

OPERATING  
ALIGNMENT & SERVICING  
INSTRUCTIONS FOR  
SKY CHAMPION  
MODEL S-20R



*the hallicrafters co.*

CHICAGO U.S.A.

# SKY CHAMPION MODEL S-20R

## OPERATING INSTRUCTIONS

The Hallicrafters Co. believes that, without exception, the model S-20R receiver represents the best value in the communications field. This instruction booklet, when studied and carefully followed will help you to better understand and appreciate your Sky Champion so that you then will be able to obtain all of the characteristics of excellent performance for which this model is noted.

It is recommended that, upon receipt, the owner of the S-20R receiver carefully inspect the carton and then the receiver for any damage which might have occurred in transit. Should any signs of damage be apparent immediately file claim with the carrier accurately stating the extent of the damage.

### ANTENNA

The Sky Champion has an antenna input circuit which will allow the use of either a doublet or Marconi (inverted "L") antenna. The approximate antenna input impedance of the S-20R is 400 ohms.

A very serviceable antenna will be the inverted "L", or Marconi type. This antenna should be approximately 75 feet long overall, including the lead-in to the set. Satisfactory operation of the Sky Champion is obtained throughout its tuning range with this type of antenna and because of that fact as well as its ease of construction it is highly recommended.

With the inverted "L" type of antenna terminal A2 must remain connected to terminal G for best operation. While a ground connection is usually not necessary it might prove to be helpful in reducing noise. A cold water pipe or 6' foot rod driven in moist soil will be a very satisfactory ground when connected to the G terminal on the receiver. Connections to a radiator or gas piping are not recommended.

Should a doublet antenna be used it is suggested that a 400 ohm transmission line be constructed so that a most efficient transfer of energy is obtained. The commercially available all wave doublet antennas are usually provided with a coupling transformer which matches the transmission line to the receiver. This transformer connects to the AI and A2 terminals on the antenna terminal strip. The half-wave length-doublet antenna cut for a particular frequency can be computed by the following formula.

$$\text{Length in feet} = 463 / \text{Frequency in megacycles}$$

or for example, a half wave 20 meter or 14 megacycle antenna would be

$$463/14 \text{ or } 33.7 \text{ feet long overall}$$

This type of antenna is broken in the center with an insulator and has the transmission line connected to each resulting quarter wave section at that point. This antenna is a very good performer, in a direction broadside to its length, only on the relatively narrow group of frequencies for which it was cut. It does not function well on harmonic frequencies.

When using either type of doublet antennas the transmission line should be connected to binding posts A1 and A2. The wire connecting the terminal A2 to ground or G can be left connected if the performance of the receiver is improved.

### FREQUENCY RANGE

The Sky Champion tunes from 550 kilocycles to 44 megacycles in four bands. The frequencies covered per band are as follows:

Band	Coverage
1	550 KC to 1,780 KC
2	1.74 MC to 5.4 MC
3	5.3 MC to 15.8 MC
4	15.5 MC to 44. MC

The main tuning dial, which appears behind the large escutcheon, is accurately calibrated in kilocycles on band #1 and in megacycles on the remaining three bands.

Note: The accuracy of the main dial calibration will hold only if the BAND SPREAD condenser is set at minimum capacity, or the position indicated by "O" on the Band Spread dial.

When first using the receiver, become familiar with its operation on the standard broadcast band, or Band #1, before tuning the short wave bands. You then will be able to fully appreciate the capabilities of the Sky Champion.

## TUBE LINE-UP

6SK7	R. F. Amplifier	6F6G	Audio Frequency Power Amplifier
6K8	Converter and Oscillator	6H6	Automatic Noise Limiter
6SK7	1st I.F. Amplifier	6J6GT	Beat Frequency Oscillator
6SK7	2nd I.F. Amplifier	80	Rectifier
6SQ7	2nd Detector, A.V.C. and 1st stage of audio amplification		

## CONTROLS AND OPERATION

Reading from left to right the functions of the various controls will be described.

The R.F. GAIN control adjusts the sensitivity of the receiver by varying the cathode bias on the R.F. and I.F. amplifiers. Maximum sensitivity will be obtained when this control is rotated to the right as far as it will go. When this has been done a switch will operate which turns on the calibrated "S" meter which may be obtained as a separate unit.

The BAND SWITCH selects the frequency range through which the receiver tunes.

When using the receiver for the reception of modulated, or telephone, signals it is advisable to have the AVC switch set at ON.

For code or C.W. reception, the Automatic Volume Control circuit should be disconnected by setting the A.V.C. switch at OFF. When this has been done the R.F. GAIN control should be manually adjusted so that the set will not overload or block on extremely strong signals.

The MAIN TUNING control adjusts the main dial of the receiver for reception on the desired frequency.

The TONE switch turns the receiver ON and OFF and in the HIGH position produces natural reproduction. In the MED. and LOW position, the highs are attenuated, a condition that will be helpful in receiving signals during certain types of interference.

The BAND SPREAD TUNING control allows smooth back-lash - free operation of the separate band spread condenser and dial.

The A.N.L. or automatic noise limiter switch will effectively minimize ignition and similar types of interference which are objectionable to short wave reception. Best results are obtained with the AUDIO GAIN control set near the minimum end.

The PITCH CONTROL and its associated BFO switch provide a beat note for the reception of C.W. signals. The PITCH CONTROL, when the B.F.O. switch is set at ON controls the frequency of the beat note which may be set to a pitch most pleasing to the listener.

The SEND-REC. switch removes plate voltage from the tubes in the receiver so that the set is inoperative during stand-by periods, but leaves the tube filaments hot for instant use.

Any type of high impedance headset, crystal or magnetic, may be plugged into the jack marked PHONES.

Unless otherwise specified the S-20R Receiver operates on 117 volts 50/60 cycle since phase current. A universal model is available on special order for operation on 110 or 250 volts, 25/60 cycle single phase current, at a slight increase in price.

The Model S-20R Receiver draws 65 watts of power from the source. The Hallicrafters Co. reserves the right to make changes in design or to add improvements to instruments of their manufacture without incurring any obligation to install the same in any instrument previously purchased.

## ALIGNMENT PROCEDURE

### INTERMEDIATE FREQUENCY ALIGNMENT

Have the controls set as follows:

A.F. and R.F. GAIN controls set for maximum volume.

B.F.O. switch set at OFF.

Set BAND SWITCH to #2 band.

Set main dial at 2 megacycles and band spread dial at zero.

Remove 6K8 grid cap and connect the hot lead of your 455 KC generator to this tube. Connect the ground terminal of the signal generator to the chassis of the receiver. Now feed a 455 KC signal into the receiver. Adjust all I.F. transformer trimmers for maximum gain (Transformers T1, T2 and T3.)

### R.F. ALIGNMENT

Re-connect the grid cap to the 6K8 tube. Connect the hot lead of the generator to antenna terminal A1 on the rear of the chassis through a 400 ohm resistor. Be sure a jumper is connected between terminals A2 and G. Leave signal generator ground connected to the chassis of the receiver.

The location of the following trimmers and padders can be determined by referring to the top and bottom chassis views. All pad adjustments are for the low frequency end of each band while the trimmers are for the high frequency ends.

In order to get at the RF trimmers the guarantee card can be removed by placing a knife under the small snap fasteners holding it in place. So that most satisfactory adjustment of the trimmers and padders can be made, it is advisable to "rock" the condenser gang across the signal being delivered by the generator until that particular circuit has been accurately peaked at all frequencies except 1400 KC and 4 MC.

Bands	Trim at	Pad at
1	1400 KC Adjust CA CB CC	600 KC Adjust Pad Band 1
2	4 MC Adjust CD CE CF	2 MC Adjust Pad Band 2 (Top Chassis )
3	14 MC Adjust CG CH CI	7 MC Adjust Pad Band 3
4	34 MC Adjust CJ CK CL	17 MC No pad adjustment on this Band

### GUARANTEE

This receiver is guaranteed to be free from any defect in workmanship and material that may develop within &period of ninety (90) days from date of purchase, under the terms of the standard guarantee, as designated by the Radio Manufacturers Association. Any part or parts that prove defective within this period will be replaced without charge when subjected to examination at our factory, providing such defect, in our opinion, is due to faulty material or workmanship, and not caused by tampering, abuse or normal wear. All such adjustments to be made F.O.B. the factory.

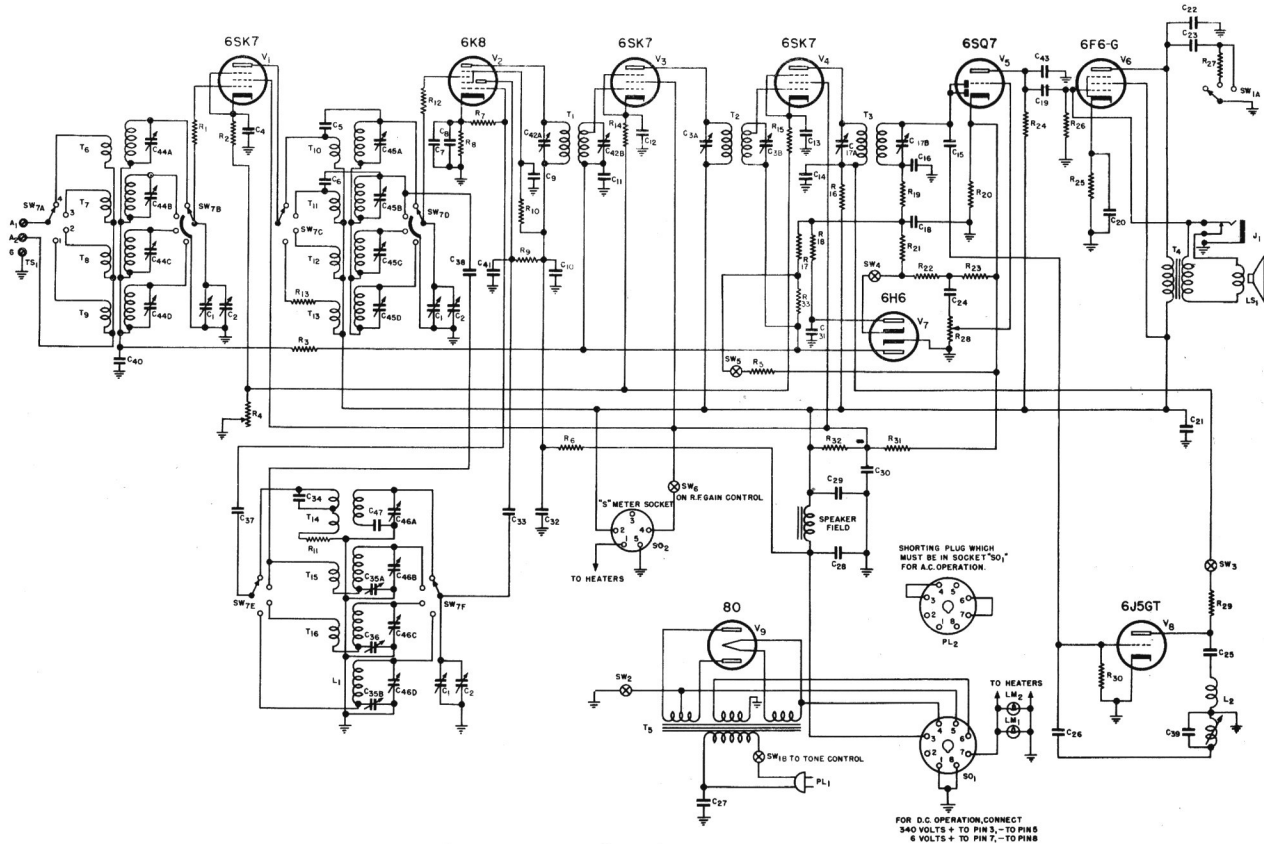
Should this receiver require any adjustments, your dealer or distributor has complete technical service in-

formation, or the factory will be glad to assist you in any problem direct.

Should it be necessary to return any part or parts to the factory, a "Return Material Permit" must be obtained in advance by first writing the Adjustment Department, who will issue due authorization under the terms of the guarantee.

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All Hallicrafters receivers are built under patents of Radio Corporation of America and Hazeltine Corporation.



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