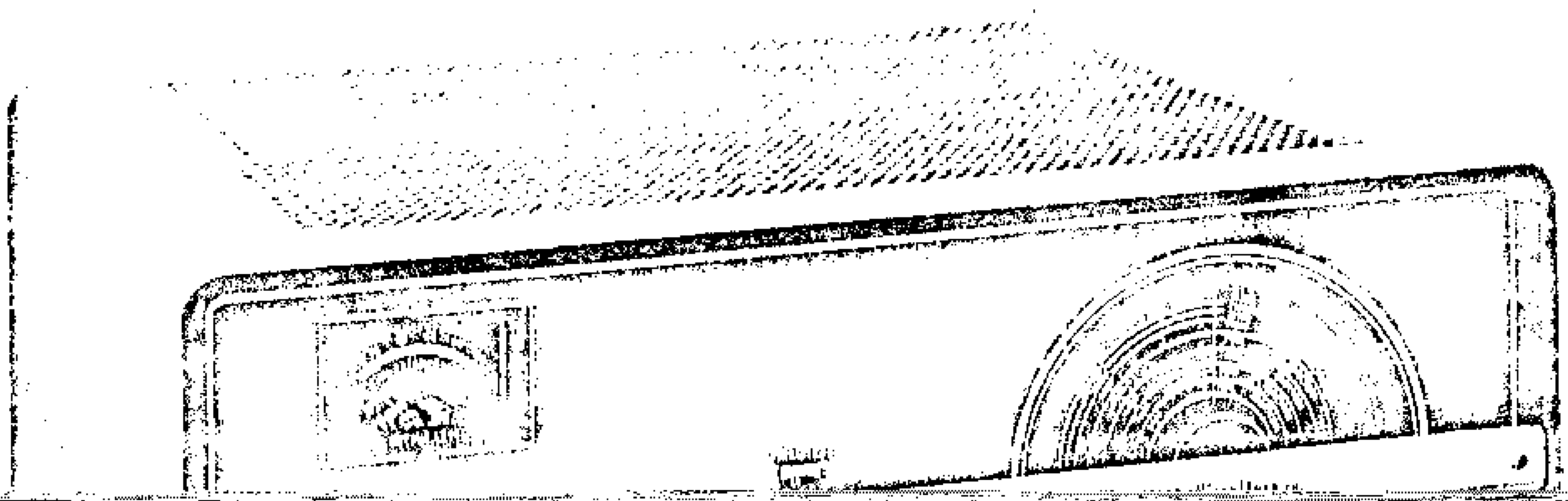


trap at the television receiver to attenuate the transmitter's fundamental signal. If the interfering signal does not enter the television receiver through the antenna, special shielding or filters on the TV receiver may be necessary. For a more complete discussion of measures that may be used to handle these special television interference problems, refer to the ARRL HANDBOOK.

SECTION II

SPECIFICATIONS

TYPES OF EMISSION

- SSB ....Single sideband suppressed carrier, upper or lower sideband
- DSB ....Amplitude modulation
- CW .... Continuous wave

FREQUENCY SELECTION ....Self contained VFO

FREQUENCY COVERAGE......80, 40, 20, 15 and 10 meter bands

POWER OUTPUT

- SSB (PEP).....................70-100 watts
- CW...........................70-100 watts
- DSB (Carrier)..................17- 25 watts

AUDIO INPUT .... .004 V minimum

CARRIER SUPPRESSION....... 50 db or more below maximum output

UNWANTED SIDEBAND REJECTION..40 db or more at 1KC input

UNWANTED BEAT OUTPUT....55 db or more below maximum output

TUBES ....18 including one voltage regulator and two voltage rectifiers

POWER SOURCE ...105-125 volts, 50/60 cycles AC, 370 watts

RF OUTPUT IMPEDANCE ...... 50Ω. Rear chassis mounted coaxial connector accepts Amphenol 83-1SP connector.

STATION CONTROL ...... Accessory socket. Rear chassis mounted 11 P socket accepts Amphenol 86-PM11 plug (Supplied)

CW KEYING ......Panel mounted phone jack accepts standard 1/4" plug. Keying point also provided at control outlet.

MICROPHONE INPUT .. Front panel mounted MIKE receptacle (Amphenol 75-PC1M) accepts an amphenol 75-MC1F connector.

repairs.

3-4. FRONT PANEL CONNECTIONS (See Figs. 1 and 5)

Receptacles are provided on the front panel of the HT-37 Transmitter/Exciter for the following purposes:

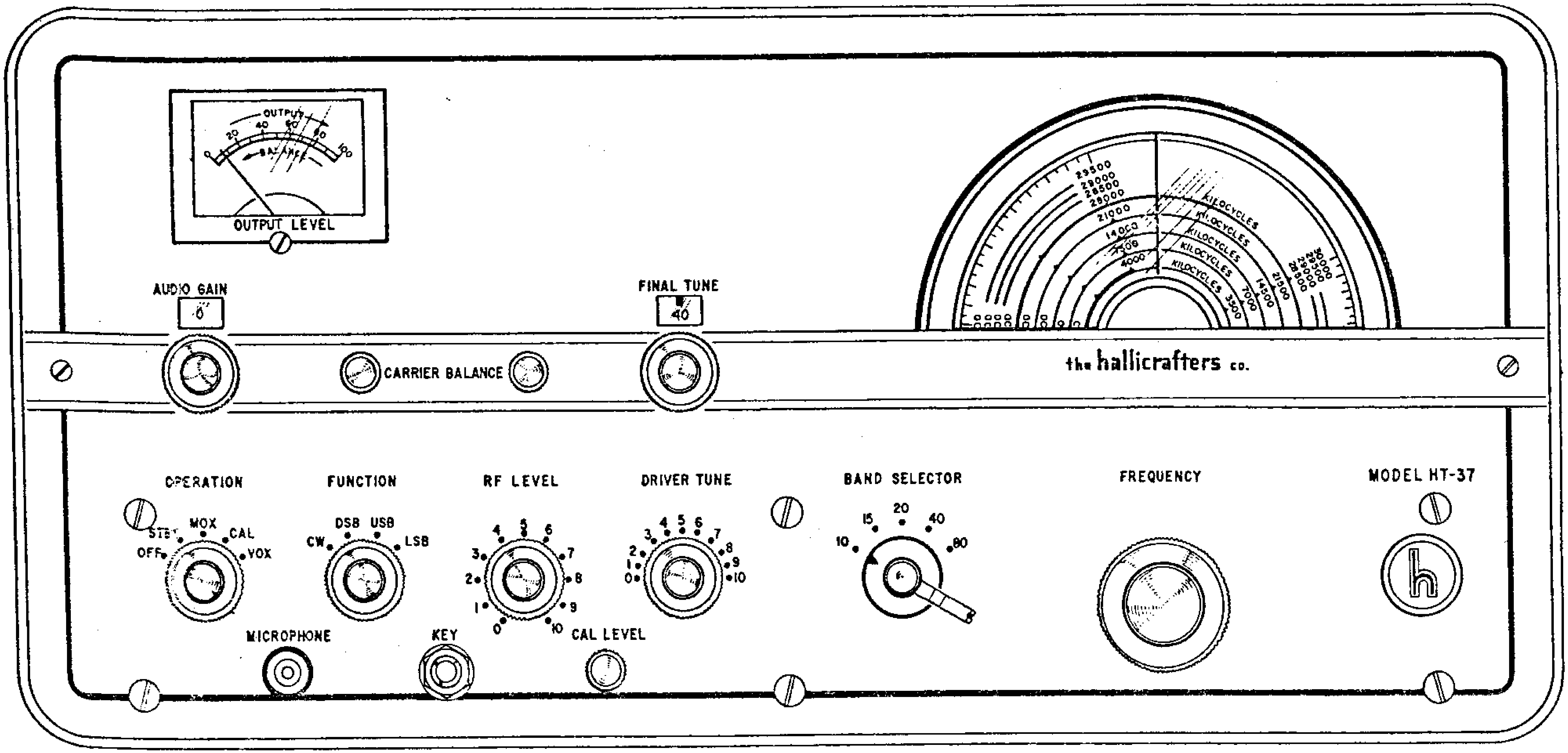
3-4-1. MIKE RECEPTACLE

Model HT-37 is designed to operate with a high impedance communications type microphone. The

...nected to pins 8 and 1 of the control outlet. Pin 1 is internally grounded to the chassis. When the key is up, cut off bias is maintained at the first and second mixer stages. Closing the key removes the cutoff bias, providing signal excitation to the succeeding RF amplifier stages. A jack is provided on the front panel for those who prefer a panel connection for the key.

3-5-2-2. ANTI-TRIP INPUT (Pins 11 and 1)

The application of the receiver audio output to pins 11 and 1 (ground) prevents "nuisance tripping" when operating the transmitter in the VOX (voice operated transmit) mode with a speaker connected receiver.



092-304204

Figure 5. Operating Controls

CAUTION

When turning off transmitter, stop momentarily in the "STANDBY" position before turning switch to "OFF" position.

The "MOX" position energizes the transmitter control relay to the transmit position. This position of the OPERATION switch is used when manual control of transmission is desired. Return the switch to the "STANDBY" position during receiving periods.

In the "CALIBRATE" position a controllable low level CW signal is generated for frequency calibration purposes. In this position, control relay (VOX RELAY) operation is inhibited and standby bias is maintained in the transmitter. If an antenna change-over relay is used the receiver will operate normally and the transmitter signal can be monitored and the level to the receiver adjusted with the CALIBRATE LEVEL control. (See paragraph 4-10.)

In the "VOX" position, the transmitter control relay is operated by voice energy from the microphone. The relay tube is biased to cut-off, and will not energize the VOX RELAY until signal excitation is received from the audio amplifier and vox amplifier stages.

4-3. DRIVER TUNING

This control is a variable capacitor in the 2nd mixer plate and driver plate circuits, and will resonate the circuits to any frequency in the 80, 40, 20,

cuits of the balanced modulator tubes. They provide a means of differentially adjusting the gain of the stages to provide equal outputs resulting in a suppressed carrier signal.

4-8. AUDIO GAIN

This control consists of a potentiometer connected in the grid circuit of the third audio amplifier stage which adjusts the amount of audio drive to the audio modulators. The control has sufficient range to permit adjustment for any high level crystal microphone or low level dynamic microphone normally used for voice communications.

4-9. RF LEVEL

The RF LEVEL control is a potentiometer in the output circuit of the balanced modulators which in CW and DSB adjusts the carrier output of the transmitter. In USB or LSB (suppressed carrier) the control has no effect on output.

4-10. CALIBRATE LEVEL

The CALIBRATE LEVEL control provides a low level adjustment of the transmitter output for SSB, DSB, or CW operation when the OPERATION control is set

... or ...-built, may be operated successfully when only roughly adjusted. A clean signal from any transmitter requires good operator technique.

Two mis-tuning conditions on the HT-37 Transmitter/Exciter are possible, neither of which can be accidentally used on the air. These undesired signals are visible on the output meter due to the extreme range of levels handled by the metering circuit and are 60 db or more below fundamental output when the transmitter is correctly tuned up.

1. On the 15 meter band the undesired signal will appear when the DRIVER TUNE control is set outside its normal tuning range, approximately 0 to 2 divisions on the dial. Note that the signal level cannot be increased with the RF LEVEL control when operating on DSB or CW, nor can it be increased with greater speech input volume on SSB. An

2. Tune the driver and final amplifier stages for MAXIMUM meter deflection, using the DRIVER TUNE and FINAL TUNE controls. Advance the RF LEVEL control slightly, if necessary, to obtain reasonable meter readings for tune up.

3. Set FUNCTION switch to USB for carrier balance adjustments.

4. Adjust CARRIER BALANCE controls for MINIMUM meter deflection. Pull CALIBRATE LEVEL knob OUT to provide maximum meter sensitivity during this operation. Continue adjustment of CARRIER BALANCE controls until no further reduction in level can be obtained.

CAUTION: The CALIBRATE LEVEL knob (meter sensitivity switch) should be in the

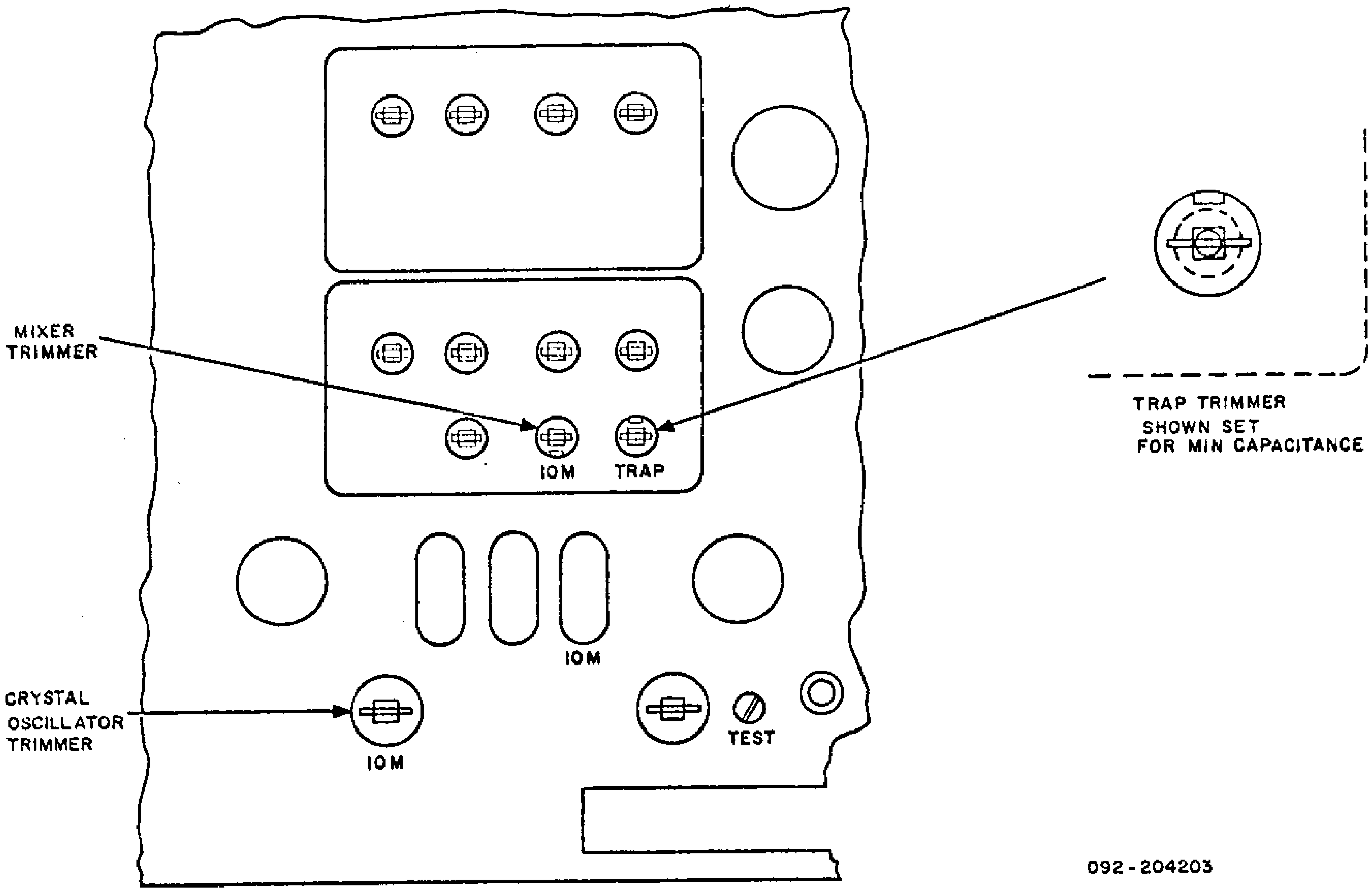


Figure 6. 10 Meter Band Adjustments

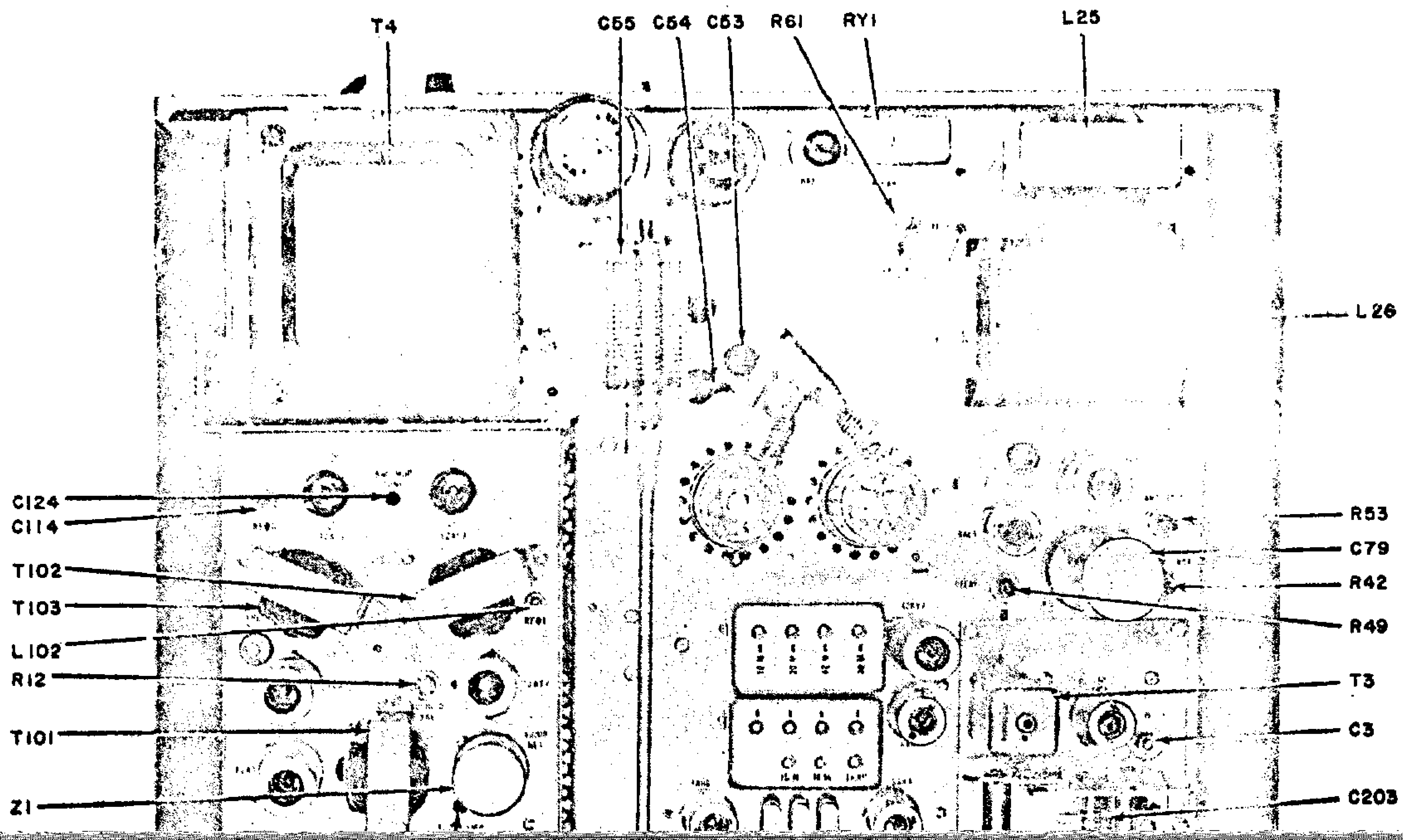
BAND	NOMINAL FREQ.	OUTPUT FREQ.	NUMBER
10M	*32.0MC	28.0-28.5MC	019-201963
10M	32.5MC	28.5-29.0MC	019-201964
10M	*33.0MC	29.0-29.5MC	019-201965
10M	*33.5MC	29.5-30.0MC	019-201966

*NOTE: These crystals are available but not supplied with the transmitter.

2. Connect electronic voltmeter, or similar

the Transmitter/Exciter on the air. Note that the VOX sensitivity control and the AUDIO LEVEL control for the microphone are separate level adjustments, hence for example, backing off the AUDIO LEVEL control will not reduce the VOX sensitivity.

2. The DELAY control is a means of adjustment in the grid circuit of the relay tube which determines the time lag in de-energizing the VOX RELAY when audio excitation is removed from the audio amplifier


T4
C55
C54
C53
R61
RY1
L25
L26
C124
C114
T102
T103
L102
R12
T101
Z1
R53
C79
R42
R49
T3
C3
C203

High power grounded grid or triode amplifiers generally will require little or no swamping, since the driving power will be essentially equal to the power output capabilities of the HT-37. Linear power amplifiers

Be sure to include the model, serial and ... purchased.

Make no service shipments to the factory unless instructed to do so by letter. The Hallicrafters Com-

... push... ...he frequency applied to the grids through L103 and L104 produces sum and difference frequencies (carrier frequency ± audio frequency), which, in the output, are 180 degrees out of phase with respect to each other. This produces a net output at the link of two side frequencies, equal in amplitude, displaced by the frequency of the audio signal from the suppressed carrier.

The operation of the other balanced modulator, V5, supplied with input voltages that are 90 degrees out of phase with respect to V4, is such that one of the side frequencies produced is exactly 180 degrees out of phase with the corresponding side frequency of V4, and the other is exactly in phase. Consequently, the in phase components add, the out of phase components cancel, and the net resultant is a single sideband suppressed carrier signal.

Selection of the other sideband is accomplished by reversal of the audio input phase to V4 by means of FUNCTION switch wafer, FS-2R.

A DSB (AM) signal is generated by removing the audio from V4 and introducing a fixed amount of unbalance in V5 through R136 and FS-2F. V4, therefore, remains balanced at the carrier frequency and does not enter into the resultant. V5, however, produces sum and difference frequencies, along with the now present carrier frequency. With no opposite phase components present, the result is a DSB signal with carrier.

CW is similar to DSB operation, with the exception that the audio signal to both balanced modulators is blocked (FS-1F applies -49 volts blocking bias to the grid of the 2nd audio tube, V1B, through R107), resulting in the production of the carrier frequency only.

Depending on the setting of the FUNCTION and OPERATION switches, the signal is transferred from the link of T105 to the main chassis by either the fixed attenuator, R134 and R135 (USB, LSB, and CAL) or the RF LEVEL control, R133, (CW and DSB).

6-3. MAIN CHASSIS

Up to the input stage of the 1st mixer, V7, the operation of the HT-37 Transmitter/Exciter is identical on all bands. The remaining stages "beat" (sum or difference) the 9 MC signal to the desired operating frequency. Frequency multiplication cannot be used, since doubling the frequency would double the spacing of the sidebands. This would change the relative frequency of the modulating frequencies when the signal is detected.

6-3-2. 1st MIXER (V7)

The 1st mixer operates as a straight through amplifier on the 80 and 20 meter bands, and as a mixer in conjunction with the heterodyne oscillator, V6, on 40, 15 and 10 meters. The operating frequency and gain of the mixer is adjusted for each band by bandswitch wafers BS-3F and BS-3R. Plate coil L23 is tuned in conjunction with the fixed capacitor C74 for operation on 40M. The same coil is used on 15 and 10M, tuned with variable capacitors C201 or C78, respectively. On 20 and 80 meters, R16 and/or R38 function as the plate load, tuneable circuits being switched out. On the 10M band, the trap coil, L24, and capacitor C77, are adjusted so that in the mixer plate circuit the crystal frequency generated by the heterodyne oscillator, V6, is attenuated. This prevents subsequent heterodyning of this signal with the VFO, which would produce an undesired output. The 1st mixer output is coupled to the grid of the 2nd mixer, V8, through C16.

6-3-3. VFO (V9)

The VFO produces an RF signal in the range of 5.0 to 5.5 MC, as determined by the setting of the FREQUENCY capacitor, C203. The output of the oscillator is coupled to the grid of the 2nd mixer through the bandpass transformer, T3, and the VFO injection capacitor, C15.

6-3-4. 2ND MIXER (V8)

The 2nd mixer heterodynes the signals from the VFO and 1st mixer to the desired operating frequency. The plate circuit components are selected for each band by switch wafers BS-4R and BS-4F. The output of the 2nd mixer is connected to the grid of the driver stage, V10, through coupling capacitor C30.

6-3-5. KEYING

Bias voltage applied to the grid of the 2nd mixer, V8, through R6 and R7, and to the 1st mixer grid, V7, through R32 effectively cuts off the tubes. Grounding the input of the key click filter, R71, R72, and C204, adjusts the bias of the stages to the operating level. This ground is supplied by one of three methods, depending on the selected mode of operation. In CW the hand key is connected to this point through contacts on the FUNCTION and OPERATION switches. In SSB and DSB, keying is performed by the "J" and "K" contacts of the VOX relay, RY1. In the CALIBRATE mode, an adjustable ground is supplied by the CAL LEVEL control, R73, permitting a controllable low level

The output stage consists of two parallel connected 6146 tubes connected to a Pi-section output tank. Bandswitch wafer BS-6 selects portions of L17 and fixed capacitances to provide the proper output impedance on each band. The FINAL TUNE capacitor, C55, is used to tune the tank circuit to resonance.

CAUTION

> In all operational conditions other than "Power Off", full plate voltage is present at the top caps of the final amplifier tubes. Safety precautions should be observed to prevent dangerous electrical shock. When changing these tubes, the plate caps should first be shunted to ground discharging any voltage that might be retained by the filter capacitors.

The final amplifiers are bridge neutralized by a neutralization capacitor, C44, in series with C40, in conjunction with the plate tank coil of the driver stage, V10.

6-3-8. VOX AND ANTI-TRIP CIRCUITS

In the VOX mode of operation, when modulating the transmitter with a microphone, a sample of the audio signal at the grid of the 2nd audio tube, V2A, is VOX DIODE, V14A, rectifies this signal, causing the RELAY TUBE, V15B, to actuate the VOX relay, RY1, placing the transmitter on the air (See KEYING, 6-3-5). The anti-trip circuit, supplied with a sample of the receivers output, prevents VOX tripping due to received signals being picked up by the microphone. In this case, the ANTI-TRIP diode, V14B, supplies a "bucking" voltage to the VOX DIODE.

During MOX operation, the bottom end of R51 is grounded, causing conduction of the relay tube, V15B, resulting in relay actuation.

6-3-9. POWER SUPPLY

Three sources of DC voltage are employed in the transmitter. The high voltage rectifier, V17, supplies plate voltage for the final amplifier tubes only. The low voltage rectifier, V18, supplies screen voltage for the final amplifiers and plate and screen voltages for all other tubes. A negative voltage used for grid bias and blocking purposes is supplied by the selenium rectifier, SR1. This source is adjusted with R61 for -49 volts with the FUNCTION switch set at MOX. When the "J" and "K" contacts of the VOX relay open (during receive or standby periods), the loading effect of R46 on the bias bleeder network is removed, resulting in the development of a larger negative bias. This reduces the standby current drain of the final amplifier tubes, resulting in prolonged tube life.

SECTION VII

SERVICE DATA

7-1. CHASSIS REMOVAL

The chassis and front panel assembly are removable from the cabinet. To remove, proceed as follows:

1. Remove four side screws and lift off top cabinet half.
2. Remove 5R4GY rectifier tube and turn entire set over, permitting it to rest on the panel edge and SB generator shield.
3. Remove all screws from the underside of the cabinet, including the rubber feet. Lift off the bottom cabinet half.

defective. Malfunctions of this nature are easily isolated and corrected. However, it is entirely possible that a more obscure malfunction may arise. In this event, only thoroughly trained technical personnel should attempt servicing the unit.

A recommended aid for troubleshooting the HT-37 Transmitter/Exciter is a general coverage receiver. This receiver can be used to provide a quick check on various oscillator circuits in the HT-37. A lead connected to the antenna of this general coverage receiver, when placed in the proximity of the oscillator tube in the circuit to be checked, can determine the presence or absence of signal from the stage in question.

... The frequencies of the various cry-

TROUBLE SHOOTING CHART	
SYMPTOM	POSSIBLE CAUSE
No output any band any mode	Power Supply Tubes: V16, V17, V18.
	R. F. Tubes: V2 (Check at 9. 0 MC) V4, V5, V7, V8, V9, V10, V11 and V12.
CW Output only, all bands (No DSB or SSB)	Audio Tubes: V1, V2, V3 Balanced Modulators: V4 and V5.
No output, 40 Meters	Heterodyne Osc. V6 Check at 21. 5 MC.
No output, 15 Meters	Heterodyne Osc. V6 Check at 25 MC.
No output, 10 Meters	Heterodyne Osc. V6 Check Xtal frequency of portion in use.
Blows Fuses	Check bias voltage at TP2 with output tubes (V11 and V12) removed. Should be -49 ±1 volt (operation switch in MOX) Measured with a 20, 000 ohms/volt D. C. voltmeter.
No VOX operation	VOX Tubes: V13, V14, V15.
VOX will not drop out	Check for hum: V1, V13, V14, V15.

SECTION VIII

HT-37 ALIGNMENT PROCEDURE

8-1. RF ALIGNMENT

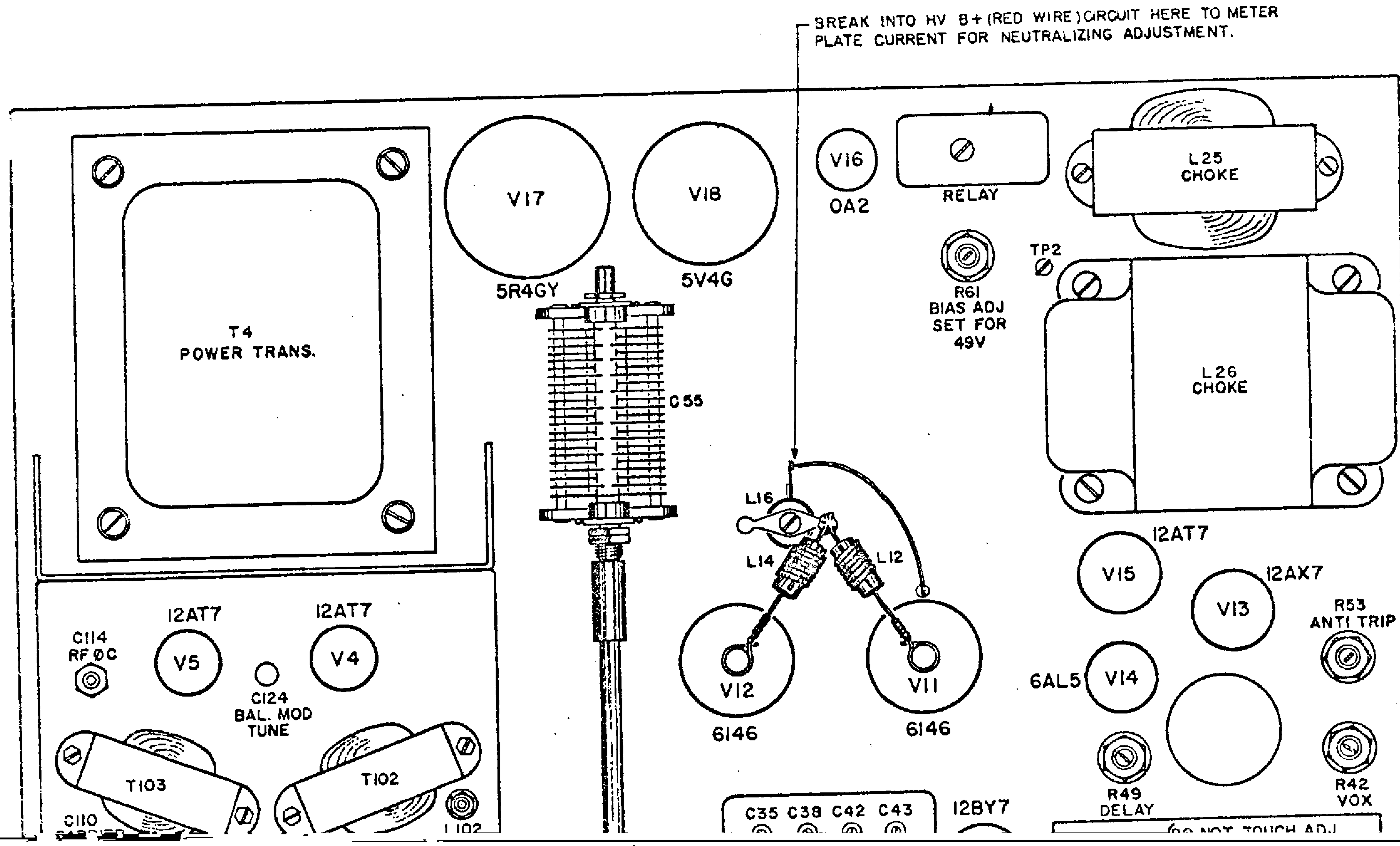
Your HT-37 Transmitter/Exciter has been accurately aligned and calibrated at the factory, and, with normal-useage, will not require re-alignment for extended periods of time. Service or replacement of a major component or circuit may require subsequent re-alignment, but under no circumstances should re-alignment be attempted unless the malfunction has been analyzed and definitely traced to RF mis-alignment.

8-2. EQUIPMENT REQUIRED

1. RF Signal Generator; Measurements Corp., Model 65B, or equivalent having a 1V RMS output at an impedance of 70 ohms or less. (A 100 mmf DC blocking capacitor must be placed in series with the RF lead.)
2. Vacuum tube voltmeter (VTVM); Hewlett Packard 410A, or equivalent having an RF probe good to 35 MC.
3. Dummy load; 50-ohms non-inductive, rated at 100 watts. The dummy load may be made up of carbon resistors, Bird Wattmeter, or equivalent.
4. Volt-Ohm-Milliameter (VOM); Simpson 260 or equivalent.
5. Oscilloscope with external vertical plate connection.
6. Sine wave audio oscillator.
7. Receiver (3-30 MC range), with crystal calibrator.

8-3. INITIAL CONTROL SETTINGS

OPERATION................. STANDBY (Power on)
FUNCTION .... DSB
CAL LEVEL 0
DRIVER TUNING ....Fully counterclockwise (Closed gang)
FINAL TUNING............ ON INDEX (Closed gang)
FREQUENCY........Fully counterclockwise (Closed gang)
BAND SELECTOR....................As instructed
AUDIO LEVEL 0
RF LEVEL................................ 0



BREAK INTO HV B+ (RED WIRE) CIRCUIT HERE TO METER PLATE CURRENT FOR NEUTRALIZING ADJUSTMENT.
T4
POWER TRANS.
V17
5R4GY
V18
5V4G
C55
V16
OA2
RELAY
L25
CHOKE
TP2
R61
BIAS ADJ
SET FOR
49V
L26
CHOKE
L16
L14
L12
V12
6146
V11
6146
12AT7
V15
12AX7
V13
R53
ANTI TRIP
6AL5
V14
R49
DELAY
R42
VOX
C114
RF ØC
12AT7
V5
12AT7
V4
C124
BAL. MOD
TUNE
T103
T102
C110
L102
C35 C38 C42 C43
12BY7

ALIGNMENT CHART

Step	Band	Signal Generator Connection	VTVM Connection	Trimmer Adjust for Maximum	Coil Adjust for Maximum	Signal Generator Freq. MC		Approx. Driver Tuning Setting	
						f_1	f_2	D_1	D_2
1	80M	High Side to Pin #1 grid of V8 (6AH6, 2nd Mixer) Common side to chassis. (Generator leads must be kept to absolute minimum to prevent regeneration.)	VTVM to Pin #5 grid of V11 (6146 Final Amp). Common to chassis.	C26 C43	L7 L11	3.5	4.0	2.6	7.4
2	40M	Same as step 1.	Same as step 1.	C25 C42	L6 L10	7.0	7.3	1.8	8.2
3	20M	Same as step 1.	Same as step 1.	C22 C38	L5 L9	14.0	14.35	2.2	7.4
4	15M	Same as step 1.	Same as step 1.		L5 L9	21.0		3.6	
5	10M	Same as step 1.	Same as step 1.	C20 C35	L4 L8	28.0	29.7	2.4	8.0

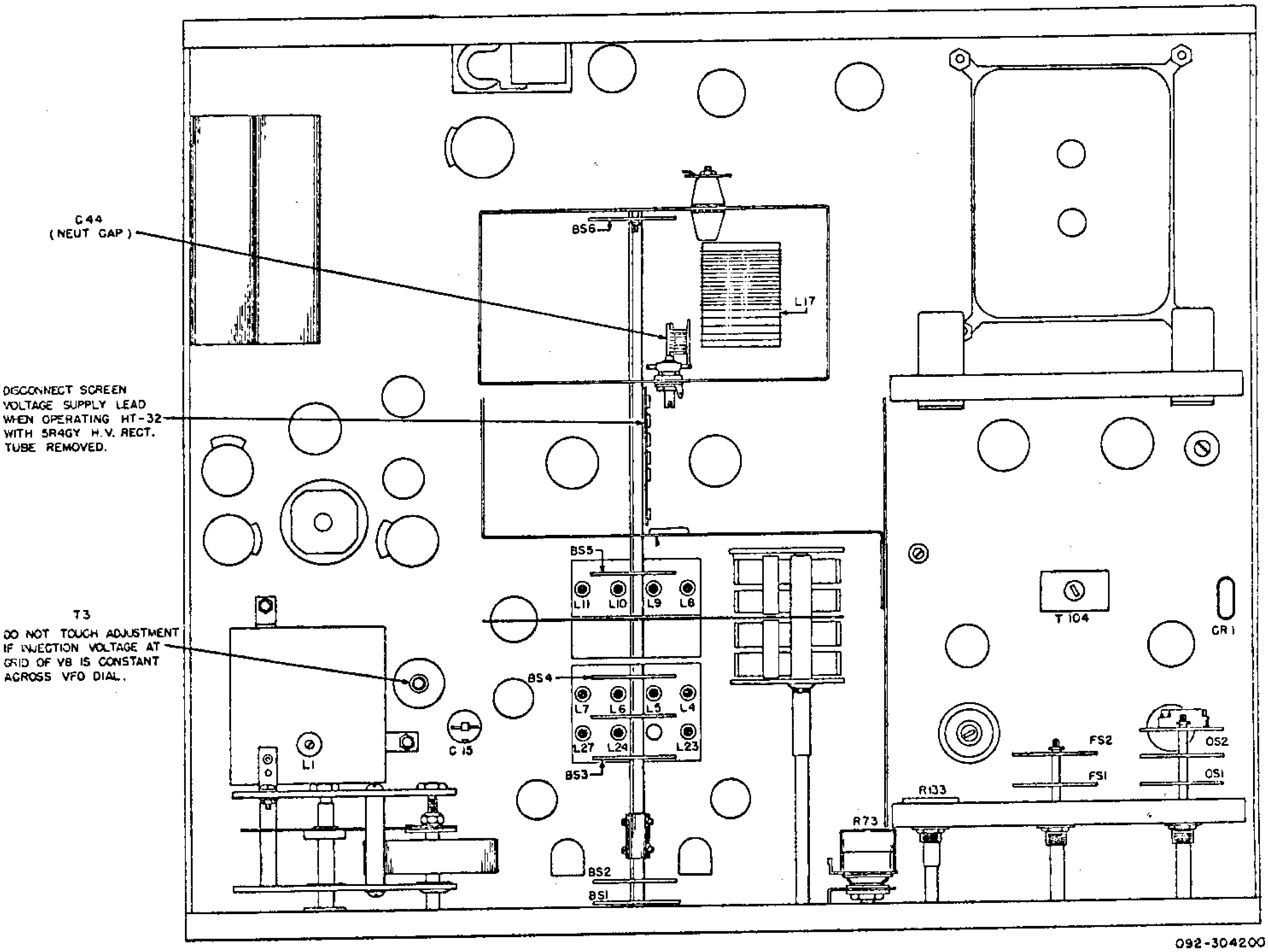


Figure 10. Bottom Chassis Alignment Points

8-5-2. 1ST MIXER STAGE

ALIGNMENT CHART

Step	Band	Signal Generator Connection	VTVM Connection	Trimmer Adjust for Maximum	Slug Adjust for Maximum	Signal Generator Freq. (MC)		VFO Freq. (MC)
						f_1	f_2	
1	40M	High side to pin #1 grid of V7 (6AH6, 1st Mixer). common side to chassis.	VTVM to pin #5 grid of V11 (6146, Final Amp.). Common to chassis.		L23	7.2	12.5	7.2
2	15M	Same as step 1.	Same as step 1.	C201		21.0	16.0	21.0
3	10M	Same as step 1.	Same as step 1.	C78		29.0	23.5	29.0

8-5-2-.. 1ST MIXER STAGE ALIGNMENT

The 1st mixer alignment procedure must follow the sequences shown in the chart, since the setting of the coil inductance on 40M must precede the trimmer adjustments on 15M and 10M bands. The following is the alignment procedure for 40 meters.

1. Set BAND SELECTOR at 40M.

2. Set trimmers C201 and C78 at mid-capacity.

3. Set slug (L23) at it's maximum counterclock-wise position (minimum inductance)

9. Proceed with the alignment of the 2nd mixer stage on 15M and 10M, using the chart and the above procedures used on 40M.

NOTE

The above alignment for 10M 1st mixer adjustment covers the 28.5 - 29.0 MC 10M segment (32.5 MC xtal) supplied with the HT-37 Transmitter/Exciter. For alignment instructions covering the use of other 10M 0.5 MC segments, refer to SEGMENT ALIGNMENT for 10M BAND in paragraph 5-8.

the VFO unit and set the receiver at 5.0 MC with the xtal calibrator. Receiver BFO turned off.

3. Tune the VFO unit to 4000 KC on 80M.

4. Adjust slug L1 for zero beat.

5. Set the receiver to 5.5 MC with the xtal calibrator.

6. Tune the VFO unit to 3500 KC on 80M.

7. Adjust air trimmer C3 for zero beat.

8. Repeat steps 3, 4, 5, 6, and 7 until cali-

3. Tune up the transmitter on 40 meters into a dummy load.

4. Adjust BAL MOD TUNE trimmer (C124) for maximum output level. Reduce the setting of the RF GAIN control if necessary to prevent over-driving the final.

8-10. AUDIO AND RF PHASE SHIFT ADJUSTMENTS

The AUDIO Ø BAL (R112), AUDIO AMP BAL (R113), RFØL (L102) & RFØC (C114) controls determine the degree of suppression of the unwanted sideband. These adjustments are made at one frequency and hold for all other output frequencies of the transmitter. Once properly set, they should require no

Connect source of 1000 Cycle Sine wave into
to MICROPHONE input socket.

9. With HT-37 AUDIO GAIN control set to 6 on the dial, adjust audio source voltage to produce approximately 2/3 full transmitter output.

NOTE

With audio oscillators that produce a comparatively large output voltage, it may be necessary to insert an attenuator in the audio input lead to prevent overload saturation of the input audio stages.

10. Tune RECEIVER, set to the narrowest selectivity position and with the BFO "OFF", for the maximum S-meter reading at the transmitted sideband frequency (see figure 11A). Adjust antenna coupling and/or receiver RF gain control to prevent receiver saturation while maintaining a good S-meter indication.

11. Set HT-37 FUNCTION switch to LSB. There should be a noticeable reduction in the RECEIVER S-meter reading. As shown in figure 11D, the receiver is now tuned to the "unwanted" sideband frequency.

    In cases of extreme mis-alignment of the phase shift controls, RFØL, RFØC, AUDIO Ø BAL, and AUDIO AMP BAL, it is difficult to locate the "wanted" and "unwanted" sidebands on the basis of signal strength, since the "unwanted" sideband may be equal or even greater in amplitude than the "wanted" sideband. Under these conditions, before proceeding with alignment, it is necessary to determine the sideband relationship to the suppressed carrier. To accomplish this, proceed as follows:

    (a) Set HT-37 FUNCTION switch to CAL.

    (b) Tune RECEIVER to "zero in" (peak reading on S-meter) on transmitter frequency. Adjust CAL LEVEL control as necessary to provide adequate coupling to receiver.

    (c) Set HT-37 FUNCTION switch to USB. (Transmitter modulated with 1000 CPS audio tone as previously explained).

    (d) Tune Receiver, set to narrowest selectivity position to the "wanted" sideband frequency. This will now be the first S-meter peak found by tuning the receiver <u>higher</u> (1KC) in frequency from the carrier setting.

    (e) Set HT-37 FUNCTION switch to LSB. The receiver is now tuned to the "unwanted" sideband frequency.

12. Starting from the extreme counterclockwise end, adjust AUDIO Ø BAL control (R112) for maximum S-meter null, i. e. lowest reading.

maximum S-meter null.

14. Alternately adjust RFØL (L102) and RFØC (C114) for maximum S-meter null.

15. Readjust AUDIO Ø BAL and AUDIO AMP BAL controls for maximum null. Only a very slight adjustment should be required.

16. Steps 14 and 15 should be repeated until no further reduction in the S-meter reading can be obtained. Note S-meter reading for future reference.

17. Retune RECEIVER to "wanted" sideband frequency (LSB).

18. Set HT-37 FUNCTION switch to USB. Note S-meter reduction. Compare reading to that obtained on the other sideband.

19. A compromise of the low reading obtained on either sideband should be made by setting the AUDIO Ø BAL control to "split the difference" between them.

    If an oscilloscope is available, this compromise setting can be determined by observing the output waveform as the FUNCTION switch is set alternately between USB and LSB. Proper setting of the AUDIO Ø BAL control is evidenced by essentially equal ripple appearing on either sideband pattern.

20. Readjust RFØL and RFØC for maximum S-meter null. Note S-meter reading for future reference.

21. Retune RECEIVER to "wanted" sideband (USB) frequency.

22. Set HT-37 FUNCTION switch to LSB. Note S-meter reading.

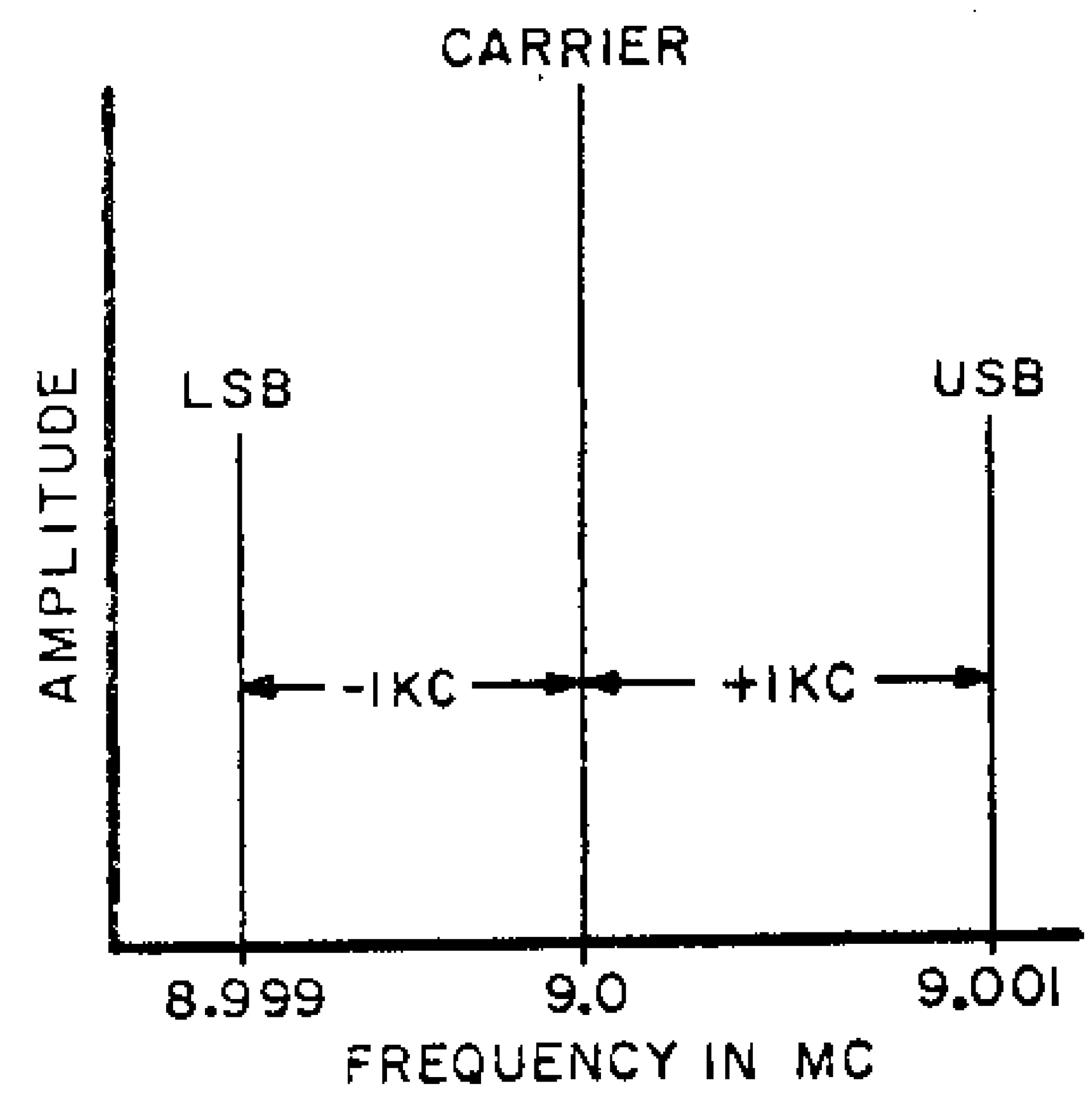
23. S-meter differences between step 20 and 22 should be compromised as in step 19.

24. Repeat steps 14 to 23 until no further compromise setting is necessary with RFØL and RFØC set for maximum null on either sideband. The oscilloscope representation of this condition will be minimum ripple on either sideband consistent with equal ripple amplitude.

8-11. NEUTRALIZATION OF FINAL AMPLIFIER

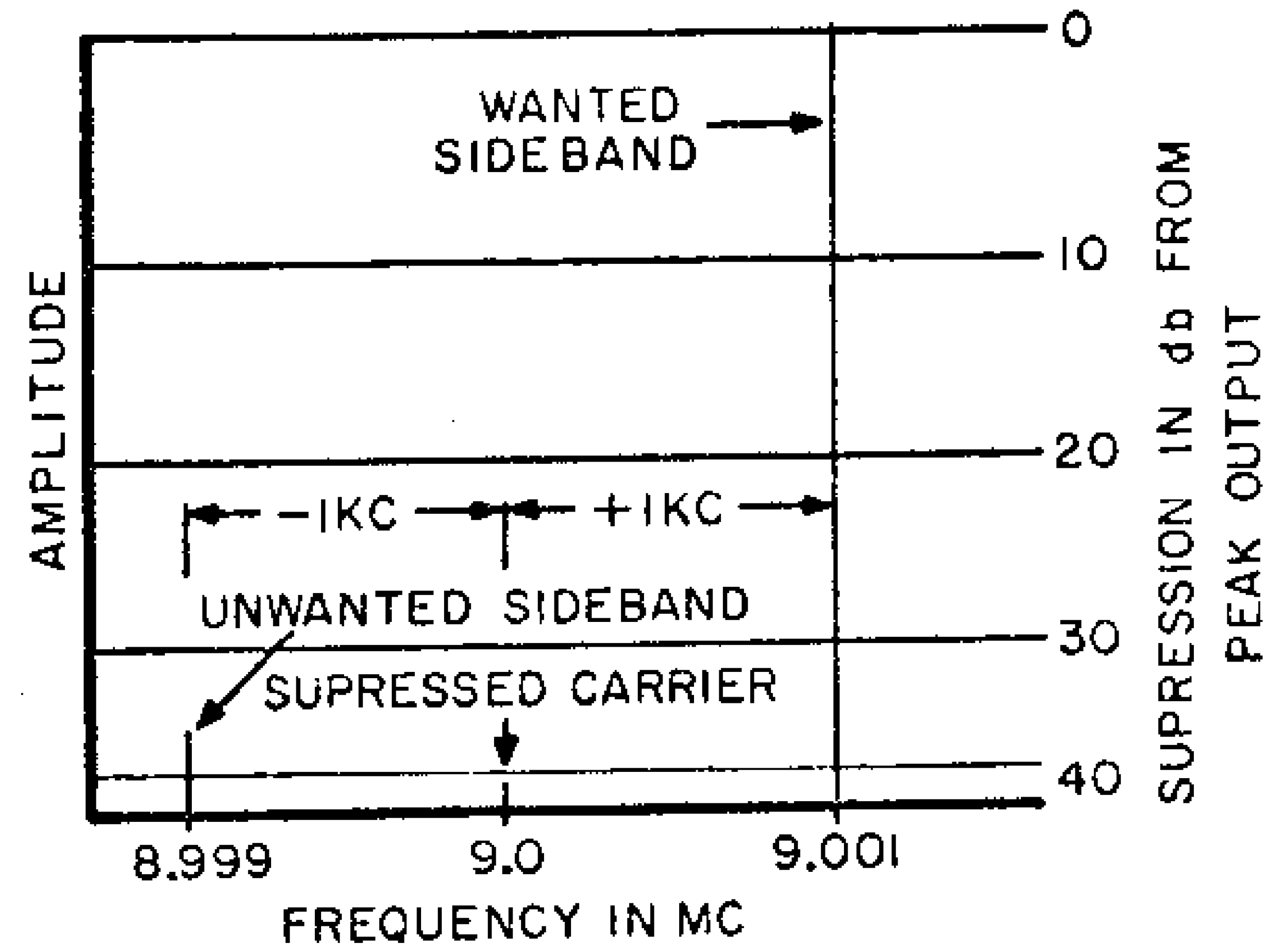
Although a signal generator is used here for this adjustment, the carrier on DSB or CW generated by the transmitter on the 10M and 15M bands may be used.

1. Connect signal generator to pin #1 of V7 (1st mixer) through 100 uuf capacitor. Common side to chassis.
2. Connect dummy load to transmitter output.
3. Remove heterodyne oscillator tube (V6) and carrier oscillator tube (V2).



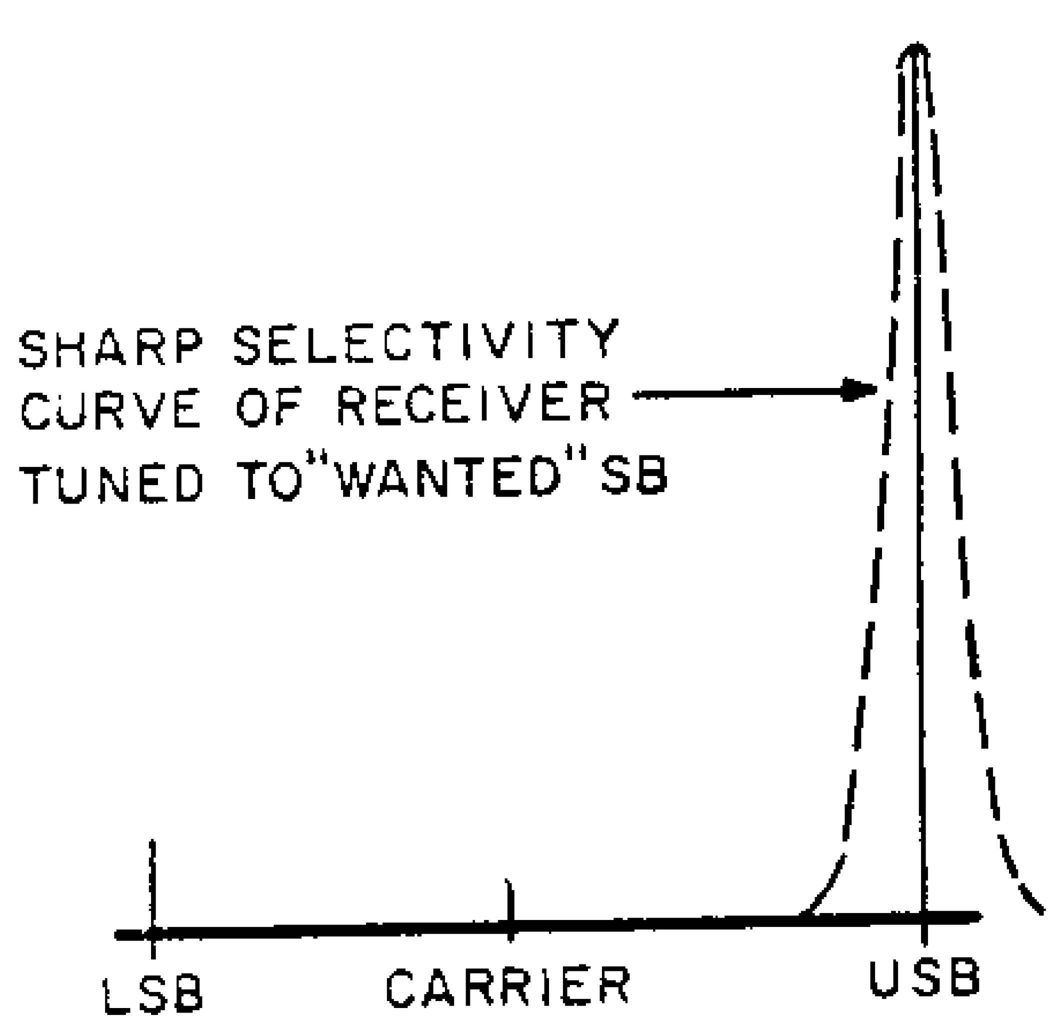
A

PANORAMIC DISPLAY OF AN AM TYPE SIGNAL. (9.0MC RF CARRIER MODULATED BY A 1000 CPS AUDIO TONE).

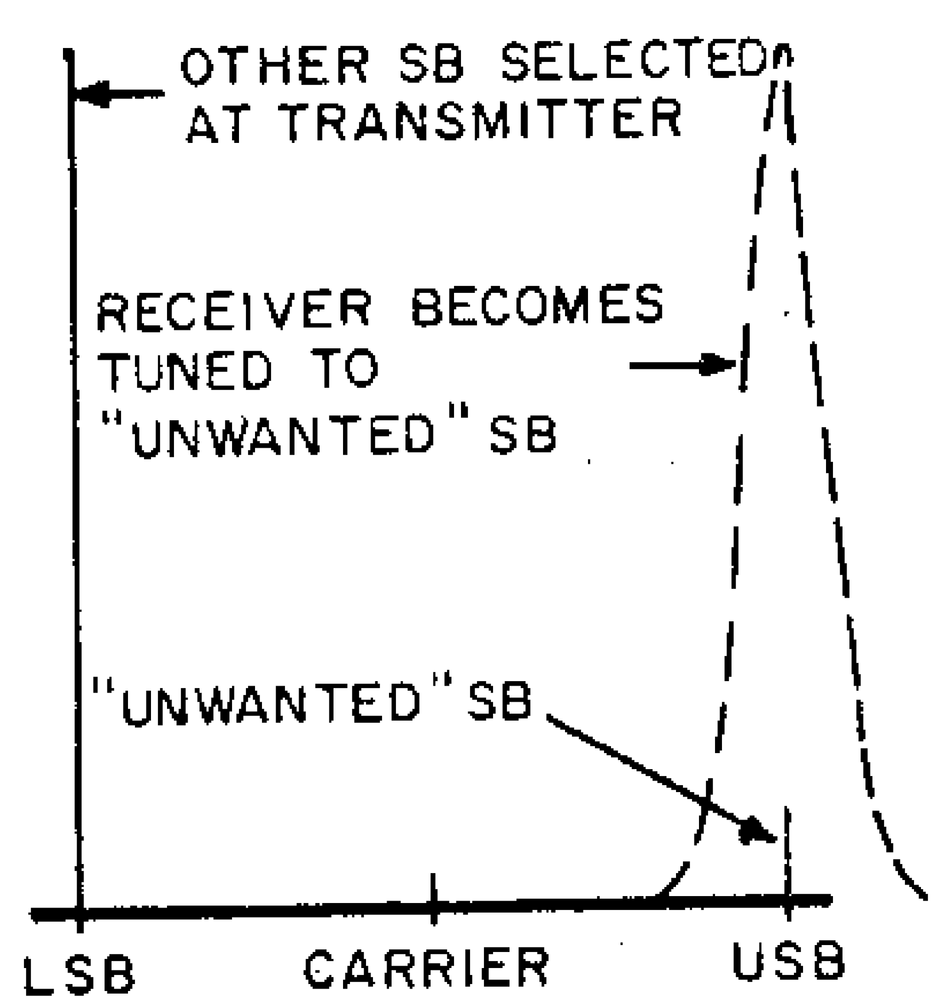


B

PANORAMIC DISPLAY OF A SSB SIGNAL WHICH WILL PRODUCE A 1000 CPS AUDIO TONE WHEN DETECTED BY A SSB RECEIVER.



C



D

PANORAMIC DISPLAY OF TECHNIQUE INCORPORATED IN CHECKING AND ADJUSTING "UNWANTED" SIDEBAND REJECTION, PARAGRAPH 8-10.

092-104202B

Figure 11. Panoramic Sideband Displays

4. Connect 0-300 MA milliammeter in H.V. plate lead between the filter capacitor (C69) and shunt feed choke (L16).

5. Insert H.V. rectifier and reconnect screen supply lead.

6. Set neutralization capacitor (C44) at mid-capacity.

7. Set OPERATION switch at MOX, and frequency dial at mid position.

8. Set BANDSWITCH at 10M, signal generator at 23 MC, and adjust DRIVER and FINAL TUNING for maximum output. Set signal generator output for 150-175 MA plate current.

9. Tune FINAL TUNE control for plate current dip and observe output meter. Adjust neutralization capacitor until the output meter passes through maximum at the same time the plate current passes through the resonant dip.

10. Set BANDSWITCH at 15M, signal generator at 16 MC, and repeat the above procedure.

11. If the neutralization capacitor setting does not change, the adjustment is complete. If a small change in setting occurs, set the capacitor half way between the two settings and recheck with this compromise setting.

8-12. VFO INJECTION ADJUSTMENT

This adjustment is a coupling trimmer in the output of the VFO unit which governs the amount of VFO injection voltage applied to the 2nd mixer stage.

1. Set BAND SELECTOR at 15M.

2. Set VFO dial to 21.33 MC.

3. Tune the Transmitter/Exciter for DSB operation into 50-ohm load.

4. Remove carrier oscillator tube (V2).

5. Adjust VFO coupling trimmer (C15) for 0.1V RMS RF output across 50 ohms.

6. Connect VTVM probe to pin #1 grid of V8 (6AH6, 2nd Mixer). The injection voltage will be approximately 0.3 to 0.4V RMS. If below 0.3V, check screen and bias voltages on tubes V8 and V10, and check tubes V8 and V10 for malfunction.

7. Replace carrier oscillator tube V2, and tune for maximum saturated power output, which should be at least 60V RMS across 50 ohm load.

8-13. 10 METER TRAP COIL ADJUSTMENT

This adjustment should be made with a 33.5 MC crystal in the 10 meter heterodyne osc. xtal socket. If the 33.5 MC xtal is not available to the operator, the 32.5 MC xtal supplied with the HT-37 may be used to adjust the trap coil. However, when higher frequency xtals are installed, the trap coil must then be reset as outlined below.

1. Preset the trap trimmer (C77) to minimum capacity (slot toward center of RF deck). See Figure 6.

2. Preset the trap coil slug (L24) for minimum inductance (maximum counterclockwise).

3. Tune the transmitter for CW operation on the 10M band.

4. Set the FUNCTION switch at LSB.

5. Adjust DRIVER TUNING and FINAL TUNING for the spurious output. (33.5 MC Xtal-VFO frequency = 28.0 to 28.5 MC.)

6. Adjust trap coil slug (L24) for minimum output.

7. Increase trap trimmer capacity slightly, and reset the trap coil slug for minimum output. Use just enough capacity in the trap trimmer to observe two resonant dips in the spurious output when the trimmer is rotated through minimum capacity.

8. Set FUNCTION switch at DSB.

9. Tune DRIVER TUNING and FINAL TUNING to desired frequency between 29.5 - 29.7 MC.

10. Readjust 10M 1st mixer trimmer (C78) for maximum output with RF LEVEL slightly advanced.

11. Set FUNCTION switch at LSB.

12. Retune DRIVER TUNING and FINAL TUNING for spurious output.

13. Adjust trap coil slug for minimum spurious output and repeat step 10 to be sure the mixer stage is resonant.

14. When crystals other than 33.5 MC are used on the 10M band, it is only necessary to adjust the trap trimmer. The trap coil adjustment is left adjusted for the highest frequency crystal.

8-14. 18 MC TRAP

The 18 MC trap provides additional suppression a 28,000 KC, 29,000 KC, 30,000 KC and 31,000 KC spurious signal generated by the 2nd harmonic

8-14-1. 18 MC TRAP COIL ADJUSTMENT

To check or adjust the 18 MC trap, tune up the transmitter on either 28,000 KC or 29,000 KC in the CW position of the FUNCTION switch (key closed). Leave the RF LEVEL control set for saturated output, and open the key. Remove the VFO tube V9 (6CB6) and

SERVICE PARTS LIST (CONT.)

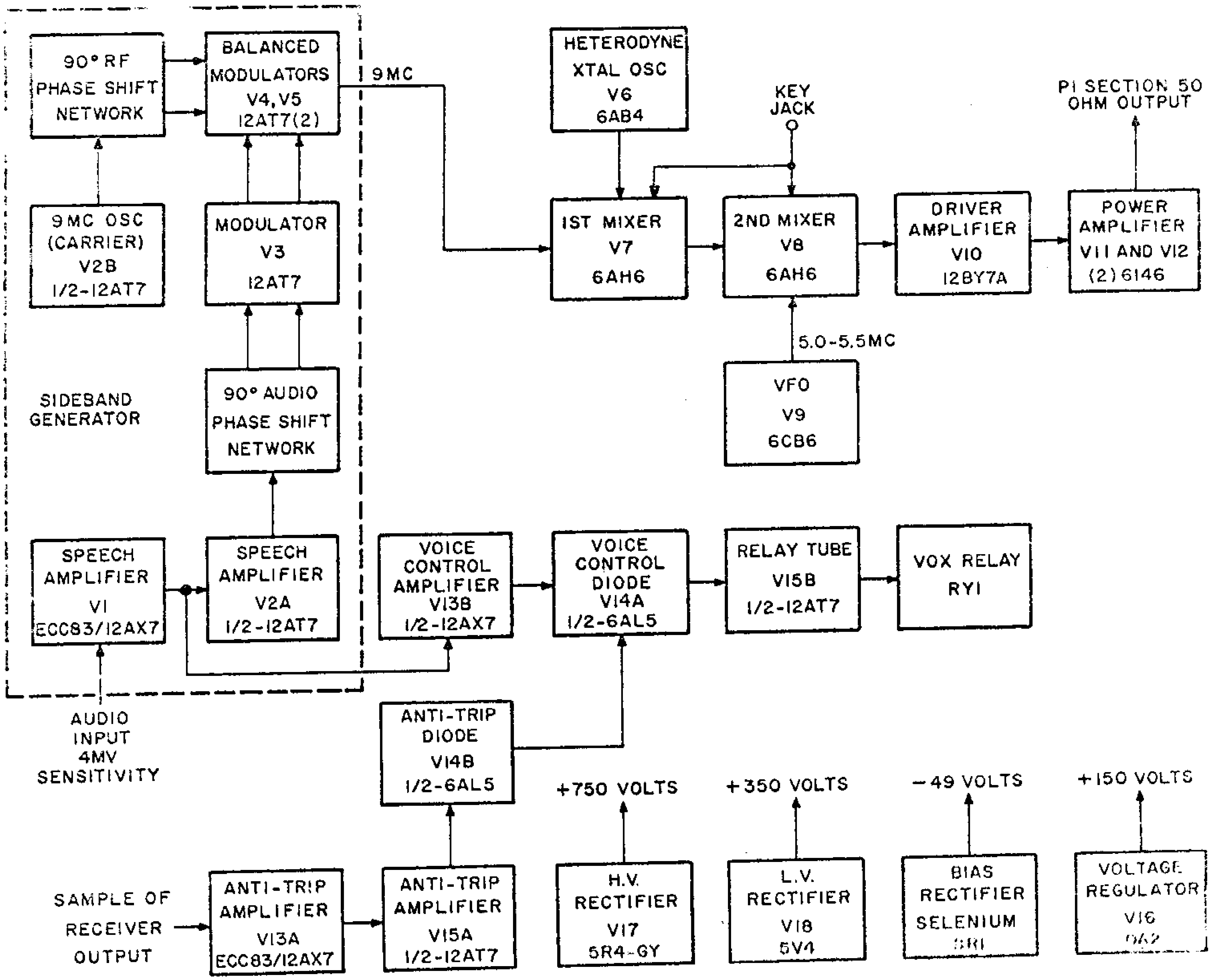
Schematic Symbol	Description	Hallicrafters Part Number
	***RESISTORS (SIDEBAND GENERATOR ASSEM.) (cont)**	
R117	1K ohm, 1/2W	451-252102
R118, 119	47 ohm	451-352470
R120, 121, 126, 127	15K ohm, 1/2W	451-252153
R122, 124, 128, 130	390 ohm	451-352391
R123, 129	500 ohm; Variable, CARRIER BAL. controls	025-101711
R132	6.8K ohm, 2W	451-652682
R133	1K ohm; Variable, RF LEVEL control	025-101712
R135	1.5K ohm, 1/2W	451-252152
R136	180 ohm, 1/2W	451-252181

*RESISTORS are 10%, 1W, carbon type, unless otherwise noted.

Schematic Symbol	Description	Hallicrafters Part Number
	TRANSFORMERS AND COILS	
L1	Coil Assem., VFO	051-202180
L2	Choke, VFO Filament	053-200359
L3, 13, 107	Choke, RF (2.5 MH)	053-200335
L4, 8	Coil RF (10M)	051-202015
L5, 9	Coil, LF (15-20M)	051-202668
L6, 10	Coil, RF (40M)	051-202017
L7, 11	Coil, RF (80M)	051-202018
L12, 14	Choke, Parasitic Suppressor	053-200417
L15	Choke, Filament	053-200358
L16	Choke, RF Final Plate	053-200426
L17	Coil, Final Tank	051-302558
L18	Choke, RF; Safety	053-100160
L19, 20	Coil, Xtal Osc. Grid (15 & 40M)	051-202251
L21	Coil, Xtal Osc. Grid (10M)	051-202250
L23	Coil, RF; Xtal Osc. Plate	051-202235
L23	Coil, RF; 1st Mixer Plate	051-202182
L24	Coil, 32-33.5MC Trap	051-202234
L25	Choke, Filter (9HY @ 135MA)	056-300259
L26	Choke, Filter (8HY @ 175MA)	056-300260
L27	Coil, 18MC Trap	051-202656
L101	Choke, Iron Core (50MH)	053-100536
L102	Coil, RFOL	051-202566
L103, 104, 105, 106	Choke, RF(500UH)	053-200537
T1	Transformer, VFO Band-Pass Filter	050-200679
T2	Transformer, Power	052-400673
T101	Transformer, Audio	055-300397
T102	Transformer, Audio	055-300398

Schematic Symbol	Description	Hallicrafters Part Number
	SWITCHES AND WAFERS	
BS1, 2	Switch, Wafer; BAND SELECTOR	060-202076
BS3	Switch, Wafer; 1st Mixer	062-200102
BS4, 5	Switch, Wafer; 2nd Mixer and Driver	062-200103
BS6	Switch, Wafer; Tank Coil	062-200112
FS	Switch, FUNCTION	060-302058
OS	Switch, OPERATION	060-302059
	PLUGS, SOCKETS AND CONNECTORS	
P1, 5	Plug, Phono	010-100231
P2	Line Cord and Power Plug	087-105302
P3	Plug, 10 Pin	006-100715
P4	Plug, 6 Pin	006-100714
SO1	Connector, Mike	029-100566
SO2, 5	Jack, Phono	036-100041
SO3	Socket, 10 Pin	006-100712
SO4	Socket, 6 Pin	006-100713
SO6	Jack, KEY	036-100064
SO7	Connector, Coax (RF)	010-100056
SO8	Socket, 11 Pin	006-200707
	Plug, 11 Pin	035-100043
	Socket Assem., Pilot Light	086-200466
	Socket, Tube; Octal (V11, V12, V17, V18)	006-100760
	Socket, Tube; 7 Pin Min. (V16)	006-100354
	Socket, Crystal (CR2, CR3, CR4)	006-100320
	Socket, Tube; 7 Pin Min. (V6, V7, V8, V14)	006-200759
	Socket, Tube; 7 Pin Min. (V9)	006-100645
	Socket, Tube; 9 Pin W/Base (V1, V2, V3, V10, V13, V15)	006-200672
	Socket, Tube; Octal (Z1)	006-200296
	Socket, Tube; 9 Pin Min. (V4, V5)	006-200778
	Plug; 8 Pin Octal (Z1)	006-100853
	TUBES AND RECTIFIERS	
V1	ECC83/12AX7; 1st & 2nd Audio	090-901230
V2	12AT7; 3rd Audio and Carrier Osc.	090-900034
V3	12AT7; Modulator	090-900034
V4, 5	12AT7; Balanced Modulators	090-900034
V6	6AB4; Heterodyne Osc.	090-900784
V7, 8	6AH6; 1st & 2nd Mixers	090-900793
V9	6CB6; VFO	090-901115
V10	12BY7A; Driver	090-901192
V11, 12	6146; Final Amplifiers	090-900756
V13	12AX7; 1st Anti-Trip Amplifier and VOX Amp.	090-900038
V14	6AL5; VOX Diode and Anti-Trip Diode	090-901163

Schematic Symbol	Description	Hallicrafters Part Number
	TUBES AND RECTIFIERS (cont)	
SR1	Rectifier, Selenium	027-200224
	LAMPS AND FUSES	
LM1	Lamp, Pilot; #47 (Meter)	039-100004
LM2, 3	Lamp, Pilot; #44 (Dial)	039-100003
F1	Fuse, 4 Amp; Slo-Blo, 3AG	039-100448
	KNOBS	
	Knob, CARRIER BALANCE	015-200676
	Knob, OPERATION, FUNCTION, RF LEVEL and DRIVER TUNE	015-001724
	Knob, AUDIO GAIN and FINAL TUNE	015-001464
	Knob, CAL. LEVEL	015-200835
	Knob, MAIN TUNING	015-001491
	Knob, BAND SELECTOR	015-200209
	CRYSTALS AND DIODES	
CR1	Crystal, Carrier Osc. (9MC)	019-102299
CR2	Crystal, 21.5 MC	019-201960
CR3	Crystal, 25 MC	019-201961
CR4	Crystal, 32.5 MC (28.5-29.0 MC)	019-201964
	Crystal, 32.0 MC (28.0-28.5 MC)	019-201963
	Crystal, 33.0 MC (29.0-29.5 MC)	019-201965
	Crystal, 33.5 MC (29.5-29.7 MC)	019-201966
CR5	Rectifier, Diode	019-101916
	MISCELLANEOUS CHASSIS PARTS	
	Cabinet, Bottom	066-702447
	Cabinet, Foot	016-100029
	Cabinet, Top	066-702448
	Clip, Dial Glass Retaining	076-100663
	Core, Iron	077-100068
	Coupler, Insulated	029-100564
	Coupler, Solid	029-100264
	Dial, Final Tune	083-300687
	Dial, Audio Level	083-300688
	Dial, Frequency	083-500691
	Dial Glass, Frequency	022-200602
	Flywheel	071-000210
	Fuse Holder	006-100845
	Line Cord Lock (Male)	076-200756-01
	Line Cord Lock (Female)	076-200756-02
M1	Meter, Output Level	082-200416
	Network, Audio Phase Shift	041-250449
	Panel, Front	068-500867
	Pointer, Dial	032-200425
RY1	Relay, VOX	021-200442
	Shaft, PA Tuning	074-202121
	Shaft, Drive	074-202122
	Shaft, Idler	074-202123

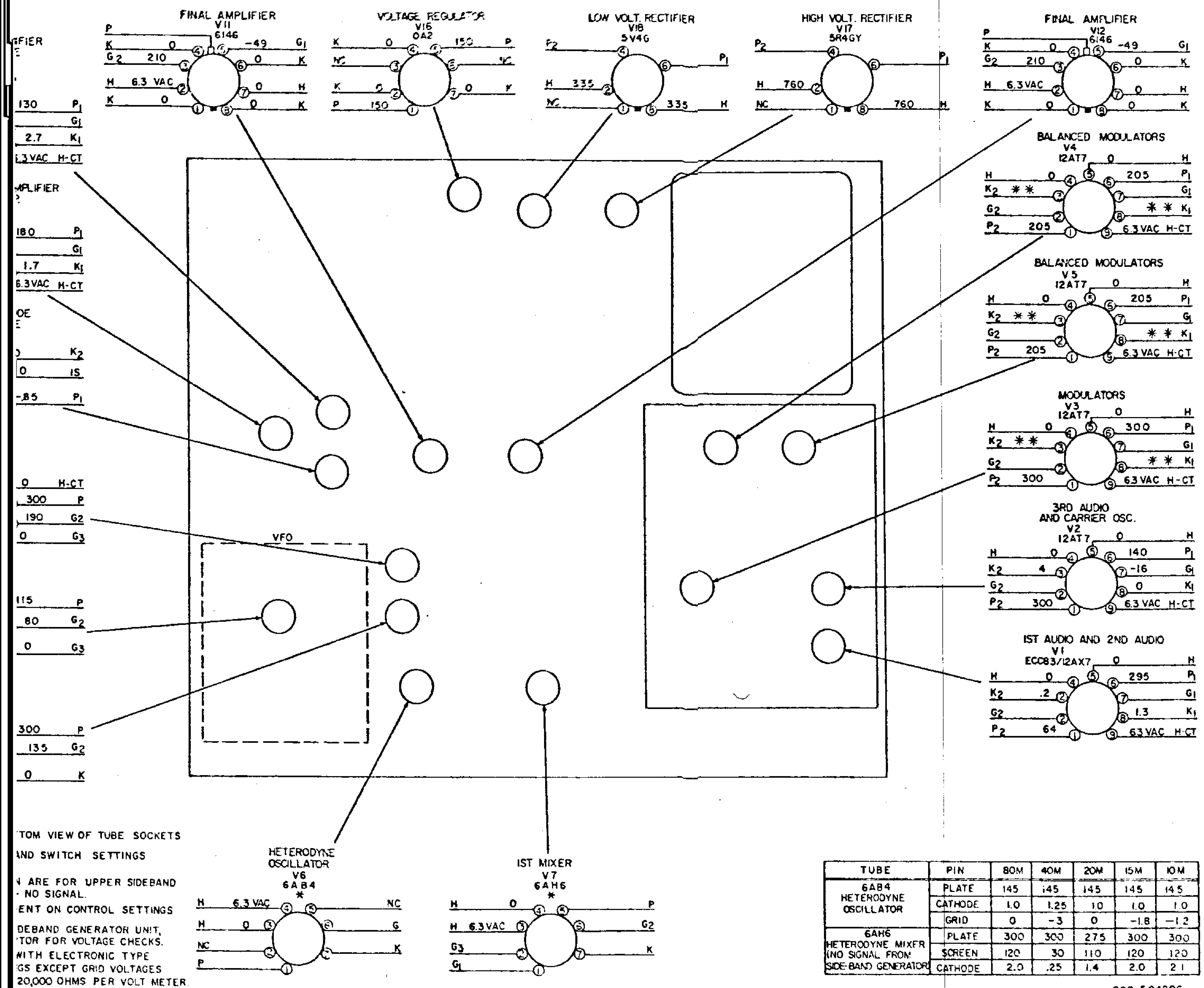


OUTPUT FREQUENCY DEVELOPEMENT

BAND	1ST MIXER, V7 INPUT FROM SB GEN.	1ST MIXER, V7 INPUT FROM HET. OSC.	1ST MIXER, V7 OUTPUT	2ND MIXER, V8 INPUT FROM 1ST MIXER	2ND MIXER, V8 INPUT FROM VFO	2ND MIXER, V8 OUTPUT	BAND
80M		INOPERATIVE	9.0MC	9.0MC		3.5-4.0MC	80M
40M		21.5MC	12.5MC	12.5MC		7.0-7.5MC	40M
20M		INOPERATIVE	9.0MC	9.0MC		14.0-14.5MC	20M
15M	9.0MC	25.0MC	16.0MC	16.0MC	5.0-5.5MC	21.0-21.5MC	15M
10M		32.0MC	23.0MC	23.0MC		28.0-28.5MC	10M
10M		32.5MC	23.5MC	23.5MC		28.5-29.0MC	10M
10M		33.0MC	24.0MC	24.0MC		29.0-29.5MC	10M
10M		33.5MC	24.5MC	24.5MC		29.5-30.0MC	10M

092-304205

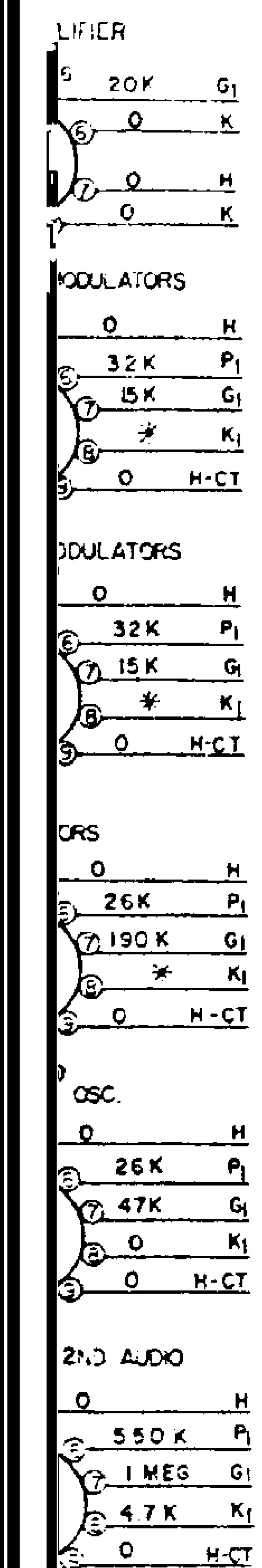
Figure 12. Model HT-37 Block Diagram.



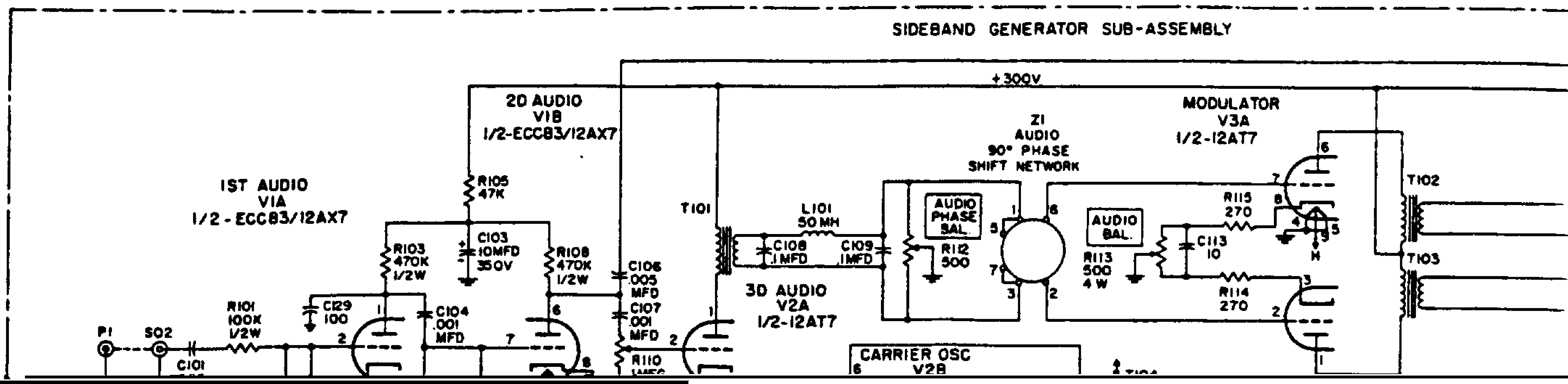
TUBE	PIN	80M	40M	20M	15M	10M
6AB4 HETERODYNE OSCILLATOR	PLATE	145	145	145	145	145
	CATHODE	1.0	1.25	1.0	1.0	1.0
	GRID	0	-3	0	-1.8	-1.2
6AH6 HETERODYNE MIXER (NO SIGNAL FROM SIDE-BAND GENERATOR)	PLATE	300	300	275	300	300
	SCREEN	120	30	110	120	120
	CATHODE	2.0	.25	1.4	2.0	2.1

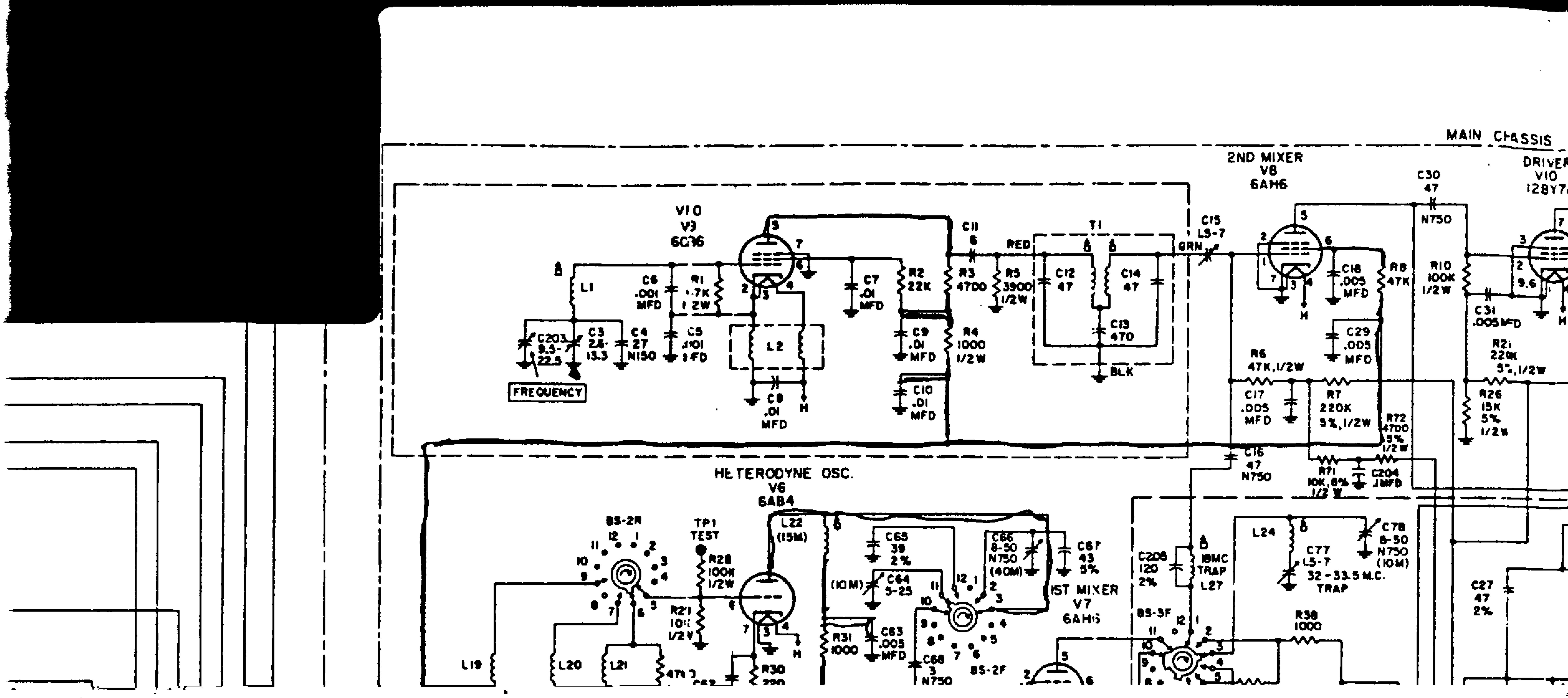
092-504206

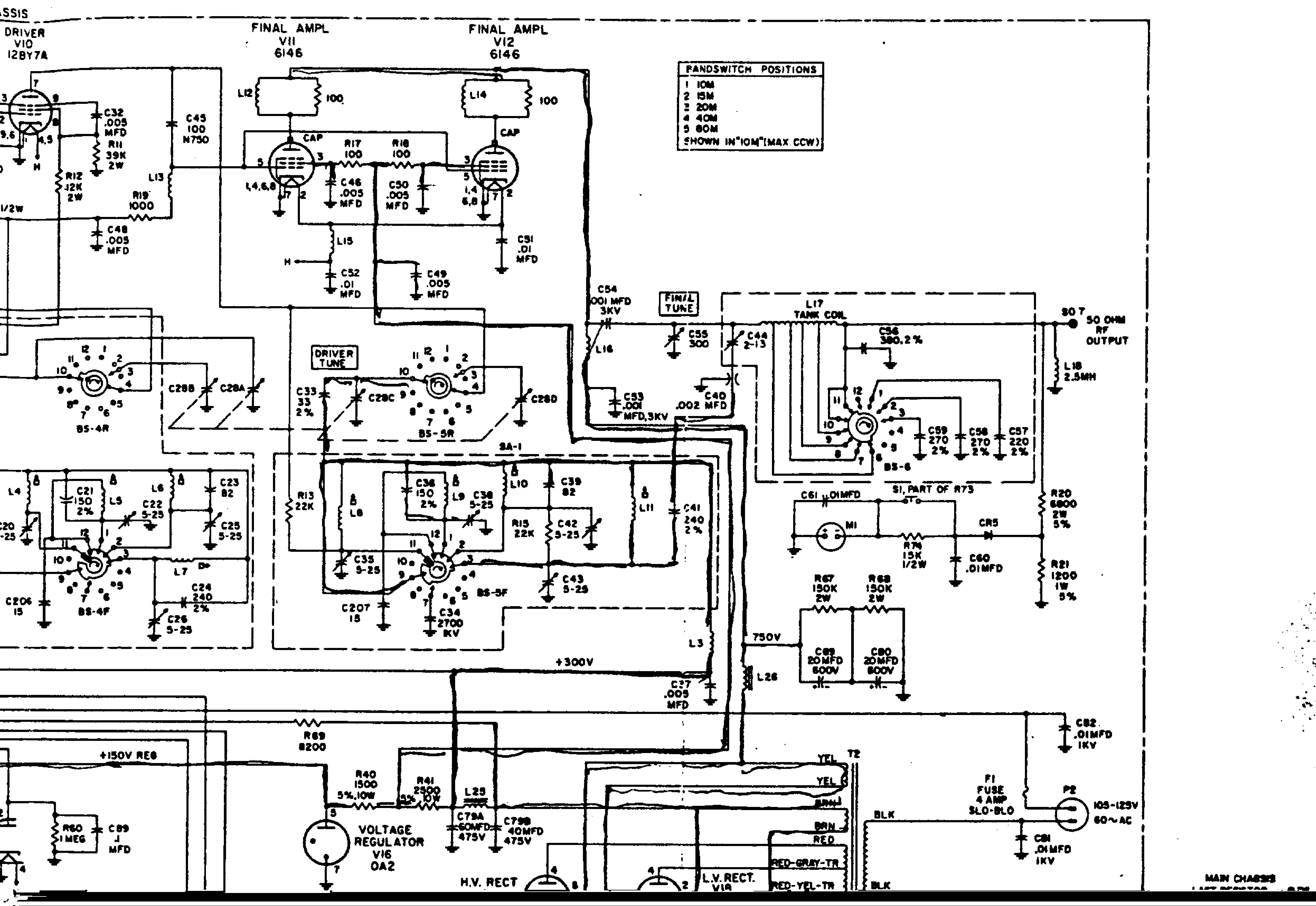
Figure 13. Model HT-37 Voltage Chart.

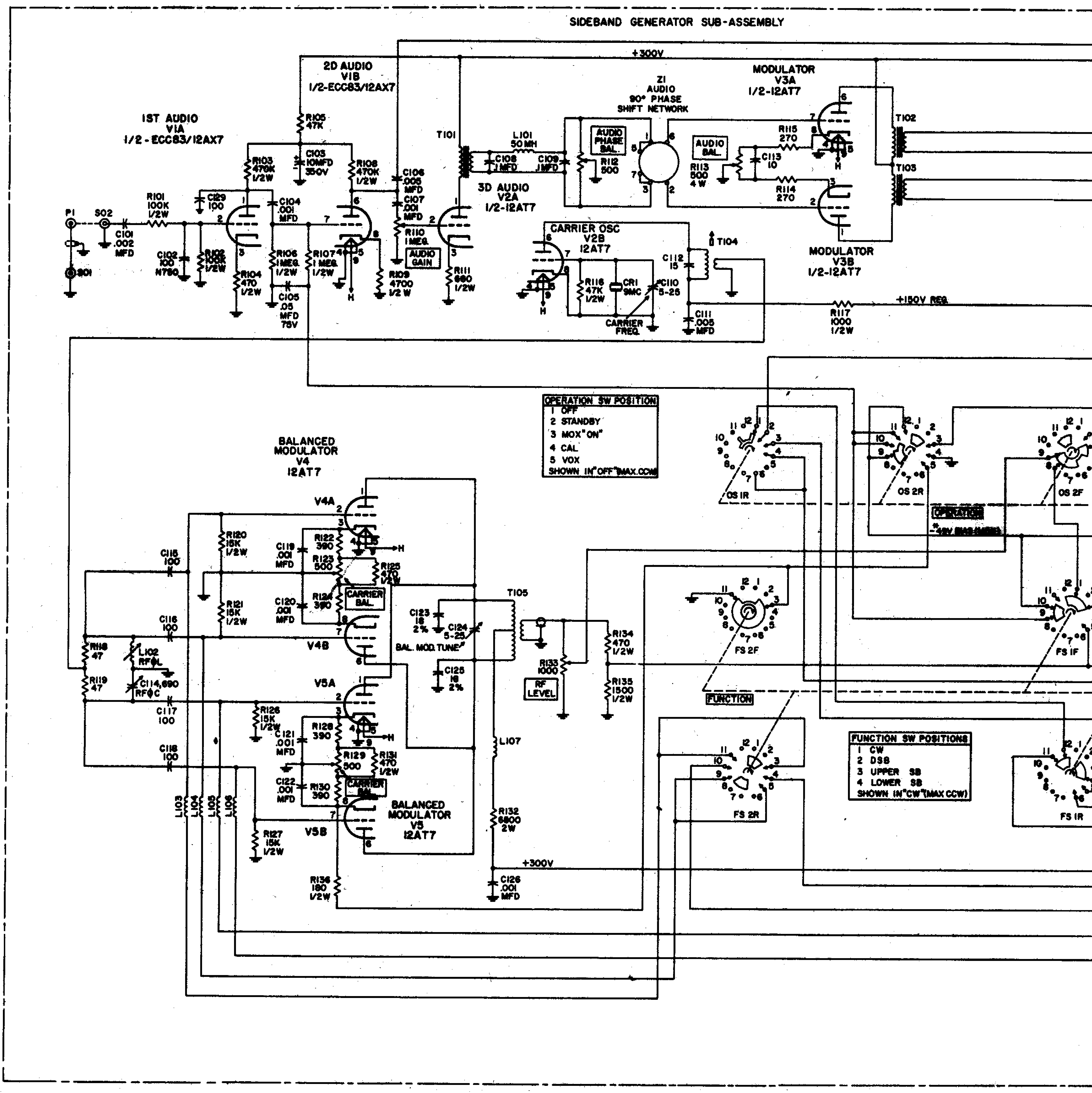

LIFIER
20K G1
0 K
0 H
0 K
ODULATORS
0 H
32K P1
15K G1
* K1
0 H-CT
ODULATORS
0 H
32K P1
15K G1
* K1
0 H-CT
ORS
0 H
26K P1
190K G1
* K1
0 H-CT
OSC.
0 H
26K P1
47K G1
0 K1
0 H-CT
2ND AUDIO
0 H
550K P1
1 MEG G1
4.7K K1
0 H-CT

092-50608

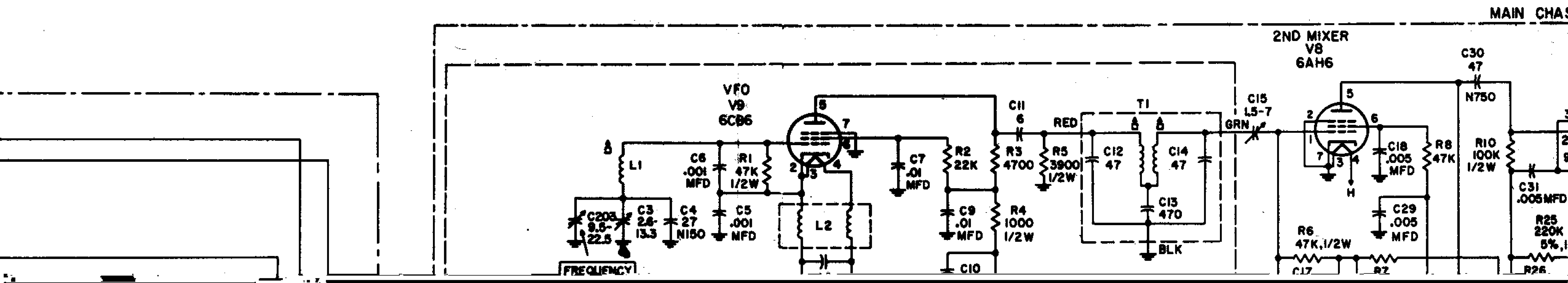

SIDEBAND GENERATOR SUB-ASSEMBLY
+300V
1ST AUDIO
V1A
1/2-ECC83/12AX7
2D AUDIO
V1B
1/2-ECC83/12AX7
3D AUDIO
V2A
1/2-12AT7
Z1
AUDIO
90° PHASE
SHIFT NETWORK
MODULATOR
V3A
1/2-12AT7
CARRIER OSC
V2B
AUDIO PHASE BAL.
AUDIO BAL.
P1
SO2
C101
R101
100K
1/2W
C129
100
R103
470K
1/2W
R105
47K
C103
10MFD
350V
C104
.001
MFD
R108
470K
1/2W
C106
.005
MFD
C107
.001
MFD
R110
T101
L101
50MH
C108
.1MFD
C109
.1MFD
R112
500
R113
500
4W
C113
10
R115
270
R114
270
T102
T103


MAIN CHASSIS
2ND MIXER
V8
6AH6
HETERODYNE OSC.
V6
6AB4
1ST MIXER
V7
6AH6
FREQUENCY
TP1
TEST
T1
RED
GRN
BLK
18MC TRAP
32-53.5 M.C. TRAP


DRIVER
V10
12BY7A
FINAL AMPL
V11
6146
FINAL AMPL
V12
6146
BANDSWITCH POSITIONS
1 10M
2 15M
3 20M
4 40M
5 80M
SHOWN IN "10M" (MAX CCW)
DRIVER TUNE
FINAL TUNE
L17
TANK COIL
50 OHM
RF
OUTPUT
+300V
750V
+150V REG
VOLTAGE
REGULATOR
V16
OA2
H.V. RECT
L.V. RECT.
FUSE
4 AMP
SLO-BLO
105-125V
60~AC



LAST RESISTOR—R137
LAST CAPACITOR—C129


MAIN CHAS
2ND MIXER
V8
6AH6
VFO
V9
6CB6
C30
47
N750
C11
6
RED
T1
GRN
C15
L5-7
BLK
L1
C6
.001
MFD
R1
47K
1/2W
C7
.01
MFD
R2
22K
R3
4700
R5
3900
1/2W
C12
47
C14
47
C13
470
C9
.01
MFD
R4
1000
1/2W
C10
L2
C203
9.5-
22.5
C3
2.6-
13.3
C4
27
N150
C5
.001
MFD
FREQUENCY
C18
.005
MFD
R8
47K
R10
100K
1/2W
C31
.005MFD
R25
220K
C29
.005
MFD
R6
47K,1/2W

CHASSIS