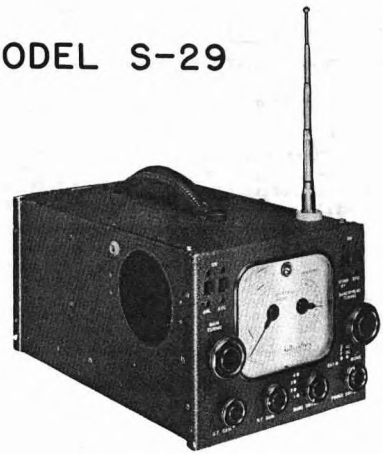
OPERATING ALIGNMENT and SERVICING INSTRUCTIONS for the

SKY TRAVELER

MODEL S-29



the hallicrafters *co.*

CHICAGO U.S.A.

94X014

OPERATING INSTRUCTIONS:

The engineers of the HALLICRAFTERS, INC., have embodied in the SKY TRAVELER MODEL S-29 receiver every worthwhile advancement; both in the design of a battery powered and an all-wave communications receiver. After the owner becomes acquainted with the many features of the S-29 receiver, its versatility will be evident.

It is recommended that, upon receipt, the owner carefully inspect the carton and then his 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.

FREQUENCY RANGE:

The SKY TRAVELER tunes from 540 to 30,500 kilocycles in four bands. The frequencies covered by each band are as follows:

Band	Coverage
1	540 kc to 1500 kc
2	1.45 mc to 4.3 mc
3	4.12 mc to 11.9 mc
4	11.26 mc to 30.5 mc

The MAIN TUNING DIAL is accurately calibrated in megacycles when the BANDSPREAD dial is set at "0", the position of minimum bandspread condenser capacity.

When using the receiver for the first time, it is best to become familiar with its operation on the standard broadcast, or band #1, before tuning the short wave bands. You will then be more able to fully appreciate the capabilities of the SKY TRAVELER when using it later on the other bands.

TUBE LINE-UP

1 - 1T4 R.F. Amplifier
1 - 1R5 1st Detector - Oscillator
1 - 1P5GT 1st I.F. Amplifier
1 - 1P5GT 2nd I.F. Amplifier
1 - 1H5GT 2nd Detector - AVC - 1st Stage of Audio
1 - 3Q5GT 2nd Audio Output Stage
1 - 1G4GT Beat Frequency Oscillator
1 - 1G4GT Automatic Noise Limiter
1 - 50Y6GT Rectifier

CONTROLS AND THEIR FUNCTIONS:

Reading from left to right, the functions of the various identified controls will be described:

The "ANL" or automatic noise limiter switch will effectively minimize ignition and similar types of interference which would otherwise be objectionable to short wave reception. With "ANL ON" filament voltage is supplied to the 1G4GT noise limiter tube by the 1.5 volt flashlight cell - this being its sole function. The POWER SWITCH is wired to also open this circuit when in its "OFF" position. Since the flashlight cell is not included in the "CHARGE" circuit, noise limiting should be used only when necessary regardless of the low replacement cost of the cell. For best noise limiting action use full "RF GAIN" and adjust for volume with "AF GAIN".

The "AVC" switch is for optional use of automatic volume control. To eliminate fading it should be "ON" when receiving phone signals, "OFF" when copying code or CW signals.

The "MAIN TUNING" control is for adjusting the main dial of the receiver to the desired frequency.

The "A.F. GAIN" or audio volume control varies the output of both speaker and phones.

The "R.F. GAIN" control adjusts the sensitivity of the receiver by varying the screen voltage on the R.F. and I.F. amplifiers. Maximum sensitivity and AVC action will be obtained with this control rotated as far as it will go to the right.

The "BAND SWITCH" will allow selection of the frequency ranges through which the receiver tunes.

The "POWER SWITCH" has four positions, namely:-

"OFF" - In this position the receiver is completely inoperative, being completely disconnected from all batteries and from the 115 volt line, should the line cord be left plugged-in. CAUTION: - Be sure the Power Switch is "OFF" when the receiver is not in use (neon glow lamp indicates when receiver is turned ON.)

"BAT" - This abbreviation indicates the position in which the receiver requires no external power, operating solely from its self-contained batteries.

"A.C. - D.C." - In this position the S-29 may be operated on 115 volts A.C. or D.C. - the line cord contained in the back compartment being connected to either sources of power. This will be discussed in greater detail under OPERATION.

"CHGE" - This position is used when "Charging" the batteries. More detail will be found under "CHARGING" in the section devoted to MAINTENANCE.

The "BANDSPREAD TUNING" knob controls the BANDSPREAD dial and its associated condenser. By setting the MAIN TUNING dial to the HIGH FREQUENCY edges of the four amateur bands listed, the BANDSPREAD that may be expected is as follows:-

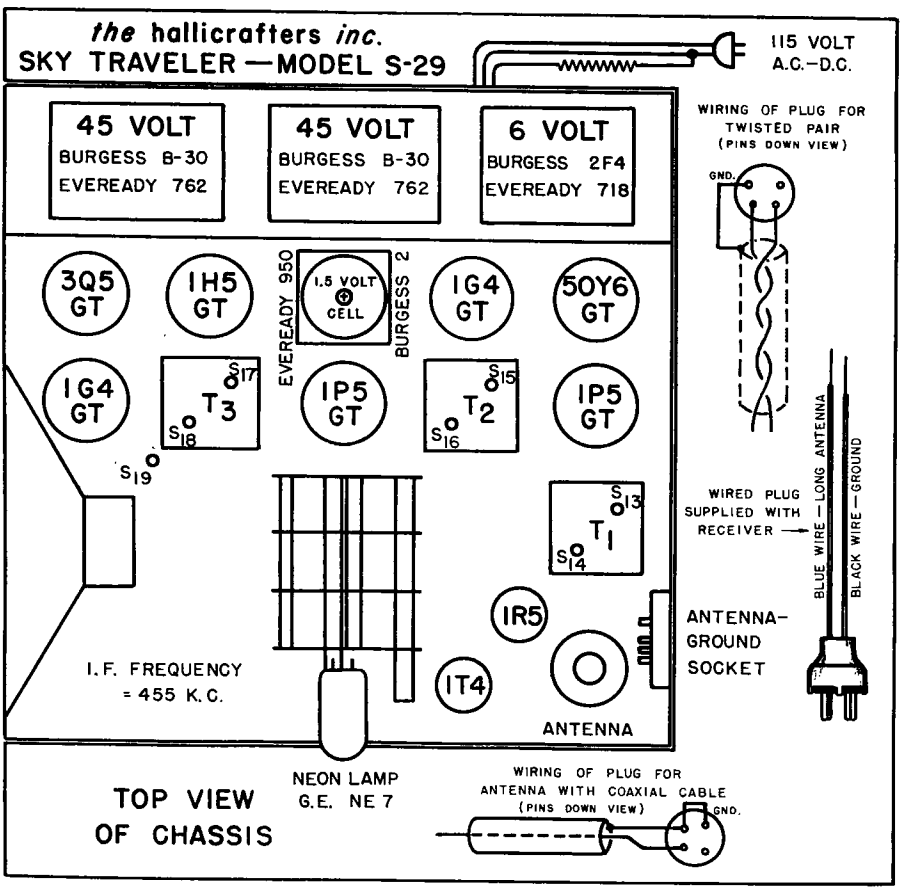
	FREQUENCY RANGE (Megacycles)	BANDSPREAD - DIAL DIVISIONS
(80 meter band)	4.0 - 3.5	0 - 88
(40 " ")	7.3 - 7.0	0 - 76
(20 " ")	14.4 - 14.0	0 - 88
(10 " ")	30.0 - 28.0	0 - 70

The "STAND-BY" switch removes current from the plates and filaments of all tubes with the exception of the noise limiter. This is possible because of almost instantaneous heating of the filaments when voltage is applied, and is an advantage in increasing both tube and battery life. When working from 115 volts A.C. or D.C., filament voltage is left on the cathode type 50Y6GT rectifier because of the time required for it to reach operating temperature.

The "BFO" switch allows optional use of the Beat Frequency Oscillator and is used when copying code signals. It is of additional help in locating weak phone signals by first locating their carrier. Once located, the B.F.O. is turned off to eliminate the whistle and allow reception of the modulated signal.

The PHONE JACK located on the left side near the speaker is connected to the audio output tube so that when a pair of high impedance earphones (crystal or magnetic) are "Plugged in", the speaker will be removed from the circuit.

The NEON LAMP located in the center of the tuning dial is used to indicate when the POWER is "ON". It will glow during STAND-BY periods as insurance against accidently leaving the S-29 turned ON.



OPERATION

ANTENNA:

The SKY TRAVELER is supplied with its own antenna which is permanently connected in the circuit. Being completely telescopic, it may be extended to its full length of approximately 28 inches or compressed entirely into the cabinet. A cap is provided to shield the recessed antenna from ignition and other pickup when using an automobile whip, a doublet or a long wire (inverted "L" Marconi) antenna. To facilitate use of these, or any other type of antenna you may choose, an antenna socket will be found on the right side of the S-29 receiver. A plug having a blue and a black wire extending from it will be found in the envelope of accessories. The BLUE wire is for the LONG ANTENNA - the BLACK is ground. A length of wire of about 75 to 100 feet, erected as high as possible, removed from surrounding objects, and insulated from the ground at all points, will give excellent results throughout the tuning range of the S-29.

If peak operation is desired on a particular band, a 1/2 wave DOUBLET ANTENNA may be used. The flat-top length for a particular frequency may be computed by the following formula:

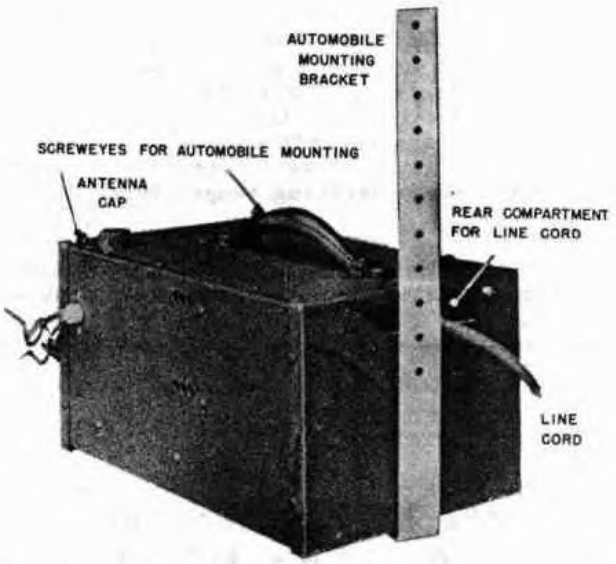
$$\text{Length in feet} = \frac{463}{\text{Frequency in megacycles}}$$

For example - a half wave 20 meter or 14 megacycle antenna would be $\frac{463}{14} = 33.7$ ft. long overall. This length of wire is cut at the center and an insulator inserted at that point. The twisted pair is then soldered to each half, directly on either side of insulator. The other end should be connected to the plug as shown in the drawing. It should be remembered that such an antenna has directional properties broadside to its length.

Due to the effective shielding of a steel automobile body, it is necessary to provide an external antenna for the S-29 if satisfactory portable-mobile operation is to be desired. The COWL ANTENNA is probably the simplest and best suited for use with this receiver. The unassembled antenna plug found in the accessories envelope may be wired for a coaxial cable as shown on the chassis drawing. A shielded single conductor is then used between the antenna and the receiver - the center conductor connecting to the bottom of the antenna and the shield connecting to ground (body of car).

BATTERY PORTABLE AND PORTABLE MOBILE USE

1 - AS A HAND UNIT - Since absolutely no external equipment is necessary, a multitude of portable uses will suggest themselves to the owner of the SKY TRAVELER. The self-contained telescopic antenna will provide satisfactory results over the entire frequency range of the receiver. Should peak performance be necessary at a particular frequency, it may be possible to carry a ready-made doublet which may be suspended from trees in cases of field work.



2 - MOUNTED IN AN AUTOMOBILE - For automobile mounting of the SKY TRAVELER - referring to the photographs - take the following steps:

Remove the upper front screws from the cabinet and replace with the screweyes furnished.

Hook the bracket to the protruding bolt on the underside of the S-29.

Hold the receiver in place under the dashboard so that the bracket is flush against the bulkhead or firewall and the front panel is close to the dashboard.

Adjust the height of the rear bracket and determine bolt locations.

Drill the bulkhead and bolt the bracket to it.

Locate positions for the two hooks on the underside of the dashboard, such that they readily hook into the screweyes on the cabinet.

The SKY TRAVELER may now be installed in and removed from your automobile with ease.

LINE CORD OPERATION

1 - 115 VOLTS A.C.

To operate the S-29 on 115 volts A.C. a line cord will be found in the rear compartment which should be completely removed and extended its full length to aid in the dissipation of heat generated by the line cord resistors which are common to most all AC-DC receivers. To apply power, turn the POWER SWITCH from its "OFF" position to the "AC-DC" position. Should hum be excessive after the tubes reach operating temperature - reverse the line cord plug in the outlet.

PARTS LIST

CONDENSERS

No.	Capacity	Voltage	Type
C1	Main Tuning Gang		air
2	Bandspread Gang		air
3	25 mmfd		ceramicon
4	0.1 mfd	400	paper
5	10 mmfd		ceramicon
6	5 mmfd		ceramicon
7	.05 mfd	200	paper
8	.01 mfd	400	paper
9	15 mmfd		ceramicon
10	5 mmfd		ceramicon
11	5 mmfd		ceramicon
12	.05 mfd	200	paper
13	.05 mfd	200	paper
14	3 mmfd		twisted pair
15	2 mmfd		twisted pair
16	50 mmfd		mica
17	.05 mfd	200	paper
18	.01 mfd	400	paper
19	.05 mfd	200	paper
20	.01 mfd	400	paper
21	50 mmfd		mica
22	.003 mfd	400	paper
23	0.1 mfd	200	paper
24	0.01 mfd	400	paper
25	.005 mfd	400	paper
26	.01 mfd	400	paper
27	60 mfd	150	electrolytic
28	.02 mfd	200	paper
29	.01 mfd	400	paper
30	2 mmfd		twisted pair
31	100 mmfd		mica
32	500 mmfd		mica
33	.05 mfd	200	paper
34	.05 mfd	400	paper
35	60 mfd	150	electrolytic
36	100 mfd	40	electrolytic
37	60 mfd	40	electrolytic
38	60 mfd	150	electrolytic
39	4230 mmfd		mica
40	250 mmfd		mica
41	2030 mmfd		mica
42	880 mmfd		mica
43	380 mmfd		mica
44	.01 mfd	400	paper
45	.05 mfd	200	paper

RESISTORS

No.	Ohms		Wattage
R1	2 megs		1/3
2	2 megs		1/3
3	9000		1/3
4	500,000	R.F. Gain	
5	5,000		1/3
6	2 megs		1/3
7	100,000		1/3
8	1 meg		1/3
9	2 megs		1/3
10	40,000		1/3
11	2 megs		1/3
12	1 meg		1/3
13	100,000		1/3
14	500,000	A.F. Gain	
15	10 megs		1/3
16	100,000		1/3
17	500,000		1/3
18	500,000		1/3
19	400,000		1/3
20	50,000		1/3
21	50,000		1/3
22	300		1/3
23	1100		1/3
24	25		1
25	450		line cord
26	450		line cord
27	1100		1/3
28	500		1/3
29	550		1/3
30	600		1/2
31	9000		1/3
32	900		1/3
33	800		1
34	800		3
35	845		3
36	750		1/3
37	2000		2

For A.C. operation of receiver in the range 105 to 112 volts, change filament resistor tap as follows:

Locate metal-clad resistor on top of metal chassis directly beneath right side of ganged tuning condenser. Unsolder flexible lead connected to terminal opposite 117 volt marking. Solder this lead to terminal opposite 110 volt marking on resistor.

Caution: The above change should be made only when the receiver will be operated continuously at low line voltage. The lead should be reconnected to 117 volts when the receiver is operated at 114 volts or over.

2 - 115 VOLTS D.C.

The same procedure is followed as in A.C. operation with the exception that the S-29 may not operate until the polarity of voltage is corrected by reversing the plug in the outlet.

NOTE: The POWER DRAIN at 115 volts AC or DC is approximately 40 WATTS.

MAINTENANCE

CHARGING: - After the S-29 has been used for some time on batteries, (approximately 100 hours) you will notice a slight loss of audio power output. This is an indication that the batteries are no longer at full strength. Now is the time that the "CHARGE" feature becomes important. Instead of having to replace the batteries, it is only necessary to plug into 115 volts AC or DC and turn the power switch to the "CHARGE" position. All but the 1.5 volt flashlight battery are included in the charging circuits.

CAUTION: Do not charge batteries until absolutely necessary. Do not charge the batteries more than approximately three (3) times the length of time the receiver was used on battery power. Do not charge batteries more than twelve (12) hours at any one time.

NOTE: - The POWER DRAIN when CHARGING at 115 volts AC or DC is about 25 WATTS.

BATTERY REPLACEMENT

To remove the batteries it is necessary, as the photograph indicates, to take out the center one first. The others must then be slid to the center position before they may be removed. The chassis layout drawing gives type numbers of batteries produced by two manufacturers. Any make, of the same size and voltage may be substituted.

TUBE REPLACEMENT

Before removing tubes the POWER should be "OFF" and the line cord removed from the outlet. Special precautions are necessary only in the replacement of the small 1T4 and 1R5 tubes. Care should be taken not to twist them in their sockets to avoid breaking their glass envelopes.

Should the NEON LAMP (G.E. NE7) become inoperative, it must be unsoldered from the circuit before it may be removed.

ALIGNMENT PROCEDURE

EQUIPMENT NEEDED FOR ALIGNING:

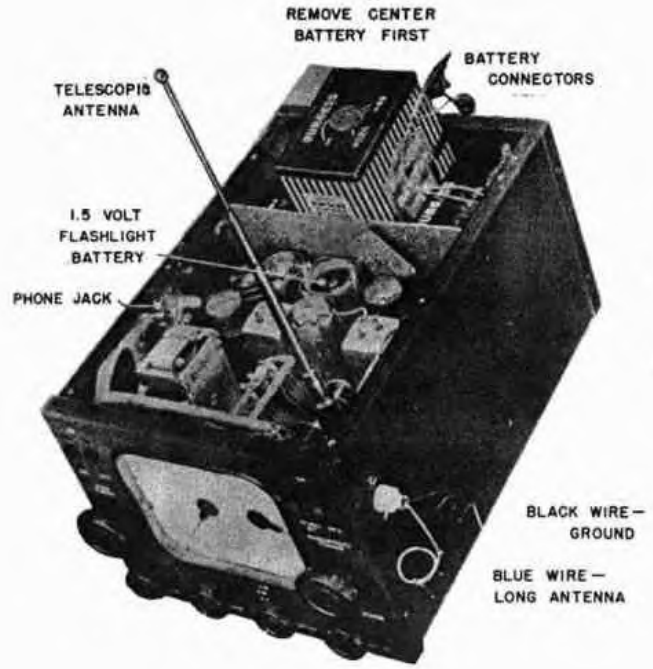
1 - An all wave signal generator which will provide an accurately calibrated signal at the test frequencies indicated.

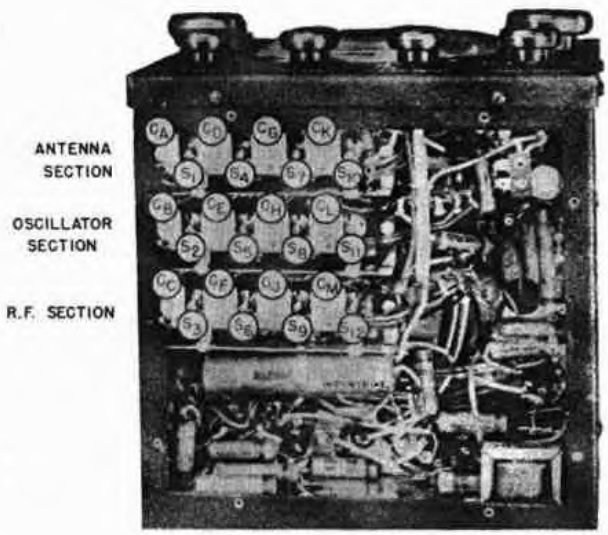
2 - Output indicating rectifier type meter connected across the two lugs on the speaker transformer.

3 - Non-Metallic screw driver.

SETTING OF CONTROLS PRIOR TO ALIGNMENT - I.F. & R.F.

"POWER SWITCH" in "BAT" position.
LINE CORD removed from outlet.
BFO, ANL, AVC switches "OFF".
"RF & AF GAIN" controls for maximum volume.
BAND SWITCH on #1 Band.
BANDSPREAD at (0).
Completely compress the telescopic antenna.





BOTTOM VIEW

455 KC - I.F. ALIGNMENT

Set "MAIN TUNING" control at 1500 kc.
Have antenna plug removed from antenna socket.
Tune generator to 455 kc.
Connect low side (GND) of generator to chassis.
Connect high side (HOT) of generator to lug on rear Stator section (R.F.) of main tuning condenser through a 0.1 mfd condenser.
Proceed to adjust the screws S_{13} to S_{18} inclusive protruding from the tops of the I.F. transformers, T_1, T_2 and T_3, for maximum output.

BFO ADJUSTMENT

Without changing the frequency of the generator after completing I.F. alignment - turn BFO switch "ON" and remove modulation from the signal generator. Adjust screw S_{19} to the desired tone (approximately 1000 cycles).

NOTE: - It is also possible to adjust the BFO without the aid of the signal generator by tuning a signal to exact resonance with the BFO switch "OFF" - with BFO "ON" adjust S_{19} to desired tone.

R. F. ALIGNMENT

Insert "long-antenna" plug, furnished with receiver, into antenna socket and connect generator as indicated in chart below. A condenser in the receiver in series with the blue lead compensates for the reduction in capacity when the antenna is folded and the covers removed - thus, a dummy antenna is unnecessary.

NOTE: - On #3 and 4 Bands, it may be necessary to "rock" the main tuning condenser to compensate for slight shifts in oscillator frequency. When adjusting the trimmers and slugs for maximum gain, the oscillator frequency is 455 kc. less than the signal frequency on #4 band.

Connect hot lead of signal generator to BLUE wire of antenna plug and low side of generator to BLACK wire. A dummy antenna is unnecessary.

Band	Signal Generator Frequency and Receiver Dial Setting	Oscillator Frequency Relative to Signal	HIGH FREQUENCY END		LOW FREQUENCY END	
			Adjust Osc. with	Adjust Trimmers For Max. Grain	Adjust Osc. with	Adjust Slugs For Max. Grain
1	1.4 mc	Above	C_B	C_A C_C		
	.6				S_2	S_1 S_3
2	4.0	Above	C_E	C_D C_F		
	1.6				S_5	S_4 S_6
3	11.0	Above	C_H	C_G C_J		
	5.0				S_8	S_7 S_9
4	28.0	Below	C_L	C_K C_M		
	14.0				S_{11}	S_{10} S_{12}

GUARANTEE

This receiver is guaranteed to be free from any defect in workmanship and material that may develop within a 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 FOB the factory.

Should this receiver require any adjustments, your dealer or distributor has complete technical service information, or the factory will be glad to assist you in any problem direct.

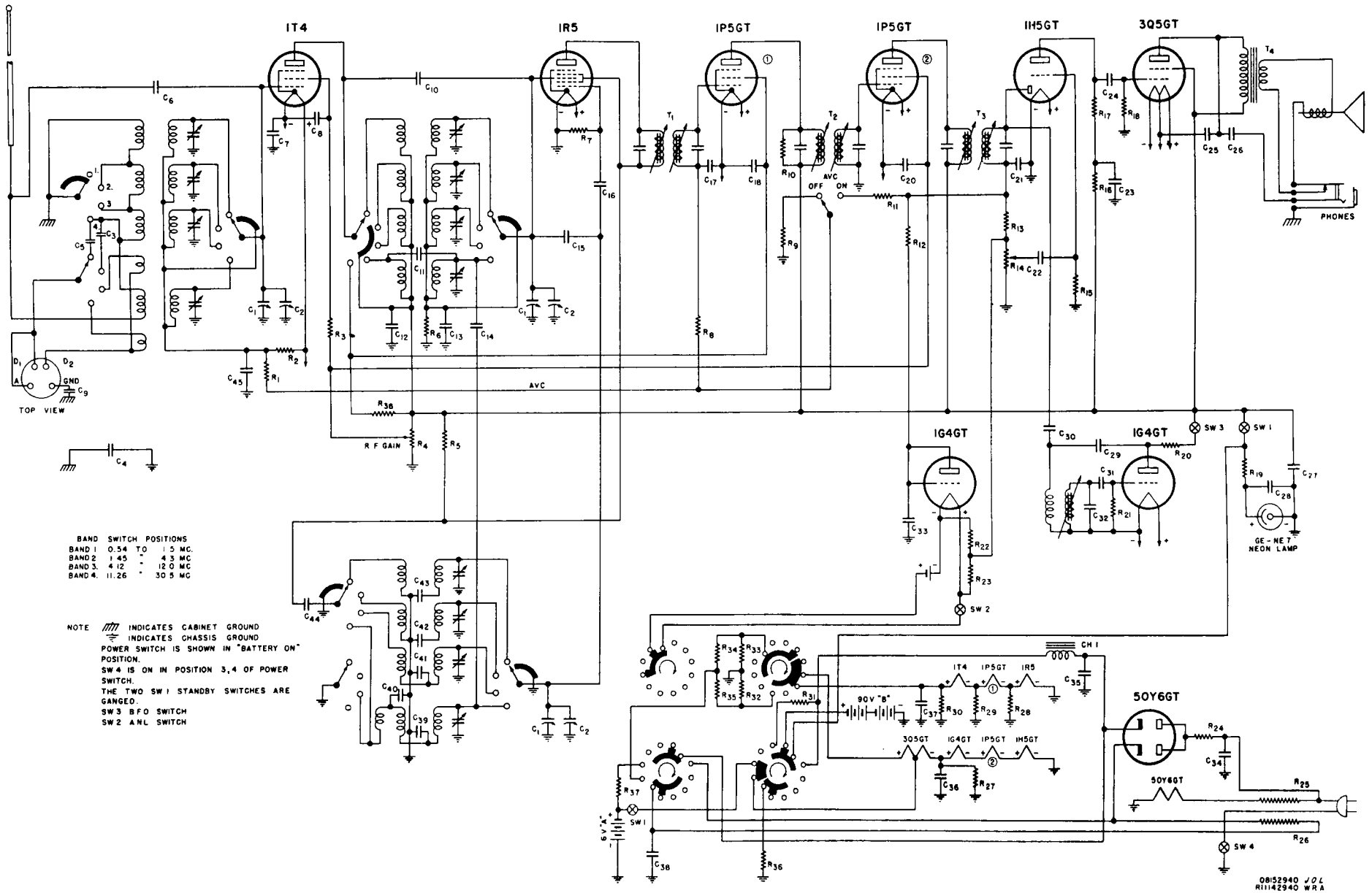
Should it be necessary to return any part or parts to the factory, a "Return Material Permit" must be obtained in advance by first writing the Adjustment Department, who will issue due authorization under the terms of the guarantee.

The Hallicrafters, Inc., reserve the right to make changes in design or add improvements to instruments manufactured by them, without incurring any obligation to install the same in any instrument previously purchased.

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

the hallicrafters *inc.*

SCHEMATIC DIAGRAM – MODEL S-29 – SKY TRAVELER



BAND SWITCH POSITIONS

BAND 1	0.54	TO	1.5 MC.
BAND 2	1.45	"	4.3 MC
BAND 3.	4.12	"	12.0 MC
BAND 4.	11.26	"	30.5 MC

NOTE ////// INDICATES CABINET GROUND
⏚ INDICATES CHASSIS GROUND
POWER SWITCH IS SHOWN IN "BATTERY ON" POSITION.
SW 4 IS ON IN POSITION 3,4 OF POWER SWITCH.
THE TWO SW 1 STANDBY SWITCHES ARE GANGED.
SW 3 BFO SWITCH
SW 2 ANL SWITCH

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