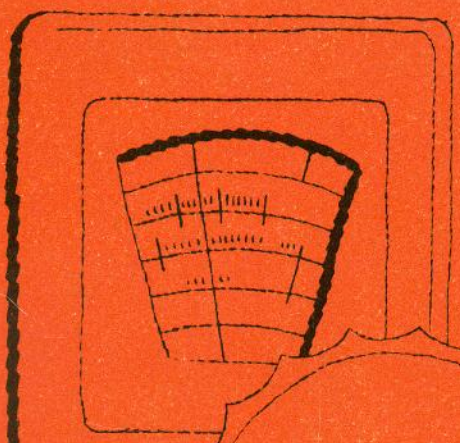


HQ-100
COMMUNICATIONS RECEIVER

TECHNICAL
DESCRIPTION
AND
OPERATING
INSTRUCTIONS

HAMMARLUND

The Hammarlund Manufacturing Co., Inc.
460 West 34th Street, New York 1, N. Y.
International Division: 13 East 40th Street, New York 16, N. Y.

THE
HQ-100, HQ-100C, HQ-100E
COMMUNICATIONS
RECEIVERS

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

THE HAMMARLUND MANUFACTURING CO., INC.
460 West 34th Street : : : : New York 1, N.Y.

Figure 1. The HQ-100 Receiver

TUBE COMPLEMENT

Symbol	Type	Tube	Function
V1	6BZ6	Pentode	RF Amplifier
V2	6BE6	Pentagrid Converter	Mixer
V3	6C4	Triode	HF Oscillator
V4A	1/2 12AX7	Triode	First AF Amplifier
V4B	1/2 12AX7	Triode	Q-Multiplier - BFO
V5	6BA6	Remote Cutoff Pentode	First IF Amplifier
V6	6BA6	Remote Cutoff Pentode	Second IF Amplifier
V7	6AL5	Twin Diode	Detector, Series Noise Limiter
V8	6AQ5	Beam Power Amplifier	Audio Power Output
V9	0B2	Gas Filled Diode	Voltage Regulator
V10	5Y3	Twin Diode	Rectifier

INTRODUCTION

The Hammarlund HQ-100 is an all-new communications receiver representing entirely new concepts in electrical and mechanical design. It will provide years of top performance with minimum maintenance. The HQ-100 has a self-contained power supply operating from a 60 cps, 105-125 volt AC source. The Hammarlund HQ-100-C incorporates a telechron automatic electric clock-timer in its design. The export model, HQ-100-E, will operate from a 50-60 cps, 115-230 volt AC source. Because of the power supply operating frequency of the export model, the automatic timer and clock is not incorporated in this model.

The HQ-100 is a superheterodyne receiver with a frequency coverage continuously tunable from 540 KCS to 30 MCS with extremely fine control in separation of crowded signals. A very high signal-to-noise ratio plus the famous Hammarlund noise limiter circuit, permits full use of the receiver's excellent sensitivity on the weakest signals. A Q-Multiplier is provided for varying the selectivity of the receiver.

Electrical band spread tuning is provided with direct calibration every 10 KCS on 80, 40, and 20 meter bands; every 20 KCS on the 15 meter band and every 50 KCS on the 10 meter band. In addition, an arbitrary band spread logging scale is provided for use throughout the tuning range of the receiver.

A new audio output circuit feature is the Auto-Response which automatically narrows and widens the frequency range of the audio output, depending upon the gain required. This feature permits the receiver to be used as a high-fidelity receiver on stronger signals, while providing the sharp cutoff required in receiving communication signals. A second advantage of the Hammarlund Auto-Response is the rapid damping of the audio power in the speaker voice coil which greatly minimizes undesirable speaker "hangover." The receiver may be used with either speaker or headphones. Fast acting AVC maintains a constant audio level. Adequate filtering practically eliminates AC power ripple.

The HQ-100 is equipped with a stable beat frequency oscillator which provides the operator with a continuous range of audio tones when receiving telegraph, code signals, or excellent single-side band reception.

An "S" meter is provided to obtain accurate readings on received phone signals and to assure "on-the-nose" tuning. A send-receive switch is provided to silence the receiver while transmitting.

Large, comfortable controls in logical groupings are provided for greatest operating ease. The new futuristic front panel is clearly marked to permit full attention to the operating at hand.

The HQ-100 was designed with you in mind. You'll have many hours of pleasure and use in operating this truly fine communications instrument.

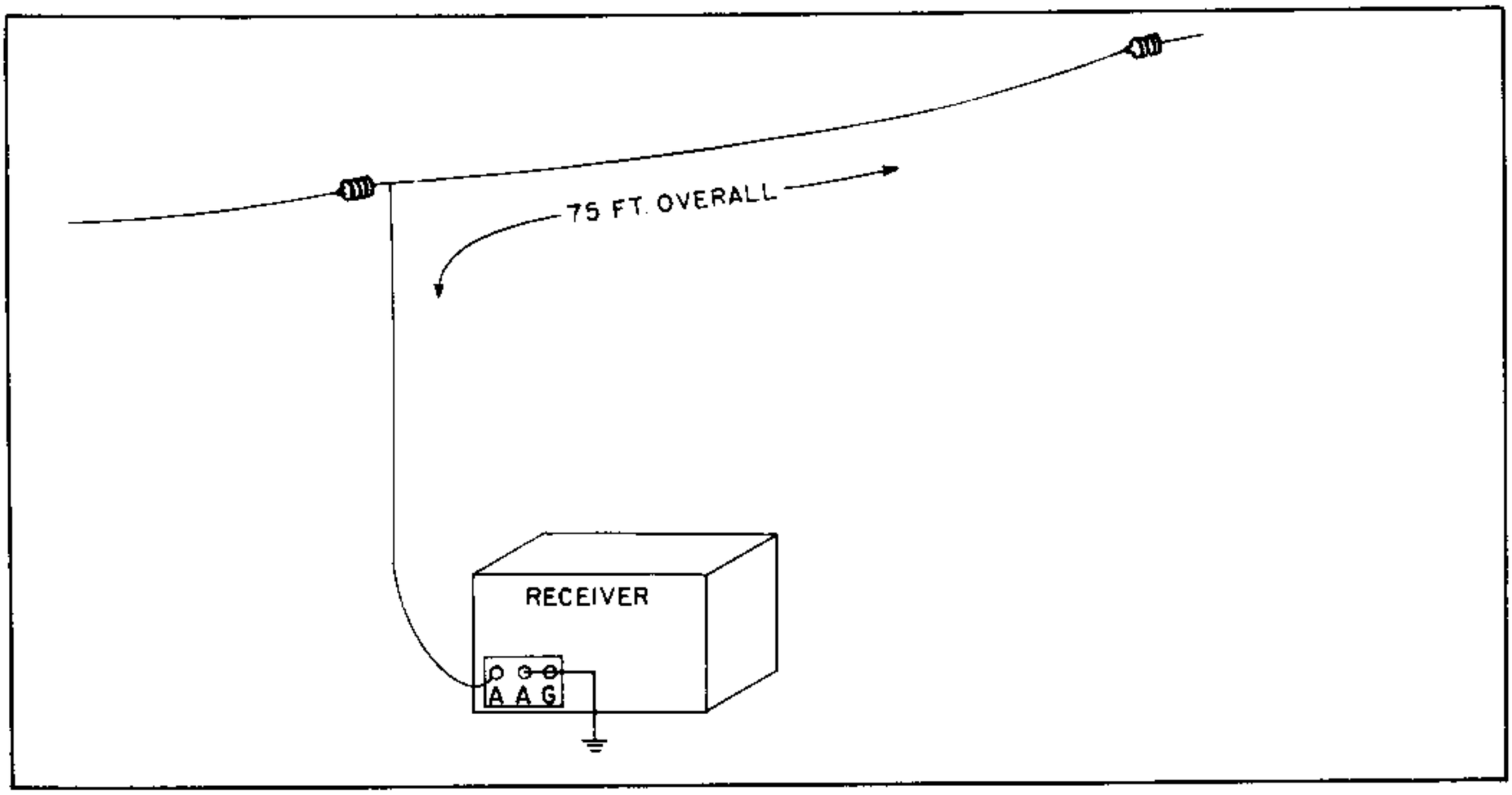


Figure 2. Installation of Single-wire Antenna

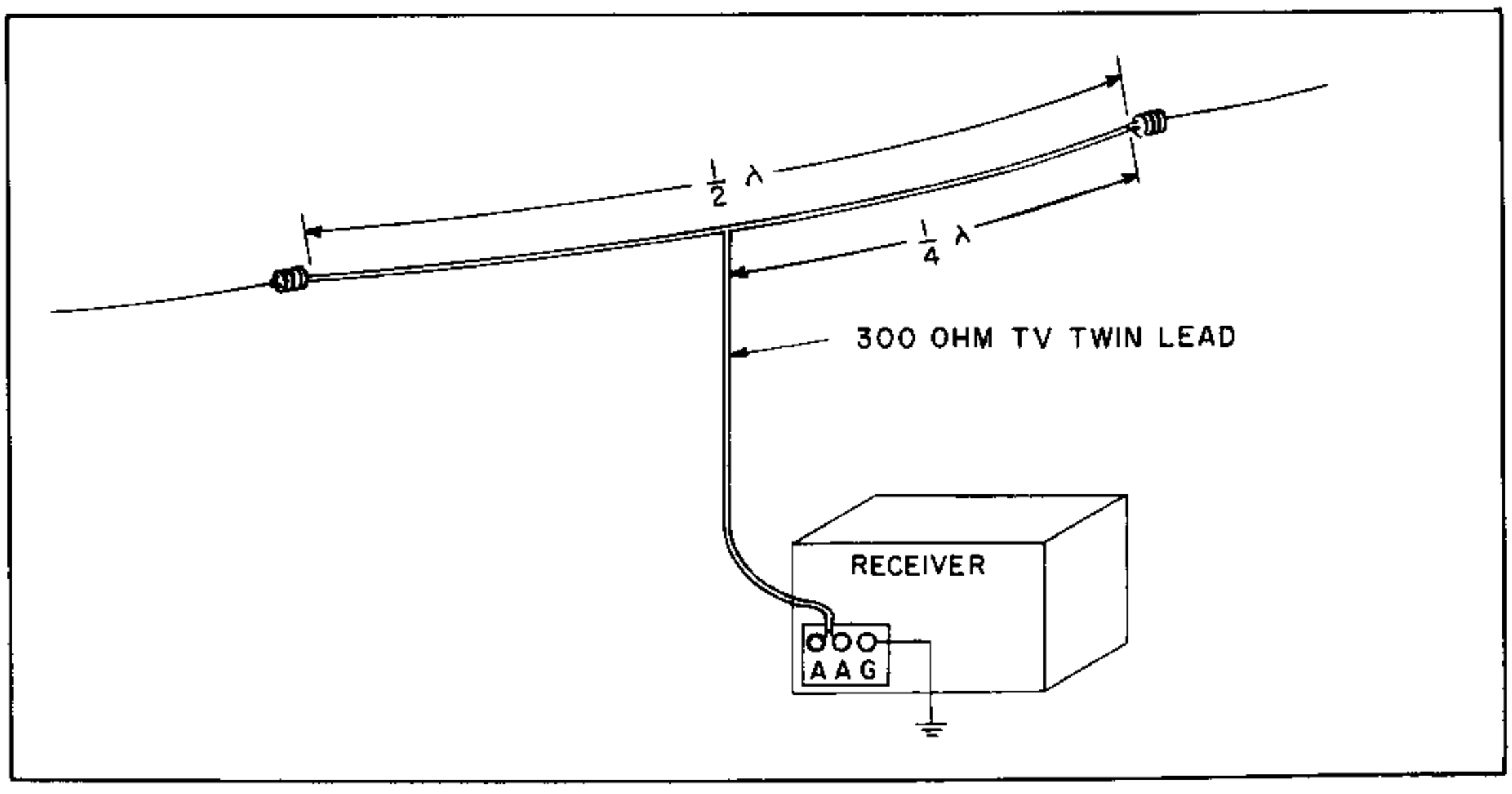


Figure 3. Installation of Folded Dipole Antenna

INSTALLATION

UNPACKING

Unpack the receiver 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-100 Speaker) to the two terminals marked SPKR. on the rear of the chassis. (Note Figure 4). For best performance do not place speaker on top of receiver cabinet.

POWER CONNECTIONS

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

INSTALLING ANTENNA

The HQ-100 is designed to operate with a single wire or a balanced type antenna. The front panel antenna trimmer control (Figure 5) permits a good match to most antennae systems of 50 to 600 ohms.

For general coverage, single wire antennae 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 a particular amateur band or other narrow tuning range will be obtained by using a tuned half-wave dipole or folded dipole fed with 300 ohm transmission line or other suitable lead-in, as shown in Figure 3.

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.

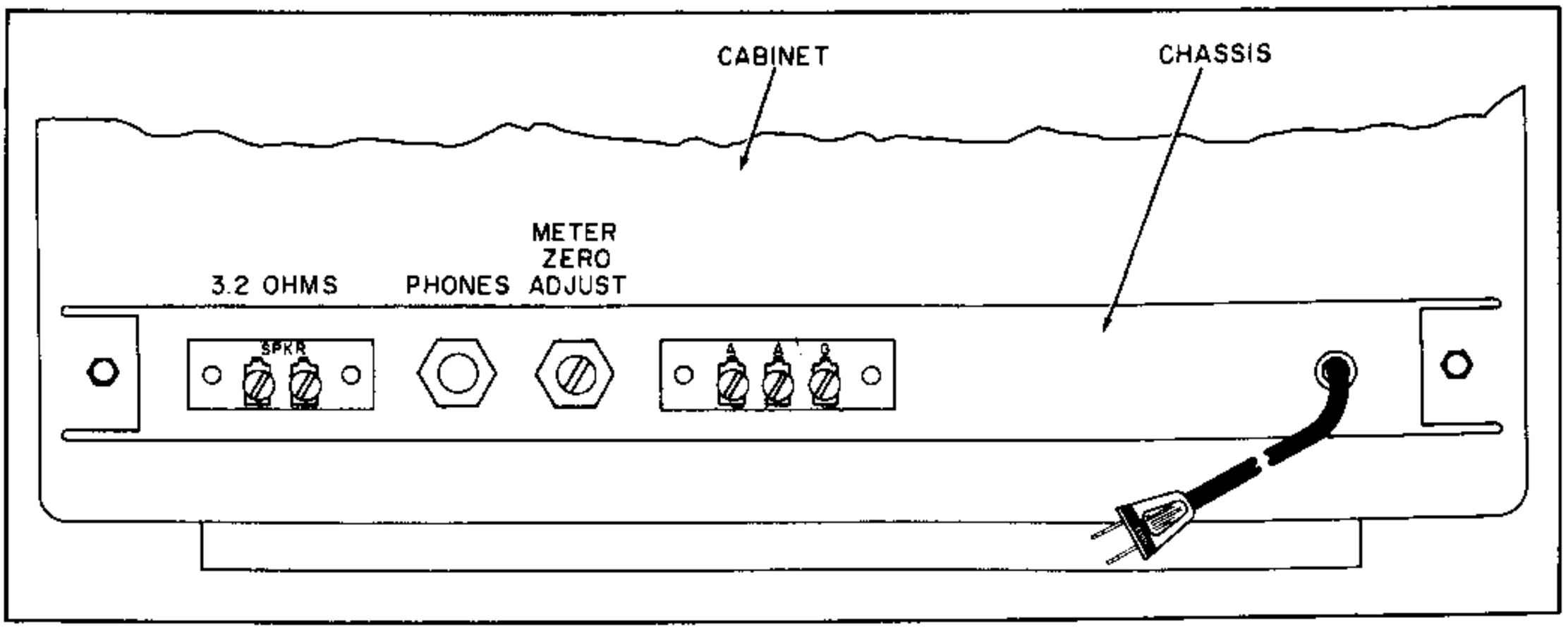
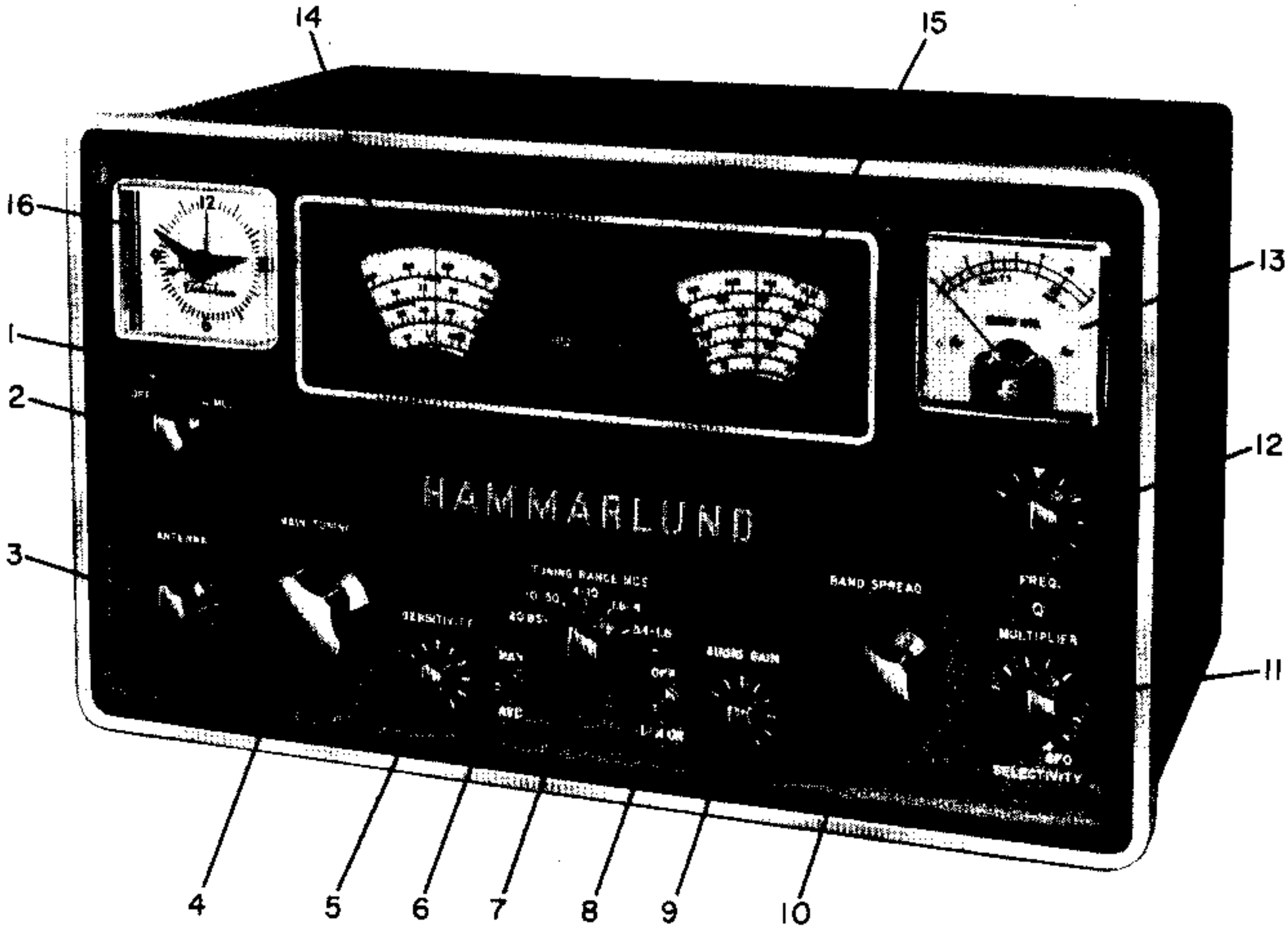


Figure 4. Connection Points at Rear of Chassis



INDEX NO.	CONTROL	INDEX NO.	CONTROL
1	Automatic Clock-Timer Control	9	AUDIO GAIN Control
2	Function Switch	10	Electrical BAND SPREAD Control
3	ANTENNA Trimmer	11	SELECTIVITY Control
4	MAIN TUNING Control	12	Frequency Control
5	SENSITIVITY Control	13	"S" Meter
6	MAN. -AVC Switch	14	Main Tuning Dial
7	Band Selector Switch	15	Electrical Band Spread Dial
8	Noise Limiter Switch	16	Telechron Automatic Clock-Timer

Figure 5. Location of Controls

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-100, 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:

Function Switch	Receive (REC.)
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 RANGE MCS) Switch	Set to desired frequency 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	BFO position *
Frequency (FREQ.) Control	Set pointer to triangular marking.

* Setting the SELECTIVITY control to BFO with the function switch in receive position disconnects the Q-Multiplier from the IF allowing normally broad IF bandpass.

CODE SIGNAL RECEPTION

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

Function Switch	Q-Multiplier (Q MULT.)
ANTENNA Trimmer	Peak for maximum output on "S" meter.
MAIN TUNING Control	Peak for maximum output on "S" meter.
SENSITIVITY Control	Adjust for desired output level.
MAN.-AVC Switch	Manual (MAN.)
Band Selector (TUNING RANGE MCS) Switch	Set to desired frequency range.
Noise Limiter Switch	OFF or ON as required by local noise conditions.
AUDIO GAIN Control	Fully clockwise
BAND SPREAD Control	BFO position
Frequency (FREQ.) Control	Tune signal to zero beat with pointer on triangle and then offset either left or right for desired pitch.

FUNCTION SWITCH

With the function switch in the Q MULT. position, three modes of operation are possible. CW or Single Side Band signals may be received with the SELECTIVITY control in the BFO position. With the SELECTIVITY control switched off the BFO position, AM signals, under conditions where additional selectivity is required, are received.

The broadest position of the SELECTIVITY control (corresponding to a 6 db bandpass of 3 KCS) is extreme counterclockwise. Rotating the control clockwise will continuously narrow the pass band until the Q-Multiplier goes into oscillation. In the oscillating condition, "single signal" reception of CW is possible.

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 frequency control should be set approximately 2-1/2 divisions to the left or right of the triangle 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 registry 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 towards 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.

A separate switch position is provided on the TUNING RANGE control for spreading the 20-meter band. This switches in another band spread capacitor for optimum spreading of this band.

TELECHRON AUTOMATIC TIMER

If your receiver is equipped with the built-in Telechron Automatic Clock-Timer, the following instructions should be noted:

Every radio-frequency device is stable only at predetermined operating temperatures. In order to eliminate waiting for receiver to warm-up to operating temperature, the Telechron Timer automatically turns on the receiver ahead of anticipated operating time. This is accomplished by setting the hand of the timer (small knob at rear of receiver) to approximately one-half hour before operating hour. The front panel control under Timer is then set to "Auto" position. The function switch is set to REC. The receiver is then automatically turned on at the desired time.

The clock will continue to run as long as the receiver line cord is connected to the power outlet, and is extremely useful for checking sign-in periods and schedules.

If your receiver is not equipped with the Telechron Automatic Clock-Timer, and you would care to have the accessory added, clock kits, with full installation instructions, may be had by writing the Hammarlund Mfg. Co., 460 West 34th St., New York 1, N. Y. Order CLOCK KIT 38920-G1, or by contacting the nearest Hammarlund dealer.

CIRCUIT THEORY

The HQ-100 is basically a single conversion, four-band, superheterodyne receiver with a noise limiter. Its circuitry incorporates a Q-Multiplier for full control of selectivity and also serves as a 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 (6C4), V3.

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 circuit employed in this receiver serves a dual function. 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 clockwise serves as the beat frequency oscillator on-off switch. In some cases when it is desirable to have narrow band width and the beat frequency oscillator as well, it will be found that the Q-Multiplier will go into oscillation at a point below the full on position. A little experience will be necessary using the Q-Multiplier in this fashion to provide optimum performance in the crowded CW bands, or in using the receiver for single side band reception. 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. 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 selectivity. Iron core permeability-tuned transformers improve performance and add to the ease of adjustment. The intermediate frequency is 455 KCS, the RETMA 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 a 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 function switch to REC.

2. Set front panel SENSITIVITY control to "10" and Q-Multiplier SELECTIVITY control to BFO.

3. With receiver off, mechanically zero pointer with a fine screwdriver.

4. With AVC on and the ANT. terminals shorted, zero pointer with ZERO ADJ potentiometer R-15.

DETECTOR AND NOISE LIMITER

One section of the 6AL5 tube, V7, is used for the second detector and AVC system. This system produces a minimum of distortion.

The other half of V7 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)

As mentioned previously, the Q-Multiplier serves a dual function, since it is also employed as the beat frequency oscillator. Under these conditions, with the SELECTIVITY switch in the full counterclockwise position, the Q-Multiplier is made to oscillate more vigorously. The FREQ. 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 counterclockwise from the center position, optimum single side band reception will usually be obtained. Whether the beat frequency oscillator control will be set clockwise

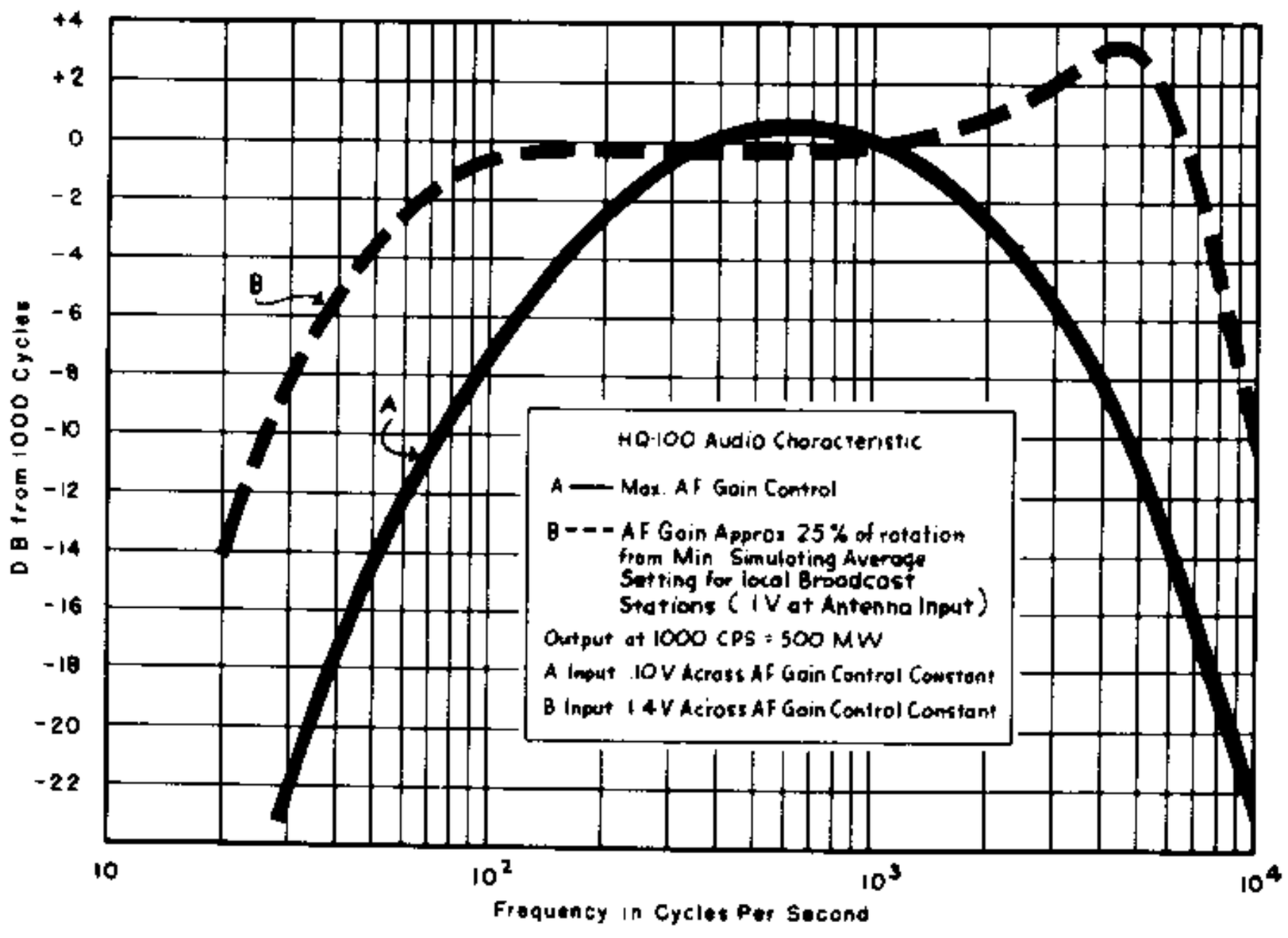


Figure 6. Auto-Response Curve

from zero beat will depend on whether upper or lower 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 FREQ. control from the one degree counterclockwise to the one degree clockwise position and then very carefully adjust the BAND SPREAD 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. For improved selectivity with BFO, the following procedure may prove advantageous. After a CW signal or single side band signal has been tuned in using the procedure previously given, if the SELECTIVITY control is very gradually rotated in the counterclockwise position, it will be found that the Q-Multiplier will continue to oscillate. Under these conditions, narrower band width with BFO injection will result.

AUDIO AMPLIFIER

The first audio stage is a resistance coupled voltage amplifier employing the other section of the 12AX7 (V4B). The audio output stage is a 6AQ5 beam power amplifier (V8) providing an undistorted output level of at least one watt.

A feature of the audio system is the variable negative feedback employed (see Auto-Response Curve, Figure 6). Maximum feedback is provided at low settings of the AUDIO GAIN control for the fine quality reception of local broadcast and strong short wave stations. As the AUDIO GAIN control is increased, the feedback decreases so that on reception of weak signals additional selectivity is provided by the audio section. This results in an increased signal-to-noise ratio. A further advantage is the critical damping of the speaker for elimination of speaker "hangover". This upgrades the reception of speech and music and decreases the noise output of the receiver. A further advantage is the reduction of distortion at lower settings of the AUDIO GAIN control.

SERVICE AND REALIGNMENT PROCEDURE

NOTE

To service this receiver, disconnect from power source and remove all leadwires attached to terminal connections at rear of chassis apron. Carefully turn the receiver 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, and the knob from the clock adjustment shaft if receiver is so equipped. Lift cabinet straight up and off of chassis. To reassemble, use reverse procedure.

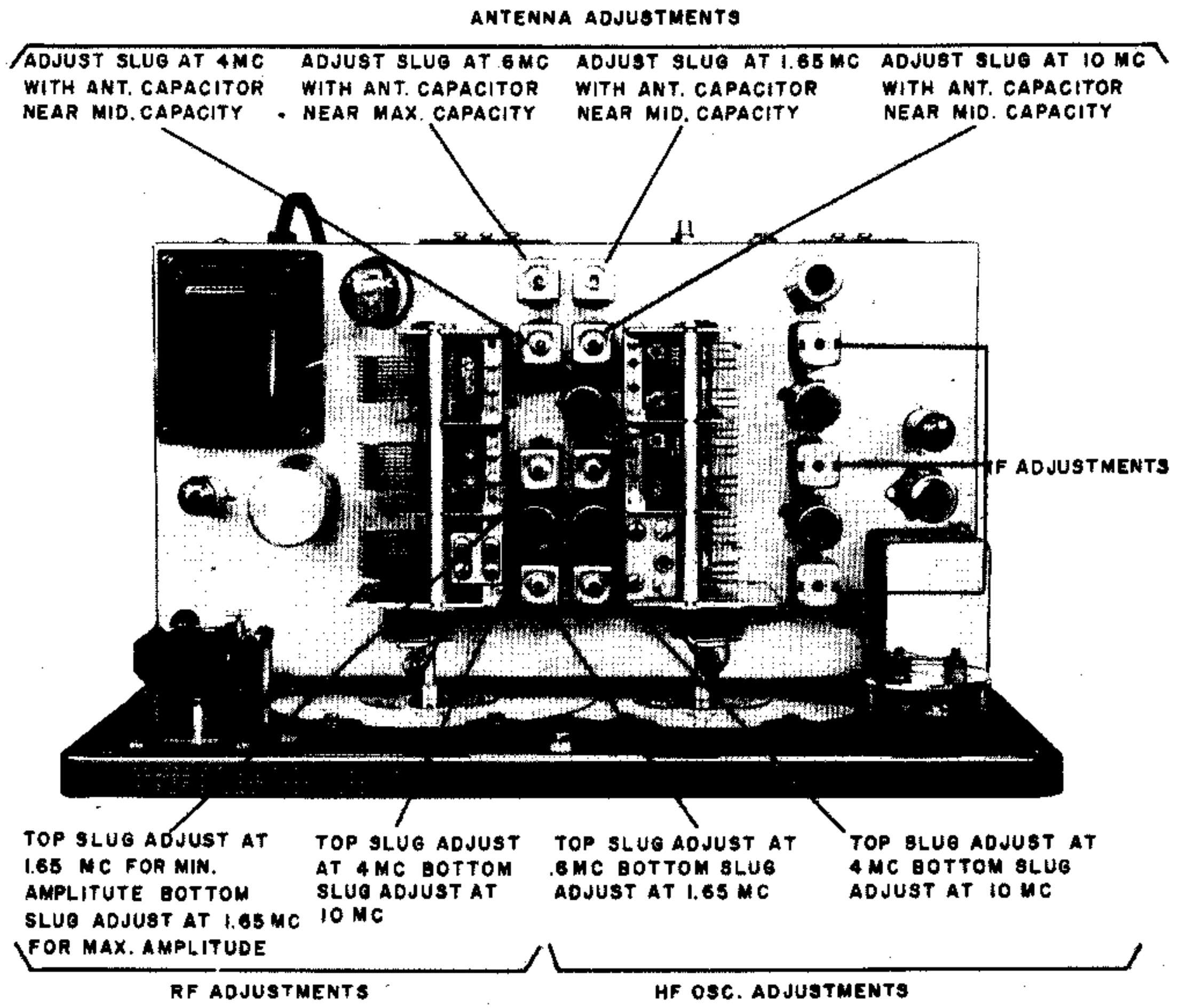


Figure 7. Top View of Chassis

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 1 of the V7, 6AL5 socket.

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 BFO
Band selector switch on .54 - 1.6 MC
MAN. -AVC switch on MAN.
SENSITIVITY control on 3 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 cir-

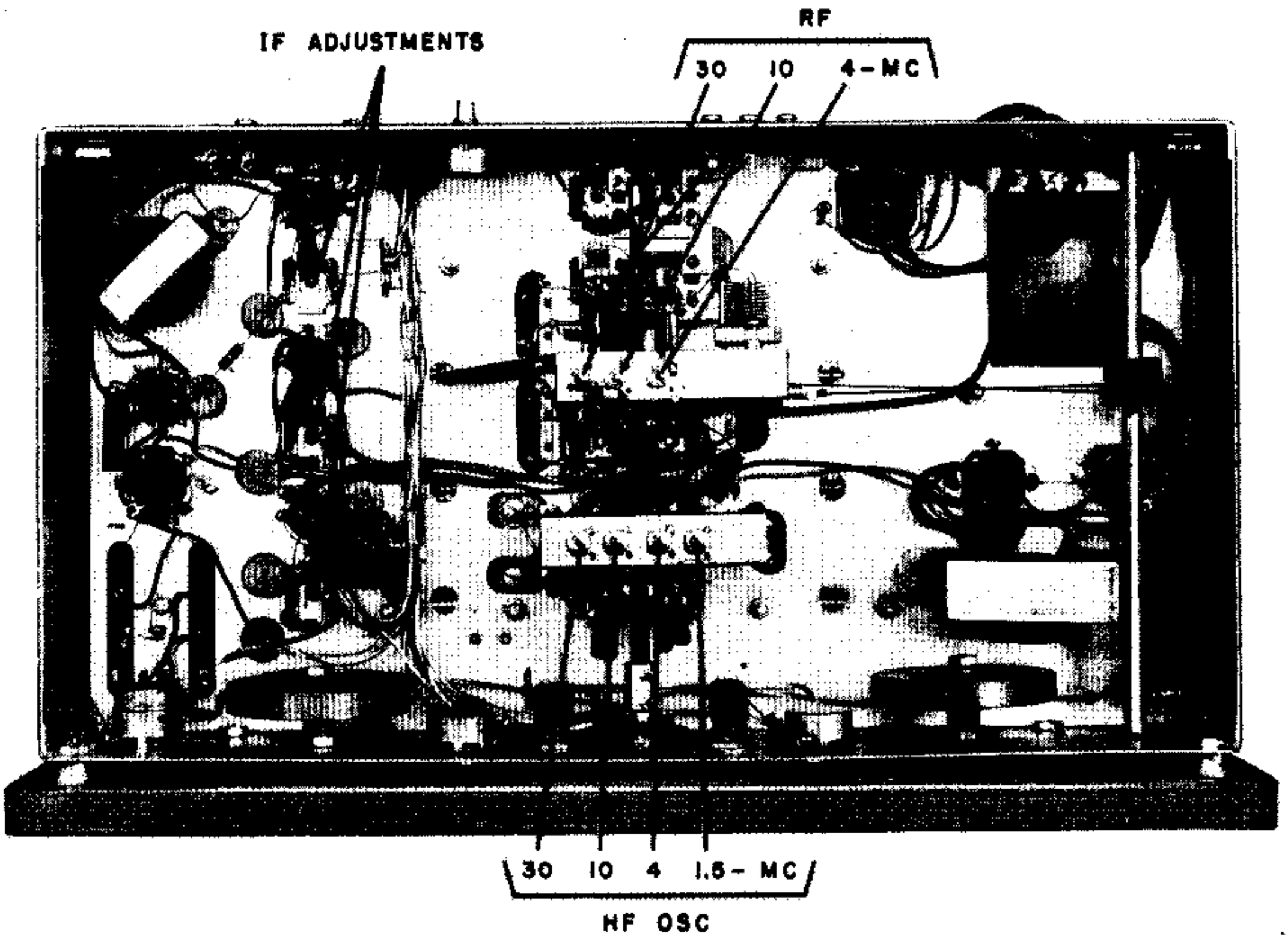


Figure 8. Bottom View of Chassis

cuits; bottom of chassis adjustments (Figure 8) are primaries or plate circuits.

e. Turn the function switch to Q MULT. 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 FREQ. control to obtain a maximum meter 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 and is also the zero setting for the BFO. 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. With the MAN. -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 adjusted last. A certain amount of interaction will occur between the oscillator and RF adjustments, particularly on the higher frequency bands. Final adjustment 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 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-100 is always on the high side of the signal frequency by 455 MCS. 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-half 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 Q MULT. Set the FREQ. control to zero (triangular indice). Set the SELECTIVITY control to BFO. Set the MAN. -AVC switch to AVC.

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.

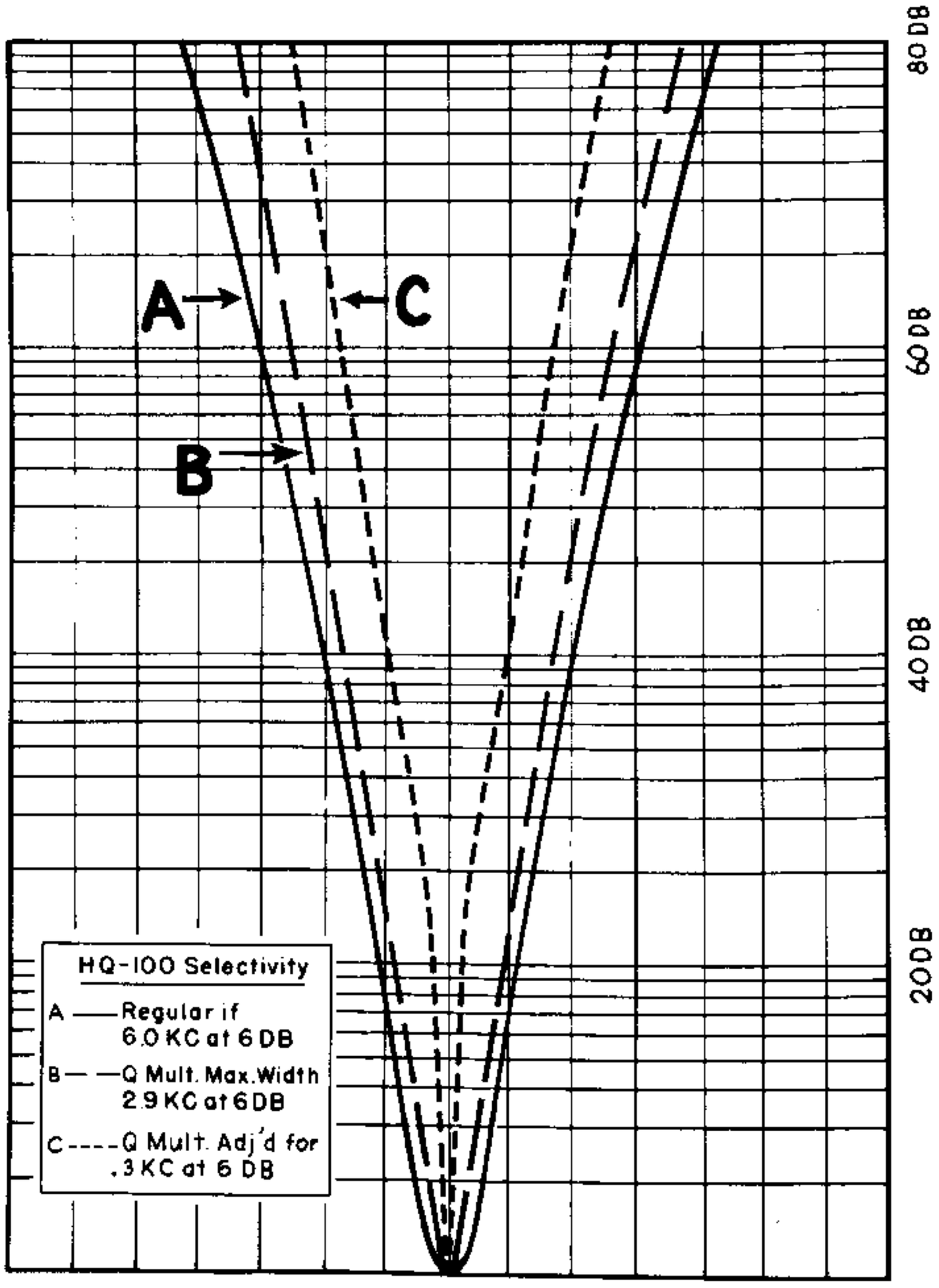


Figure 9. Selectivity Curves

TABLE 1. TUBE SOCKET VOLTAGES

Measured from tube socket pins to chassis with vacuum tube voltmeter. AUDIO GAIN control minimum. Band Selector switch on 10-30 MCS. Noise Limiter switch OFF. MAN. -AVC on MAN. SENSITIVITY control maximum except where noted. Function switch on Q MULT. except where noted. SELECTIVITY control counterclockwise. Line voltage 117. No signal input.

TUBE	SOCKET PIN NUMBERS								
	1	2	3	4	5	6	7	8	9
V1 RF 6BZ6	-	1.8		6.3 ac	245	105	-	-	-
V2 MIXER 6BE6	-1.3	1.3	-	6.3 ac	235	70	-	-	-
V3 HF OSC 6C4	100	-	-	6.3 ac	100	.7	-	-	-
V4 12AX7 Q MULT. 1st AF	230 0 ON REC.	-	2.7 0 ON REC.	6.3 ac	6.3 ac	76	-	.8	-
V5 1st IF 6BA6	-	-	-	6.3 ac	230	105	2.15 13.6 Min SENS	-	-
V6 2nd IF 6BA6	-	-	-	6.3 ac	230	95	2.4 13.6 Min SENS	-	-
V7 6AL5 DET. LIM. AVC	-.2	-.3	-	6.3 ac	-	-	-.2	-	-
V8 6AQ5 AUDIO OUTPUT	-	15	-	6.3 ac	260	240	-	-	-
V9 0B2 VOLTAGE REG.	105	-	-	-	105	-	-	-	-
V10 5Y3 RECTIFIER	-	270	-	250 ac	-	250 ac	-	270	-

TABLE 2. TUBE SOCKET RESISTANCES

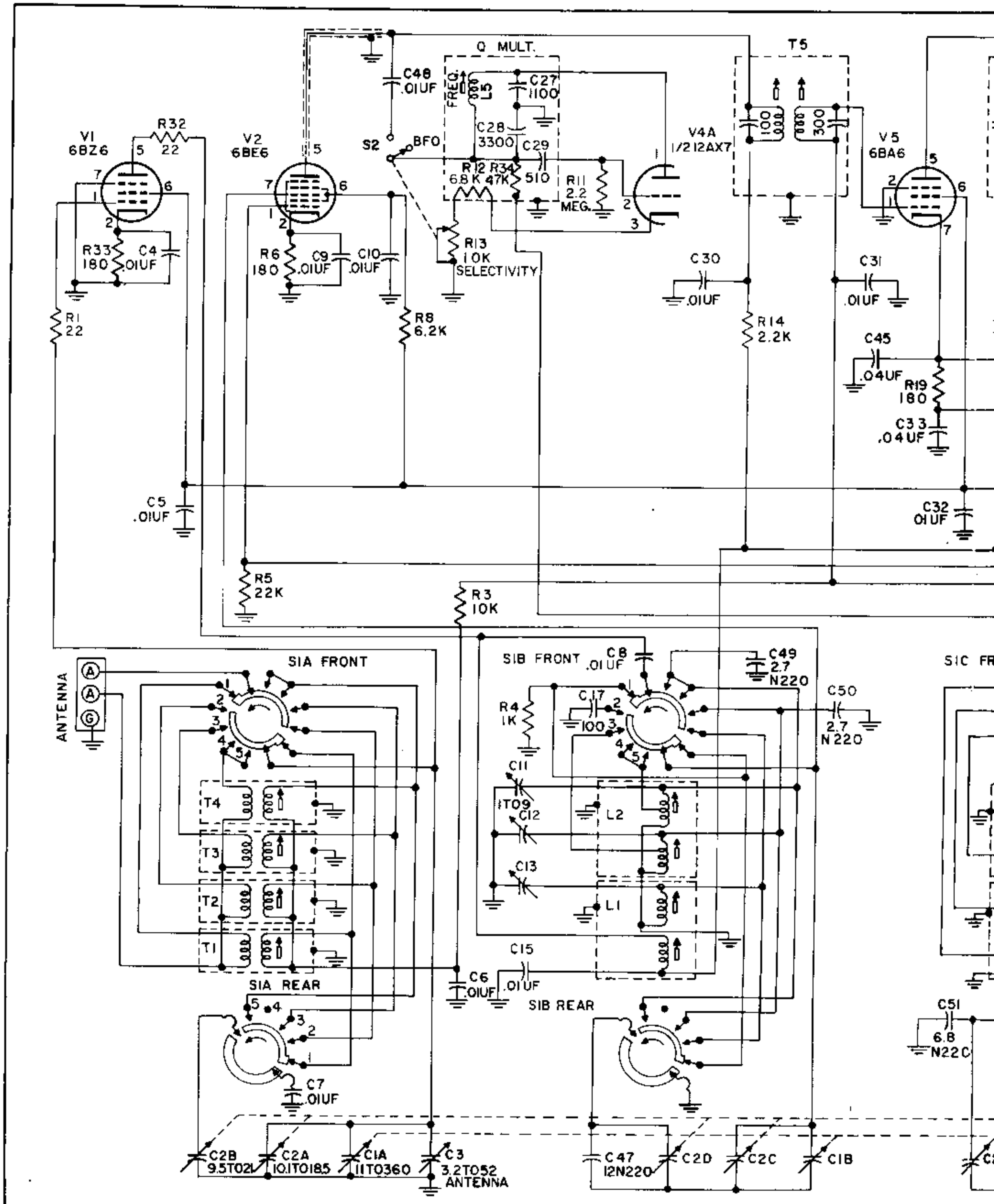
Measured from tube socket pins to chassis with vacuum tube ohmmeter. AUDIO GAIN control maximum. SELECTIVITY control on BFO. Noise Limiter switch ON. SENSITIVITY control maximum except where noted. MAN.-AVC on MAN. Function switch on Q MULT. Band Selector switch on 10-30 MCS.

TUBE	SOCKET PIN NUMBERS								
	1	2	3	4	5	6	7	8	9
V1 RF 6BZ6	10K 2.4 Meg on AVC	180	0	0	.5 Meg or more	.5 Meg or more	0	-	0
V2 MIXER 6BE6	22K	180	0	0	.5 Meg or more	.5 Meg or more	0	-	-
V3 HF OSC 6C4	.5 Meg or more	INF	0	0	.5 Meg or more	47K	0	-	-
V4 12AX7 Q MULT. 1st AF	.5 Meg or more	2.2 Meg	6800 18K Min Sel.	0	0	.5 Meg or more	1 Meg	2200	0
V5 1st IF 6BA6	0 2.4 Meg on AVC	0	0	0	.5 Meg or more	.5 Meg or more	180 10.2K Min Sel.	-	-
V6 2nd IF 6BA6	470K	0	0	0	.5 Meg or more	.5 Meg or more	200 10.2K Min Sel.	-	-
V7 6AL5 DET. LIM. AVC	2.1 Meg	190K	0	0	.5 Meg or more	.5 Meg or more	120K	-	-
V8 6AQ5 AUDIO OUTPUT	.5 Meg	430	0	0	.5 Meg or more	.5 Meg or more	.5 Meg or more	-	-
V9 0B2 VOLTAGE REG.	.5 Meg or more	0	INF	0	.5 Meg or more	INF	0	-	-
V10 5Y3 RECTIFIER	-	.5 Meg or more	-	85	-	90	-	.5 Meg or more	-

PARTS LIST

Schematic Designation	Description	Hammarlund Part No.
	RESISTORS	
R1	22 Ohms, 1/2 W	K19309-9
R2	Potentiometer, 10,000 Ohms.	K26218-2
R3	10,000 Ohms, 1/2 W	K19309-73
R4	1,000 Ohms, 1/2 W.	K19309-49
R5	22,000 Ohms, 1/2 W	K19309-81
R6	180 Ohms, 1/2 W.	K19309-31
R8	6,200 Ohms, 1/2 W.	K19309-176
R9	47,000 Ohms, 1/2 W	K19309-89
R10	1,000 Ohms, 1/2 W.	K19309-49
R11	2.2 Megohms, 1/2 W	K19309-129
R12	6,800 Ohms, 1/2 W.	K19309-71
R13	Potentiometer, 10,000 Ohms	K15378-69
R14	2,200 Ohms, 1/2 W.	K19309-57
R15	Potentiometer, 200 Ohms	K15368-6
R16	2,200 Ohms, 1/2 W.	K19309-57
R17	1,600 Ohms, 1/2 W 5%	K19309-210
R19	180 Ohms, 1/2 W.	K19309-31
R20	5,000 Ohms, 15 W	K19330-60
R21	2,200 Ohms, 1/2 W.	K19309-57
R27	Potentiometer, 1 Meg.	K26218-3
R28	47 Ohms, 1/2 W	K19309-17
R29	2,200 Ohms, 1/2 W.	K19309-57
R30	100 Ohms, 1/2 W.	K19309-25
R31	430 Ohms, 1 W.	K19310-212
R32	22 Ohms, 1/2 W	K19309-9
R33	180 Ohms, 1/2 W.	K19309-31
R34	47,000 Ohms, 1/2 W	K19309-89
R35	2,200 Ohms, 1/2 W.	K19309-57
R36	10 Ohms, 1/2 W	K19309-1
J1	Phone jack.	K35608-1
CMC	Clock, Telechron, Auto-timer	K38874-1
	CAPACITORS	
C1, A-C	Variable, Main tuning.	P38834-1
C2, A-F	Variable, Band spread	P38335-1
C3	Variable, Antenna compensator	34454-G11
C4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15	Fixed, Ceramic disc, .01mf 600 W.V.D.C.	M23034-14
C16, 17, 18	Fixed, Silver mica, .001 mf 500 W.V.D.C.	K23006-1
C19	Fixed, Ceramic disc, .01 mf 600 W.V.D.C.	M23034-14
C20, 21, 22, 23	Variable, 1-8 mmf 500 W.V.D.C.	K23008-1
C24	Fixed, Silver mica, 430 mmf 300 W.V.D.C.	K23071-317
C25	Fixed, Silver mica, 1300 mmf 500 W.V.D.C.	K23072-60
C26	Fixed, Silver mica, 3000 mmf 500 W.V.D.C.	K23072-7
C27	Fixed, Silver mica, 1100 mmf 500 W.V.D.C.	K23011-59
C28	Fixed, Silver mica, 3300 mmf 500 W.V.D.C.	K23011-43
C29	Fixed, Silver mica, 510 mmf 500 W.V.D.C.	K23003-74
C30, 31, 32	Fixed, Ceramic disc, .01 mf 600 W.V.D.C.	M23034-14
C33	Fixed, Ceramic disc, .04 mf 600 W.V.D.C.	M23034-12
C34, 35, 36	Fixed, Ceramic disc, .01 mf 600 W.V.D.C.	M23034-14
C38	Fixed, Three-section electrolytic	K15504-62

Schematic Designation	Description	Hammarlund Part No.
	CAPACITORS (continued)	
C38A	20 mf 450 W.V.D.C. (Part of K15504-62)	
C38B	20 mf 450 W.V.D.C. (Part of K15504-62)	
C38C	25 mf 50 W.V.D.C. (Part of K15504-62)	
C41	Fixed, Ceramic disc, .01 mf 600 W.V.D.C.	M23034-14
C42	Fixed, Ceramic disc, .005 mf 1000 W.V.D.C.	M23034-10
C43, 44	Fixed, Ceramic disc, .01 mf 1000 W.V.D.C.	M23034-8
C45, 46	Fixed, Ceramic disc, .04 mf 600 W.V.D.C.	M23034-12
C47	Fixed, Discap, temperature compensating, 12 mmf	K23010-2
C48	Fixed, Ceramic disc, .01 mf 600 W.V.D.C.	M23034-14
C49, 50	Fixed, Discap, temperature compensating, 2.7 mmf	K23010-1
C51	Fixed, Discap, temperature compensating, 6.8 mmf	K23010-3
C52	Fixed, Ceramic, temperature compensating, non-insulated, 1.5 mmf	K23061-208B
	COILS	
L1	R. F. Coil Assembly (Bands 1 and 2)	K38816-1
L2	R. F. Coil Assembly (Bands 3 and 4)	K38817-1
L3	H. F. Osc. Coil Assembly (Bands 1 and 2)	K38818-1
L4	H. F. Osc. Coil Assembly (Bands 3 and 4)	K38819-1
L6	Choke, Filter, 13 Henries at 65 ma D. C.	K38827-1
	TRANSFORMERS AND IMPEDANCE ASSEMBLIES	
T1	Antenna Transformer Assembly (Band 1)	K38812-1
T2	Antenna Transformer Assembly (Band 2)	K38813-2
T3	Antenna Transformer Assembly (Band 3)	K38814-1
T4	Antenna Coil Assembly (Band 4)	K38815-1
T5, 6, 7	Transformer, 1st, 2nd, and 3rd I. F.	K38829-1
T8	Transformer, Output, Max power 5W, impedance match; 10,000 Ohms plate to 4 Ohms voice coil	K38828-1
T9	Transformer, Power, Primary 115V-60 cycle, Secondary 250-0-250V - 90 ma.	P38826-1
Z1	RC Printed Network	K38846-1
Z2	RC Printed Network	K38885-1
	SWITCHES	
S2	Power-On-Off, SPST (Part of R13, K15378-1)	
S3	OFF-REC-Q MULT., Single section, four position	K38848-1
S4	MAN.-AVC, SPST	K38857-1
S5	LIMITER, SPST	K38857-1
I1, 2	Lamp, Pilot, No. 47, 6.3V, .15A	K16004-1
M1	Meter, "S" (Carrier Level)	K26149-4


V1
6BZ6
R32
22
R33
180
C4
.01UF
R1
22
C5
.01UF
V2
6BE6
S2
BFO
C48
.01UF
Q MULT.
FREQ.
L15
C27
1100
C28
3300
C29
R12 R34
68K 47K
510
R11
2.2
MEG.
R13
10K
SELECTIVITY
R6
180
C9
.01UF
C10
.01UF
R8
6.2K
R5
22K
R3
10K
V4A
1/2 12AX7
T5
C30
.01UF
R14
2.2K
V5
6BA6
C31
.01UF
C45
.04UF
R19
180
C33
.04UF
C32
.01UF
ANTENNA
SIA FRONT
T4
T3
T2
T1
SIA REAR
C7
.01UF
SIB FRONT
C8
.01UF
C49
2.7
N220
C50
2.7
N220
R4
1K
C17
100
C11
T09
C12
C13
L2
L1
C15
.01UF
C6
.01UF
SIB REAR
C51
6.8
N22C
C2B
9.5T021
C2A
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C1A
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C47
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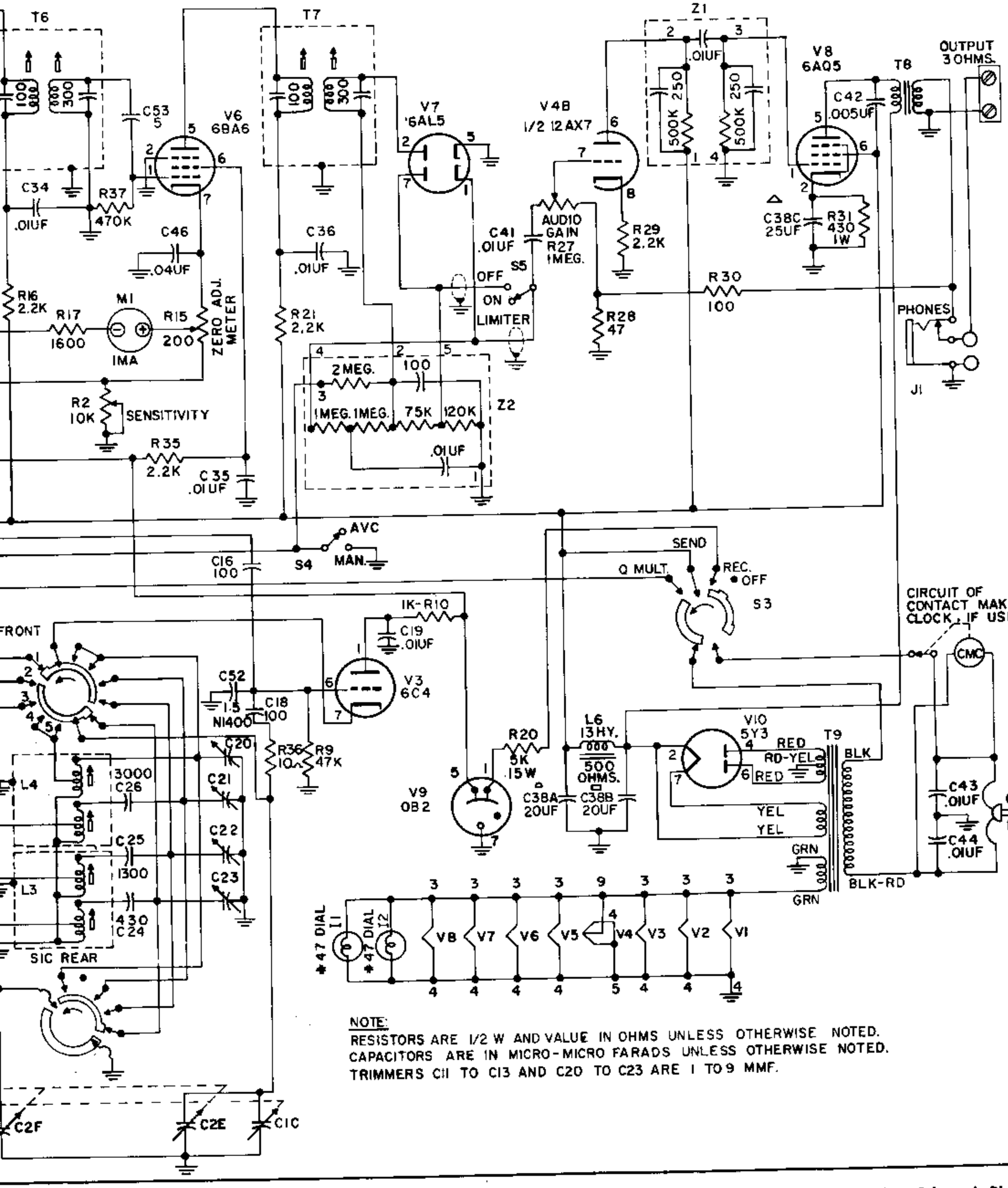
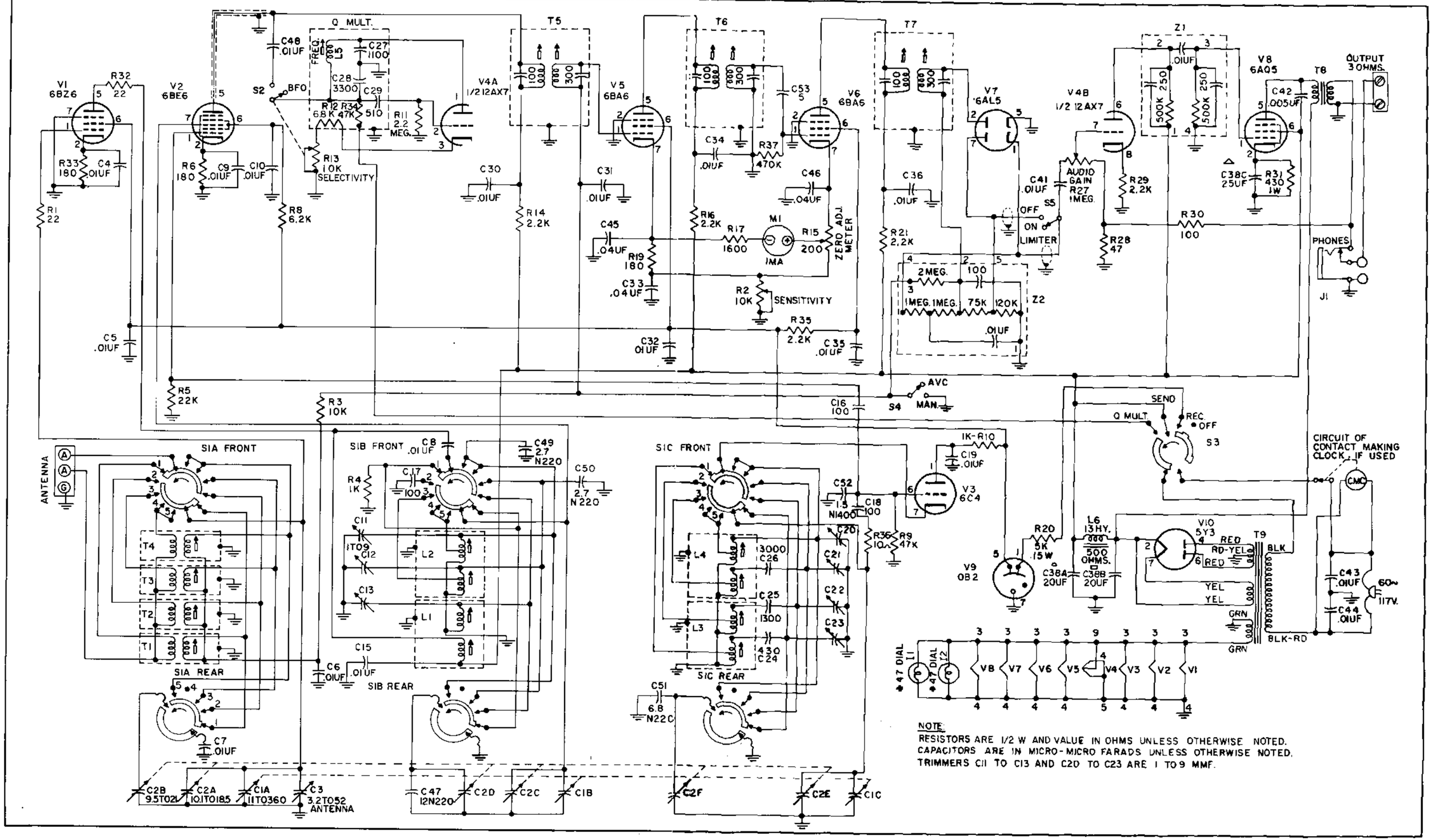
C1B



NOTE:
RESISTORS ARE 1/2 W AND VALUE IN OHMS UNLESS OTHERWISE NOTED.
CAPACITORS ARE IN MICRO-MICRO FARADS UNLESS OTHERWISE NOTED.
TRIMMERS C11 TO C13 AND C20 TO C23 ARE 1 TO 9 MMF.

Figure 10. Hammarlund HQ-100 Receiver, Schematic Diagram



NOTE:
RESISTORS ARE 1/2 W AND VALUE IN OHMS UNLESS OTHERWISE NOTED.
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