

HQ-205
COMMUNICATIONS
TRANSCEIVER

TECHNICAL
DESCRIPTION
AND
OPERATING
INSTRUCTIONS



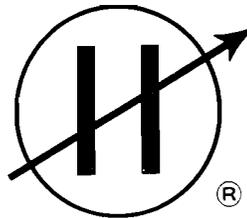
HAMMARLUND

Hammarlund Manufacturing Company

73-88 HAMMARLUND DRIVE
MARS HILL, NORTH CAROLINA

THE
HQ-205
COMMUNICATIONS
TRANSCEIVER

INSTRUCTION AND SERVICE INFORMATION



Established 1910

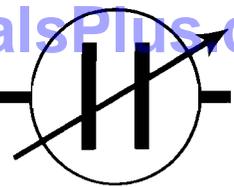
In order to receive the full unconditional 90-day warranty against defective material and workmanship in this receiver, the warranty card must be filled out and mailed within two weeks of purchase. Please refer to serial number of warranty in correspondence.

HAMMARLUND MANUFACTURING COMPANY



Figure 1. HQ-205 Transceiver

Symbol	Type	TUBE COMPLEMENT	Tube	Function
V1	6BZ6		Pentode	RF Amplifier
V2	6BE6		Pentagrid Converter	Mixer
V3A	6HF8		Triode	Tunable HF Oscillator, all bands and CB
V3B	6HF8		Pentode	Crystal controlled HF Oscillator, CB only.
V4A	12AX7		Triode	Q Multiplier
V4B	12AX7		Triode	First Speech Amplifier
V5	6BA6		Remote Cutoff Pentode	First IF Amplifier
V6	6BA6		Remote Cutoff Pentode	Second IF Amplifier
V7A	6GW8		Triode	First Audio Amplifier Second Speech Amplifier
V7B	6GW8		Pentode	Audio Output, Modulator
V8	6C4		Triode	BFO
V9	6BQ5		Pentode	Final RF Amplifier, CB
V10	6BA6		Remote Cutoff Pentode	Transmitter Oscillator
V11	OB2		Gas Filled Diode	Voltage Regulator



INTRODUCTION

The Hammarlund HQ-205 includes a general coverage 0.54 to 30 MCS superhetrodyne receiver and a Class D Citizen's Band transceiver. Interlock circuitry enhances simplicity of operation.

The HQ-205 includes a built in 115 volt 50—60 CPS power supply. Solid state diodes are used to secure improved voltage regulation as required by the transmitter section. The high frequency oscillators are operated from a regulated supply.

The superhetrodyne receiver provides for reception of AM, CW, and SSB signals. A very high signal-to-noise ratio plus the famous Hammarlund noise limiter circuit, permit full use of the receiver's excellent sensitivity on the weakest signals. A Q-Multiplier is provided for varying the selectivity of the receiver. An "S" Meter is provided for tuning phone signals and for insuring precise tuning of the CB channels calibrated on the bandsread dial.

Electrical bandsread tuning is provided with direct calibration every 10 KCS on the 80, 40, and 20 meter bands; every 20 KCS on the 15 meter band and every 50 KCS on the 10 meter band. CB channels are included on the bandsread dial, with precise calibration available to the operator by use of the Spot switch located on the front panel. The HQ-205 can be operated either as a tunable or crystal controlled CB receiver with selection of the desired mode quickly accomplished with the front panel controls.

Red segments on the main tuning dial indicate wherein the majority of the international shortwave stations can be located.

Separate short wave and CB antenna inputs are provided and both antennas can be connected at all times.

Provisions for five internal CB receive crystals, five internal CB transmit crystals, and one external CB transmit crystal are provided. The receiver is automatically switched to the tunable mode when the external transmit crystal is used. Channel selection is accomplished from the front panel.

An adjustable squelch circuit is provided for receiver quieting in the absence of a CB signal.

The high gain modulator is designed for use with a desk type microphone. Transmitter keying is accomplished by use of the transmit switch on the front panel, or by use of the push to key switch on the microphone.

The HQ-205 was designed with you in mind. You'll have many hours of pleasure in operating this truly fine communications instrument.

The HQ-205 may be used as a 10 meter transceiver without modification. Simple adjustment as outlined on page 15 (Transmitter Alignment) will permit retuning the transmitter for 10 meter operation. Receiver operation will be as outlined for VFO operation.

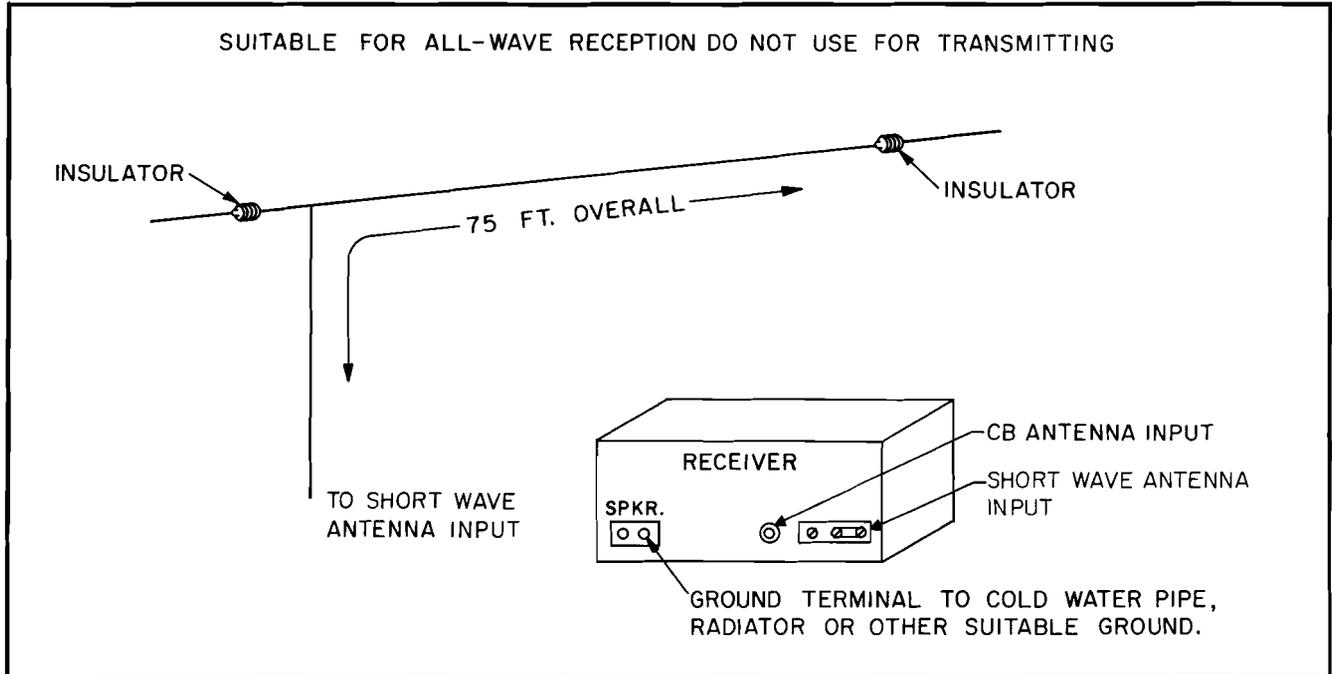
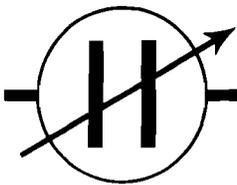


Figure 2. Installation of Single-wire Antenna

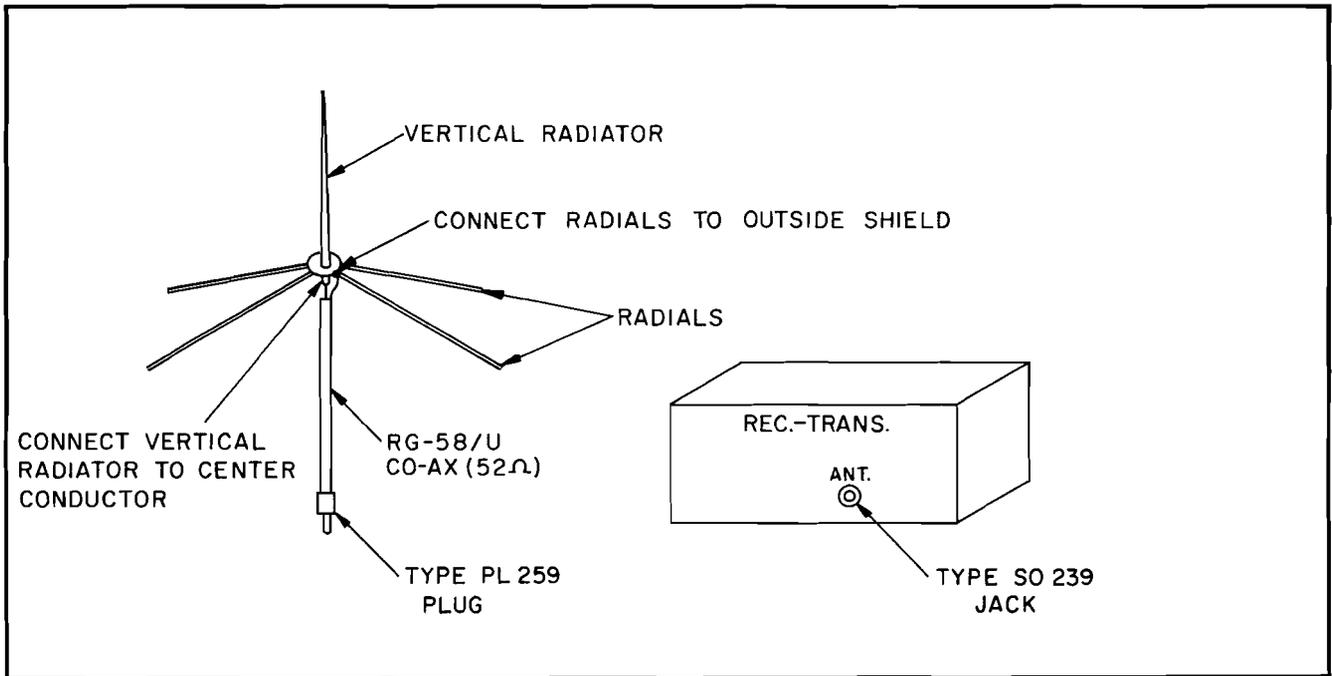
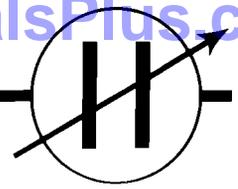


Figure 3. Installation of Ground Plane Antenna



CITIZENS RADIO LICENSE

WARNING

The HQ-205 may not be operated as a transmitter except when covered by a valid Class D Citizens Radio Station License in the United States. You may not use someone else's license and severe penalties can be imposed for operation of a radio transmitter without a valid radio station license. The HQ-205 may be used as a receiver only without a license.

OBTAINING A LICENSE

Any United States citizen 18 years of age or over may apply for a Citizens Radio Station License. The license application consists of F.C.C. Form 505, which when completed must be submitted to the Federal Communications Commission, Gettysburg, Pa. 17325. The fee for a Class D Citizens Band Radio Station License is \$8.00.

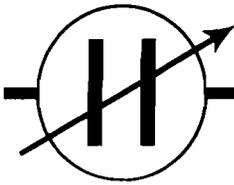
After you have filed a license application, you may have to wait several weeks for your license. You may not operate the transmitter until after a license has been granted and is in your possession. (see warning)

RULES AND REGULATIONS

Listed herewith are some of the other more important rules governing citizens radio service.

1. You may not engage in communications for hire or broadcasting (radio programs, music, etc.) and must not use profane indecent or obscene language.
2. Any citizen 18 years of age or older can obtain a license. Anyone of any age can operate the equipment. However, it is the responsibility of the licensee to have the equipment operated properly.
3. The tip of the antenna may not extend more than 20 feet above the highest point of the building or natural formation upon which it is mounted. If the antenna is mounted upon an existing antenna support structure, the tip of the antenna may not extend above the highest point of such structure.
4. You may not use your equipment for any purpose contrary to federal, state or local law.
5. Equipment adjustments of the transmitter which can affect proper operation must not be made by anyone other than a licensed commercial radio operator with a first or second class radiotelephone license.
6. Transmissions should be kept to the minimum length practicable to avoid unnecessary interference to other stations sharing the same channel. There is no time restriction when communicating between units of your own (or group) but when communicating with other than your own group you cannot communicate more than 5 minutes for each 15 minute period. No general calls (CQ calls) may be made, you must always call a specific station.

It is not the intention, nor within the scope of this instruction manual to give a detailed explanation of the Federal Communications Commission rules and regulations governing Citizens Band Radio Stations. The Federal Communications Commission does require the licensee to possess and be familiar with F.C.C. rules and regulations Volume VI part 95. These are available from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.



INSTALLATION

UNPACKING

Unpack the transceiver carefully. Make sure the tubes, associated tube shields and pilot lamps are in place.

SPEAKER CONNECTION

Connect a 3.2 ohm permanent magnet dynamic speaker (Hammarlund S-205 Speaker) to the terminals marked SPKR. on the rear of the chassis. (Note figure 4). For the best performance do not place on top of transceiver cabinet.

POWER CONNECTIONS

Before inserting attachment plug into power outlet, make certain power source is of proper voltage and frequency. (Refer to paragraph two of **INTRODUCTION.**)

INSTALLING ANTENNA

The HQ-205 is designed to operate with a single wire or a 50 ohm Dipole antenna. The front panel antenna trimmer control (Figure 5) permits a good match to most antenna systems of 50 to 600 ohms.

For general coverage, a single wire antenna of 20 to 50 feet length will provide surprisingly good reception. A long single wire outdoor antenna, such as shown in Figure 2, will generally provide entirely satisfactory performance. This wire may be 50 to 150 feet long.

For best reception, the antenna should be isolated as much as possible from neighboring objects and at right angles to power lines or busy highways so as to minimize possible interference pickup.

Optimum performance on CB or 10M amateur bands will be obtained with any of the standard whip or ground plane type of antenna. See figure 3 for a typical installation.

An antenna to be used at a fixed location by Class D Citizens Band station shall not exceed 20 feet in height above any man made structure or natural formation on which it is mounted.

Any standard Citizens Band antenna employing 50 or 75 ohm coaxial cable will provide optimum performance on the Citizens Band channels. This antenna will also be

suitable for general coverage reception throughout the tuning range of the receiver. However, optimum performance on a particular amateur band or other narrow tuning range will be obtained by using a tuned half-wave dipole fed with 50 or 75 ohm coaxial cable transmission line or other suitable leadin.

To tune the one-half wave length dipole, the following formula for the length of the antenna may be used:

$$\text{Length (feet)} = \frac{468}{\text{Freq. (MCS)}}$$

Each half (1/4 wave length) is half the length found from the above formula.

A good ground, although not always necessary, will generally aid in reception and reduce stray line hum. Reversal of polarity of power cord plug may possibly further reduce line hum in some locations.

CITIZENS BAND CRYSTALS

CRYSTAL FREQ.

CB CHANNEL NO.	Transmit	Receive
1.	26.965	26.510
2.	26.975	26.520
3.	26.985	26.530
4.	27.005	26.550
5.	27.015	26.560
6.	27.025	26.570
7.	27.035	26.580
8.	27.055	26.600
9.	27.065	26.610
10.	27.075	26.620
11.	27.085	26.630
12.	27.105	26.650
13.	27.115	26.660
14.	27.125	26.670
15.	27.135	26.680
16.	27.155	26.700
17.	27.165	26.710
18.	27.175	26.720
19.	27.185	26.730
20.	27.205	26.750
21.	27.215	26.760
22.	27.225	26.770
23.	27.255	26.800

Crystals should be of the HC-6/U type, having .050 diameter pins spaced .495 apart. Crystals must be the overtone type, series resonance. Resonance resistance must not exceed 35 ohms.

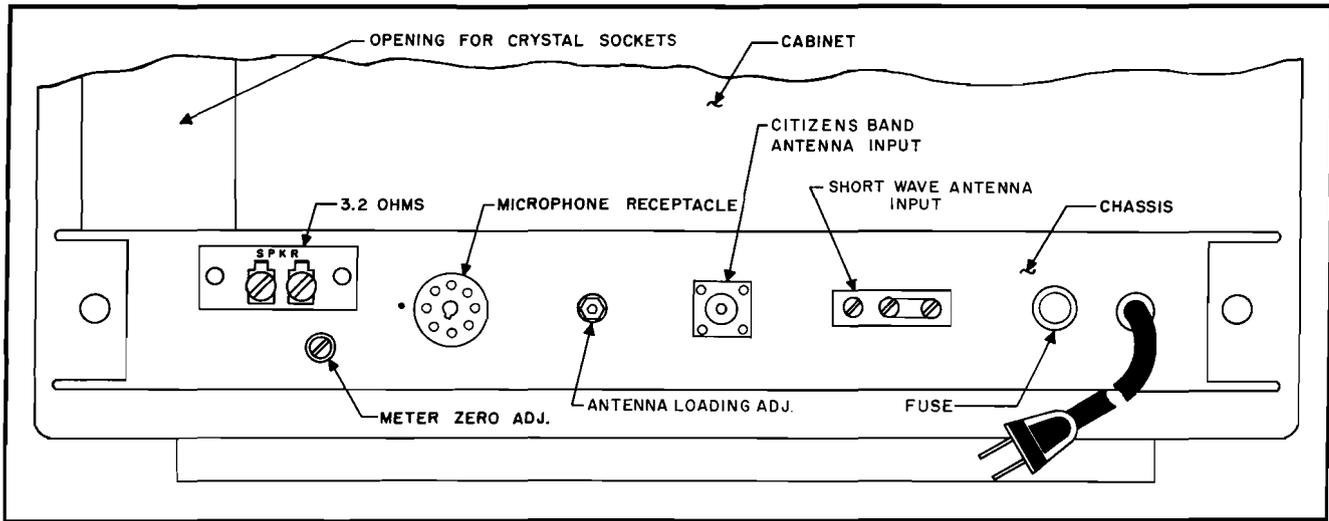


Figure 4. Connection Points at Rear of Chassis

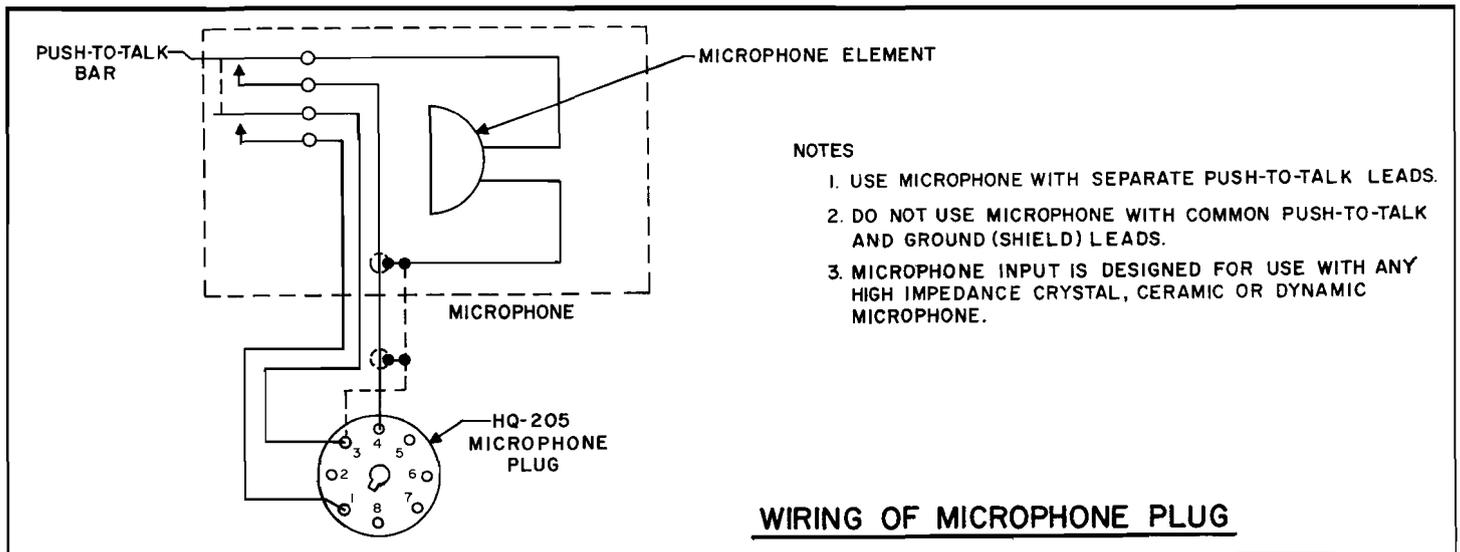


Figure 4A. Push-to-Talk Microphone Connections

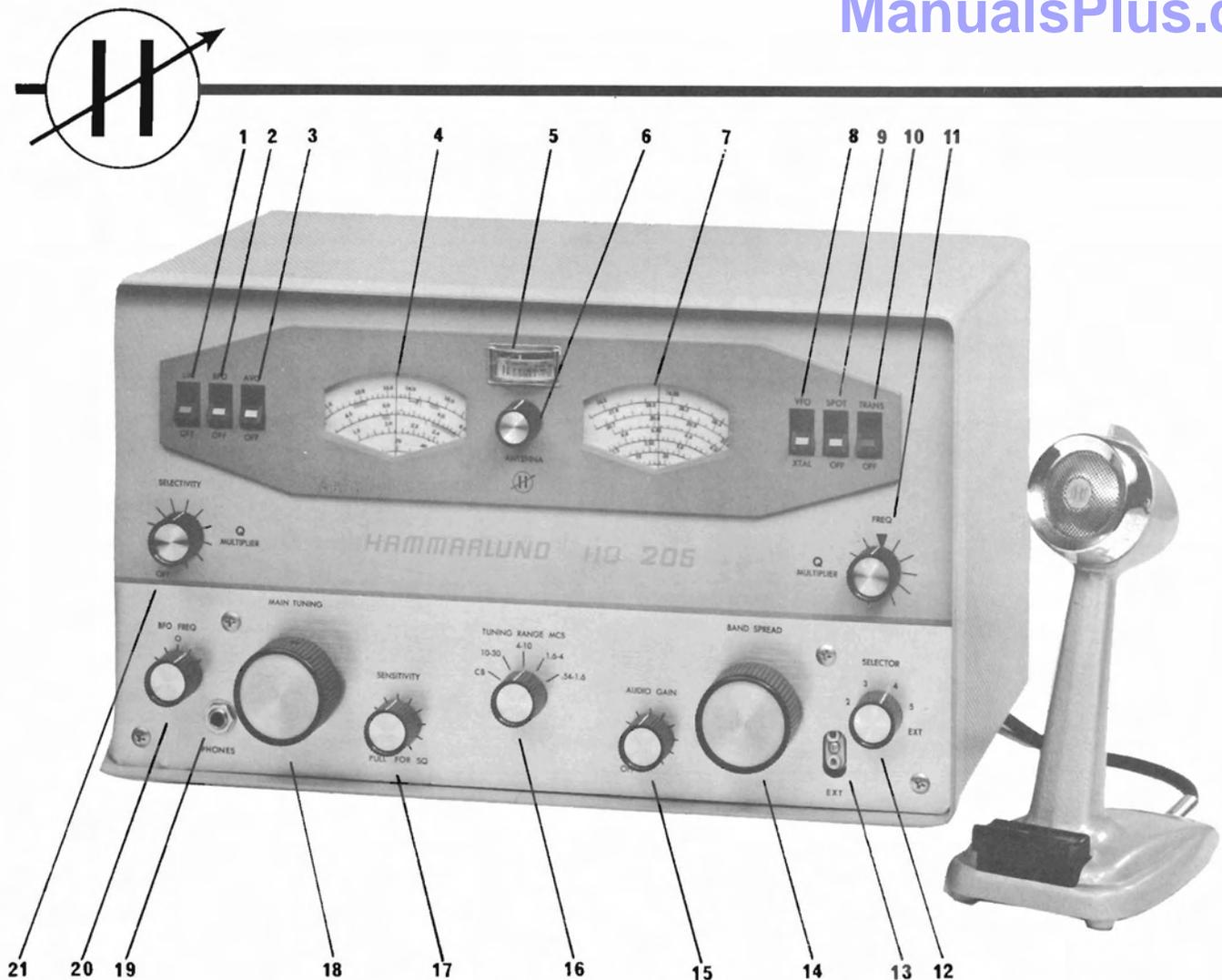
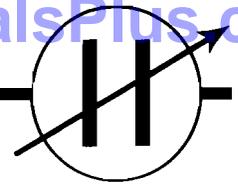


Figure 5. Controls and Functions

1. Noise Limiter Switch.
2. BFO Switch. AVC is automatically turned off, generally requiring reduced setting of the sensitivity control.
3. AVC Switch. Receiver is automatically switched for unsquelched operation when the AVC is turned off.
4. Main Tuning Dial.
5. "S" Meter.
6. Antenna Trimmer.
7. Bandsread Tuning Dial.
8. VFO/XTAL Switch. The VFO cannot be turned off except when switched to CB and to an internal crystal position.
9. Spot Switch. Turn on the XC-100 Calibrator, an accessory item, if installed except when switched to CB. To calibrate the CB portion of the Bandsread Dial, set bandsread to same channel as available transmit crystal. Turn Spot Switch on and tune main dial for maximum "S" Meter indication, (near 27 MHz).
10. Transmit Switch. Transmitter cannot be keyed except when switched to CB.
11. "Q" Multiplier Frequency Control.
12. Crystal Selector Switch.
13. External Transmit Crystal Socket.
14. Bandsread.
15. Audio gain/power. Pull switch to turn transceiver on.
16. Band Selector Switch.
17. Sensitivity/Squelch. Pull for squelch operation.
18. Main Tuning. Set to vicinity of 27 MHz for CB operation on crystal control. Spot to channel frequency when operating tunable CB.
19. Phone Jack.
20. BFO Frequency.
21. "Q" Multiplier Selectivity Control.



OPERATION

Basically, all that is necessary to operate a radio receiver are the tuning and volume controls. The additional controls found on the front panel of a communications receiver such as the HQ-205, control functions which greatly improve operating performance and make possible reception of otherwise unintelligible signals.

NORMAL CONTROL SETTINGS

For "normal" operation such as broadcast, short wave listening, etc., the position of the various controls should be as follows:

- AUDIO GAIN Pull "ON"
- ANTENNA Trimmer Tune for highest "S" meter reading on signal.
- MAIN TUNING Control Tune for highest "S" meter reading on signal.
- SENSITIVITY CONTROL Fully Clockwise
- MAN.-AVC Switch AVC
- Band Selector (TUNING Set to desired frequency RANGE MCS) Switch range.
- Noise Limiter Switch OFF
- AUDIO GAIN Control Adjust for proper level.
- BAND SPREAD Control Set counterclockwise to "100" on band spread dial.
- SELECTIVITY Control OFF
- Frequency(FREQ.) Control. Set pointer to triangular marking.

CODE SIGNAL RECEPTION

For reception of code signals, the controls should be as follows:

- BFO Switch BFO
- ANTENNA Trimmer Peak for maximum out put on "S" meter.
- MAIN TUNING Control Peak for Maximum output on "S" meter.
- SENSITIVITY Control Adjust for desired output level.
- AVC Switch OFF
- Band Selector (Tuning Set to desired frequency RANGE MCS) Switch range.
- Noise Limiter Switch OFF or ON as required by local noise conditions.
- AUDIO GAIN Control 2/3 or 3/4 clockwise rotation.
- SELECTIVITY Control ON
- BFO Control Tune signal to zero beat with pointer on zero and then offset either left or right for desired pitch.

CITIZENS BAND RECEPTION

Main tuning, set VFO/XTAL switch to VFO, set spot switch to spot and tune for maximum "S" meter reading. Do not accept an indication near 26MCS as it is the image of the desired Spot signal. Turn Spot switch off.

ANT. trimmer. Set for maximum "S" meter reading. VFO/XTAL switch. Use VFO for Spot function and for tunable operation. Use XTAL for crystal controlled operation.

SENSITIVITY/SQUELCH. Pull switch and rotate counterclockwise until noise with no incoming signal just ceases to be heard. Excessively "tight" squelch should be avoided.

SINGLE SIDE BAND OPERATION

The setting of the controls for Single Side Band reception is the same as for CW reception, with the BFO being used for carrier reinsertion. The BFO frequency control should be set approximately 1 division to the left or right of the zero indice, depending upon whether the upper or lower sideband intelligence is desired. Final tuning should be accomplished with the BAND SPREAD control in order that proper speech quality be achieved.

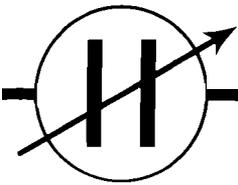
BAND SPREAD OPERATION

The BAND SPREAD control may be used for fine tuning by setting it at approximately 90 on the band spread dial and tuning in the signal with the MAIN TUNING control. Final peaking of the signal is then accomplished by adjustment of the BAND SPREAD control. It should be understood that the setting of the BAND SPREAD control will affect the Main Dial calibration in that a higher frequency setting of the main tuning dial will be required. Rotating the band spread dial from 100 toward 0 tunes the receiver to a lower frequency.

For Band Spread operation in the amateur bands, the following procedure must be followed: The main tuning dial is set to the line marking the high frequency (right-hand end) of a given amateur band. The Band spread tuning and calibration may then be accomplished solely with the BAND SPREAD control and dial.

20 METER BANDSPREAD

The 20 meter amateur band is divided into 2 segments. The first covering from 14.0 to 14.25 MC. Set the main tuning dial at 14.0 MC and use the bandspread to tune up to 14.25 MC. By setting the main dial to the high end of the 20 meter band as marked, the bandspread will tune down to 14.20 MC. The bandspread dial must be rotated 360 degrees in order to cover the entire 20 meter band.



CITIZENS BAND CALIBRATION

Class "D" Citizens Band Channels covering the range of 26.965 to 27.255 MCS are indicated on the bandspread dial of the HQ-205.

To set up the Tunable Receiver for correct calibration of the CB channels, the receiver is calibrated against a transmit crystal as follows.

1. Select a crystal with the crystal selector switch.
 2. Set the Bandspread dial to the selected CB Channel.
 3. Set the VFO-XTAL switch to VFO, Spot switch to SPOT, and the AVC switch to AVC.
 4. Tune the main dial for maximum S-Meter indication near 27 MCS. Do not accept the indication near 26 MCS as it is the image of the desired SPOT signal.
 5. Set SPOT switch to OFF. The receiver is now ready for use as a highly calibrated tunable CB receiver on all channels.
- To set up for crystal controlled CB reception, the re-

ceiver should be "spotted" as above, then proceed as follows.

1. Set the VFO-XTAL switch to XTAL.
2. Use the main dial for peaking to CB signals.

The HQ-205 is equipped with a squelch control for use on CB. The receiver is automatically set for maximum sensitivity when the sensitivity-squelch control is pulled out for squelch operation. The control should be pulled out and rotated counter-clockwise for threshold of receiver noise. An incoming signal will "break" the squelch causing the receiver audio section to function.

To transmit, either press the microphone button or set the TRANSMIT switch to TRANSMIT.

The external crystal socket and associated position on the crystal selector switch allows for a sixth crystal controlled transmit position. The receiver oscillator is automatically switched to VFO when the crystal selector switch is placed in the EXT position.

If desired, the receiver can be spotted against the external transmit crystal.

CIRCUIT THEORY

The HQ-205 is basically a single conversion, four band superhetrodyne receiver and five watt transmitter for the Citizens Band or the ten meter amateur band. Its circuitry incorporates a Q-Multiplier for full control of selectivity and a stable BFO.

PRESELECTION

The antenna input coupling and RF amplifier stage provide the necessary preselection and gain for high performance and rejection of undesired signals. The high signal level at the mixer grid, V2, contributes to a favorable signal-to-noise ratio.

Both grid and plate circuits of the RF stage are tuned; individual tuning coils are selected for each band.

The antenna compensating capacitor, adjustable from

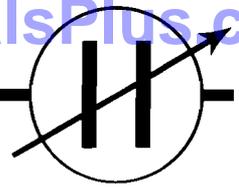
the front panel, permits the receiver to be resonated for optimum performance with the particular antenna in use.

CONVERTER STAGE

A high degree of oscillator stability is attained by the use of a separate mixer (6BE6), V2, and an independent oscillator (6HF8), V3A.

The output signal from RF amplifier V1 is heterodyned with the output of the local high frequency oscillator, V3, and electronically combined within the mixer tube, V2. On the four frequency ranges the local oscillator is 455 KCS above the signal frequency.

Low-loss tube sockets, low-loss phenolic temperature compensating capacitors, and stable coaxial trimmers all contribute to oscillator stability. Additional frequency stability is attained by applying regulated voltage to the oscillator circuit and by the rugged construction of the entire HF oscillator section assembly.



Q MULTIPLIER

The Q-Multiplier frequency control provides a means of peaking any signal within the pass band of the IF amplifier. The degree of peaking is controlled by the SELECTIVITY control. This same SELECTIVITY control, when turned completely counter clockwise, disconnects the Q-Multiplier.

The "Q" Multiplier is generally never employed on the standard broadcast band or when short wave broadcast stations are being received. The use of the Q-Multiplier under these circumstances will only result in limiting the frequency response of the broadcast band and short wave broadcast stations in view of the very narrow band width that is provided by the Q-Multiplier. Of course, the SELECTIVITY control will make it possible to control this response characteristic. If, by chance, when receiving foreign short wave broadcast stations interference is experienced caused by two stations operating very close to one another, the Q-Multiplier may be employed under these circumstances to minimize, if not eliminate, the interference by the improved selectivity or decreased band width proper adjustment will provide. The proper use of the Q-Multiplier can actually enhance many times the results obtained with this receiver. In view of this, it is suggested that a little time be spent in learning just how to properly adjust the Q-Multiplier frequency and selectivity controls under different receiving conditions. As the Q-Multiplier SELECTIVITY control is advanced, a decided decrease in noise will be apparent. This is due to the narrowing of the pass band. On AM phone signals this control will usually be between the 7 and 11 o'clock positions. The FREQUENCY control should then be adjusted for clarity of signal or for minimum adjacent channel interference. The SELECTIVITY control may be advanced progressively more for SSB and CW reception. The more this control is advanced, the more critical the setting of the FREQUENCY control becomes. Advancing the SELECTIVITY control too far will cause the Q-Multiplier to oscillate. This should be avoided. The Q-Multiplier is a very handy tool in the hands of an experienced operator and, unfortunately, it is beyond the scope of this instruction manual to attempt to be more definite than we have.

IF AMPLIFIER

Seven stable tuned circuits, in two stages of IF amplification (V5 and V6), contribute to sensitivity and selectiv-

ity. Iron core permeability-tuned transformers improve performance and add to the ease of adjustment. The intermediate frequency is 455 KCS, the EIA standard.

AVC SYSTEM

Automatic Volume control minimizes fading and signal strength variations by controlling the gain of the RF stage V1 and the IF stage V5. As a result, a comfortable and constant level of audio is maintained.

"S" METER (CARRIER LEVEL)

The "S" or Tuning Meter is provided to assist in tuning and to give an indication of relative signal strength. Because the meter readings are proportional to AVC voltage, it is operative only in the AVC position.

The meter, which is calibrated to 40 db over S-9, is factory adjusted so that signal input of approximately 50 microvolts gives a reading of S-9. Each "S" unit indicates a 6 db increase, equivalent to doubling signal strength. Should meter readjustment be necessary:

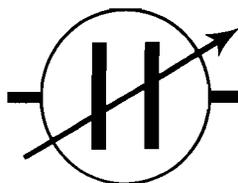
1. Set front panel SENSITIVITY control to Max. and Q-Multiplier SELECTIVITY control to OFF.
2. With AVC on and the ANT. terminals shorted, zero pointer with ZERO adjust potentiometer R-158.

In the transmit position the meter functions as a relative output indicator, when the receiver is tuned to the transmitter operating frequency.

DETECTOR AND NOISE LIMITER

One diode CR101, is used for the second detector and AVC system. This system produces a minimum of distortion.

Another diode (CR-102) operates as a series, self adjusting noise limiter. It will reduce automobile ignition and other types of impulse noise to a minimum. Intelligibility is not affected by the noise limiter, although it may be switched off if desired.



BEAT FREQUENCY OSCILLATOR (BFO)

The BFO is activated by the BFO switch for reception of CW or SSB signals or as an aid in locating weak SW BDCST stations. The BFO control is used under these conditions to vary the pitch. Each calibration division of this control represents approximately 1000 cycles. When receiving single side band transmission, the generally accepted procedure of setting the beat frequency oscillator approximately 1000 cycles above or below zero beat should be employed. In other words, if the beat frequency oscillator **FREQ.** Control is set one degree clockwise or counter-clockwise from the center position, optimum single side band reception will usually be obtained. Whether the beat frequency oscillator control will be set clockwise from zero beat will depend on whether upper or low-

er side band is being transmitted. If the beat frequency oscillator is on the wrong side of zero beat, it will be impossible to obtain intelligibility of the single side band signal when the band spread dial is tuned very slowly through the single side band signal. Should such a condition arise, merely rotate the B.F.O. control from the one degree counterclockwise to the one degree clockwise position and then very carefully adjust the **BANDSPREAD** for intelligible speech. Here again experience is the best teacher. The stability of both the high frequency oscillator and the beat frequency oscillator employed in this receiver plus the excellent mechanical rigidity will provide excellent single side band reception. Refer to the above paragraph on the **Q-Multiplier** for improved single side band reception.

AUDIO AMPLIFIER

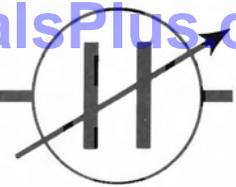
The first audio stage is a resistance coupled voltage amplifier employing the triode section of the 6GW8 V-7. The audio output stage uses the pentode section of V-7. This pentode section of V-7 also serves as the audio mod-

ulator when in the transmit or send position. One triode section of V-4 serves as a mike preamp. when transmitting. It is out of the circuit when receiving. The audio level is fixed on the transmit position.

TRANSMITTER

A crystal controlled transmitter is incorporated in the HQ-205 for operation on either the class "D" Citizens Band or the 10 meter amateur band V10. A 6BA6 serves as a crystal oscillator. V9, a 6BQ5 serves as the modulated RF power amplifier. A built-in relay provides complete changeover from receive to transmit. The trans-

mitter is activated by throwing the front panel function switch to "TRANS." If a push to talk microphone is employed, the function switch can remain on the OFF position. Transmit operation is then accomplished by activating the push to talk switch on the mike. See Figure 4-A for the proper mike connections.



ACCESSORIES

The XC-100 Crystal Calibrator is available, providing checkpoints every 100 KCS within the range of the receiver.

The kit is quickly and easily installed. It is complete with easy-to-follow instructions and mounting hardware.

This is not usually required by the average short wave listener, although it will prove an aid as a means of correcting for possible dial error.

The amateur operator will find this of most value since the 100 KCS checkpoints this unit provides, will make it possible to accurately set amateur band edges. This will result in improving the accuracy of the amateur band spread dial, by determining the exact setting of the main tuning dial.



POSSIBLE RECEIVER DIFFICULTIES

1. Excessive hum or failure of the Q multiplier to operate properly will usually be due to a defective 12AX7 type tube. Such a defective tube may test good in a tube tester but be unsatisfactory because of higher than normal heater-to-cathode leakage. Poor noise limiter action is usually due to a poor or defective 1N34 Diode. The use of the noise limiter will result in some distortion which must be tolerated for most efficient noise limiting. Because of this, when listening to broadcast stations or other strong local signals the noise limiter switch should be in the "off" position unless the slight distortion is preferable to excessive pulse type noise, such as ignition interference.
2. Erratic S Meter performance, lack of sufficient variation, etc., is usually due to the two 6BA6 tubes employ-

ed in the AVC circuit. These are the two 6BA6 tubes, V5 and V6, in the schematic diagram. Merely interchanging these tubes will sometimes provide sufficient improvement. Replacing one or both may be found advisable before suspecting other troubles.

3. Excessive drift, after allowing sufficient time for warm up, may be due to a poor type 6HF8 tube, V3, in the diagram or 6BE6, V2, in the schematic diagram.

Ninety-nine percent of all receiver trouble has been found to be due to one or more defective tubes. This can undoubtedly be attributed to the rough handling equipments receive in shipment. Please, therefore, be sure to follow the above suggestions in addition to having all tubes tested before writing the Home Office.



SERVICE AND REALIGNMENT PROCEDURE

NOTE

To service this transceiver, disconnect from power source and remove all lead wires attached to terminal connections at rear of chassis apron. Carefully turn the transceiver up onto the front panel face on a smooth clean surface. Remove the two #10 hex machine screws at the extreme ends of the chassis apron at the rear of the cabinet. Lift cabinet straight up and off of chassis. To reassemble, use reverse procedure.

ANT ADJUSTMENTS

ADJUST SLUG AT 4MC WITH ANT. CAPACITOR NEAR MID CAPACITY.

ADJUST SLUG AT 1.2 MC WITH ANT. CAPACITOR NEAR MIN. CAPACITY.

ADJUST SLUG AT 1.65 MC WITH ANT. CAPACITOR NEAR MID CAPACITY.

ADJUST SLUG AT 10MC WITH ANT. CAPACITOR NEAR MID CAPACITY.

ADJUST SLUG ON CB CHANNEL

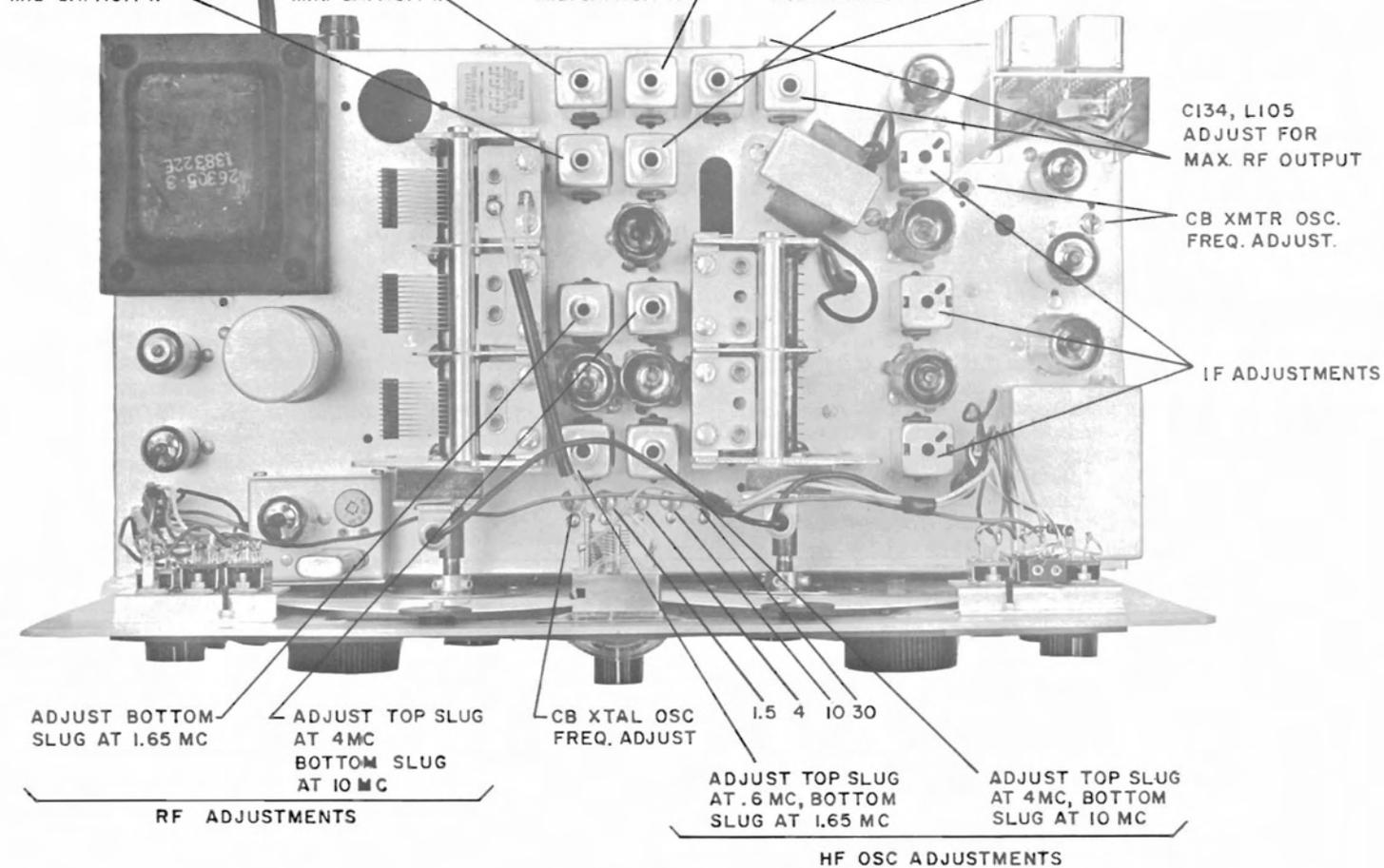


Figure 7. Top view of Chassis



IF ALIGNMENT

NOTE

Use a non metallic alignment tool such as General Cement Co. No. 5097, or equal.

- a. Connect the output cable of a 455 KCS unmodulated, signal generator to the bus lead of the 6BE6 mixer grid. The frequency accuracy of the generator may be checked with sufficient precision by picking up its second harmonic (910 KCS) in any receiver whose calibration at 910 KCS has been checked as correct and then adjusting the generator frequency.
- b. Connect a DC vacuum tube voltmeter, set for negative voltage reading to pin 3 of ZF101.
- c. Set the receiver controls as follows:
 BAND SPREAD dial on 100
 Function Switch on REC.

Main tuning dial on .54 MC
 Noise limiter switch on OFF
 AUDIO GAIN control at minimum
 SELECTIVITY control on OFF
 Band selector switch on .54 - 1.6MC
 OFF - AVC switch on OFF
 SENSITIVITY control on 1/2 from maximum.

- d. During alignment, adjust the generator output and the SENSITIVITY control to prevent overloading. Final adjustment should be made with the SENSITIVITY control at approximately the third indice from its maximum (clockwise) position. Adjust each of the three IF transformers for maximum meter reading. Topside adjustments (Figure 7) are secondaries or grid circuits; bottom of chassis adjustments (Figure 8) are primaries or plate circuits.

RF ADJUSTMENTS

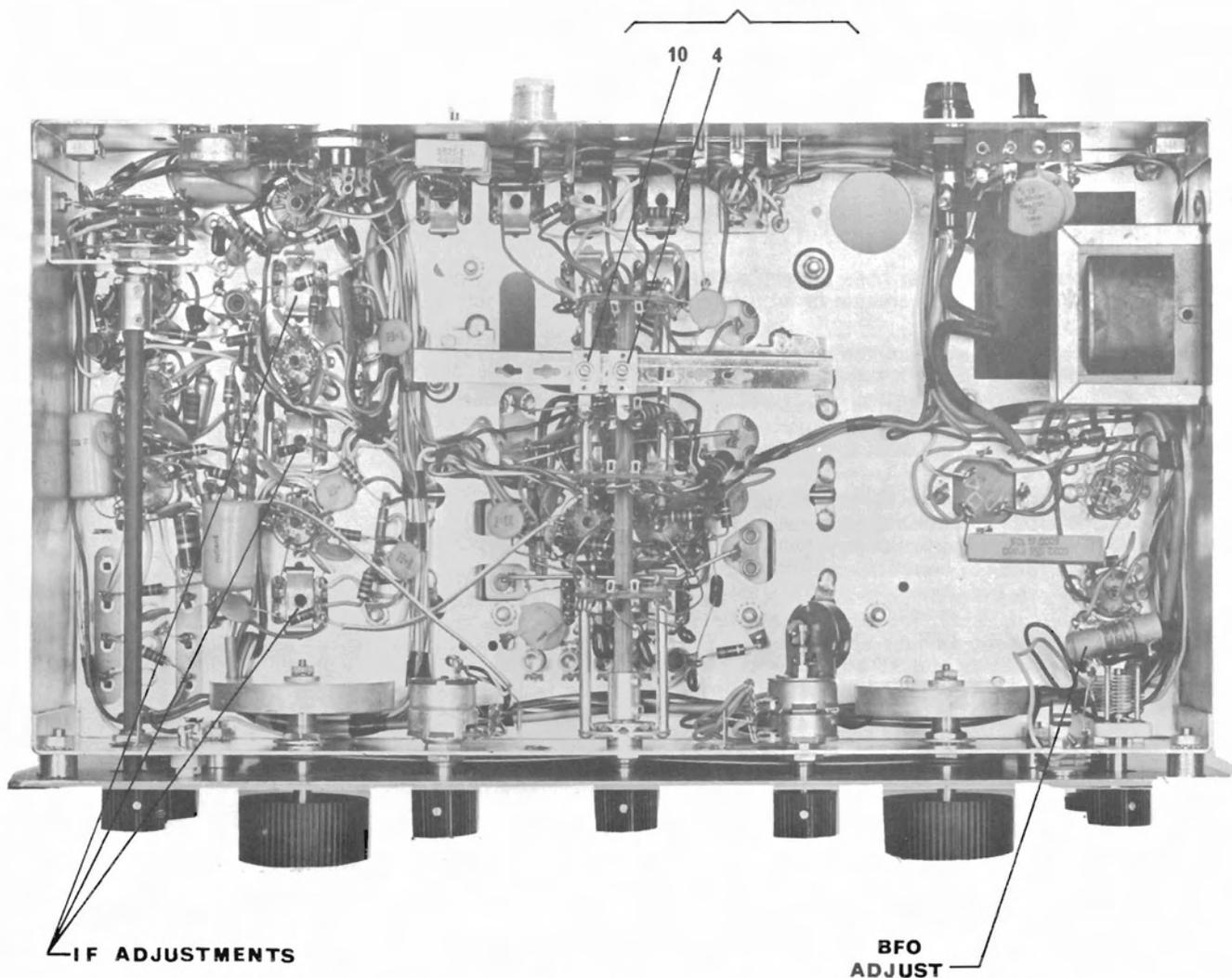
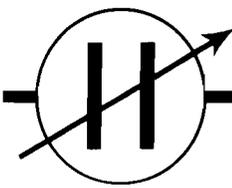


Figure 8. Bottom View of Chassis



- e. Turn the Q MULT. switch to ON and adjust the SELECTIVITY control counterclockwise to a position below the oscillating point. With its panel bushing nut loosened to permit the frequency shaft to turn without hindrance by the stop, adjust the Q MULT. FREQ. control to obtain a maximum indication. The input signal must be adjusted to a value just sufficient to obtain a good meter swing. This adjustment is the center frequency of the pass band. While the meter is at maximum turn the stop lug to a position 180 degrees directly opposite the stop pin in the frequency shaft. Holding it in this position, tighten the bushing in the nut making sure that the shaft or the stop lug have not turned by checking the zero setting.
- f. Push the BFO switch to BFO. With frequency control on zero adjust slug L-102 for zero beat with AVC switch on OFF position and sensitivity control adjusted at a position below overload.
- g. With the OFF-AVC switch on AVC, the SENSITIVITY control at maximum, with grid pin 1 of the V5 amplifier tube grounded, and with no signal input, adjust the METER ZERO ADJUST. pot at the rear of the chassis (Figure 4) for a reading of zero on the "S" meter.

RF ALIGNMENT

NOTE

Use a non metallic alignment tool such as General Cement Co. No. 8282, or equal.

- a. The slugs and trimmers, having been factory adjusted, should require a minimum amount of adjustment for any realignment.
- b. All RF and oscillator slug adjustments are made from the top of the shield cans. See Figure 7.
- c. Connect the unmodulated, signal generator output cable to the antenna and ground terminals of the receiver, with the A terminal adjacent to the G terminal jumped together. See Figure 4.
- d. Set the controls the same as for IF alignment above. Adjust the SENSITIVITY control as required to obtain a sufficient voltmeter reading and to prevent overloading.
- e. The oscillator adjustment is made first. The RF is adjusted next to obtain maximum amplitude. The antenna slugs are last. A certain amount of interaction will occur between the oscillator and RF adjustments, particularly on the higher frequency bands. Final adjust-

ment should be accomplished by combined or alternate adjustment of the oscillator and RF for maximum amplitude.

NOTE

The trimmer adjustments, if required, should be the final adjustment for each band. See Figure 7 and 8 for location of trimmers.

There is no RF amplifier adjustment for the .54 – 1.6 MC band.

- f. Note that the oscillator frequency in the HQ-205 is always on the high side of the signal frequency by 455 KCS. Therefore, it is necessary to make sure that the oscillator frequency is not adjusted below the signal frequency which would be an image response of the signal.
- g. It will be necessary to repeat low and high end alignment adjustments of each band since the adjustments are interdependent. The process should be repeated until maximum amplitude is obtained at both alignment frequencies of each band.

NOTE

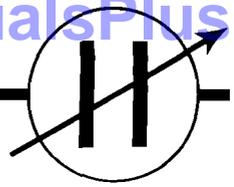
The receiver should be warmed up at least one hour before final oscillator frequency adjustments are made for the dial calibration check.

DIAL CALIBRATION

- a. Use a crystal calibrator having 100 KCS and 1000 KCS output. Set the arbitrary band spread dial scale to 100. Set the function switch to BFO. Set the BFO control to zero. Set the SELECTIVITY control to OFF. Set the OFF – AVC switch to OFF.
- b. Check to see that the frequencies at or near the alignment frequencies are "on the line." If not, make minor adjustments of the slugs and trimmers (Figures 7 and 8) to make them correct.

CAUTION

Weaker signals will be observed at dial settings approximately 10 KCS above each calibration dial marking. These are image signals from 1 MC above the desired signal and may be recognized by their somewhat weaker strength and may be further reduced by proper adjustment of the gain controls. They will, of course, be more noticeable on the higher bands. Keeping the antenna tuned will help.



TRANSMITTER ADJUSTMENT

Class "D" Citizens Band

As shipped from the factory the HQ-205 is equipped with a crystal for operation on one of the Citizens Band channels. The transmitter has been completely aligned and tested according to F.C.C. regulations. No Attempt Should Be Made to Adjust or change the Frequency or alignment except by the holder of a 2nd Class Commercial Radiotelephone license or higher.

Power input has been limited to 5 watts maximum and the output frequency has been set within .005% as required by law. Modulation limiting has been built into the circuitry so as not to exceed 100% modulation.

The output may be peaked up for maximum R.F. output by peaking L-105 and C-134 but no attempt should be

made to adjust L-108 and L-106 in the oscillator circuit as this would adversely affect the operating frequency. If it is desired to change channels it must be performed by a properly licensed operator.

10 Meter Amateur Band

If it is desired to operate on the 10 meter amateur band the crystal as supplied with the unit must be changed. Only properly licensed (General Class) amateurs may operate on this 10 Meter band or make changes or adjustments to the transmitter section. Crystals should be of the third overtone type and in an HC-6/U holder. The transmitter may be put on frequency by peaking L-108, L-106, L-105 and C-134 for maximum reading on the receiver "S" meter. There is enough stray radiation in the IF strip to give an accurate reading. Sharpness of the tuning may be enhanced with the use of the Q-Multiplier.

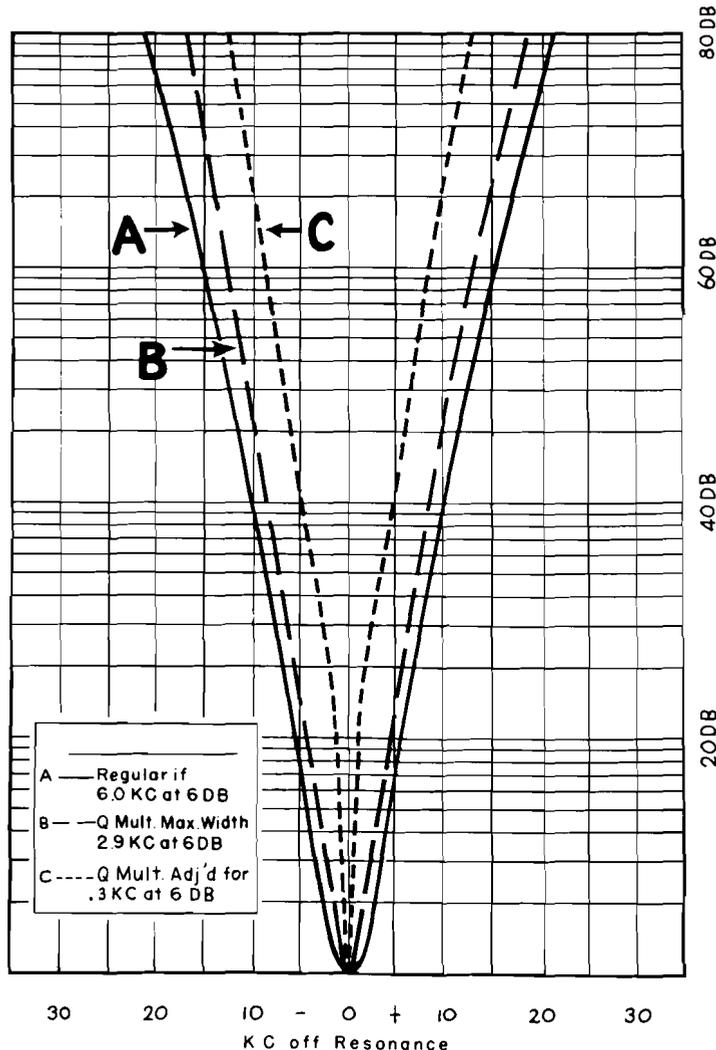


Figure 9. Selectivity Curves

TABLE 1: TUBE SOCKET VOLTAGES

Measured from tube socket pins to chassis with vacuum tube RF voltmeter. Band selector switch on CB. Main tuning dial near 27 MCS. (Use Spot function to obtain on-channel condition.) Noise Limiter off. Audio gain fully counter-clockwise. No signal input. External 52 ohm load connected to CB antenna input. Other switch modes are as follows:

- | | | | |
|-----|--|-----|---|
| A. | AGC on. | TO. | Transmit switch off. |
| M. | AGC off (manual). | TR. | Transmit switch on. |
| V. | VFO XTAL switch to VFO. | C. | Crystal selector switch to any crystal except external. |
| X. | VFO XTAL switch to XTAL. | CE. | Crystal selector switch to external. |
| S. | Sensitivity/Squelch control pushed in, full clockwise. (Max. Sensitivity, no Squelch.) | B. | BFO on, reduced sensitivity control setting. |
| SQ. | Sensitivity/Squelch control pulled out, full counter-clockwise. (Max. Sens., Max. Sq.) | SP. | Spot on. |

TUBE SOCKET NO.	SWITCH MODES	SOCKET PIN NUMBERS							8	9	CIRCUIT CHECKED
		1	2	3	4	5	6	7			
V1 6BZ6	A, V, S, TO	0	2.8	6.3~	0	220	160	0	---	---	RF Amplifier.
V2 6BE6	A, V, S, TO	-1.8 2.7~	1.28 0.86~	6.3~	0	250	72	0 0.96~	---	---	Mixer.
V3 6HF8	A, V, S, TO, C A, X, S, TO, CE A, X, S, TO, C	9.2 9.2 4.7	6.9 6.9 3.6	103 103 0	0 0 0	6.3~ 6.3~ 6.3~	0 0 0	-6.8 -6.8 -4.2	0 0 98	250 250 162	Tunable HF Osc. Tun. HFO Interlock Crystal HF Osc.
V4 12AX7	A, V, S, TO A, V, X, TR, C	100 100	0 0	1.3 1.3	0 0	0 0	250 155	0 0	250 1.3	6.3~ 6.3~	Q-Multiplier 1st Speech Amp.
V5 6BA6	A, V, S, TO A, V, S, TR, C	-.14 -5	0 0	0 0	6.3~ 6.3~	232 0	98 100	2.1 .76	---	---	IF Amplifier High B+ Keying
V6 6BA6	M, V, SQ, TO, C A, V, SQ, TO, C	0 0	0 0	0 0	6.3~ 6.3~	230 235	105 80	2.1 1.63	---	---	No Sq. w/AGC off Squelch range.
V7 6GW8	A, V, S, TO, C A, V, SQ, TR, C	105 103	105 104	250 231	6.3~ 6.3~	0 0	4.2 219	6.7 6.1	0 0	215 197	Audio Squelch Break.
V8 6C4	B, TO	103	---	6.3~	0	---	-8.4	0	---	---	BFO
V9 6BQ5	TR, C TR, C, SET to 10-30 MCS	---	-7 0	0 44	6.3~ 6.3~	0 0	---	159 248	---	143 248	Final Safety Interlock Re- lay MUST NOT Close
V10 6BA6	TR, C A, V, TO, C, SP	0 0	0 0	0 0	6.3~ 6.3~	221 28	144 20	1.82 0.2	---	---	Transmit oscillator Spot. Tune for max. S-Meter reading.
V11 OB2	Any Condition	104	---	---	---	104	---	0	---	---	VR Tube.

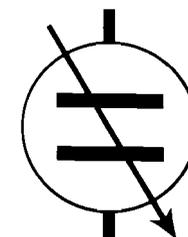
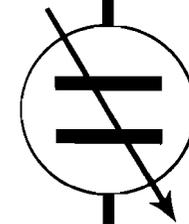
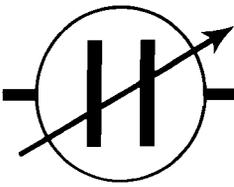


TABLE 2: TUBE SOCKET RESISTANCES

Measures from tube socket pins to chassis with V. T. V. M. Audio Gain minimum; Band Switch on 10-30 MC; Limiter off; AVC off; Sensitivity maximum; VFO-XTAL Switch to VFO; Spot off; Transmit off; Selectivity off; BFO off.

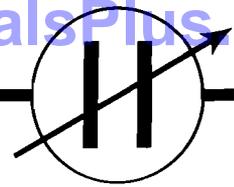
TUBE SOCKET NO.	1	2	3	4	5	6	7	8	9
V1 - 6BZ6	1 Meg	200	0	0	10K	21K	0		
V2 - 6BE6	22K	180	0	0	9K	31K	0		
V3 - 6HF8	2.2K	50K	12K	0	0	1.2	100K	75 Meg	20K
V4 - 12AX7	75K	2.2 Meg	16K	0	0	250K	1 Meg	22 Meg	0
V5 - 6BA6	10	0	0	0	4.5K	32K	200		
V6 - 6BA6	470K	0	0	0	4.5K	32K	180		
V7 - 6GW8	1.0 Meg	15K	5.5K	0	0	5.5K	150	1 Meg	100K
V8 - 6C4	INF	INF	0	0	INF	100K	.6		
V9 - 6BQ5	10K	10K	200 Meg	0	0	INF	8K	INF	20K
V10 - 6BA6	50K	0	0	0	500=Meg	500 Meg	150		
V11 - OB2	11K	0	INF	0	11K	INF	0		



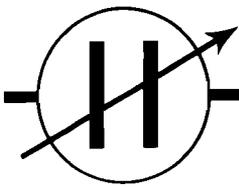


PARTS LIST

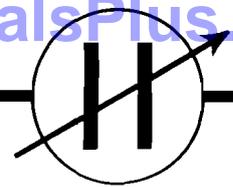
Schematic Designation	Description	Hammarlund Part No.
CAPACITORS		
C1 A, B, C	Variable, Main Tuning	9441-60-40003
C2 A, B, C, D	Variable, Bandsread	9441-60-40007
C3	Variable, Antenna trimmer (3-50 pf)	9434-45-40038
C101	Disc Ceramic .01 uf, 20%, 500V	1509-01-01017
C102	Disc Ceramic .01 uf, 20%, 500V	1509-01-01017
C103	Dur Mica DM-15, 10 pf \pm . 5 pf, 500V	1519-01-00017
C104	Disc Ceramic .01 uf, 20% , 500V	1509-01-01017
C105	Disc Ceramic .01 uf, 20%, 500V	1509-01-01017
C106	Dur Mica DM-19, 3300 pf, 5%, 500V	1519-02-03012
C107	Dur Mica DM-19, 1100 pf, 2%, 500V	1519-01-03001
C108	Dur Mica DM-19, 510 pf, 5%, 500V	1519-01-03002
C109	Disc Ceramic, .01 uf, 20%, 500V	1509-01-01017
C110	Disc Ceramic, .01 uf, 20%, 500V	1509-01-01017
C111	Disc Ceramic, .01 uf, 20%, 500V	1509-01-01017
C112	Disc Ceramic, .01 uf, 20%, 500V	1509-01-01017
C113	Disc Ceramic, .01 uf, 20%, 500V	1509-01-01017
C114	Disc Ceramic, .01 uf, 20%, 500V	1509-01-01017
C115	Dur Mica, DM-15, 5 pf, 10%, 500V	1519-01-00003
C116	Disc Ceramic, .01 uf, 20%, 500V	1509-01-01017
C117	Disc Ceramic, .01 uf, 20%, 500V	1509-01-01017
C118	Disc Ceramic, .01 uf, 20%, 500V	1509-01-01017
C119	Disc Ceramic, .01 uf, 20%, 500V	1509-01-01017
C120	Disc Ceramic, .01 uf, 20%, 500V	1509-01-01017
C121	Electrolytic 80 uf, 40 uf, 20 uf, 450V	1517-01-00003
C121A	Electrolytic 20 uf at 450V	Part of C121
C121B	Electrolytic 80 uf at 450V	Part of C121
C121C	Electrolytic 40 uf at 450V	Part of C121
C122	Disc Ceramic .01 uf, 20%, 500V	1509-01-01017
C123	Dur Mica DM-15, 350 pf, 20%, 500V	1519-02-00053
C124	Dur Mica DM-15, 220 pf, 5%, 500V	1519-01-00007
C125	Variable, BFO (3-50 pf)	9434-45-40038
C126	Dur Mica DM-19, 3000 pf, 5%, 500V	1519-02-03009
C127	Temp. Comp. Disc. 4.7 pf, N-220, 5%	1509-02-00024
C128	Disc Ceramic .01 uf, 20%, 500V	1509-01-01017
C129	Paper Tubular .47 uf, 20%, 500V	1523-01-00005
C130	Paper Tubular 1 uf, 200V	1523-01-00001



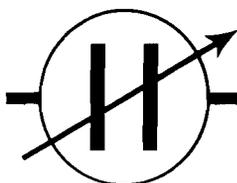
Schematic Designation	Description	Hammarlund Part No.
C131	Disc Ceramic .01 uf, 20%, 500V	1509-01-01017
C132	Disc Ceramic, .002 uf, 20%, 1KV	1509-01-01032
C133	Disc Ceramic, .005 uf, 20%, 1KV	1509-01-01039
C134	Variable, Transmitter final (65-340 pf)	1521-01-00001
C135	Dur Mica, DM-15, 5 pf, 10%, 500V	1519-01-00003
C136	Disc Ceramic .01 uf, 20%, 500V	1509-01-01017
C137	Disc Ceramic .001 uf, 20%, 1KV	1509-01-01038
C138	Dur Mica DM-15, 1 pf, $\pm .5$ pf, 500V	1519-01-00023
C139	Disc Ceramic, .001 uf, 20%, 1KV	1509-01-01038
C140	Paper Tubular, 1 uf, 200V	1523-01-00001
C141	Dur Mica, DM-15, 5 pf, 10%, 500V	1519-01-00003
C142	Dur Mica, DM-15, 20 pf, 20%, 500V	1519-01-00039
C143	Disc Ceramic, .001 uf, 20%, 1KV	1509-01-01038
C144	Dur Mica, DM-15, 12 pf, 5%, 500V	1519-01-00049
C145	Disc Ceramic, .001 uf, 20%, 1KV	1509-01-01038
C144	Dur Mica, DM-15, 12 pf, 5%, 500V	1519-01-00049
C145	Disc Ceramic, .001 uf, 20%, 1KV	1509-01-01038
C146	Dur Mica, DM-15, 20 pf, 5%, 500V	1519-01-00010
C147	Disc Ceramic, .01 uf, 20%, 500V	1509-01-01017
C148	Disc Ceramic, .01 uf, 20%, 500V	1509-01-01017
C149	Dur Mica, DM-15, 39 pf, 20%, 500V	1519-02-00063
C150	Disc Ceramic, .01 uf, 20%, 500V	1509-01-01017
C151	Dur Mica DM-15, 350 pf, 20%, 500V	1519-02-00053
C152	Dur Mica DM-15, 12 pf, 5%, 500V	1519-01-00049
C153	Dur Mica DM-15, 100 pf, 5%, 500V	1519-01-00043
C154	Disc Ceramic, .01 uf, 20%, 500V	1509-01-01017
C155	Dur Mica, DM-15, 100 pf, 5%, 500V	1519-01-00043
C156	Variable Trimmer 1-9 pf	1527-01-00002
C157	Variable Trimmer 1-9 pf	1527-01-00002
C158	Variable Trimmer 1-9 pf	1527-01-00002
C159	Variable Trimmer 1-9 pf	1527-01-00002
C160	Dur Mica DM-15, 430 pf, 1%, 300V	1519-02-00029
C161	Dur Mica DM-19, 1300 pf, 2%, 500V	1519-02-03011
C162	Dur Mica, DM-19, 3000 pf, 5%, 500V	1519-02-03009
C163	Temp. Comp. Disc. 6.8 pf, N-220, 5%, 1KV	1509-02-00003
C164	Disc Ceramic, .02 uf, 20%, 500V	1509-01-01036
C165	Temp. Comp. Disc. 6.8 pf, NPO, $\pm .5$ pf, 1KV	1509-01-00022
C166	Disc Ceramic, .01 uf, 20%, 500V	1509-01-01017
C167	Variable Trimmer (1.5-20 pf)	1521-01-00003
C168	Variable Trimmer (1.5-20 pf)	1521-01-00003
C169	Dur Mica DM-15, 100 pf, 5%, 500V	1519-01-00043
C170	Temp. Comp. Disc, 2.7 pf, N-220, $\pm .25$ pf, 1KV	1509-01-00001



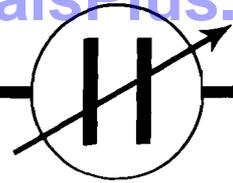
Schematic Designation	Description	Hammarlund Part No.
CAPACITORS (Continued)		
C171	Disc Ceramic, .01 uf, 20%, 500V	1509-01-01017
C172	Disc Ceramic, .01 uf, 20%, 500V	1509-01-01017
C173	Disc Ceramic, .01 uf, 20%, 500V	1509-01-01017
C174	Electrolytic, 25 uf, 25V	1515-02-04003
C175	Disc Ceramic, .01 uf, 150 VAC, 1400 VDC	1509-01-01015
C176	Disc Ceramic, .01 uf, 150 VAC, 1400 VDC	1509-01-01015
C177	Fixed Polyester .002 uf, 20% 1KV	1509-01-01032
C178	Dur Mica DM-15, 350 pf, 2% 500V	1519-02-00053
C179	Disc Ceramic, .01 uf, 20%, 500V	1509-01-01017
DIODES		
CR101	Germanium, 1N916	4803-01-00001
CR102	Germanium, 1N34	4823-02-00001
CR103	Germanium, 1N34	4823-02-00001
CR104	Silicon, CER72C	4807-01-00001
CR105	Silicon, CER72C	4807-01-00001
CR106	Silicon, CER72C	4807-01-00001
COILS AND CHOKES		
L101	Coil, "Q" Multiplier	9001-03-00118
L102	BFO Coil	1804-02-00055
L103	Choke, PA Grid, 2.2 uh	1805-02-00067
L104	Choke, PA Plate, 20 uh	1805-01-00056
L105	Coil, Final Tank	1805-01-00062
L106	Coil, Transmitter Osc. Plate	1806-02-00010
L107	Choke, Transmitter Osc. Cathode, 2.2 uh	1805-02-00067
L108	Coil, Transmitter Osc.	1805-01-00119
L109	Choke, Filter, 8 hy	5627-01-00004
L110	Choke, 2.2 uh	1805-02-00067
L111	Coil, CB Rec. Osc. (Xtal)	1805-01-00119
L112	Coil, Assembly (Osc. Bands 1 & 2)	1809-01-00006
L113	Coil, Assembly (Osc. Bands 3 & 4)	1811-01-00012
L114	Coil, Assembly (RF Bands 1 & 2)	1809-01-00055
L115	Coil Assembly (RF Bands 3 & 4)	1811-01-00011
L116	Choke, 20uh	1804-01-00056
RESISTORS		
(Resistors are $\pm 10\%$, 1/2 Watt unless otherwise specified)		
R101	180 Ohms	4703-01-00323
R102	22K	4703-01-00348



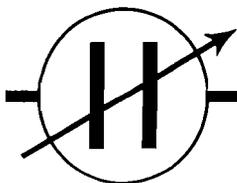
Schematic Designation	Description	Hammarlund Part No.
RESISTORS (Continued)		
R103	180 Ohms	4703-01-00323
R104	22K	4703-01-00340
R105	1 Megohm	4703-01-00368
R106	4.7 K	4703-01-00340
R107	10K, Variable (Selectivity)	4735-01-08002
R108	6.8K	4703-01-00342
R109	47K	4703-01-00352
R110	2.2 Megohm	4703-01-00372
R111	2.2K	4703-01-00336
R112	220 Ohms	4703-01-00324
R113	2.2K	4703-01-00336
R114	15K	4703-01-00346
R115	10K Variable (Sensitivity) Part of R120	4735-01-17002
R116	22K	4703-01-00336
R117	470K	4703-01-00364
R118	220 Ohms	4703-01-00324
R119	2.2K	4703-01-00336
R120	10K Variable (Squelch)	4735-01-17002
R121	18K, 2 watts	4705-01-01077
R122	1 Meg Ohm	4703-01-00368
R123	150 Ohms	4703-01-00322
R124	3.9K	4703-01-00339
R125	220K	4703-01-00360
R126	10K	4703-01-00344
R127	47K	4703-01-00352
R128	1 Megohm	4703-01-00368
R129	100K	4703-01-00356
R130	1 Meg Variable (Audio)	4735-01-17001
R131	100K	4703-01-00356
R132	3.9K	4703-01-00339
R133	1 Megohm	4703-01-00368
R134	100K	4703-01-00356
R135	150 Ohms, 1 Watt	4704-01-00622
R136	1.5K, 3 Watts	4707-01-00001
R137	10K, 1 Watt	4704-01-00644
R138	10K	4703-01-00344
R139	1K	4703-01-00322
R140	22K	4703-01-00348
R141	470 Ohms	4703-01-00328
R142	15K, 2 Watts	4705-01-00946
R143	68K	4703-01-00354



Schematic Designation	Description	Hammarlund Part No.
RESISTORS (Continued)		
R144	1.5K	4703-01-00334
R145	6K 10 Watt	4714-01-01015
R146	4.7K, 3 Watt	4707-01-00002
R147	1K	4703-01-00332
R148	100K	4703-01-00356
R149	47K	4703-01-00352
R150	1K	4703-01-00332
R151	10 Ohms	4703-01-00308
R152	2.2K	4703-01-00336
R153	47K	4703-01-00352
R154	47K	4703-01-00352
R155	47K	4703-01-00352
R156	47K	4703-01-00352
R157	33K	4703-01-00350
R158	25K, Variable (Meter Adjust)	4735-02-00403
R159	2.2K	4703-01-00336
R160	82K	4703-01-00355
R161	100K	4703-01-00356
R162	500 Ohms, 15 Watts	4714-01-01000
R163	68 Ohms	4703-01-00318
SWITCHES		
S1A	Switch Wafer (Antenna)	5105-01-00007
S1B	Switch Wafer (RF)	5105-01-00007
S1C	Switch Wafer (B+ & Reg. B+)	5105-01-00007
S1D	Switch Oscillator	5106-02-00005
S2	Switch Crystal Selector	5107-02-00008
S3	Switch, Rocker SPDT (VFO-Xtal)	5111-01-00002
S4	Switch, Rocker DPDT (Off-Spot)	5111-01-00003
S5	Switch, Rocker DPDT (BFO-OFF)	5111-01-00003
S6	Switch, Rocker, SPDT (OFF-XMIT)	5111-01-00002
S7	Switch, Rocker SPDT (LIMITER)	5111-01-00002
S8	Switch, Rocker DPDT (AVC)	5111-01-00003
S9	Switch, (Part of R-107) "Q" MULT	4735-01-08002
S10A	Switch, (Part of R-120) Squelch	4735-01-17002
S10B	Switch, (Part of R120) Squelch	4735-01-17002
S11	Switch (Part of R-130) (POWER OFF-ON)	4735-01-17001



Schematic Designation	Description	Hammarlund Part No.
TRANSFORMERS		
T101	Antenna Transformer (Band 1)	1809-01-00004
T102	Antenna Transformer (Band 2)	1810-01-00010
T103	Antenna Transformer (Band 3)	1811-01-00010
T104	Antenna Transformer (Band 4)	1812-01-00012
T105	Antenna Transformer (CB Band)	1812-01-00012
T106	IF Transformer (455 Kcs)	1811-01-00018
T107	IF Transformer (455 Kcs)	1811-01-00018
T108	IF Transformer (455 Kcs)	1811-01-00018
T109	Audio Transformer	5620-01-00004
T110	Power Transformer (115/230V - 50/60 Cps)	5603-01-00002
MISCELLANEOUS		
F1	Fuse, 1 Amp	5134-02-00004
J1	Connector, CB Antenna	2111-01-00001
J2	Connector, Antenna Strip	2887-02-02000
J3	Jack, Phone	2109-01-00001
J4	Jack, Mike Input	2126-01-00001
K101	Relay 4 PDT, 115V DC	4515-02-00001
M1	Meter	2902-02-00011
S205	Speaker	9210-00-00061
TY1	Crystal, Transmit (Specify Channel) <i>3RD OVERTONE</i>	2305-01-00080
TY2	Crystal, Receive (Specify Channel) <i>FREQ - 455</i>	2305-01-00081
ZF101	RC Printed Network	1711-01-00002
	Instruction Book	9007-06-00008
	Knob (Small)	2430-02-00061
	Knob (Medium)	2430-02-00060
	Knob (Large)	2430-01-00062
	Microphone	9007-03-00016



ADDITIONAL HINTS FOR THE NOVICE AND SHORTWAVE LISTENER

A voltage reading of 45-50 volts may be obtained between the chassis and a ground as the result of the two power line by-pass condensers that are connected across the power line with the center tap grounded. Since we are dealing with AC, these capacitors will look like resistors to a volt meter. This will also produce a slight shock if the chassis is not grounded, and one happens to contact a grounded object, and the chassis or any exposed part of the receiver. This also will account for a slight spark, if the receiver is connected to the power line and the ground connection is made. For protection a good ground should always be employed.

In using the receiver for CW, or with the BFO in the oscillating state, it is absolutely necessary to take the receiver out of the AVC position and put it into the Manual position. Failure to do this will result in the receiver blocking and erratic action of the S meter. The S meter is only usable in the AVC position. When using BFO the audio control should be used at 2/3 to 3/4 rotation clockwise position and the RF sensitivity control employed as a means of adjusting volume.

When employing the Q multiplier for phone use the function switch will, of course, be in the REC and it is advisable to start with the Q multiplier selectivity control in the complete counter clock wise position. If this control is advanced past approximately the 2 o'clock position, the Q multiplier may go into oscillation resulting in the blocking of the receiver. For use on phone the Q multiplier selectivity control, will also usually be employed between maximum counter clock wise position and approximately straight up. Beyond this point or even at approximately the straight up position the receiver is usually so selective that it is capable of wiping the modulation off the carrier by actually rejecting the side bands. For normal phone use or broadcast reception the selectivity control should always be employed in the OPF or counter clock wise position, since this results in the operation of a switch which disconnects the Q multiplier from the IF system.

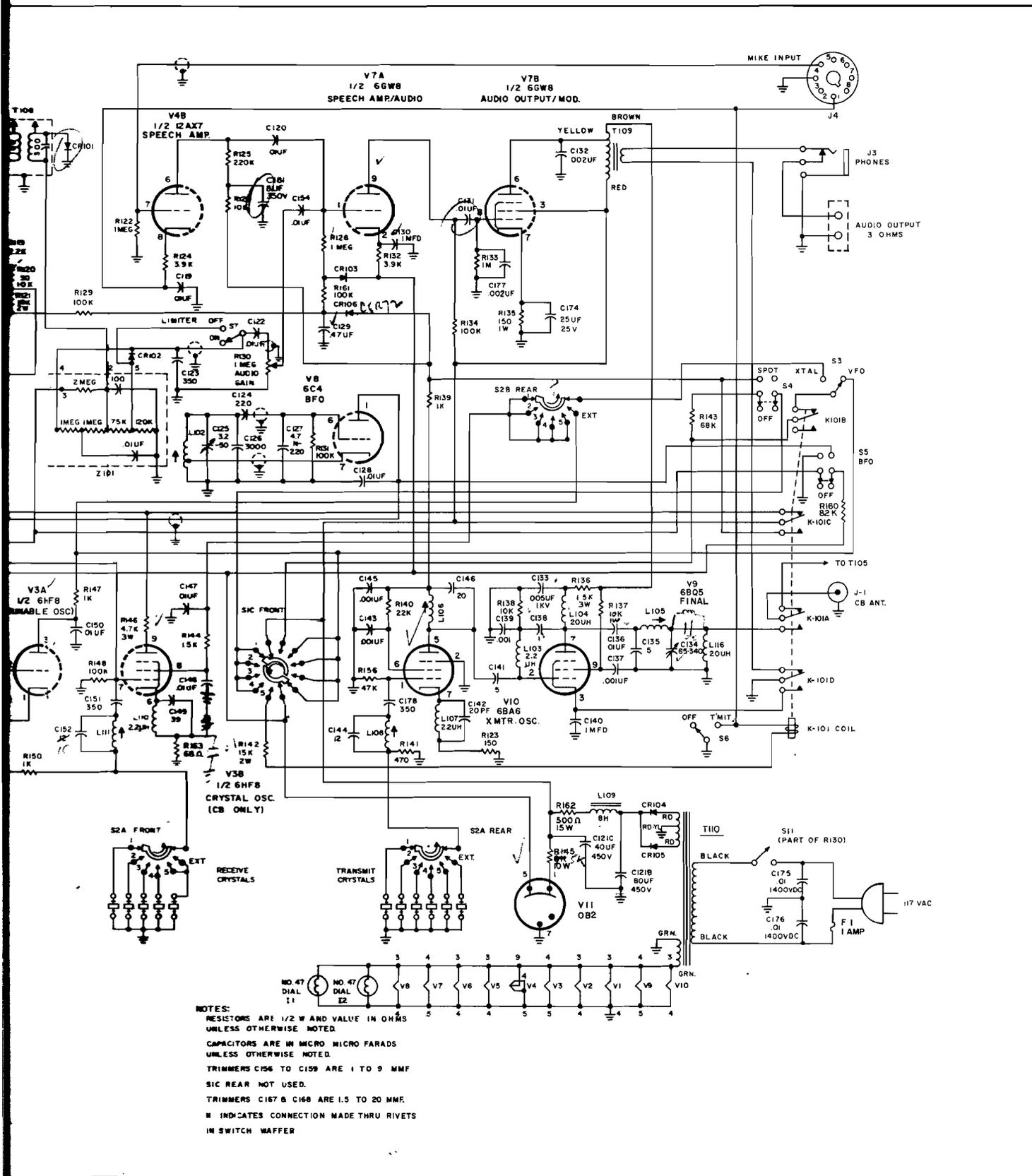
It may be found desirable to place the function switch on BFO while tuning to aide in locating weak signals. As a result of activating the BFO, each carrier tuned in will produce a beat note or whistle, easily discernable. If

phone signal is located in this manner, adjust the band-spread tuning control for the lowest pitch tone or zero beat. This will result in centering the desired phone signal and now placing the function switch on REC will allow for normal AM operation.

If interference is experienced, either between stations close to one another or from an interfering CW signal, gradually advance the Q Multiplier selectivity control from its normally off or extreme counterclockwise position. This will result in increased selectivity by producing a spike or narrow bandwidth that is adjustable from approximately 3 Kcs to 100 cycles in width. The narrowest bandwidth being obtained by adjustment on the Q multiplier selectivity control to the point just below that which would cause the Q Multiplier to break into self oscillation as evidenced by the receiver blocking with a resultant loss of volume.

The spike can be moved around within the IF pass band that is nominally approximately 6 kc wide. The frequency control is the means for varying the position of this spike. Assuming that the selectivity control is adjusted to produce a spike 1 KC wide and also assuming that the bandwidth of the IF system is 6 kc wide, it can be appreciated that the shape of the IF system response curve can be varied by moving the 1 kc band width anywhere within the 6 kc band width. This will produce a valley on either side of the spike or peak. By proper tuning, therefore, of the band spread dial and the frequency control of the Q multiplier, it should be apparent that an interfering signal may be placed in a valley and the desired signal on the peak, with the net result of decreasing the strength or eliminating the signal that is in the valley, without seriously affecting the desired signal intelligibility.

Since the use of the Q multiplier naturally means narrower band width, it should only be employed when interference is present. Never use the Q multiplier on the broadcast band unless you are hunting weak DX signals and are therefore not after maximum fidelity response. The same, more or less, applies to short wave broadcast listening. Here the use of the Q multiplier in addition to functioning as previously described may also prove advantageous from a noise reduction standpoint as a direct result of the decreased band width.



NOTES:
 RESISTORS ARE 1/2 W AND VALUE IN OHMS UNLESS OTHERWISE NOTED.
 CAPACITORS ARE IN MICRO MICRO FARADS UNLESS OTHERWISE NOTED.
 TRIMMERS C156 TO C159 ARE 1 TO 9 MMF.
 SIC REAR NOT USED.
 TRIMMERS C167 & C168 ARE 1.5 TO 20 MMF.
 W INDICATES CONNECTION MADE THRU RIVETS IN SWITCH MAFFER

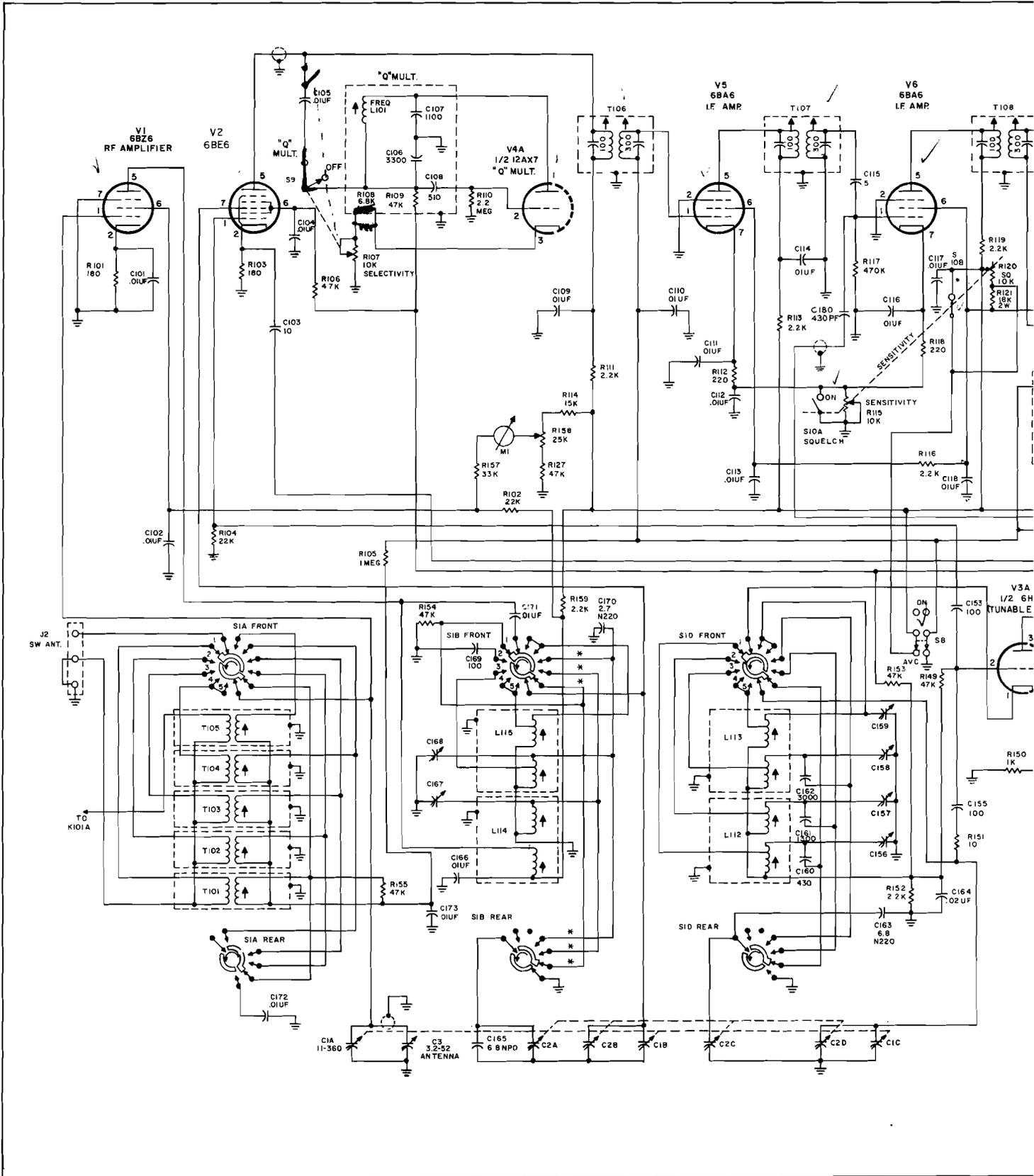


Figure 10. Hammarlund HQ-205 T

THE HAMMARLUND MANUFACTURING COMPANY
Standard Warranty

The Hammarlund Manufacturing Company, warrants this equipment to be free from defects in workmanship and materials under normal and proper use and service for the uses and purposes for which it is designed, and agrees to repair or replace, without charge, all parts thereof showing such defects which are returned for inspection to the Company's factory, transportation prepaid, within a period of 90 days from date of delivery, provided such inspection discloses to the satisfaction of the Company that the defects are as claimed, and provided also, that the equipment has not been altered, repaired, subjected to misuse, negligence or accident, or damaged by lightning, excessive current or otherwise, or had its serial number or any part thereof altered, defaced, or removed. Tubes shall be deemed to be covered by the manufacturer's standard warranty applicable thereto, and such items shall be and are hereby excluded from the provisions of this warranty. Pilot lamps and fuses are not guaranteed for length of service.

Except as herein specifically provided, no warranty, express or implied, other than that of title, shall apply to any equipment sold hereunder. In no event shall the Company be liable for damages by reason of the failure of the equipment to function properly or for any consequential damages.

This Warranty is valid for the original owner of the equipment, and is contingent upon receipt of the Warranty Registration Card by the Company. No equipment shall be returned to the factory for repairs under warranty unless written authorization is obtained by the Company, and the equipment is shipped prepaid by the owner. The Company maintains Authorized Service Stations, names and locations of which will be sent upon request of the owner.

The Hammarlund Manufacturing Company

A Giannini Scientific Co.

73-88 Hammarlund Drive, Mars Hill, N. C.

Export Department: 13 East 40th Street, New York 16, N. Y.



The policy of the Hammarlund Manufacturing Company, is one of continued improvement in design and manufacture wherever and whenever possible, to provide the highest attainable quality and performance. Hence, specifications, finishes, etc. are subject to change without notice and without assumption by Hammarlund of any obligation or responsibility to provide such features as may be changed, added or dropped from previous production runs of this equipment.

Hammarlund Manufacturing Company

A Giannini Scientific Co.

73-88 Hammarlund Drive, Mars Hill, N. C.

Export Department: 13 East 40th Street, New York 16, N. Y.

DO NOT MAKE ANY RETURNS WITHOUT AUTHORIZATION FROM THE FACTORY. ALL AUTHORIZED RETURNS SHOULD BE SHIPPED TO HAMMARLUND MANUFACTURING CO., ATTN. CUSTOMER SERVICE, MARS HILL, NORTH CAROLINA.



®

ESTABLISHED 1910