

HQ-180 INSTRUCTION BOOK ERRATA SHEET

All Hammarlund HQ-180 receivers beginning with serial number 1335 will be factory equipped with a vernier tuning control. This control is effectively a variable adjustment of the third mixer frequency. It will provide for extremely fine tuning, usefull for CW and single sideband operation, or for moving the incoming signal plus or minus 3 Kc. from the passband center as indicated on the front panel.

Normally the vernier tuning should be set at 0 Kc. and the bandsread dial employed for tuning as outlined on page 9 of your operating instruction manual. Once the desired signal has been tuned in with the bandsread dial for maximum volume, you may utilize this vernier tuning adjustment, either plus or minus from its 0 Kc. setting in order to obtain optimum intelligibility.

Referring to page 4, fig 5, in the operating instruction manual, "Location of Controls", these changes are in effect:

1. Control #4, the slot depth control is now located inside the cabinet, on a bracket, behind the slot frequency control. The slot depth control can be adjusted in accordance with the procedure on page 6 of the instruction manual, by lifting the top lid of the receiver cabinet. Once the maximum null position for this slot depth control has been found, it will not require any further adjustment.

2. Control #6, the beat frequency oscillator adjustment is located in the position originally occupied by the slot depth control.

3. The new vernier tuning control now occupies the position on the front panel where the beat frequency control had been formerly.

Changes to be made on schematic diagram, page 23:

The added vernier tuning variable capacitor, C156, 24uuf should be shown wired in parallel with capacitor C29.



ESTABLISHED 1910

The Hammarlund Manufacturing Co., Inc.

460 WEST 34TH STREET · NEW YORK 1, N.Y.

Dear OM:

This is to announce that we are now making available for all Hammarlund HQ-180 owners, a vernier tuning modification kit. This vernier tuning control will allow for extremely fine tuning, plus or minus 3 Kcs. of center frequency. This will be very useful for CW and single sideband operation. This vernier tuning is not a new mechanical gear reduction on the existing bandspread dial. Instead by means of a new front panel control it will provide passband tuning. Its operation is similar to the vernier tuning control on the HQ-170 series of receivers.

The installation of this vernier tuning control in your present HQ-180 receiver can be accomplished with a minimum of time and effort on your part. The attached step by step instructions describing this revision will show how relatively simple the entire procedure is.

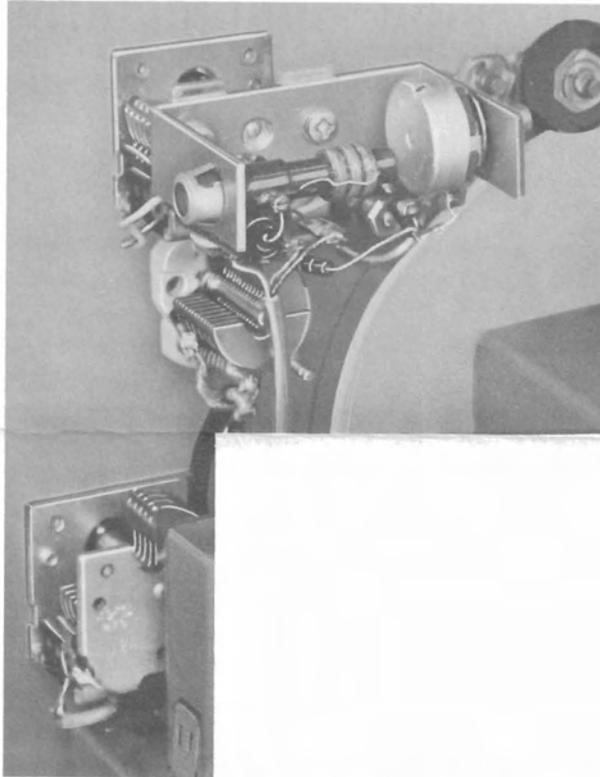
This vernier tuning kit for the HQ-180 receiver, complete with all the necessary instructions and parts, can be ordered direct from our factory; The Hammarlund Mfg. Co., Inc., Mars Hill, North Carolina, by requesting part #42188-G1. The price is \$6, prepaid in the U.S., or it may be shipped C.O.D. if you wish.

Trusting this information will be of service to you, we remain

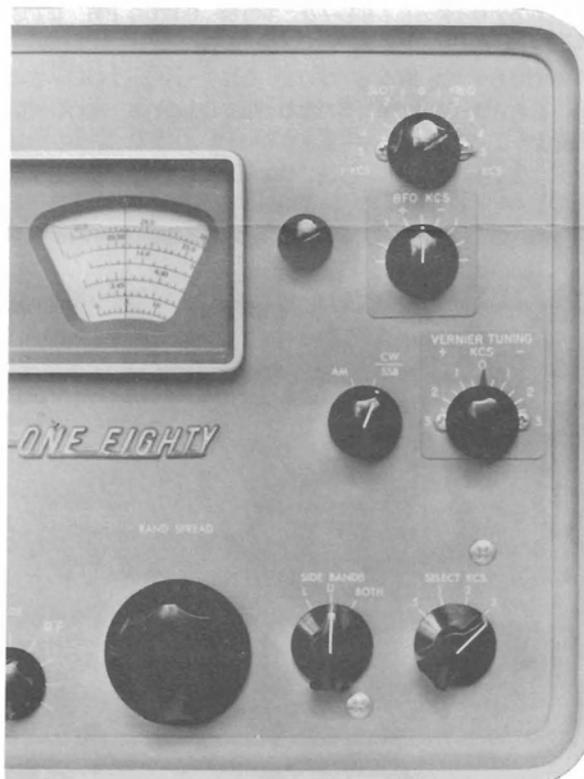
Yours very truly,

THE HAMMARLUND MFG. CO., INC.

Frank I. Lester, W2AMJ
Communications Products



This illustration is a rear view of the receiver panel after modification. Notice new bracket for slot depth control and slot filter coil. Also note position of new added variable capacitor for B. F. O. and new vernier tuning capacitor assembly.



This illustration is a front view of the receiver panel after modification showing the new location of the controls and the new dial plates.



Vernier Tuning Modification for HQ-180

I.

1. Remove receiver from its cabinet.
2. Remove knobs from Slot Depth, "BFO," and "Select KCS" controls.
3. Remove Slot Depth potentiometer R-26 from panel and carefully fold it back away from the panel.
4. Unsnap the Slot Frequency coil L-3 from the bracket on the Slot Frequency Capacitor C-26. This is accomplished by pressing the two tabs on the metal mounting cap toward the coil form and then pushing on the metal mounting cap to release it from the bracket.
5. Remove the bracket from Slot Frequency capacitor C-26.
6. Assemble the Slot Depth potentiometer R-26 to the new bracket supplied. Holding the bracket horizontal and with the open side towards the rear of the receiver the potentiometer mounts on the left side with the shaft pointing towards the center of the receiver.
7. Screw the bracket to the Slot Frequency capacitor C-26.
8. Snap the Slot Frequency coil L-3 into the right side of the bracket so that the coil is inside the bracket. This completes step one of the conversion and can be a stopping-off place if the conversion is to be done in several sessions. The receiver will be operable by replacing the knobs.

II.

1. Unsolder the coax cable from the BFO capacitor C-129.
2. Remove C-129 from the panel. The panel may be pulled forward slightly and the capacitor rotated to facilitate removal.
3. Mount the new BFO capacitor supplied in the hole in the panel previously occupied by the Slot Depth control. The new BFO dial plate should be mounted under the nut and held straight while the nut is tightened.
4. The coax cable which was unsoldered from the old BFO capacitor should be pulled through the hole in the chassis from the bottom and then pulled to the rear of the chassis to its origin on T-28. It should now be routed towards the front of the chassis alongside the main cable. Loosen the cable clamp at the front of the chassis near the oscillator section, put the coax cable under it and then re-tighten. The coax should now be fed through the hole in the chassis near the gate tube V18. It should be dressed over towards the side of the chassis around switch S7 and up to the new BFO capacitor. The center conductor is soldered to the stator and the shield to the rotor wiper.

This completes Step 2 of the conversion and may serve as a resting point. The receiver will be operable by replacing the knobs.

III.

1. The Vernier Tuning Capacitor and cable assembly is to be installed in the panel position formerly occupied by the BFO capacitor.
2. Pass the coax cable through the chassis hole directly under the panel hole and assemble the capacitor and dial plate to the panel, using the screws from the old BFO capacitor but not the lock-washers.



3. Loosen the nut holding the selectivity switch to the bracket and carefully push the switch towards the rear of the chassis so that the bottom of L4 may be seen between the switch and the chassis skirt.
4. Solder the center conductor and shield braid of the coax cable to L4 (using a small iron) as shown in Fig. 1.
5. Push the selectivity switch back in position and tighten the nut.
6. Place the metal pointer on the vernier tuning capacitor shaft. (Section nearest the panel.) Set the pointer to the "O" with the capacitor at half mesh.
7. Replace all knobs.

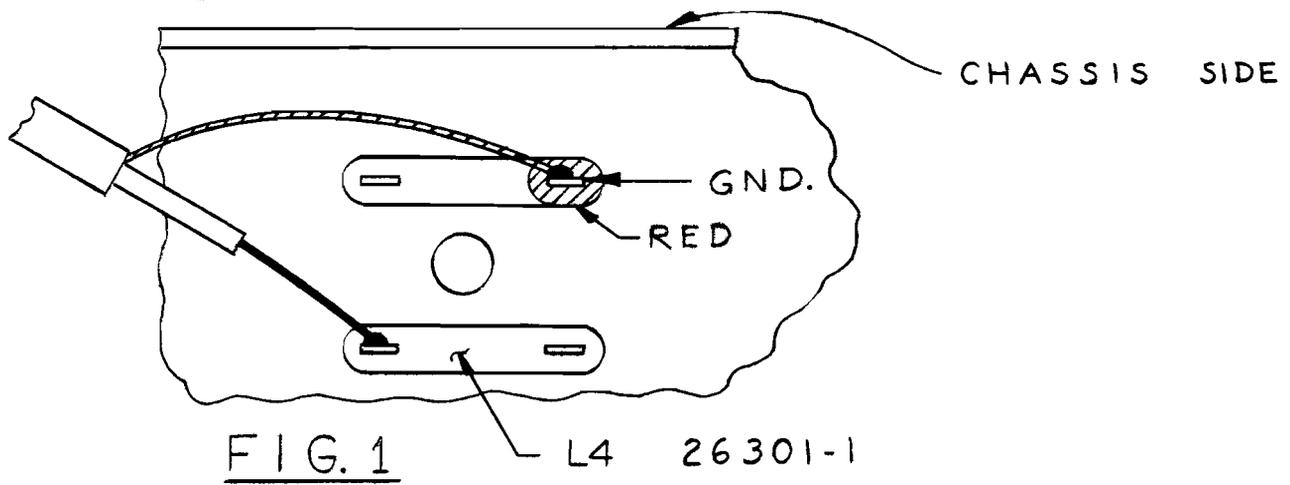
Alignment

Due to the added capacitance of C156 the vernier tuning capacitor, the dial calibration will be affected to a minor degree. To compensate for this, in addition to maintaining former dial accuracy, use the following procedure. Before making this modification tune in the 2.1 mc calibration signal and adjust the movable hairline or fiducial for accurate calibration. Leave the tuning dial in this position, or make a careful note of the dial reading, so that it can be re-set to this position. After this modification has been completed adjust the coil slug in L4 as per the following instructions until the crystal calibrator signal is heard on the same exact position it was prior to modification.

1. Position of controls.

- | | |
|--|---|
| a) Noise Limiter Off | b) Band Spread - 100 |
| b) AVC Fast | i) Side Bands - UPPER |
| c) Function - Cal. | j) Selectivity - .5 |
| d) Main Tuning - 2.1 Mcs. | k) Function Switch - CW/SSB |
| e) AF - to suit | l) Vernier Tuning - center |
| f) Tuning Range - 2.05 - 4 mcs. | m) BFO - center |
| g) R.F. - to suit (approximately 9:00 o'clock) | n) Slot Frequency - extreme counter clockwise |

2. Tune in the signal from the 100 KC calibrator at 2.1 Mcs by adjusting the slug in L4. This should be accomplished by turning the slug counter clockwise for maximum "S" meter reading.
3. Adjust the slug in T-28 for zero beat.
4. Check Slot Depth action as per instructions page 6 of the HQ-180 Manual and adjust if necessary.



CHANGES TO
 TECHNICAL DESCRIPTION AND OPERATING INSTRUCTION MANUAL NO. 52787-1
 HQ-180 SERIES COMMUNICATIONS RECEIVERS

Page 8 and Page 26

Change Crystal Frequency Chart to read as follows:

SIGNAL FREQUENCY Range mc.	ADD IF---- Freq. mc.	SUBTRACT IF---- Freq. mc.	MODE OF OPERATION
0.540 to 1.05	.455000		Fundamental
1.05 to 2.05	.455000		Fundamental
2.05 to 4.0	.455000		Fundamental
4.0 to 7.85	.455000		Fundamental
7.85 to 15.35	3.035		Fundamental
15.35 to 20.662	3.035		Fundamental
20.662 to 30.0		3.035	2nd Harmonic

Page 30

Make the following change to Detector, BFO and Noise Limiter Circuit Diagram:

1. Capacitor C124 was connected from junction of R73 and R74 to junction of R72 and R74. This capacitor (C124) is now connected from junction of R72 and R74 to ground.

CHANGES TO HQ-180A SCHEMATIC DIAGRAM

C--NOT C

1. Change R3 from 6.8K-1/2w to 6.8K 1w.:by S2G rear-V2 screens
2. Change R19 from 1.5K-1/2w 10% to 1.5K-1/2w 30%: not necessary
3. Change R20 from 300 ohm-1/2w to 1.5K-1/2w:S-meter zero adjust
4. Change R22 from 820 ohm-1/2w to 470 ohm-1/2w:By S-meter
5. Change R33 from 68 ohm-1/2w to 390 ohm-1/2w:V7
6. Change R47 from 1K ohm to 2.2K: below V10
7. Change R53 from 2K-10w to 4K-10w or 25w:V14
8. Change R61 from 330K-1/2w to 820K-1/2w:S6, Sect 1, front
9. Change R67 from 330K-1/2w to 820K-1/2w:S6, Sect 2, front
10. Change R88 from 2700 ohm-1/2w to 2.7k:not necessary
11. Change R99 from 1K-1/2w to 2.2K-1/2w:V17
12. Delete capacitor C6 .01 mf.:not necessary
13. Add capacitor C158 .01, from pin 7 of V17 (6BA6) to ground

CHANGES TO PARTS LIST

Page 67

1. Delete capacitor C6 .01 mfd 600v.

Hammarlund Part No.

1509-01-01011

Page 68

1. Add capacitor C158 .01 mfd 600v.

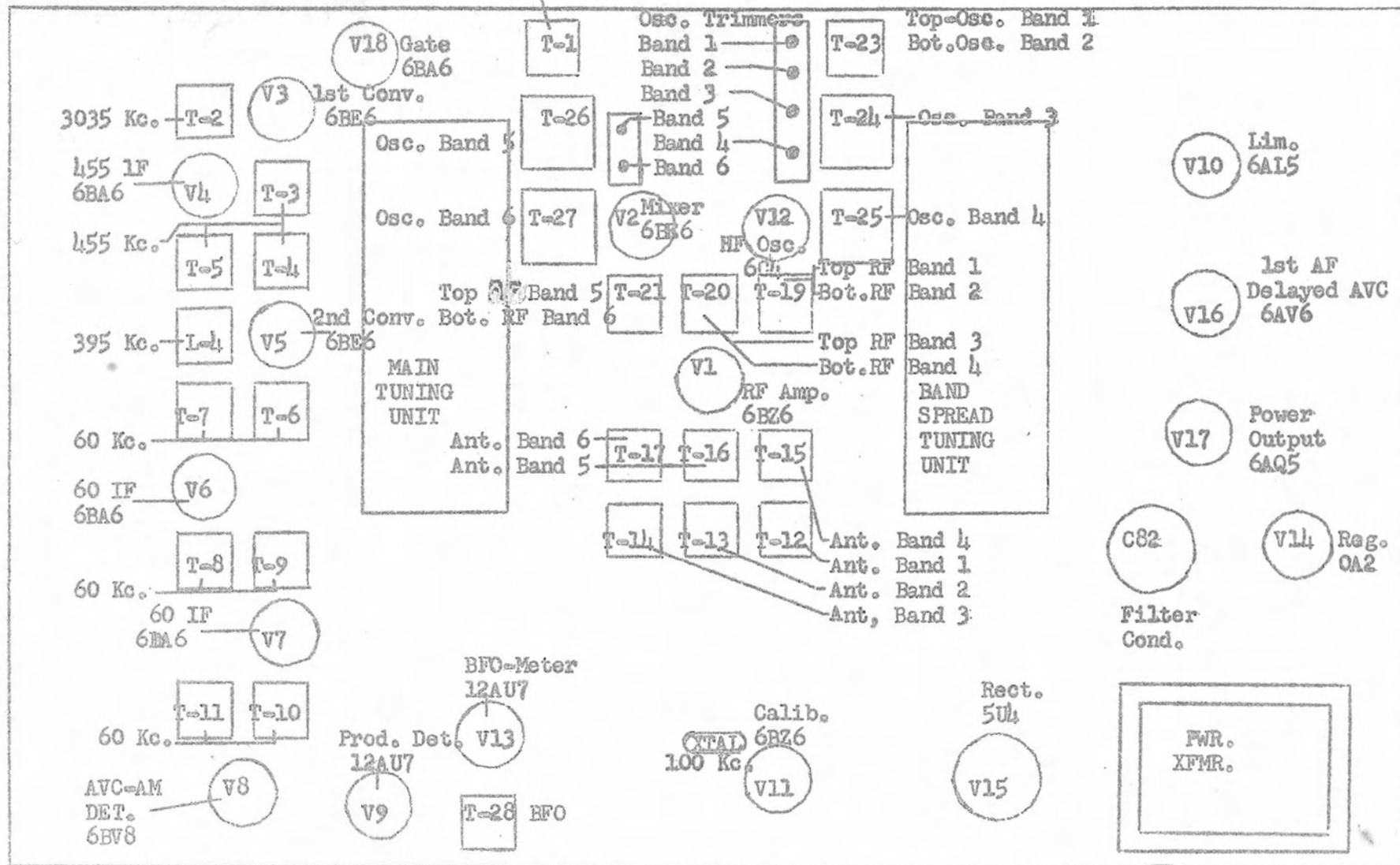
1509-01-01011

* 3. and 4. above were tried and improved meter accuracy was noted. The mod gave nearer to 6db/s-unit.

TUBE COIL TRIMMER TRANSFORMER LAYOUT FOR HQ-180

Top 455 Kc.
Bot. 3035 Kc.

TOP VIEW



11-5-59 *LD*

HQ-180 ERRATA SHEET

May 6, 1960

1. The figures 15.0 and 30.0 under C149 and C148 respectively are interchanged. Fig. 9, Page 11.
2. Parts List Page 18.
 - a. In the grouping beginning with C4, delete C39.
 - b. Add C39 to C42, 500 mmf disc. K-23034-13.
 - c. In the group beginning with C48, delete C128.
 - d. In the group beginning with C102 add C153, C154, C155.
 - e. Following group C126, C127 add C128 Fixed ceramic disc. .001 mfd 500 W.V.D.C. Part No. K-23034-30.
3. Parts List Page 19.
 - a. In the group beginning with R5 add R80.
 - b. In the group beginning with R10 add R107.
 - c. Delete R38, 150K ohms 1/2 W. 10% Part No. K-19309-101.
 - d. Delete R80, 100 ohms 1/2 W. 10% Part No. K-19309-25.
4. Figure 12 Schematic Diagram.
 - a. Add R107, 100K, shunting the terminals of the lower coil in T1.

FIELD MODIFICATION

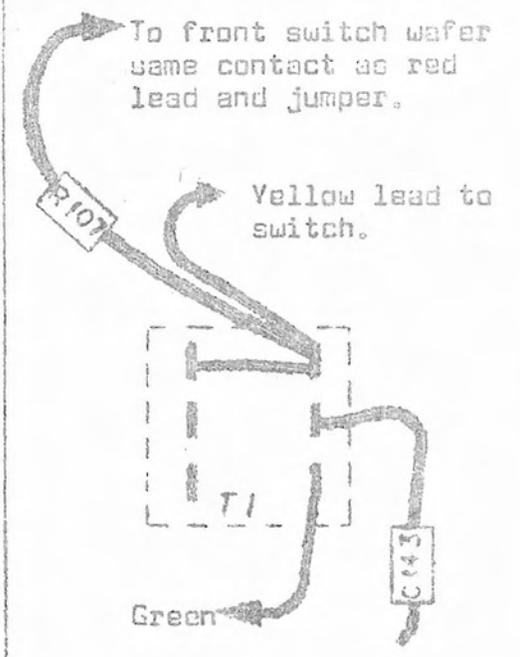
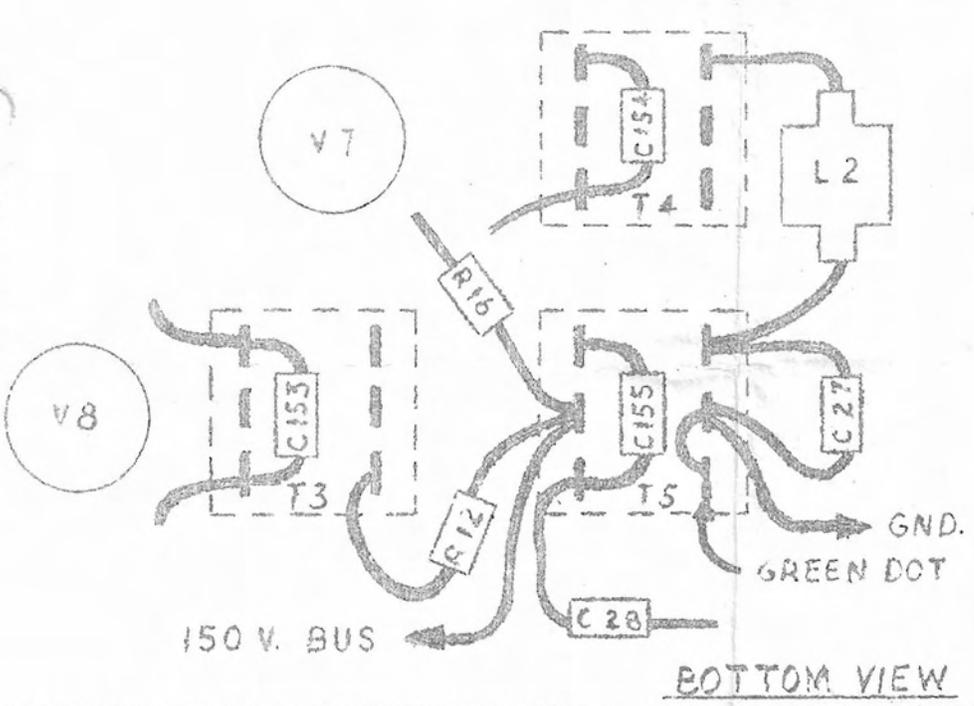
HQ-1⁸⁰ Errata Sheet

Feb. 18, 1960

1. The figures 15.0 and 30.0 under C149 and C14⁸ respectively are interchanged. Fig. 9, Page 11.
2. Parts List Page 1⁸.
 - a. In the grouping beginning with C4, delete C39.
 - b. Add C39 to C42, 500 mmf disc. K-23034-13.
 - c. In the group beginning with C48, delete C128.
 - d. In the group beginning with C102 add C153, C154, C155.
 - e. Following group C126, C127 add C12⁸ Fixed ceramic disc. .001 mfd 500 W.V.D.C. Part No. K-23034-30.
3. Parts List Page 19.
 - a. In the group beginning with R5 add R80.
 - b. In the group beginning with R10 add R107.
 - c. Delete R3⁸, 150K ohms 1/2 W. 10% Part No. K-19309-101.
 - d. Delete R80, 100 ohms 1/2 W. 10% Part No. K-19309-25.
4. Figure 12 Schematic Diagram.
 - a. Add R107, 100K, shunting the terminals of the lower coil in T1.

HQ-180 FIELD MODIFICATION

FRONT PANEL



NEW ADDITIONAL PARTS REQUIRED

PART NO.	DESCRIPTION	PART NO.	DESCRIPTION
C39	1-Pt.#K23034-13 500 mmf discap	R80	1-K19309-260 180 ohm 1/2 W
C153,154,155	3-K23006-21 9 mmf Dur-mica	R107	1-K19309-97 100K 1/2 W
C128	1-K23034-30 .001 discap		

- 4B. Reverse the connections to the secondary terminal of T5. These are the two terminals towards the center of the chassis. The (green) rear terminal is to be connected to chassis and the front terminal is connected to C28, 7 mmf. This capacitor lead should be clipped close to the terminal and extended with a piece of #22 bare wire. The splice should be soldered and protected by a piece of sleeving approximately 3/4" long.
- 4C. Connect and solder, 3, 9 mmf Dur-mica capacitors K-23006-21, one each, between the high terminals of the primaries and secondaries of T3, T4 and T5. Note that these terminals are the two outside terminals at the front of each of the three transformers, i.e. toward the front panel of the receiver.
(The following changes 4D to 5 not shown on above diagram.)
- 4D. Connect .001 mfd ceramic disc K-23034-30 between pin 7 of V16 and chassis.
- 4E. Remove the 100 ohm resistor, R80, located at the audio gain control, and replace it with 180 ohm 1/2 w. resistor K-19309-260.
- 4F. Remove the .01 mfd Capacitor C39 from between pins 3 and 7 of V8 and replace it with 500 mmf ceramic disc K-23034-13.
- 4G. Remove the yellow-black lead from the rear terminal of the terminal strip, located between V8 and V9 sockets and reconnect it to the front terminal of this strip, at the junction of L8 and C44.

IMPORTANT NOTICE AND OPERATING INFORMATION

DUE TO RECENT CIRCUIT CHANGES, THE "S" METER WILL INDICATE RELATIVE SIGNAL STRENGTH OF THE INCOMING SIGNAL ONLY WHEN THE AVC SWITCH IS SET TO THE FAST, MEDIUM, OR SLOW POSITIONS, WHICH MAY PROVE DESIRABLE FOR CW OPERATION.

SINGLE SIDEBAND

IN ORDER TO OBTAIN OPTIMUM RECEPTION OF SSB AND ALLOW PROPER SIDEBAND SWITCHING, THE BFO FREQUENCY MUST BE ACCURATELY ZEROED TO THE CENTER OF THE IF PASSBAND.

THIS CAN BE DONE IN THE FOLLOWING MANNER:

SET THE SIDEBAND SELECTOR ON LOWER; SELECTIVITY SWITCH ON .5 KCS; FUNCTION SWITCH ON AM; AND THE SEND/REC/CAL SWITCH ON CAL; CAREFULLY TUNE IN THE CRYSTAL CALIBRATOR SIGNAL PREFERABLY ON THE 160 METER BAND FOR A PEAK "S" METER READING. NOW, PLACE THE FUNCTION SWITCH ON CW/SSB AND SLOWLY ADJUST THE BFO CONTROL FOR ZERO BEAT WITH THE INCOMING SIGNAL. THE SIDEBAND AND SELECTIVITY CONTROLS CAN NOW BE RETURNED TO THEIR NORMAL POSITION.

ONCE THE BFO HAS BEEN PROPERLY SET IN THE ABOVE MANNER, IT WILL REQUIRE NO FURTHER ADJUSTMENT OF SSB OPERATION. ALL SIDEBAND SWITCHING CAN BE ACCOMPLISHED WITH THE APPROPRIATE CONTROL. FAILURE TO OBSERVE THE PRECAUTION WILL RESULT IN ONE SIDEBAND BEING FAVORED AND DEGRADED SSB PERFORMANCE.

HQ-180 TEST PROCEDURE

1. Voltage Measurements
2. Resistance Measurements
3. 60kc IF & BFO Alignment
4. 3035kc IF Alignment
5. 395kc Oscillator Adjustment
6. 455kc IF Alignment
7. HF Oscillator & RF Alignment
8. Performance Measurement
9. Air Test

Alignment tools required; General Cement Co. #5097 or equal, General Cement Co. #8282 or equal, thin blade, insulated alignment screw driver.

Front panel Controls: Unless otherwise specified, all front panel controls shall be as follows for the alignment and test of the receiver.

KNOB FUNCTIONNOMINAL POSITION

Band selector switch	7.85-15.35mc band
Band spread tuning	100 on arbitrary scale with all set at center
AM-SSE/CW switch	AM
Sideband selector	Both
Selectivity	1 Kc.
Slot frequency	Counterclockwise
Slot depth	As required
BFO	Center
Noise limiter	Off
AVC	Off
Antenna compensator	As required
Send-Rec-Cal	Rec
AF gain & RF gain	As required
Clock function switch	On

Voltage Measurements: All voltage measurements are to be made with a VTVM with the ground terminal of the voltmeter connected to the receiver chassis. Typical readings and the conditions under which made are shown in Table 1.

Resistance Measurements: All resistance measurements are to be made with the ground side of the ohmster connected to the receiver chassis. Typical readings are shown on Table 2.

60 KCS and BFO Alignment: Turn the sideband switch to Lower and the selectivity switch to .5 Kc. Connect an unmodulated 60kc signal source to the junction of C-28 and T-5. Connect the VTVM between the junction of L8 and C44 and chassis. Peak T6, T7, T8, T9, T10 and T11 for maximum negative voltage, keeping the output level at approximately -4 volts. Adjust the input and the RF gain control to prevent overloading, and follow this procedure on all subsequent alignments. If no voltmeter reading is obtained with large amounts of input signal level, then connect the 60kc signal source to pin 1 of V7 and peak T10 and T11. Then connect the signal source to pin 1 of V6 and peak T8, T9. Re-connect the signal source to the junction

Turn the AM-SSB/CW switch to SSB/CW checking that the BFO control is on)0) and its capacitor is at mid range and adjust T-28 for zero beat.

3035kc IF Alignment: Connect the sweep frequency alignment generator output to the grid pin 7 of V2, 6BE6 mixer and set its frequency selector switch to 3035kc. Switch the AM-SSB/CW switch to AM the sideband switch to both and the selectivity switch to 3kc. Turn the RF gain control to minimum. Connect a demodulator probe to the junction of pin 5 of V3 and T-3, at T-3, and its ground clip to chassis. Connect the probe cable to the vertical input of the scope and the sync cable of the generator to the ext. sync terminals of the scope. Peak the bottom coil in T-1 and peak T-2 and adjust the sweep generator frequency for co-incidence of traces, particularly the sides, adjusting the phasing capacitor C79 for co-incidence. It will be noted that there are two possible curves of different width and amplitude; the lower and wider curve is the proper one. Check the bandwidth by the height and width of the curves and by the sweep. The 6db bandwidth should be approximately 10kc.

395kc Oscillator Adjustments:

Leave the frequency setting (3035) of the sweep generator as determined above. Remove the probe cable from the scope, and connect the vertical scope terminals of the scope to the junction of L8 and C114. Peak L4 for coincidence of traces.

455kc IF Alignment: With the same conditions established above adjust the top and bottom cores of T3, T4 and T5 for maximum amplitude. Check that the slot frequency capacitor is set at mid range with the control knob at 0 and adjust the slug in L2 slot frequency coil for coincidence of the slot traces, increasing the input signal as required. Check the slot depth control for maximum depth of slot.

RF Oscillator & RF Alignment: Leave the scope connected as in 395 kc oscillator adjustment above. Remove the sweep generator output connection from pin 7 of V2 and connect the generator cable to the Antenna and Ground terminals of the receiver. Make sure that the cal set has the window indice of the bandspread at the center mark and that the bandspread dial is at 100 of the arbitrary 0-100 logging scale. Set the antenna compensator approximately 30 degrees to the left of center (about 10 o'clock). Turn the bandswitch to .54-1.05mc and set the Main Dial to .60mc. Adjust the top slug of T23 for maximum coincidence of traces. Adjust the top of T12 and T19 for maximum amplitude. Note that the proper position of the slugs in the antenna transformer is the upper one. Check that the cores are adjusted in the upper position (for each antenna coil). While properly adjusted for the .60mc signal, adjust the top slug in T1 for maximum amplitude. Switch the generator to 1.0mc. Adjust C114, C53 and the ant compensator for maximum amplitude and coincidence of the traces. Note the two positions of the Ant compensator pointer for the two test frequencies of the band. They should be both within the range of the control and approximately centered i.e. approximately equally spaced either side of vertical. If not re-set the control knob as necessary and readjust the antenna coil slug T12 in this case to correct same. Repeat the .60 and 1.0mc alignments until no further improvements can be noted. Finish with high end adjustments.

Switch the signal generator to 1.1mc set the main dial to 1.1 mc and the band change switch to 1.05-2.05mc Adjust T23 for coincidence of traces, and T19 and T13 for maximum amplitude. Follow the same procedure for T13 and the setting of the ant compensator as above. Switch the generator to 2.0mc, set the Main dial to 2.0mc and adjust C115 for coincidence of traces and C54 the antenna compensator for maximum amplitude. Repeat the two alignment frequency adjustments until no further improvement results. Finish with the high freq end adjustments. With the band switch on 2.05-4.04 switch the generator to 2.1mc and adjust T24 for coincidence of trace and T14 and T20 for maximum amplitude. The other bands are aligned in a similar manner making sure that the proper oscillator coil and trimmer are set

HQ-180 TYPICAL PERFORMANCE MEASUREMENTS

Selectivity: Connect the equipment in the same manner as in the 60Kc IF alignment. Use -3 volts dc as the reference. Record bandwidth and center frequency on all positions. Typical results are given in the following table:

<u>Sideband Switch</u>	<u>Select. Kc</u>	<u>Bandwidth Cycles</u>	<u>Center Freq. Appx.</u>
Lower	.5	less than 600	60.0
Lower	1.0	800-1000	60.5
Lower	2.0	1700-2000	61.0
Lower	3.0	2600-3000	61.5
Upper	1.0	800-1000	59.5
Upper	2.0	1700-2000	59.0
Upper	3.0	2600-3000	58.5
Both	1.0	1600-2000	60.0
Both	2.0	3400-4000	60.0
Both	3.0	5200-6000	60.0

Note: Observe flatness in the 3kc both sideband position. The peak to valley ratio should not be more than 2db (peak at -3 volts and valley at -2.4 volts). The three peaks should be within one db of each other. See the HQ-180 manual for the ideal curve.

Sensitivity: A series, composition type dummy antenna resistor of such value as to make the sum of the resistor and the output impedance of the signal generator equal to approximately 75 ohms. The signal to noise output power shall be 10:1 for sensitivity and image rejection ratios. Both sidebands and 3kc shall be used. The controls shall be RF gain maximum; AF gain adjusted for signal to noise ratio; limiter off and am-ssb/cw switch on AM. Except where otherwise required 400cps modulation 30% shall be used for all AM sensitivity and image rejection ratio measurements.

Typical RF performance table

<u>Frequency Mc</u>	<u>AM Sensitivity uv.</u>	<u>Image ratio rej.</u>	<u>Image freq mcs</u>
.60	1.9	13500	1.91
1.0	2.0	"	"
1.1	1.7		
2.0	1.8	2400	2.91
2.1	1.4		
4.0	2.0	500	4.91
4.0	1.8		
7.85	1.5	150	8.76
7.85	1.3		
15.0	1.3	650	21.07
15.5	2.5		
21.9	2.0	430	
28.0	2.0		

At 4.5mc; CW sensitivity .3uv; power sensitivity 1 watt output, 1uv input

Dial Calibration: The calibration of both the main and bandspread dials should be held within plus or minus $\frac{1}{2}$ dial division when the dials are correctly positioned on the capacitor and the Cal Set index is at its nominal center. If the main dial

and 27.9-29.7 mc calibrations are off, carefully adjust the front section plates of the HF osc bandspread capacitor. If the 14.0-14.4 mc calibration is off carefully adjust the middle section serrated plates of the HF osc bandspread capacitor. If the 3.5-4.0 mc calibration is off, adjust the rear section of the HF osc bandspread capacitor.

Stage gain checks for reference in trouble shooting

With VTVM at junction of L8 and C44, .4 volts constant output, the microvolts input is approx as follows. RF gain at max, selectivity .5kc; upper sideband
Note in all these checks the signal generator is connected through a .01 series blocking capacitor.

300,000 uv at junction of T9 and C37 (green lead on switch, 60kc)
150,000uv..... at pin #1 of V6 (60kc)
33,000uv..... at junction of T5 and C28 (60kc)
25,000uv..... at junction of T5 and C28 (455kc)
2800uv..... at pin #1 of V4 (455kc)
2000uv..... at pin #7 of V3 (3035kc) 7.85-15.35 band
1600uv at pin #1 of V18 (455kc) .54-1.05 band
330uv..... at pin #7 of V2 (3035kc) 7.85-15.35 band
500uv..... at pin #7 of V2 (455kc) .54-1.05 band
With VTVM at pin #7 of V2, AC probe and RF gain max, Main dial and antenna compensator tuned to test frequency, the overall RF gain should be such as to produce 1.0 volts (at the mixer grid) as follows (approx.)

<u>Freq. Mcs</u>	<u>Antenna Input in uv.</u>
.8	8400
1.5	4000
3.0	5000
6.0	5800
12.0	13000
23.0	26000

With standard output meter at speaker terminals and set for 3.2 ohms impedance the overall power gain should be such to produce 1.0 watt output with the input to the antenna terminal through dummy resistance as follows;

<u>Freq. Mcs</u>	<u>Antenna Input in uv.</u>
.8	1.2
1.5	1.2
3.0	1.0
6.0	1.0
12.0	1.0
23.0	2.4

Audio frequency typical measurements; .1 volt at 1000 cycles input to the high side of the AF gain control with the control at maxima should produce 1.0 watt output into a 3.2 ohm load. The hum level across the 3.2 ohm load should not exceed .003 volts.

ADDENDA HQ--180AX

The following addenda information together with the basic manual, Issue #4, of the HQ-180 takes care of the modification to the new Hammarlund HQ-180AX series.

The HQ-180AX differs from the previous model in the following respects:

1. The power supply is now designed for 115/230 v. 50,60 cycle AC operation. This applies to the power transformer T-30 and the new filament transformer T22.

2. A separate filament transformer is now employed T-22 in the schematic diagram. This transformer provides 24 hour a day operation of the heaters of the high frequency oscillator and first converter, to reduce initial warm up drift. In addition, this transformer also supplies the accessory socket which is a new added feature.

3. A new accessory socket previously mentioned plus a systems socket has been added. The accessory socket may be used to power most 6 and 2 meter converters. The systems socket will be found convenient when the HQ-180AX series of receiver is employed in conjunction with a transmitter since all of the necessary VOX anti trip and/or relay connections are available from this socket. This also provides a rapid disconnect without the need of tools once the installation has been completed properly. A Coordination Cable is available for use with the HQ-180A or HQ-170A series of receivers designed primarily for use with the HX-50 Hammarlund transmitter but useable with other transmitters as well. This is part #PL39286-G1 at \$8.50.

4. A new three (3) position BFO switch is now provided enabling the BFO to be in the off position, SSB, where the BFO is fixed for optimum SSB audio response with reference to the pass band. The CW position enables the BFO to be adjusted plus or minus 2 KC thus providing the usual pitch control adjustment. For CW reception, the BFO should always be set plus or minus 500 cycles to 1000 cycles especially in the .5 KC selectivity position so as to prevent detuning of the desired signal for the desired pitch.

5. 3.2 ohms and 500 ohms output terminations are now provided for voice coil or line operation. The 500 ohm line termination will be found very advantageous for phone patch and improved anti trip operation of most VOX circuits.

6. The 5U4G tube formerly used in the HQ-180 has now been replaced with two (2) silicon diode rectifiers thus providing cooler operation and better regulation from the power supply.

7. The HQ-180AX series of receivers provides an 11 position fixed frequency crystal oscillator assembly which is factory installed in the panel space provided for the 24 hour clock timer. Two knobs are on this assembly; one allows selection of normal variable frequency tuning or any one of eleven fixed frequencies crystal controlled. Six crystals are mounted on the front plate of the oscillator assembly and may be changed quite readily to shift frequency. The remaining 5 crystals are mounted behind the front panel on the oscillator box and may be changed by lifting the top cover of the cabinet. It is intended that the five inside crystals will be for commonly used channels not subject to being changed very often. The receiver can be zeroed into the channel frequency by manipulating the vernier tuning control on the front panel. This will correct for frequency discrepancy due to crystal tolerance and assure accurate "netting".

The use of the crystal controlled oscillator will permit the highly stable reception of signals on the eleven channels selected. The only operation required beside turning the selector switch to the desired crystal position is to turn the band switch to the required position and tune the main dial to the approximate frequency rocking the knob finally for maximum "S" meter indication.

In order to ensure proper operation the crystals should be ordered from your local authorized Hammarlund distributor.

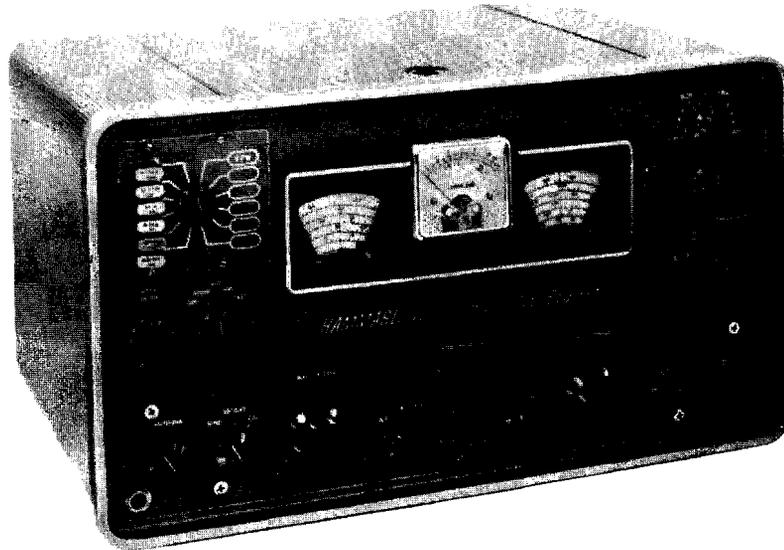
A new schematic diagram, chassis layout and crystal formula chart are attached herewith covering the new model HQ-180AX. In addition to the aforementioned changes, the HQ-180A series of receiver employs our new, more attractive finish.

This addenda is supplied in addition to the HQ-180 manual since all of the information on the former model applies to the new model with the exception of the BFO switch functions explained above. Also, included herewith will be found an addenda to the parts list in the HQ-180 manual.

The oscillator or actual crystal frequency for a given signal frequency shall be determined from the following:

<u>SIGNAL FREQUENCY</u> <u>RANGE mc</u>	<u>ADD IF -----</u> <u>FREQUENCY mc</u>	<u>SUBTRACT IF-</u> <u>FREQUENCY mc</u>	<u>MODE OF</u> <u>OPERATION</u>
.54 to 1.05 mc	.455000		Fundamental
1.05 to 2.05 mc	.455000		Fundamental
2.05 to 4. mc	.455000		Fundamental
4.0 to 7.85 mc	.455000		Fundamental
7.85 to 15.35 mc	3.035		Fundamental
15.35 to 20.662 mc	3.035		Fundamental
20.662 to 30.000 mc		3.035	2nd Harmonic

NOTE: WHERE LOW SIDE INJECTION IS SPECIFIED, HIGH SIDE INJECTION MAY BE USED AT REDUCED SENSITIVITY.



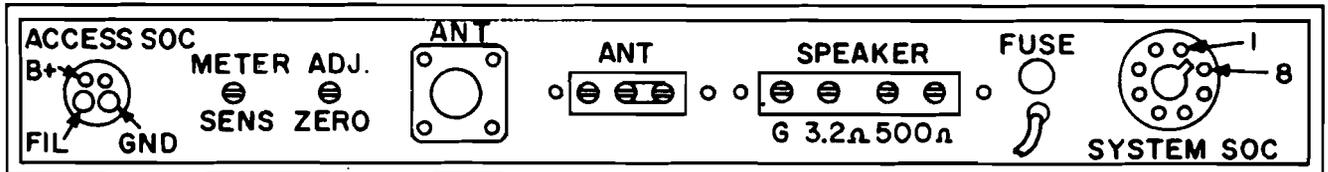
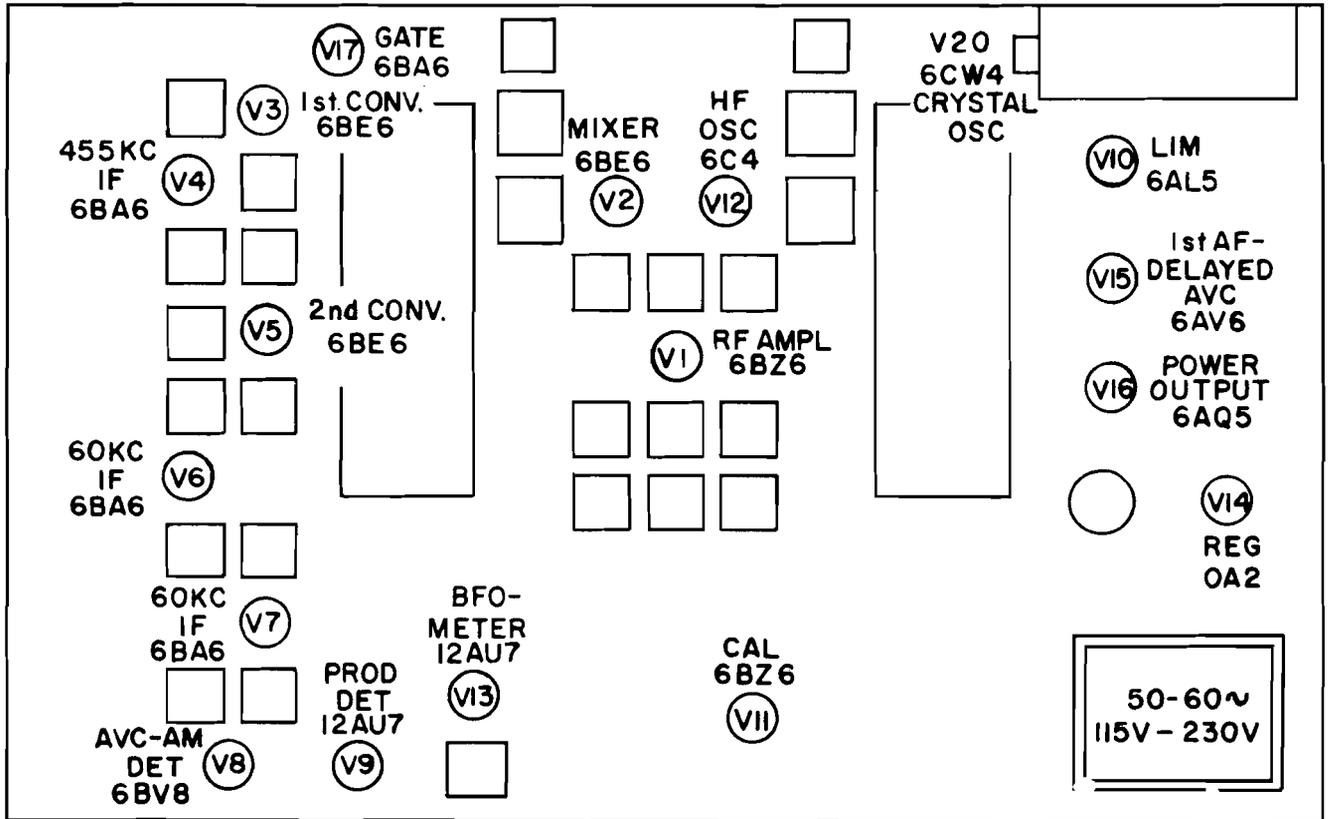
The HQ-180AX Communications Receiver

ADDENDA
PARTS LIST

SCHEMATIC DESIGNATION	<u>DESCRIPTION</u>	<u>HAMMARLUND PART NO.</u>
C159	Capacitor dur-mica DM-15 25mmf \pm 5% 500v	K23006-142
CR2, CR3	Rectifier, silicon (CER 72 C) 800 PIV 250 MA	M41215-3
F1	Fuse 1-1/2 amp type 3AGC for 50-60 cycles 115-230v operation	K15928-6
J1	Socket (8 pin) (system socket)	K16083-1
J4	Connector, female (accessor socket)	K41138-1
S2E, F, G	HF oscillator switch assem.	K26480-1
S7	Switch (AM-SSB-CW)	K52033-1
T1	Mixer plate transformer 3035 and 455 kc	M26474-2
T18	Power transformer	P26305-4
T22	Filament transformer	K39224-2
T29	Output transformer	K38828-2

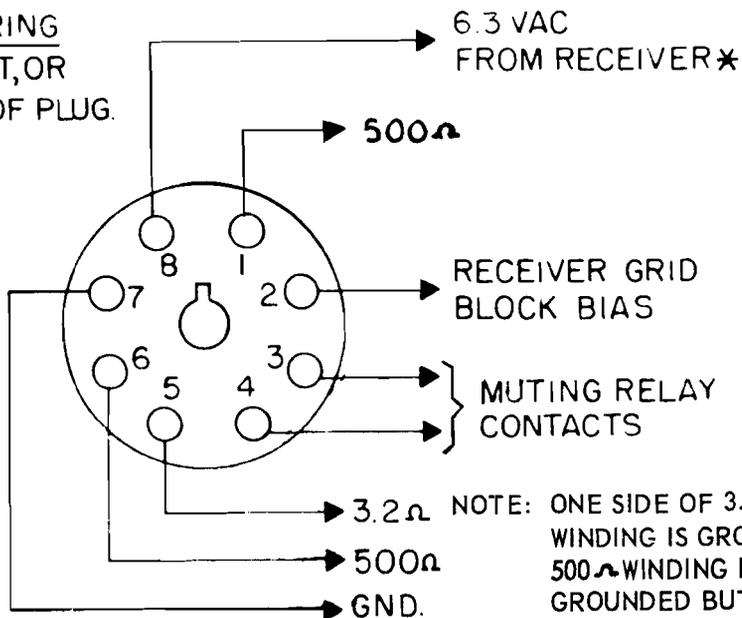
HAMMARLUND MFG. CO.
MARS HILL, N.C.

MODEL NO. HQ-180-AX



PT. 39333-1

VIEW FROM WIRING SIDE OF SOCKET, OR FROM PIN END OF PLUG.



* ALWAYS ON IF RECEIVER PLUGGED INTO LIVE POWER.

NOTE: ONE SIDE OF 3.2 Ω WINDING IS GROUNDED. 500 Ω WINDING IS NOT GROUNDED BUT LEFT FLOATING

SYSTEM SOCKET CONNECTIONS

TABLE 1 TUBE SOCKET VOLTAGES

MEASURED WITH VTVM; 117 LINE VOLTS; NO ANTENNA; UNLESS OTHERWISE SPECIFIED, BAND AND DIAL 10 MC, AM, AVC OFF, 3 KC BOTH SIDEBANDS, REC., LIMITER OFF, RF GAIN MAX., AF GAIN MIN.

TUBE		SOCKET PIN NUMBERS								
		1	2	3	4	5	6	7	8	9
V 1	RF 6BZ6	0	1.5 RF 5.8 (min)	6.3 AC	0	245	105	0	--	--
V 2	Mixer #1 6BE6	-2.8 approx.	1.35	0	6.3 AC	245	110	0	--	--
V 3	Mixer #2 6BE6	-2.4 approx.	2	0	6.3 AC	250	⁷⁴ 0 (1 mc)	0	--	--
V 4	IF Amp 6BA6	0	0	6.3 AC	0	245	110	^{2.1} RF 29 (min)	--	--
V 5	Mixer #3 6BE6	-7.4 approx.	0	0	6.3 AC	250	84	0	--	--
V 6	IF Amp 6BA6	0	0	6.3 AC	0	240	83	1.0	--	--
V 7	IF Amp 6BA6	0	0	6.3 AC	0	230	82	1.0	--	--
V 8	DET AVC 6BV8	5	0	235	0	--	-.24	0	0	-4
V 9	Prod Det 12AU7	220 (SSB)	0	7.0 (SSB)	6.3 AC	6.3 AC	100 (SSB)	0	7.0 (SSB)	0
V 10	Limiter 6AL5	36 (off) .24 (max)	30 (off) 0 (max)	0	6.3 AC	³⁶ (off) ^{.24} (max)	0	³⁰ (off) 0 (max)	--	--
V 11	Cal 6BZ6	-60 (cal) approx.	9.0 (cal)	6.3 AC	0	75 (cal)	88 (cal)	9.0 (cal)	--	--
V 12	HF Osc. 6C4	130	--	6.3 AC	0	130	-6.0	0	--	--
V 13	BFO Meter 12AU7	80	0	3.7	6.3 AC	6.3 AC	200 (SSB)	125 (SSB)	125 (SSB)	0
V 14	Volt. Reg. 0A2	150	--	--	--	150	--	--	--	--
V 15	AF AVC 6AV6	0	1.3	6.3 AC	0	0	0	115	--	--
V 16	Power Amp 6AQ5	0	13	6.3 AC	0	275	250	--	--	--
V 17	IF Gate 6BA6	0	0	6.3 AC	0	250	⁰ 88 (1 mc)	^{.02} 4 (1 mc)	--	--
Systems Socket		0	A.V.C.	105	105	0	0	0	6.3 V.A.C.	--
Ace Socket		0	0	300 v D.C.	6.3 V.A.C.	--	--	--	--	--

HQ-180AX TEST PROCEDURE

V20 6CW4 crystal dsc* Pin 2 78V+, Pin 4 8.6V-, Pin 8 .08V+, Pin 10 6.3V AC

*Readings taken with switch in crystal position with 3 MC crystal in use.

TABLE 2 TUBE SOCKET RESISTANCES

MEASURED WITH VT OHMMETER; POWER PLUG AND ANTENNA DISCONNECTED; UNLESS OTHERWISE SPECIFIED, BAND AND DIAL 10 MC, AM, AVC OFF, 3 KC BOTH SIDEBANDS, REC., LIMITER OFF, RF GAIN MAX., AF GAIN MIN.

TUBE		SOCKET PIN NUMBERS								
		1	2	3	4	5	6	7	8	9
V 1	RF 6BZ6	480K	180 RF 1.7K (min)	--	0	19K	44K	0	--	--
V 2	Mixer #1 6BE6	47K	160	0	--	21K	25K	0	--	--
V 3	Mixer #2 6BE6	100K	470	0	--	21K	45K Inf (1 mc)	1.8	--	--
V 4	IF Amp 6BA6	1.1 meg	0	--	0	19K	33K	180 RF 10K (min)	--	--
V 5	Mixer #3 6BE6	22K	.8	0	--	22K	44K	1.2 MEG	--	--
V 6	IF Amp 6BA6	1.47 MEG	0	--	0	19K	61K	68	--	--
V 7	IF Amp 6BA6	470K	0	--	0	20K	60K	68	--	--
V 8	Det. AVC 6BV8	560	17	30K	0	--	47K	70	0	4.7K
V 9	Prod Det 12AU7	INF 20K (SSB)	470K	820	--	--	55K	100K	820	0
V 10	Limiter 6AL5	210K	1.4 MEG 200K (LIM ON)	0	--	220K	0	1.5 MEG 470K (LIM ON)	--	--
V 11	Cal. 6BZ6	470K	4.7K	--	0	INF 500K (CAL)	INF 110K (CAL)	4.7K	--	--
V 12	HF Osc 6C4	24K	--	--	0	24K	100K	27	--	--
V 13	BFO Meter 12AU7	17K	0	1K	--	---	INF 20K (SSB)	545K	47K	0
V 14	Volt. Reg. 0A2	24K	--	--	--	24K	--	0	--	--
V 15	AF AVC 6AV6	50 Approx.	5.6K	--	0	235K	235K	540K	--	--
V 16	Power Amp 6AQ5	500K	430	--	0	22K	21K	500K	--	--
V 17	IF Gate 6BA6	1.1 MEG	0	--	0	21K	INF 61K (MC)	1K	--	--
Systems Socket		0	2.2 MEG	B + 20K	B + 20K	0	∞	0	0	
Ace Socket		0	∞	B + 20K	0					

HQ-180AX TEST PROCEDURE