NAVSHIPS 92917

Instruction Book

type

SSB-1

SINGLE-SIDEBAND

RADIO

COMMUNICATION EQUIPMENT

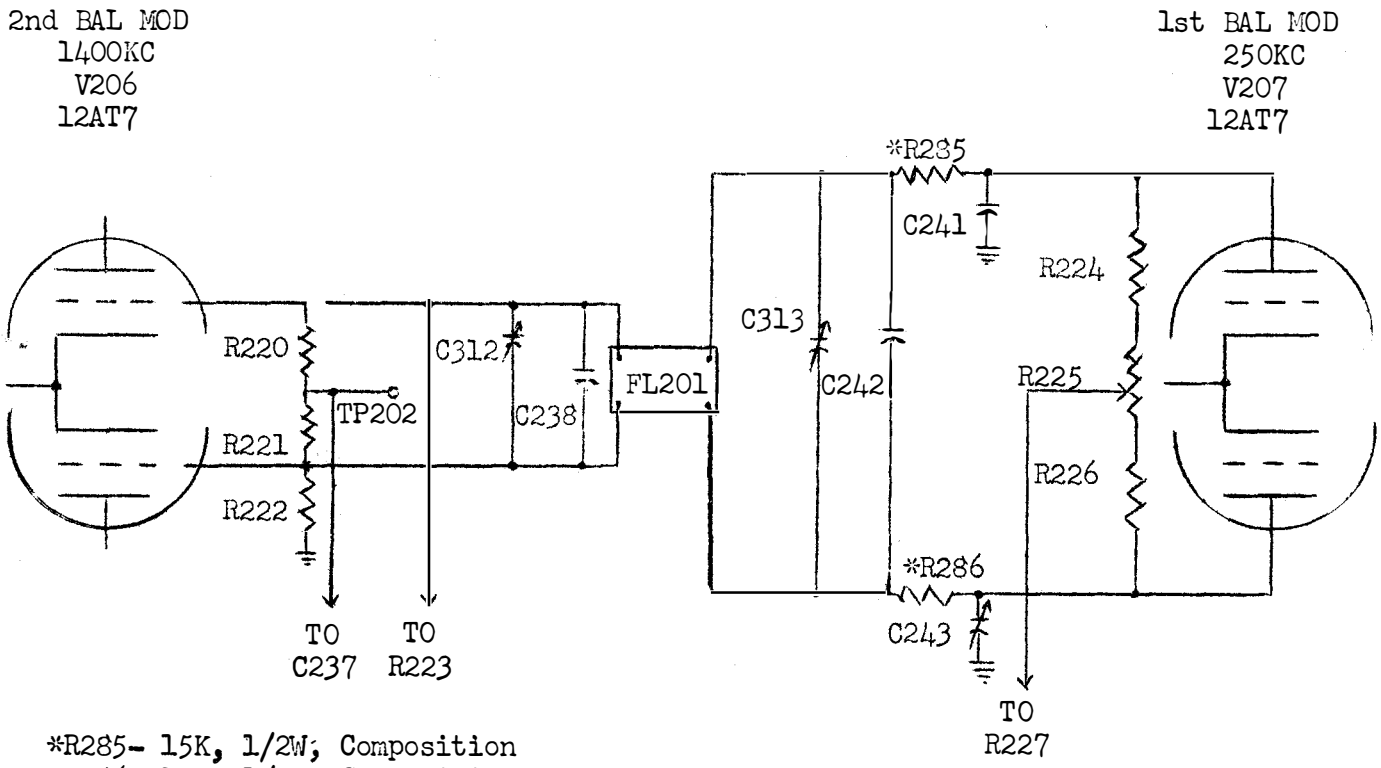
RADIO CORPORATION of AMERICA
COMMERCIAL ELECTRONIC PRODUCTS
RADIOMARINE PRODUCTS
75 VARICK STREET • NEW YORK 13, N. Y.

SINGLE SIDEBAND
RADIO COMMUNICATION EQUIPMENT

TYPE SSB-1

ADDENDUM NO. 1 October 1956

1. Resistors R285 and R286 have been relocated and their values changed on some sets with Serial Numbers 5601 and above. Refer to sketch below and Transmitter Receiver Schematic (Fig. 29B)



*R285- 15K, 1/2W, Composition
*R286- 15K, 1/2W, Composition

NAVSHIPS 92917

INSTRUCTION BOOK

SINGLE SIDEBAND
RADIO COMMUNICATION EQUIPMENT

TYPE SSB-1

Frequency Range 3,000 to 15,000 Kc

115/230 Volts

50/60 Cycles

Manufactured by

RADIO CORPORATION of AMERICA
COMMERCIAL ELECTRONIC PRODUCTS
RADIOMARINE PRODUCTS
75 VARICK STREET • NEW YORK 13, N. Y.

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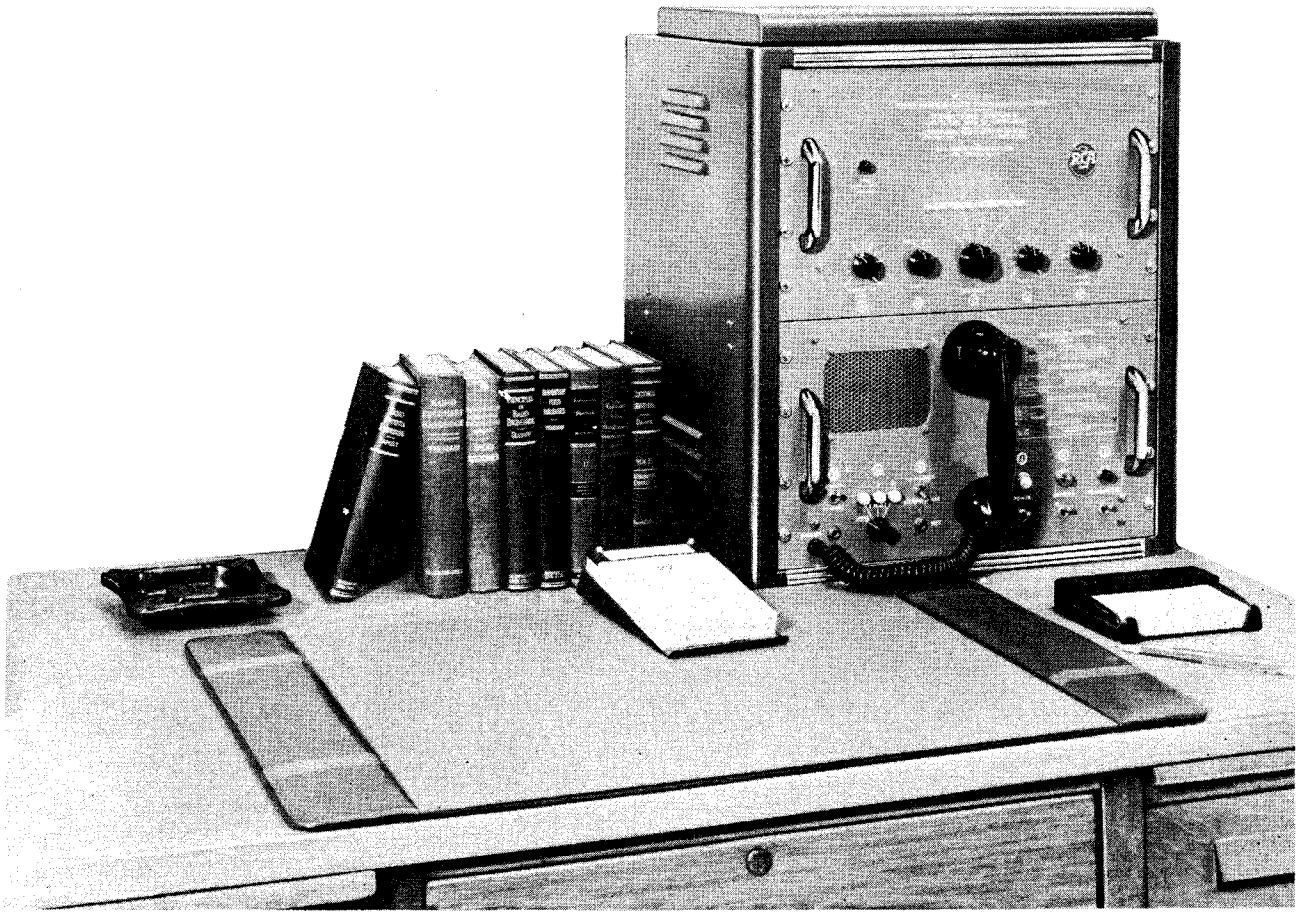

Figure 1. Desk Installation

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WARNING

ELECTRICAL OR MECHANICAL SERVICING OF THIS EQUIPMENT SHOULD BE ATTEMPTED ONLY BY QUALIFIED TECHNICAL PERSONNEL AUTHORIZED FOR SUCH WORK. OPERATION OF THIS EQUIPMENT INVOLVES THE USE OF VOLTAGES WHICH MAY BE DANGEROUS TO LIFE.

SINGLE SIDEBAND RADIO COMMUNICATION EQUIPMENT
RCA TYPE SSB-1

I

GENERAL DESCRIPTION
TECHNICAL SUMMARY

GENERAL:

CHANNELS . . . . . Four

TYPE OF OPERATION . . . . . Simplex ("Push-to-talk" telephone, or telegraph)

FREQUENCY RANGE
Channels 1 and 2 . . . . 3.0 - 6.7 Mc
Channels 3 and 4 . . . 6.7 - 15.0 Mc

ANTENNA REQUIRED . . . . . Resistance: 10-80 ohms. Capacitance: 300 uuf (min.). Single wire not to exceed 1/4 wave length at highest channel frequency.

CRYSTALS REQUIRED . . . . . 1 - 250 Kc Type CR-47/U. 1 - 1150 Kc Type CR-27/U. 4 - Type CR-27/U (one per channel).

NOTE: Channel crystals must be 1400 Kc higher in frequency than the desired operating frequency. The same crystal serves both transmitter and receiver.

EMISSION
Phone . . . . . Single Sideband Suppressed Carrier.
. . . . . Single Sideband With Carrier.
Telegraph . . A1; Single Sideband Keyed Tone.

RECEPTION . . Single Sideband Suppressed Carrier.
. . . . . Single Sideband With Carrier.
. . . . . A1; A2; A2 Keyed Tone; Single Sideband Keyed Tone; A3.

KEYING SPEED . . . 30 Words Per Minute - manual (break-in) operation,
. . . . . 60 Words Per Minute - teleprinter operation.

TRANSMITTER:

POWER OUTPUT . . . . . 60 watts

FREQUENCY STABILITY . . . . . ±0.0005 %

CLARIFIER RANGE . . . . . ±75 cps

TRANSMITTED SIDEBAND . . . . . Lower

UNWANTED SIDEBAND. . . . . .50 db SUPPRESSION

CARRIER SUPPRESSION . . . . . .50 db

HARMONIC SUPPRESSION. . . . . .56 db

AUDIO INPUT . . . . a) Single Button Carbon Microphone From Local Handset or From Up To 3 Remote Positions.
. . . . b) -6 DBM in 600 Ohm Line for Full Transmitter Output.

AUDIO FIDELITY. . . . . ±2 db, 350-3000 cps

AMOUNT OF SPEECH CLIPPING . . . .20 db

TRANSMITTED SIDEBAND DISTORTION:
Single tone, full power output, no clipping . . . . . 2.5% at 1000 cps

TWO-TONE TEST:
Distortion Products . . . . . -26 db

RECEIVER:

SENSITIVITY. . . Better than 1 microvolt for 50 milliwatts output with 6 db signal-to-noise ratio.

SELECTIVITY. . Determined by mechanical filter characteristics: 3.2 Kc nominal bandwidth for 6 db attenuation; 6.5 Kc bandwidth for 60 db attenuation.

AUDIO FIDELITY. . . . ± 2 db, 350-3000 cps

AUDIO OUTPUT. . . a) 2 watts maximum in speaker.
. . . b) With 50 mw output in loudspeaker, audio level in 600 ohm line is -7 DBM.

AUDIO DISTORTION . . . . . 2.5% (1000 cps at 50 milliwatts output)

TWO-TONE TEST:
Distortion Products . . . . . -26 db

POWER REQUIREMENTS:

LINE VOLTAGE. . . . . 115/230 volts ± 10%, 50/60 cycles single phase

POWER LOAD:

Receiver only	85 watts
Receiver and Transmitter:	
No signal, power on	210 watts
Single Sinewave Input	310 watts
Full Output	310 watts

FUSES:

1	Type 3AG	3 amp. 125V time Lag
1	Type 3AG	2 amp. 125V Time Lag
1	Type 3AG	1.5 amp. 125V Time Lag
1	Type 3AG	0.5 amp. 250V
1	Type 3AG	0.25 amp. 250V

LAMPS:

5 . . . . . neon glow lamp (omni glow) 0.04 watts

GERMANIUM DIODES:

2 . . . . . RCA Type 1N34A

TUBES:

Transmitter-Receiver

V-201	RCA-6146	Power Amplifier
V-202	RCA-6146	Power Amplifier
V-203	RCA-6BA6	Modulation Indicator Amplifier
V-204	RCA-6CL6	Intermediate Power Amplifier
V-205	RCA-12AT7	3rd Balanced Modulator
V-206	RCA-12AT7	2nd Balanced Modulator
V-207	RCA-12AT7	1st Balanced Modulator
V-208	RCA-6CL6	4.4mc-16.4mc Crystal Oscillator
V-209	RCA-6BE6	1150Kc Crystal Oscillator
V-210	RCA-6BE6	250 Kc Crystal Oscillator
V-211	RCA-6BA6	RF Amplifier
V-212	RCA-6BE6	1st Mixer
V-213	RCA-6BE6	2nd Mixer
V-214	RCA-6BA6	1st IF Amplifier
V-215	RCA-6BA6	2nd IF Amplifier
V-216	RCA-12AT7	Demodulator/1st AF Amplifier

Power Supply

V-101	RCA-5R4GY	+600V Full Wave Rectifier
V-102	RCA-5R4GY	+600V Full Wave Rectifier
V-103	RCA-5R4GY	+200V Full Wave Rectifier
V-104	RCA-0A3/VR-75	-75V Bias Regulator
V-105	RCA-0D3/VR-150	+150V Regulator
V-106	RCA-12AT7	Tone Oscillator/Mike Amplifier
V-107	RCA-12AT7	Cathode Follower/AF Amplifier
V-108	RCA-6AQ5	Receiver AF Output

Speech Clipper

V-401	RCA-6U8	AF Amplifier/Cathode Follower
V-402	RCA-6AL5	Diode Clipper

1. INTRODUCTION.

The Type SSB-1 Communication Equipment is a single-sideband, low-power, suppressed carrier system designed for simplex telephone or telegraph operation. It may also be operated as a single-sideband-with-carrier equipment to make it compatible with existing amplitude modulated (AM) systems. The SSB-1 covers the frequency range of 3 to 15 Mc, with the actual operating frequency selected from one of four pre-tuned channels. The peak envelope power output of the transmitter is nominally 60 watts.

2. BASIC PRINCIPLES.

In a conventional amplitude-modulated (AM) system, the radiated signal includes a carrier, an upper sideband and a lower sideband. All the intelligence is contained in the sidebands; none is contained in the carrier. Therefore, there is no need to transmit the carrier if it can be inserted at the receiving end. Furthermore, since both sidebands contain identical and complete information, only one need be transmitted.

In a standard AM system modulated 100% with a sine wave, 66% of the radiated power is in the carrier and 17% is in each of the sidebands. The SSB-1 eliminates the carrier and one sideband from the transmitted signal, thus operating at the same intelligence power level with a possible saving of 83% of the total radiated power as compared with the standard AM transmitter.

3. ADVANTAGES OF SINGLE-SIDEBAND, SUPPRESSED CARRIER COMMUNICATION.

a. The SSB-1 uses a total frequency band of approximately 2.8 Kc as opposed to an equivalent AM system which uses a frequency band of about 6Kc. Figure 2 illustrates the frequency spread of each system.

b. The SSB-1 transmits intelligence at a much higher level than that transmitted by an AM system of equivalent power. Figure 2 illustrates the relative power levels of the radiated intelligence of both systems.

c. The SSB-1 is much smaller than comparable AM equipment since less power is required.

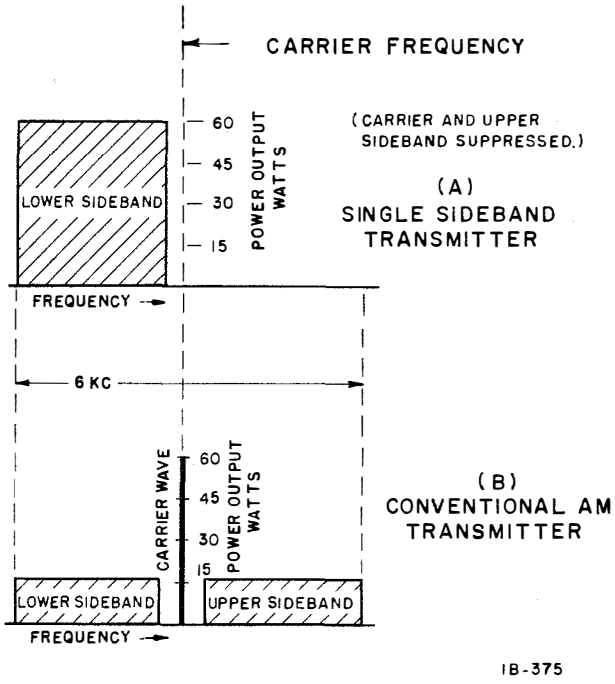


Figure 2. Comparative Frequency and Power of Type SSB-1 and Equivalent AM System

d. The SSB-1 signal is subject to less distortion, noise and interference than AM signals since the frequency bandpass is narrower.

e. The SSB-1 affords a degree of privacy since home-type short-wave receivers do not respond to single sideband emissions.

4. SYSTEM APPLICATION.

The SSB-1 may be used in any of the following types of radio communication systems:

a. Simplex telephone system.
b. Telegraph or teleprinter system.
c. Duplex telephone system.
d. Compatible operation with AM system.

See Section IV for a discussion of the various modes of operation.

5. PHYSICAL DESCRIPTION.

The SSB-1 consists of a transmitter-receiver chassis and a power supply chassis mounted within a single cabinet. The overall dimensions are 24-1/8 inches high, 22-3/8 inches wide, and 16-3/8 inches deep. The weight is approximately 150 pounds. By

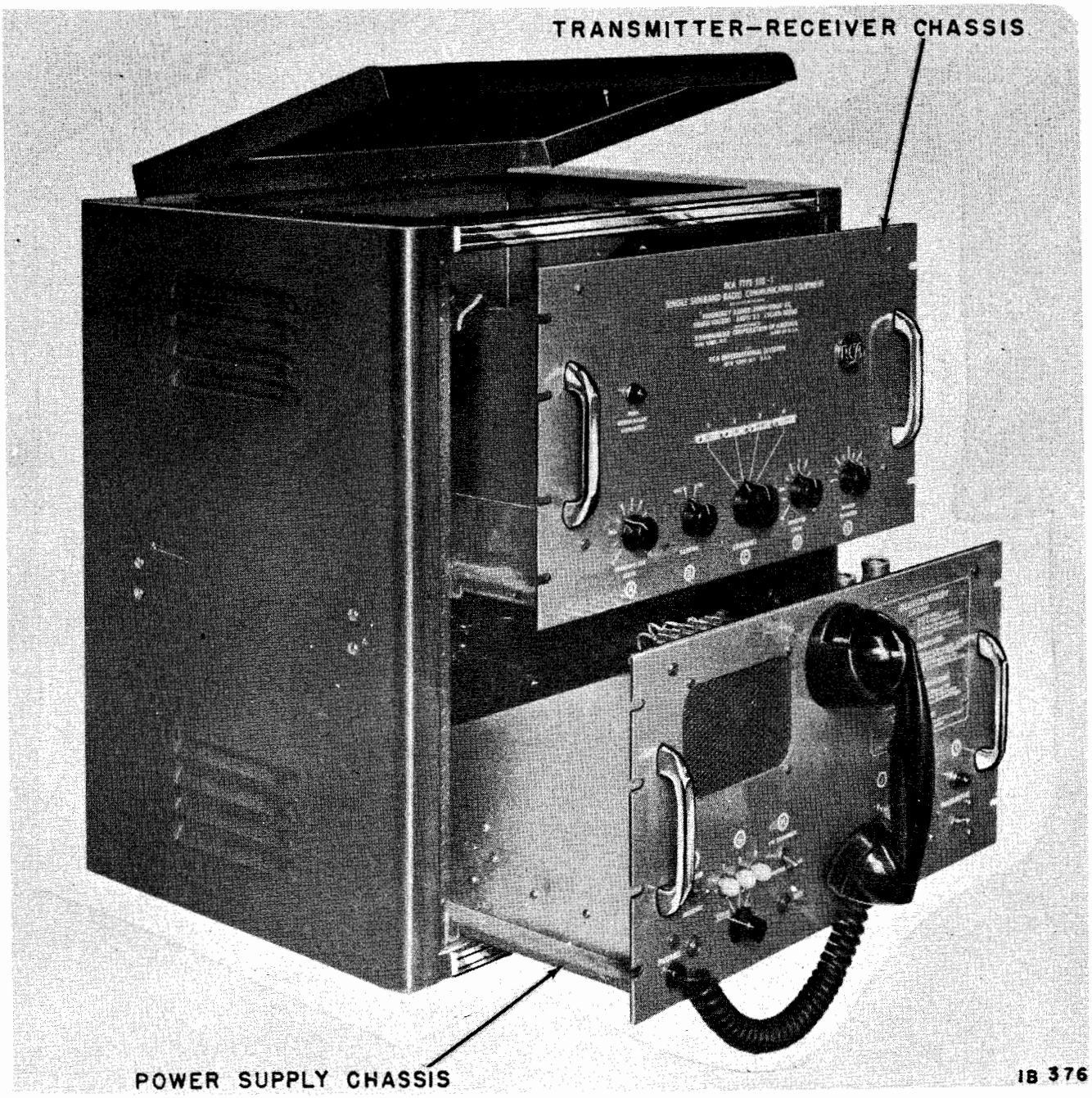


Figure 3. Cabinet Top Raised and Chassis Withdrawn

raising the top of the cabinet, opening the rear cabinet door and withdrawing the chassis, all components are made readily accessible for field maintenance procedures (figure 3).

The speech clipper (figure 4) is supplied as standard equipment. During transmission, the speech clipper limits high-level audio signals, thus permitting a higher average transmitted speech power.

One to three remote telephone-type desk sets may be used as accessories. These are supplied as covered by the order.

6. ELECTRICAL LAYOUT.

All circuitry is contained on the two chassis. The lower (power supply) chassis includes all power supply circuits, control circuits, the speech clipper, and all audio circuits except the receiver first audio amplifier. The upper (transmitter-receiver) chassis contains all the r-f circuits plus the receiver first audio amplifier stage.

The equipment operates from either a 115 volt or a 230 volt, 50 to 60 cycle single phase power source and requires approximately 310 watts for full power output. The remote desk sets (when used) are connected by a six-wire cable to terminals accessible through the back of the cabinet.

Antenna materials, power cable and remote connection cables are not supplied with the equipment.

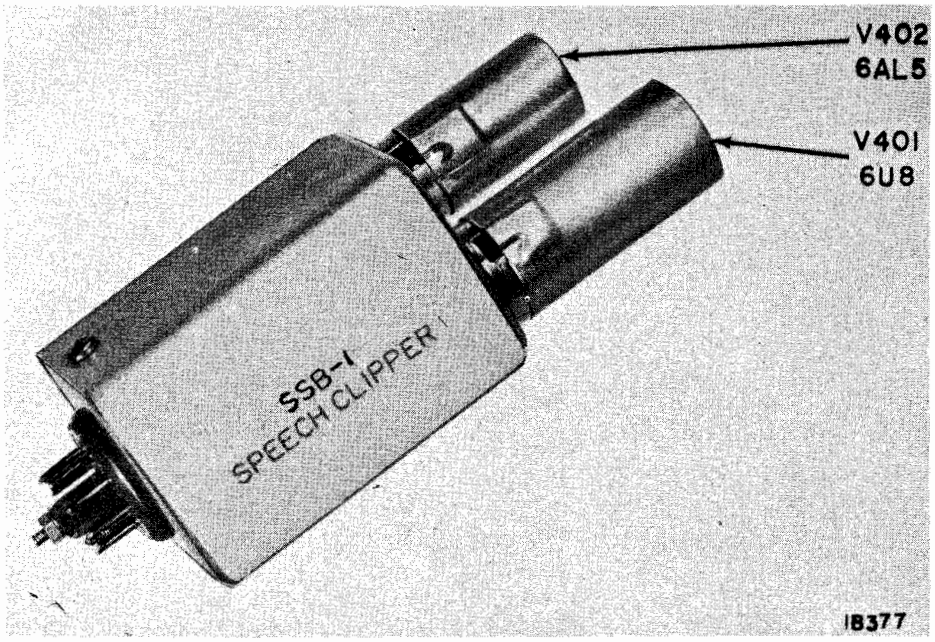


Figure 4. Speech Clipper

II

CIRCUIT ARRANGEMENT

1. GENERAL.

When a single-sideband signal is generated at a low frequency, frequency multiplying circuits cannot be used to raise the signal to the desired frequency of transmission; they would not preserve the original modulation. Heterodyning, or frequency mixing, methods are used instead.

When two frequencies are mixed together, the resultant output contains a frequency component which is the sum of the original two frequencies (upper sideband) and a component which is the difference of the original two frequencies (lower sideband). Either the sum or the difference component can be extracted from the composite signal by using suitable filters.

The SSB-1 uses three crystal oscillators to heterodyne the original modulating signal up to the transmitter output frequency. The same three oscillators operate with the receiving circuits to heterodyne the received r-f down to the original modulating signal. By the use of conventional balanced modulators in the heterodyning process, the crystal oscillator frequencies, and hence, the carrier frequency also, are suppressed.

2. SUPPRESSED CARRIER TRANSMISSION.

The intelligence to be transmitted may be either a voice or telegraph signal. A voice signal would be applied from the microphone to the microphone amplifier; a telegraph signal is applied by keying the tone oscillator which feeds the microphone amplifier.

In the discussion which follows, it will be assumed that the modulating signal is a 1 kc tone from the tone oscillator, with the understanding that the discussion is equally valid for a voice signal. Refer to the block diagram, figure 5.

a. The tone oscillator, V106A, (one half of a type 12AT7 dual triode) is a phase-shift oscillator operating at 1000 cps. One contact of keying relay K101, in the cathode circuit of V106A, keys the oscillator. When K101 is energized by pressing the telegraph key, another contact of the relay energizes the transmit-receive relay, K201, which connects the antenna to the transmitter. Relay K201 is held energized (transmit position) by a resistance-capacitance delay circuit bridging the "key-off" time as long as normal keying is continued. This keying system provides "break-in" type switching between receiver and transmitter on telegraph operation, and thus requires no manual switching.

b. Audio output from the keyed tone oscillator or voice current from the microphone of handset HS101 (with "push-to-talk" button depressed) is fed to the microphone amplifier which consists of two stages, an AF voltage amplifier, V106B, (one half of a 12AT7 dual triode) and a cathode follower, V107A, (also one half of a 12AT7 tube).

c. Assume that a 1 kc test tone is applied either through the microphone of handset HS101 or by the tone oscillator through the microphone amplifier to the speech clipper. The speech clipper is a plug-in unit consisting of an AF amplifier, V401A, (the pentode section of a 6U8 triode-pentode) a clipper tube, V402, (a 6AL5 dual-diode) and a cathode follower, V401B, (the triode section of the 6U8). The speech clipper limits the peaks of a varying amplitude voice signal so that the average intelligence signal level can be kept high. When a tone is applied the speech clipper functions only as a buffer amplifier.

d. The 1 kc tone is applied to the grids of V 207A and V 207B (a 12AT7 dual-triode), the first balanced modulator stage in opposite phase through AF transformer T202 (figure 29) and TRANSMITTER GAIN control R233 (a dual potentiometer with sections in series and center grounded). At the same time a 250 kc signal is fed from crystal oscillator V210 to both V207 grids in phase. These phase relationships result in the 250 kc signal cancelling out in the series-connected output of the circuit and the generation of the sum and difference frequencies, 251 kc and 249 kc. Potentiometer

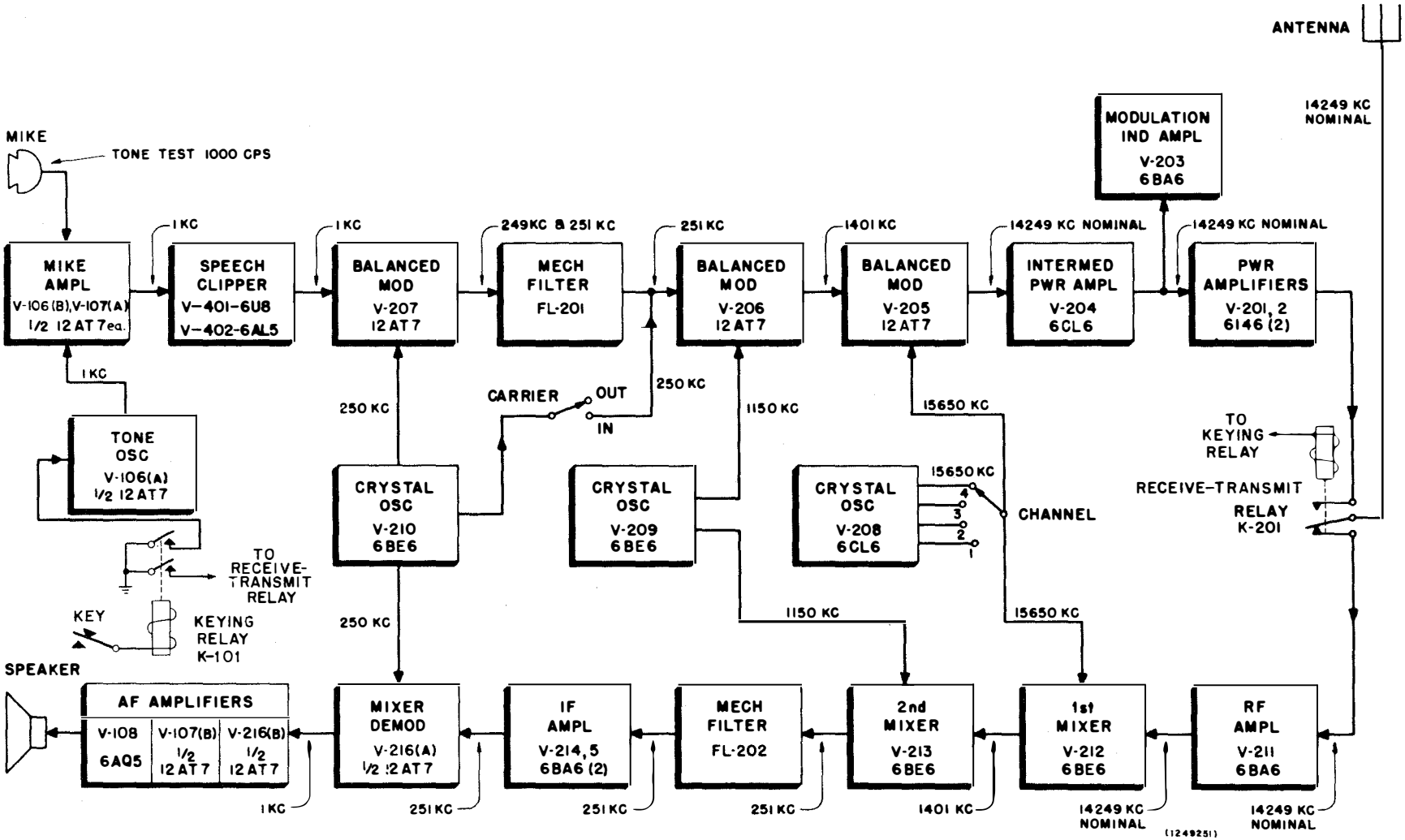


Figure 5. Block Diagram

R225 and trimmer capacitor C243 are adjusted to balance the output circuit of V207 to achieve a high order of cancellation of the 250 kc signal.

e. The resultant 249 and 251 kc signals are applied to a mechanical filter FL201 which operates on the magnetostriction principle. Its response is characterized by a nearly flat top and a sharp drop-off on both sides of the pass band. FL201 resonates with the upper sideband using 250 kc carrier and 3.2 kc nominal bandwidth at 6 db down. It thus passes the 251 kc signal but eliminates the 249 kc signal. The single sideband suppressed carrier signal is present here for the first time: the succeeding stages are merely to heterodyne it to the desired output frequency and amplify it to the desired power level.

f. The 251 kc signal (upper sideband) is then applied in opposite phase to the grids of the 2nd balanced modulator, V206, (another 12AT7 dual-triode) along with the application, in parallel, of an 1150 kc signal from crystal oscillator V209. This second balanced modulator operates in a manner similar to the first one, eliminating the 1150 kc and generating sum and difference frequencies of 1401 kc and 899 kc. These two frequencies are applied to tuned rf transformer T201 which passes the 1401 kc signal but eliminates the 899 kc. Output circuit balance is achieved by the use of R215 and C234.

g. The 1401 kc (upper sideband) signal is then applied to the 3rd balanced modulator, V205 (another 12AT7) along with the output of crystal oscillator V208, the frequency of which depends upon the channel crystal selected. Assume that the highest frequency channel is being used and that its crystal produces an output of 15,650 kc (for a nominal carrier frequency of 14250 kc). The 1401 kc and 15,650 kc signals, mixed in the balanced modulator, produce sideband frequencies of 17,051 and 14,249 kc, the 15,650 kc signal being balanced out in the same manner as explained for the previous balanced modulators. Pretuned inductance and capacitance circuits, selected by sections of the CHANNEL switch, S201, pass the lower sideband signal, 14,249 kc, but eliminate the 17,051 kc.

h. The single-sideband signal (14,249 kc) is then fed through the intermediate power amplifier and power amplifier stages at output frequency. The IPA stage, V204, uses a 6CL6 pentode in a conventional Class A power amplifier circuit having a pretuned inductance-capacitance network in the plate circuit as selected by sections of the CHANNEL switch, S201. The signal is then applied to the grids of the power amplifiers, V201 and V202, (type 6146 tetrodes in parallel) in a Class AB_1 linear-amplifier circuit. The plate circuit of the paralleled power amplifiers is inductance-capacitance pretuned to the output frequency using tapped coil L202 and variable capacitors as selected by the CHANNEL switch, S201. The output signal is fed through a contact of the antenna transfer relay, K201, and antenna loading coil L201 to the antenna terminal, E204.

i. The modulator indicator amplifier V203, (a 6BA6 pentode operating off the grid circuit of the power amplifiers) with PEAK MODULATION INDICATOR DS201 lamp in its plate circuit, gives a flash indication on the lamp when the plate current of V203 increases due to modulation peaks. This occurs just below the point where the power amplifier grids go positive. Necessary adjustment is made using TRANSMITTER GAIN control R233 (see paragraph d above).

j. CRYSTAL OSCILLATORS.

The three crystal oscillators, 250 kc, 1150 kc and the four-channel oscillator, are of the electron-coupled type with crystals connected between screen and grid, output being taken from the plate circuit. Each oscillator supplies mixing frequency for both the transmitter balanced modulator and the receiver mixer stages. Crystals are mounted in dual crystal ovens of the plug-in type. The oven heaters are fed 6.3 v ac from transformer T104.

The 250 kc oscillator, V210, uses a 6BE6 pentagrid tube and the 250 kc crystal, Y206, is mounted in oven E203.

The 1150 kc oscillator, V209, also uses a 6BE6 pentagrid tube and the 1150 kc crystal (Y205) is also mounted in oven E203. SPEECH CLARIFIER capacitor C268 varies the oscillator frequency over a small range so the operator may bring the frequency exactly to that of the station he is working.

The channel frequency oscillator (V208) uses a 6CL6 power pentode and any one of four crystals (Y201 to Y204) as selected by CHANNEL selector S201. Diodes CR201 and CR202 keep the output voltage of V208 at a

constant amplitude over the entire frequency range.

3. TRANSMISSION WITH CARRIER.

When it is desired to radiate the carrier as well as one sideband, the CARRIER switch, S202, is turned to IN. This reinserts the 250 kc carrier signal after filter FL201 at the input of the 2nd balanced modulator, V206, along with the 251 kc sideband signal passed by the filter. (See figure 5.) Both these signals are then heterodyned up to the final output frequency, maintaining the frequency difference between carrier and sideband the same as in the original signal. Again assume an output of 15,650 kc from the channel crystal oscillator (V208). The radiated signal would then be composed of a 14,250 kc carrier and the lower sideband (14,249 kc) produced by the 1 kc tone. This composite signal can be detected by any standard AM receiver which can be tuned to this frequency.

4. RECEPTION.

a. The operation of the receiving section is essentially the reverse of the transmitter operation. Again assume that the intelligence signal is a 1 kc tone and that the frequency of the crystal oscillator V208 is 15,650 kc. The frequency of the received single-sideband signal would therefore be 14,249 kc (15,650 kc minus 1400 kc minus 1 kc), the same as for the transmitter as explained in paragraph 2, above.

b. The signal (14,249 kc) from the antenna is fed through a contact of antenna-transfer relay K201 and the tuned rf transformer, as selected by CHANNEL switch S201 for the proper channel, to the rf amplifier (V211, a 6BA6 pentode) where it is amplified and fed to the first mixer, through the proper rf transformer selected by the CHANNEL switch. RECEIVER GAIN control R271 controls the bias on this tube and on the first i.f. amplifier tube, thus controlling the gain of the receiver.

c. In the first mixer (V212, a 6BE6 pentagrid converter), the single-sideband signal (14,249 kc) is mixed with the channel crystal frequency (15,650 kc) from crystal oscillator V208 with the CHANNEL switch (S201) selecting the proper crystal. The output of V212 thus contains the sum and difference frequency components (29,899 kc and 1401 kc respectively). RF interstage transformer T203, peaked at 1400 kc, passes the 1401 kc but rejects the 29,899 kc signal.

d. The resultant signal (1401 kc) is fed into the second mixer (V213, another 6BE6 converter) where it is mixed with the 1150kc output of crystal oscillator V209 to produce sum and difference frequencies (2551 kc and 251 kc). The resultant signals are fed to mechanical filter FL202, peaked for the upper sideband and identical to FL201 used in the transmitter. The difference frequency (251 kc) is passed but the sum frequency (2551 kc) is attenuated by the filter.

e. The single-sideband signal (251 kc) is then amplified in two stages of conventional i.f. amplification using two 6BA6 pentodes (V214 and V215). I.f. interstage transformers T204 and T205 are of the double-tuned, adjustable-core type. The primary of T204 and the primary and secondary of T205 are peaked at 250 kc. The secondary of T204 is used as a resonant wave trap tuned to approximately 235 kc to reduce a characteristic spurious response of the mechanical filter.

f. The output signal (251 kc) from T205 is fed to the grid of the mixer-demodulator tube (V216A, one half of a 12AT7 twin-triode) along with 250 kc output from the crystal oscillator (V210). Mixing of the two frequencies in the plate circuit of V216A produces sum and difference frequencies (501 kc and 1 kc respectively). The output circuit of the mixer-demodulator bypasses the higher frequencies to ground through a comparatively large capacitor. Thus the sum frequency (501 kc) is bypassed to ground and the difference frequency remains. This difference frequency (1 kc in this case) represents the original intelligence signal (test tone).

g. The intelligence signal (1 kc) is then fed through two stages of triode audio voltage amplification in V216B, (the second half of a 12AT7) and V107B, (the second half of another 12AT7).

h. The final AF amplifier stage V108 (a 6AQ5 beam power pentode) supplies audio output through transformer T106 to handset HS101 and speaker LS101 when the SPEAKER-HANDSET switch (S101) is in SPEAKER position. A telephone headset may also be plugged into PHONES jack J104 for monitoring

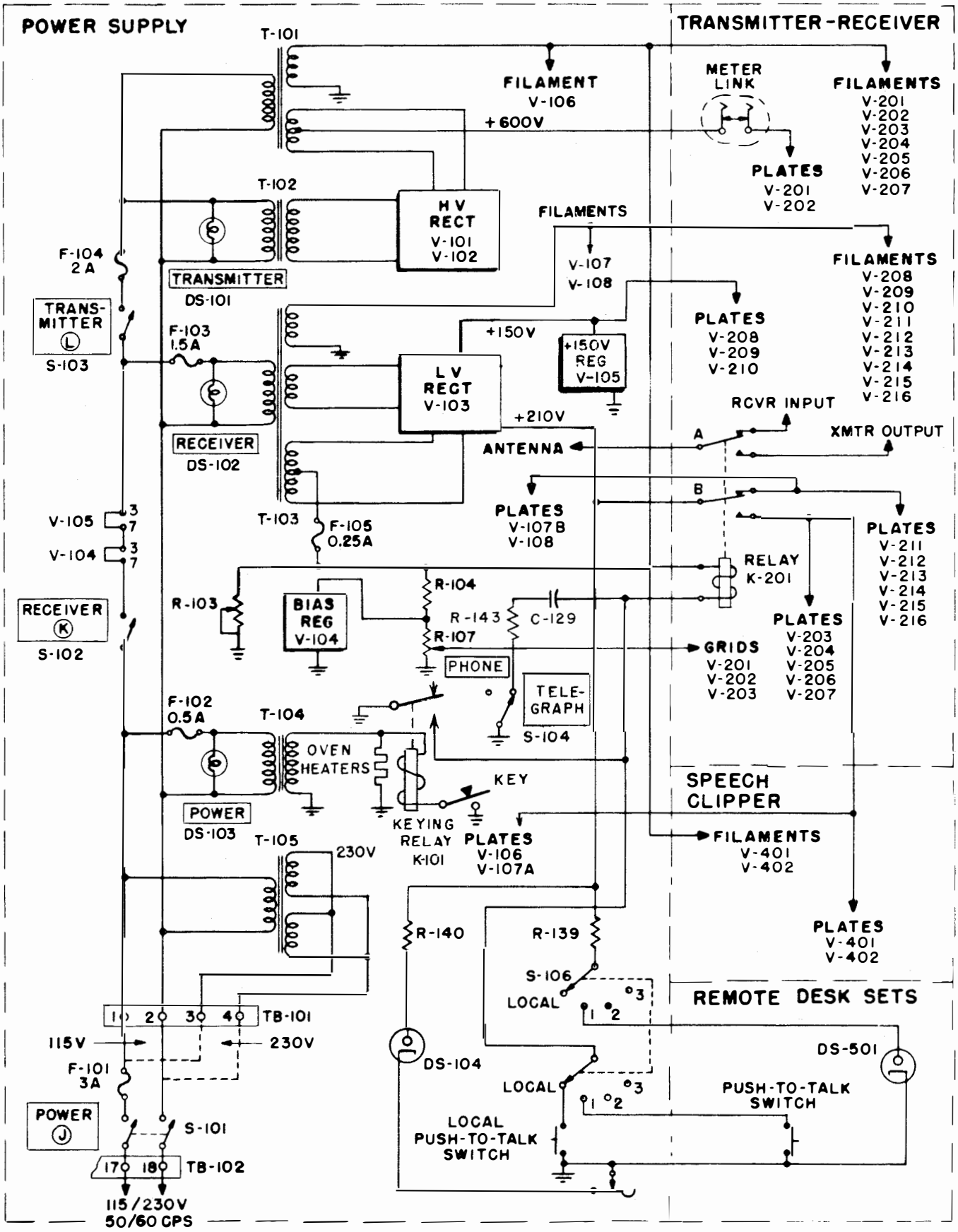


Figure 6. Power and Control Circuits

purposes. The LOCAL-REMOTE switch gives selection of either the local handset or any one of up to three remote desk sets.

5. POWER AND CONTROL CIRCUITS.

a. When the input power is at 230 volts, it is applied through step-down transformer T105. 115 volts is applied directly to the power supply circuit without the use of T105. Refer to figure 6.

b. Turning POWER switch, S101, on energizes transformer T104 which applies power to the crystal oven heaters and keying relay K101 (when key is depressed), makes power available at RECEIVER switch S102 and lights the POWER indicator DS103.

c. Turning RECEIVER switch, S102, on energizes transformer T103, makes power available at TRANSMITTER switch S103, and lights RECEIVER indicator DS102. One secondary winding of T103 furnishes filament power for the three crystal oscillators and all of the receiver tubes. Another secondary furnishes filament power for the Low-Voltage Rectifier tube V103. The third secondary of T103 is center-tapped and furnishes plate power to the 5R4GY full-wave LV rectifier tube V103 which supplies filtered dc at +210 volts for receiver and transmitter tube plates (low level stages) and +150 volts to the crystal oscillator plates. The +150 volt supply is regulated by V105 (an OD3/VR-150). The +210 volt supply is switched between transmitter and receiver by contacts of antenna transfer relay K201. The bias supply is obtained from a tap-off on the LV rectifier using regulator tube V104 (an OA3/VR-75) and is adjustable by BIAS ADJ potentiometer R107. The bias voltage is applied to the grids of V101, V102 and V103. The negative voltage is also used to operate the antenna transfer relay (K201).

d. Turning TRANSMITTER switch, S103, on energizes transformers T101 and T102 and lights the TRANSMITTER lamp DS101. T101 supplies filament power for all the transmitter tubes T102 supplies plate voltage for the HV rectifiers V101 and V102 (type 5R4GY), connected in a full-wave center tap circuit with plates in parallel to supply +600 volts dc through a single-section choke input filter to the plates of power amplifiers V101 and V102.

e. The connections to the switches are such that when the POWER switch is off the entire equipment is de-energized, regardless of the positions of the other switches. When the RECEIVER switch is off, the transmitter circuits are also de-energized, regardless of the position of the TRANSMITTER switch. Also, jumpers inside voltage regulator tubes V104 and V105 are connected in series with the RECEIVER and TRANSMITTER switches so that if either tube is removed from its socket, no power can be applied to any circuit except the oven heaters.

f. When antenna transfer relay K201 is de-energized its contacts connect the antenna to the receiver input and plate voltage to the receiver tubes. When it is energized its contacts connect the transmitter output to the antenna and plate voltage to the transmitter tubes. Energizing the relay is accomplished by operating the push-to-talk switch on the handset or desk set or by setting switch S104 to the TELEGRAPH position and operating a telegraph key inserted in the KEY jack, J103.

g. LOCAL-REMOTE switch S106 selects the local handset or any one of the remote desk sets. It switches the microphone circuit, the received audio signal, the push-to-talk control circuit, and (for the remote desk sets) the power for the indicator lamp which denotes the selected remote station.

III

INSTALLATION

1. LOCATION AND MOUNTING.

The Type SSB-1 communication equipment may be mounted on a desk or a table top, (figure 1) or at any site affording a mounting area of 22-3/8 in. wide by 18-3/4 in. deep. A minimum clearance of 12-1/2 inches is required at the top of the cabinet to permit the raising of the cabinet top panel; a minimum clearance of 6 inches is required at the rear of the cabinet to permit antenna and ground connections or 19-3/4 inches if the rear door is to be opened without moving the equipment. Figure 7 shows the outline dimensions of the equipment.

2. ANTENNA.

Satisfactory operation is largely dependent on the proper choice and erection of an antenna. A single-wire end-fed antenna that does not exceed 1/4 wave length at the highest channel frequency should be used. The length is measured from the antenna binding post, accessible through the rear door of the cabinet, to the far end of the wire and includes the lead-in wire to the antenna. The following chart and figure 23 show the length of antenna required at an installation for the highest transmitted frequency used.

Highest Transmitted Frequency (megacycles)	Length of Antenna (feet)
3	78.0
4	58.5
5	46.8
6	39.0
7	33.4
8	29.3
9	26.0
10	23.4
11	21.3
12	19.5
13	18.0
14	16.7
15	15.6

As an example: for 14,250 kc carrier the length of antenna would be approximately 16.4 feet. If difficulty is experienced in loading the antenna on the highest frequency channel, the antenna should be shortened slightly 1 or 2 feet at a time, until proper loading is obtained.

3. GROUND CONNECTION.

The SSB-1 should be grounded with as heavy a ground strap as possible. Connect the strap from the ground terminal at the rear of the transmitter-receiver chassis to a water pipe or any other good ground connection. Use as short a strap as possible. Too long a strap may require a shortening of the antenna to make it resonate on all channels.

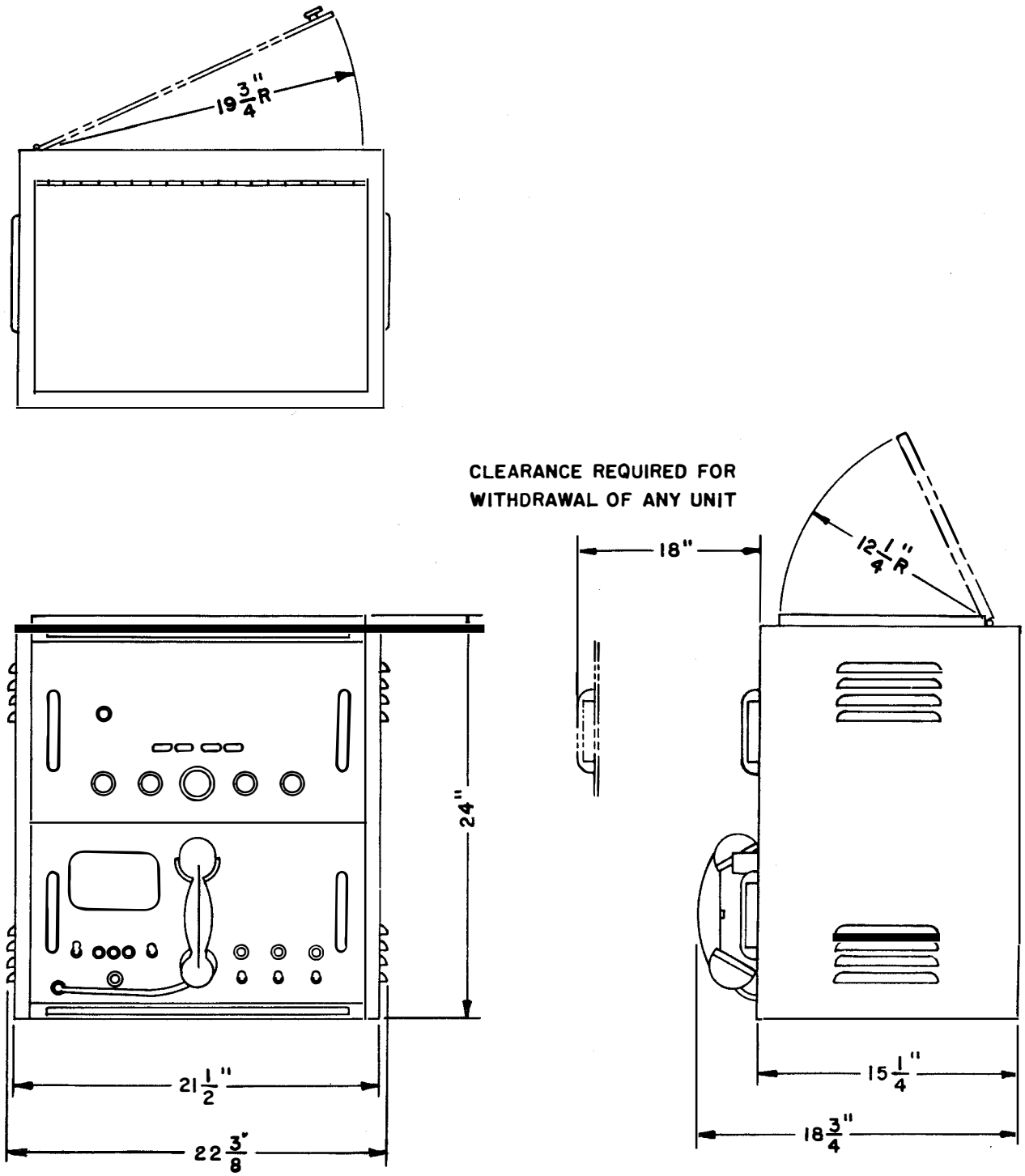
4. POWER SOURCE.

Primary power for the SSB-1 may be either 115v or 230v ac, single phase, 50 to 60 cycles. Internal connections at TB101, located on the bottom side of the power supply chassis, must be checked to ensure proper transformer connections for the power source employed. Use rubber covered two-conductor cable, No. 14 AWG or larger. Connections are listed below and shown in figure 28.

Power Source	Line Connections at Terminal Board TB101
115v ac, 50/60 cps	Terminals 1 and 2
230v ac, 50/60 cps	Terminals 3 and 4

5. REMOTE TELEPHONE CONNECTIONS.

Connections for up to three remote telephones are provided at terminal board TB 103 on the power supply chassis. Connect



WEIGHT – 149LBS

Figure 7. Outline Dimensions

each remote telephone terminal board TB-501 to terminal board TB103, mating terminals bearing identical numbers. These connections are shown in figure 28. For connection of each remote desk set use a 6 conductor shielded cable, No. 24 AWG for up to 300 feet, or larger for greater distances.

6. TUBES.

Refer to figure 15 for the location of all tubes, and to the Technical Summary in Section I which lists the tube complement of both chassis. Make certain that each tube is firmly seated in its socket, with the tube shields in place.

7. CRYSTALS.

The equipment uses two crystals for the fixed frequency oscillators and one to four crystals for the "channel frequency" oscillator. The 250 kc crystal (Y206, Type CR-47/U) and the 1150 kc crystal (Y205, Type CR-27/U) are supplied with the equipment and mounted in crystal oven E203. The channel frequency crystals (Y201 to Y204, Type CR-27/U) are not furnished with the equipment unless covered by special order.

When ordering or installing channel frequency crystals the correct crystal frequency is determined as follows: Add 1400 kc to the desired nominal carrier frequency. Thus, if the nominal carrier frequency desired is 14,250 kc the channel crystal frequency is determined by adding 14,250 kc and 1400 kc which equals 15,650 kc.

NOTE: The audio frequency of the modulation or tone frequency is not involved in determining the crystal frequency: only the carrier or assigned channel frequency is used.

Figure 9 shows the location of the crystal ovens and crystals on the chassis. The rear oven, E202, contains crystals for channels 1 and 2 (Y204 and Y203) in the frequency range of 4400 kc to 8100 kc. The front oven, E201, contains the crystals for channels 3 and 4 (Y202 and Y201) in the frequency range of 8100 kc to 16,400 kc.

NOTE: For convenience in operation, crystals should be placed in order of frequency ascension from the rear to the front of the chassis: i.e., the lowest in channel 1 position, the next higher in channel 2, etcetera.

Install channel crystals as follows:

a. Withdraw the crystal oven from its socket (E201 for channel 4 for 15,650 kc, as an example).

b. Loosen the screws securing the oven cover to the oven base, and remove the cover.

c. Insert channel crystal in proper socket (front position no. 2 in E201 for the 15,650 kc).

d. Replace the oven cover and mark the appropriate crystal frequency on the top of the cover. Reinsert the oven into its socket.

e. Install crystals for other channels, as required, in a similar manner.

f. At the front panel of the equipment, above the CHANNEL selector, write the nominal carrier frequencies of the channels (crystal frequencies minus 1400 kc) in the blanks provided below the corresponding channel numbers.

8. TRANSMITTER CHANNEL ALIGNMENT.

All components mentioned in the following procedures may be located by referring to figure 8.

CAUTION: HIGH VOLTAGES ARE PRESENT IN THIS EQUIPMENT. EXERCISE CAUTION WHEN PERFORMING THE ALIGNMENT PROCEDURES. BEFORE APPLYING POWER, MAKE CERTAIN THAT THE EQUIPMENT HAS BEEN PROPERLY GROUNDED.

a. Place a dc milliammeter (0-250 ma) into the METER LINK observing proper meter polarity, as indicated.

b. Set CHANNEL FREQ OSC TRIMMERS 1 (C-251), 2 (C-250), 3 (C-249), and 4 (C-248) midway between their fully clockwise and counterclockwise limits (screwdriver slots parallel to front panel as shown in figure 8).

c. From a fully counterclockwise position, rotate IPA PLATE TANK COIL SLUG 1 (L-208) the number of turns required to tune to the desired output frequency of channel 1. The number of required turns relative to the desired frequency is given below and is shown graphically in figure 24.

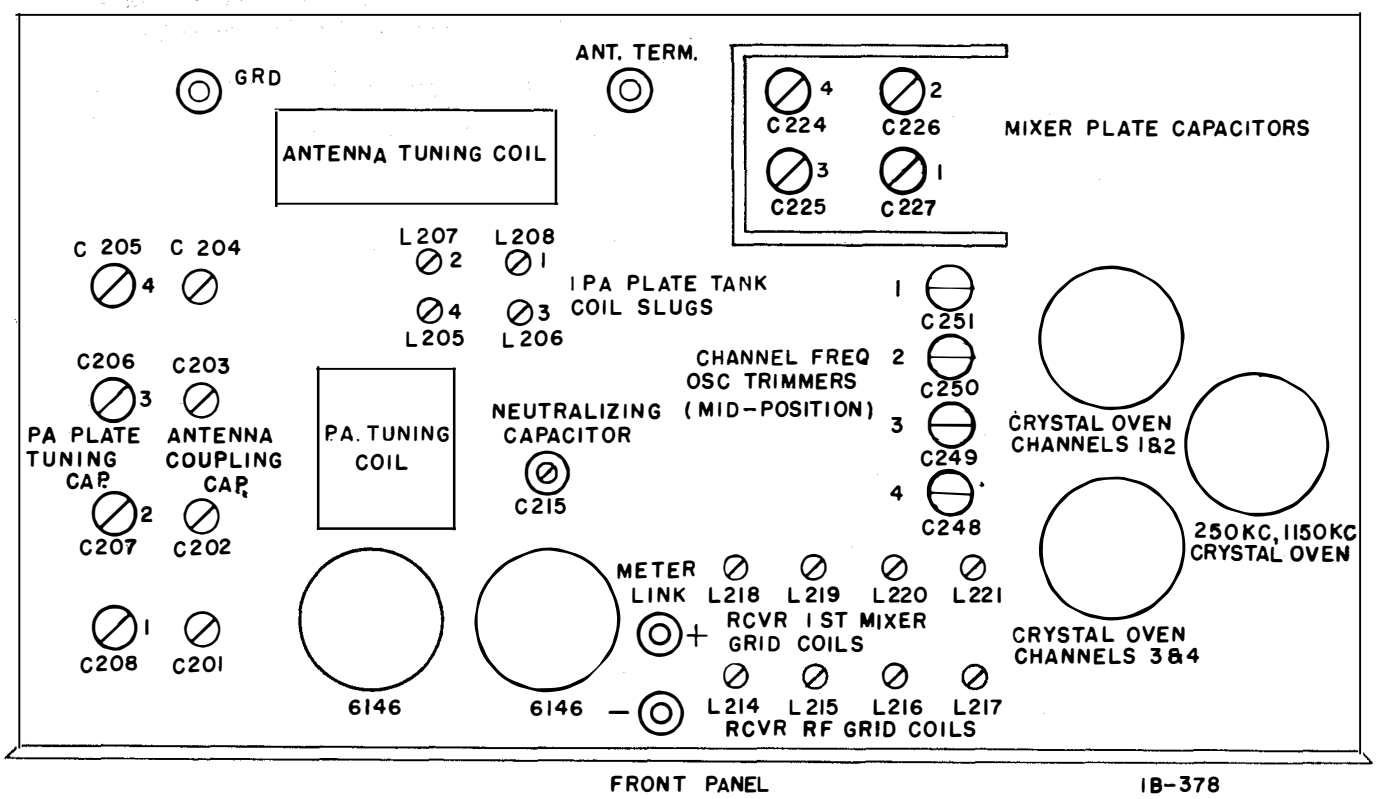


Figure 8. Location of Channel Alignment Components on Transmitter-Receiver Chassis

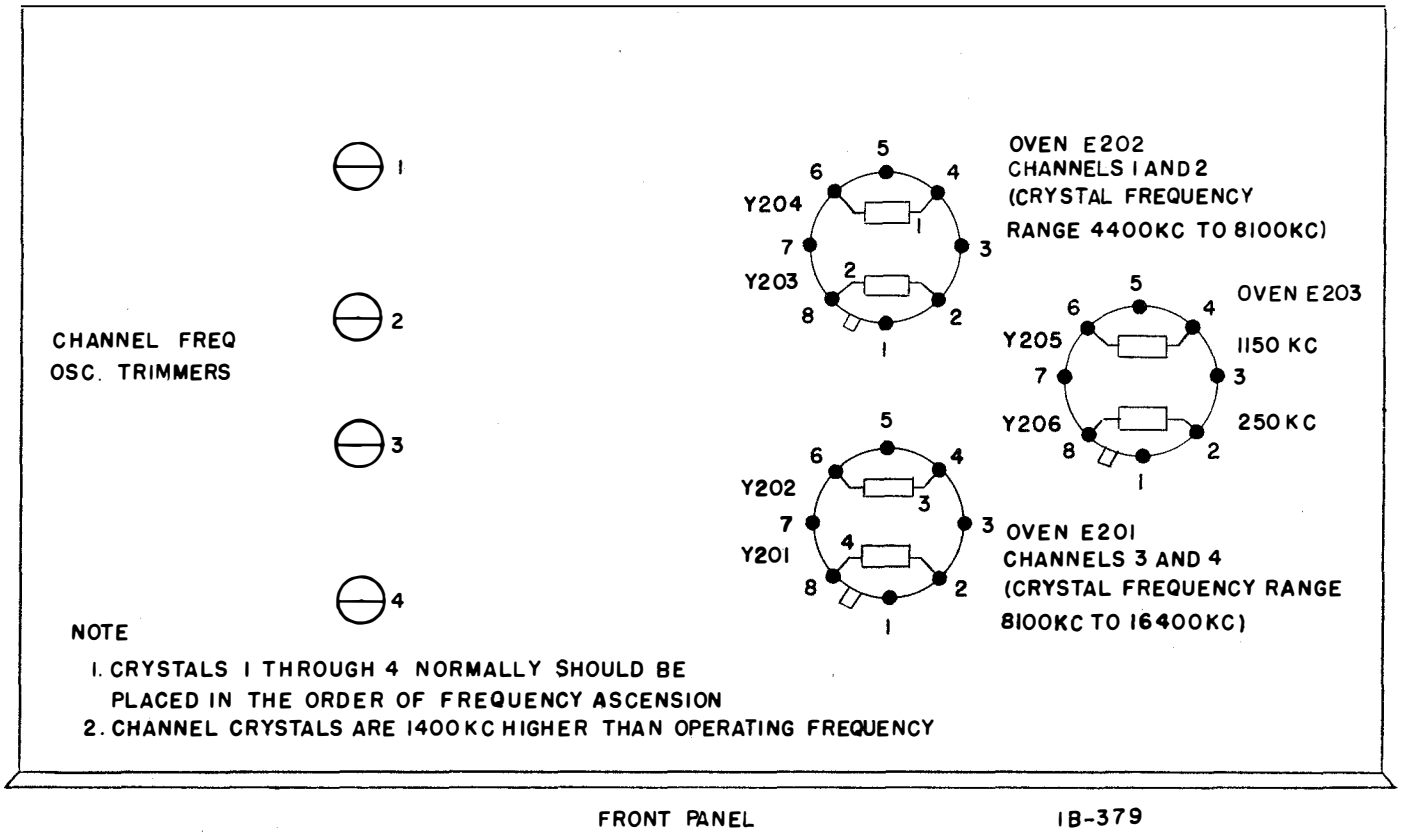


Figure 9. Crystal Ovens, Top View, Cover Removed

APPROXIMATE SLUG POSITION OF IPA PLATE TANK COILS

Frequency	Number of Turns From Minimum Inductance	
	Serial Nos-5501-55250	5601 and above
CHANNELS 1 or 2		
3000Kc	45	31
4000Kc	33-1/2	23
5000Kc	25	19
6000Kc	20	16
6700Kc	17	13
CHANNELS 3 or 4		
6700Kc	44	29
8000Kc	35	25
9500Kc	29	21-1/2
11000Kc	25	19
13000Kc	20	16
15000Kc	13	13

Note: Two sets of values are given because new coils in later equipments require different adjustments.

In the example; the number of turns at 14,250 kc carrier would be 16.

d. Place tap 1 (leads are marked with channel no.) of P.A. TUNING COIL (L-202) at the number of turns from the cold end (end closer to ANTENNA TUNING COIL) required to tune to the desired output frequency of channel 1. The required number of turns relative to the desired frequency is given below and shown graphically in figure 25.

APPROXIMATE TAP POSITION OF THE PLATE TANK COIL L-202

Frequency	Number of Turns From Coil End of Coil
CHANNELS 1 or 2	
3.0-3.2 Mc.	2-1/2
3.2-3.5 Mc.	3-1/2
3.5-3.8 Mc.	4-1/2
3.8-4.2 Mc.	5-1/2
4.2-4.6 Mc.	6-1/2
4.6-5.0 Mc.	7-1/2
5.0-5.6 Mc.	8-1/2
5.6-6.3 Mc.	9-1/2
6.3-6.7 Mc.	10-1/2

APPROXIMATE TAP POSITION OF THE PLATE TANK COIL L-202 (Cont'd)

CHANNELS 3 or 4

Frequency	Number of Turns From Cold End of Coil
6.7-7.1 Mc.	8-1/2
7.1-8.0 Mc.	9-1/2
8.0-9.2 Mc.	10-1/2
9.2-10.7 Mc.	11-1/2
10.7-13.0 Mc.	12-1/2
13.0-15.0 Mc.	13-1/2

Thus at 14,250 kc carrier, the number of turns would be 13-1/2.

e. Rotate ANTENNA COUPLING CAP 1 (C-201) for maximum capacitance (fully counterclockwise).

f. Set tap 1 of ANTENNA TUNING COIL (L-201) on the turn closest to the ANT TERM post.

g. Repeat steps c through f above, for channels 2, 3 and 4.

h. Remove the antenna connection from the ANT TERM binding post.

i. Insert a key into the front panel KEY jack.

j. Adjust the front panel controls as follows:

TELEGRAPH-PHONE switch to TELEGRAPH.
CARRIER switch to OUT.
TRANSMITTER GAIN control to 0.
CHANNEL selector to 1.

k. Turn POWER, RECEIVER and TRANSMITTER switches on. Allow the equipment a 30-second warm-up interval. Press the telegraph key. The PA plate current should read between 58 and 62 ma. If it is not between these limits, adjust power supply chassis control R-107 (located on top of chassis) for a PA plate current of 60 ma. Retighten the locking nut on R-107.

NOTE: For the remainder of this procedure, as tuning adjustments are made, make certain that the milliameter inserted into the METER LINK jack does not read more than 90 ma with the antenna disconnected. Decrease the current as necessary by lowering the setting of the TRANSMITTER GAIN control. Use an insulated screwdriver for all adjustments.

l. With the key depressed and the TRANSMITTER GAIN control set at midposition, adjust 3rd BAL MOD PLATE CAPACITOR

1 (C-227) for maximum deflection of the milliameter. To be sure of tuning to the desired output frequency and not to the oscillator frequency, back off on the TRANSMITTER GAIN control. If the plate current decreases, the mixer is tuned for the desired frequency. If the plate current does not decrease as the TRANSMITTER GAIN is lowered, the mixer is tuned to the HF oscillator frequency. Turn BAL MOD PLATE CAPACITOR 1 (C-227) to a lower frequency (increased capacity) until another rise in plate current is noted.

m. Adjust IPA PLATE TANK COIL 1 (L-208) for maximum deflection of the milliameter. If the meter exceeds 90 ma, lower the TRANSMITTER GAIN control setting.

n. Adjust P.A. PLATE TUNING CAP 1 (C-208) for a dip in PA plate current. Current should dip to approximately 65 ma or lower.

o. Turn off the TRANSMITTER switch. Reconnect the antenna. Turn on the TRANSMITTER switch. Set TRANSMITTER GAIN control to 0.

p. Press telegraph key and throw the CARRIER switch to IN. Note the PA plate current.

q. Set CARRIER switch to OUT. Change tap 1 of ANTENNA TUNING COIL L-201, one turn at a time, away from the antenna end of the coil. After each turn, reset the CARRIER switch to IN, press telegraph key and note the plate current. Continue this procedure until a peak plate current is reached. The antenna circuit is now properly tuned to the desired frequency. Readjust P.A. PLATE TUNING CAP 1 (C-208) for a dip in the plate current. Only a slight variation of the capacitor should be required if the antenna circuit has been properly resonated.

NOTE: If unable to note any rise in PA plate current as the antenna coil tap is changed, increase coupling to the antenna circuit by rotating ANTENNA COUPLING CAP 1 (C-201) clockwise one or two turns, retune PA PLATE TUNING CAP 1 (C-208) for dip in plate current and repeat procedure as in paragraphs p and q.

r. Place the CARRIER switch to OUT and depress the key. Increase TRANSMITTER GAIN until PEAK MODULATION INDICATOR lights. Full load conditions exist when the indicator lights coincident with a milliameter indication of 150 ma.

s. If the PLATE MODULATION INDICATOR lights coincidentally with a plate current indication below 150 ma, an undercoupled condition exists. Adjust ANTENNA COUPLING CAP 1 (C-201) clockwise in small increments. After each increment, dip the plate current by adjusting P.A. PLATE TUNING CAP 1 (C-208), and raise the TRANSMITTER GAIN control until a full-load condition exists.

t. If the PLATE MODULATION INDICATOR lights coincidentally with a plate current indication above 150 ma (step r above), an overcoupled condition exists. Adjust ANTENNA COUPLING CAP 1 (C-201) counterclockwise in small increments. After each increment, dip the plate current by adjusting P.A. PLATE TUNING CAP 1 (C-208), and adjust the TRANSMITTER GAIN control until a full-load condition exists.

u. If a full-load condition cannot be obtained, vary P.A. PLATE TUNING COIL (L-202), tap 1. Change the tap position one or two turns and repeat the procedures of steps o through u, above.

v. Tune channels 2, 3 and 4 using the respective circuit elements and following the procedures of steps j through u, above. If difficulty is experienced in loading the highest frequency channel refer to paragraph 2 above.

9. RECEIVER CHANNEL ALIGNMENT.

Components are numbered 1 through 4, corresponding to their respective channels. All components may be located by referring to figure 8.

a. Turn off all power and make the following preliminary adjustment: From a fully counterclockwise position, adjust REC RF GRID COIL 1 (L-217) to the desired frequency of channel 1. The number of turns relative to the desired frequency is listed below and shown graphically in figure 26.

APPROXIMATE SLUG POSITION OF RECEIVER RF COILS

Frequency	Number of Turns	
Serial Nos.	5501-55250	5601 and above
	CHANNELS 1 or 2	
3000Kc	38	30
4000Kc	27	24
5000Kc	19-1/2	19
6000Kc	15	15
6700Kc	12	13

APPROXIMATE SLUG POSITION OF RECEIVER RF COILS (Cont'd)

Frequency	Number of Turns	
	Serial Nos. 5501-55250	5601 and above
	CHANNELS 3 or 4	
6700Kc	38	29
8000Kc	21	25
9500Kc	25	22
11000Kc	21	19
13000Kc	15	15
15000Kc	10	12

Thus, at 14,250 kc carrier, the number of turns would be 11.

b. Adjust REC. 1st MIXER GRID COIL 1 (L-221) from a fully counterclockwise position. Turn the slug the number of turns required to tune to the desired frequency of channel 1, as indicated below or as shown in figure 27.

APPROXIMATE SLUG POSITION OF RECEIVER MIXER GRID COILS

Frequency	Number of Turns	
	Serial Nos. 5501-55250	5601 and above
	CHANNELS 1 or 2	
3000Kc	40	30
4000Kc	26	23-1/2
5000Kc	18	19
6000Kc	13	15
6700Kc	11	12-1/2
	CHANNELS 3 or 4	
6700Kc	41	30
8000Kc	32	25
9500Kc	26	21-1/2
11000Kc	22	19
13000Kc	17	15-1/2
15000Kc	12	12

Thus at 14,250 kc carrier, the slug position would be 14.5 turns from minimum inductance.

c. Turn on the POWER and RECEIVER switches; set CHANNEL selector to 1, SPEAKER-HANDSET switch to SPEAKER and TELEGRAPH-PHONE switch to PHONE; and turn the RECEIVER GAIN control fully clockwise.

d. Adjust the REC RF GRID COIL 1 (L-217) for maximum noise response of the SSB-1 speaker.

e. Adjust the REC. 1st MIXER GRID COIL 1 (L-221) for maximum noise response of the speaker.

f. Align the receiver for channels 2, 3 and 4 by using the respective circuit tuning elements for each channel and following the procedures of steps a through e above.

10. TELEPRINTER CONNECTIONS.

When external teleprinter and tone converter equipment is to be used, connect this equipment to terminal board TB104 on the rear apron of the SSB-1 power supply chassis as shown in figure 28. With this connection, the tone oscillator in the SSB-1 is keyed externally and the added switch operates the internal antenna transfer relay to switch between receiver and transmitter operation.

11. OPERATIONAL CHECKS.

Using the operational procedures of Section IV, check that the equipment is operating properly on each channel. Establish contact with another station of the network. During reception, and with the SPEECH CLARIFIER control centered, adjust the respective CHANNEL FREQ. OSC. TRIMMERS 1, 2, 3, and 4 (C-251, C-250, C-249 and C-248, respectively,) for clearest reception. This procedure also adjusts the transmitted signal for clearest reception at the distant station.

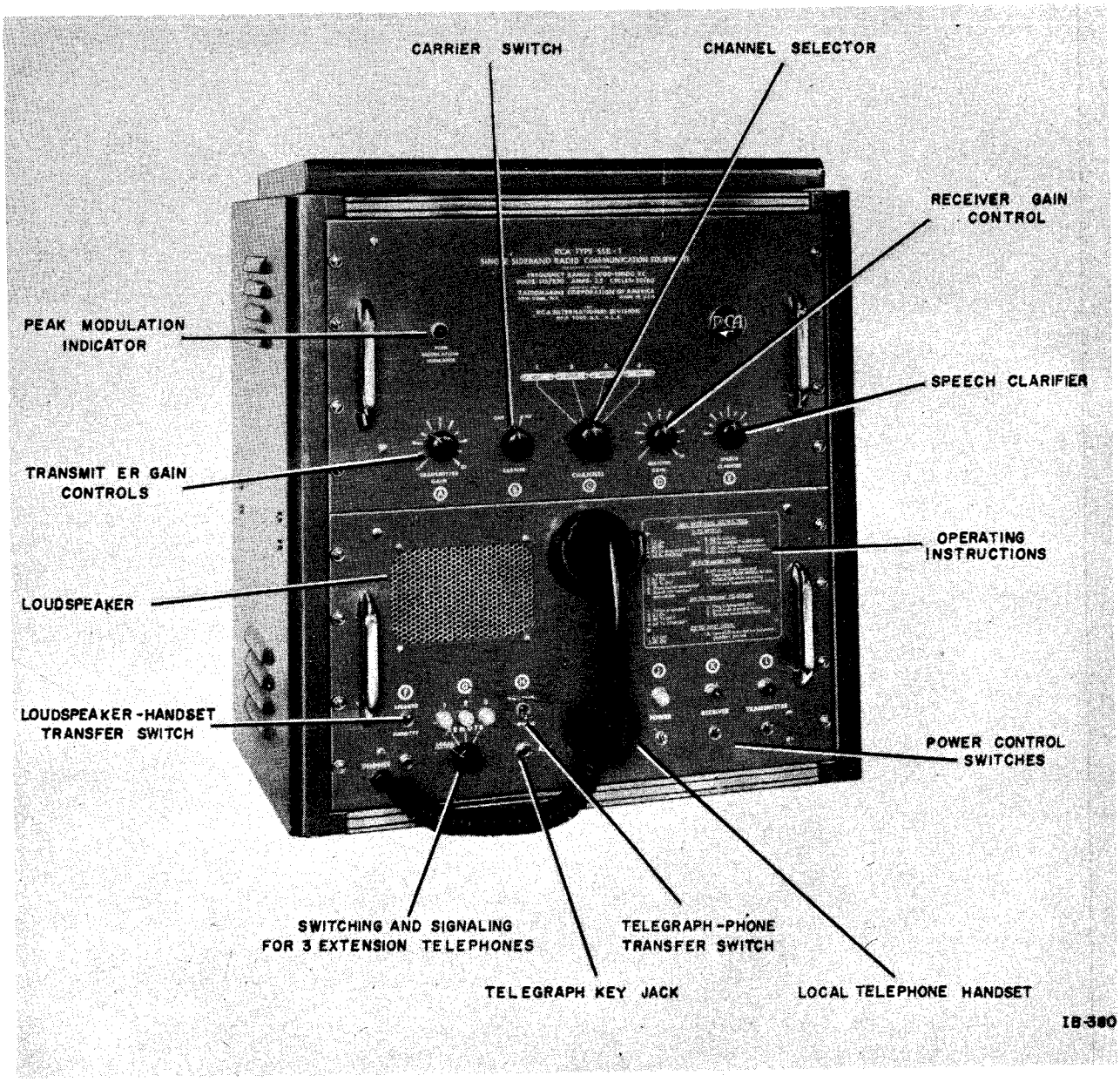


Figure 10. Front Panel Controls

IV

OPERATION

1. CONTROLS AND INDICATORS.

All controls and indicators required for the operation of the Type SSB-1 are available at the front panels of the equipment. These controls and indicators are illustrated in figure 10 and are listed, with their functions, in table 1. Study this information before operating the equipment.

2. SIMPLEX RADIO TELEPHONE OPERATION.

Operation of a simplex radio telephone station using an SSB-1 with up to three remote desk sets such as shown in figure 11 is as follows:

a. Preliminary.

(1) Turn POWER switch Ⓙ on.

(2) Turn RECEIVER switch Ⓚ on.

(3) Turn TRANSMITTER switch Ⓛ on. The three associated pilot lamps should be on.

(4) Turn CARRIER switch Ⓑ to OUT.

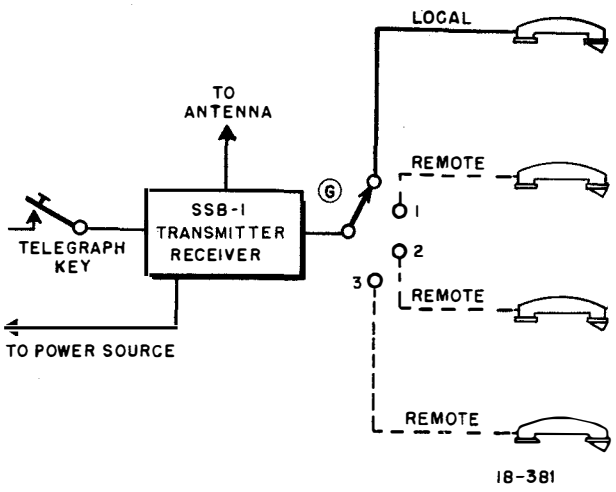


Figure 11. Simplex Radio Telephone Station

(5) Set CHANNEL selector Ⓒ to desired channel.

(6) Turn TELEGRAPH-PHONE switch Ⓗ to PHONE position.

(7) Set LOCAL-REMOTE selector Ⓖ to LOCAL position.

(8) Set SPEAKER-HANDSET switch Ⓕ to HANDSET position.

(9) Lift the handset from its holder.

(10) Adjust RECEIVER GAIN control Ⓓ for low-level background noise.

(11) Press the push-to-talk switch on the handset and call the distant station. While speaking into the microphone, adjust the TRANSMITTER GAIN control Ⓐ to obtain intermittent flashing of the PEAK MODULATION INDICATOR lamp. To obtain the most effective modulation, the adjustment should be such that the PEAK MODULATION INDICATOR lamp flashes once or twice on every word spoken at normal voice levels. While receiving the distant station, adjust the SPEECH CLARIFIER control Ⓔ for most natural sounding voice.

b. Operation at Equipment Site.

(1) Perform the preliminary steps of subparagraph a above.

(2) The equipment is now ready for full operation. When transmitting press the push-to-talk switch on the handset and speak into the microphone. To listen, release the switch.

(3) To monitor the circuit turn switch Ⓕ to SPEAKER. Any incoming signal will then be heard on the speaker.

(4) If it is anticipated that no local transmission will take place for some time, the TRANSMITTER switch may be turned off! When the transmitter is re-energized a warm-up period of 30 seconds is required.

c. Operation from Remote Site.

(1) Operator at equipment site must perform the preliminary steps of subparagraph a. above.

(2) On the power supply chassis, turn LOCAL-REMOTE switch Ⓖ to the number of the extension to be used.

(3) The lamp on the extension desk set will light indicating at remote location that

TABLE 1 - FUNCTIONS OF CONTROLS AND INDICATORS

DESIGNATION	TYPE OF CONTROL	FUNCTION
TRANSMITTER-RECEIVER UNIT		
TRANSMITTER GAIN Ⓐ	Potentiometer	Adjusts gain of transmitter. Normally set while talking for occasional flashing of PEAK MODULATION INDICATOR.
PEAK MODULATION INDICATOR	Neon lamp (red)	Indicates degree of modulation.
CARRIER OUT-IN Ⓑ	Rotary switch (2 positions)	Permits communication with conventional AM systems. At OUT position, SSB-1 operates as a single-sideband, suppressed carrier equipment. At IN position, carrier is not suppressed and SSB-1 operates as an AM system with a single sideband.
CHANNEL 1-2-3-4 Ⓒ	Rotary switch (4 positions)	Selects predetermined operating frequency of transmitter and receiver. Frequencies are as marked.
RECEIVER GAIN Ⓓ	Potentiometer	Adjusts gain of receiver. Normally set for low-level background noise when monitoring a channel, or for desired volume when receiving.
SPEECH CLARIFIER Ⓔ	Trimmer capacitor	Compensates for slight frequency differences between two SSB-1's. Normally set for clear voice reproduction.
POWER SUPPLY UNIT		
SPEAKER-HANDSET Ⓕ	Toggle switch (2 positions)	Selects either handset or speaker for receiver output.
LOCAL-REMOTE Ⓖ	Rotary switch (4 positions)	Selects operation from either local handset or up to three remote (extension) desk sets.
REMOTE INDICATORS -1-2-3	Neon lamps (white)	Remote lamp lights when respective extension is in use.
TELEGRAPH-PHONE Ⓗ	Toggle switch (2 positions)	At TELEGRAPH, CW telegraph or tone SSB transmission may be used. At PHONE, telephone signals only are used.
POWER Ⓙ	Toggle switch (2 positions)	In on position, line power is brought into power supply. 6.3V ac is applied to crystal ovens and to keying relay through key.
POWER	Neon lamp (white)	Indicates application of line power to power supply.
RECEIVER Ⓚ	Toggle switch (2 positions)	Applies operating voltages to receiver.
RECEIVER	Neon lamp (Amber)	Indicates receiver power supply is energized.
TRANSMITTER Ⓛ	Toggle switch (2 positions)	Applies operating voltages to transmitter.
TRANSMITTER	Neon lamp (red)	Indicates transmitter power supply is energized.
PHONES	Telephone jack	Provides local monitoring facilities for remote operation. (Listen only)
KEY	Telephone jack	Provides connection for external telegraph key.

the extension is now connected to the communications system.

(4) Pick up the extension telephone, operate the push-to-talk switch when speaking, and release it when listening. In other respects, it is used like an ordinary telephone.

(5) At the equipment site the appropriate REMOTE lamp will light when the extension telephone is lifted from its cradle and go out when it is replaced. The system may be monitored by plugging a headset into the PHONES jack. This circuit monitors both transmitted and received signals. The received signal only may be monitored on the speaker by turning switch Ⓕ to SPEAKER.

3. SIMPLEX NETWORK OPERATION.

Any number of stations may operate on one working frequency by sharing time. Transmitting and receiving are on the same frequency, the transmitter working only when the "press-to-talk" button on the handset is operated. When the button is not pressed, the receiver is ready to receive any other station that may want to talk. The four available frequencies permit any station to be used on several networks, possibly using different frequencies for day and night operation.

4. TELEGRAPH AND TELEPRINTER OPERATION.

Operation of the SSB-1 for telegraph or teleprinter use such as shown in figure 12 is as follows:

a. Telegraph Operation.

(1) Perform the first 10 steps of paragraph 2a.

(2) Turn switch Ⓗ to TELEGRAPH position.

(3) Plug telegraph key into the KEY jack and transmit code. While transmitting adjust the TRANSMITTER GAIN control Ⓐ to obtain intermittent flashing of the PEAK MODULATION INDICATOR lamp. Break-in operation is a feature of the SSB-1, i.e., pressing the telegraph key automatically switches the unit from receive to transmit. A delay circuit holds the unit in the transmit condition during fast keying. A slight pause will allow the break-in relay to switch to the receive condition.

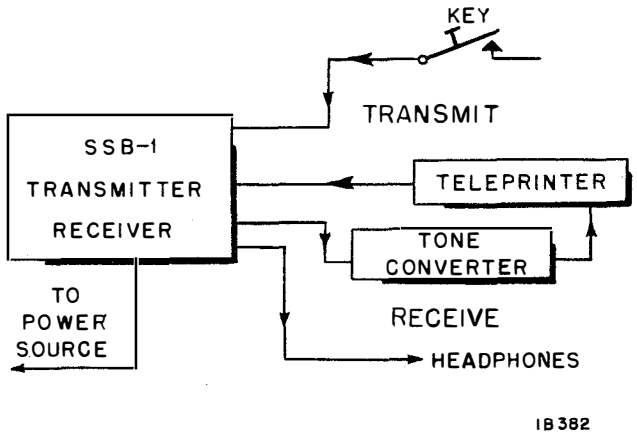


Figure 12. Telegraph and Teleprinter Operation

(4) To receive, plug a headset into the PHONES jack, or if desired, use the speaker by setting switch Ⓕ to SPEAKER.

(5) To transmit again, just operate the key.

b. Teleprinter Operation.

As illustrated in figure 12, the SSB-1 can also be used for teleprinting. The keyed tone is received by a system with necessary tone-signal conversion equipment to feed direct current to the teleprinter. "On-line" two-way teleprinter operation can be used through the SSB-1, by simply adding the necessary teleprinting equipment and accessories. The teleprinter itself does the switching, from transmit to receive, automatically. Teleprinter keying speeds being in the order of 60 words per minute, the break-in feature of the SSB-1 cannot be used. The teleprinter is connected to TB-104. The keying lead keys only the tone oscillator, the transmit-receive relay being operated by an external switch.

5. DUPLEX TELEPHONE OPERATION.

Two SSB-1 equipments, connected as shown in figure 13, provide a complete duplex telephone system. Both, connected to a hybrid transformer, provide full two-frequency duplex operation when interconnected with any wire telephone system. Privacy equipment may be incorporated as shown in the figure.

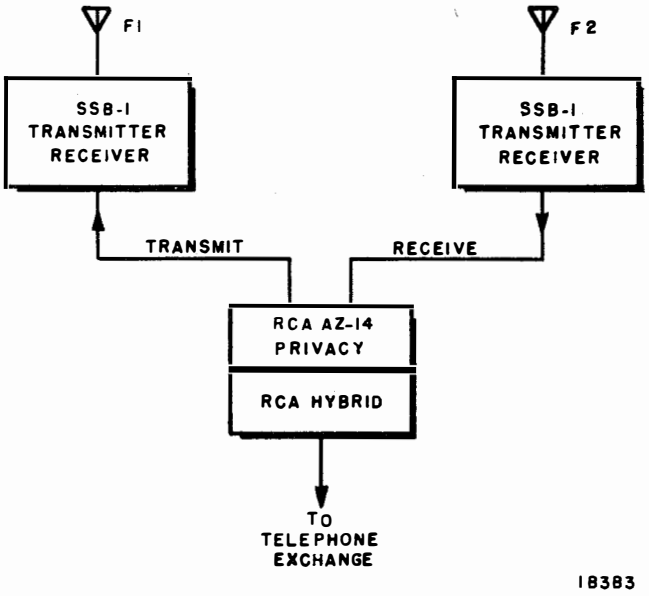


Figure 13. Duplex Radio Telephone Operation

For signaling over the radio system, provisions must be made at the telephone exchange for "in-band" calling, and for operating the local calling devices when a calling signal is received.

Operation of the SSB-1 equipments is similar to the procedure in paragraph 2 above.

6. OPERATION COMPATIBLE WITH AM SYSTEM.

An SSB-1 equipment can be operated in any standard AM system by setting CARRIER switch B to the IN position.

7. SHUTTING DOWN.

When shutting down for short periods of time, turn the TRANSMITTER and RECEIVER switches off. If the shutdown is to be for more than a few hours, turn off the POWER switch also.

V

MAINTENANCE

1. GENERAL.

The Type SSB-1 communications equipment should maintain its correct factory adjustment over a reasonably long period of time. Causes of trouble and methods of checking and adjustment are outlined in the following paragraphs.

2. VACUUM TUBES.

Breakdown or faulty operation of radio communication equipment may usually be attributed to defective vacuum tubes. Locate the chassis in which faulty operation occurs, by use of the troubleshooting procedure given below, and attempt to locate the tube that is defective. If it is impossible to localize the defective stage, change all tubes, one at a time, and either check in a tube tester or substitute a new tube. The tube complement is listed in the technical summary of Section I, illustrated in figures 4 and 14; tube locations are shown in figure 15.

3. TROUBLE SHOOTING.

In the event of equipment breakdown, it is first necessary to sectionalize the trouble to either the power supply chassis, which includes power supply and audio circuits, or the transmitter-receiver chassis, which includes the oscillator, transmitter and receiver circuits. Secondly, it is necessary to localize the trouble to a particular stage. The following procedure not only will assist in locating the trouble source but will also act as an overall check of optimum system performance after repairs have been made.

a. TEST EQUIPMENT - The following test equipment is required to check and align the SSB-1.

(1) Vacuum Tube Voltmeter with R.F. probe
(2) Calibrated Signal Generator
(3) Oscilloscope
(4) 0-250 ma D.C. Milliammeter
(5) Calibrated Audio Oscillator
(6) Dummy Antenna: Any 75 watt non-inductive resistor with a resistance between 10 and 80 ohms in series with a transmitting type mica capacitor of at least 300 uuf.

b. TEST PROCEDURE - Performance of these tests presupposes that the technician is familiar with the operating procedures given in Section IV. Follow the step-by-step procedure, checking that panel lamps light, an audio response is obtained at the receiver output and the PEAK MODULATION INDICATOR indicates modulation of the transmitted output.

c. TROUBLE SHOOTING INFORMATION - The following photographs and charts are included in this book to facilitate the localization of a trouble source within the equipment.

Figure 15. Tube Location Diagram
Figure 16. Power Supply, Top View
Figure 17. Power Supply, Bottom View
Figure 18. Speech Clipper, Internal View
Figure 19. Remote Desk Set
Figure 20. Transmitter-Receiver, Top View
Figure 21. Transmitter-Receiver, Bottom View
Figure 22. Color Codes
Figure 28. Power Supply Schematic
Figure 29. Transmitter-Receiver Schematic
Table 2. Tube Socket Voltages
Table 3. Terminal Boards, Voltage and Resistance Readings

d. OPERATIONAL AND VOLTAGE CHECK. - Perform a complete check of the equipment under various operating conditions. The receiver may be checked using transmission from another single-sideband station or using an accurately calibrated signal generator adjusted to a frequency in the sideband range for the channel being checked. The transmitter may be checked using either a single-sideband receiver or an AM receiver with a beat-frequency oscillator to listen to the signal. Note any faulty operation or improper signal and proceed to find the trouble and correct it before making final adjustments.

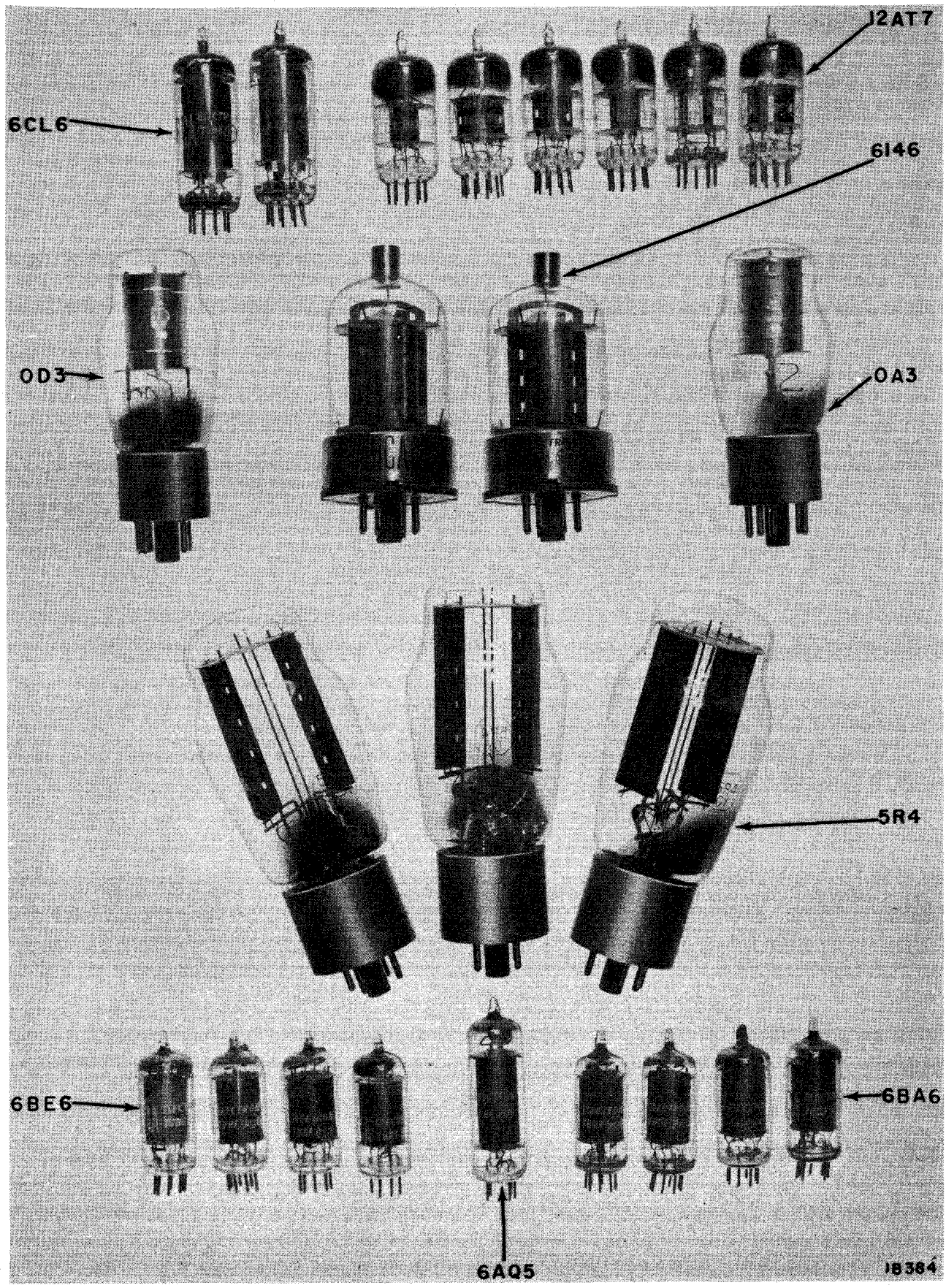
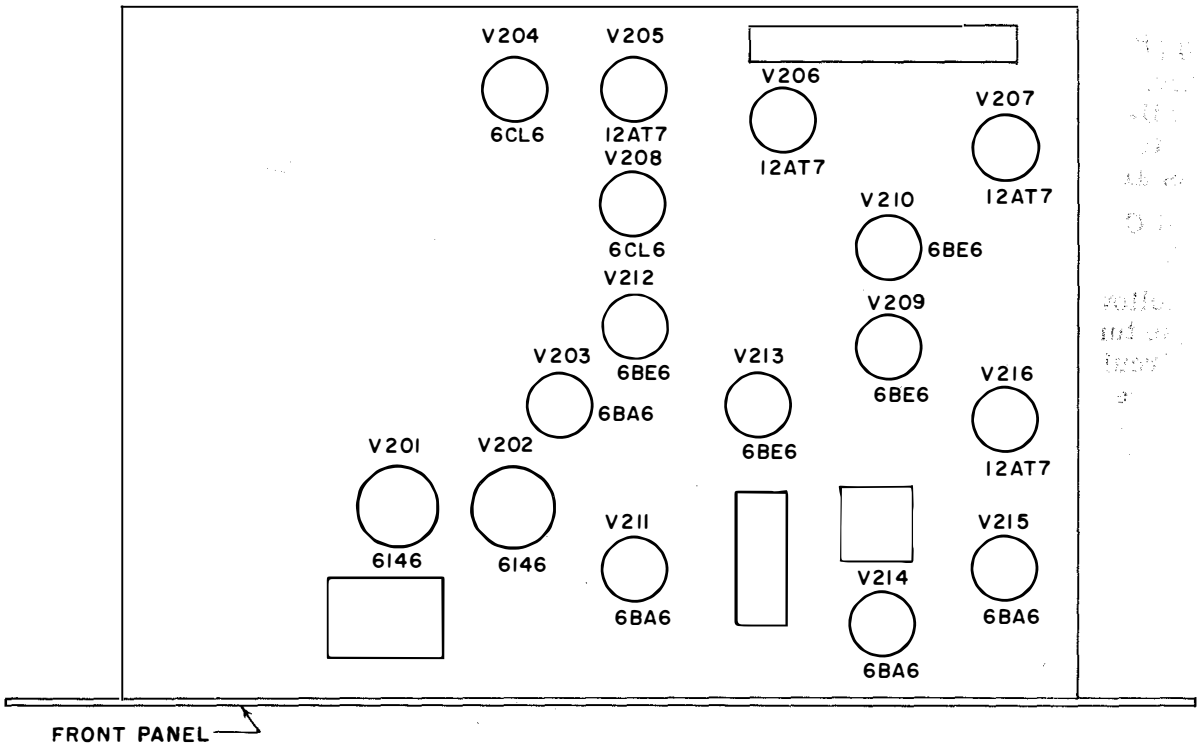


Figure 14. Tube Complement



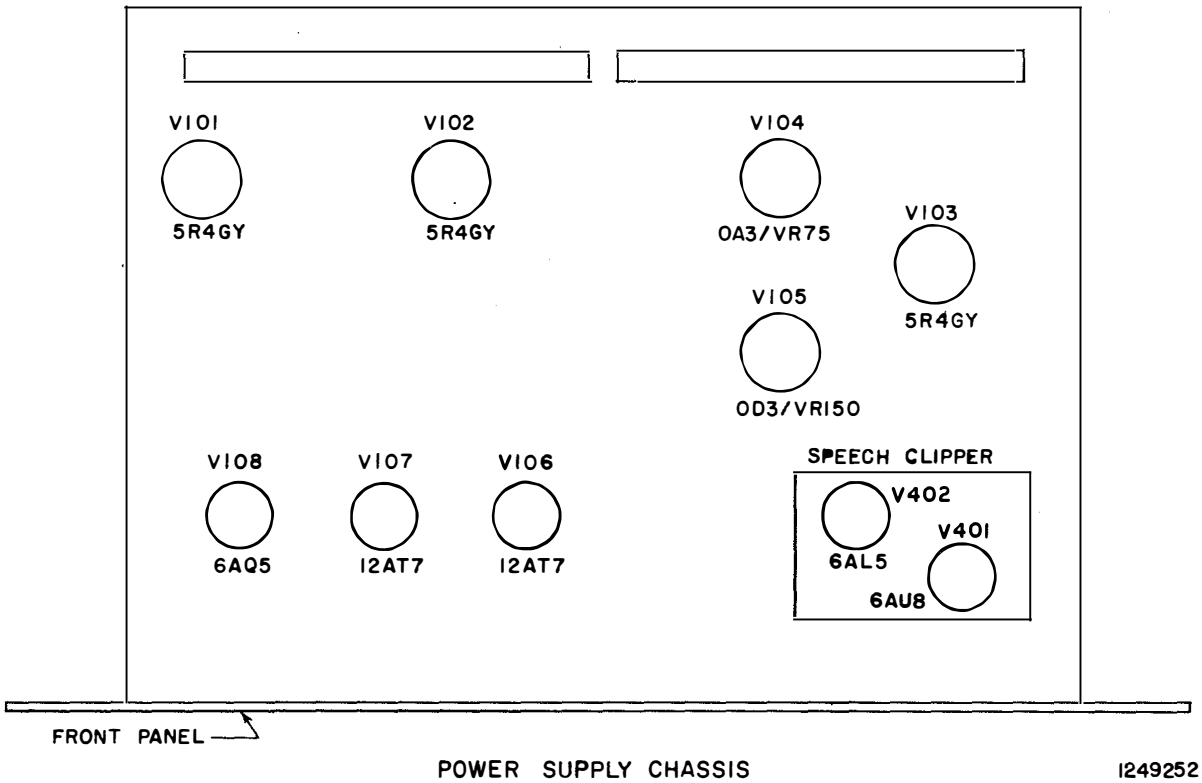


Figure 15. Tube Location Diagram

When attempting to locate trouble a check of voltages and resistances at the terminal boards will often indicate the faulty circuit. Typical terminal board voltages and resistances are given in Table 3.

4. CHECKING AND ALIGNMENT.

The following alignment procedure describes the tuning and adjustment procedures of all circuits of the SSB-1. Normally, a complete realignment of the SSB-1 would not be necessary unless tests proved an absolute need for it. If a defective part, such as an IF transformer is replaced, only that part of the circuit affected by the replacement would be realigned.

a. POWER SUPPLY - Connect an ohmmeter between TB-102, terminal 2, and the chassis. Set the low voltage power supply bleeder resistor R-103 to 1500 ohms. Disconnect the ohmmeter and turn on the RECEIVER switch. The voltage across 470 ohm resistor, R-104, should be 17.5 volts and VR tubes V-104 and V-105 should ignite within 10 seconds. If the voltage across R-104 is not 17.5 volts, adjust bleeder resistor R-103 for a 17.5 volt reading across R-104.

b. OSCILLATORS

(1) Turn on the POWER and RECEIVER switches and permit the equipment a 15 minute warm-up period.

(2) Insert the RF probe of a VTVM in TP-203. A nominal reading of 9 volts should be obtained for the 250 kc oscillator output.

(3) Insert the RF probe in TP-202. A nominal reading of 9 volts should be obtained for the 1150 kc oscillator output. Adjust L-213 for maximum output.

(4) Insert the RF probe in TP-201. A nominal reading of 0.35 volts should be obtained for the channel oscillator output for all four positions of the CHANNEL selector.

(5) Using an accurate frequency standard, which is tuned to 250kc set the 250 kc oscillator exactly on frequency by adjusting trimmer capacitor C-272. Also check the 1150 kc oscillator with the frequency standard set at 1150 kc. SPEECH CLARIFIER control C-268 is the trimmer across the 1150 kc output. Zero beat with the standard should occur near the center of the SPEECH CLARIFIER range.

c. RECEIVER

(1) Turn POWER and RECEIVER switches on. Set RECEIVER GAIN control fully clockwise.

(2) Insert a VTVM at TP-101 on the power supply chassis. Use the AC scale. Inject a 251 kc unmodulated signal at TP-205, and tune the primary (bottom) of T-204, and the primary (bottom) and secondary (top) of T-205 for a maximum output.

(3) Retune the signal generator to approximately 235 kc and increase the amplitude of the signal generator output. Vary the signal generator frequency slightly until a spurious signal is detected as indicated by a reading on the VTVM. Adjust the secondary (top) of T-204 for minimum output reading.

(4) Retune the signal generator to 251 kc, and set SPEAKER-HANDSET switch at HANDSET position. For an output level of 0.5 volts at TP-101 the signal generator output should be a maximum of 60 microvolts.

(5) Check the response of the mechanical filter by connecting an oscilloscope at TP-101 and inserting a 251 kc signal at TP-205. Set the oscilloscope level for 20 divisions. Keeping the input level constant, vary the input frequency and check the relative output comparing with the chart below. This check is made with SPEAKER-HANDSET switch at the HANDSET position.

Input Frequency at TP-205	Relative Output at TP-101
250.2 kc	5 divisions
250.3 kc	10 divisions
251.0 kc	20 divisions
253.2 kc	15 divisions
253.4 kc	5 divisions
254.0 kc	0 divisions

(6) Insert a 1401 kc signal at TP-204, and tune T-203 for a maximum output at TP-101. For a 0.5 volt output at TP-101, the signal generator output should be 20 microvolts maximum.

(7) Connect signal generator in series with a 75 ohm resistor to the antenna post and set CHANNEL selector to position 1. Set signal generator to the channel 1 input frequency (channel 1 crystal frequency minus 1400 kc). Adjust the signal generator frequency slightly for maximum output indication at TP-101.

(8) Repeat the procedure described in step (7), above, for positions 2, 3, and 4 of the CHANNEL selector, by injecting associated RF channel frequencies at the antenna.

(9) To check the overall sensitivity of the SSB-1 connect the signal generator as in step (7). Set SPEAKER-HANDSET switch at HANDSET. Turn power switch on signal generator to OFF position. Advance RECEIVER GAIN control for a reading of 0.25 volts of noise at TP-101. Turn on signal generator, set to channel frequency and adjust signal generator output voltage for a reading of 0.5 volts at TP-101. A maximum of 1 microvolt output from the signal generator should be required at any channel frequency between 3 and 15 Mc, for a 2/1 signal-plus-noise to noise ratio.

d. TRANSMITTER- All components mentioned in the following procedures may be located by referring to figure 8.

CAUTION: HIGH VOLTAGES ARE PRESENT IN THIS EQUIPMENT. EXERCISE CAUTION WHEN PERFORMING THE ALIGNMENT PROCEDURES. BEFORE APPLYING POWER, MAKE CERTAIN THAT THE EQUIPMENT HAS BEEN GROUNDED.

(1) Place a dc milliameter (0-250 ma) into the METER LINK observing proper meter polarity, as indicated.

(2) Set TRANSMITTER GAIN to extreme counterclockwise position, CARRIER switch to OUT, TELEGRAPH-PHONE switch to TELEGRAPH and CHANNEL selector to position 1. Throw on the POWER, RECEIVER and TRANSMITTER switches.

(3) Depress telegraph key. Set power supply bias control R-107 for a 60 ma indication on the dc milliameter.

(4) Connect the R.F. probe of a VTVM from TP-201 to ground. Set TRANSMITTER GAIN control to mid position. With key depressed adjust both primary and secondary of T-201 for maximum deflection of the VTVM.

(5) Turn off the POWER switch.

(6) From a fully counterclockwise position, rotate IPA PLATE TANK COIL SLUG 1 (L-208) the number of turns required to tune to the desired output frequency of channel 1. The number of required turns relative to the desired frequency is given in Section III par. 8 c and also shown in graphical form in figure 24.

(7) Place tap 1 of P. A. TUNING COIL (L-202) at the number of turns from the cold end (end closer to ANTENNA TUNING COIL) required to tune to the desired output frequency of channel 1. The required number of turns relative to the desired frequency is given in Section III par. 8 d and also shown graphically in figure 25.

(8) Adjust the associated components for channels 2, 3 and 4 by repeating the procedures of (6) and (7), above.

(9) Set coupling capacitors C-201, C-202, C-203 and C-204 for maximum capacitance (fully counterclockwise).

(10) Set taps 1, 2, 3 and 4 of antenna tuning coil L-201 on the turn closest to the antenna terminal post.

(11) Connect an audio oscillator (600 ohm output impedance) across terminals 14 and 15 of TB-102 and inject a 1000 cps signal at a level of approximately 1 volt.

(12) Remove key from the KEY jack, set TELEGRAPH-PHONE switch to PHONE. Disconnect dummy antenna. Tape the mike button closed.

(13) Turn on the POWER, RECEIVER and TRANSMITTER switches.

NOTE: For the remainder of this procedure, make certain that the milliammeter inserted into the METER LINK jack does not indicate a PA plate current exceeding 90 ma with the antenna disconnected. Decrease current as necessary by lowering the TRANSMITTER GAIN setting.

(14) Set CHANNEL selector to position 1. Raise the TRANSMITTER GAIN control setting and adjust MIXER PLATE TUNING CAPACITOR 1 (C-227) for maximum deflection of the plate current meter. To be sure of tuning to the desired output frequency and not the oscillator frequency, lower the setting of the TRANSMITTER GAIN control. If the plate current decreases, the mixer is tuned to the desired frequency. Retune the primary and secondary of T-201 for maximum deflection of the P. A. plate current.

(15) Adjust the IPA plate tuning coil slug no. 1 for maximum deflection on the plate current meter.

(16) Adjust plate tank tuning capacitor no. 1 (C-208) for a dip in plate current. Plate current should dip to 65 ma or less.

(17) Turn TRANSMITTER switch off and connect dummy antenna.

(18) Adjust carrier level capacitor (C-240) for half capacitance and turn TRANSMITTER GAIN control to zero.

(19) Turn TRANSMITTER switch on and CARRIER switch to IN. Note value of plate current.

(20) Throw CARRIER switch to OUT and change tap no. 1 of (L-201) one turn at a time. At each turn, put CARRIER switch on and note plate current reading. Repeat this procedure until a peak value of plate current is obtained. This is the correct tap setting for L-201. Readjust P. A. PLATE TUNING CAP 1 (C-208) for a dip in plate current. Only a slight variation of the capacitor should be required if the antenna circuit has been properly resonated.

NOTE: If unable to note any rise in PA plate current as the antenna coil tap is changed, increase coupling to the antenna circuit by rotating ANTENNA COUPLING CAP 1 (C-201) clockwise one or two turns, retune PA PLATE TUNING CAP 1 (C-208) for dip in plate current and repeat procedure as in paragraph 8 p and q in Section III.

(21) Set CARRIER switch to OUT and raise the TRANSMITTER GAIN control setting. Full load conditions are obtained if the PEAK MODULATION INDICATOR lights coincident with 190-200 ma of plate current.

(22) If the PEAK MODULATION INDICATOR lights coincident with PA plate current below 190 ma, turn capacitor C-201 clockwise in small increments, dipping the plate current with C-208 after each change. Raise the TRANSMITTER GAIN setting after each change until full load conditions exist.

(23) If the PEAK MODULATION INDICATOR lights coincident with plate current in excess of 200 ma turn capacitor C-201 counter clockwise, dipping the plate current with C-208, until conditions of full load exist.

(24) Align channels 2, 3 and 4 by repeating steps (14) through (23) above, using the proper P. A. tuning and coupling capacitors for each channel.

(25) The TRANSMITTER GAIN control, with a 1 volt audio input, should be at its approximate mid-position for full load conditions on all channels.

NOTE: If an audio oscillator is not available the tone oscillator in the SSB-1 may be used. Follow channel alignment procedure as described in Section III, paragraph 8.

(26) PA NEUTRALIZATION- The setting of the PA neutralizing capacitor C-215 will very seldom require adjustment. Need for re-neutralization will be apparent if excessive plate dissipation in the PA tubes is noted with full output (plate slightly red) or if an oscillatory condition exists, usually at the higher frequencies.

If neutralization adjustment is required, connect a 0-3 amp (or lower) RF ammeter in series with the dummy antenna. With transmitter controls set as for channel alignment and the CHANNEL switch set for channel 4, advance the TRANSMITTER GAIN control for approximately 130 ma PA plate current and vary the plate tuning capacitor C-205 through resonance as indicated by the dip in PA plate current. Also note the reading of the RF ammeter. The dip in plate current should coincide with maximum current as indicated on the RF ammeter when the PA is properly neutralized. If this is not the case vary the setting of neutralizing capacitor C-215 in small increments until plate current dip and maximum output current are coincident. Tighten the locking screws on C-215 and recheck neutralization.

(27) CARRIER BALANCE - Closely couple a suitable oscilloscope to the dummy antenna with CHANNEL switch set on channel no. 1. Remove the audio oscillator from terminals 14 and 15 of TB-102. Set the TRANSMITTER GAIN to its mid-position. With no audio input adjust 250 kc balance (C-243 and R-225) and 1150 kc balance (C-234 and R-215) for minimum output on the oscilloscope. This adjustment is critical and should be done in steps there being interaction between the controls. Adjust the 250 kc balance first and the 1150 kc balance second.

(28) CARRIER LEVEL ADJUSTMENT- Reconnect the audio oscillator across terminals 14 and 15 of TB-102. Inject a 1000 kc signal at a 1 volt level.

TABLE 2. TUBE SOCKET VOLTAGES

A. READINGS TAKEN WITH VACUUM TUBE VOLTMETER (RCA-WV97A)

SYMBOL	PIN NUMBERS									
	1	2	3	4	5	6	7	8	9	CAP
V-101	0	+630	0	760 ac	0	760 ac	0	+630	-	-
V-102	0	+630	0	760 ac	0	760 ac	0	+630	-	-
V-103	0	+212	0	400 ac	0	400 ac	0	+212	-	-
V-104	-92	-75	*	+190	0	-	*	-	-	-
V-105	-27	0	*	6.3 ac TP	+150	53 ac TP	*	-92 TP	-	-
V-106	+83 ⊛	-1.05 ⊛	+1.06 ⊛	6.3 ac	6.3 ac	+62	0	+0.4	0	-
V-107	+200	+39	+66	6.3 ac	6.3 ac	+62	0	+1.2	0	-
V-108	0	+5.5	6.3 ac	0	+195	+130	-	-	-	-
V-201	0	6.3 ac	+200	0	-45	0	0	0	-	+620
V-202	0	6.3 ac	+200	0	-45	0	0	0	-	+620
V-203	-45	0	0	6.3 ac	+185	+190	0	-	-	-
V-204	+5	0	+175	0	6.3 ac	+175	0	+175	0	-
V-205	+160	0	+3.3	6.3 ac	6.3 ac	+160	0	+3.3	0	-
V-206	+144	0	+2.8	6.3 ac	6.3 ac	+144	0	+2.8	0	-
V-207	+130	+0.25	+3.2	6.3 ac	6.3 ac	+130	+0.25	+3.2	0	-
V-208	0	-6.6	+146	6.3 ac	0	+20	0	+146	-6.6	-
V-209	-3.9	0	0	6.3 ac	+117	-49	+73	-	-	-
V-210	-1.75	0	0	6.3 ac	+90	+52	+56	-	-	-
V-211	0	+1.35	0	6.3 ac	+130	+68	+1.5	-	-	-
V-212	-0.12	+0.62	0	6.3 ac	+175	+17	-0.2	-	-	-
V-213	-0.9	+0.78	0	6.3 ac	+144	+22	0	-	-	-
V-214	0	+1.55	0	6.3 ac	+150	+56	+1.55	-	-	-
V-215	0	+1.6	0	6.3 ac	+150	+54	+1.6	-	-	-
V-216	+72	-1.2	0	6.3 ac	6.3 ac	+150	+0.4	+2.8	0	-
V-401	+190	0	+22.5	6.3 ac	0	+73	+0.82	+4.2	0	-
V-402	+3.8	+3.5	0	6.3 ac	+3.8	-	+3.5	-	-	-

B. READINGS TAKEN WITH 20,000-OHMS/VOLT VOLTMETER (SIMPSON 260)

V-101	0	+600	0	720 ac	0	720 ac	0	+600	-	-
V-102	0	+600	0	720 ac	0	720 ac	0	+600	-	-
V-103	0	+212	0	300 ac	0	300 ac	0	+212	-	-
V-104	-88	-73	*	+190	0	-	*	-	-	-
V-105	-26.5	0	*	6.3 ac TP	+142	53 ac TP	*	-88 TP	-	-
V-106	+80 ⊛	0 ⊛	+1 ⊛	6.3 ac	6.3 ac	+60	0	+0.35	0	-
V-107	+192	+30	+65	6.3 ac	6.3 ac	+61	0	+1.2	0	-
V-108	0	+5.6	6.3 ac	0	+190	+128	0	-	-	-
V-201	0	6.3 ac	+190	0	-44	0	0	0	-	+600
V-202	0	6.3 ac	+190	0	-44	0	0	0	-	+600
V-203	-44	0	0	6.3 ac	+183	+190	0	-	-	-
V-204	+49	0	+172	0	6.3 ac	+170	0	+172	0	-
V-205	+162	0	+3.4	6.3 ac	6.3 ac	+162	0	+3.4	0	-
V-206	+137	0	+2.85	6.3 ac	6.3 ac	+137	0	+2.85	0	-
V-207	+120	0	+3.2	6.3 ac	6.3 ac	+120	0	+3.2	0	-
V-208	0	-6.3	+140	6.3 ac	0	+19.5	0	+140	-6.3	-
V-209	-1.35	0	0	6.3 ac	+112	+48.5	+70	-	-	-
V-210	-0.22	0	0	6.3 ac	+86	+50	+56	-	-	-
V-211	0	+1.4	0	6.3 ac	+125	+66	+1.4	-	-	-
V-212	0	+0.68	0	6.3 ac	+173	+17.2	0	-	-	-
V-213	-0.15	+0.8	0	6.3 ac	+140	+21.5	0	-	-	-
V-214	0	+1.6	0	6.3 ac	+152	+55	+1.6	-	-	-
V-215	0	+1.65	0	6.3 ac	+152	+54	+1.65	-	-	-
V-216	+71	-0.7	0	6.3 ac	6.3 ac	+152	+0.05	+2.9	0	-
V-401	+187	0	+22	6.3 ac	0	+68	+0.8	+4.1	0	-
V-402	+3	+2.8	0	6.3 ac	+3	-	+2.8	-	-	-

CONDITIONS:

All readings are dc and are taken from tube pin to ground, unless otherwise noted.

RECEIVER GAIN control in fully clockwise positions.

Transmitter operating frequency: 4 Mc.

Push to talk switch pressed but no audio input.

NOTES:

1. Asterisk * designates jumpers for ac line.
2. Encircled asterisk ⊛ designates TELEGRAPH-PHONE switch at TELEGRAPH position, and key closed.
3. TP designates tie-point.

TABLE 3. TERMINAL BOARD VOLTAGE AND RESISTANCE READINGS.

A. READINGS TAKEN WITH VACUUM TUBE VOLTMETER (RCA-WV97A)

CONDITION	TERMINAL BOARD	TERMINALS																	
	TB-102	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
KEY UP VOLTAGE		-90	-92	6.3ac	6.3ac	6.3ac	-45	+148	+190	+190	0	+640	0	0	0	0	0	*	*
KEY DOWN VOLTAGE		0	-88	6.3ac	6.3ac	6.3ac	-45	+148	+190	0	+190	+600	0	0	0	0	0	*	*
KEY UP RESISTANCE		5.8K	1.0K	0	0	0	13.0K	6.2K	6.2K	6.2K	47.0K	35.0K	170	170	20	0	0	Inf.	Inf.
KEY DOWN RESISTANCE		Inf.	820	0	0	0	13.0K	6.2K	6.2K	6.2K	47.0K	35.0K	170	170	20	0	0	Inf.	Inf.
	TB-103	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
KEY UP VOLTAGE		+195	+140	0	-2.5	-90	0	+195	+140	0	-2.5	-90	0	+195	+140	0	-2.5	-90	0
KEY UP RESISTANCE		170K	Inf.	0	1.0K	6.0K	100	170K	Inf.	0	1.0K	6.0K	100	170K	Inf.	0	1.0K	6.0K	100

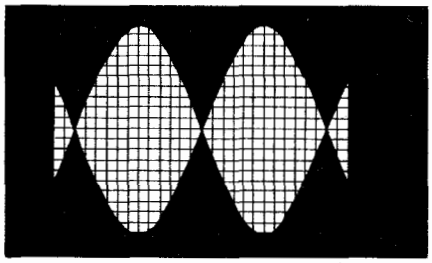
B. READINGS TAKEN WITH 20,000-OHM/VOLT OHMMETER (SIMPSON 260)

	TB-102	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
KEY UP VOLTAGE		-85	-85	6.3ac	6.3ac	6.3ac	-44.5	+142	+194	+194	0	+630	0	0	0	0	0	*	*
KEY DOWN VOLTAGE		0	-80	6.3ac	6.3ac	6.3ac	-44.5	+142	+194	0	+194	+590	0	0	0	0	0	*	*
KEY UP RESISTANCE		5.8K	1.0K	0	0	0	13.0K	6.2K	6.2K	6.2K	47.0K	35.0K	170	170	20	0	0	Inf.	Inf.
KEY DOWN RESISTANCE		Inf.	820	0	0	0	13.0K	6.2K	6.2K	6.2K	47.0K	35.0K	170	170	20	0	0	Inf.	Inf.
	TB-103	1	2	3	4	5	6												
KEY UP VOLTAGE		+187	+133	0	-2.4	-85	0												
KEY UP RESISTANCE		170K	Inf.	0	1.0K	6.0K	100												

NOTES:

1. Asterisk (*) designates ac line.
2. No remote unit connected.
3. All resistances taken with vacuum tube voltmeter (RCA-WV97A)

Set the TRANSMITTER GAIN for a full output on the channel with the lowest response. (This is the channel where the TRANSMITTER GAIN control must be most advanced for full output.) Keeping the oscilloscope coupled to the antenna, set the level on the oscilloscope for 20 divisions at full output. Set the TRANSMITTER GAIN at minimum. Throw the CARRIER switch to IN and adjust capacitor C240 for 10 divisions on oscilloscope. Raise the TRANSMITTER GAIN control until the PEAK MODULATION INDICATOR lights. Pattern on oscilloscope should appear as a two-tone signal with a sharp cross-over point as illustrated in the figure below.



5. REPLACEMENT AND TUNING OF MECHANICAL FILTERS.

a. FILTER TYPES- Three slightly different variations of mechanical filters, FL201 and FL202, have been supplied. All of these pass an upper sideband approximately 3 kc wide while rejecting the 250 kc carrier. Because of the variations, however, certain different accessory components are used with each of the three type filters. These components are listed in Table 4 and shown in the schematics and Parts List.

b. REPLACEMENT- Although the mechanical filters FL201 and FL202 are designed for continuous duty over long periods of time without maintenance, it may become necessary to replace one because of failure due to overloading, burn-out or physical damage. Direct replacement of one filter by another of the same type will require no special procedure except that, in equipments Serial Numbers 5601 and above, the new filter will require tuning in accordance with paragraph c. below. In case the filter to be installed is of a different type than the one in the equipment, proceed as follows:

(1) FOR EQUIPMENTS SERIAL NOS. 5501 TO 55250.

Type F-250Z-4 filters whether modified or not, may be used. No filter tuning is provided. Type MFU-250-1 filters can not be installed in these equipments.

(2) FOR EQUIPMENTS SERIAL NOS. 5601 TO 56200.

These equipments are supplied with Type F-250Z-4 filters at the factory. Direct replacement by a modified F-250Z-4 (as supplied for spares on Serial Nos. 5501 to 55250) is satisfactory and the new filter should then be tuned in accordance with paragraph c.

TABLE 4. COMPONENTS USED WITH FILTERS

EQUIPMENT SERIAL NUMBERS	MECHANICAL FILTER FL201 FL202	CAPACITORS			RESISTORS		
		C312 C313 C314 C315	C238 C294	C242 C293	R255	R285 R286	BRACKET A201 (4 req'd)
5501 to 55250	Type F250Z-4 (modified)	Not Used	91uuf	C242-82uuf C293-91uuf	Not Used	Not Used	Not Used
5601 to 56200	Type F250Z-4	7-45uuf	68uuf	62uuf	Not Used	Not Used	Radiomarine A-1214592
56201 and above	Type MFU-250-1	20 to 125uuf	360uuf	360uuf	33K, 1/2W	47K, 1/2W	Radiomarine A-1214593

Replacement of a Type F-250Z-4 filter by a Type MFU-250-1 filter requires that additional components be changed as listed in Table 4 and shown in Figure 21C. Proceed as follows:

(a) Remove filter tuning capacitors C312 and C313 and brackets A201, if FL201 is being changed. Remove C314 and C315 with brackets A201 if FL202 is being replaced.

(b) Remove old filter unit FL201 or FL202.

(c) Mount new MFU-250-1 filter in place.

(d) Replace filter tuning capacitors C312 to C315 with capacitors of proper value (20-125 uuf) for MFU-250-1 filter. See Table 4. New bracket A201 are required for these capacitors.

(e) Replace capacitors C238 and C242 or C293 and C294 with 360 uuf capacitors as required for the new filter.

(f) Rewire filter circuit per the schematic Figure 29B, inserting resistors R285 and R286 ahead of FL201 and/or R255 in the output circuit of FL202 as required.

(g) Tune filter in accordance with paragraph c. below.

(3) FOR EQUIPMENTS SERIAL NOS. 56201 AND ABOVE:

Replacement of the Type MFU-250-1 filter installed at the factory by a Type F-250Z-4 filter requires replacement of tuning capacitors and removal of resistors as follows:

(a) Remove filter tuning capacitors C238 and C242 or C293 and C294 and also brackets A201.

(b) Remove resistors R255 and/or R285 and R286 and discard them.

(c) Remove the filter FL201 or FL202.

(d) Mount new Type F-250Z-4 filter.

(e) Replace filter tuning capacitors C312 and C313 and/or C314 and C315 with 7-45 uuf capacitors and new bracket A201.

(f) Replace capacitors C238 and C242 or C293 and C294 with new ones of value as specified in Table 4 for the F-250Z-4 filter.

(g) Tune filters in accordance with paragraph c. below.

c. TUNING- The method of tuning the mechanical filters is the same for the Type F-250Z-4 and Type MFU-250-1 except that they should be peaked at slightly different audio (sideband) frequencies. Location of filter tuning capacitors is shown in Figure 31C.

TO TUNE TRANSMITTER SIDEBAND FILTER FL201.

(1) Set filter tuning capacitors C312 and C313 approximately in mid-position.

(2) Connect the output from an Audio Oscillator to terminal 4 on one of the Remote Desk Set terminations on TB103. Connect the corresponding terminal 5 to terminal 3 (ground).

(3) Set controls on the SSB-1 as follows:

TELEGRAPH-PHONE to PHONE
LOCAL-REMOTE to REMOTE-position corresponding to connections made in paragraph (2) above.
TRANSMITTER GAIN at 0.

(4) Insert leads from a 0-250 ma dc milliameter into the METER LINK jacks observing proper polarity as marked on the chassis.

(5) Energize the transmitter on a channel for which a crystal is available.

(6) Adjust Audio Oscillator output to 1800 cps if a Type F-250Z-4 filter is used or to 1950 cps if Type MFU-250-1 filter is used.

NOTE: If an Audio Oscillator is not available, temporary field adjustments may be made using the tone oscillator (1000 cps) in the SSB-1. In this case, omit steps (2), (3) and (6). Start with the TRANSMITTER GAIN set at 0. (Permanent adjustments should be made at the earliest opportunity using the proper frequency).

(7) Increase TRANSMITTER GAIN until a reading is obtained on the milliameter and then tune capacitor C313 for maximum reading on the meter. Use an insulated screwdriver for all adjustments.

NOTE: Never allow meter reading to exceed 90 ma. Throughout this procedure use TRANSMITTER GAIN control to keep meter reading at or below 60 ma for best operation.

(8) Tune capacitor C312 for maximum reading on the milliameter using GAIN control to reduce output if necessary.

(9) After tuning is complete set TRANSMITTER GAIN for 60 ma on the meter and check tuning points by slightly varying capacitor C313 and C312 settings, readjusting for maximum output.

(10) Remove meter connections, Oscillator connections and ground from terminal 5 on TB103.

TO TUNE RECEIVER SIDEBAND FILTER FL202.

In order to tune the receiver filter properly, an R. F. signal adjusted to the center frequency of the sideband range of the fil-

ter is required. The following procedure is recommended.

(1) Connect output from an R. F. Signal Generator through a small coupling capac- to Test Point jack TP205 which is at the grid of the 2nd Mixer V213.

(2) Connect output from an Audio Oscillator to terminal 12 on TB102 in the Power Supply. Adjust the frequency of the Oscillator to 1800 cps when a Type F-250Z-4 filter is used or to 1950 cps when a Type MFU-250-1 filter is used.

(3) Set filter tuning capacitors C314 and C315 to approximately mid-position. Set the RECEIVER GAIN to 0 and energize the receiver.

(4) Adjust the Audio Oscillator output to give a fairly low audio volume in the receiver loudspeaker.

(5) Adjust the Signal Generator frequency to just above 250 kc (approximately 251. 8 kc, if calibrated). Increase RECEIVER GAIN and/or Signal Generator output until an audio beat is heard in the speaker. Vary Signal Generator frequency slightly if no beat is hear at first.

(6) Adjust output of Signal Generator and Audio Oscillator to give approximately the same level in the speaker.

(7) Vary Signal Generator frequency to zero beat with Audio Oscillator in speaker.

(8) Remove Audio Oscillator and proceed with tuning the filter.

NOTE: If equipment for the above is not available in the field, a temporary adjustment may be made by setting the receiver up on a regular channel but with no signal present, RECEIVER GAIN at maximum and then tuning for maximum noise in the speaker. (Permanent adjustment should be made at the earliest opportunity using proper frequency).

(9) Tune capacitor C315 and then C314 for maximum response in the speaker, using RECEIVER GAIN control to cut volume to a resonable value for listening. Use an insulated screwdriver for all tuning adjustments.

(10) Shut down receiver and remove Signal Generator connections.

NOTES

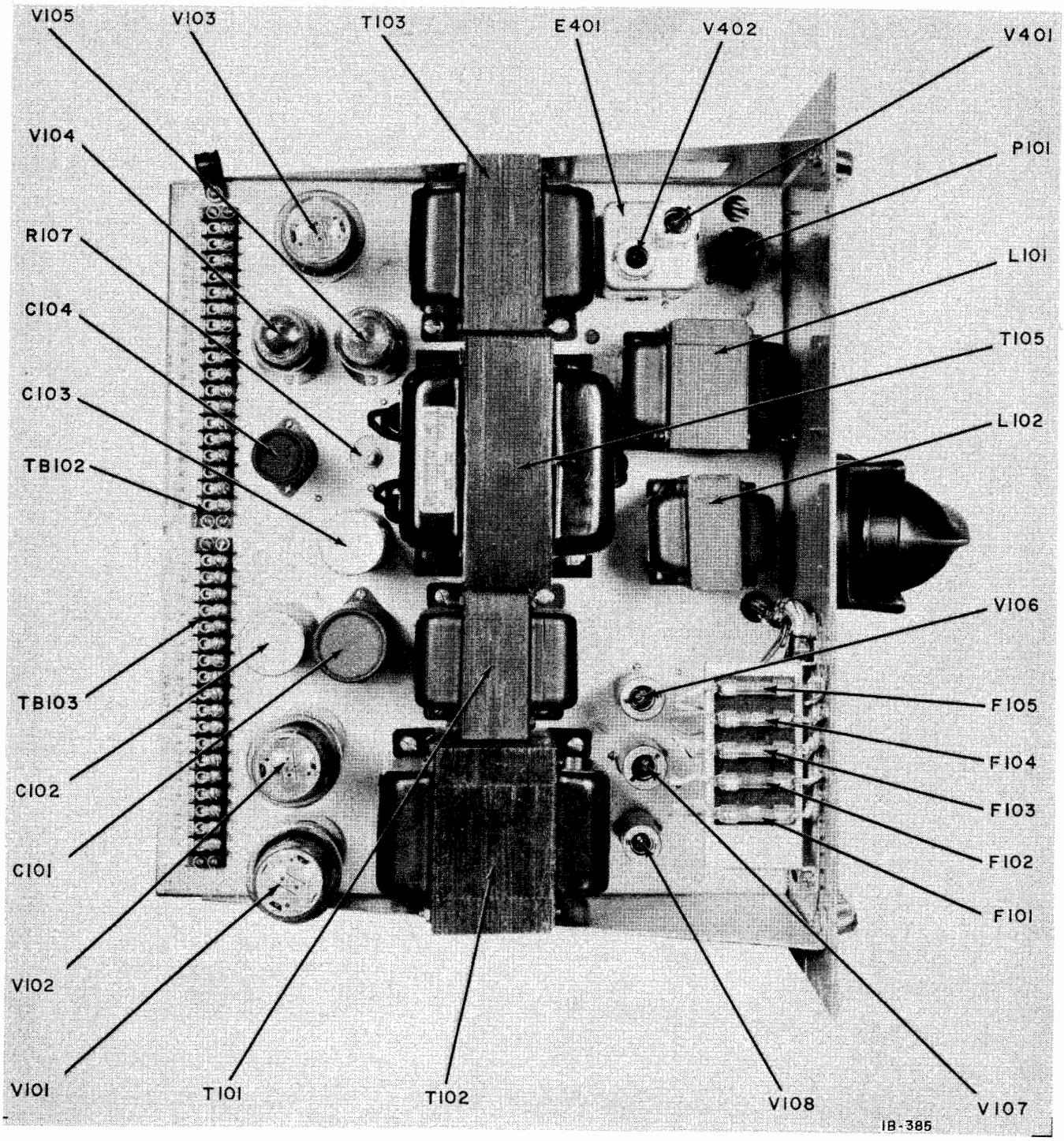


Figure 16. Power Supply, Top View

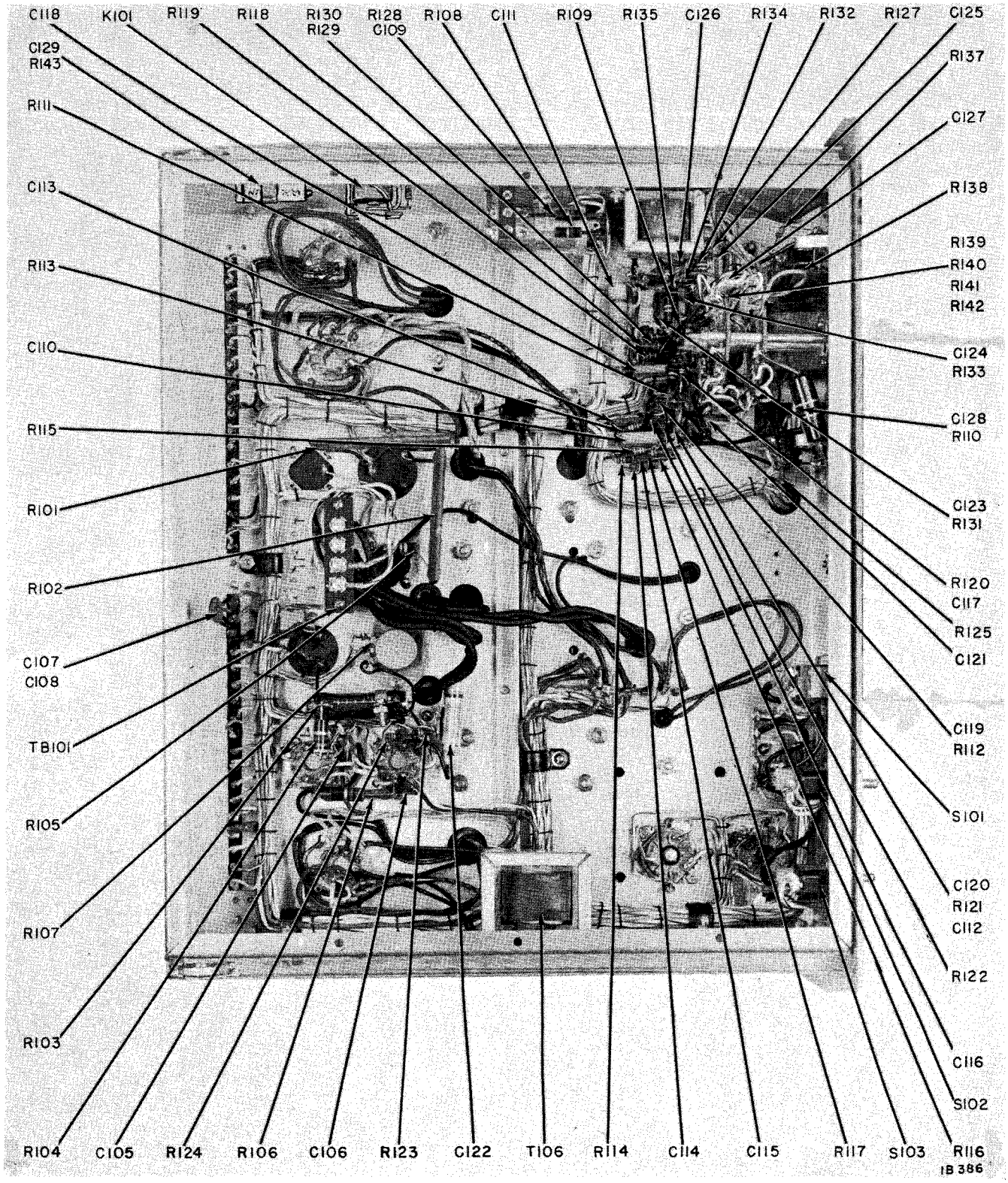


Figure 17. Power Supply, Bottom View

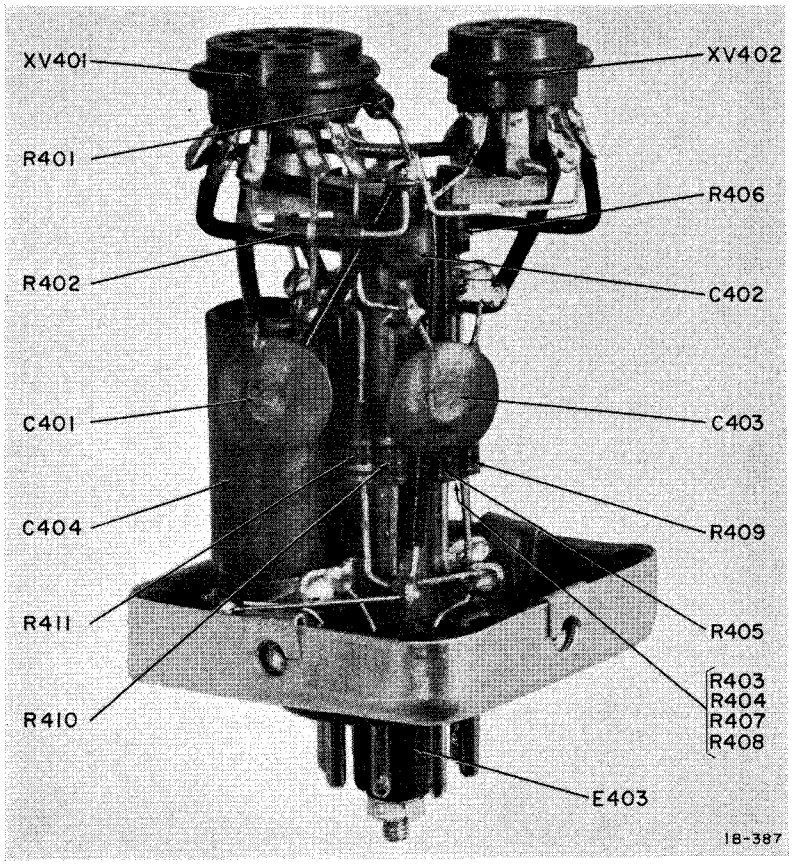
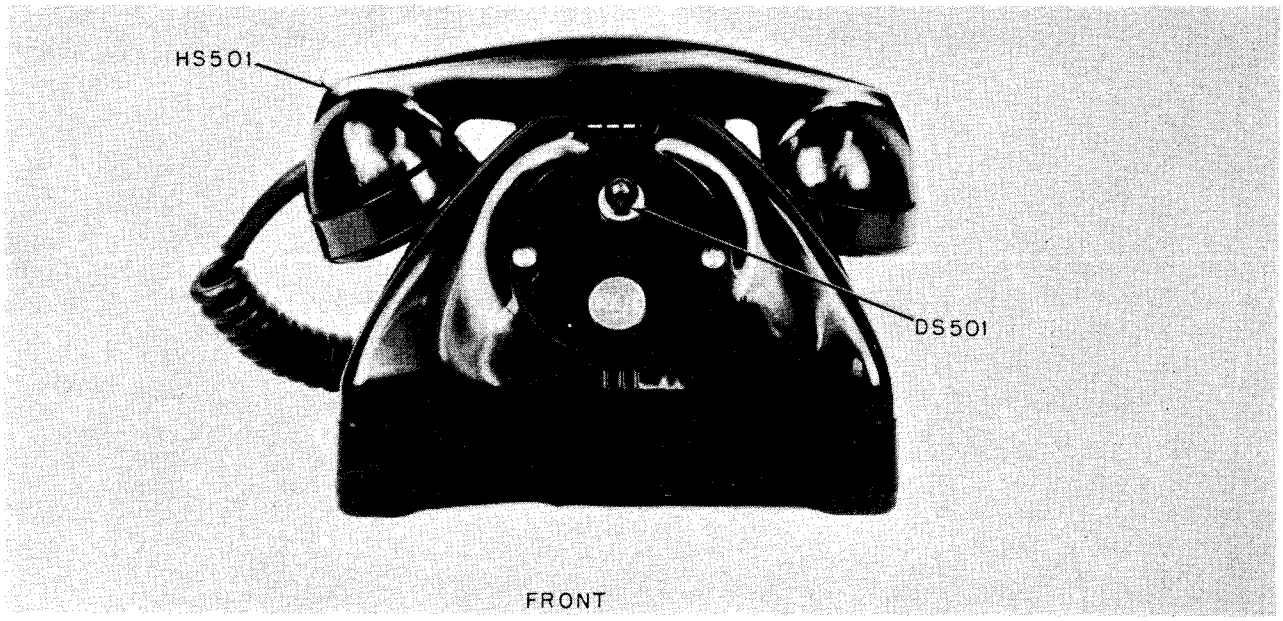


Figure 18. Speech Clipper, Internal View



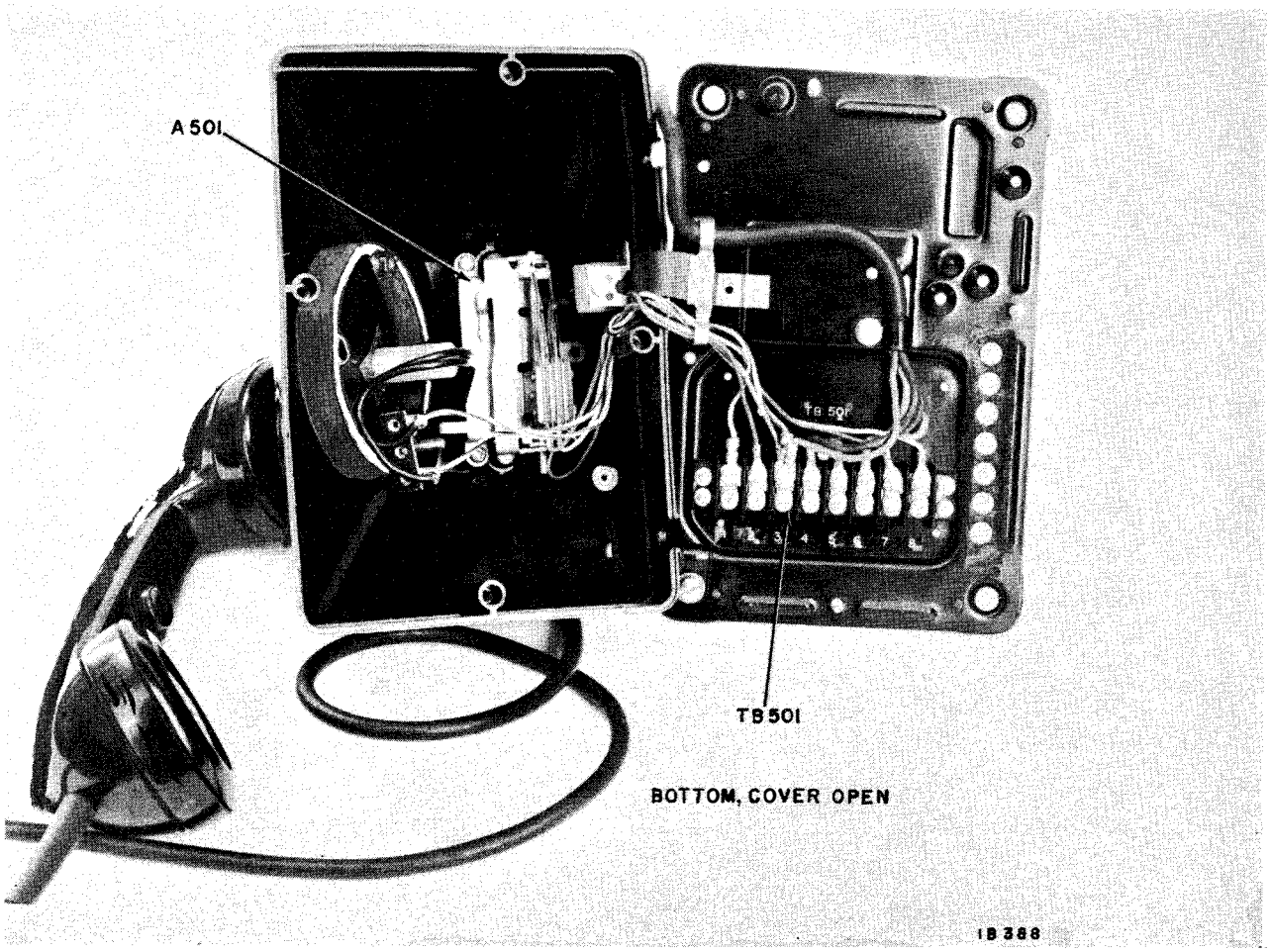


Figure 19. Remote Desk Set

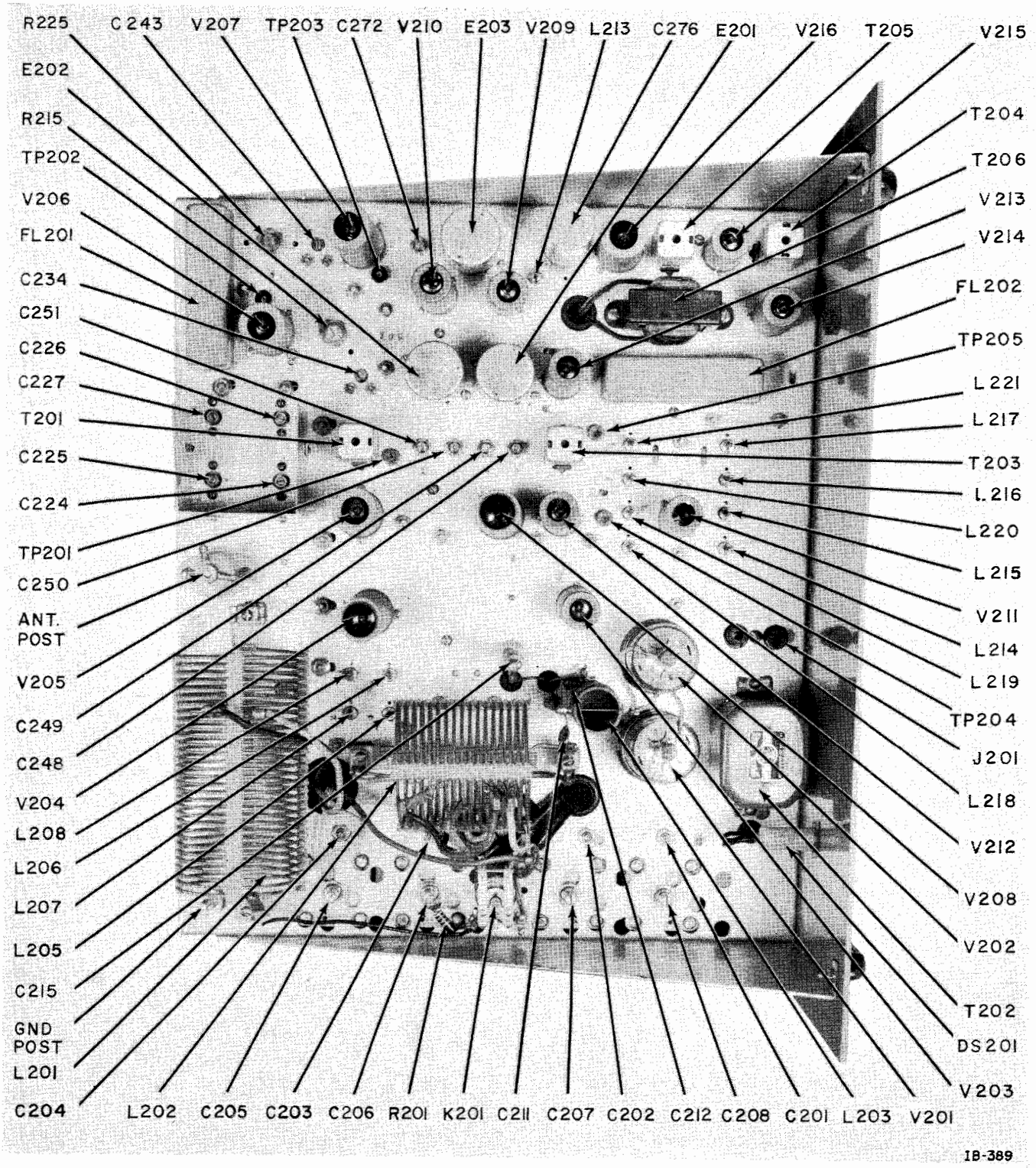


Figure 20. Transmitter-Receiver, Top View

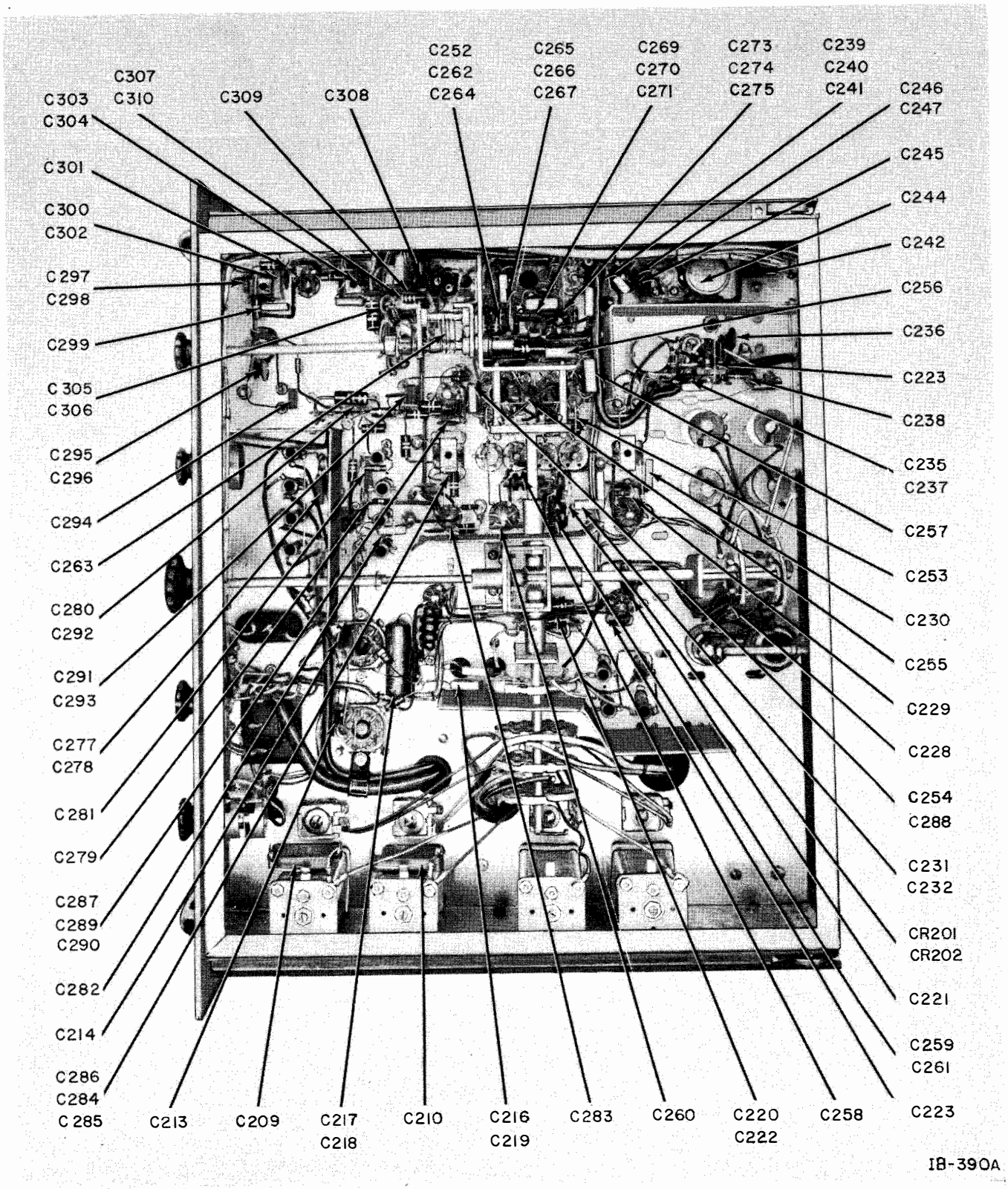


Figure 21A. Transmitter-Receiver, Bottom View, Location of Capacitors

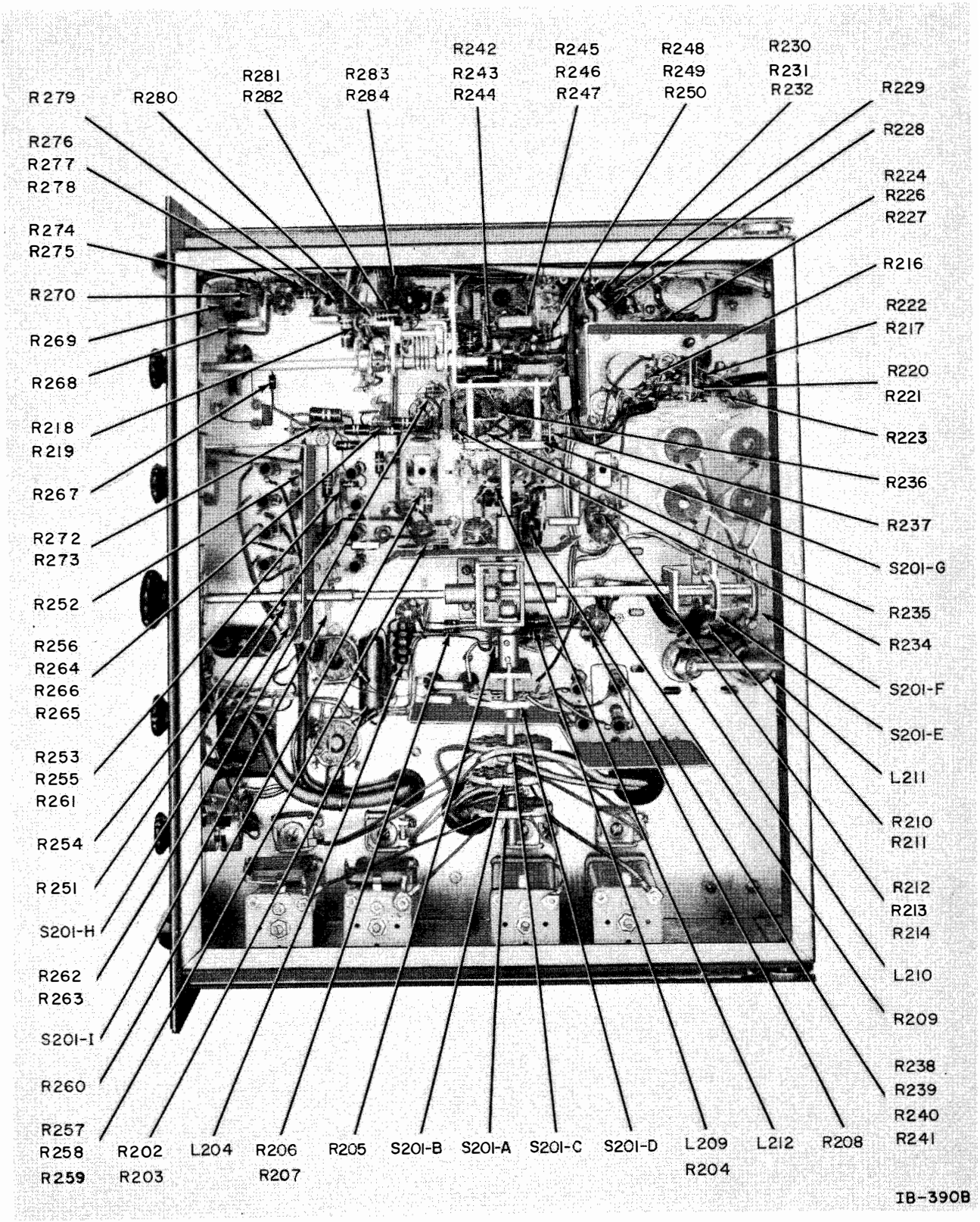


Figure 21B. Transmitter-Receiver, Bottom View, Location of Components other than Capacitors

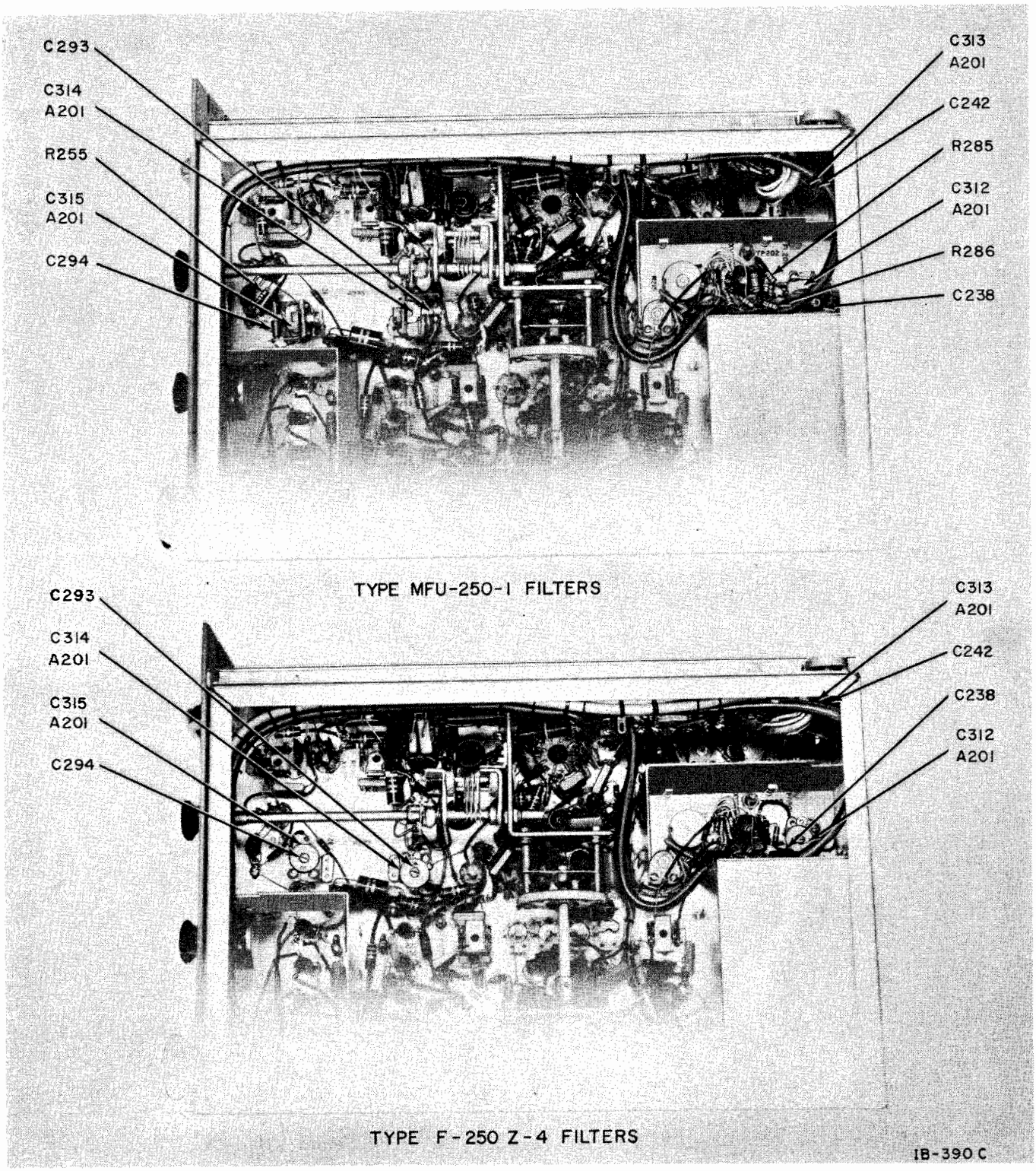


Figure 21C. Transmitter-Receiver, Components Used with Mechanical Filters, Equipments Serial Nos. 5601 and above

DIRECTIONS – Identify similar component type in the proper column on the lower section of the page. Read across the rows at the top to determine the significance or value of the various colors.

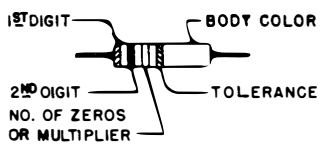
COLOR	DIGITS OR NO. OF ZEROS	RESISTORS RMA & JAN		CAPACITORS MOLDED MICA RMA & JAN			CAPACITORS MOLDED PAPER		CAPACITORS CERAMIC RMA & JAN				DIGITS OR NO. OF ZEROS	COLOR
		MULTIPLIER	TOLERANCE	MULTIPLIER	TOLERANCE	CLASS OR CHARACTERISTIC	MULTIPLIER	TOLERANCE	MULTIPLIER	TOLERANCE C > 10 μμf	TOLERANCE C ≤ 10 μμf	TEMP. COEFF. PTS. / MIL. / °C.		
BLACK	0	1		1	20%	A	1	20%	1	20%	2.0	0	0	BLACK
BROWN	1	10		10		B	10		10	1%		-30	1	BROWN
RED	2	100		100	2%	C	100		100	2%		-80	2	RED
ORANGE	3	1000		1000	3% (RMA)	D	1000		1000	2.5% (RMA)		-150	3	ORANGE
YELLOW	4	10000		10000		E	10000	5%	10000 (RMA)			-220	4	YELLOW
GREEN	5	10^5			5% (RMA)	F (JAN)				5%	0.5	-330	5	GREEN
BLUE	6	10^6				G (JAN)						-470	6	BLUE
VIOLET	7	10^7										-750	7	VIOLET
GRAY	8	10^8				I (RMA)			.01		0.25	+30	8	GRAY
WHITE	9	10^9				J (RMA)		10%	.1	10%	1.0	-330 ±500 JAN +120 -750 RMA	9	WHITE
GOLD		.1	5%		5% (JAN)		.1	5%						GOLD
SILVER		.01	10%		10%			10%						SILVER
NO COLOR			20%					20%						NO COLOR

RESISTORS

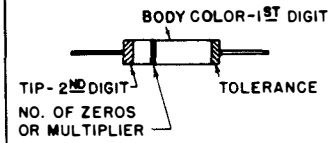
RMA & JAN COLOR CODING FOR FIXED COMPOSITION RESISTORS ARE IDENTICAL.
COLOR CODE GIVES THE RESISTANCE IN OHMS.

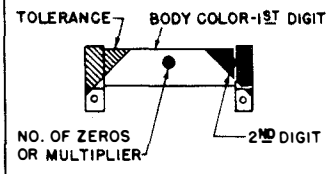
COLOR BAND SYSTEM

RESISTORS WITH BLACK BODY COLOR ARE COMPOSITION, NON-INSULATED.
RESISTORS WITH COLORED BODIES ARE COMPOSITION, INSULATED.
WIRE-WOUND RESISTORS HAVE THE 1ST DIGIT COLOR BAND DOUBLE WIDTH.



BODY, TIP, DOT OR NARROW BAND SYSTEM



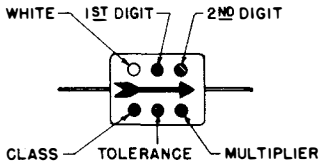


EXAMPLE –
BROWN-GREEN-RED = 1500 Ω ± 20%

CAPACITORS, MOLD. MICA

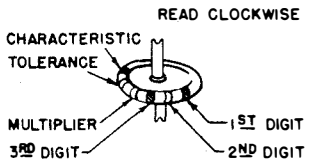
ALL AXIAL LEAD MICA CAPACITORS HAVE A VOLTAGE RATING OF 300 TO 500 VOLTS. THE MAXIMUM CAPACITY OBTAINABLE IS 10,000 μμf.
THE COLOR CODE GIVES THE CAPACITY IN μμf.

RMA 6 DOT SYSTEM

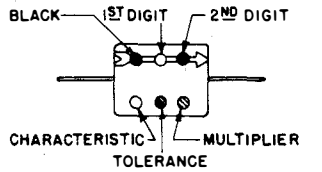


CLASS WAS PREVIOUSLY VOLTAGE.

BUTTON SILVER MICA



JAN 6 DOT SYSTEM

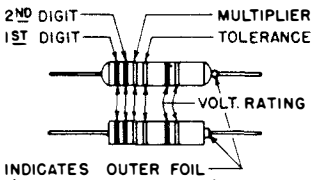


EXAMPLE – RMA 6 DOT
WHITE-ORANGE-BLUE } 360 μμf ± 2%
WHITE— RED—BROWN } CLASS J

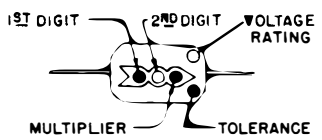
CAPACITORS, MOLD. PAPER

VOLTAGE RATINGS IN HUNDREDS OF VOLTS. ONE COLOR BAND EMPLOYED FOR RATINGS UNDER 1000 VOLTS.
THE COLOR CODE GIVES THE CAPACITY IN μμf.

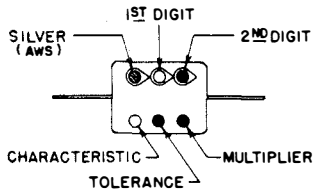
BAND SYSTEM



DOT SYSTEM



ARROW POINTS TO OUTER FOIL END

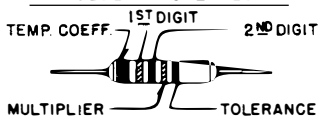


EXAMPLE –
RED-GREEN-ORANGE-BLACK-BROWN-RED
25000 μμf ± 20% 1200 Volts

CAPACITORS, CERAMIC

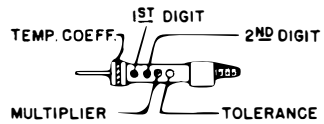
ALL TUBULAR CERAMIC CAPACITORS ARE RATED AT 500 VOLTS.
THE COLOR CODE GIVES THE CAPACITY IN μμf.

MOLDED INSULATED

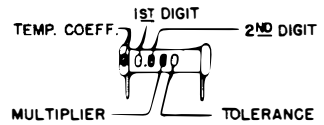


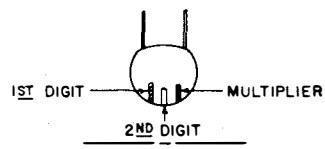
NOTE – DO NOT CONFUSE WITH RESISTORS. FIVE COLOR BANDS USED, (ONE BROAD, FOUR NARROW), WHILE RESISTORS USE FOUR BANDS.

STANDOFF CERAMIC

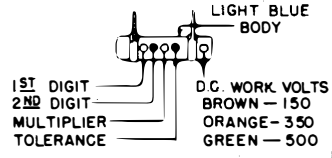


DIPPED PHENOLIC INSULATED OR NON-INSULATED





HI-CAPACITY CERAMIC TYPE (NOT TEMPERATURE COMPENSATED)



EXAMPLE –
BROWN-BLACK-ORANGE = 10000 μμf

Figure 22. Color Codes

T-1540

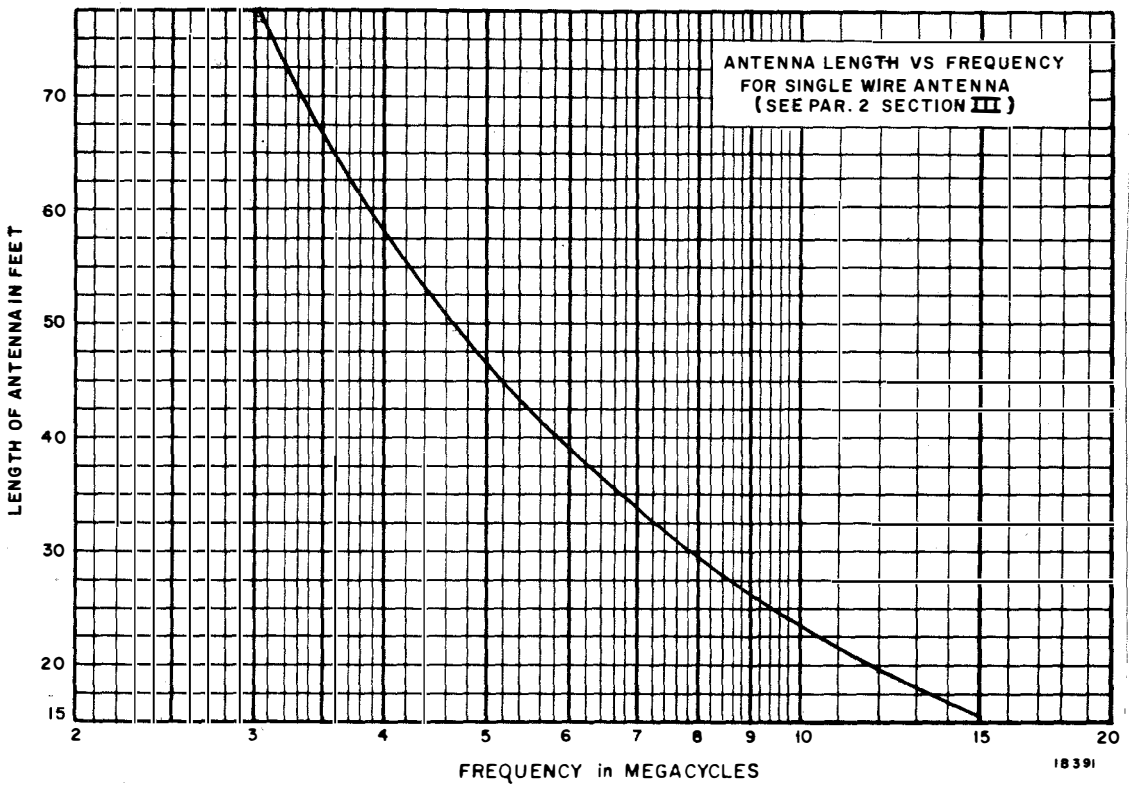


Figure 23. Antenna Length versus Frequency

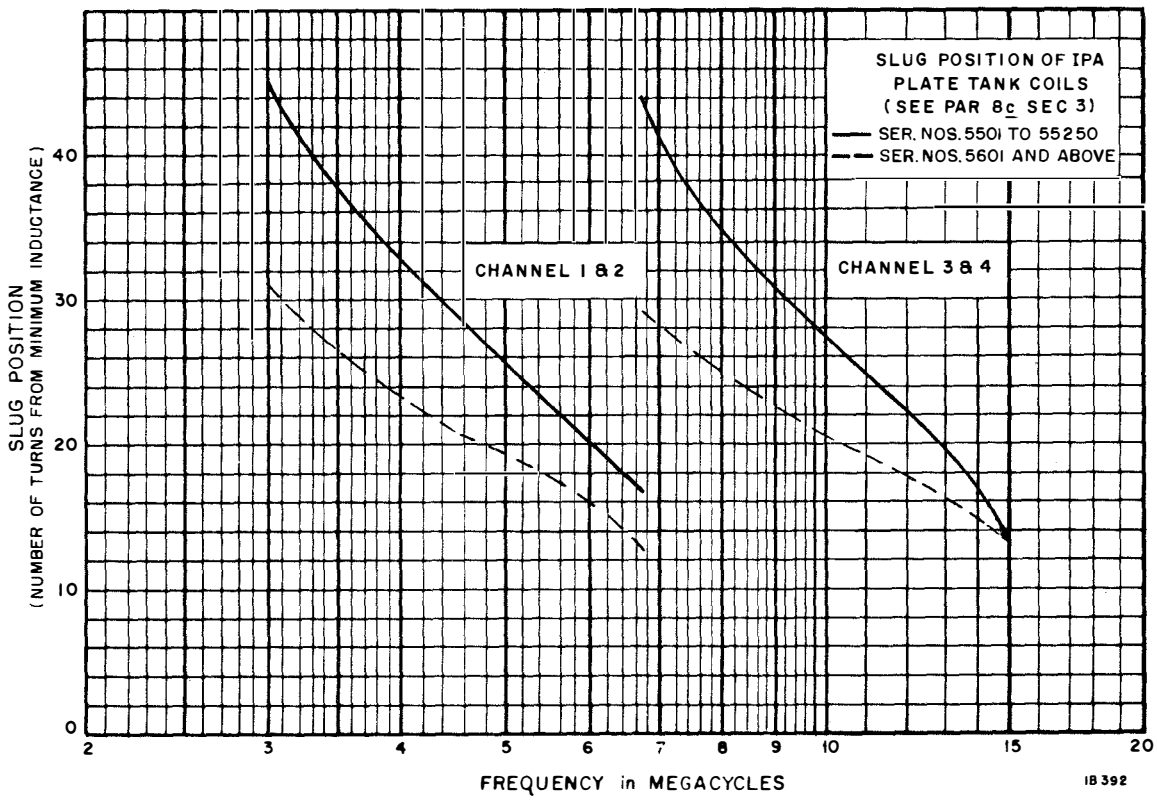


Figure 24. Slug Position of IPA Plate Tank Coils

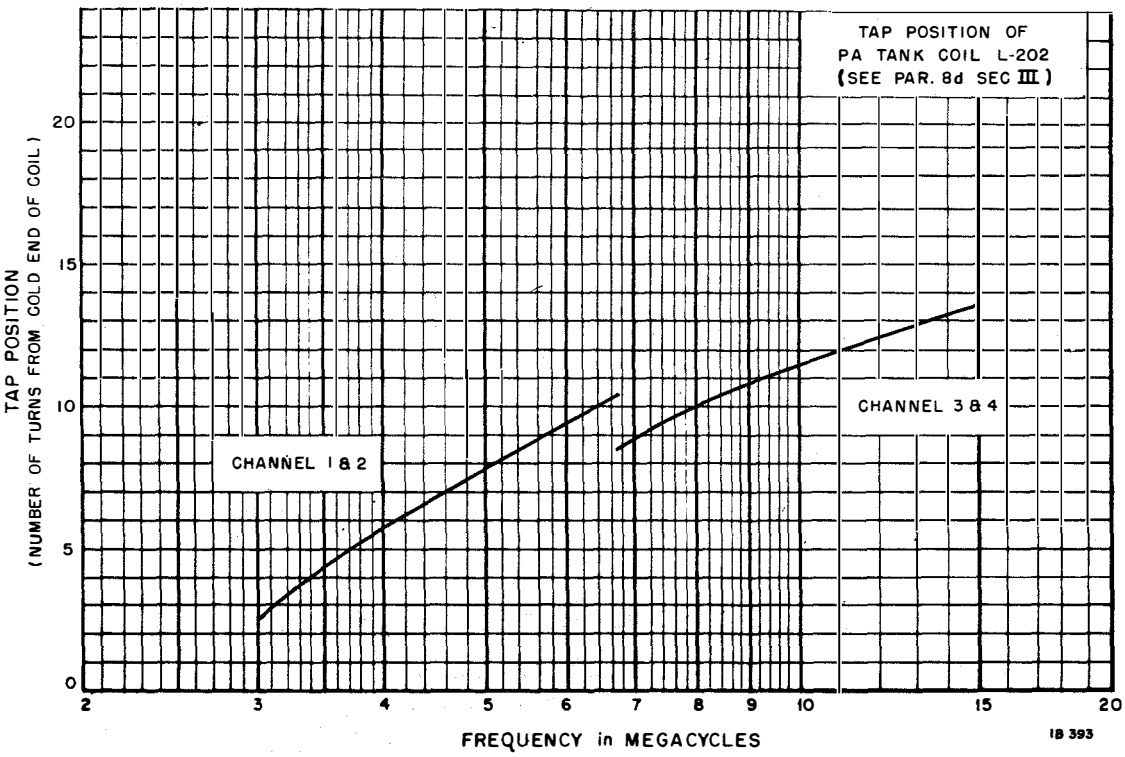


Figure 25. Tap Positions of Plate Tank Coil L-202

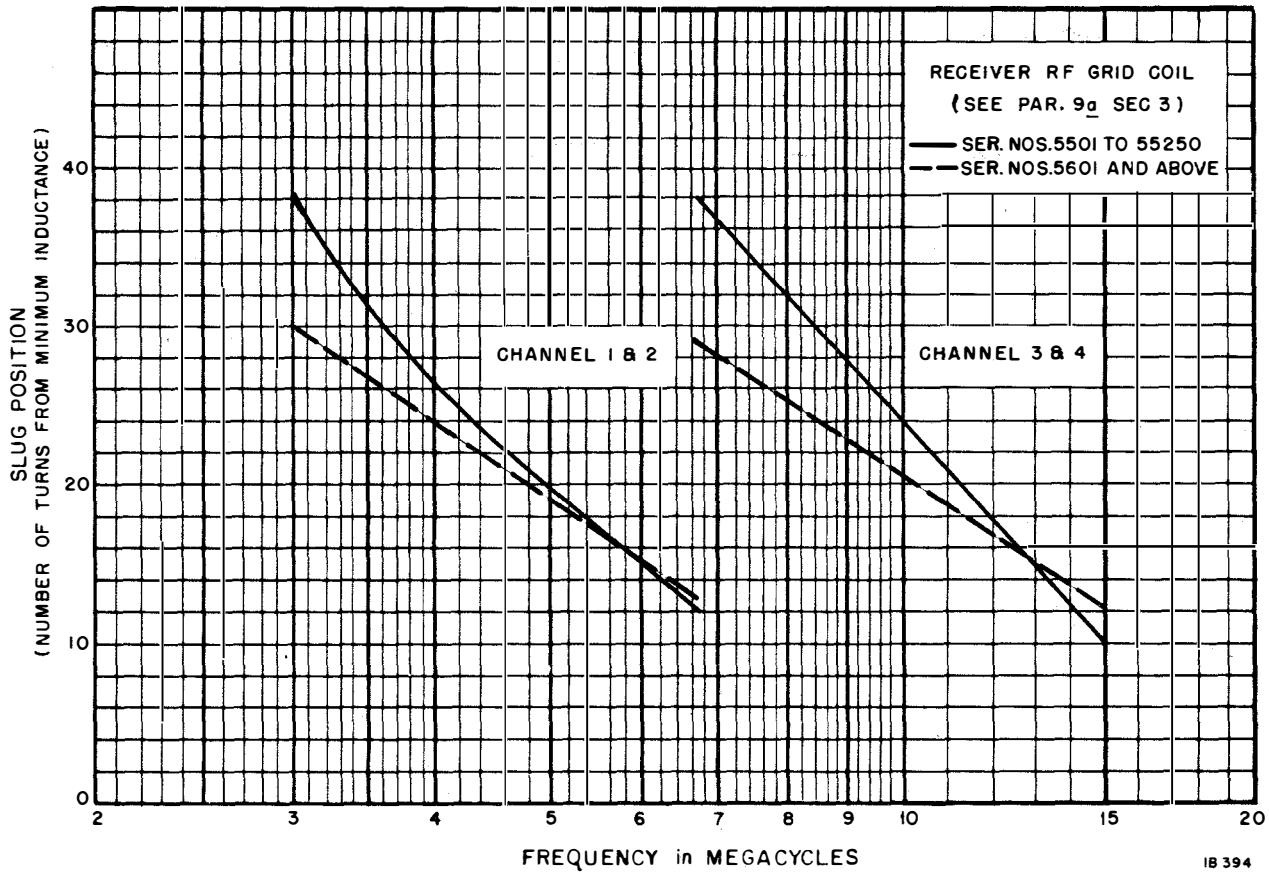


Figure 26. Slug Position of Receiver RF Coils

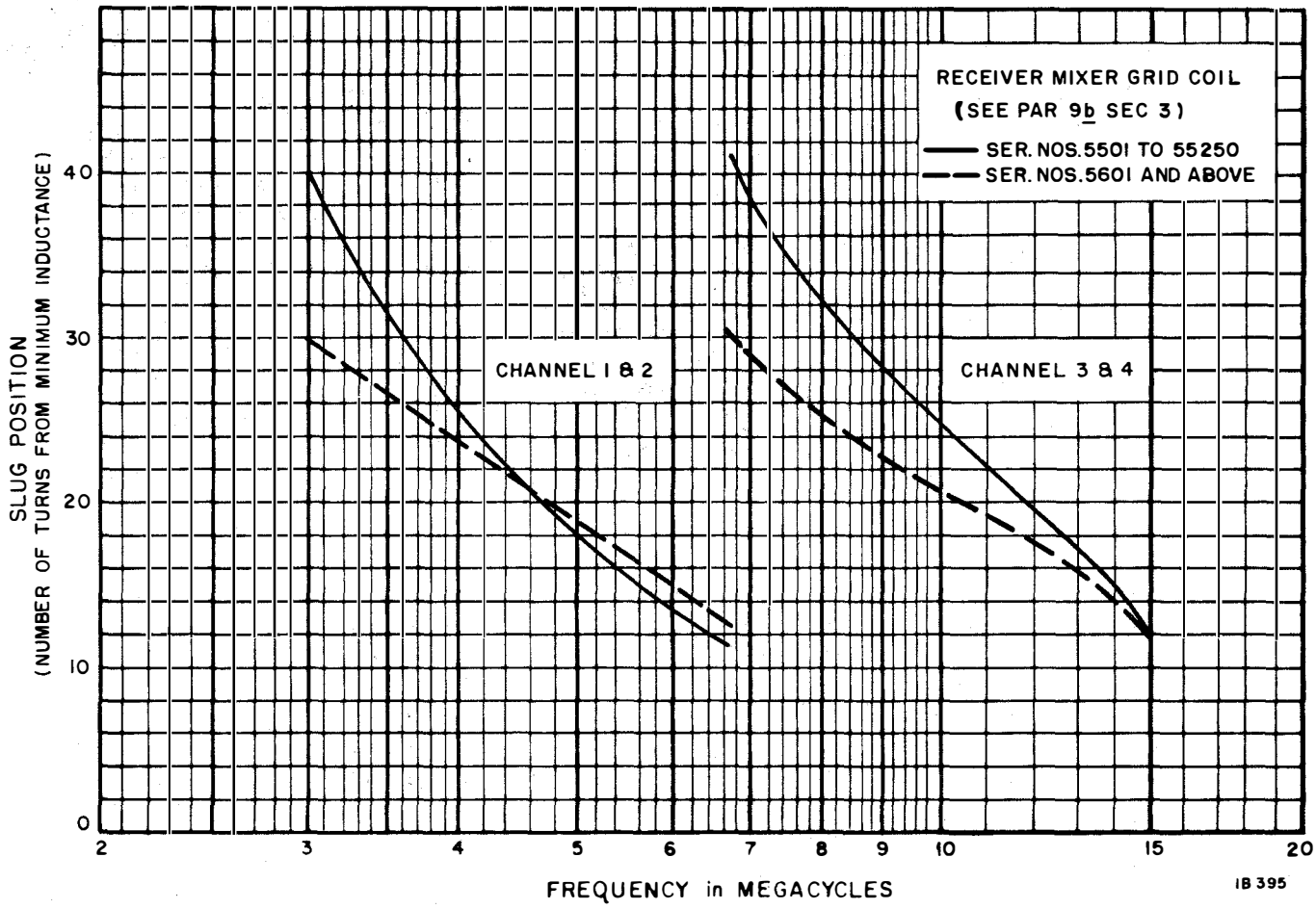


Figure 27. Slug Position of Receiver Mixer Grid Coils

Reference Symbol	Quantity	Locating Function	Name and Description	Stock Number
SSB-1			TRANSMITTER - RECEIVER UNIT	
A201	4	Mounting filter capacitor	For Serial Nos. 5501 to 55250 NOT USED. For Serial Nos. 5601 to 56200 Bracket, Radiomarine Dwg A-1214592. For Serial No. 56201 and above Bracket, Radiomarine Dwg A-1214593.	- 046-131 046-132
C101	2	Filter capacitor in power supply	Capacitor, Electrolytic, 125 uf -10+40%, 450 v, w/ cardboard insulating tube, Sprague Type DFP.	075-976
C102	1	Filter	Capacitor, Electrolytic, 125 uf -10 +40%, 450 v, Sprague Type DFP.	075-977
C103		Filter	Same as C101.	
C104	1	Filter	Capacitor, Electrolytic, 100 uf -10 +40%, 150 v, Sprague Type DFP.	075-975
C105	51	V104 Bypass	Capacitor, Ceramic, Disc Type, .01 uf guaranteed minimum, 500 v.	074-171
C106		+150 Bypass	Same as C105.	
C107		115 v ac Line bypass	Same as C105.	
C108		115 v ac Line bypass	Same as C105.	
C109A,B,C	1	B+ decoupling	Capacitor, Electrolytic, 10-10-10 uf, -10 +40%, 300 v, Sprague Type DFP.	077-290
C110	2	Tone oscillator wave shaping capacitor	Capacitor, Mica, 2200 uuf, ±10%, 500 v.	067-298
C111	2	Coupling condensor V107 to speech clipper	Capacitor, Electrolytic, 10 uf, -10 +40%, 150 v, Sprague Type DEE.	075-943
C112		Key bypass	Same as C105.	
C113	3	Tone oscillator frequency capacitor	Capacitor, Mica, 390 uuf, ±10%, 500 v.	066-724
C114		Tone oscillator frequency capacitor	Same as C113.	
C115		Tone oscillator frequency capacitor	Same as C113.	
C116		Tone oscillator plate grid coupling capacitor	Same as C105.	
C117		V106, V107 coupling condensor capacitor	Same as C105.	
C118	4	V107 Grid bypass	Capacitor, Mica, 330 uuf, ±10%, 500 v, JAN CM20B331K.	066-686
C119	1	V106 Coupling	Capacitor, Mica, 27 uuf, ±10%, 500 v, JAN CM20B270K.	066-332
C120	2	V106 Grid bypass	Capacitor, Ceramic, .01 uuf, ±20%, 500 v, Disc Type.	074-016
C121		V106 Grid coupling	Same as C120.	
C122		Bias decoupling	Same as C111.	

Reference Symbol	Quantity	Locating Function	Name and Description	Stock Number
SSB-1			TRANSMITTER - RECEIVER UNIT	
C123		V107, V108 coupling capacitor	Same as C105.	
C124	4	V108 grid bypass	Capacitor, Mica, 100 uuf, ±10%, 500v, JAN CM20B101K.	066-322
C125	2	V108 cathode bypass	Capacitor, Elect., 25 uf, -10% +75%, 25v, Sprague Type DEE.	075-945
C126	4	V108 plate bypass	Capacitor, Mica, 1,000 uuf, ±10%, 300 v, JAN CM20B102K.	067-011
C127	5	Side tone capacitor	Capacitor, Paper, 0.1 uf, ±20%, 200v, Sprague Type 67P10402.	074-145
C128		Mike button bypass	Same as C127.	
C129	1	Relay delay	Capacitor, Elect., 50uf, 150v, Mallory Type TC-49	075-790
C201	2	Channel 1 loading capacitor	Capacitor, Var., Mica, 1400-3055 uuf, 250v, El Menco Type 315.	078-430
C202		Channel 2 loading capacitor	Same as C201.	
C203	2	Channel 3 loading capacitor	Capacitor, Var., Mica, 340-1070 uuf, 500v, El Menco Type 307M.	078-425
C204		Channel 4 loading capacitor	Same as C203.	
C205	4	Channel 4 tuning capacitor	Capacitor, Var., Air, 12-250 uuf, 1500 v, Bud Type CE2007.	078-243
C206		Channel 3 tuning capacitor	Same as C205.	
C207		Channel 2 tuning capacitor	Same as C205.	
C208		Channel 1 tuning capacitor	Same as C205.	
C209	2	Channel 1 padding capacitor	Capacitor, Mica, 100 uuf, ±10%, 2500 v, Jan CM45B101K.	066-358
C210		Channel 2 padding capacitor.	Same as C209.	
C211	2	PA coupling capacitor	Capacitor, Ceramic, 1000 uuf, ±20%, 1500 v, Erie Type 1R5KV-102.	073-900
C212		PA plate bypass capacitor	Same as C211.	
C213		PA screen bypass capacitor	Same as C105.	
C214		PA screen bypass capacitor	Same as C105.	

Reference Symbol	Quantity	Locating Function	Name and Description	Stock Number
SSB-1			TRANSMITTER - RECEIVER UNIT	
C215	1	PA neutralizing capacitor	Capacitor, Var., Air, Neut., 0.75-4 uuf, Bud Type NC-1928.	078-484
C216		IPA coupling capacitor	Same as C126.	
C217		Bias filter capacitor	Same as C105.	
C218	1	Bias filter capacitor	Capacitor, Paper, 0.47 uf, ±20%, 200 v, Sprague Type 67P47402.	074-928
C219	1	IPA tuning capacitor	Capacitor, Mica, 22 uuf, ±5%, 500 v, Jan CM20B220J.	066-060
C220	1	IPA plate bypass capacitor	Capacitor, Mica, 470 uuf, ±10%, 500v, Jan CM20B471K.	066-772
C221		IPA screen bypass capacitor	Same as C105.	
C222		IPA screen bypass capacitor	Same as C105.	
C223		IPA cathode bypass capacitor	Same as C105.	
C224	4	V205 balanced modulator channel 4 tuning capacitor	Capacitor, Var., Air, 6.7-140 uuf, 600 v, Hammerlund Type APC-140.	078-012
C225		V205 balanced modulator channel 3 tuning capacitor	Same as C224.	
C226		V205 balanced modulator channel 2 tuning capacitor	Same as C224.	
C227		V205 balanced modulator channel 1 tuning capacitor	Same as C224.	
C228		V205 balanced modulator plate bypass capacitor	Same as C105.	
C229		V205 balanced modulator cathode bypass capacitor	Same as C105.	
C230	5	T201 output tuning capacitor	Capacitor, Mica, 22 uuf, ±10%, 500 v, Jan CM20B220K.	066-066
C231		T201 output tuning capacitor	Same as C230.	
C232	6	V208 output capacitor	Capacitor, Mica, 10 uuf, ±10%, 500 v, Jan CM20B100K.	066-018
C233		T201 plate tuning capacitor	Same as C230.	
C234	2	T201 plate tuning and balancing capacitor	Capacitor, Var., Cer., 4-30 uuf, Erie Type TS2A-4.	078-016

Reference Symbol	Quantity	Locating Function	Name and Description	Stock Number
SSB-1			TRANSMITTER - RECEIVER UNIT	
C235		V206 balanced modulator plate bypass capacitor	Same as C105.	
C236		V206 balanced modulator cathode bypass capacitor	Same as C105.	
C237		V209 output capacitor	Same as C118.	
C238	3	FL201 output tuning	For Serial Nos. 5501 to 55250 Capacitor, Mica, 91 uuf, ±5%, 500 v, JAN CM20B910J.	066-284
	2		For Serial Nos. 5601 to 56200 Capacitor, Mica, 68 uuf, ±5%, 500 v, JAN CM20B680J.	066-264
	4		For Serial No. 56201 and above Capacitor, Mica, 360 uuf, ±2%, 500 v, JAN CM20C361G.	066-274
C239		V210 output capacitor	Same as C118.	
C240	1	Carrier in capacitor	Capacitor, Var., Cer., 1.5-7 uuf, Erie No. TS2A-1.5.	078-014
C241		FL201 filter input tuning	Same as C230.	
C242	1	FL201 filter input tuning	For Serial Nos. 5501 to 55250 Capacitor, Mica, 82 uuf, ±10%, 500 v, JAN CM20B820K.	066-141
	2		For Serial Nos. 5601 to 56200 Capacitor, Mica, 62 uuf, ±5%, 500 v, JAN CM20B620J.	066-246
			For Serial No. 56201 and above Same as C238.	
C243		FL201 filter input tuning and balancing capacitor	Same as C234.	
C244		V207 plate bypass	Same as C105.	
C245		V207 cathode bypass	Same as C105.	
C246		V207 input bypass	Same as C124.	
C247		V207 input bypass	Same as C124.	
C248	5	Channel 4 crystal tuning	Capacitor, Var., Air, 2.3-14.2 uuf, 1100 v, Johnson Type 15M11.	078-131
C249		Channel 3 crystal tuning	Same as C248.	
C250		Channel 2 crystal tuning	Same as C248.	
C251		Channel 1 crystal tuning	Same as C248.	
C252		Oven heater bypass	Same as C127.	
C253		Oven heater bypass	Same as C127.	
C254	2	Channel 4 crystal feedback	Capacitor, Mica, 510 uuf, ±5%, 500 v JAN CM20B511J.	066-826
C255		Channel 3 crystal feedback	Same as C254.	

Reference Symbol	Quantity	Locating Function	Name and Description	Stock Number
SSB-1			TRANSMITTER - RECEIVER UNIT	
C256	3	Channel 2 crystal feedback capacitor	Capacitor, Mica, 1200 uuf, ±10%, 500 v, Jan CM30B122K.	067-100
C257		Channel 1 crystal feedback capacitor	Same as C256.	
C258		V208 coupling capacitor	Same as C105.	
C259		V208 plate output capacitor	Same as C126.	
C260	2	V212 oscillator input capacitor	Capacitor, Cer., 3 uuf, ±20%, 600 v, Centralab Type D6-030.	073-924
C261		CR202 bypass capacitor	Same as C105.	
C262		V209 plate bypass capacitor	Same as C105.	
C263		V213 oscillator input capacitor	Same as C260.	
C264	1	V209 plate tuning capacitor	Capacitor, Mica, 750 uuf, ±5%, 300 v, Jan CM20B751J.	066-910
C265		V209 screen bypass capacitor	Same as C105.	
C266		V209 coupling capacitor	Same as C105.	
C267		1150 kc crystal feedback capacitor	Same as C118.	
C268	1	1150 kc crystal tuning capacitor (speech clarifier)	Capacitor, Var., Air, 6-50 uuf, Bud Type MC-903	078-485
C269		Oven heater bypass capacitor	Same as C127.	
C270		250 kc crystal feedback capacitor	Same as C256.	
C271		V210 coupling capacitor	Same as C105.	
C272		250 kc crystal tuning capacitor	Same as C248.	
C273	1	V216A oscillator input capacitor	Capacitor, Cer., 5 uuf, ±20%, 600 v, Centralab Type D6-050.	073-925
C274		V210 screen bypass capacitor	Same as C105.	
C275		V210 plate bypass capacitor	Same as C105.	

Reference Symbol	Quantity	Locating Function	Name and Description	Stock Number
SSB-1			TRANSMITTER - RECEIVER UNIT	
C276A, B, C	1	Bypass	Capacitor, Electrolytic, 20-10-20 uf, 350-350-25 v, Sprague Type DFP.	077-894
C277	1	V211 input tuning	Capacitor, Mica, 62 uuf, ±5%, 500 v, JAN CM20B620J.	066-246
C278		V211 cathode bypass	Same as C105.	
C279		V211 screen bypass	Same as C105.	
C280		V211 plate bypass	Same as C105.	
C281	1	V211 plate tuning	Capacitor, Mica, 47 uuf, ±5%, 500 v, JAN CM20B470J.	066-138
C282		V211, V212 coupling	Same as C124.	
C283		V212 cathode bypass	Same as C105.	
C284		V212 screen bypass	Same as C105.	
C285		V212 plate bypass	Same as C105.	
C286		T203 input tuning	Same as C232.	
C287		T203 output tuning	Same as C232.	
C288		V213 cathode bypass	Same as C105.	
C289		V213 screen bypass	Same as C105.	
C290		FL202 coupling	Same as C105.	
C291		V213 plate bypass	Same as C105.	
C292		Receiver gain control bypass	Same as C105.	
C293		FL202 input tuning	For Serial Nos. 5501 to 55250 and 56201 and above Same as C238. For Serial Nos. 5601 to 56200 Same as C242.	
C294		FL202 output tuning	Same as C238.	
C295		V214 cathode bypass	Same as C105.	
C296		V214 screen bypass	Same as C105.	
C297		V214 plate bypass	Same as C105.	
C298		T204 input tuning	Same as C232.	
C299		V214, V215 coupling	Same as C232.	
C300		T204 output tuning	Same as C230.	
C301		V215 screen bypass	Same as C105.	
C302		V215 cathode bypass	Same as C105.	
C303		V215 plate bypass	Same as C105.	
C304		T205 input tuning	Same as C232.	
C305	1	T205 output tuning	Capacitor, Mica, 15 uuf, ±10%, 500 v, JAN CM20B150K.	066-039

Reference Symbol	Quantity	Locating Function	Name and Description	Stock Number
SSB-1			TRANSMITTER - RECEIVER UNIT	
C306		V216A input capacitor	Same as C105.	
C307		V216A plate bypass capacitor	Same as C126.	
C308		V216B plate bypass capacitor	Same as C105.	
C309		V216A, V216B coupling capacitor	Same as C105.	
C310		V216B plate bypass	Same as C110.	
C311		V203 screen bypass	Same as C105.	
C312	4	FL201 filter tuning	For Serial Nos. 5501 to 55250 NOT USED.	
			For Serial Nos. 5601 to 56200 Capacitor, Variable, Ceramic, 7-45 uuf, 500 vdcw, Erie TS2A-7.	078-389
			For Serial No. 56201 and above Capacitor, Variable, Ceramic, 20-125 uuf, Centralab 823-AN.	078-175
C313		FL201 filter tuning	Same as C312.	
C314		FL202 filter tuning	Same as C312.	
C315		FL202 filter tuning	Same as C312.	
CR201	2	V208 crystal oscillator output level equalizer	Crystal Diode, Germanium, Type 1N34A.	115-021
CR202		V208 crystal oscillator output level equalizer	Same as CR201.	
DS101	2	Transmitter "on" indicator	Dial Light, neon, red including mounting nut, Omni-Glow Type 1010A1.	262-293
DS102	1	Receiver "on" indicator	Dial Light, neon, amber including mounting nut, Omni-Glow Type 1010A3.	262-292
DS103	4	Power "on" indicator	Dial Light, neon, white including mounting nut, Omni-Glow Type 1010A4.	262-291
DS104		Remote desk set no. 1 indicator	Same as DS103.	
DS105		Remote desk set no. 2 indicator	Same as DS103.	
DS106		Remote desk set no. 3 indicator	Same as DS103.	
DS201		Peak modulation indicator	Same as DS101.	
E101	8	For V106	For Serial Nos. 5501 to 55250 Tube shield, Elco Type 227.	304-750
	7		For Serial No. 5601 and above Tube shield, JAN TS103U02.	304-450

Reference Symbol	Quantity	Locating Function	Name and Description	Stock Number
SSB-1			TRANSMITTER - RECEIVER UNIT	
E102		For V107	Same as E101.	
E103	1	For V108	For Serial Nos. 5501 to 55250 Tube shield, Elco Type 314.	304-249
			For Serial No. 5601 and above Tube shield, JAN TS102U03.	304-346
E201	3	Mounting for Y201, Y202	Crystal oven, temperature stabilizer, 6.3 v ac, 75° C, Dual crystal, Radiomarine Dwg A-1219561.	228-602
E202		Mounting for Y203, Y204	Same as E201.	
E203		Mounting for Y205, Y206	Same as E201.	
E204	1	Antenna terminal	Insulator, Birnback Type 866.	184-144
E205	8	For V203	For Serial Nos 5501 to 55250 Tube shield, Elco Type 200.	304-375
			For Serial No. 5601 and above Tube shield, JAN TS102U02.	
E206	2	For V204	For Serial Nos. 5501 to 55250 Tube shield, Elco Type 227 modified per Radiomarine Dwg A-1214334.	304-394
			For Serial No. 5601 and above Tube shield, JAN TS103U03.	
E207		For V205	Same as E101.	
E208		For V206	Same as E101.	
E209		For V207	Same as E101.	
E210		For V208	Same as E206.	
E211		For V209	Same as E205.	
E212		For V210	Same as E205.	
E213		For V211	Same as E205.	
E214		For V212	Same as E205.	
E215		For V213	Same as E205.	
E216		For V214	Same as E205.	
E217		For V215	Same as E205.	
E218		For V216	Same as E101.	
F101	1	Main line protection	Fuse, 3A, (Time Lag), 125v, Littelfuse Type 3AG.	146-196
F102	1	Oven protection	Fuse, 0.5A, 250v, Littelfuse Type 3AG.	146-075
F103	1	Receiver protection	Fuse, 1.5A, (Time Lag), 125 v, Littelfuse Type 3AG.	146-248
F104	1	Transmitter protection	Fuse, 2.0A, (Time Lag), 125 v, Littelfuse Type 3AG.	146-233
F105	1	Low voltage protection	Fuse, 0.25A, 250v, Littelfuse Type 3AG.	146-045

Reference Symbol	Quantity	Locating Function	Name and Description	Stock Number
SSB-1			TRANSMITTER - RECEIVER UNIT	
FL201	2	Transmitter sideband	For Serial Nos. 5501 to 55250 Mechanical Filter, Band-pass, 251.8 kc center frequency, band width 3.2 kc at 6 db, Type F250Z-4, modified skirt selectivity.	136-284
			For Serial Nos. 5601 to 56200 Mechanical Filter, Band-pass, 250 kc, upper sideband, 3 kc bandwidth at 6 db, Type F250Z-4, Case style C.	136-284
			For Serial No. 56201 and above Mechanical Filter, Band-pass, 250 kc, upper sideband, 3 kc bandwidth at 6 db, Type MFU-250-1.	136-036
FL202		Receiver sideband	Same as FL201.	
HS101	1	Transmitter input/ receiver output	Handset, with 4 foot, 4 conductor rubber covered retrax cable, 10 inches retracted (approximate), Roanwell Corporation Type 10219.	166-240
J101	12	Mounting for receiver AVC unit	Socket, octal, cadmium plated, brass contact, Elco Type 335.	261-889
J102		Mounting for speech clipper	Same as J101.	
J103	2	Key jack	Jack, telephone type, open circuit, Switchcraft Type 11.	259-038
J104		Phone jack	Same as J103.	
J201	1	Connection for PA plate meter	Jack, meter, twin tip shorting type, Johnson Type 105-432.	259-190
K101	1	Keying relay	Relay, coil 6.3 v ac, 50/60 cycles, contacts dpdt, Advance Type MG/2C/6VA.	265-800
K201	1	Receive-transmit relay	Relay, coil 5000 ohms, 85 v dc, contacts dpdt, Advance Type 3868Y.	265-396
L101	1	+600 filter choke	Inductance, 2-12 h at 25-250 ma, Stancor Type C1402.	349-670
L102	1	+210 filter choke	Inductance, 7 h at 140 ma, impreg., Stancor Type C1421.	349-675
L201	1	Antenna tuning	Inductance, 22 uh, Radiomarine Dwg A-499.	349-735
L202	1	PA tank tuning	Inductance, 12 uh, Radiomarine Dwg A-498.	349-736
L203	1	PA plate rf choke	Inductance, 155 uh, Radiomarine Dwg A-497.	349-535
L204	2	PA grid rf choke	Inductance, 1.0 mh, National Type R50.	348-130
L205	4	Channel 4 IPA plate tuning	For Serial Nos. 5501 to 55250 Inductance, 1.5-7.5 uh, Radiomarine Dwg B-1239561-1.	349-537
			For Serial No. 5601 and above Inductance, 1.5-7.5 uh, Radiomarine Dwg B-1239611-1.	348-142
L206		Channel 3 IPA plate tuning	Same as L205.	
L207	4	Channel 2 IPA plate	For Serial Nos. 5501 to 55250 Inductance, 7.5-37.5 uh, Radiomarine Dwg B-1239561-2.	349-536
			For Serial No. 5601 and above Inductance, 7.5-37.5 uh, Radiomarine Dwg B-1239611-2.	348-144

Reference Symbol	Quantity	Locating Function	Name and Description	Stock Number
SSB-1			TRANSMITTER - RECEIVER UNIT	
L208		Channel 1 IPA plate tuning	Same as L207.	
L209	1	IPA plate rf choke	Inductance, 0.5 mh, National Type R50.	348-135
L210	1	V205 balance modulator tuning channel 1 and 2	Inductance, 22 uh with 6 uh link, Radiomarine Dwg A-1219503-1	349-737
L211	1	V205 balance modulator tuning channel 3 and 4	Inductance, 5 uh with 0.5 uh link, Radiomarine Dwg A-1219503-2	349-738
L212		V208 screen rf choke	Same as L204.	
L213	1	V209 plate tuning	Inductance, 16-55 uh, Crest Labs Type 200-4.	349-625
L214	2	Channel 4 input tuning for V211	For Serial Nos. 5501 to 55250 Inductance, 1.5-7.5 uh, Radiomarine Dwg B-1239561-1A.	349-538
			For Serial No. 5601 and above Inductance, 1.5-7.5 uh, Radiomarine Dwg B-1239611-1A.	348-146
L215		Channel 3 input tuning for V211	Same as L214.	
L216	2	Channel 2 input tuning for V211	For Serial Nos. 5501 to 55250 Inductance, 7.5-37.5 uh, Radiomarine Dwg B-1239561-2A.	349-539
			For Serial No. 5601 and above Inductance, 7.5-37.5 uh, Radiomarine Dwg B-1239611-2A.	348-148
L217		Channel 1 input tuning for V211	Same as L216.	
L218		Channel 4 V211 plate tuning	Same as L207.	
L219		Channel 3 V211 plate tuning	Same as L207.	
L220		Channel 2 V211 plate tuning	Same as L205.	
L221		Channel 1 V211 plate tuning	Same as L205.	
L222	1	V208 peaking	For Serial Nos. 5501 to 55250 NOT USED.	
			For Serial No. 5601 and above Coil, RF, 1.24 uh, 19 turns, Radiomarine Dwg T-1569-part 17.	348-208
LS101	1	Receiver AF output	Loudspeaker, 4 in. by 6 in. oval, 3.2 ohm voice coil impedance, Radiomarine Dwg B-460292-1.	308-190
P101	1	Substitute for receiver AVC unit	Plug, 8 contacts, male receptacle, Amphenol Type 86-PM8.	260-263

Reference Symbol	Quantity	Locating Function	Name and Description	Stock Number
SSB-1			TRANSMITTER - RECEIVER UNIT	
P102		Substitute for speech clipper unit	Same as P101 (Not Supplied).	
R101	2	+600 v. power supply bleeder	Resistor, wirewound, 15,000 ohms, 20 w, Tru-ohm Type Ser-20.	279-797
R102		+600 v, power supply bleeder	Same as R101.	
R103	1	V104 current adjustment	Resistor, wirewound, adjustable, 2,000 ohms, 25 w, with bracket P3747, Tru-ohm Type AR25.	278-915
R104	2	V104 starting resistor	Resistor, composition, 470 ohms, ±10%, 2 w, JAN RC42BF471K.	276-471
R105	7	+210 bleeder	Resistor, composition, 100,000 ohms, ±10%, 1 w, JAN RC32BF104K.	273-104
R106	1	V105 dropping resistor	Resistor, wirewound, 900 ohms, 5 w, Tru-ohm Type Ser-5.	278-907
R107	2	Bias adjustment resistor	Resistor, composition, variable, 50,000 ohms, 1/2 w, linear taper, 5/8 in. slotted 3/64 in. by 1/16 in. shaft, 3/8 in. locking bushing, Mallory Type LC50MP with no. 232 nut, no. 227 lockwasher and A700469-2 locknut.	244-179
R108	2	Speech clipper decoupling	Resistor, composition, 1,000 ohms, ±10%, 1 w, JAN RC32BF102K.	293-102
R109	1	Receiver blocking bias resistor	Resistor, composition, 33,000 ohms, ±10%, 2 w, JAN RC42BF333K.	276-333
R110	8	Keying resistor	Resistor, composition, 10,000 ohms, ±10%, 1/2 w, JAN RC20BF103K.	270-103
	(7)		For Serial Nos. 5601 to 56600.	
R111	1	V106 plate resistor	Resistor, composition, 220,000 ohms, ±10%, 1 w, JAN RC32BF224K.	273-224
R112	2	V106 cathode resistor	Resistor, composition, 2,200 ohms, ±10%, 1/2 w, JAN RC20BF222K.	270-222
R113	8	Tone oscillator tuned circuit resistor	Resistor, composition, 470,000 ohms, ±10%, 1/2 w, JAN RC20BF474K.	270-474
R114		Tone oscillator tuned circuit resistor	Same as R113.	
R115		Tone oscillator tuned circuit resistor	Same as R113.	
R116	9	V106 grid resistor	Resistor, composition, 1 meg, ±10%, 1/2 w, JAN RC20BF105K.	270-105
R117	1	V106 grid resistor	Resistor, composition, 3.3 meg, ±10%, 1/2 w, JAN RC20BF335K.	270-335
R118	1	V107 cathode resistor	Resistor, composition, 7,500 ohms, ±10%, 1 w, JAN RC32BF752K.	273-752

Reference Symbol	Quantity	Locating Function	Name and Description	Stock Number
SSB-1			TRANSMITTER - RECEIVER UNIT	
R119		V107 grid resistor	Same as R113.	
R120		V106 plate resistor	Same as R105.	
R121	3	V106 cathode resistor	Resistor, composition, 330 ohms, ±10%, 1/2 W, JAN RC20BF331K.	270-331
R122		V106 grid resistor	Same as R116.	
R123		Bias divider	Same as R110.	
R124	2	Bias decoupling	Resistor, composition, 27,000 ohms, ±10%, 1/2 W, JAN RC20BF273K.	270-273
R125	7	Bias divider	Resistor, composition, 1,000 ohms, ±10%, 1/2 W, JAN RC20BF102K.	270-102
R126			Not Used.	
R127		T-206 termination	Same as R121.	
R128		Receiver AVC decoupling	Same as R108.	
R129		V107 grid resistor	Same as R121.	
R130	1	V107 cathode resistor	Resistor, composition, 2,700 ohms, ±10%, 1/2 W, JAN RC20BF272K.	270-272
R131		V107 plate resistor	Same as R105.	
R132	1	V107 plate decoupling	Resistor, composition, 22,000 ohms, ±10%, 1 W, JAN RC32BF223K.	273-223
R133		AF amplifier feedback	Same as R110.	
R134		V108 grid resistor	Same as R113.	
R135	3	V108 cathode resistor	Resistor, composition, 220 ohms, ±10%, 1/2 W, JAN RC20BF221K.	270-221
R136	1	Handset isolation resistor	Resistor, composition, 100 ohms, ±10%, 1 W, JAN RC32BF101K.	273-101
R137	6	Earphone isolation resistor	Resistor, composition, 470 ohms, ±10%, 1/2 W, JAN RC20BF471K.	270-471
R138	1	Speaker cut-out resistor	Resistor, W.W., 5 ohms, 5 W, Tru-ohm Type Ser-5.	278-457
R139	7	Dial light dropping resistor	Resistor, composition, 150,000 ohms, ±10%, 1/2 W, JAN RC20BF154K.	270-154
R140		Dial light dropping resistor	Same as R139.	
R141		Dial light dropping resistor	Same as R139.	

PARTS LIST (Cont'd)

Reference Symbol	Quantity	Locating Function	Name and Description	Stock Number
SSB-1			TRANSMITTER - RECEIVER UNIT	
R142		Dial light dropping resistor	Same as R139.	
R143		Relay delay	Same as R104.	
R201	5	Static discharge resistor	Resistor, composition, 47,000 ohms, ±10%, 1 w, JAN RC32BF473K.	273-473
R202	2	PA parasitic resistor	Resistor, wirewound, 4.3 ohms, ±10%, 1/2 w, IRC Type BW 1/2.	278-079
R203		PA parasitic resistor	Same as R202.	
R204		L209 swamper	Same as R125.	
R205		IPA plate decoupling	Same as R125.	
R206		V203 plate resistor	Same as R124.	
R207	1	V203 screen resistor	Resistor, composition, 33,000 ohms, ±10%, 1/2 w, JAN RC20BF333K.	270-333
	(2)		For Serial Nos. 56201 to 56600.	
R208		IPA cathode resistor	Same as R135.	
R209		IPA grid resistor	Same as R110.	
R210	1	IPA grid input resistor	Resistor, composition, 750 ohms, ±10%, 1/2 w, JAN RC20BF751K.	270-751
R211		V205 balance modulator plate resistor	Same as R110.	
R212		V205 balance modulator cathode resistor	Same as R125.	
R213		V205 balance modulator grid resistor	Same as R113.	
R214		V205 balance modulator grid resistor	Same as R113.	
R215		V206 balance modulator balance adjustment	Same as R107.	
R216		V206 balance modulator plate decoupling	Same as R110.	
R217		V206 balance modulator cathode resistor	Same as R125.	
R218	2	Transmitter blocking bias	Resistor, composition, 47,000, ±10%, 2 w, JAN RC42BF473K.	276-473
R219		Transmitter blocking bias	Same as R218.	
R220	4	V206 balance modulator grid resistor	Resistor, composition, 47,000 ohms, ±10%, 1/2 w, JAN RC20BF473K.	270-473
	(6)		For Serial Nos. 56201 and above.	

Reference Symbol	Quantity	Locating Function	Name and Description	Stock Number
SSB-1			TRANSMITTER - RECEIVER UNIT	
R221		V206 balance modulator grid resistor	Same as R220.	
R222	5	Carrier out/in resistor	Resistor, composition, 100,000 ohms, ±10%, 1/2 W, JAN RC20BF104K.	270-104
R223		Carrier out/in resistor	Same as R222.	
R224	3	V207 balance modulator plate resistor	Resistor, composition, 15,000 ohms, ±10%, 1/2 W, JAN RC20BF153K.	270-153
R225	1	V207 balance modulator balance adjustment	Resistor, composition, variable, 20,000 ohms, 1/2 W, linear taper, 5/8 in. slotted 3/64 in. by 1/16 in. shaft, 3/8 in. locking bushing, left and/or right hand locating lugs. Mallory Type LC20MP with no. 232 nut, no. 227 lockwasher, and A700469-2 locknut.	244-972
R226		V207 balance modulator plate resistor	Same as R224.	
R227		V207 balance modulator plate decoupling resistor	Same as R110.	
R228		V207 balance modulator cathode resistor	Same as R125.	
R229		V207 balance modulator grid resistor	Same as R139.	
R230		V207 balance modulator grid resistor	Same as R139.	
R231		V207 balance modulator grid isolation resistor	Same as R116.	
R232		V207 balance modulator grid isolation resistor	Same as R116.	
R233	1	Transmitter gain control	Resistor, composition, variable, dual, 100,000 ohms, 1/2 W, linear taper, 7/8 in. round shaft, 3/8 in. bushing, left and/or right hand locating lugs. Mallory Type LCT-100MP with no. 232 nut and no. 227 lock-washer.	246-440
R234	4	V208 crystal oscillator grid resistor channel 4	Resistor, composition, 22,000 ohms, ±10%, 1/2 W. JAN RC20BF223K.	270-223
R235		V208 crystal oscillator grid resistor channel 3	Same as R234.	
R236		V208 crystal oscillator grid resistor channel 2	Same as R220.	
R237		V208 crystal oscillator grid resistor channel 1	Same as R220.	
R238	4	V208 crystal oscillator plate resistor	Resistor, composition, 22,000 ohms, ±10%, 2 W, JAN RC42BF223K.	276-223

Reference Symbol	Quantity	Locating Function	Name and Description	Stock Number
SSB-1			TRANSMITTER - RECEIVER UNIT	
R239		V208 oscillator plate	Same as R238.	
R240	1	CR201/CR202 voltage divider	Resistor, composition, 15,000 ohms, ±10%, 2 w, JAN RC42BF153K.	276-153
R241	1	CR201/CR202 voltage divider	Resistor, composition, 180 ohms, ±10%, 1/2 w, JAN RC20BF181K.	270-181
R242		V209 screen resistor	Same as R105.	
R243	2	V209 plate decoupling resistor	Resistor, composition, 10,000 ohms, ±10%, 2 w, JAN RC42BF103K.	276-103
R244		V209 grid resistor	Same as R201.	
R245		V209 grid resistor	Same as R116.	
R246		V210 grid resistor	Same as R201.	
R247		V210 grid resistor	Same as R116.	
R248		V210 plate decoupling	Same as R243.	
R249	7	V210 plate resistor	Resistor, composition, 10,000 ohms, ±10%, 1 w, JAN RC32BF103K.	273-103
R250		V210 screen resistor	Same as R201.	
R251	1	V211 grid resistor	Resistor, composition, 250 ohms, ±10%, 1/2 w, JAN RC20BF271K.	270-271
R252		V211 cathode resistor	Same as R135.	
R253	1	V211 screen resistor	Resistor, composition, 33,000 ohms, ±10%, 1 w, JAN RC32BF333K.	273-333
R254	1	V211 plate swamping	For Serial Nos. 5501 to 55250 Same as R110.	
		V208 grid	For Serial No. 5601 and above Resistor, composition, 1200 ohms, ±10%, 1/2 w, JAN RC20BF122K.	270-122
R255			For Serial Nos. 5501 to 55250 and 5601 to 56200 NOT USED.	
			For Serial No. 56201 and above Same as R207.	
R256		V211 plate decoupling	Same as R249.	
R257		V212 grid resistor	Same as R116.	
R258		V212 oscillator grid	Same as R234.	
R259		V212 cathode resistor	Same as R137.	
R260	2	V212 screen resistor	Resistor, composition, 150,000 ohms, ±10%, 1 w, JAN RC32BF154K.	273-154
R261		V212 plate decoupling	Same as R249.	

Reference Symbol	Quantity	Locating Function	Name and Description	Stock Number
SSB-1			TRANSMITTER - RECEIVER UNIT	
R262		V213 oscillator grid resistor	Same as R234.	
R263		V213 cathode resistor	Same as R137.	
R264		V213 screen resistor	Same as R260.	
R265		V213 plate resistor	Same as R105.	
R266		V213 plate decoupling resistor	Same as R249.	
R267		V213 cathode resistor	Same as R137.	
R268		V214 screen resistor	Same as R105.	
R269	3	T204 input swamping resistor	Resistor, composition, 220,000 ohms, ±10%, 1/2 w, JAN RC20BF224K.	270-224
R270		V214 plate decoupling resistor	Same as R249.	
R271	1	Receiver gain control	Resistor, wirewound, variable, 5,000 ohms, 2 w, taper II, 7/8 in. round shaft, 3/8 in. bushing, left and/or right hand locating lugs. Mallory Type R5MP with no. 232 nut and no. 227 lockwasher.	244-970
R272		Receiver gain voltage divider	Same as R238.	
R273		Receiver gain voltage divider	Same as R238.	
R274		V215 grid resistor	Same as R112.	
R275		V215 cathode resistor	Same as R137.	
R276		V215 screen resistor	Same as R105.	
R277		T205 input swamping resistor	Same as R269.	
R278		V215 plate decoupling resistor	Same as R249.	
R279		T205 output swamping resistor	Same as R224.	
R280		V216A grid resistor	Same as R222.	
R281		V216A plate resistor	Same as R201.	
R282		V216 decoupler	Same as R249.	
R283		V216B grid resistor	Same as R113.	
R284	1	V216B cathode resistor	Resistor, composition, 1,500 ohms, ±10%, 1/2 w, JAN RC20BF152K.	270-152
R285 and R286		FL201 attenuation	For Serial Nos. 5501 to 55250 and 5601 to 56200 NOT USED. For Serial No. 56201 and above Same as R220.	

Reference Symbol	Quantity	Locating Function	Name and Description	Stock Number
SSB-1			TRANSMITTER - RECEIVER UNIT	
S101	1	Power on-off	Switch, Toggle, dpst, Cutler-Hammer Type 7561K4.	328-659
S102	2	Receiver on-off	Switch, Toggle, spst, Cutler-Hammer Type 7501K13.	328-657
S103		Transmitter on-off	Same as S102.	
S104	1	CW-transmit-phone receive	Switch, Toggle, dpdt, Cutler-Hammer Type 7565K5.	328-655
S105	1	Speaker-handset	Switch, Toggle, spdt, Cutler-Hammer Type 7505K4.	328-665
S106	1	Local-remote	Switch, Rotary, 2 sections, 4p4t, Radiomarine Dwg A-1214339.	328-765
S201A, B, C & D	1	Channel selector PA	Switch, Rotary, 4 sections, 4 position, Radiomarine Dwg A-1214335.	328-767
S201 E & F	1	Channel selector IPA	Switch, Rotary, 2 sections, 4 position, Radiomarine Dwg A-1214336.	328-769
S201G	1	Channel selector oscillator	Switch, Rotary, 1 section, 4 position, Radiomarine Dwg A-1214337, sub 1.	328-774
S201 H & I	1	Channel selector receiver	Switch, Rotary, 2 section, 4 position, Radiomarine Dwg A-1214338.	328-776
S202	1	Carrier in/out	Switch, Rotary, spdt, 3/8 in. bushing 7/8 in. shaft Oak Type no. 23.	328-685
T101	1	Filament supply	Transformer, Power, step-down; primary 107/117 v ac, 60 cycles; secondaries; 5v CT at 6 amp, 6.3v CT at 6 amp, impregnated, Stancor Type P4022.	349-781
T102	1	HV plate supply	Transformer, Power, step-up; primary 117v, 60 cycles; secondary; 1500v CT at 250 ma, impregnated, Stancor Type PC8304.	349-783
T103	1	LV plate supply	Transformer, Power, step-up and step-down; primary 117v, 60 cycles; secondaries, 800v ct at 200 ma, 5v at 3 amp, 6.3v at 5 amp, impregnated, Stancor Type PC8412.	349-785
T104	1	Oven heater supply	Transformer, Power, step-down; primary 117v, 60 cycles; secondary; 6.3v CT at 3 amp, impregnated, Stancor Type PC6466.	349-787
T105	1	Line transformer	Transformer, step-down; primary 230/460v; secondary; 115v at 2.2 amp, Chicago Type PCG-24250.	349-680
T106	1	Receiver AF output	Transformer, Audio, 5000 ohms to 4 ohms, maximum primary dc current 40 ma, impreg., Stancor Type A-3877.	350-845
T201	2	V206 output	Transformer, R.F.-1500 kc, Automatic Mfg Corp Type (MI-409K) 1500-1 with no. 1041 mtg clip.	349-741
T202	1	V207 input	Transformer, Audio, humbucking type, 16:1, UTC Type S-5.	349-739
T203		V213 input	Same as T201.	

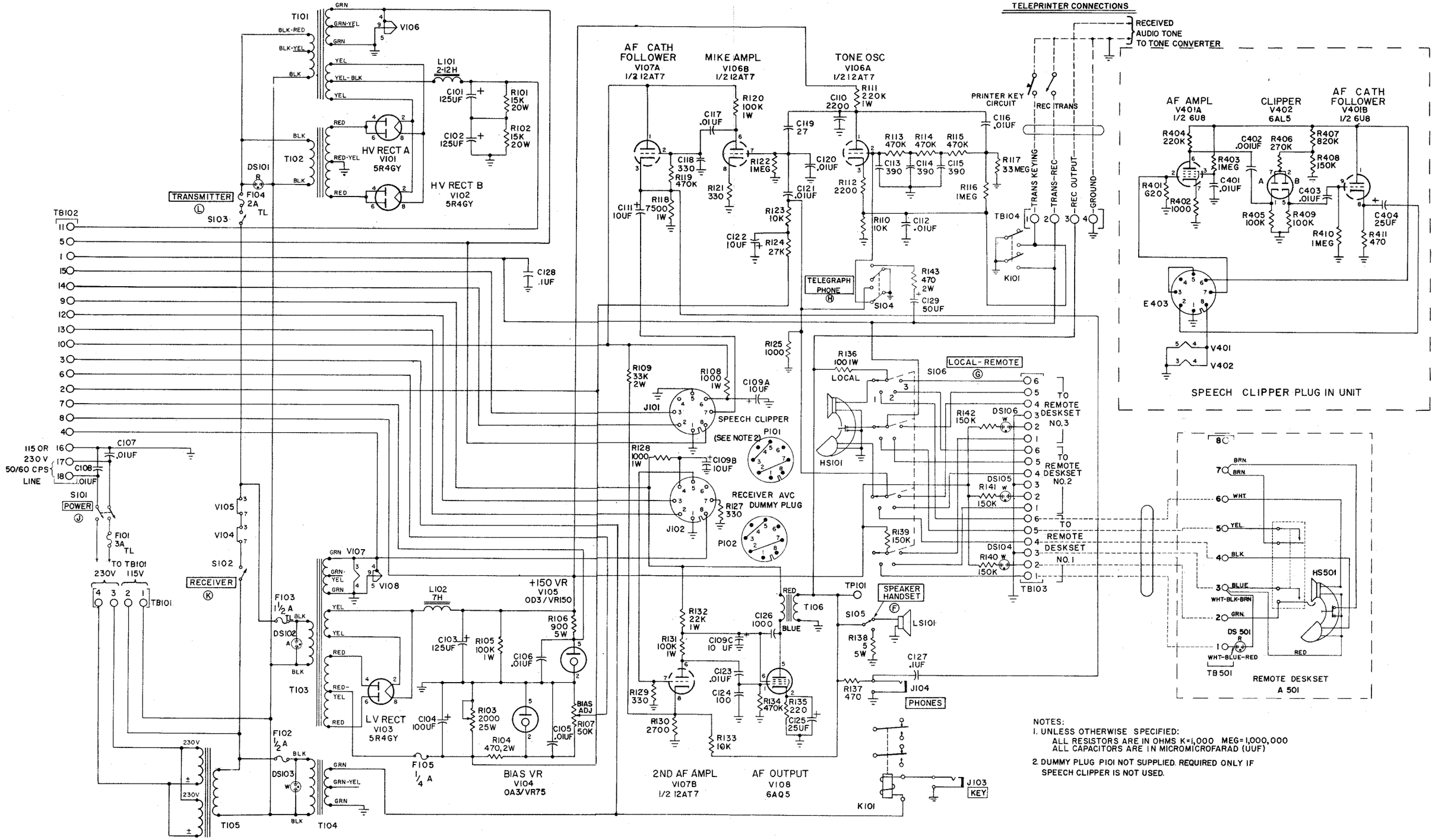
Reference Symbol	Quantity	Locating Function	Name and Description	Stock Number
SSB-1			TRANSMITTER - RECEIVER UNIT	
T204	2	1st IF interstage	Transformer, R.F.-262 kc, Automatic Mfg Corp Type 1655-4 with no. 1041 mtg clip.	349-742
T205		2nd IF interstage	Same as T204.	
T206	1	1st AF interstage	Transformer, Audio-18,000 to 600 ohms, encapsulated, Triad A-53X (modified).	349-740
TB101	1	115/230 v adjustment	Terminal Board- 4 terminals, Cinch Type 1774.	036-977
TB102	2	Connection to Receiver/ Transmitter	Terminal Board- 18 terminals, Jones Type 18-140Y.	036-976
TB103		Connection to Remote Desk-set	Same as TB102.	
TB104	1	Teleprinter connections	Terminal Board, 4 terminals, Jones Type 4-140-Y.	036-035
TP101	6	Receiver output	Tip Jack-red, Johnson Type 105-602-1.	259-284
TP201		V205 input	Same as TP101.	
TP202		V206 input	Same as TP101.	
TP203		V207 input	Same as TP101.	
TP204		V212 input	Same as TP101.	
TP205		V213 input	Same as TP101.	
V101	3	+600v full-wave rectifier	Electron Tube, full-wave rectifier, 5R4GY.	352-164
V102		+600v full-wave rectifier	Same as V101.	
V103		+200v full-wave rectifier	Same as V101.	
V104	1	-75v bias regulator	Electron Tube, voltage regulator, OA3/VR-75.	352-009
V105	1	+150v regulator	Electron Tube, voltage regulator, OD3/VR-150	352-016
V106	6	Tone oscillator-mike	Electron Tube, High-Mu twin triode, 12AT7.	352-489
V107		Cathode follower/ AF amplifier	Same as V106.	
V108	1	Receiver AF output	Electron Tube, beam power amplifier, 6AQ5.	352-223
V201	2	PA	Electron Tube, VHF beam power amplifier, 6146	352-829
V202		PA	Same as V201.	
V203	4	Modulation indicator	Electron Tube, remote cut-off pentode, 6BA6.	352-251
V204	2	IPA	Electron Tube, power pentode, 6CL6.	352-276

Reference Symbol	Quantity	Locating Function	Name and Description	Stock Number
SSB-1			TRANSMITTER - RECEIVER UNIT	
V205		3-15 mc balance modulator	Same as V106.	
V206		1400 kc balance modulator	Same as V106.	
V207		250 kc balance modulator	Same as V106.	
V208		4.4 mc to 16.4 mc crystal oscillator	Same as V204.	
V209	4	1150 kc crystal oscillator	Electron Tube, pentagrid converter, 6BE6.	352-253
V210		250 kc crystal oscillator	Same as V209.	
V211		RF amplifier	Same as V203.	
V212		1st Mixer	Same as V209.	
V213		2nd Mixer	Same as V209.	
V214		1st IF amplifier	Same as V203.	
V215		2nd IF amplifier	Same as V203.	
V216		Demodulator/1st AF amplifier	Same as V106.	
XE201		Mounting for E201 oven	Same as J101.	
XE202		Mounting for E202 oven	Same as J101.	
XE203		Mounting for E203 oven	Same as J101.	
XF101	1	Mounting for F101	Fuseholder, 5 unit, Littelfuse Type 357005.	172-347
XV101		Mounting for V101	Same as J101.	
XV102		Mounting for V102	Same as J101.	
XV103		Mounting for V103	Same as J101.	
XV104		Mounting for V104	Same as J101.	
XV105		Mounting for V105	Same as J101.	
XV106	8	Mounting for V106	For Serial Nos. 5501 to 55250 Socket, 9 prong noval. 0.125 in. dia mounting holes, cadmium plated brass contacts. Elco Type 457.	261-420
			For Serial No. 5601 and above Socket, 9 prong noval, mica filled bakelite, 0.125 in. dia mounting holes, cadmium plated brass contacts, JAN TS103P01.	261-180
XV107		Mounting for V107	Same as XV106.	
XV108	9	Mounting for V108	For Serial Nos. 5501 to 55250 Socket, 7 prong miniature, 0.125 in. dia mounting holes, cadmium plated brass contacts, Elco Type 257.	261-888
			For Serial No. 5601 and above Socket, 7 prong miniature, mica filled bakelite, 0.125 in. dia mounting holes, cadmium plated brass contacts, JAN TS102P01.	261-179

Reference Symbol	Quantity	Locating Function	Name and Description	Stock Number
SSB-1			TRANSMITTER - RECEIVER UNIT	
XV201		Mounting for V201	Same as J101.	
XV202		Mounting for V202	Same as J101.	
XV203		Mounting for V203	Same as XV108.	
XV204		Mounting for V204	Same as XV106.	
XV205		Mounting for V205	Same as XV106.	
XV206		Mounting for V206	Same as XV106.	
XV207		Mounting for V207	Same as XV106.	
XV208		Mounting for V208	Same as XV106.	
XV209		Mounting for V209	Same as XV108.	
XV210		Mounting for V210	Same as XV108.	
XV211		Mounting for V211	Same as XV108.	
XV212		Mounting for V212	Same as XV108.	
XV213		Mounting for V213	Same as XV108.	
XV214		Mounting for V214	Same as XV108.	
XV215		Mounting for V215	Same as XV108.	
XV216		Mounting for V216	Same as XV106.	
Y201		Channel 4 crystal	Crystal, range 8.1 mc-16.4 mc, Type CR-27U.	Not Supplied
Y202		Channel 3 crystal	Same as Y201.	Not Supplied
Y203		Channel 2 crystal	Crystal, range 4.4 mc-8.1 mc, Type CR-27U.	Not Supplied
Y204		Channel 1 crystal	Same as Y203.	Not Supplied
Y205	1	Local oscillator	Crystal, 1150 kc, Type CR-27U.	115-460
Y206	1	Local oscillator	Crystal, 250 kc, Type CR-47U	115-470

Reference Symbol	Quantity	Locating Function	Name and Description	Stock Number
SSB-1			SPEECH CLIPPER	
C401		V401 screen bypass capacitor	Same as C105.	
C402	1	V401 plate coupling capacitor	Capacitor, Ceramic, .001 uf guaranteed minimum value, 500v, Disc Type.	073-554
C403		V401 input capacitor	Same as C105.	
C404		V401 output capacitor	Same as C125.	
E401	1	For V401	For Serial Nos. 5501 to 55250 Tube shield, Elco Type 190.	304-378
			For Serial No. 5601 and above Same as E101.	
E402	1	For V402	For Serial Nos. 5501 to 55250 Tube shield, Elco Type 127.	304-380
			For Serial No. 5601 and above Tube shield, JAN TS102U01.	304-347
E403	1	Mounts and connects speech clipper	Plug-in socket turret with octal plug, one seven pin miniature socket and one nine pin noval, Vector Electronics Co. Cat. Type C12-NM-L.	010-473
R401	1	V401 grid resistor	Resistor, Composition, 620 ohms, ±10%, 1/2 w, JAN RC20BF621K.	270-621
R402		V401 cathode resistor	Same as R125.	
R403		V401 screen resistor	Same as R116.	
R404		V401 plate resistor	Same as R269.	
R405		V402 cathode resistor	Same as R222.	
R406	1	V402 plate resistor	Resistor, Composition, 270,000 ohms, ±10%, 1/2 w, JAN RC20BF274K.	270-274
R407	1	Voltage divider	Resistor, Composition, 820,000 ohms, ±10%, 1/2 w, JAN RC20BF824K.	270-824
R408		Voltage divider	Same as R139.	
R409		V402 cathode resistor	Same as R222.	
R410		V401 grid resistor	Same as R116.	
R411		V401 cathode resistor	Same as R137.	
V401	1	Audio amplifier/cathode follower	Electron Tube, medium-mu-triode-sharp cut-off pentode, 6U8.	352-412
V402	1	Diode clipper	Electron Tube, twin diode, 6AL5.	352-222
XV401		Mounting for V401	Socket, 9 pin noval, part of E403.	
XV402		Mounting for V402	Socket, 7 pin miniature, part of E403.	

Reference Symbol	Quantity	Locating Function	Name and Description	Stock Number
SSB-1			REMOTE DESK-SET	
A501	1	Remote control switch assembly	Telephone mounting, w/dpst switch, bottom plate and mounting feet, Connecticut Telephone and Electric Co. Type PL-15110 modified per Radiomarine Dwg C-1241360.	216-250
DS501	1	Remote indicator	Dial Light, neon, red, including mounting nut, Omni-glow Type 1010A1.	262-293
HS501	1	Remote transmitter input/receiver output	Handset with 4 feet of 4 conductor, rubber covered cable, Roanwell Corp. Type 10218.	166-239
TB501	1	Connection to transmitter/receiver	Terminal Board, 8 terminals, Jones Type 8-140.	036-073



NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTORS ARE IN OHMS K=1,000 MEG=1,000,000
   ALL CAPACITORS ARE IN MICROMICROFARAD (UUF)
2. DUMMY PLUG P101 NOT SUPPLIED. REQUIRED ONLY IF SPEECH CLIPPER IS NOT USED.

Figure 28. Power Supply Schematic

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTORS ARE IN OHMS, K=1,000Ω, MEG=1,000,000Ω
   ALL CAPACITORS ARE IN MICROMICROFARADS (UUF)

Figure 29A Transmitter-Receiver Schematic (Serial Numbers 5501 to 55250)

NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTORS ARE IN OHMS, K=1000Ω, MEG=1,000,000Ω
   ALL CAPACITORS ARE IN MICROMICROFARADS (UUF)
2. THIS SCHEMATIC APPLIES ONLY TO EQUIPMENTS SERIAL NUMBER 5601 AND ABOVE.
3. COMPONENTS MARKED WITH AN ASTERISK (*) DEPEND UPON TYPE OF FILTER USED AS FOLLOWS:

FL201 FL202	C312 C313 C314 C315	C238 C294	C242 0293	R285 R286	R255
TYPE F-250Z-4	7-45 UUF	68 UUF	62 UUF	NOT USED	NOT USED
TYPE MFU-250-1	20-125 UUF	360 UUF	360 UUF	47K 1/2W	33K 1/2W

E201, E202 & E203 CRYSTAL OVENS

K201 RELAY

Figure 29B Transmitter-Receiver Schematic (Serial Numbers 5601 and above)