W4KOL

communications

OPERATING and SERVICE INSTRUCTIONS

HT-32B

the hallicrafters co.
MANUFACTURERS OF ELECTRONIC EQUIPMENT, CHICAGO 24, U. S. A.

TECHNICAL SPECIFICATIONS

TUBES	17 Plus 1 Voltage Regulator and 2 Rectifiers
POWER SOURCE	105-125 Volts, 50-60 Cycle AC
POWER OUTPUT:	
SSB(P.E.P.)	70-100 Watts
CW	70-100 Watts
AM(CARRIER)	17-25 Watts
AUDIO INPUT	0.004V RMS. Minimum
STABILITY	0.009% Maximum
HUM AND NOISE OUTPUT	At Least 40DB Below Carrier
DISTORTION PRODUCTS	30DB Below P.E.P. Output
CARRIER SUPPRESSION	50DB Below P.E.P. Output
UNWANTED SIDEBAND	50DB Below P.E.P. Output
UNWANTED BEAT OUTPUT	At Least 55DB Below Carrier
FREQUENCY COVERAGE	80, 40, 20, 15, and 10 Meter Bands
FREQUENCY SELECTION	Self-contained VFO
DIAL CALIBRATION	Linear
CALIBRATION ACCURACY	1000 CPS (After Indexing to Secondary Standard)
DIMENSIONS	10-3/8" High, 16" Deep, 20" Wide
SHIPPING WEIGHT	85-1/4 lbs.

Figure 1. Hallicrafters Model HT-32B Transmitter/Exciter

SECTION 1
INTRODUCTION

1-1. DESCRIPTION

The Hallicrafters Model HT-32B Transmitter/Exciter is an advanced design of self-contained transmitting equipment. This twenty-tube precision built transmitter/exciter is capable of SSB (single sideband with suppressed carrier), DSB (double sideband amplitude modulated), and CW (continuous wave) transmission in the 80, 40, 20, 15, and 10 meter bands. This unit can represent the complete transmitting complement of any amateur station. The only requirements for immediate "on the air" operation are a 50-ohm terminated antenna system, key or microphone, and AC power source.

1-2. SCOPE OF OPERATION

This unit may be utilized as a complete self-contained transmitter, or as an exciter for a linear power amplifier such as the Hallicrafters Model HT-33A. If other linear amplifiers are employed, they should be capable of supplying a 50-ohm termination to the driver output to utilize the full capabilities of the HT-32B Transmitter/Exciter. Maximum power output ratings of the HT-32B Transmitter/Exciter are:

SSB, 70-100 watts P.E.P. (peak envelope power); CW 70-100 watts; and DSB 17-25 watts (carrier power).

Prominent features of the HT-32B Transmitter/Exciter are:

Stable quartz crystal sideband filter-operating at 5 MC.

Beam deflection, high level sideband modulator.

C.T.O. direct reading in kilocycles with less than 1000 CPS error between adjacent 100 KC calibration points after indexing.

144 watts plate input (P.E.P. two-tone).

Five band output (80, 40, 20, 15, and 10 meters).

10 meter band coverage in four band-switched segments to provide the same calibration accuracy as lower frequency bands.

Unwanted sideband down 50 DB or more.

Distortion products down 30 DB or more.

Carrier suppression down 50 DB or more.

1-3. T.V.I. SUPPRESSION

The HT-32B Transmitter/Exciter has been designed and constructed to suppress spurious radiations that may cause television interference (T.V.I.). The T.V.I. problem was given full consideration in the design of every circuit as well as in the selection and layout of parts. Adequate filtering has been provided for control circuits and AC power lines. Components were specifically selected to avoid undesired resonances and arranged to prevent parasitic oscillation.

Another important T.V.I. proofing feature is employed in the output coupling circuit of the final amplifier. The tuned output circuit is a pi network that has inherently excellent harmonic suppression ability. The unique design of this network is such that the conventional loading control is unnecessary, and only the final tank tuning need be adjusted. The pi network is connected to a coaxial connector and permits the use of any antenna system having a transmission line impedance of 50 ohms. In addition to these factory installed precautions, a commercial 50-ohm low pass T.V.I. filter, which connects between the antenna and the Transmitter/Exciter output, can be used.

The Model HT-32B Transmitter/Exciter, as received from the factory, has had every advantage of Hallicrafters advanced engineering to minimize television interference. There are, however, some types of T.V.I. that cannot be prevented within the transmitter itself. For example, when a television receiver is located in the immediate vicinity of the Transmitter/Exciter it is entirely possible that a fundamental signal will reach the input grid of the receiver in sufficient strength to cause a slight amount of interference. In such cases, it will be necessary to install a filter or 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
INSTALLATION

2-1. UNPACKING

After unpacking the HT-32B Transmitter/Exciter, examine it closely for any possible damage which may have occurred during transit. Should any sign of damage be apparent, file a claim immediately with the carrier stating the extent of damage. Carefully check all shipping labels and tags for any special instructions before removing or destroying them.

2-2. LOCATION

Although the Model HT-32B Transmitter/Exciter is provided with a built-in fan for cooling purposes, avoid excessively warm locations such as those near radiators and heating vents. The unit should be placed in a location that provides adequate space around it, permitting free circulation of clean air through the cabinet openings.

2-3. POWER SOURCE

The HT-32B Transmitter/Exciter is designed to operate on 105 to 125 volt, 50-60 cycle AC current; power consumption is 375 watts.

IMPORTANT: If in doubt about your power source, contact your local power company prior to inserting the power cord into an AC power outlet. Plugging the power cord into the wrong power source can cause extensive damage to the unit, requiring costly repairs.

2-4. FRONT PANEL CONNECTIONS

Receptacles are provided on the front panel of the HT-32B Transmitter/Exciter to facilitate the connection of associated equipment (see fig. 5).

2-4-1. MIKE RECEPTACLE

The Model HT-32B Transmitter/Exciter is designed to operate with a high impedance communications type microphone. The microphone cable should be fitted with an Amphenol type 80-MC2M connector and should be wired as shown in the schematic diagram, Figure 14. If the microphone used does not have a push-to-talk switch, the switch circuitry may be disregarded and the microphone connected between pin 1 and the shield (connector body).

2-4-2. KEY JACK

This standard two-conductor phone jack is provided on the front panel for hand key or "bug" operation. The KEY jack accepts a general purpose, standard two-conductor phone plug. Wire the plug so that the key base is connected to the sleeve of the plug which is also at chassis ground.

Connections for keying are also provided on the Control Outlet receptacle on the rear panel. See paragraph 2-5-2-2.

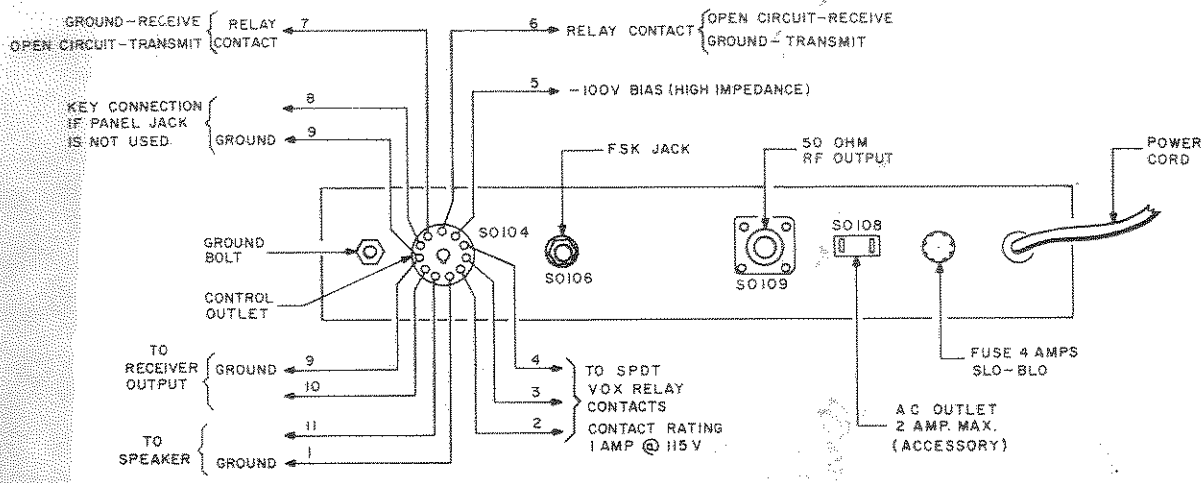


Figure 2. Rear Chassis Connections

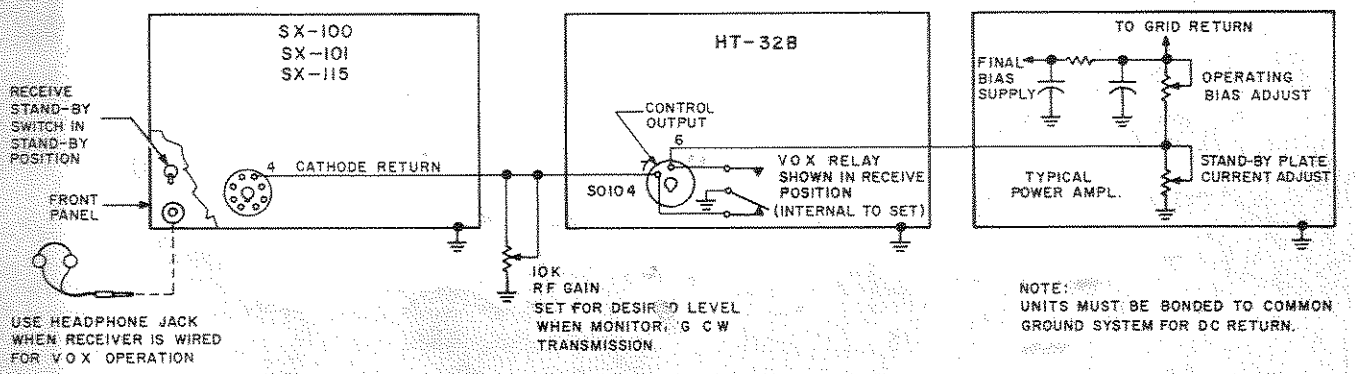


Figure 3. Application For Accessory Relay Contacts

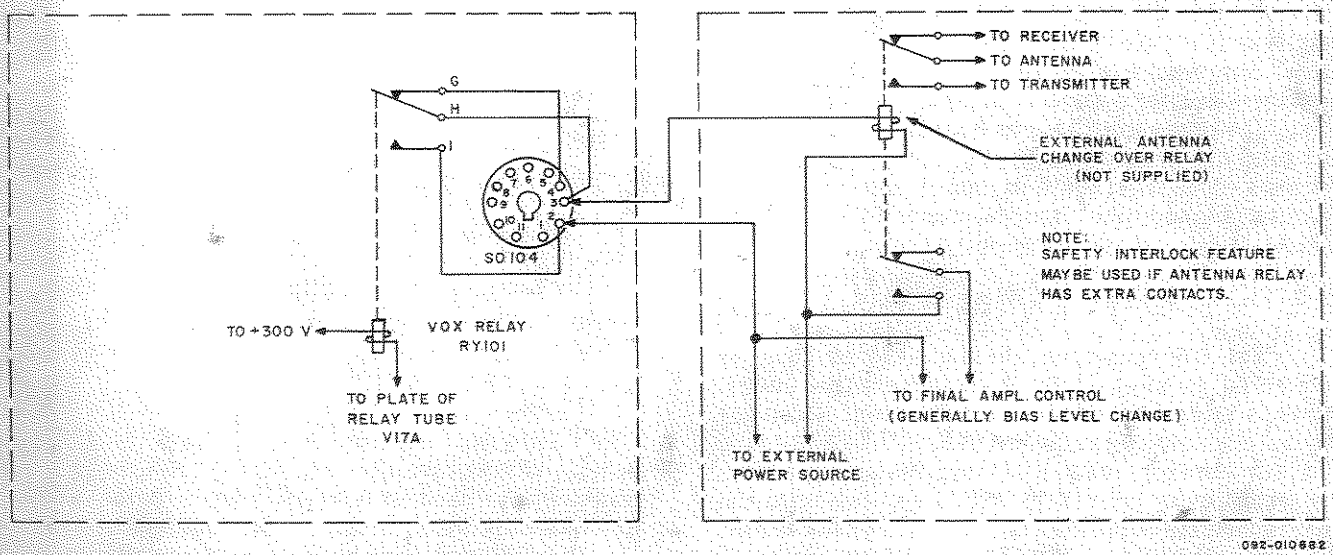


Figure 4. Control Outlet Relay Connections

2-4-3. MONITOR JACK

This standard two-conductor phone jack permits voice controlled headphone reception in the VOX mode of operation. The MONITOR jack accepts a general purpose two-conductor phone plug. Inserting the plug of a headset into this jack will automatically cut off the receiver speaker when it is connected as instructed in paragraph 2-5-2-4.

2-5. REAR CHASSIS CONNECTIONS

Sockets are provided on the rear of the HT-32B Transmitter/Exciter to facilitate the connection of associated equipment (see fig. 2).

2-5-1. RF OUTPUT CONNECTOR

This is a coaxial connector which connects the HT-32B Transmitter/Exciter to the antenna system or a linear amplifier. The connecting cable (52 ohm coax.) should be fitted with an Amphenol type 83-1SP connector or its equivalent. The selection of the type of antenna and coupling will depend upon the frequencies used and the purpose of operation. Refer to the ARRL ANTENNA HANDBOOK for detailed information concerning transmitting antennas.

2-5-2. CONTROL OUTLET

An eleven pin socket is provided at the rear of the chassis to connect the HT-32B Transmitter/Exciter into the station control system. The mating connector for this socket is an Amphenol 86-PM11. The instructions which follow may be modified to suit your particular needs.

2-5-2-1. ACCESSORY RELAY CONTACTS (Pins 6 and 7)

Two extra relay contacts working against chassis ground (Relay arm grounded, contacts connected to pins 6 and 7) are available for applications where a closed circuit to chassis is required in either the transmit or receive condition. When transmitting, pin 6 is at chassis ground and pin 7 circuit is open. During standby or receive periods, pin 6 circuit is open and pin 7 is at chassis ground. See figure 3 for a typical application.

2-5-2-2. KEYING (Pins 8 and 9)

For CW operation, the hand key or "bug" is connected to pins 8 and 9 of the control outlet. Pin 9 is internally grounded in the unit. When the key is up, cutoff bias is maintained at the second and third mixer stage. Closing the key removes the cutoff bias providing signal excitation to the succeeding RF amplifier stages. A key jack is also provided at the front panel for those who prefer a panel connection for the key.

2-5-2-3. ANTENNA RELAY (Pins 2, 3 and 4)

An external antenna change-over relay may be employed by utilizing pins 2, 3, and 4 on the control outlet. These pins are connected internally to insulated contacts on the VOX RELAY of the HT-32B Transmitter/Exciter. Figure 4 illustrates typical connections of an external change-over relay to the control outlet. During periods of transmission the VOX relay connects pins 2 and 3 enabling the external power source to activate the external antenna change-over relay. For external applications where an open circuit is required when transmitting, pins 3 and 4 may be used. The required voltage of the external power source is dependent upon the type of change-over relay used. A coaxial-type relay for 50-ohm transmission line impedance is recommended. Where pins 2, 3, and 4 are used to switch external equipment loads, the load current should be limited to one ampere.

2-5-2-4. RECEIVER OUTPUT AND SPEAKER (Pins 9, 10, 11 and 1)

Connect the audio output of the station's receiver directly to pins 9 and 10 of the control outlet. (Pin 9 is ground or chassis side.) Connect a 2 watt resistor across the receiver audio output to maintain a load at all times. The receiver speaker is connected directly to pins 1 and 11. (Pin 1 is ground side.) Connecting the receiver and speaker in this manner prevents the actuating of the HT-32B Transmitter/Exciter VOX circuit by incoming audio signals from the receiver and also disconnects the receiver output to the speaker when the HT-32B Transmitter/Exciter is on the air. Use an 18-ohm 2 watt resistor for 3 to 8 ohm voice coil impedances or a 1500 ohm 2 watt resisistor for 500-600 ohm outputs.

2-5-2-5. BIAS (Pins 5 and 9)

A high impedance bias source is available at pin 5, with pin 9 used as the return or ground connection. The bias is fixed at approximately -100V regardless of the mode of operation of the transmitter. An external relay may be used with the fixed bias provided at pin 5 to obtain the desired application. Note that the bias source is high impedance and not intended as a "hard" bias source for fixed bias applications in power amplifiers.

2-5-3. FSK JACK

This is a standard 3-circuit jack that brings out the keying circuit required for FSK (frequency shift keying) used in teletype transmission. For a more detailed explanation, refer to NOTES on page 27. The FSK jack accepts the standard size, general purpose three-conductor phone plug.

2-5-4. ACCESSORY POWER OUTLET

A standard AC receptacle is provided at the rear apron as a convenient source of 117V AC power for the antenna relay or similar light duty loads. Do not use this outlet for heavy loads such as a power amplifier.

2-6. PHONE PATCH INPUT

While this connector, SO 2, is not located on the rear apron, its connecting cable will be fed through one of the rear cabinet vents. The receptacle is located on the sideband generator unit in the upper right hand corner of the deck near the microphone input connector (see fig. 6). The receptacle is a standard phono type of jack used on record players with a shielded audio cable. The input impedance is 500-600 ohms, and the signal level required for maximum SSB power or 100% AM modulation is a function of the AUDIO LEVEL control setting, and runs approximately 4 millivolts at the full clockwise position. At reduced sensitivity settings of the AUDIO LEVEL control, demanded by the output of the operator's microphone, the phone patch input level for maximum transmitter output will be proportionately higher.

2-7. CALIBRATION COUPLING JACK

Most installations will not require additional measures to couple the receiver to the transmitter for an adequate calibrating signal level. However, there are situations where more coupling may be desired. A phone tip jack, SO 110, has been provided at the top of the shield over the final amplifier tubes to cope with such situations (see fig. 6). With this configuration, the signal level is adequate so that the capacity coupling between the jack, final tank capacitor, and tube caps will provide more than enough coupling if a wire lead with a phone tip soldered to it is used to couple the receiver to the transmitter. The phone tip is merely a convenient way of anchoring the coupling lead securely to prevent it from accidently coming into contact with the amplifier components inside the shield compartment. The receiver end of the coupling lead may be connected to the receiver antenna terminal or may be brought into close proximity of the antenna terminal as determined by trial.

SECTION III
OPERATING CONTROLS

3-1. FUNCTION

The FUNCTION control (see fig. 5) is a four position rotary switch used by the operator to select the mode of transmission, either CW, DSB, UPPER or LOWER SIDEBAND.

3-2. OPERATION

This control is a five position rotary switch used by the operator to select the transmitters operating condition (POWER OFF, STANDBY or CAL) and the mode of operating control (MOX or PTT-VOX).

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 CAL position, the HT-32B Transmitter/Exciter control relay (VOXRELAY) is de-energized, permitting normal receiving operation with an antenna change-over relay (if used) in the receive position. With the receiver in operation, the transmitter signal can now be monitored and the signal level in the receiver controlled with the CALIBRATE LEVEL control. See paragraph 3-11.

In the PTT-VOX position, the transmitter control relay may be 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. When push-to-talk operation is desired, turn the VOX sensitivity control fully counterclockwise and then control the transmission with the microphone switch.

3-3. DRIVER TUNING

This control is a variable capacitor in the last mixer and driver plate circuits, and will resonate the circuits to any frequency in the 80, 40, 20, 15 and 10 meter bands.

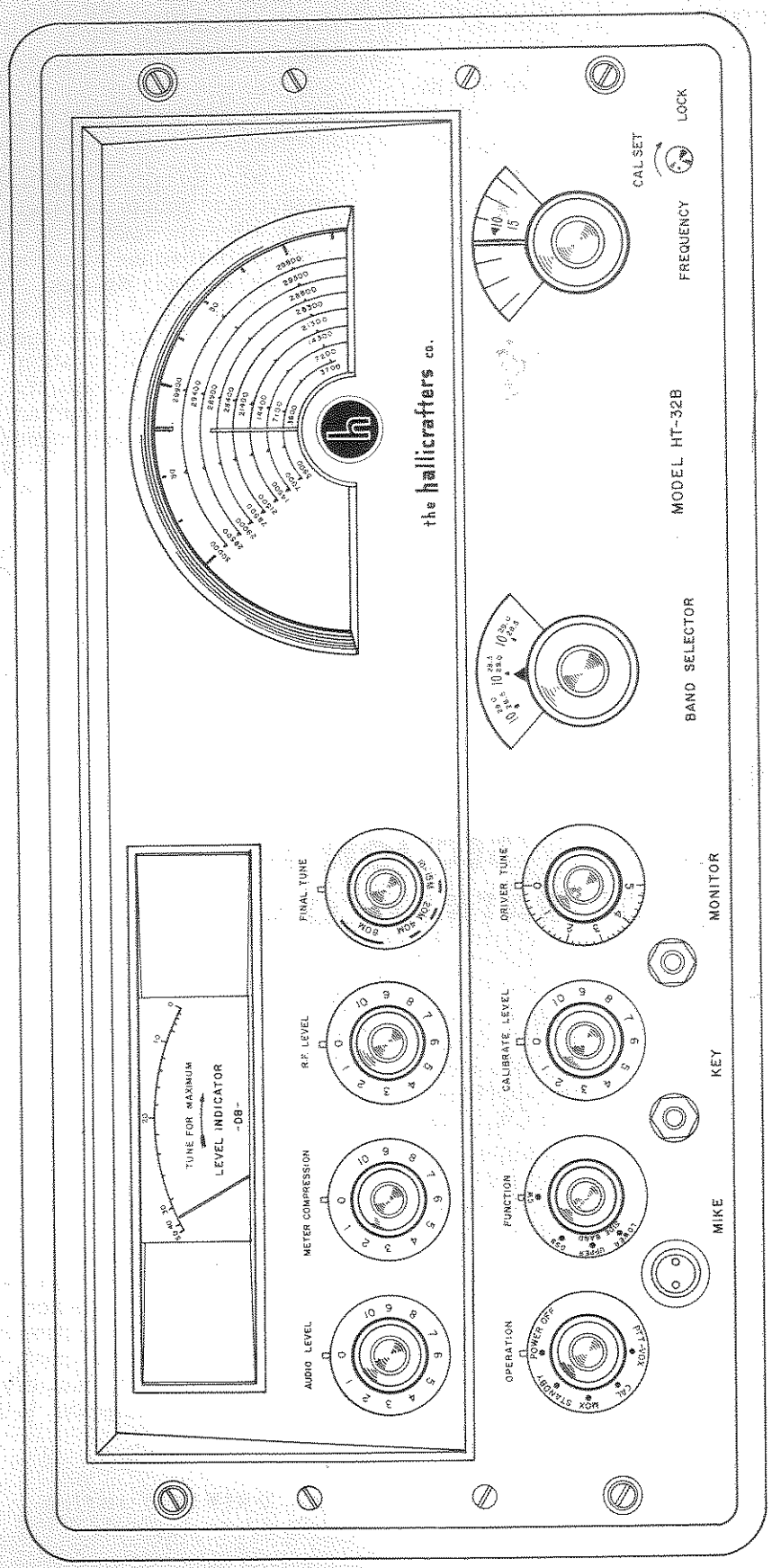


Figure 2. Model HT-32B Front Panel

3-4. BAND SELECTOR

The BAND SELECTOR control is an eight position rotary switch which selects the proper combination of tuned circuits and stages for the desired frequency band. It also selects the correct crystal oscillator (4.05 or 13.95 MC) to produce the desired sideband when the FUNCTION switch is set at either "UPPER" or "LOWER" SIDEBAND.

Associated with and directly above the control is a band indicating dial. The 10 meter band is divided into four 500 KC segments or ranges. Each range is indicated on the dial.

This control also positions the vertical pointer rising from the hub of the large frequency dial. The pointer moves vertically and its point indicates the band or frequency range to which the Transmitter/Exciter is set.

3-5. FINAL TUNE

This control is a variable capacitor in the final amplifier tank circuit and will resonate the circuit to the operating frequency of the selected band. The dial calibrations permit presetting the control roughly during tune up.

3-6. FREQUENCY

The FREQUENCY control is a variable capacitor which sets the VFO frequency. The VFO frequency range is 500 KC (5000 to 5500 KC). With mixing circuits, the VFO will set the HT-32B Transmitter/Exciter to the desired operating frequency as indicated on the large tuning dial in any of the five amateur bands (eight ranges).

The transmitting frequency is read from the dial scale (range) indicated by the tip of the vertical pointer, which is set by the BAND SELECTOR control. This scale is graduated into 100 KC segments, each of which is divided into 25 KC segments by the fixed pointer and dial scale at the rim of the dial. Each 25 KC segment represents one revolution of the FREQUENCY control and the FREQUENCY control dial, thus allowing the operator to read the frequency directly in kilocycles.

NOTE

The frequency of the 80 and 40 meter bands increase as the FREQUENCY control is rotated counterclockwise. These ranges are indicated on the tuning dial by a red line and on the fine tuning dial by red numerials. The frequency of the 20, 15 and 10 meter bands increases as the FREQUENCY control is rotated clockwise.

3-7. CAL SET

The CAL SET control is a mechanical brake serving two important functions. First, it is used to index the FREQUENCY dial exactly to frequency (see Paragraph 4-7-1.). Secondly, this control may be used as a friction brake for the FREQUENCY control to prevent an accidental frequency shift while operating the equipment.

3-8. AUDIO LEVEL

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

3-9. RF LEVEL

The RF LEVEL control is a potentiometer in the grid bias circuit of the 9 MC amplifier tube to adjust the gain of the 9 MC amplifier. For DSB and CW, the amount of carrier in the output signal is determined by the setting of the RF LEVEL control. With this type of carrier control, the audio level required for the 100% modulation remains the same for all carrier level settings.

3-10. METER COMPRESSION

This is a meter sensitivity control which permits the operator to set the meter at maximum deflection (0 DB) for desired output level (between approximately 1/4 power and full power) when establishing proper drive levels in the HT-32B Transmitter/Exciter. (See paragraph 3-12).

3-11. 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 at CAL . The CALIBRATE LEVEL control is normally set to provide the desired signal level in the station receiver for monitoring purposes and need not be changed except, possibly, when changing bands. For CW or DSB work a carrier signal is obtained for "zero beat" frequency setting. On SSB a sideband signal is obtained when talking into microphone to "talk onto frequency". If the zero beat method is preferred by the sideband operator, the FUNCTION control is switched to DSB to obtain a carrier for calibration purposes then switched back to the desired sideband before going on the air. Note that on DSB or CW the preset RF LEVEL setting is not to be disturbed when calibrating.

3-12. LEVEL INDICATOR METER

The LEVEL INDICATOR meter indicates the output of the HT-32B Transmitter/Exciter in DB below "0" DB reference, allowing the adjustment of the HT-32B Transmitter/Exciter for correct output (drive level required for a linear amplifier or approximate rated output for "barefoot" operation). Tuning of the transmitter has been simplified by the design of the front panel meter circuit. The meter scale is compressed to enable low-level signals to produce a usable indication, yet strong signals do not drive the meter pointer off scale. This feature gives the meter a wide usable dynamic range which is not possible to obtain with a linear scale. The desired amount of compression may be obtained by adjusting the METER COMPRESSION control on the front panel. The output reading on the LEVEL INDICATOR meter can be shifted to read full scale ("0" DB) down to approximately 1/4 of full power and any level below this reference can easily be read on the meter. A log of METER COMPRESSION control settings, for normal output into loads of controlled and reproducible characteristics, will aid in re-establishing proper drive levels and determining the proper operation of the unit.

To monitor carrier suppression for SSB operation, set the METER COMPRESSION control to read zero DB reference on the meter at the maximum sideband output (single tone), and read carrier level directly when the audio excitation is removed. Note that the MOX mode of operation must be used for this test, since on VOX operation the transmitter is disabled between voice controlled transmissions by the operation of the VOX relay.

SECTION IV

TUNING PROCEDURE

4-1. GENERAL

The tuning procedure for the Model HT-32B Transmitter/Exciter has been simplified by design as much as possible to permit rapid adjustment by the operator. This does not mean, however, that a transmitter, commercial or home-built, may be operated successfully when only roughly adjusted. A clean signal from any transmitter requires good operating technique.

Two mis-tuning conditions on the HT-32B 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 1 division on the dial. Note that its level cannot be increased on AM or CW with the RF LEVEL control or driven by speech input on SSB; hence, it may be identified in this manner.

2. On the 10-meter band, the undesired signal will appear when the DRIVER TUNE control is set outside its normal tuning range. For example, when tuning the 29 MC to 29.5 MC segment of the 10-meter band, the DRIVER TUNE control will normally tune up around 3 on the dial, while the unwanted signal tunes up at around 1.5 divisions on the dial. Here again it is identified by the fact that its level cannot be increased on AM or CW with the RF LEVEL control or driven on SSB with speech input.

4-2. LOAD

Connect a 50-ohm non-reactive load to the RF OUTPUT connector on the HT-32B Transmitter/Exciter. This impedance may be an antenna or a properly adjusted linear amplifier. A 50-ohm non-reactive load of at least 100 watts dissipation capability is required to handle the full power output.

4-3. INITIAL CONTROL SETTINGS

Set the front panel controls to their starting positions as outlined below.

OPERATION	STANDBY (Power on)
FUNCTION	DSB
AUDIO LEVEL	0
R.F. LEVEL	0
METER COMPRESSION	5
CALIBRATE LEVEL	0
DRIVER TUNING	Center of Rotation
FINAL TUNING	Desired Band Segment
BAND SELECTOR	Desired Band or range
FREQUENCY	Desired Frequency

4-4. CW TUNING

The tuning procedure for CW operation will be presented first since AM (DSB) and SSB tuning procedures are modifications of that required for CW operation.

The tuning procedure for CW operation is as follows:

1. Set the OPERATION switch at MOX; FUNCTION switch at DSB.

2. Tune the driver and final amplifier stages with the DRIVER TUNE and FINAL TUNE controls for maximum meter deflection. Advance the RF LEVEL control slightly, if necessary, to obtain reasonable meter readings for tune up. Since these tuned circuits, as in any transmitter, affect transmitter performance, ALWAYS TUNE FOR MAXIMUM OUTPUT.

3. Set FUNCTION switch at CW and close key.

4. Advance the RF LEVEL control slowly while observing the output meter. When feeding a dummy or an antenna load, set the control at a point where further rotation does not cause an appreciable increase in the meter reading. This is saturation output; operate slightly below this level for CW. When driving a final amplifier stage with the HT-32B Transmitter/Exciter, advance the RF LEVEL control until required excitation is obtained for the amplifier. In either case, do not operate beyond the saturation level.

5. A convenient reference for this operating level may be obtained by setting the METER COMPRESSION control so that the output meter reads zero DB.

6. Recheck the driver and final tuning by reducing the carrier level by about 5 or 10 DB on the output meter with the RF LEVEL control and touching up the DRIVER TUNE and FINAL TUNE controls for maximum output. Reset the RF LEVEL control for maximum output just below the saturation point, as outlined above.

7. Open the key. The output should drop to zero.

8. When the transmitter and receiver share the same antenna (via an antenna relay), manual CW operation is accomplished by switching between MOX (to transmit) and STANDBY (to receive). Note that manual operation will not be possible unless the CW DELAY control (knurled sleeve shaft of R147) is turned fully clockwise. See Figure 6.

9. Automatic break-in keying with a shared antenna system is accomplished by placing the OPERATION control in the MOX position, and turning the CW DELAY control (sleeve shaft) counterclockwise until the VOX relay de-energizes (as in "receive" operation). With this accomplished, any time the key is closed, the VOX relay will energize, and immediate transmission will begin, starting from the first dot. Note that this setting of the CW DELAY control (sleeve shaft) affords the longest delay between the time transmission ends and the receiver is reactivated. For shorter delays, turn the CW DELAY control (sleeve shaft) further counterclockwise. To restore normal CW operation on MOX, return the CW DELAY control (sleeve shaft) to its maximum clockwise position.

   Note that the CW DELAY (sleeve shaft) control adjustment need not be changed when switching to other manually operated modes of operation, such as DSB or SSB; but, if normal manual CW operation is desired, the CW DELAY control (sleeve shaft) must be set at its maximum clockwise position.

   Refer to the use of the CAL position of the OPERATION switch and the CALIBRATE LEVEL control for "zeroing-in" on the receiver frequency. See paragraphs 3-2 and 3-11.

4-5. SSB TUNING

The tuning procedure for SSB operation is as follows:

1. Set the OPERATION switch at MOX (manual operation).

2. Set FUNCTION switch at DSB (Audio level zero).

3. Tune the driver and final amplifier stages as described for CW tune up.

4. Set the FUNCTION switch to UPPER or LOWER sideband as desired. If the output meter was referenced at zero DB for maximum output with the COMPRESSION control, the meter will now indicate the carrier suppression directly in DB below maximum output.

5. While monitoring the transmitter output, proceed with SSB transmission, setting the AUDIO LEVEL control for the required audio gain which does not produce peak flattening or overload distortion of the output signal. Note that the output meter damping factor prevents the meter from indicating 0 DB reference on voice peaks. The meter will swing roughly 2/3 scale with voice excitation.

6. If manual operation is desired on SSB, switch the OPERATION control between MOX and STANDBY. For voice control operation, with the receiver and transmitter interconnected, set the OPERATION control at PTT-VOX. To "zero-in" on frequency, see paragraph 3-11 regarding the calibration procedure. For information on the use of the VOX, DELAY, and ANTI-TRIP controls, see paragraphs 4-8 and 4-9.

4-6. AM (DSB) TUNING

The tuning procedure for AM operation is as follows:

1. Set the OPERATION switch at MOX; FUNCTION switch at DSB (Audio level zero).

2. Tune the driver and final amplifier stages as described for CW tune up.

3. When feeding a dummy or antenna load, advance the RF LEVEL control to the saturated output level and reference 0 DB on the output meter with the METER COMPRESSION control, as described for CW tune up. When driving a linear power amplifier with the HT-32B Transmitter/Exciter, advance the RF LEVEL control until maximum linear power output is obtained from the final amplifier stage before setting the reference level on the output meter.

4. With the RF LEVEL control, reduce the carrier level 6 DB, as read on the output meter. This sets the maximum carrier level that the linear amplifiers in the HT-32B Transmitter/Exciter, or following linear power amplifier, can handle and provide 100% modulation capabilities. This carrier reference level can be established more precisely if an oscilloscope and audio oscillator are used to set up and monitor the output signal. Note that if the carrier level is set too high, peak amplitudes are flattened before 100% modulation occurs. If the carrier level is set too low, the maximum power output capabilities are not attained at 100% modulation.

5. While monitoring the transmitter output, proceed with AM transmission, setting the AUDIO LEVEL control for the required audio gain which does not produce peak flattening, or over modulation distortion of the output signal. Note that the output meter permits a rough operational check on over-modulation. The output meter will drop about 1 to 2 DB in level when the percentage of modulation with voice excitation runs close to 100%.

6. If manual operation is desired on AM, switch the OPERATION control between MOX and STANDBY. For voice control operation with the receiver and transmitter interconnected, set the OPERATION control at PTT-VOX.

4-7. INDEXING THE VFO

The FREQUENCY control dial tracks mechanically with the large calibrated dial. At the first and last calibration markers on the large dial the FREQUENCY control dial reads "0". Twenty revolutions of this control are required to cover the range of the large dial. Each complete rotation of the FREQUENCY control advances the large dial one 25 KC segment.

4-7-1. MECHANICAL INDEXING PROCEDURE

The position of the FREQUENCY control dial is adjustable to allow mechanical indexing of the mechanism (indexing the frequency dial to the large dial). The indexing procedure is as follows:

1. Set the large dial to 4000 KC with the FREQUENCY control. Note the reading on the FREQUENCY control dial. If it reads "0", reset the large dial to 3500 KC. If the FREQUENCY dial reads "0" the unit is mechanically indexed.

2. If the FREQUENCY control dial is not at "0" with the large dial at 4000 KC, set the FREQUENCY control dial at "0"

3. Rotate the CAL SET control clockwise to the LOCK position and set the large dial to 4000 KC with the FREQUENCY control.

4. Release the CAL SET lock (counter-clockwise) and reposition the large dial to 3500 KC. Note the FREQUENCY control dial reading. If it is "0" the indexing is complete.

5. If the FREQUENCY control dial is not on "0" with the large dial at 3500 KC, set it to "0" and set the CAL SET control to LOCK.

6. A small error in setting of the large dial may be reduced by one half if desired by adjusting the FREQUENCY control knob.

7. Release the CAL SET lock.

4-7-2. ELECTRICAL INDEXING PROCEDURE

To obtain maximum calibration accuracy from the dial, the VFO unit must be electrically indexed as each amateur band or 10 meter segment is switched into use, with the exception of the 80 and 20 meter bands. If either of these bands is switched, it will not effect the indexing of the other.

After indexing a particular band or range with an accurate crystal calibrator, the transmitter will be within approximately 1000 CPS of dial setting anywhere in the range. On the 40, 15 and 10 meter bands where the heterodyne oscillator becomes part of the system, the 25KC markers on the outer scale of the dial may miss the pointer by as much as a pointer width, depending upon the frequency error of the heterodyne oscillator. This does not effect the dial reading since the FREQUENCY control dial indicates the frequency to the nearest kilocycle.

To electrically index the VFO for the desired band:

1. Set the transmitter at the low frequency edge of the amateur band or 10 meter band segment to be used.

2. Set the FREQUENCY control dial to "0" and lock in this position with the CAL SET control.

3. Turn on the 100KC calibrator in the station receiver and zero-beat the marker crystal with the transmitter (receiver BFO turned off) by rocking the FREQUENCY control to adjust the transmitter frequency.

NOTE

Closer tolerance over a small portion of any band may be obtained by calibrating the transmitter to the nearest 100KC point in the band rather than at the band edge. While this method will provide a closer frequency tolerance over a small segment of the band, the overall calibration may not remain with 1000 CPS.

4-8. USE OF VOX AND DELAY CONTROLS

The VOX and DELAY controls are located on the top of the HT-32B Transmitter/Exciter chassis, as illustrated in Figure 6. Both controls are utilized in conjunction with VOX operation and are adjusted to provide control of the transmitter and station receiver.

1. The VOX control is an audio sensitivity control which determines the audio level that will trip (energize) the VOX RELAY, and place the HT-32B Transmitter/Exciter "on the air". This control should be adjusted with the microphone at the normal speaking distance from the mouth. Advance the VOX control to a setting slightly above that which will "trip" the VOX RELAY. Excessive sensitivity will have the undesirable result of background noise "tripping" the VOX RELAY and placing the HT-32B Transmitter/Exciter on the air. Note that the VOX sensitivity control and the AUDIO LEVEL control for the microphone are separate level adjustments; therefore, backing off the AUDIO LEVEL control will not reduce the VOX sensitivity.

2. The VOX DELAY control (center shaft) is in the grid circuit of the relay tube and determines the time lag in de-energizing the VOX RELAY when audio excitation is removed from the audio amplifier and VOX amplifier stages. This control should be advanced while speaking into the microphone and set at a position in which the time lapse between words will not de-energize the VOX RELAY. This adjustment will eliminate the constant keying of the HT-32B Transmitter/Exciter at the beginning of each word. There is a slight interaction between the VOX sensitivity and DELAY circuits, consequently, a slight re-adjustment of controls may be necessary to obtain desired results. The VOX DELAY adjustment (R147B) is the center shaft with the screwdriver slot. See Figure 6. For adjustment instructions concerning the sleeve shaft (CW DELAY), see paragraph 4-4, step 9.

4-9. USE OF ANTI-TRIP CONTROL

This control is located on top of the HT-32B Transmitter/Exciter chassis (see figure 6) and is used in conjunction with VOX operation. When the station receiver and speaker are connected for VOX operation (paragraph 2-5-2-4), the speaker ANTI-TRIP control is advanced to a setting where the audio signal picked up by the microphone from

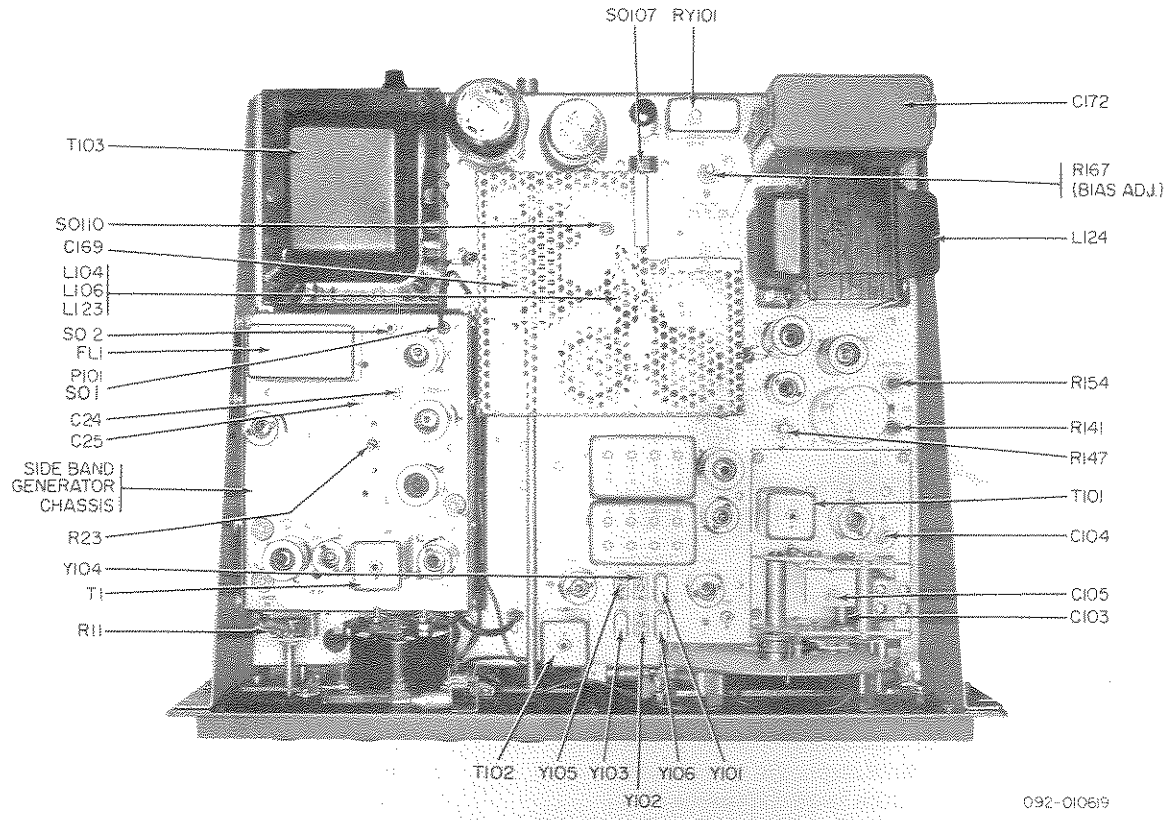


Figure 6. Top Chassis View

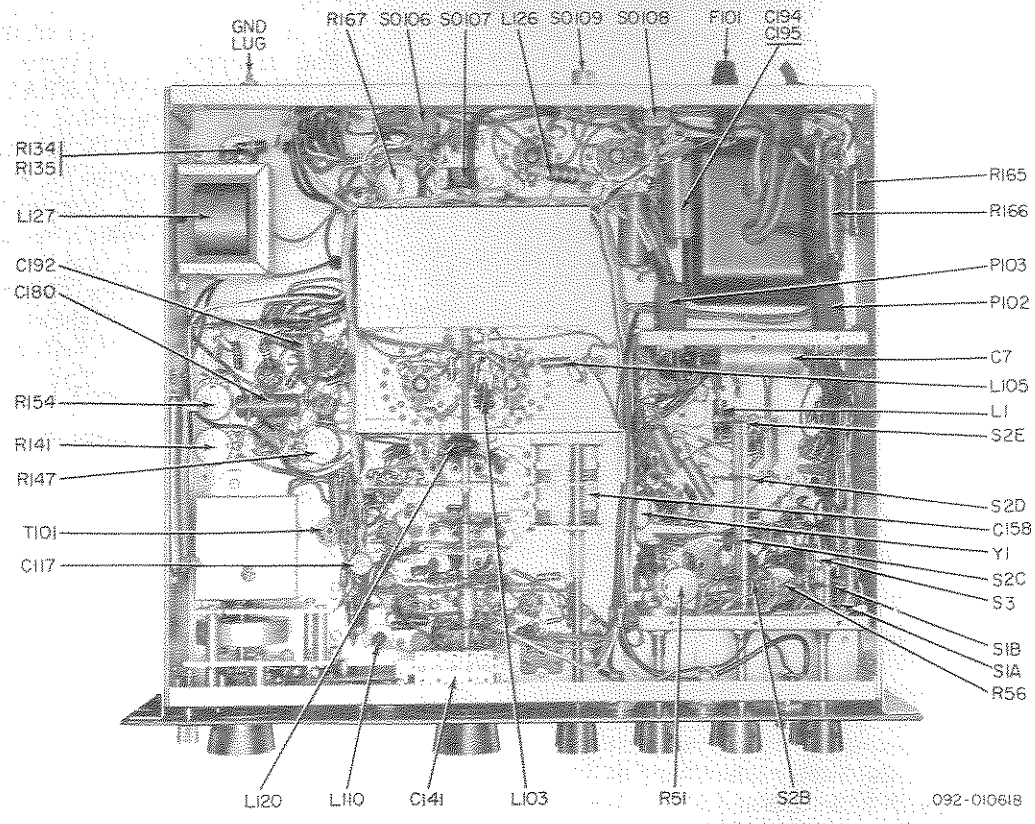


Figure 7. Bottom Chassis View

the receiver's speaker will not energize the VOX RELAY. This feature prevents the re-transmitting of the incoming audio signals from your station receiver. It should be noted that excessive anti-trip voltage (gain) is capable of completely blocking normal VOX operation, hence the minimum anti-trip gain should be used. Occasionally, a strong heterodyne will block normal VOX operation. The operator may quickly regain control by momentarily dropping the receiver audio gain while verbally tripping the transmitter "on the air".

4-10. BIAS ADJ. CONTROL

This control has been factory set for -49V measured at the adjacent TEST terminal with the transmitter operating from a 117V line.

The control is located on top and to the rear of the chassis and slightly to the right of center. (See Figure 6).

An occasional check with an accurate, high resistance voltmeter will insure maximum tube life since the 6146 final amplifier tubes are operated close to rated plate dissipation for optimum performance. Do not use a voltmeter with less than 20,000 ohm per volt sensitivity.

To adjust the bias, set the OPERATION switch at MOX, FUNCTION switch at either sideband (zero signal) and adjust for -49V ±1V with the voltmeter connected between the test point terminal (-) and chassis (+). Note polarity since this is a bias voltage.

Note that the bias voltage specified is for operation from a 117V line and that it will rise and fall with the source voltage. In cases where the power source voltage cannot be set at 117V to make the bias adjustment, make allowances for it when setting the bias. For example, if the line voltage measures 112V, set the bias at -47V; if at 115V, set at -48V; if at 120V, set at -50V; and if at 122V, set at -51V.

Setting the bias abnormally high or low because of meter errors etc., will not only affect the final tubes but the over-all transmitter performance as well, since the bias level also controls the over-all transmitter sensitivity.

4-11. MODEL HT-32B TRANSMITTER/ EXCITER WITH LINEAR POWER AMPLIFIER

When the Model HT-32B Transmitter/Exciter is used to drive a linear amplifier, swamping or padding between the units may be required for optimum performance.

The degree of swamping or padding will depend upon the driving power required by the linear amplifier. High powered 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-32B Transmitter/Exciter. Linear power amplifiers using tetrodes or pentodes with resonant grid circuits generally require considerably less than the peak power output available from the HT-32B Transmitter/Exciter.

In general the swamping between units should "soak up" the unused driving power so that the driver unit (HT-32B) is running reasonably close to its peak power output and terminated in a 50-ohm load. This condition will retain the carrier suppression of the HT-32B Transmitter/Exciter for the overall system as well as hum and noise ratio which are all related to the peak envelope power output.

For example: should the linear power amplifier require 40 to 50 watts of drive, then a 3 DB T-pad designed for 50-ohm terminations would fully load the HT-32B Transmitter/Exciter while still transferring the required driving power to the final amplifier grids.

4-12. SERVICE OR OPERATION QUESTIONS

For any further information regarding operation or servicing of the receiver, contact The Hallicrafters dealer from which the receiver was purchased. The Hallicrafters Company maintains an extensive system of authorized service centers where any required service will be performed promptly and efficiently at a nominal charge. All Hallicrafters Authorized Service Centers display the sign shown below. For the location of the one nearest you, consult the telephone directory.

Do not make any service shipments to the factory unless instructed to do so by letter. The Hallicrafters Company will not accept the responsibility for any unauthorized shipments.

The Hallicrafters Company reserves the privilege of making revisions in current production of equipment and assumes no obligation to incorporate these revisions in earlier models.

SECTION V

BASIC OPERATING THEORY

5-1. BASIC OPERATING PRINCIPLES

The basic operating principles of the Model HT-32B Transmitter/Exciter are explained in the following sub-paragraphs. Figure 11 is a block diagram of the HT-32B Transmitter/Exciter and Figure 14 is the schematic diagram. The complete system is first discussed for SSB operation and a brief description of CW and AM operation follows:

5-2. GENERAL DESCRIPTION

Tube V2B is a 4.95 MC crystal controlled oscillator with an output frequency that is ultimately converted to the desired operating frequency by the heterodyning action of the carrier oscillator V2B and the sideband switching oscillator V7. The output of the carrier oscillator is fed directly into the grid of the beam deflection modulator tube V3. The audio signal is impressed across the beam deflection plates of the modulator tube to modulate the carrier oscillator signal.

In SSB operation (FUNCTION switch in UPPER SB or LOWER SB position), the modulator stage is placed in a balanced condition and the carrier is suppressed approximately 50 DB below peak envelope power output. Balance is accomplished in the modulator stage by balancing both the DC voltages on the deflection plates with potentiometer R23 and the phase of the plate currents in the plate circuit of the modulator with the differential capacitor C24. Under balanced conditions, the output of the modulator consists of the upper and lower sidebands of the 4.95 MC signal. A crystal lattice filter in the sideband amplifier stage V2 suppresses the lower sideband of the modulated 4.95 MC signal. The upper sideband is fed to the 1st mixer V5 where it is combined with 4.05 MC or 13.95 MC, as selected, from the sideband switching oscillator V7.

The oscillator frequency used determines whether the upper or lower sideband is transmitted. For example, the upper or lower sideband at 9 MC is generated as follows:

1. Upper sideband - the upper sideband of 4.95 MC is mixed (sum) with 4.05 MC to obtain the upper sideband at 9 MC. The inter-stage coupling between the 1st mixer, 9 MC amplifier V6, and the 2nd mixer, V14, consists of tuned transformers T1 and T102 which pass only a band of frequencies near 9 MC.

2. Lower sideband - the upper sideband of 4.95 MC is mixed with 13.95 MC to obtain the lower sideband at 9 MC. As in the upper sideband condition, the inter-stage coupling of V5, V6, and V14 pass only the frequencies near 9 MC. The upper and lower sideband at the output frequency of the transmitter are obtained by selecting the 4.05 MC or 13.95 MC oscillator as required by the overall heterodyning system. This selection is accomplished by the band switch wafer S 101B (Front). Refer to Figure 11 for information on the overall system.

Up to the input stage of the 2nd mixer V14, the operation of the HT-32B Transmitter/Exciter is identical on all bands. The remaining stages "beat" (sum or difference) the selected 9 MC sideband 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.

5-3. 80 METER OPERATION

The selected sideband (upper or lower) at 9 MC is amplified by 9 MC amplifier V6 and fed to the 2nd mixer V14. On 80 meters, heterodyne oscillator V13 has no output, and the 2nd mixer V14 functions as an additional amplifier. At the 3rd mixer V9, the sideband is mixed (difference) with the output frequency of the VFO, V8. Since the VFO output frequency is tunable from 5.0 to 5.5 MC, the difference output of V9 is the sideband of a frequency between 3.5 to 4.0 MC.

5-4. 40 METER OPERATION

The selected sideband at 9 MC is mixed (difference) with a 21.5 MC output of heterodyne oscillator V13 in 2nd mixer V14. The output of V14 is a sideband at 12.5 MC which is applied to the 3rd mixer V9. In this stage, the signal is mixed (difference) with the VFO output (5.0 to 5.5 MC); the resulting signal is the sideband of a frequency between 7.0 to 7.5 MC.

5-5. 20 METER OPERATION

Operation on 20 meters is essentially the same as 80 meters, except that "sum" mixing is employed in place of "difference" mixing at the 3rd mixer V9. When the VFO output (5.0 to 5.5 MC) is mixed with the upper or lower sideband at 9 MC, the resulting signal is the sideband of a frequency between 14.0 to 14.5 MC.

5-6. 15 METER OPERATION

The selected sideband (upper or lower) at 9 MC is mixed (difference) at 2nd mixer V14, with a 25 MC signal from heterodyne oscillator V13; the

output of V14 is a sideband of a 16 MC signal. This signal is applied to 3rd mixer V9, where it is mixed (sum) with the 5.0 to 5.5 MC output of the VFO, V8. The result of the mixing action is a sideband of a frequency from 21.0 to 21.5 MC.

5-7. 10 METER OPERATION

Four distinct ranges are provided for complete coverage of the 10 meter band. Each range utilizes a separate frequency from the heterodyne oscillator V13. The operation in the four ranges is as follows:

1. 28 MC to 28.5 MC. - The selected sideband at 9 MC is mixed (difference) at the 2nd mixer V14, with a 32.0 MC signal from the heterodyne oscillator V13. The resulting signal a sideband at 23.0 MC is applied to the 3rd mixer V9. In this stage, the sideband at 23.0 MC is mixed (sum) with the VFO output (5.0 to 5.5 MC). The resulting signal is a sideband at a frequency between 28.0 to 28.5 MC.

2. 28.5 MC to 29 MC. - For this range, the 9 MC sideband is mixed (difference) with the 32.5 MC signal from the heterodyne oscillator V13, in the 2nd mixer V14. The resulting signal, a sideband at 23.5 MC, is mixed (sum) in the 3rd mixer V9, with the 5.0 to 5.5 MC output of the VFO. The output of V9 is a sideband at a frequency between 28.5 to 29 MC.

3. 29 MC to 29.5 MC. - As in the above two ranges, the selected sideband of the 9 MC signal from V6 is applied to the 2nd mixer V14. Here it is mixed (difference) with the 33 MC output of V13. The output of V14 is a sideband at 24 MC. This signal is mixed (sum) in the 3rd mixer V9 with the VFO output. The resulting signal is a selected sideband at a frequency between 29 to 29.5 MC.

4. 29.5 MC to 30 MC. - For operation in this range, the heterodyne oscillator V13 injects a 33.5 MC signal in V14 and is mixed (difference) with the selected sideband at 9 MC. The resulting frequency, a sideband at 24.5 MC, is mixed (sum) in V9 with the 5.0 to 5.5 MC output of the VFO. The output of V9 is a sideband at a frequency between 29.5 to 30 MC.

5-8. CW OPERATION

When the FUNCTION control is set to CW or DSB position, it unbalances the modulator stage, allowing a carrier to be amplified and heterodyned to the desired output frequency. Two sections of the FUNCTION switch are used to bypass the 4.95 MC filter (V4 and associated circuitry) in the CW or DSB position. With these exceptions, CW operation is the same as SSB operation.

5-9. DSB (AM) OPERATION

As in CW operation, the carrier frequency is present in the signal and the 4.95 MC filter is bypassed. Amplitude modulation of the carrier occurs and the resulting signal is amplified and heterodyned as in CW and SSB operation.

SECTION VI
SERVICE DATA

6-1. CHASSIS REMOVAL

The chassis and front panel assembly are removable as a unit from the cabinet by removing 2 screws at each side of the front panel and the 3 screws on the underside of the cabinet.

6-2. TUBE AND DIAL LAMP REPLACEMENT

Access to the dial lamps and all tubes may be obtained by raising the top cover of the cabinet.

6-3. SERVICING THE HT-32B TRANSMITTER/EXCITER

Throughout the design of the Model HT-32B Transmitter/Exciter, full consideration was given to keep maintenance problems at an absolute minimum. In all well designed communications equipment, maintenance and repair problems are generally confined to the checking and replacement of tubes which may become 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-32B Transmitter/Exciter is a general coverage receiver. This receiver can be used to provide a quick check on various oscillator circuits in the HT-32B. A lead connected to the antenna of this general coverage receiver, when placed near the oscillator tube in the circuit to be checked, can determine the presence or absence of signal from

the stage in question.

NOTE

The frequencies of the various crystals can vary somewhat from the frequencies marked thereon. The frequencies of all the mixer stages can also vary to some degree.

If a malfunction occurs when operating on one particular band and mode of operation, the unit should be checked on all other bands and in all other modes of operation to isolate the difficulty. A careful study of the block diagram (Figure 11) should give a quick clue as to which tubes should be checked. The schematic diagram (Figure 14), voltage chart (Figure 13) and resistance chart (Figure 12) and the following table will prove to be a valuable aid in isolating and correcting a malfunction.

TROUBLESHOOTING CHART

Symptom	Possible Cause
No output any band any mode	Check V2, V3, V4, V5, V6, V7, V8, V9, V10, V11, V12, V13, V14, V18, V19, V20
No output any band SSB only	Check V4
No output 80 Mtrs. USB	Check V7 4.05 MC
LSB	Check V7 13.95 MC
AM-CW	Check V7 13.95 MC
No output 40 Mtrs. All Modes	Check V13 21.5 MC
USB	Check V7 13.95 MC
LSB	Check V7 4.05 MC
AM-CW	Check V7 4.05 MC
No output 20 Mtrs. USB	Check V7 4.05 MC
LSB	Check V7 13.95 MC
AM-CW	Check V7 13.95 MC
No output 15 Mtrs. All Modes	Check V13 25 MC
USB	Check V7 13.95 MC
LSB	Check V7 4.05 MC
AM-CW	Check V7 4.05 MC
No output 10 Mtrs. All Modes	Check V13 Check Xtal frequency of segment in use.
USB	Check V7 13.95 MC
LSB	Check V7 4.05 MC
AM-CW	Check V7 4.05 MC
No Vox Operation	Check V15, V16, V17
Vox will not drop out	Check for Hum V1, V15, V17 Check V15, V16, V17

6-4. RESTRINGING DIAL POINTER MECHANISM

Remove the chassis from the cabinet (see Paragraph 6-1). The procedure for restringing the pointer drive is as follows:

1. Remove the front panel from the chassis by removing knobs (bristol wrench), jacks, microphone receptacle, meter connections and two screws from each side of the panel.
2. Remove the band selector dial.
3. Make up dial cord as shown in figure 8.
4. Rotate the BAND SELECTOR control shaft maximum clockwise.

5. Place the loop at the end of dial cord over the pin (1) on the drum. Following the number sequence and arrows string the dial cord and anchor the spring in the chassis hole provided. Select the hole providing the required tension.

6. Check the spring clearance at the bottom pulley by rotating the band selector shaft fully counterclockwise; the end of the spring should just clear the lower idler pulley and the track mounting screw. This clearance can be obtained by loosening and resetting the drum on the band selector shaft.

7. Rotate the band selector shaft fully clockwise. Place the pointer assembly on the pointer track and engage the dial cord in the clips. Align the top of the pointer with the top of the calibration figures of the 80 meter band (3500-4000).

8. Replace the band selector dial and index it in the 80 meter position.

9. Rotate the band selector shaft fully counterclockwise to the 10 meter band (29.5-30.0) being careful not to shift the pointer along the cord. At the end of travel the pointer should just clear and be in line with the fixed pointer at the dial edge. The pointer must also line up with the center of the dial shaft. This can be adjusted by loosening the pointer track mounting screws and shifting the track as required.

10. Rotate the band selector shaft fully clockwise. Clinch the pointer clips on the dial cord and apply a drop of household cement to each to prevent slippage. Check the pointer operation. If side play is evident, check the bearing points of the pointer saddle. Bearing pressure on all four points should be light and even for smooth operation.

11. Reassemble the front panel and install unit into cabinet.

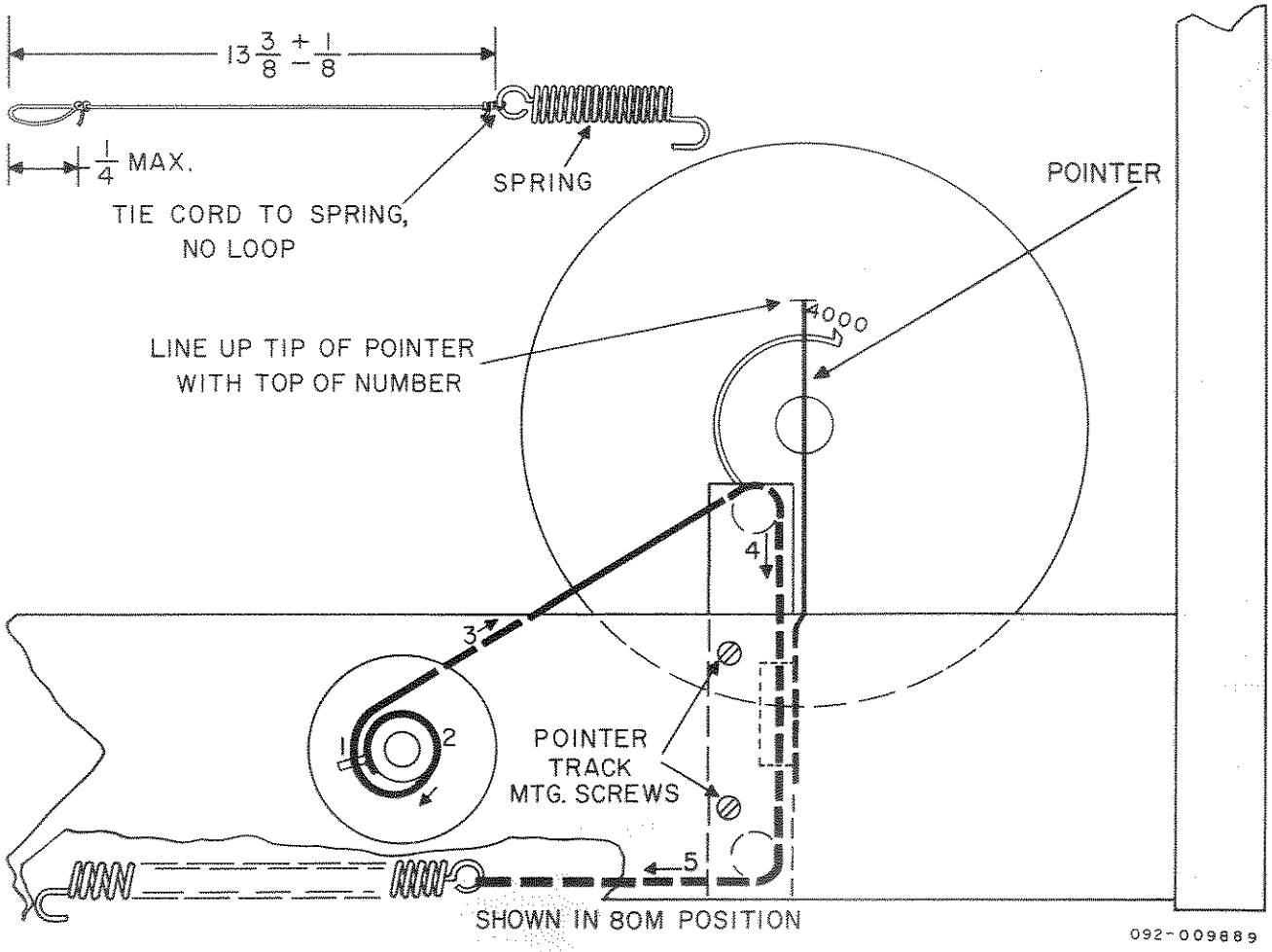


Figure 8. Dial Cord Restringing

SECTION VII

HT-32B ALIGNMENT PROCEDURES

7-1. 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. DC Milliammeter 0 to 300 MA DC.

5. DC Voltmeter with 20,000 ohm per volt sensitivity.

6. Receiver (3-30 MC range) with 50 KC calibrator. (Essential adjustments can be done with 100 KC calibrator.)

7. Audio Frequency Signal Generator covering range of 100 CPS to 5000 CPS.

8. Ballantine voltmeter or equivalent, capable of reading 2 to 4 millivolt level.

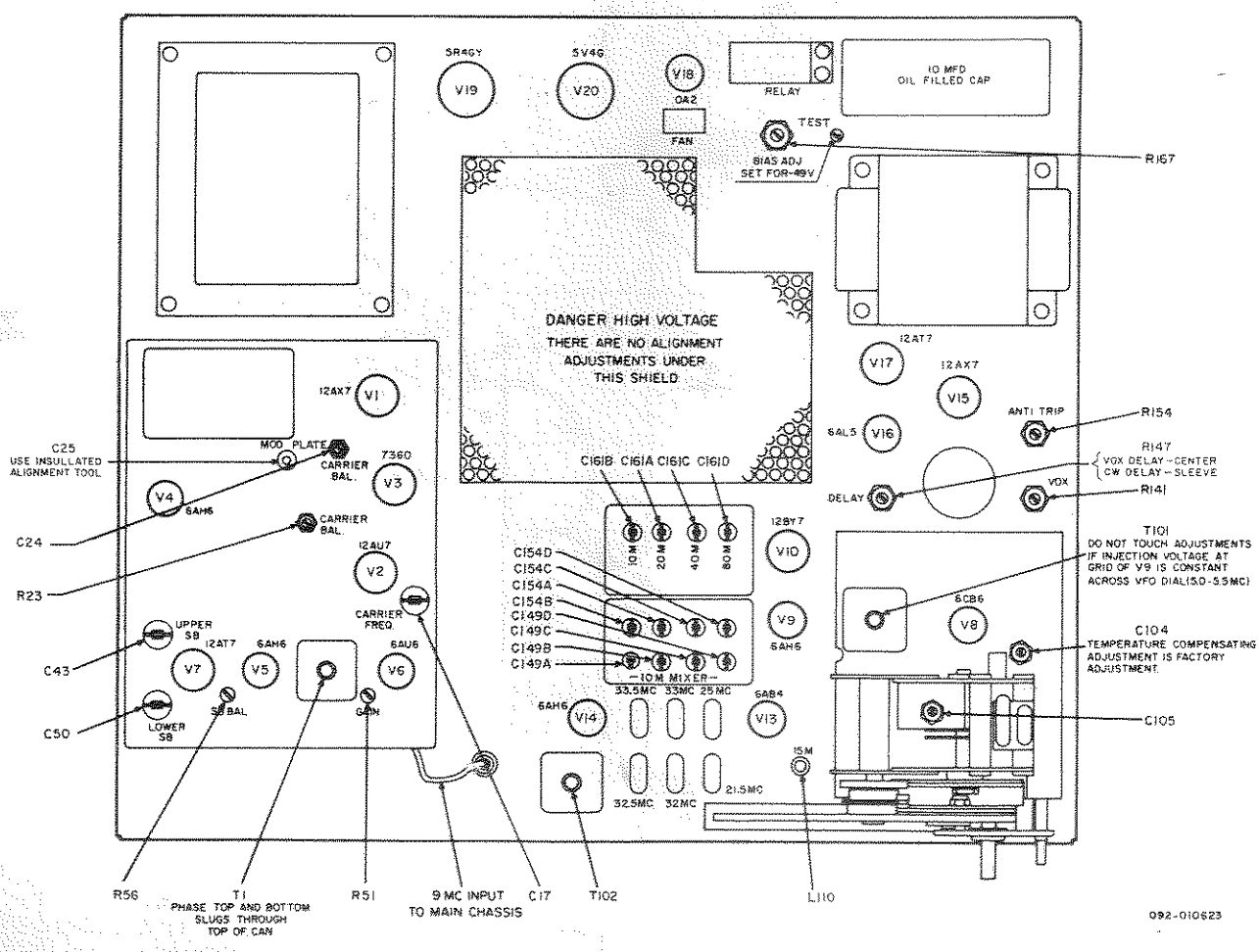


Figure 9. Alignment Points, Chassis Top

7-2. INITIAL CONTROL SETTINGS

OPERATION . . . . . STANDBY (Power on)

FUNCTION . . . . . DSB

CALIBRATE LEVEL . . 0

DRIVER TUNING . . . . Fully counterclockwise (Closed gang)

FINAL TUNING . . . . . ON INDEX (Closed gang)

FREQUENCY . . . . . Fully counterclockwise (Closed)

BAND SELECTOR. . . . As instructed

AUDIO LEVEL. 0

METER COMPRESSION. 10

RF LEVEL 0

7-3. BIAS ADJUSTMENT

Check the bias voltage before running any extensive checks with the plate and screen voltage applied to the 6146 final amplifier tubes. Set BIAS ADJ. for -49VDC ±1V with the OPERATION switch at MOX., FUNCTION switch at either UPPER or LOWER sideband (zero signal), and line voltage 117V. See paragraph 4-10 for additional comments on bias adjustments.

7-4. RF ALIGNMENT OF 2ND AND 3RD MIXER AND DRIVER STAGES

IMPORTANT: The RF alignment should only be attempted when an HT-32B Transmitter/Exciter malfunction has been analyzed and definitely traced to RF misalignment.

Remove the heterodyne oscillator crystals, Osc. Tube V8, HV Rect V19, and disconnect the 9 MC RF cable from SB generator to the main chassis.

7-4-1. 3RD MIXER AND DRIVER

Disconnect screen lead of V11 and V12 (6146, Final Amp) from lug at terminal board on underside of chassis. Set neutralization capacitor C171 and VFO coupling capacitor C117 at mid-capacity, if these components are new and have never been adjusted before.

To place the transmitter in operation for alignment, set OPERATION control at MOX. This places operating bias on the 2nd and 3rd mixer stages.

ALIGNMENT CHART FOR 3RD MIXER AND DRIVER STAGES.

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 V9 (6AH6, 3rd 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.	C154D C161D	L117 L122	3.5	4.0	1.2	3.7
2	40M	Same as step 1.	Same as step 1.	C154C C161C	L116 L121	7.0	7.3	0.9	4.0
3	20M	Same as step 1.	Same as step 1.	C154A C161A	L115 L119	14.0	14.35	1.1	3.7
4	15M	Same as step 1.	Same as step 1.		L115 L119	21.0		1.2	
*5	10M	Same as step 1.	Same as step 1.	C154B C161B	L114 L118	28.0	30.0	1.4	3.6

*NOTE: Set band switch at low frequency segment for core adjustment and at highest frequency segment for trimmer adjustment.

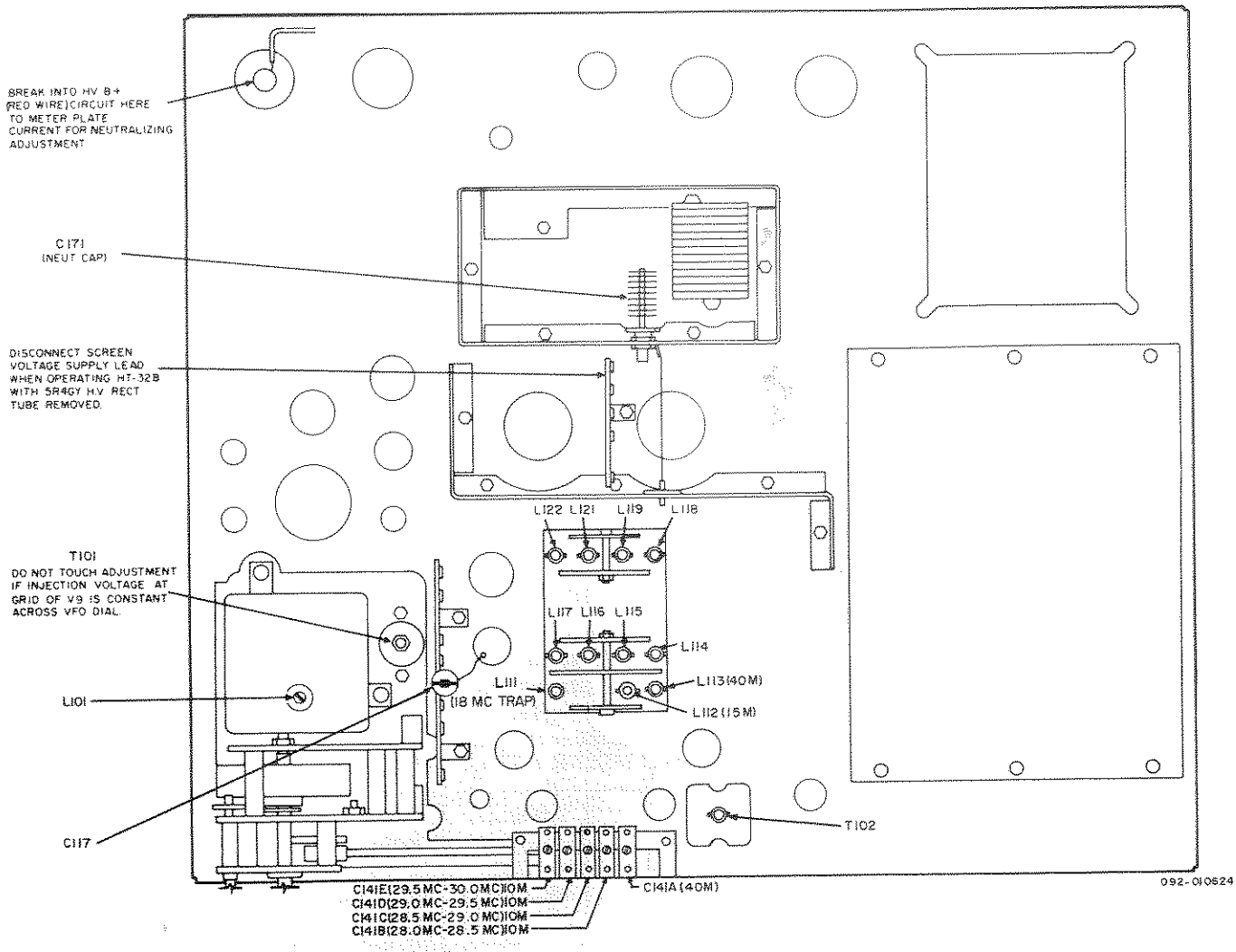


Figure 10. Alignment Points, Chassis Bottom

7-4-2. ALIGNMENT PROCEDURE

1. The 3rd mixer and driver stages alignment procedure for 80, 40, 20 and 10 meter bands is essentially the same, the difference being only in frequency used and adjustment location (which can be obtained from the preceding chart). The following is the alignment procedure for 80 meters. Preset the Initial Control Settings with the BAND SELECTOR set on the band being aligned (80M).

   (a) Set trimmers C154D and C161D to mid-capacity.

   (b) Preset the cores of L117 and L122 to minimum inductance if they have never been previously aligned.

   (c) Set the DRIVER TUNING to D_1 (1.2 on knob).

   (d) Set the RF generator to f_1 (3.5 MC) using sufficient generator output to obtain a readable indication on the VTVM. If 1V out of the signal generator does not provide a VTVM reading, proceed with core adjustment below.

   (e) Carefully adjust each core L117 and L122 for maximum deflection on VTVM. Use reference voltage on VTVM of approximately 20V RMS. Correct core position will fall between coil and mounting clip.

   (f) Adjust the output frequency of the RF generator to f_2(4.0 MC) using sufficient generator output to obtain about 20V RMS at the grid.

   (g) Tune DRIVER TUNING for maximum deflection on VTVM. Driver tuning setting should be approximately D_2 (3.7 on the knob).

   (h) Adjust trimmers C154D and C161D for maximum deflection on VTVM.

(i) Repeat steps (c) thru (h) until the adjustments result in no appreciable increase in grid voltage. The band is then correctly tracking with maximum output.

2. The 3rd Mixer and Driver Alignment procedure for 15M is slightly different, since the 20M and 15M bands share the same coil.

The following is the alignment procedure for 15 meters.

(a) Align 20 meter band as outlined above.

(b) Set BAND SELECTOR at 15M.

(c) Set the RF generator at f_1 (21.0 MC), using sufficient generator output to obtain about 20V RMS at the grid of the final amplifier.

(d) Tune DRIVER TUNING for maximum deflection of VTVM. Driver tuning setting should be approximately D_1 (1.2 on the knob).

(e) Adjust cores of L115 and L119 for maximum deflection of VTVM. If additional gain is obtained with this adjustment, repeat 20 meter trimmer alignment at 14.35 MC and check 14.0 MC for uniform gain on 20M band.

(f) Repeat above procedure until no further gain can be obtained on either band.

7-4-3. 2ND MIXER STAGE

ALIGNMENT CHART FOR 2ND MIXER STAGE

Step	Band	Signal Generator Connection	VTVM Connection	Trimmer Adjust for Maximum	Coil Adjust for Maximum	Signal Generator Freq. (MC)		VFO Freq. (MC)
						f_1	f_2	
1	40M	High side to pin #1 grid of V14 (6AH6, 2nd Mixer). Common side to chassis.	VTVM to pin #5 grid of V11 (6146, Final Amp.). Common to chassis.		L113	7.2	12.5	7.2
2	15M	Same as step 1.	Same as step 1.		L112	21.0	16.0	21.0
3	*10M	Same as step 1.	Same as step 1.	C149D		28.0	23.0	28.0
4	*10M	Same as step 1.	Same as step 1.	C149C		28.5	23.5	28.5
5	*10M	Same as step 1.	Same as step 1.	C149B		29.0	24.0	29.0
6	*10M	Same as step 1.	Same as step 1.	C149A		29.5	24.5	29.5

*Refer to chart in paragraph 7-4-4.

7-4-4. ALIGNMENT PROCEDURE

The 2nd mixer alignment procedure must follow the sequences shown in the chart, since the setting of the coil inductance on 40M and 15M must precede the trimmer adjustments on the band segments. The following is the alignment procedure for 40 meters:

1. Set BAND SELECTOR at 40M.

2. Set core of L 113 at its maximum counterclockwise position (minimum inductance).

3. Set signal generator at f_1 (7.2 MC) with sufficient output to permit setting the driver tuning to resonance.

4. Adjust DRIVER TUNING for maximum deflection on VTVM.

5. Set VFO dial to 7.2 MC.

6. Set RF generator at f_2 (12.5 MC). Set generator output for approximately 20V

RMS at the final grid while making alignment adjustments.

7. Adjust mixer coil L 113 for maximum deflection on VTVM.

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

   The 2nd mixer plate frequency (f_2) for the various crystals used on the 10M band are shown at the right.

Trans. Freq. range	Xtal freq.	2nd Mixer freq. (f_2)
28.0-28.5 MC	32.0 MC	23.0 MC
28.5-29.0 MC	*32.5 MC	23.5 MC
29.0-29.5 MC	33.0 MC	24.0 MC
29.5-30.0 MC	33.5 MC	24.5 MC
*Crystal supplied with transmitter.		

7-5. HETERODYNE CRYSTAL OSCILLATOR ALIGNMENT

HETERODYNE OSCILLATOR ALIGNMENT CHART

Step	Band Selector	VTVM Connection	Trimmer Adjustment	Coil Adjustment	Injection Level
1	15M	VTVM to pin #1 of V14 (6AH6, 2nd Mixer). Common side to chassis.		L110	0.25V RMS
2	40M	Same as step 1.	C141A		0.5V RMS
3	10M(28.0-28.5 MC)	Same as step 1.	C141B		0.5V RMS
4	10M(28.5-29.0 MC)	Same as step 1.	C141C		0.5V RMS
5	10M(29.0-29.5 MC)	Same as step 1.	C141D		0.5V RMS
6	10M(29.5-30.0 MC)	Same as step 1.	C141E		0.5V RMS

7-5-1. ALIGNMENT PROCEDURE

The heterodyne crystal oscillator alignment procedure must follow the sequence shown in the chart, since the setting of the coil inductance on 15M must precede the trimmer adjustments on 40M and 10M bands. Set RF LEVEL at 0, FUNCTION switch at DSB, and OPERATION switch at MOX.

1. Set BAND SELECTOR at 15M.

2. Adjust crystal oscillator coil core L110 for 0.25V RMS on the gentle slope side of resonance.

3. Set BAND SELECTOR at 40M.

4. Adjust crystal oscillator trimmer C141A for 0.5V RMS on the gentle slope side of resonance.

5. Set BAND SELECTOR at 10M (28.0 MC - 28.5 MC segment).

6. Adjust crystal oscillator trimmer C141B for 0.5V RMS on the gentle slope side of resonance.

7. Repeat steps 5 and 6 for the remaining three 10M segments. Refer to chart above and Figure 10 for trimmer symbol and location.

7-6. VFO CALIBRATION ALIGNMENT

The VFO unit has been carefully aligned and temperature-compensated at the factory. Before touching up trimmer C105 or coil L101, check the dial for mechanical and electrical indexing as described in paragraph 4-7. Check calibration at the VFO fundamental frequency of 5.0 to 5.5 MC. While the VFO could be checked out on 80M or 20M, the accuracy of the 9 MC sideband generator frequency would have to be checked before assuming that the VFO was in error; hence, a check out directly on the VFO frequency is most desirable.

7-6-1. CONDITION REQUIRING TRIMMER ADJUSTMENT ONLY

If the electrical index check shows the large dial calibration to fall consistently to one side of the top pointer, at the 100 KC points across the dial, a trimmer adjustment is indicated. Correct the trimmer error as follows:

1. Set OPERATION control at STANDBY.

2. Mechanically index the VFO as described in paragraph 4-7.

3. Lightly couple the receiver to the VFO to avoid disturbing its frequency and set the receiver at 5.5 MC with an accurate 50 KC or 100 KC calibrator signal to beat against. (Receiver BFO turned off.)

4. Set the VFO at 5.5 MC as indicated on its dial and adjust trimmer C105 for zero beat.

5. Check across the dial at the 100 KC points. If the frequency error is less than 500 CPS, to 1000 CPS at most, the VFO is back to normal. If the error at the low frequency end of the dial is in excess of 500 CPS at 5 MC, the VFO may require a coil adjustment in addition to the trimmer adjustment.

7-6-2. CONDITION REQUIRING TRIMMER AND COIL ADJUSTMENT

Before adjusting the core of coil L101, follow the checks and adjustment of trimmer C105 outlined in paragraph 7-6-1. Check the dial calibration, starting at 5.5 MC and tuning toward 5.0 MC.

If the dial error progressively increases in the same direction, with the 5 MC end point running over 500 CPS in error, then adjust both trimmer C105 and the core of coil L101 as follows:

1. Set OPERATION control at STANDBY.

2. Mechanically index the VFO as outlined in paragraph 4-7-1.

3. Lightly couple the receiver to the VFO to avoid disturbing its frequency and set the receiver at 5 MC with an accurate 50 KC or 100 KC crystal calibrator signal to beat against. (Receiver BFO turned off.)

4. Set the VFO at 5 MC as indicated on its dial and adjust coil L101 for zero beat.

5. Set the receiver and VFO at 5.5 MC and again zero beat the VFO to the crystal calibrator by adjusting trimmer capacitor C105.

6. Repeat steps 4 and 5 until zero beat is obtained at both 5 MC and 5.5 MC within an error of a few cycles.

7. Check across the dial at the 100 KC points. If the frequency error is less than 1000 CPS, the VFO is back to normal. If the error exceeds 1000 CPS at 5.1 MC, 5.2 MC, 5.3 MC or 5.4 MC, with 5 MC and 5.5 MC at zero error, the VFO variable capacitor may be in need of "knifing". This operation should not be attempted by other than qualified personnel thoroughly familiar with the technique.

7-7. RF ALIGNMENT 9MC AMPLIFIER STAGES

Signal Generator Connection	Signal Generator Frequency	VTVM Connection	Control Setting	Remarks
High side to Pin #1 Grid of V5 (6AH6, 1st Mixer) Common to chassis.	9 MC (Unmod.)	VTVM RF probe to pin #5 Plate of V14 (6AH6, 2nd Mixer.) Common side to chassis.	BAND SELECTOR, 20M. OPERATION, MOX. FUNCTION, SSB. (All other controls at initial control setting.)	Remove OSC. tubes V2, V7, V8. Peak upper and lower core adjustments of T1 and T102 for maximum deflection of VTVM (1V RMS)

7-8. CARRIER OSC. AND SIDEBAND SWITCHING OSC. ALIGNMENT

The carrier oscillator and sideband switching oscillators are provided with minor frequency correction trimmers which permit setting each oscillator to exact frequency. The object of the oscillator frequency adjustment in the sideband generator unit is to provide a carrier signal frequency of exactly 9000 KC. This is accomplished by heterodyning the carrier oscillator frequency (4950 KC) with either the 4050 KC or 13,950 KC sideband switching oscillator to produce a 9000 KC signal at the output of the sideband unit.

7-8-1. CARRIER OSCILLATOR

Ordinarily the carrier oscillator will not require adjustment in the field. If the 9 MC signal is not on frequency, adjust the sideband switching oscillators only. In cases where the carrier oscillator frequency must be set, proceed as follows:

1. Set the OPERATION switch at MOX.

2. Set the FUNCTION switch at DSB.

3. Tune up the transmitter on 80M into a dummy load.

4. Reset the FUNCTION switch for either USB or LSB.

5. Set the CARRIER BAL. potentiometer R23 on the sideband unit for maximum carrier level and, if necessary, detune with the DRIVER TUNE control to prevent over-driving the final.

6. Adjust the CARRIER FREQ. trimmer C17 for maximum carrier level, again detuning with the DRIVER TUNE control to prevent driving the final stage into a saturated output.

7. Set the carrier level with the DRIVER TUNE control for 50V RMS across the dummy load, or use the output meter on the transmitter, taking care to avoid driving the final into the saturation level. Set the output meter sensitivity for zero DB.

8. Decrease the carrier oscillator frequency by turning the CARRIER FREQ. trimmer until the carrier level drops 20 DB to 25 DB.

NOTE: The carrier oscillator frequency may not fall exactly on 4950 KC, which is stated in the manual as the nominal frequency.

9. Repeak the modulator plate circuit by adjusting capacitor C25 (MOD. PLATE) with an insulated alignment tool.

CAUTION: The trimmer is in a balanced RF circuit and has +150 volts on its rotar.

10. Rebalance for maximum carrier suppression with the carrier balance adjustments R23 and C24. Retune the driver stage and check the low frequency audio response. Use a 50V RMS RF output level at 1000 CPS audio reference frequency. The low frequency response for -3 DB will fall below 500 CPS.

11. Check the audio frequency response at the high end of the range. The output level should fall -3 DB at 3000 to 4000 CPS.

12. After the carrier frequency has been set, it is now necessary to adjust the sideband switching oscillators for exactly 9000 KC from the sideband unit as described in paragraph 7-8-2.

7-8-2. SIDEBAND SWITCHING OSCILLATOR

1. Set band switch at 80M.

2. Disconnect shielded cable from sideband unit at main chassis connector.

3. Place antenna lead of receiver near the center terminal of the shielded plug and set the receiver at 9000 KC, with the crystal calibrator. Receiver BFO turned off.

4. Set the FUNCTION switch at LSB.

5. Adjust LOWER SB oscillator trimmer C50 for zero beat.

6. Set the FUNCTION switch at USB.

7. Adjust UPPER SB osc. trimmer C43 for zero beat.

NOTE: It may be desirable to unbalance the carrier balance adjustments slightly to obtain a higher signal level for the receiver.

7-9. SIDEBAND BALANCE ADJUSTMENT

The SB BAL control is a potentiometer (R56) in the cathode circuits of the 4.05 MC oscillator and 13.95 MC oscillator (V7) stages. This control is utilized to maintain sideband amplitude symmetry and seldom requires adjustment. However, if adjustment is necessary, proceed as follows:

1. Tune the HT-32B Transmitter Exciter for SSB operation, using a 1000 CPS audio tone.

2. Set the FUNCTION switch at UPPER SIDEBAND and note the reading on the front panel meter. Set AUDIO LEVEL control for approximately mid-scale reading.

3. Set the FUNCTION switch at LOWER SIDEBAND. The meter indication for both UPPER and LOWER SIDEBAND should be essentially the same.

   Any difference in output between the 4.05 MC oscillator and 13.95 MC oscillator can be compensated by adjusting the SB BAL control. Rotating the SB BAL control will increase the output of one sideband and decrease the other simultaneously. Consequently, it is necessary to alternate between the UPPER and LOWER SIDEBAND positions of the FUNCTION switch, checking for equal output, while adjusting the SB BAL control.

4. There is a slight interaction between the SB BAL adjustment and SB frequency adjustment, hence a relatively

large change in one will affect the performance of the other. If a large correction in sideband balance is required, recheck the sideband switching oscillator frequency adjustment.

7-10. NEUTRALIZATION OF FINAL AMPLIFIER

The carrier on DSB or CW, generated by the transmitter may be used on the 10M and 15M bands as a signal source for this adjustment.

1. Connect dummy load to transmitter output.
2. Connect 0 to 300 MA milliammeter in H.V. plate lead between the filter capacitor C172 and shunt feed choke L123.
3. Insert H.V. rectifier and reconnect screen supply lead.
4. Set neutralizing capacitor C 171 at mid-capacity.
5. Set OPERATION switch at MOX. and frequency dial at mid-position.
6. Set BAND SELECTOR to 10M (28.5 - 29.0 MC) and adjust DRIVER and FINAL TUNING for maximum output. Set transmitter output for 150 - 175 MA plate current.
7. 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.
8. Set BAND SELECTOR to 15M and repeat the above procedure, as in steps 6 and 7.
9. 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.

7-11. CARRIER BALANCE ALIGNMENT

Two CARRIER BAL adjustments are located on the top side of the sideband generator unit. The potentiometer adjustment R23 balances the DC potential on the deflection plates of the modulator tube V3 and the differential capacitor C24 controls the phase balance in the plate circuit of the modulator stage. Generally the differential capacitor requires adjustment only at the time a new modulator tube is installed.

The best working carrier balance adjustment will be obtained if adjustment is made after the transmitter has reached normal operating temperature, which is usually in about 1 to 2 hours.

1. Tune up the transmitter for DSB operation into a dummy load or 50-ohm antenna load.
2. Set FUNCTION switch for either sideband operation and set AUDIO LEVEL control at zero.
3. Adjust both CARRIER BAL controls for minimum carrier level (Minimum output meter reading) with the METER COMPRESSION control set for maximum meter sensitivity.
4. Switch to DSB operation and drive the transmitter to just below saturation output with the RF LEVEL control. Set METER COMPRESSION control for an output meter reading of zero DB and then reduce carrier level to zero.
5. Switch to either sideband and check balanced carrier level. Normal carrier suppression exceeds 50 DB when initially set up and may show 35 to 40 DB the first 10 minutes of operation while warming up.

7-12. 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 3rd mixer stage.

1. Set BAND SELECTOR at 15M.
2. Set VFO dial to 21.33 MC.
3. Tune the HT-32B Transmitter/Exciter for DSB operation into a 50 ohm load.
4. Disconnect 9 MC cable input from SB generator.
5. Adjust VFO injection C117 for 0.1V RMS RF output across 50 ohms.
6. Connect VTVM probe to pin 1, grid of V9 (6AH6, 3rd Mixer). The injection voltage will be approximately 0.3 to 0.4V RMS. If below 0.3V check screen and bias voltages on tubes V9 and V10 and check tubes V9 and V10 for malfunction.
7. Replace 9 MC cable input from SB generator and tune for maximum saturated power output, which should be at least 60V RMS across 50 ohm load.

7-13. 18 MC TRAP

The 18 MC trap provides additional suppression to 28,000 KC, 29,000 KC, 30,000 KC and 31,000 KC spurious signals, generated by the 2nd harmonic of the 9 MC sideband generator signal beating with the 2nd harmonic of the 23 to 24.5 MC 2nd mixer output. This spurious signal level becomes objectional when the transmitter is overdriven on

CW or SSB. The trap will help to maintain the 50 DB spurious rejection level, but over-driving the equipment is still to be avoided.

7-13-1. 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 just below saturated output, zero the output meter with the METER COMPRESSION control, and open the key. Remove the VFO tube V8 (6CB6) and then close the key. If the output meter indicates a spurious signal above the 40 DB point, the trap coil L111 is in need of adjustment. At reasonable drive levels, the spurious level will remain 50 DB or more below the maximum fundamental signal power output when the trap is properly adjusted.

To adjust the 18 MC trap proceed as follows:

1. Set up the transmitter for DSB operation and tune up on 28,000 KC into a 50-ohm dummy load.
2. Adjust the RF LEVEL control for well below saturation output and peak up trimmer C149D in the plate circuit of the 2nd mixer stage.
3. Adjust the RF LEVEL control for just under the saturation output level and set the output meter at zero DB with the METER COMPRESSION control.
4. Switch to STANDBY and remove the VFO tube V8 to eliminate the VFO injection.
5. Switch back to MOX and read the spurious level on the output meter. If it is below 50 DB level, switch to the second segment of the 10M band and check as above on 29,000 KC. If the spurious level is excessive at 28,000 KC, adjust trap coil L111 for minimum spur level. A substantial change in the setting of the trap coil will necessitate a readjustment of the 2nd mixer plate coil L112. This will require switching back to the 15M band and peaking coil L112. Changing the inductance of coil L112 then makes it necessary to repeak all of the 10M 2nd mixer trimmers C149A, B, C, and D.
6. After adjusting the trap at 28,000 KC, switch to the second segment of the 10M band and tune up on 29,000 KC. Adjust the RF LEVEL control for well under saturation output and peak up trimmer C149C in the plate circuit of the 2nd mixer stage.
7. Repeat steps 3 and 4.
8. Switch back to MOX and read the spurious level. If it is below 50 DB, the adjustments are complete. If an adjustment of the 18 MC trap coil is required to suppress the spur, then recheck the 28,000 KC spur in the 1st segment of 10M to be sure the new trap setting holds for that segment too. Note that excessive drive and loss of 2nd mixer gain (mistuning of trimmers or faulty tube) work to the spur's advantage since harmonic distortion is the reason for the spur's existence. Even though a 30,000 KC and 31,000 KC spur are generated, the transmitter does not tune through these frequencies in the 3rd and 4th segments respectively, thus the trap adjustment need be checked out only in the first two segments as described. If adjustments were made in the trap setting or 2nd mixer coil L112, be sure to repeak the 2nd mixer trimmers C149A and C149B in the 3rd and 4th segment of 10M respectively.

7-14. 9 MC GAIN ADJUSTMENT

This control (R51) is located on the sideband generator unit and is accessible at the top of its chassis. The control sets the gain of the 9 MC amplifier and is considered a factory adjustment which will generally not require adjustment unless extensive service work has been done on the equipment.

Before changing the adjustment, check the performance of the transmitter as follows:

1. Tune up the transmitter on single sideband using a dummy load. With a 1000 CPS audio oscillator, measure the audio signal level at the microphone connector for peak or saturation power output on each of the bands. AUDIO LEVEL control should be set at 9.
2. The audio signal level at the microphone input should run between 1 to 4 millivolts RMS for saturation or peak power output. Should any one band require substantially more audio signal level than the rest, re-check the alignment on that band.
3. If the audio level required is uniformly higher on all bands, advance the 9 MC amplifier gain adjustment to bring it into agreement with the level specified in step 2. If the audio level required runs less than 1 millivolt, the gain is excessively high and will not permit the carrier suppression and unwanted sideband to reach 50 DB below maximum output. In this case reduce the gain setting accordingly.

NOTES ON RTTY OPERATION OF THE HT-32B TRANSMITTER/EXCITER

GENERAL

The Model HT-32B Transmitter/Exciter has the required keying circuit brought out at the rear chassis apron on a three-circuit jack marked FSK. The transmitter may be setup for teletype operation by connecting a polar relay or polar key board to the three-circuit jack and shifting the frequency of the 13.95 MC sideband switching oscillator in the sideband generator unit. The signal may be directly shifted 850 CPS by resetting the frequency adjustment trimmer marked LOWER SB. If the transmitter is to be used for RTTY and the other normal modes of transmission, it will be better to buildup a simple adapter unit with a separate trimmer set for the required shift in frequency and leave the LOWER SB trimmer adjustment in the transmitter unaltered.

THEORY OF OPERATION

The sideband switching oscillators (tube V7) operate at either 4.05 MC or 13.95 MC, depending upon which sideband is to be transmitted. When either of these two frequencies are mixed with the 4.95 MC signal, the resultant is a 9.0 MC signal at the output of the sideband generator unit.

If the frequency of one of the oscillators is shifted 850 CPS lower in frequency, then as both oscillators are keyed alternately by a RTTY keyer, the required frequency shift carrier will be obtained. On 80 and 20 meters, the shifted signal is lower than the indicated VFO dial but as additional frequency conversion is employed on 40, 15, and 10 meters, the frequency shift reverses; hence, on 40, 15, and 10 meters the shift is higher.

To disable either of the two oscillator sections of tube V7, blocking bias is applied to the grids via the BAND SELECTOR switch and FUNCTION switch for normal operation. When changing over to RTTY, the keying plug is inserted at the FSK jack and the keying circuit takes over the switching function of the sideband switching oscillators. Note that the keying plug must be removed to return the transmitter to normal operating modes.

It is not important, theoretically, which of the two oscillators is changed in frequency from the factory setting. However, the higher frequency oscillator (13.95 MC, marked LOWER SB) can be more readily shifted with negligible loss of output. Trimmer C50 is used to accomplish this shift. When the trimmer is moved for RTTY, it must be returned to its original factory setting for normal operating modes. See paragraph 7-8-2. It is suggested that a plug-in trimmer be employed to obtain the shift.

PROCEDURE

1. The adapter unit may consist of a 9-pin test socket adapter (Peco Model TBS9) and ceramic trimmer capacitor (1.5-7 mmf NPO - Erie Resistor Co. Style 555-07). Solder the trimmer between terminals 5 and 7 on the Peco test socket adapter.

2. Remove sideband switching oscillator tube V7 (12AT7) (See figure 9 for tube location) and plug adapter into the socket. Insert tube in adapter socket.

3. Wire the three-circuit plug to polar relay or polar keyboard. The sleeve of the plug is wired to the movable contact, the ring to one fixed contact, and the tip to the remaining fixed contact. Insert plug in FSK jack.

4. With FUNCTION switch at DSB and OPERATION switch at MOX, tune up the transmitter on frequency as you would for CW operation. Manually operate the keyer circuit to key on the 13.95 MC oscillator and adjust the adapter trimmer for the 850 CPS shift. To determine which oscillator is working for this adjustment, listen to the beat note in a receiver and touch the adapter trimmer. If the 13.95 MC oscillator is operating, the pitch will change when the finger increases the circuit capacity.

5. To return the transmitter to normal modes of operation, remove both the FSK plug and the adapter unit and replace the tube and shield.

SERVICE PARTS LIST

Schematic Symbol	Description	Hallicrafters Part Number
	CAPACITORS (SIDEBAND GENERATOR)	
C1, C2, C8, C12, C14, C21, C26, C29, C30, C32, C33, C34, C38, C39, C40, C41, C46, C47	.005 mfd., 20%, 500V; Cer. Disc	047-100442
C3, C4	100 mmf., 5%, 500V; Duramica	482-162101
C5, C9	.002 mfd., 20%, 500V; Cer. Disc	047-100395
C6, C20	.02 mfd., 500V; Cer. Disc	047-100242
C7A, B	10-10 mfd., 350V; Electrolytic	045-000714
C10, C13	150 mmf., 5%, 500V; Duramica	482-162151
C11	0.047 mfd., 10%, 400V; Molded Paper	499-021473
C15	33 mmf., 5%, 500V; Duramica	482-152330
C16	120 mmf., 5%, 500V; Duramica	482-162121
C17, C25, C43	5-25 mmf., Cap. Var. NPO; Trimmer	044-100473
C18	470 mmf., 5%, 300V; Duramica	481-162471
C19, C27	0.01 mfd., 500V; Cer. Disc	047-100224
C22	.047 mfd., 10%, 200V; Molded Paper	499-014473
C23	100 mmf., 2%, 500V; Duramica	482-161101
C24	Cap, Var; Differential	048-200375
C28	47 mmf., 5%, 500V; Duramica	482-152470
C31	22 mmf., 5%, 500V; Duramica	482-152220
C37	1500 mmf., 2%, 300V; Duramica	481-261152
C42	100 mmf., 10%, N750; Cer. Tub.	491-126101-95
C44, C48	18 mmf., 5%, NPO; Cer. Tub.	491-105180-22
C45, C49	43 mmf., 5%, NPO; Cer. Tub.	491-125430-22
C50	3-12mmf., Cap., Var., NPO; Trimmer	044-100483
	(MAIN CHASSIS)	
C101	12 mmf., 5%, N1500; Cer. Tub.	479-015120
C102	12 mmf., 5%, NPO; Cer. Tub.	491-005120-22
C103	Cap. Var.; MAIN TUNING	048-000481
C104	Cap. Var.; Differential	048-200375
C105	2.6-13 mmf., Trimmer	048-200376
C106	18 mmf., 5%, N80; Cer. Tub.	491-005180-42
C107, 108	.001 mfd., 5%, 300V; Mica	047-100623
C109	.01 mfd., 500V; Cer. Disc	047-100224
C110, 111	.01 mfd., 10%, 300V; Mica	470-643103
C112	.01 mfd., 500V; Cer. Disc	047-100224
C113	6 mmf. 10%, NPO; Cer. Tub	491-006060-22
C114, 116	47 mmf., Part of Transformer T101	----------
C115	470 mmf., Part of Transformer T101	----------
C117	1.5-7 mmf., Trimmer	044-100457
C118, C121, C122, C124, C125, C126, C128, C130, C131, C133, C138, C142, C143, C144, C148, C164, C181, C182, C183, C184, C185, C186, C187, C188	.005 mfd., 20%, 500V; Cer. Disc	047-100442
C119, 123	47 mmf., 10%, N750; Cer. Tub.	491-106470-95
C120, 192	.1 mfd., 20%, 200V; Molded Paper	499-014104
C127	100 mmf., 10%, N750; Cer. Tub.	491-126101-95
C129, 132, 178, 179, 189, 190, 191	0.01 mfd, 500V; Cer. Disc	047-100224
C134, 135	56 mmf., Part of Transformer T102	----------
C136	43 mmf., 2%, 500V; Duramica	482-151430
C137	39 mmf., 2%, 500V; Duramica	482-151390
C139	5 mmf., 10%, N750; Cer. Tub.	491-126101-95
C140	68 mmf., 5%, N750; Cer. Tub.	491-125680-95
C141A, B, C, D, E	4-40 mmf., 2-25 mmf; Trimmer Strip (5 Section)	044-000530
C145	120 mmf., 2%, 500V; Duramica	482-161121
C146	68 mmf., 5%, 500V; Duramica	482-162680
C147	200 mmf., 2%, 500V; Duramica	482-161201
C149A, B, C, D, 154A, B, C, D	5-25 mmf., NPO; Trimmer Strip (4 Section)	044-200464
C150, 151	.005 mfd., 20%, 1 KV; Cer. Disc	047-100523
C152	150 mmf., 2%, 500V; Duramica	482-161151
C153	47 mmf., 2%, 500V; Duramica	482-151470
C155	15 mmf., 2%, 500V; Duramica	482-131150
C156	82 mmf., 2%, 500V; Duramica	482-161820
C157	240 mmf., 2%, 500V; Duramica	482-161241
C158A, B, C, D	Cap., Var.; DRIVER TUNING	048-400453
C159	33 mmf., 2%, 500V; Duramica	482-151330
C161A, B, C, D	5-25 mmf., NPO; Trimmer Strip (4 Section)	044-200464
C162	15 mmf., 2%, 500V; Duramica	482-131150
C163	.0027 mfd., 20%, 1 KV; Cer. Disc	047-200524
C165	82 mmf., 2%, 500V; Duramica	482-161820
C166	240 mmf., 2%, 500V; Duramica	482-161241
C167, 168	.001 mfd., 3 KV; Cer. Disc	047-100397
C169	Cap., Var.; FINAL TUNE	048-000484
C170	2000 mmf., Mica (feed thru)	047-200669
C171	2.6-13 mmf., Var.	048-200316
C172	10 mfd., 1 KV; Oil Filled	046-300638
C173	380 mmf., 2%; Toothpick	047-100668
C174, 175	270 mmf., 2%; Mica	470-221271
C176	220 mmf., 2%; Toothpick	047-200596
C177	.01 mfd., 500V; Cer. Disc	047-100224
C180	.22 mfd, 20%, 200V; Molded Paper	499-014224
C193A, B	60-40 mfd., 475V; Electrolytic	045-200226
C194, 195	40 mfd., 150V; Electrolytic	045-200509
C196, 197	.01 mfd, 1KV; Cer. Disc	047-200598
	***RESISTORS (SIDEBAND GENERATOR)**	
R1, 2, 15, 20, 28, 48, 54, 59	100K ohm	451-252104
R3	560 ohm	451-252561
R4	2.7K ohm	451-252272
R5, 53, 60	220K ohm	451-252224
R6, 8	1 megohm	451-252105
R7, 16, 41, 45, 49	47K ohm, 1W	451-352473
R9, 32	120K ohm	451-252124
R10, 43, 44	2.2K ohm	451-252222
R11	1 megohm, Variable, AUDIO LEVEL Control	025-001888
R12	270K ohm, 5%	451-251274
R13, 21, 65	100K ohm, 5%	451-251104
R14	1.8K ohm	451-252182
R17, 19, 47, 50, 57	10K ohm, 1W	451-352103
R18, 36, 55, 58	2.2K ohm, 1W	451-352222
R22, 24	4.7K ohm, 5%	451-251472
R23	10K ohm, Variable, CARRIER BALANCE Control	025-001927
R25, 26	47K ohm	451-252473
R27	18K ohm, 5%	451-251183
R29	1.2K ohm	451-252122
R30, 35	1K ohm	451-252102
R31	100 ohm	451-252101
R33	330K ohm	451-252334
R34	50K ohm, Variable, CAL LEVEL Control	025-001889
R37, 39	680 ohm	451-252681
R38	180 ohm 1W	451-352181
R40	4.7K ohm, 1W	451-352472
R42	470 ohm, 1W	451-352471
R46	100K ohm, 1W	451-352104
R51	300K ohm, GAIN LEVEL Control	025-201426
R52	82K ohm	451-252823
R56	5K ohm, Variable, OSC. LEVEL Control	025-201392
R61	470K ohm, 5%	451-251474
R62	820K ohm,	451-251824
R63	1.8 megohm	451-252185
R64	1 megohm, Variable, RF LEVEL Control	025-001886
	(MAIN CHASSIS)	
R101, 106, 124	47K ohm	451-252473
R102	22K ohm 1W	451-352223
R103	4.7K ohm, 1W	451-352472
R104	1K ohm	451-252102
R105	3.9K ohm	451-252392
R107, 112	220K ohm	451-251224
R108	10K ohm, 5%	451-251103
R109	4.7K ohm, 5%	451-251472
R110, 116, 122	1K ohm, 1W	451-352102
R111, 148, 160	100K	451-252104
R113	18K ohm, 5%	451-251183
R114	12K ohm, 2W	451-652123
R115	39K ohm, 2W	451-652393
R117, 118, 151	100 ohm 1W	451-352101
R119	33 ohm	451-252330
R120	10K ohm	451-252103
R121	220 ohm, 1W	451-352221
R123	100K ohm, 1W	451-352104
R125	270 ohm	451-252271
R126	680 ohm	451-252681
R127	27K ohm	451-252273
R128, 130, 131	1K ohm, 1W	451-352102
R129	10K ohm, 5%, 1W	451-351103
R132, 133	22K ohm, 1W	451-352223
R134, 135	220K ohm, 2W	451-652224
R136	22K ohm	451-252223
R137	50K, Variable, METER COMPRESSION Control	025-001887
R138	5.6K ohm, 5%	451-251562
R139	6.8K ohm, 5%, 2W	451-651682
R140	1.2K ohm, 5%, 1W	451-351122
R141, 154	1 megohm, Variable, VOX and ANT 1 TRIP SENSITIVITY	025-201137
R142, 157, 161	1Megohm	451-252105
R143	1.2K ohm, 1W	451-352122
R144, 156, 159	330K ohm, 1W	451-352334
R145, 162, 163	220K ohm	451-252224
R146	4.7 Megohm	451-252475
R147	5/10 Megohms, Variable, VOX and CW DELAY	025-201807
R149	820K ohm	451-252824
R150	68K ohm, 1W	451-352683
R152	1.5K ohm, 1W	451-352152
R153	1 Megohm, 1W	451-352105

SERVICE PARTS LIST (CONT.)

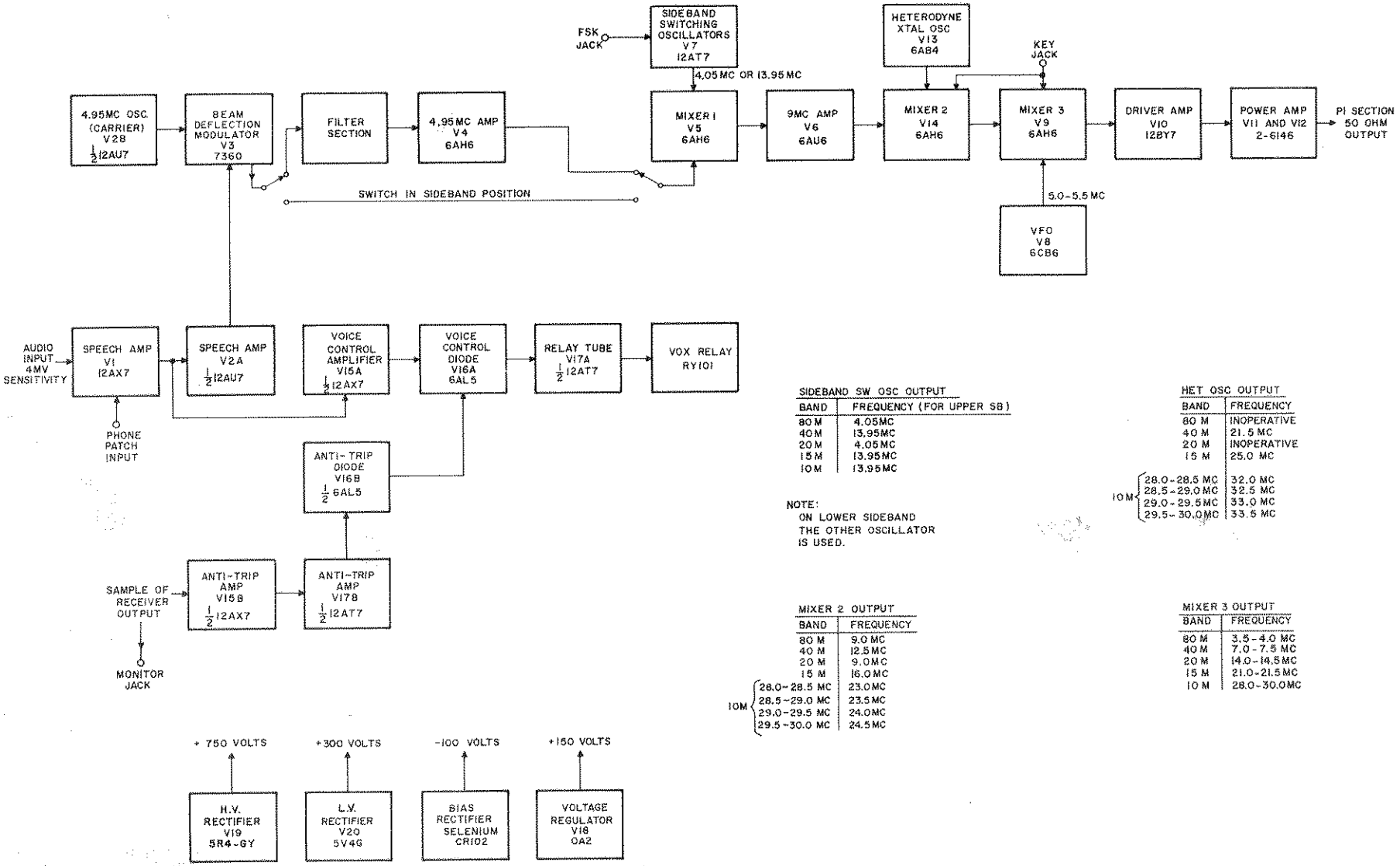
Schematic Symbol	Description	Hallicrafters Part Number
	*RESISTORS (MAIN CHASSIS CONT)	
R155, 158	4.7K ohm, 1W	451-352472
R164, 169	8.2K ohm, 1W	451-352822
R165	1.2K ohm, 5%, 10W	453-061122
R166	2250 ohm, 5%, 10W	024-001353
R167	5K, Variable, BIAS ADJUST Control	025-201579
R168	3.9K ohm, 1W	451-352397
R170	1.5K ohm, 1W	451-352152
R171	2K ohm, 8W	024-101258

*All resistors are carbon type, 10%, 1/2 watt unless otherwise specified.

	TRANSFORMERS & COILS (SIDEBAND GENERATOR)	
L1	Coil, Modulator	051-002991
L2	Choke, RF	053-100107
FL1	Filter Unit	049-000179
T1	Transformer, IF (9MC)	050-000756
	(MAIN CHASSIS)	
L101	Choke Assem., VFO	051-202180
L102	Choke, VFO Filament	053-200359
L103, 120	Choke, RF (2.5 MH)	053-200335
L104, 106	Choke, Parasitic Suppressor	053-200417
L105	Choke, Filament	053-200358
L107, 108	Coil, Xtal Osc. Grid (15 & 40M)	051-002893
L109	Coil, Xtal Osc. Grid (10M)	051-002892
L110	Coil, RF Oscillator	051-202235
L111	Coil, Trap (18MC)	051-202656
L112	Coil, RF; 2ND Mixer Plate (10 & 15M)	051-002866
L113	Coil, RF; 2ND Mixer Plate (40M)	051-002867
L114	Coil, RF (10M)	051-002861
L115	Coil, RF (15 & 20M)	051-202668
L116	Coil, RF (40M)	051-202017
L117	Coil, RF (80M)	051-202018
L118	Coil, RF (10M)	051-002861
L119	Coil, RF (15 & 20M)	051-202668
L121	Coil, RF (40M)	051-202017
L122	Coil, RF (80M)	051-202018
L123	Choke, RF; Final Plate	053-200426
L124	Choke, Filter (8HY @ 175MA)	056-300260
L125	Coil, Final Tank	051-302558
L126	Choke, RF; Safety	053-100160
L127	Choke, Filter (9HY @ 135MA)	056-300259
T101	Transformer, VFO Band Pass Filter	050-200622
T102	Transformer, IF (9MC)	050-200701
T103	Transformer, Power	052-000877
	PLUGS, SOCKETS & CONNECTORS (SIDEBAND GENERATOR)	
SO1, 2	Jack, Phono: MIKE, PHONE PATCH	036-100041
SO3	Socket, 6 Pin	006-100713
SO4	Socket, 10 Pin	006-100712
P1	Plug, Phono	010-100231
	(MAIN CHASSIS)	
SO101	Connector, MIKE	010-101569
SO102	Jack, Phono; 9 MC input	036-100041
SO103	Jack, Non-Shorting; KEY	036-100064
SO104	Socket, Power; 11 Pin	006-100707
	Plug, SO104 Mating Connector, 11 Pin	035-100043
SO105	Jack, Shorting; MONITOR	036-100002
SO106	Jack, Shorting; FSK	036-200194
SO107	Socket, AC; Fan	010-200015
SO108	Socket, AC; Accessory Outlet	010-200015
SO109	Connector, Coax; RF Output	010-100056
SO110	Jack, Test, Red	036-000304
	Socket Assy, Pilot Light	086-000532
	Socket, Crystal (Y101, Y102, Y103, Y104, Y105, Y106)	006-100320
	Socket, Tube; 7 Pin Min (Cer.)(V8)	006-100354
	Socket, Tube; 7 Pin Min (Mica)(V4, V5, V6)	006-200759

Schematic Symbol	Description	Hallicrafters Part Number
	PLUGS, SOCKETS & CONNECTORS (MAIN CHASSIS CONT)	
	Socket, Tube: 9 Pin W/Base (V1, V2, V3, V7)	006-200672
P101	Plug, Phono	010-100231
P102	Plug, 6 Pin	006-100714
P103	Plug, 10 Pin	006-100715
P104	Line Cord and Plug	087-204833
P105	Line Cord and Plug	087-105302
	SWITCHES & WAFERS (SIDEBAND GENERATOR)	
S1	Switch, OPERATION	060-002207
S2	Switch, FUNCTION	060-002230
	(MAIN CHASSIS)	
S101A	Switch, Band Selector	060-002229
S101B	Switch, Band Selector	060-002229
S101C	Wafer, Switch; 2ND Mixer	062-000163
S101D	Wafer, Switch; Mixer-Driver	062-000161
S101E	Wafer, Switch, Driver Tune	062-000161
S101F	Wafer, Switch, Final Tank	062-000162
	CRYSTALS & DIODES (SIDEBAND GENERATOR)	
Y1	Crystal, Carrier Osc.; 4950 KC	019-301956
Y2	Crystal, Sideband Switching Osc.; 4050 KC	019-301957
Y3	Crystal, Sideband Switching Osc.; 13950 KC	019-301958
	(MAIN CHASSIS)	
Y101	Crystal, Heterodyne Osc.; 25 MC	019-201961
Y102	Crystal, 32.0MC (28.0-28.5MC); Not included	019-201963
Y103	Crystal, Heterodyne Osc.; 32.5MC (28.5 - 29.0MC)	019-201964
Y104	Crystal, 33.0MC (29.0 - 29.5MC); Not included	019-101965
Y105	Crystal, 33.5MC (29.5 - 30.0MC); Not included	019-201966
Y106	Crystal, Heterodyne Osc.; 21.5MC	019-201960
CR101	Diode, Rectifier	019-101916
CR102	Selenium, Rectifier	027-200224
	LAMPS & FUSES	
LM101, 104, 105	Lamp, Pilot Light #47	039-100004
LM102, 103	Lamp, Pilot Light #44	039-100003
F101	Fuse, 4 Amp; Slo-Blo (3AG)	039-100448
	ELECTRON TUBES	
V1, 15	ECC83/12AX7; 1st and 2nd Audio, and 1st Anti-Trip and VOX Amplifier	090-901230
V2	6680/12AU7; Carrier Osc. and 3rd Audio Amplifier	090-901116
V3	7360; Modulator	090-901396
V4, V5, V9, V14	6AH6; Filter Amplifier, 1st Mixer, 2nd Mixer, 3rd Mixer	090-900793
V6	6AU6; 9MC Amplifier	090-900808
V7, V17	12AT7; Sideband Switching Osc. and 2nd Anti-Trip Amplifier and Relay Tube	090-900034
V8	6CB6; VFO	090-901115
V10	12BY7A; Driver	090-901192
V11, V12	6146; Final Amplifiers	090-900756
V13	6AB4; Heterodyne Osc.	090-900784
V16	6AL5; VOX and Anti-Trip Diode	090-901163
V18	OA2; Voltage Regulator	090-900001
V19	5R4GY; H.V. Rectifier	090-900705
V20	5V4G; L.V. Rectifier	090-900721

Schematic Symbol	Description	Hallicrafters Part Number
	KNOBS	
	Knob: FREQUENCY	015-101416
	Knob: BAND SELECTOR	015-101416
	Knob Assy: DRIVER TUNE	015-201424
	Knob Assy: METER COMPRESSION	015-201425
	Knob Assy: RF LEVEL	015-201425
	Knob Assy: AUDIO LEVEL	015-201425
	Knob Assy: CALIBRATE LEVEL	015-201425
	Knob Assy: FUNCTION	015-201427
	Knob Assy: OPERATION	015-201428
	Knob Assy: FINAL TUNE	015-001554
	Knob, Dial Lock	015-001543
	MISCELLANEOUS	
	Cabinet Assy, Front and Rear	150-000107
	Channel, Rubber	016-200929
	Cord, Dial	038-000049
	Coupler, Solid	029-100264
	Cover, Cabinet Top	066-101451
	Dial Lock, Shaft Assy	150-001820
	Dial Scale, (Main Tuning)	083-000772
	Dial Scale, Hub Assy (Frequency)	150-001679
	Dial Scale, Hub Assy (Band Selector)	150-000344
	Escutcheon, Front Panel	007-000789
	Fan, Blade	080-300305
	Flywheel	071-100205
	Foot, Cabinet	016-100029
	Fuseholder	006-200845
	Glass, Dial (Main Tuning)	022-200540
	Grommet, Motor Mounting	016-100034
	Line Cord Lock	076-200756-01
	Line Cord Lock	076-200756-02
M101	Meter, -DB LEVEL INDICATOR	082-400326
	Motor, Fan	020-200218
	Panel, Front	068-001093
	Plate, Foot Reinforcement	063-100334
	Pointer, Band Selector	082-000500
	Pointer, Dial Scale (Main Tuning)	082-000474
	Post, Latch	011-100226
RY101	Relay, VOX, Voice Control	021-200442
	Shield, Tube (V1, V2, V7, V15, V17)	069-201190
	Shield, Tube (V3, V10)	069-201189
	Shield, Tube (V4, V5, V6, V8, V9, V13, V14)	069-201191
	Shield, Tube (V16)	069-201196
	Shield, Heat Insert (V10)	069-101020
	Shield, Insert (Magnetic) (V3)	069-001384
	Shield, Heat Insert (V2)	069-100958
	Spring, Tension	075-000768
	Window, Dial (Band Selector)	022-000625
	Window, Dial (Frequency)	022-000638



SIDEBAND SW OSC OUTPUT

BAND	FREQUENCY (FOR UPPER SB)
80 M	4.05MC
40 M	13.95MC
20 M	4.05MC
15 M	13.95MC
10M	13.95MC

NOTE:
ON LOWER SIDEBAND THE OTHER OSCILLATOR IS USED.

HET OSC OUTPUT

BAND	FREQUENCY
80 M	INOPERATIVE
40 M	21.5 MC
20 M	INOPERATIVE
15 M	25.0 MC
10M 28.0-28.5 MC	32.0 MC
10M 28.5-29.0 MC	32.5 MC
10M 29.0-29.5 MC	33.0 MC
10M 29.5-30.0 MC	33.5 MC

MIXER 2 OUTPUT

BAND	FREQUENCY
80 M	9.0 MC
40 M	12.5 MC
20 M	9.0 MC
15 M	16.0 MC
10M 28.0-28.5 MC	23.0 MC
10M 28.5-29.0 MC	23.5 MC
10M 29.0-29.5 MC	24.0 MC
10M 29.5-30.0 MC	24.5 MC

MIXER 3 OUTPUT

BAND	FREQUENCY
80 M	3.5-4.0 MC
40 M	7.0-7.5 MC
20 M	14.0-14.5 MC
15 M	21.0-21.5 MC
10 M	28.0-30.0 MC

Figure 11. Model HT-32B Block Diagram

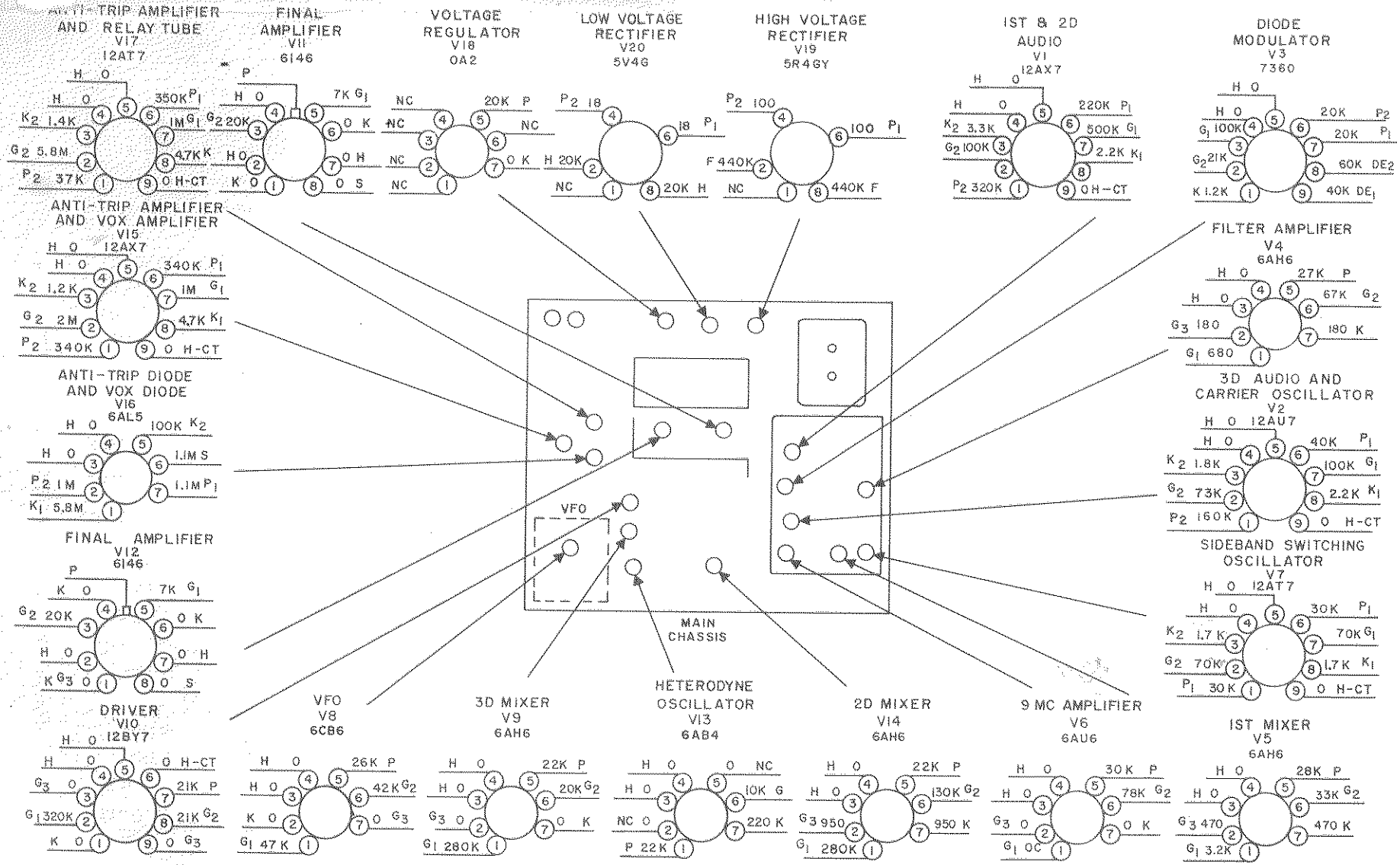


Figure 12. Model HT-32B Resistance Chart

1. BASING DESIGNATION; BOTTOM VIEW OF TUBE SOCKETS

2. RESISTANCE TO CHASSIS READINGS TAKEN WITH NO POWER APPLIED TO UNIT. KNOBS SET IN FOLLOWING POSITION:

BAND SELECTOR	15 M	VOX SENS	MAX CW
FUNCTION KNOB	C W	ANTI-TRIP	MAX CW
OPERATION KNOB	POWER OFF	CW & VOX DELAY	MAX CW
AUDIO LEVEL	ZERO		
METER COMPRESSION	ZERO	OC—OPEN CIRCUT	
R F LEVEL	ZERO	NC—NO CONNECTION	
CALIBRATE LEVEL	ZERO		

CAUTION—DISCONNECT LINE CORD WHEN MAKING RESISTANCE CHECK.

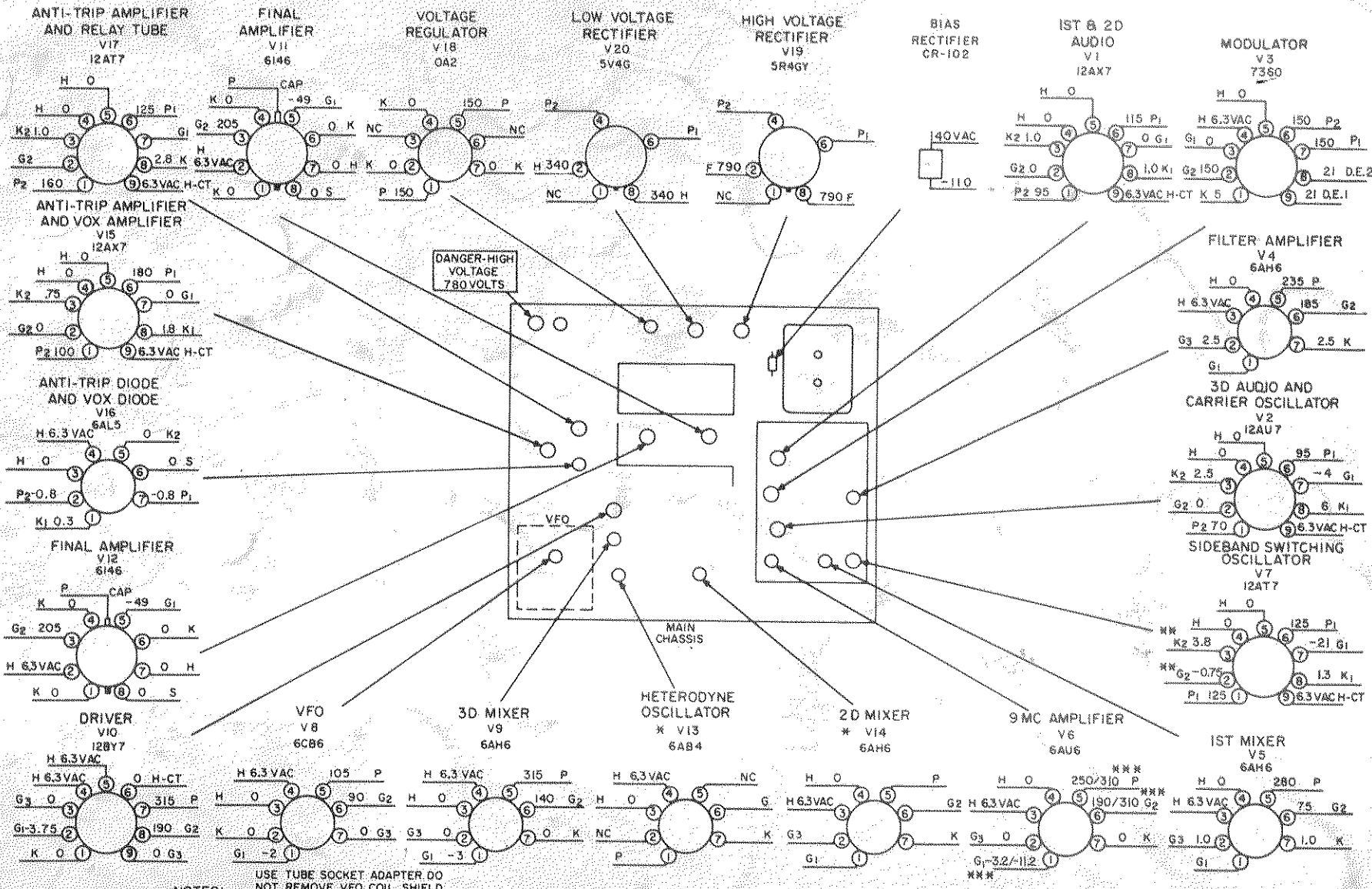


Figure 13. Model HT-32B Voltage Chart

NOTES:

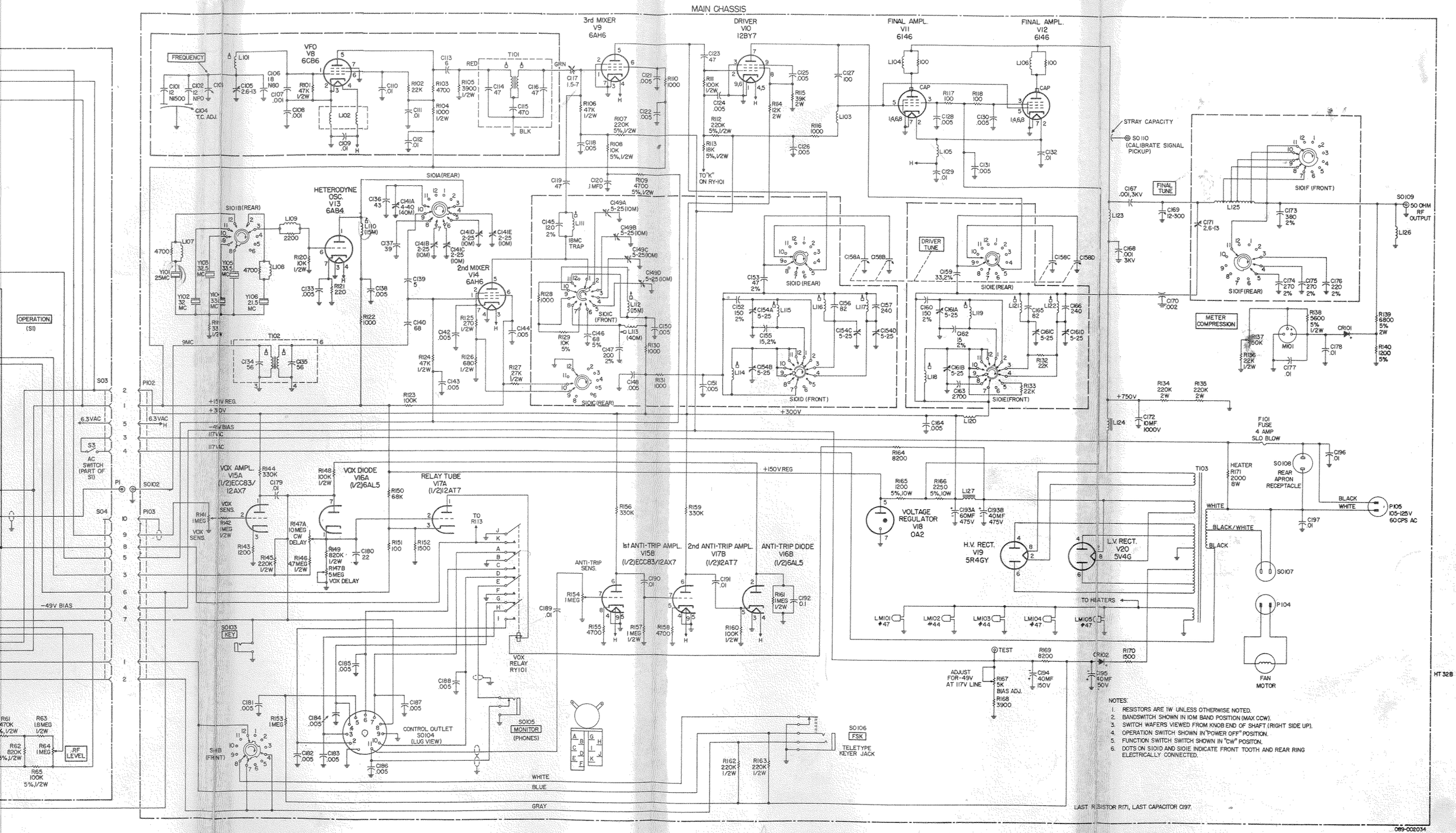
1. BASING DESIGNATION; BOTTOM VIEW OF TUBE SOCKETS.
2. * SOCKET VOLTAGES VARY WITH BAND SWITCH SETTING (SEE CHART)
3. ** CHART VOLTAGES SHOWN ARE FOR UPPER SIDEBAND POSITION ON 80 METERS-NO MODULATION
4. *** VOLTAGES CHANGE DEPENDING UPON FACTORY GAIN SETTING.
5. FOR CONVENIENCE, ON SIDEBAND GENERATOR UNIT USE TUBE SOCKET ADAPTER FOR VOLTAGE CHECKS.
6. VOLTAGE DATA TAKEN WITH ELECTRONIC TYPE VOLTMETER. ALL READINGS EXCEPT GRID VOLTAGES MAY BE OBTAINED WITH A 20,000 OHMS PER VOLT METER.

VOLTAGE READING TAKEN WITH 117V, 60~ AC SUPPLIED TO UNIT. CONTROLS SET AS FOLLOWS UNLESS OTHERWISE NOTED.

BAND SELECTOR	80M
OPERATION CONTROL	MOX
FUNCTION CONTROL	USB
AUDIO LEVEL	0
METER COMPRESSION	0
RF LEVEL	0
CALIBRATE LEVEL	0

TUBE	PIN	80M	40M	20M	15M	10M
V13 6AB4 (V13) HETERODYNE OSCILLATOR	PLATE	145V	145V	145V	145V	145V
	CATHODE	1.2V	1.35V	1.2V	1.35V	1.35V
	GRID	0V	-1V	0V	-0.2V	-0.8V
6AH6 (V14) 2ND MIXER (NO SIGNAL FROM SIDEBAND GENERATOR)	PLATE	310V	310V	280V	310V	310V
	SCREEN	115V	30V	100V	115V	115V
	CATHODE	1.8V	0.3V	0.9V	1.9V	2.0V

092-010754



NOTES:
1. RESISTORS ARE 1W UNLESS OTHERWISE NOTED.
2. BANDSWITCH SHOWN IN 10M BAND POSITION (MAX CCW).
3. SWITCH WAFERS VIEWED FROM KNOB END OF SHAFT (RIGHT SIDE UP).
4. OPERATION SWITCH SHOWN IN "POWER OFF" POSITION.
5. FUNCTION SWITCH SWITCH SHOWN IN "CW" POSITON.
6. DOTS ON S101D AND S101E INDICATE FRONT TOOTH AND REAR RING ELECTRICALLY CONNECTED.

LAST R.SISTOR R171, LAST CAPACITOR C197.

Figure 14. Model HT-32B Schematic Diagram

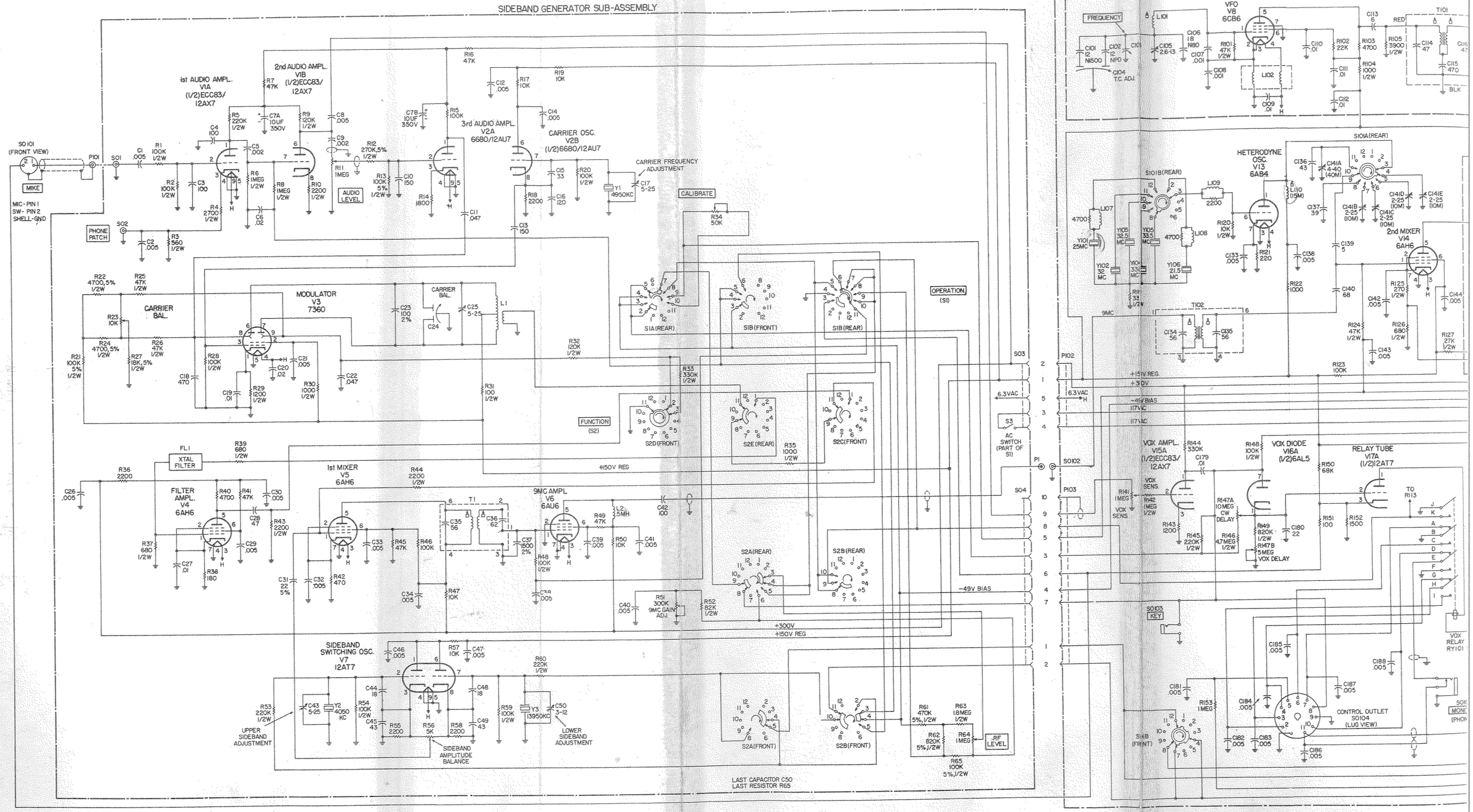


Figure 14. Model HT-32B Schematic Diagram

Warranty

"The Hallicrafter's Company warrants each new radio product manufactured by it to be free from defective material and workmanship and agrees to remedy any such defect or to furnish a new part in exchange for any part of any unit of its manufacture which under normal installation, use and service discloses such defect, provided the unit is delivered by the owner to our authorized radio dealer, wholesaler, from whom purchased, or, authorized service center, intact, for examination, with all transportation charges prepaid within ninety days from the date of sale to original purchaser and provided that such examination discloses in our judgment that it is thus defective.

This warranty does not extend to any of our radio products which have been subjected to misuse, neglect, accident, incorrect wiring not our own, improper installation, or to use in violation of instructions furnished by us, nor extend to units which have been repaired or altered outside of our factory or authorized service center, nor to cases where the serial number thereof has been removed, defaced or changed, nor to accessories used therewith not of our own manufacture.

Any part of a unit approved for remedy or exchange hereunder will be remedied or exchanged by the authorized radio dealer or wholesaler without charge to the owner.

This warranty is in lieu of all other warranties expressed or implied and no representative or person is authorized to assume for us any other liability in connection with the sale of our radio products."

Form No. 94X622

the Hallicrafters co.