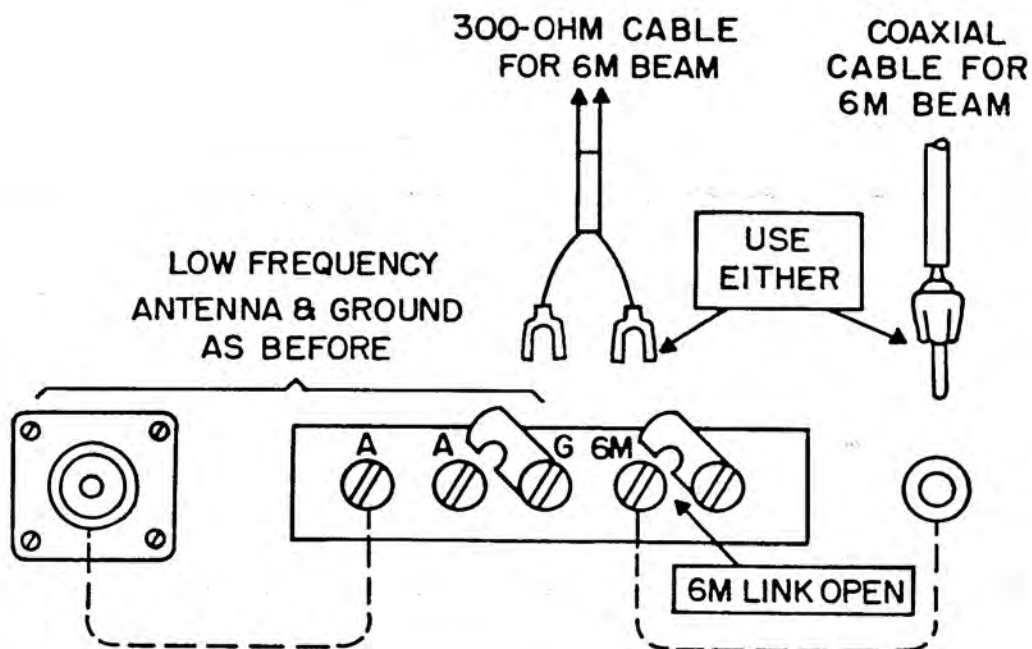




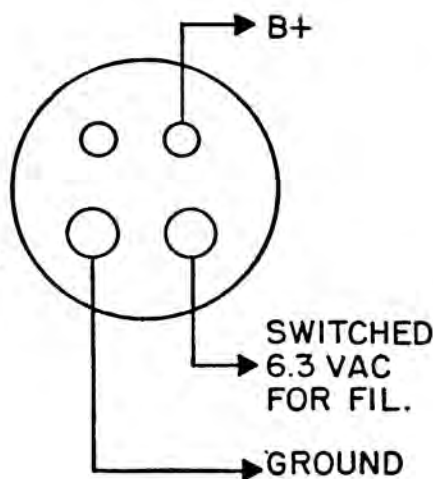
ANTENNA CONNECTIONS FOR SEPARATE
6M ANTENNA

The 455 KCS shielded pin plug connection is intended to be used as an output feed to such equipment as a panoramic adapter, providing visual indications of stations transmitting across the band, or to feed an IF converter for Radioteletype reception (RTTY). The specific instructions for these units will appear in their manuals.

Regular operation usually does not demand extended use in the 6- or 2-meter bands. For the 6-meter band, an external preamplifier will often improve reception, especially if the Receiver is used in a remote area. Two-meter reception with the HQ-170-A will require a converter whose oscillator frequency is such as to result in an IF in the 6-meter band.* The converter output is fed into the 6-meter antenna input in this case. The accessory socket is included on the HQ-170-A chassis for convenience in supplying power to the preamplifier or converter if desired, since many of these units are designed to operate in this manner. Consult their instruction manuals for complete details, wiring as needed from the accessory plug provided with the HQ-170-A.

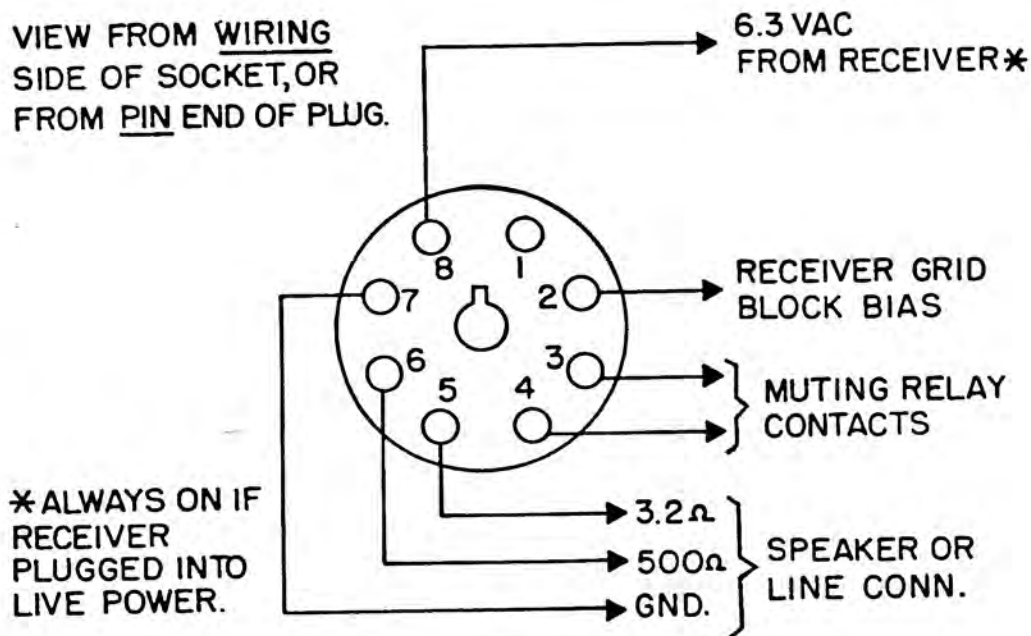
* 50-54 MCS

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



ACCESSORY SOCKET CONNECTIONS

The system socket connections provide for a variety of uses, depending upon the transmitter system installed. (Compatibility with Hammarlund HX-50 or HX-500 Transmitters included. See their instruction manuals for details.).

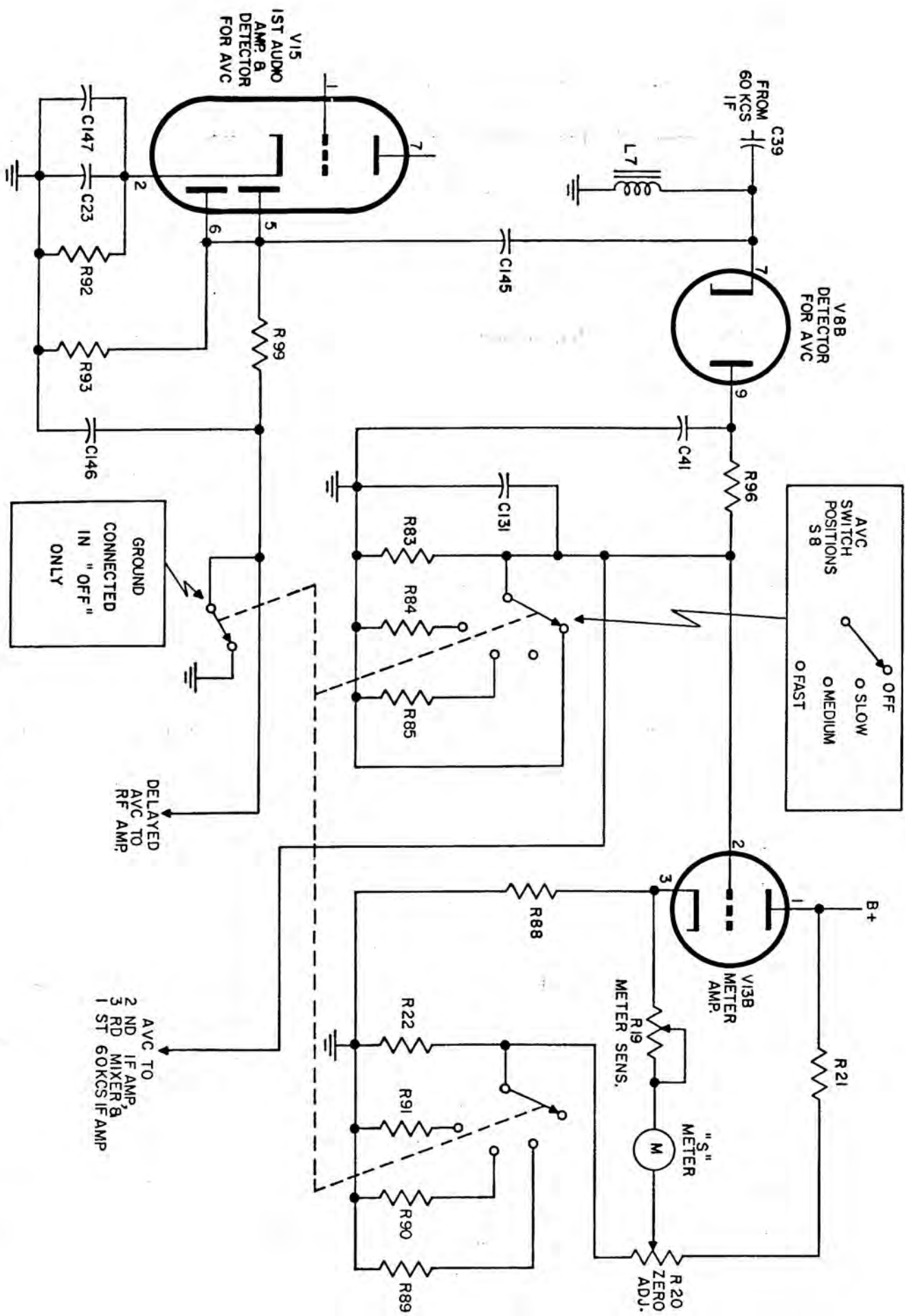


SYSTEM SOCKET CONNECTIONS

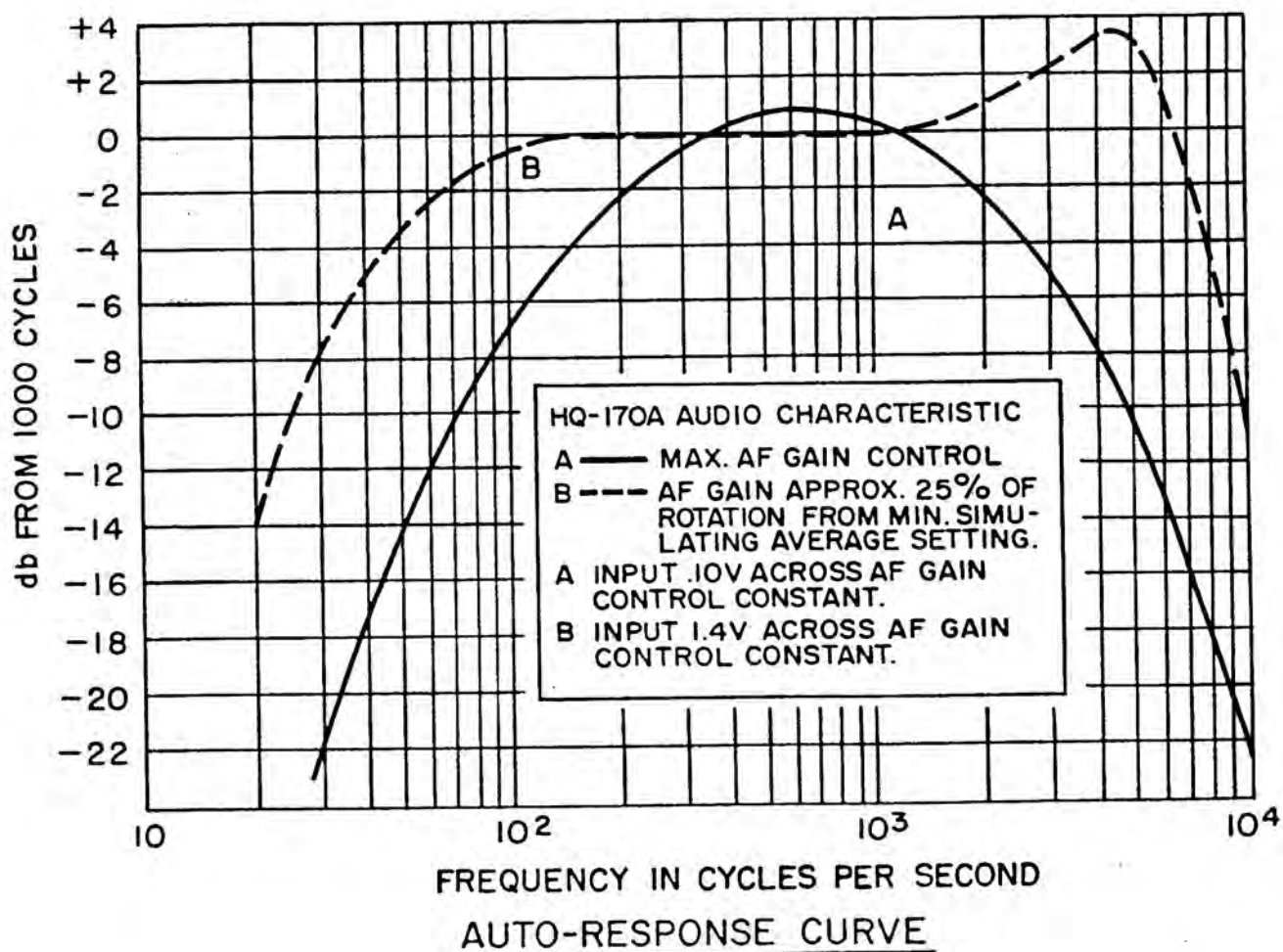
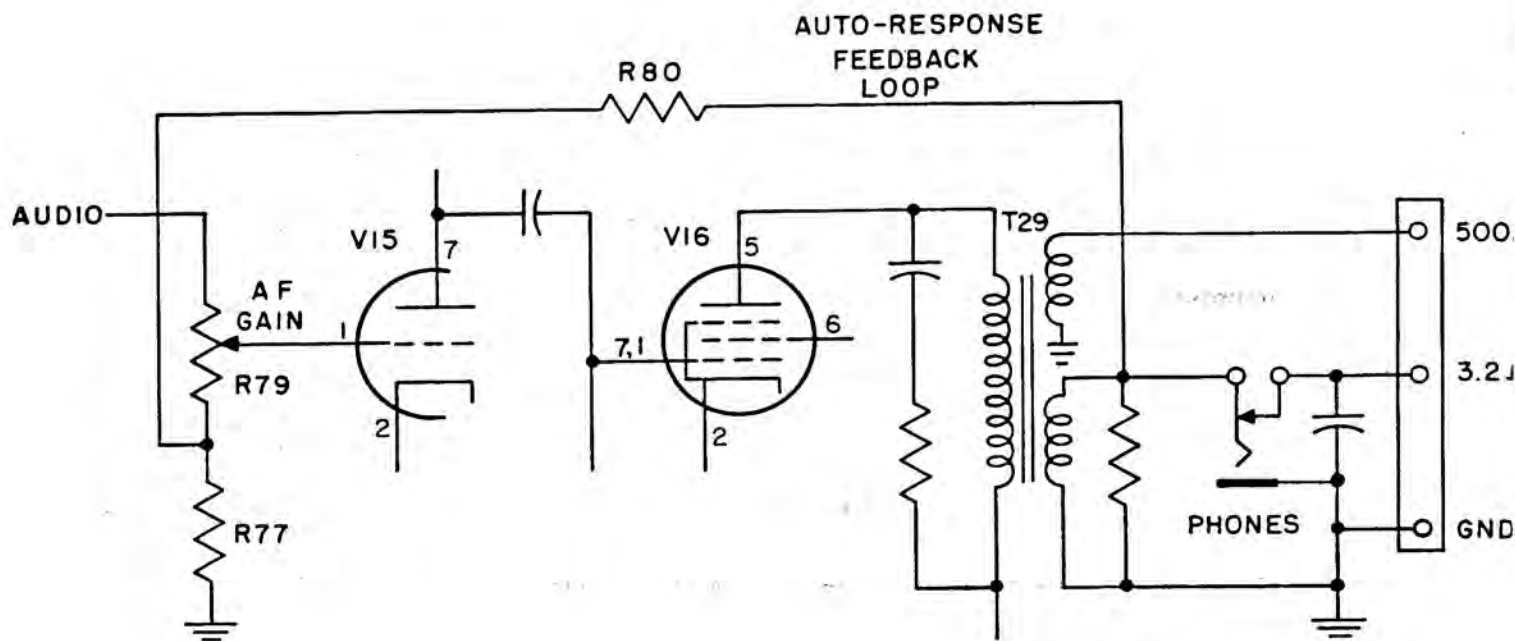
2. Turn on the Receiver; be sure to allow a 1/2-hour warm-up before proceeding further. Set the HQ-170-A to "Receive", and set the RF Gain control fully counterclockwise, without actually turning the set off.
3. Now adjust the meter zero control at the rear of the Receiver chassis again for zero on the meter. A small screwdriver inserted through the chassis is required for this setting. Do NOT adjust the meter sensitivity, this requires a special technique and an input signal generator, not normally available for home use. Check carefully with the rear of chassis illustration to be sure of the location of the meter zero adjust.

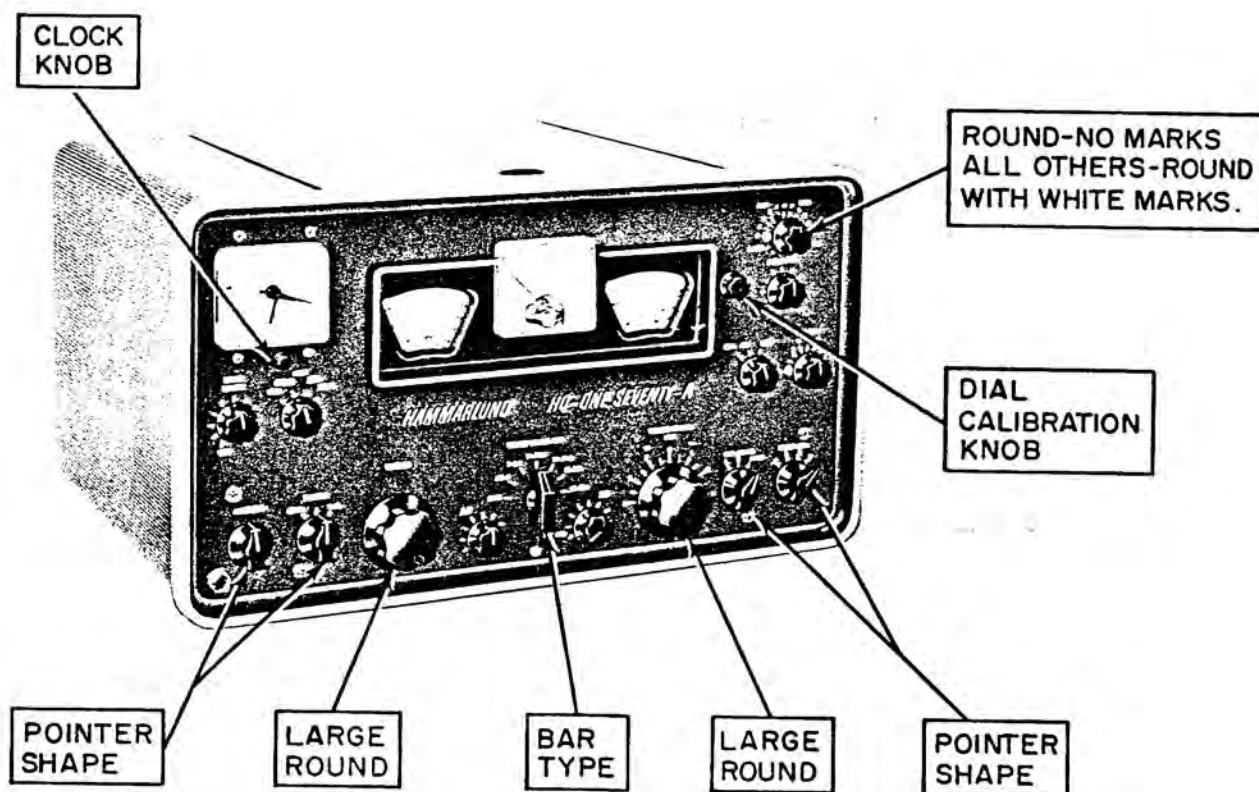
GENERAL OPERATING PROCEDURE (ANY MODE)

1. Select mode -- AM, SSB, CW.
2. Set controls for normal operation as shown on the mode illustration -- AVC, RECEIVE, SIDEBANDS, SELECT KCS -- NOISE LIMITER off, SLOT FREQ ± 5 KCS, SLOT DEPTH centered, BFO centered, VERNIER TUNING zero.
3. Tune in station -- TUNING RANGE, MAIN TUNING, AF and RF GAIN, ANTENNA TRIMMER -- use VERNIER TUNING for bandspread, or for single side band intelligibility.
4. Readjust special controls for signal reception improvement, noise or interference elimination, etc. -- NOISE LIMITER, AVC, CALIBRATE, SIDEBANDS, SELECT KCS, BFO, SLOT FREQ., SLOT DEPTH.



AVC & "S" METER CIRCUITS



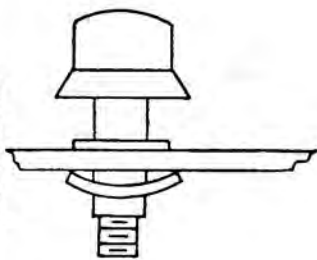


REMOVE ALL KNOBS EXCEPT CLOCK AND DIAL CALIBRATION

STEP 1

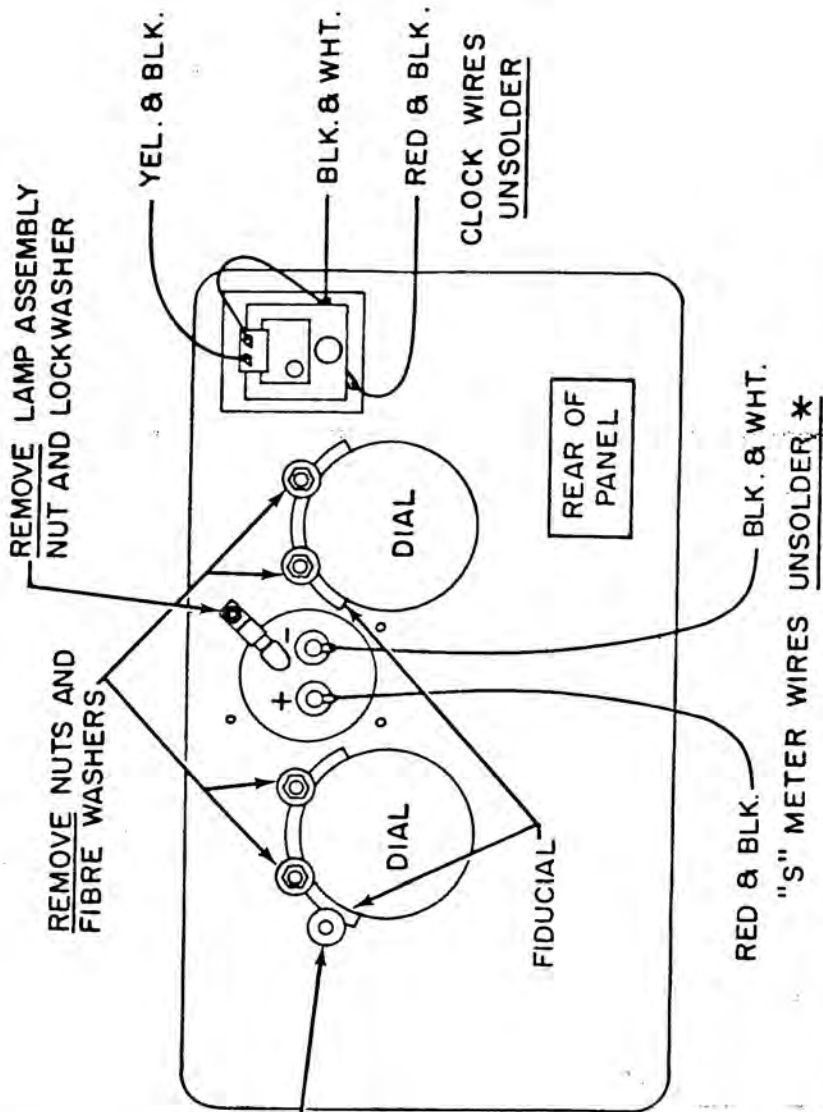
PANEL
ASSEMBLY

← REMOVE →



NUT
LOCK WASHER
SPACER
FLAT WASHER
DRIVE
FLAT WASHER
DRIVE

DETAIL OF DIAL
CALIBRATION DRIVE

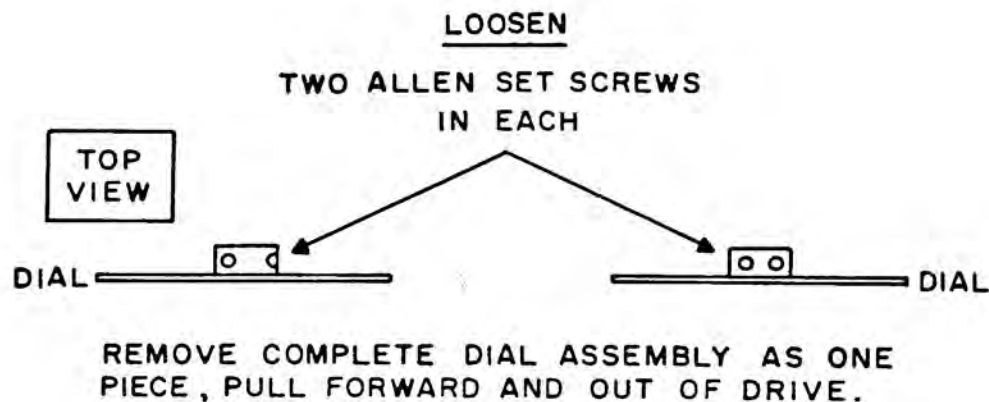


REMOVE AND UNSOLDER AS INDICATED - FOR CONVENIENCE, - PULL OFF
OTHER TWO LAMP HOLDERS.

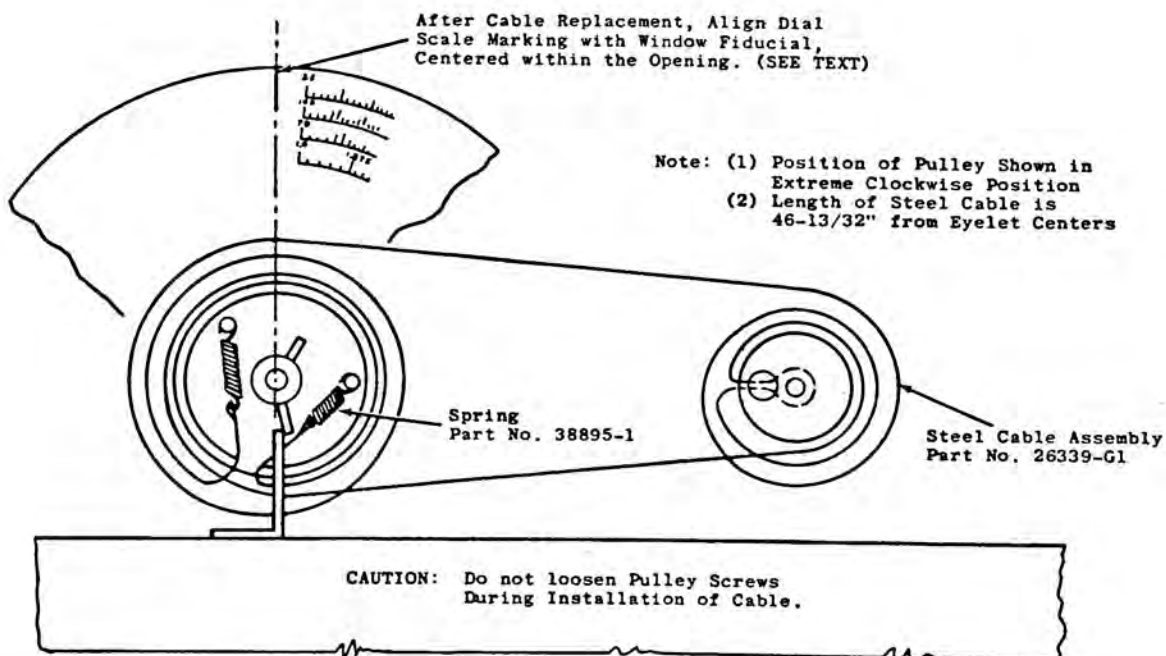
* DO NOT REMOVE NUTS FROM METER, THESE ARE INTERNAL MOUNTING STUDS.

STEP 3

- Step 5. Loosen but do not remove the set screws on the two dials. DO NOT MOVE THE SET SCREWS OF THE PULLEYS. Now pull the two dial assemblies forward, at the same time guiding the left dial out of the tuning drive discs.

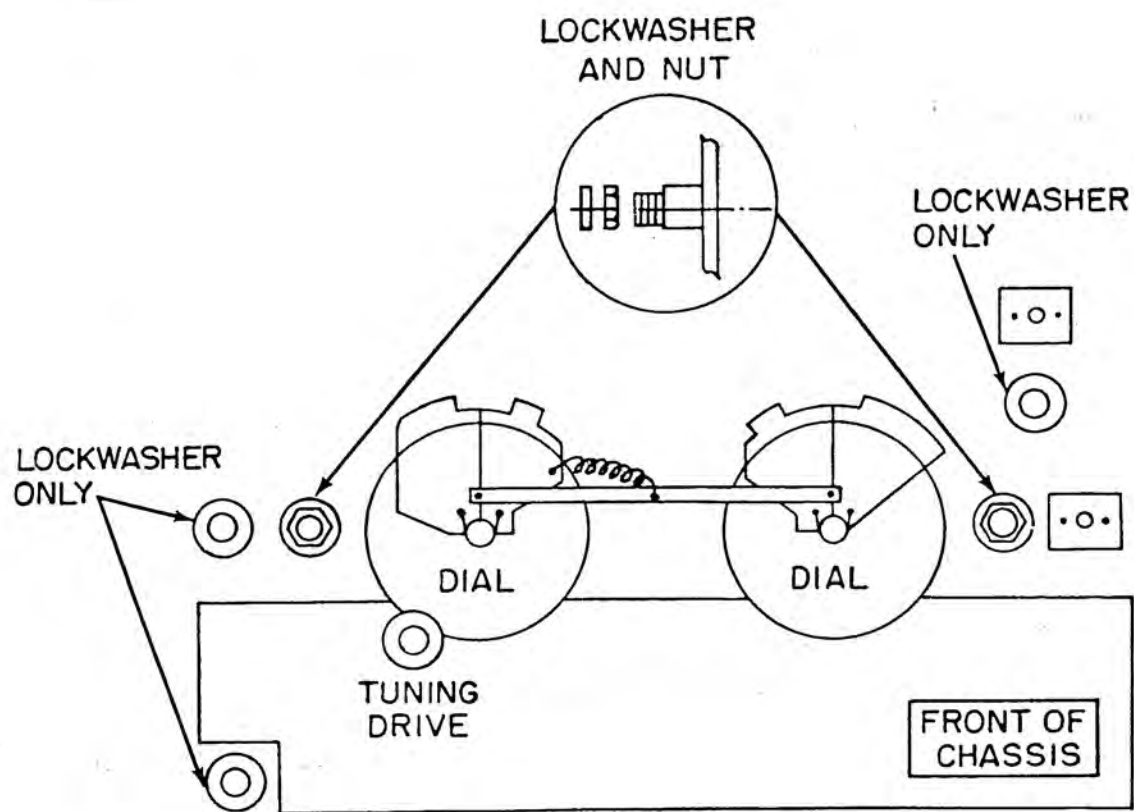


STEP 5.



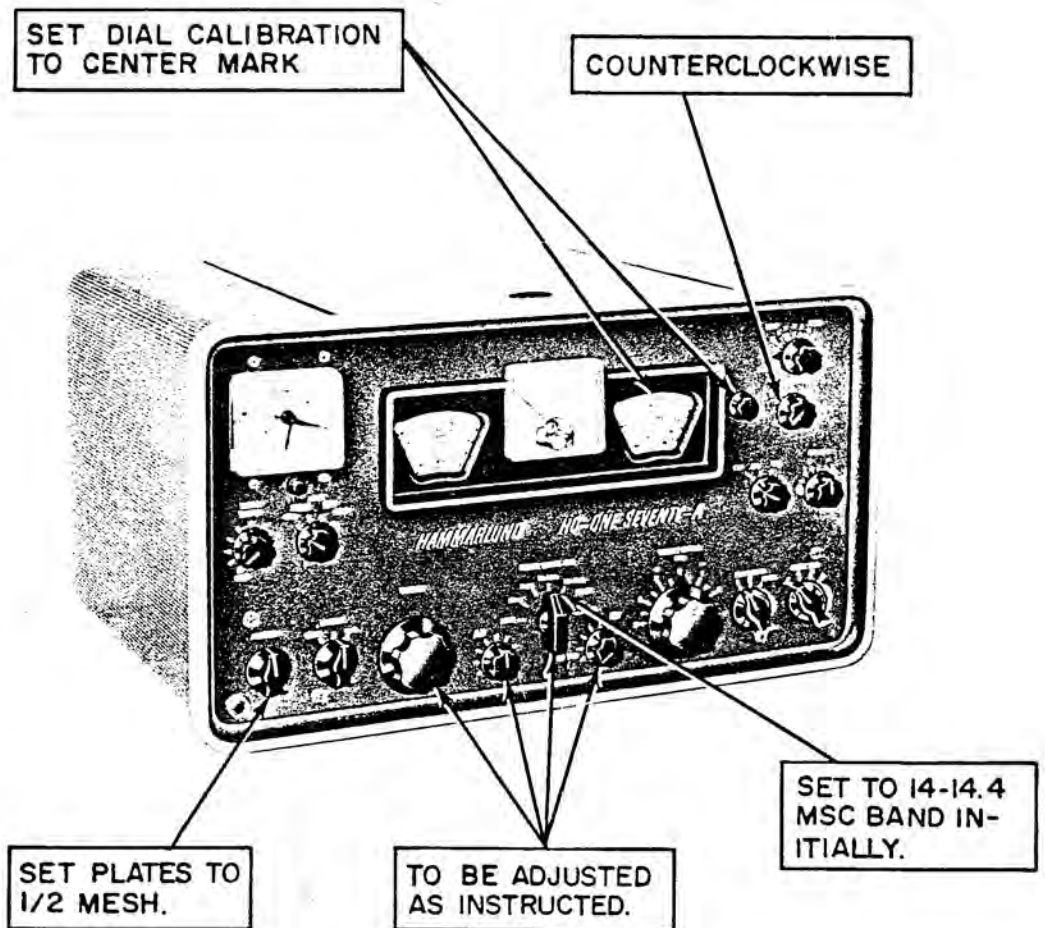
DIAL CABLE ASSEMBLY

STEP 6



HARDWARE FOR MOUNTING CONTROLS - WHEN PANEL IS REMOVED

STEP 8



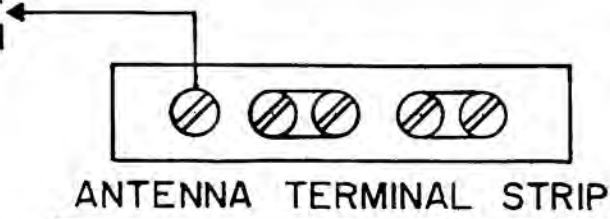
CONTROL SETTING AT START OF ALIGNMENT

Step 8. On the 50-54 MCS band, reinserting the chassis in the cabinet causes a slight shift in Receiver oscillator frequency. Set the oscillator coil T26 with the Receiver tuned to 50.05 on the dial, 50 MCS applied from the generator. After all alignment is completed, place the chassis in the cabinet or on a metal plate that will cover the entire open chassis, and check that the 50-MCS signal tunes in to 50 MCS on the dial. If it does not, alternately readjust T26 and place the receiver on the metal until it does.

Step 9. The crystal calibrator is factory adjusted to zero beat with the National Bureau of Standards radio signal coming from WWV. If adjustment is determined to be necessary, another receiver capable of receiving WWV on any one of its operating frequencies is required. The HQ-170-A does not tune WWV frequencies. Set the Send-Receive-Calibrate switch to Calibrate.

To set the calibrator, connect a wire from the isolated antenna terminal of the HQ-170-A to the antenna terminal of the second receiver. Tune in WWV on this receiver. Set the HQ-170-A calibrator adjustment C50 for zero beat.

TO SECOND RECEIVER
ANTENNA CONNECTION



This completes the RF alignment procedure. Return the chassis to the cabinet as instructed in this Manual.

PARTS LIST HQ-170A

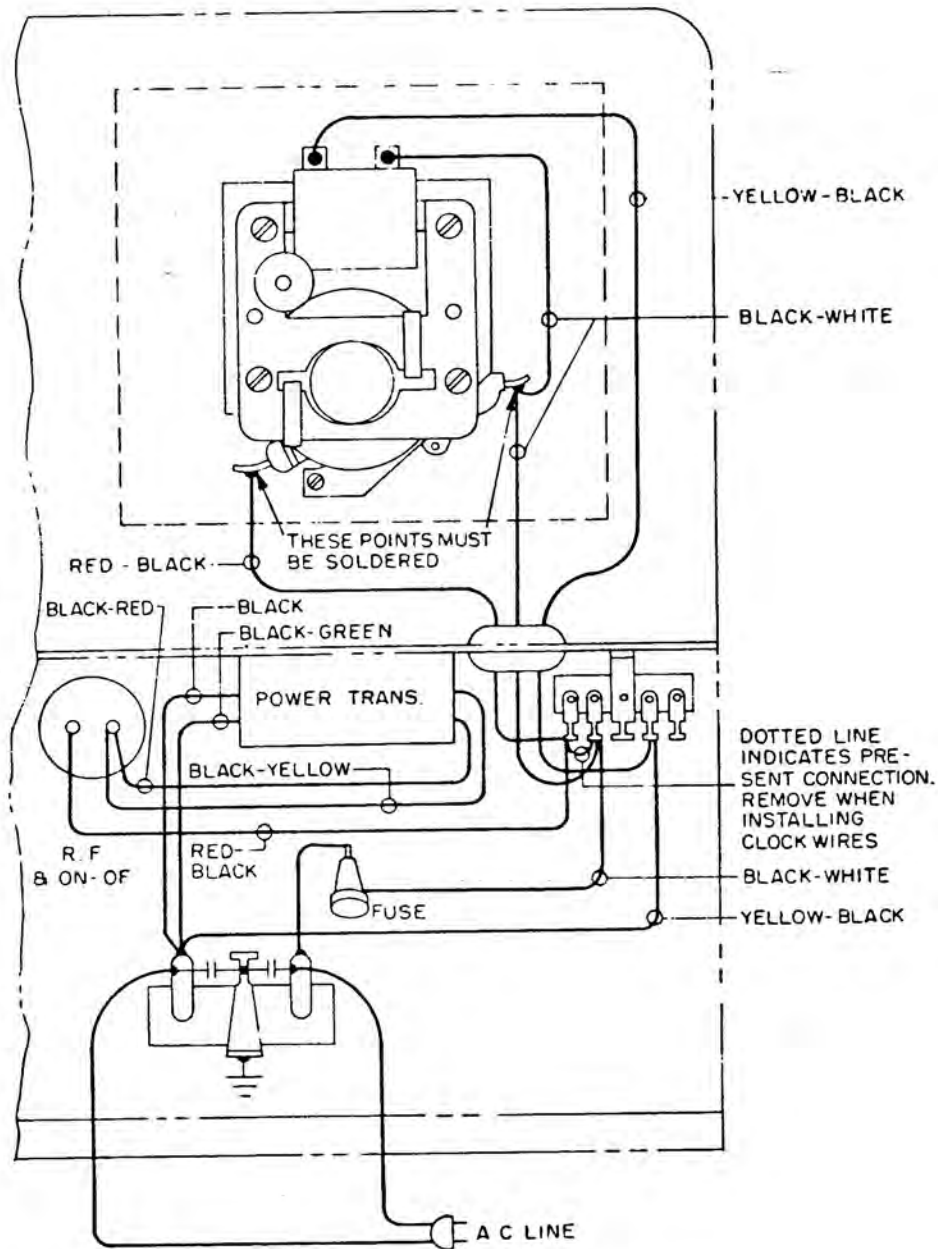
<u>SCHEMATIC DESIGNATION</u>	<u>DESCRIPTION</u>	<u>PART NO.</u>
<u>CAPACITORS (cont'd)</u>		
C39, C42	Disc Ceramic .0005 MFD $\pm 10\%$, 1000V	M23034-13
C43, C152	Dur-Mica DM-15 10 MMF $\pm 10\%$, 500V	K23006-8
C44, C45	Disc Ceramic .002 MFD GMV, 1000V	M23034-18
C48, C87, C131	Dur-Paper .1 MFD $\pm 20\%$, 200V	K23045-3
C49, C95, C105	Dur-Paper .047 MFD $\pm 20\%$, 400V	K23045-2
C50	Var. Trimmer 8-50 MMF, N750	K23038-5
C52	Assy.	K34454-G24
C53, C54	Mica Trimmer 3-35 MMF	K23043-5
C55, C56, C57, C58, C59	Mica Trimmer 1.15-20 MMF	K23043-6
C61	Dur-Mica DM-15 24 MMF $\pm .5$ MMF, 500V	K23006-48
C62, C63, C68, C70, C74	Trimmer 1-8 MMF	K23008-2
C64, C65	Rotary Trimmer 1.5-9.1 MMF	K23057-1
C66	Temp. Comp. 4.7 MMF, N750	K23010-6
C67, C69	Dur-Mica DM-15 62 MMF $\pm 2\%$, 500V	K23006-10
C71	Dur-Mica DM-15 243 MMF $\pm 5\%$, 300V	K23006-27

PARTS LIST HQ-170A

<u>SCHEMATIC DESIGNATION</u>	<u>DESCRIPTION</u>	<u>PART NO.</u>
<u>CAPACITORS (cont'd)</u>		
C102, C109, C118, C148,) C149, C150)	Dur-MICA DM-15 9 MMF $\pm$.5 MMF, 500V	K23006-21
C151, C154, C155, C156	Disc Ceramic .001 MFD, GMV, 500V	M23034-30
C153	Dur-Mica DM-15 47 MMF $\pm$ 2%, 500V	K23006-105
CR1, CR2	Rectifier, Silicon (CER 72C)	M41215-3
E1	Fuse Holder	K15923-1
F1	Fuse, 3 Amp Type 3AGC for 50-60 Cycles 115V Operation	K15928-8
F1	Fuse, 1-1/2 Amp Type 3 AGC for 50-60 Cycles 230V Operation	K15928-1
I1	Lamp, Incandescent #47	K16004-1
I2	Lamp, Incandescent #47	K16004-1
I3	Lamp, Incandescent #47	K16004-1
J1	Socket (8 Pin)	K16083-1
J2	Phone Jack	K35608-1
J3	Connector, Female	K41138-1
J4	Connector, Receptacle (Antenna)	K16111-1
J5, J6	Connector, Female	K41144-1
L1	RF Choke, 2.5 MH	K15627-1
L2	Bifilar Coil	K42032-1
L4	Passband Tuning Coil	K26301-1
L5, L7, L10	Inductor, 330 MH	K42019-1
L6	Reactor	K26302-1
L8	RF Choke, 38 Microhenry	K15629-1
L9	RF Choke, 240 Microhenry	K15629-2
M1	Meter "Signal strength"	K26149-5

PARTS LIST HQ-170A

<u>SCHEMATIC DESIGNATION</u>	<u>DESCRIPTION</u>	<u>PART NO.</u>
T29	Output Transformer	K38828-2
T30	Filament Transformer for 50-60 Cycles, 115V Operation	K39224-1
T30	Filament Transformer for 50-60 Cycles, 115/230V Operation	K39224-2
V1, V11	Tube, Electron, 6BZ6	K16388-1
V2, V3, V5	Tube, Electron, 6BE6	K16284-1
V4, V6, V7	Tube, Electron, 6BA6	K16283-1
V8	Tube, Electron, 6BV8	K16396-1
V9, V13	Tube, Electron, 12AU7	K16295-1
V10	Tube, Electron, 6AL5	K16294-1
V12	Tube, Electron, 6C4	K16288-1
V14	Tube, Electron, 0B2	K16375-1
V15	Tube, Electron, 6AV6	K16392-1
V16	Tube, Electron, 6AQ5	K16387-1
Y1	Crystal, 2580KC	K38972-2
Y2	Crystal, 100KC	K38661-1
Z1	RC Printed Network	K38981-1
Z2	RC Printed Network	K38846-1



CLOCK INSTALLATION HQ-170A & HQ-180A
115V 50 OR 60 ~

Dear OM:

This form is being prepared to provide prompt attention to a complaint as a result of trouble that may be experienced in the field. In addition to this we are supplying general information as a result of inquiries previously received, that we are sure will be of general interest. Most troubles that develop in the field can be attributed to tube failure in one form or another. Unfortunately, it is impossible for us to eliminate tube troubles completely despite precautions taken by us to do just this. It is well known that tubes sometimes fail or change in operation characteristics after a period of operation. It can therefore, be assumed that despite every precaution occasionally a tube will develop trouble and cause malfunctioning of the receiver. The most common complaint we have received is the high order harmonic output from the 100 kc crystal calibrator. This results in the crystal calibrator signal being weaker than normal, especially on 10 and 6 meters. This is usually due entirely to the 6BZ6 tube being employed in the crystal calibrator position. It is therefore, suggested that this tube be interchanged with the 6BZ6 employed in the RF stage which may provide the increased crystal calibrator signal. Switching the two tubes in question will usually in no way result in degrading the performance of the receiver since the tube formerly employed in the crystal calibrator position will usually work perfectly as an RF amplifier even though it may not develop sufficient output when used in the crystal calibrator position. If switching the two tubes does not provide the desired results it would be advisable to purchase another 6BZ6 for improved 100 kc crystal oscillator output.

HUM

Excessive hum in the speaker is usually the result of excessively high heater to cathode leakage on the part of the noise limiter tube type 6AL5 or the 6AV6 tube employed as the first audio and delayed AVC clamp. If the hum is only noticeable when the receiver is in the AM position, the chances are that this is due to a bad 6BV8. If the level of the hum varies as the audio volume control is advanced, this more or less indicates that the hum is due to a tube ahead of the audio gain control, such as the 6AL5 or the 6BV8. If the hum level remains constant regardless of the setting of the audio control, this means that the trouble is after or behind the audio control and the 6AV6 or 6AQ5 output tube should be suspected.

HUM MODULATION OR DRIFT

Hum modulation or hum frequency modulation that will be most noticeable on the 10 and 6 meter bands, is usually due to a poor 6C4 high frequency oscillator or the first 6BE6 converter V2 in the schematic diagram. This condition will be apparent by the inability to obtain a near pure DC or T9 note on 10 and 6 meters. Changing the 6C4 high frequency oscillator usually corrects or greatly improves this condition. If a new 6C4 does not result in sufficient improvement, try interchanging the 6BE6 employed in position V2 with the 6BE6 employed in position V5 or the 3rd mixer socket. Excessive drift which would be most noticeable on the high frequency bands, can also be attributed to the 6C4 high frequency oscillator or 1st 6BE6 converter.

VOLTAGE REGULATOR TUBE TROUBLES

The first HQ-170 receivers produced employed a 4K 10 watt resistor as R-53 or the VR tube dropping resistor. This was later changed to 3K 10 watts to improve the voltage regulation. In some cases when the 4K resistor was employed, the VR tube would extinguish at maximum sensitivity control setting. Another noticeable effect would be excessive frequency shift as a result of varying _ of the way on. Changing R 53 from 4K to 3K at 10 watts will eliminate bot of these conditions.

FAILURE OF THE HIGH FREQUENCY BANDS

Failure of the receiver on any or all of the triple conversion bands can usually be attributed to trouble in the second 6BE6 converter V3 in the schematic diagram. This is usually the result of low injection of the 2.580 MC crystal oscillator. Obviously, the first suggestion is to try interchanging 6BE6's or at least a new 6BE6 in this position. If this fails to produce the proper performance, a good VTVM that will not load the circuit, should be employed to measure the voltage developed from pin 1 to ground. A reading of 3 to 4 volts negative indicates proper performance or injection. Less than this voltage exceeding 10, may be the cause of the trouble. This can usually be attributed to a defective 38uh RF choke L8 in the diagram, which may be open or have shorted turns. This trouble seldom develops but is a possibility that should be investigated.

GENERAL INFORMATION

Whenever the 500 cycle or .5 kc selectivity switch position is employed, for best results the side band switch should be employed in the upper side band position. Since this band width is only employed and usable on CW, the BFO pitch or frequency control should always be employed plus or minus approximately .5 kc for best CW performance.

The headphone jack results in a deliberate mismatched to high impedance phones in order to reduce the level supplied to them. The lower the impedance of the phones, the more volume will usually

be obtained. If it is desirable to increase the headphone volume, an inexpensive line to voice coil transformer is suggested. This transformer is connected backwards with the voice coil connections to headphone plug and the 500 ohm line connections to the phones. The resultant impedance step up will provide higher headphone volume. This procedure should only be resorted to when absolutely necessary such as when a person may be hard of hearing. It should be remembered that as a result of increasing the headphone level any residual hum will also be increased, which the hard of hearing person will not find objectionable, whereas a person with normal hearing may.

VOX CIRCUIT REQUIREMENTS

In the event that the vox circuit in your transmitter may be designed for 500 ohm input and in the event that sufficient gain in this circuit may not be available to provide proper performance from the 3.2 voice coil winding, the matching transformer referred to in the headphone paragraph may be employed. Under these circumstances, the voice coil winding should be connected to the speaker terminals with the 500 ohm line winding to the Vox circuit. Such a matching transformer may also be required or useful for phone patch operation, depending, of course, on the design of the phone patch.

GRID BLOCK BIASING FOR VOX CIRCUITS

Many of the single side band transmitters being produced today provide 100 volts negative bias which is switched from the transmitter to the receiver by the Vox circuit. The Hallicrafter HT 32 transmitter is a good example. As a result of the voice control operating the relay in the transmitter, the 100 volts of negative bias available in the transmitter is made available to silence the receiver. When this type of receiver silencing is desired the relay receptacle on the rear of the HQ-170 is not employed. In order to adapt your HQ-170 for this operation it is suggested that the two leads that are now connected to the relay receptacle be removed and each one taped up so that they are insulated from one another and the chassis. This may be dressed conveniently out of the way. A 5 megohm $\frac{1}{2}$ watt resistor and 15" of insulated shielded lead is now required. One end of the 5 megohm resistor should be connected to pins 5 or 6 or tube socket V16 or the 6AV6. The other end of this resistor is then connected to the inner conductor of the insulated shielded lead with the shield left floating at this point insulated to prevent shorting to the resistor, inner conductor, or any part of the wiring. The other end of this insulated and shielded lead should have the center conductor connected to one or both of the relay terminals with the shield connected to any convenient ground or chassis connection. The bias lead from the Vox circuit is then connected to one or both of the relay receptacle terminals, a standard AC plug may be employed in the relay receptacle. It is now necessary to employ a common ground connection between the HQ-170 chassis and the transmitter chassis in order to complete the biasing circuit. Making changes will result in the 5 megohm resistor being in series with the bias lead to the AVC bus in the HQ-170. The 5 megohm resistor isolates the bias supply and prevents this lead from affecting the AVC circuit. The shielded lead is recommended to prevent RF pickup and is really a precautionary measure. It may also be advisable to shield the lead between the receiver and the transmitter. This system in no way implies that the antenna changeover relay or a suitable TR switch will not be required. Failure to employ one or the other may result in burning out the antenna coils of the receiver, or other possible damage.

Lab tests indicate that minus 75 volts will silence the receiver when one volt of RF is applied to the antenna terminals. 75 volts negative bias is therefore, the suggested minimum value for complete silencing. The full bias voltage is not applied to the grids due to a voltage division which takes place as a result of the 5 megohm resistor and the other resistors, employed in the AVC system.

DIAL CALIBRATION ACCURACY

Please remember that we do not claim frequency meter accuracy.

Our production tolerance on this receiver is plus or minus « a dial division. This tolerance is necessary as a result of working to printed dial scales. The band edge markers are held to very close tolerance, usually plus or minus the thickness of the dial marker. The total runout or what is often referred to as tracking error, will usually be within the plus or minus « a dial division as previously specified. It is for this reason that the adjustable dial marker and the 100 kc calibrator is provided for the correction factors.

RF FEED BACK

In the event that RF feed back is experienced when the relay terminals on the rear of the HQ-170 are employed, this usually indicates that the relay leads between the receiver and antenna relay are picking up RF. This may be due to the particular lead length or a high standing wave ratio on the antenna system. The solution is of course, to prevent the RF pickup of the relay leads from getting into the receiver. Adding a pair of .01 disc ceramic capacitors from each of the relay terminals to ground will usually eliminate the feed back condition. These extra .01 capacitors

should be installed using as short lead length as possible, and preferably mounted inside of the receiver bypassing each of the relay terminals to ground.

We have recently received a few complaints advising that the slot depth control on the HQ-170 receiver is apparently inoperative. This we can assure you is decidedly not the case, since from all indications, too much is being expected insofar as the effect of this control being very noticeable is concerned.

The slot depth control is actually a very gradual vernier adjustment. In view of this its effect will not be very noticeable unless the proper procedure is employed. The suggested procedure is as follows:

Tune in an AM signal on any band or any other strong constant carrier of similar nature, such as crystal calibrator. Whenever the receiver is being tuned for normal reception be sure to first rotate the slot frequency control to the extreme clockwise or counter clockwise position. In other words, never leave the slot frequency control at or near the zero setting. If this procedure is not followed it is obvious that the center of the pass band will be slotted out, in some cases this being quite obvious by producing 2 spot tuning or 2 peak S meter readings. After tuning in the constant carrier and peaking the S meter, taking the above precautions, rotate the slot frequency control. It will be noticed that upon approaching the zero setting, the S meter reading will be effected. A very definite null or minimum S meter reading will be obtained with the slot frequency control adjusted at or near zero. Observe this S meter reading. With the slot frequency control set at the minimum S meter reading position, the slot depth control should be rotated very slowly throughout its range, observing the S meter. It will be found that one particular spot throughout the range of the slot depth control a further reduction in the S meter reading will be obtained. Once this setting has been obtained, the slot depth control may be left permanently in this position, and all future slot filter adjustment made by the slot frequency control only. A check of the slot depth control setting may be advisable periodically.

It is hoped that the above information will prove of interest and assistance. If after following the various suggestions, trouble cannot be eliminated, please write to us supplying as much detailed information as possible in order that we may endeavor to be of further assistance or authorize return of the receiver for repair. Please refer to terms of our warranty on the inside rear cover of your instruction manual which will apply under these circumstances.

Erratic performance in the triple conversion bands, such as a temporary loss of gain after a period of transmission or stand-by operation, which is cured by rotating the band change switch or turning the receiver off and then on again, usually involved the second 6BE6 converter of V3 in the schematic diagram. If changing this tube does not permanently cure this condition, changing the value of R10 from 22K to 47K is recommended.

If a new 6BZ6 in the crystal calibrator does not result in improving the output of the crystal calibrator to your liking, additional output may be obtained by increasing the screen voltage, this is accomplished by merely adding an external « watt resistor from 47K to 100K across terminals or leads 3 and 4, of the couplate Z1 in the schematic diagram.

If upon checking the 100 kc calibrator against WWV using another receiver it is not possible to zero beat the calibrator by means of the adjustable trimmer, and the crystal appears to be low in frequency, the frequency of the crystal can be raised by substituting an external 470K « watt resistor, for the one in the couplate Z1. This is accomplished by unsoldering lead /7 of the couplate from one side of the trimmer and connecting the external 470K resistor across the trimmer terminals. This change will usually make it possible to zero beat a crystal that is too low and out of the range of adjustment provided by the trimmer.

Please remember that the low frequency response of the receiver is increased when the audio gain control is employed at the lower end of its range. This is the result of the auto response circuit. Increasing the audio gain control setting to a position past straight up and reducing the RF gain will make it possible to obtain the same volume level with less low frequency response and usually better signal-to-noise ratio. If it is desirable to reduce some of the low frequency response at the lower settings of the audio volume control, the auto response feature may be dispensed with by merely short circuiting resistor R47, 47 ohms. This results in removing the feedback which provided the better low frequency response.

Very truly yours,

THE HAMMARLUND MFG. CO., INC.
Frank I. Lester, W2AMJ
Sales Manager

