



Ham Tips

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NOV.-DEC., 1949

NEW RCA SPEAKER IS ACCLAIMED BY HI-FI ENTHUSIASTS

RCA 15-inch Duo-Cone Speaker Gives Extra Listening Pleasure

A top-notch good family relations program is made possible at moderate cost by RCA's introduction of a high-fidelity speaker, the RCA-515S1 15" Duo-Cone. With it, any ham worth his call can build, for his family's enjoyment, a true high-fidelity reproduction system. Most radios, phonograph combinations, as well as TV sets and communications receivers, when fed through a high-quality speaker are a revelation in good listening.

The 515S1 provides the listener with dual-speaker response—full depth of bass and a clear, natural upper register. The clarity and quality of its output make the full range of a symphony orchestra literally come to life and provide a remarkable contrast to "communications quality." Best of all, the installation won't require more than an evening or two away from DX.

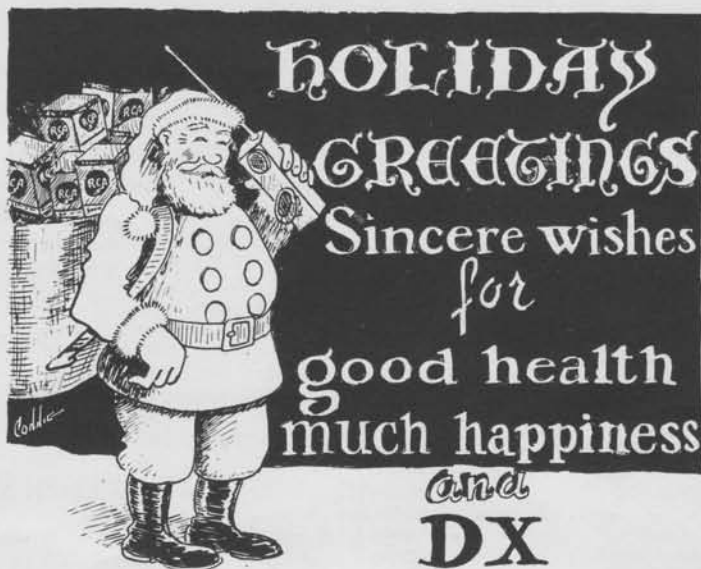
Utilizing the unique magnet structure and Duo-Cone arrangement developed by RCA, the 515S1 has two voice coils, each driving a section of the dual cone. Over the range of cross-over frequencies, which is centered at 2,000 cps, the two cone-sections vibrate as a single cone; thus, the speaker avoids the cross-over interference characteristics of usual high-low speaker combinations.

Two output transformers have been designed especially to operate
Continued on Page 3, Column 3

FOUR TUBE TYPE NUMBERS CHANGED

Here's a tip for future reference—mark it down on your tube reference list. Dual type designations are being dropped on these four tubes and they will henceforth carry only one type number.

Dual Numbers	New Number
0A3/VR75	0A3
0C3/VR105	0C3
0D3/VR150	0D3
6U5/6G5	6U5



The Mobile Receiver Comes of Age - - A DOUBLE CONVERSION TEN- AND ELEVEN-METER SUPERHET

By J. W. RICHARDT JR., W2WIY
Electronic Engineer

After the "Tiny-Tran" transmitter, which appeared in the May 1949 issue of HAM TIPS, the next logical project is a companion receiver to tune 10 and 11 meters. To match the performance capabilities of the Tiny-Tran rig, the "Tiny-Ceiver" was planned for "fixed-station" performance, hence the adoption of the double-conversion circuit.

The Double-Conversion receiver utilizes intermediate frequencies of 1560 and 455 kc. The tuned rf stage and the first mixer employ RCA-6BH6 pentodes and the local high-frequency oscillator uses an RCA-6C4 miniature triode. The rest of the tube lineup is as follows: RCA-6BE6 second mixer and low-frequency oscillator; RCA-6BJ6 455-kc if amplifier; RCA-6AL5 second detector, AVC, and automatic noise limiter; RCA-6AQ6 first audio; and RCA-6AK6 output.

The receiver uses a conventional AVC circuit and a self-adjusting series-type noise-limiting diode (ANL).

Layout Considerations

The cabinet of the receiver is a standard commercially available metal chassis 5 x 9½ x 3 inches with a perforated metal grille cut and

fitted as a cover. Any convenient type of mounting arrangement can be used. The rf head of the receiver is built on a small sub-chassis which is mounted to the left of the if strip. The other components of the receiver are built on a second sub-chassis. (See Fig. 5). The two sub-chassis units are drilled and fitted into the cabinet. When the mechanical work is completed, the units are removed for wiring. The front-panel layout and rear-terminal layout can be clearly seen in the photograph. Minor deviations in dimensions can be made.

The layout of the rf head of the receiver is shown in the top view of the finished assembly (Fig 5). The placement of all the parts as shown in the photographs should be closely followed.

Continued on Page 2, Column 1

W2IOP JOINS RCA ADVERTISING-SALES PROMOTION STAFF

To Take Active Part In RCA Amateur Activities

Larry LeKashman, W2IOP, formerly Editor of CQ, is now a member of the advertising and sales promotion staff of the RCA Tube Department.

W2IOP, a prominent DX man, contest operator, and ARRL National Sweepstakes Winner in 1949, will, among his other duties, act in an advisory capacity to the Editor of HAM TIPS. In joining RCA, he swells the RCA Tube Department's number of licensed amateurs to sixty-one.

Author of numerous technical and non-technical articles, W2IOP is also Editor of the DX Handbook and TVI Elimination Handbook. On the air since 1934, Larry LeKashman has been continuously active, with the exception of the war years, on 80, 40, 20, 10 and 2. Now operating C.W. and 'phone on all bands, his editorial and amateur experience is expected to further strengthen RCA's close relationships with amateurs.

Among the many activities of W2IOP are long-time appointments in the ARRL Communications Department, DXCC, WAZ, WAS, and almost all foreign DX awards, including the first Worked-All-Europe award made to any amateur.



TO FIT THE SMALLEST CAR OR SHACK

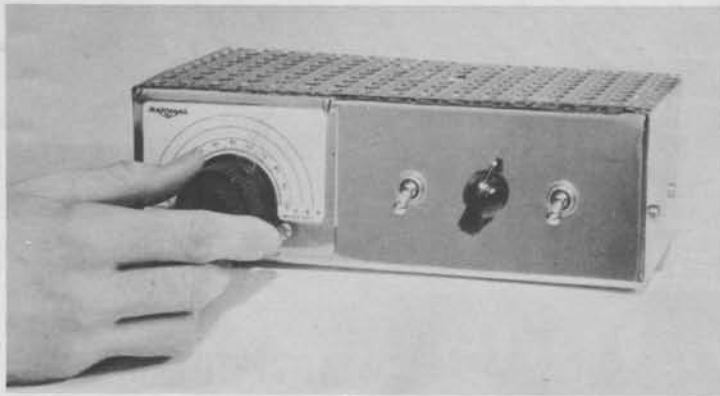


Fig. 1. Front view of the Tiny-Ceiver after final assembly. Don't let its size fool you, performance is better than "standard."

TINY-CEIVER

Continued from Page 1

Six holes have been drilled in the cabinet next to the rf head to facilitate alignment of the stages with the unit in the cabinet. These holes may be covered with spring-clip type plugs if desired.

Wiring

In wiring the rf, if, and audio sections, all the leads are kept as short and direct as possible. Since the if amplifier has very high gain, it is advisable to shield all of the 455-kc if transformer leads. The gain control, AVC and ANL on-off switches, and the other connectors should be permanently wired after the receiver has been tested and mounted in the cabinet.

Alignment

The alignment procedure is conventional, but is briefly outlined for guidance. The first step is to

check all operating voltages. These should be within $\pm 20\%$ of the values specified on the chart. After the voltages have been checked, connect a signal generator to the control grid (grid No. 3) of the 6BE6 mixer and align the last two if transformers at 455 kc with the AVC in the off position.

After these stages have been carefully adjusted, reset the signal generator to 1560 kc and adjust the low-frequency oscillator coil L6 so that it is either 455 kc above or below the signal from the generator. If the 8-uuf trimmer (C21) does not have enough range to facilitate this adjustment, the 62.5-uuf fixed capacitor (C19) will have to be replaced with one which will allow this adjustment to be made.

Next connect the signal generator to pin 7 of the first mixer tube, 6BH6, and align the first if transformer at 1560 kc. When the alignment of this transformer has been completed, connect the signal gen-

erator, set at 26.8 Mc., to pin 1 of the 6BH6 mixer. With the variable capacitor C10 set at full capacitance and the trimmer C12 at about the halfway position, adjust the slug of oscillator coil L5 so that the oscillator is 1560 kc below the generator. After this adjustment has been completed, connect the generator set at 26.8 Mc to the antenna terminals and adjust the rf and mixer slugs for maximum gain. Set the generator at 29 Mc and tune in this signal with the receiver tuning dial. At this point, the rf, mixer, and oscillator trimmers should be adjusted for tracking. It may be necessary to adjust the slugs and trimmers alternately to obtain a combination which will give the required bandwidth as well as proper tracking throughout the range of the receiver.

Power Supply Considerations

Power requirements for this receiver are 250 volts at 58 milliamperes for the plate and screens and 6.0 volts at 1.5 amperes for the heaters. A power switch is not indicated because the author's installation provides a control box on the dash board for controlling the receiver and transmitter simultaneously. This switch, however, can be added to the receiver if desired.

Most vibrator-type power supplies are filtered well enough so that no additional filtering is required. Should more be necessary, the filters shown in the sketch in Fig. 2 should be sufficient. The vacant space on top of the if chassis in front of the power connector was provided for this filter. In severe cases of interference, it may be necessary to enclose the filter components in a metal shield.

If a solid metal cover is used for the receiver, it is desirable to drill a number of holes in it, since even at the low power consumption of this receiver, its small size would make it run hot. If the receiver is operated from the same power supply as the Tiny-Tran, a dropping resistor of 860 ohms (10 watts) will be required. This resistor can be mounted either in the power supply or in the control box.

The sensitivity of the receiver is 1 microvolt for a power output of 0.050 watts into a 3.2-ohm load, or a gain of 118 db measured with AVC and ANL off. If the unit is constructed carefully and aligned properly, it should give many pleasant hours of mobile or home station operation.

TINY-CEIVER VOLTAGE CHART

Tube	Plate	Grid 2	Cathode
6BH6 RF Amp	250 v	150 v	1 v
6BH6 First Mixer	250 v	50 v	2 v
6C4 H.F. Osc.	80-120 v		
6BE6 2nd Mixer	235 v	100 v	
L.F. Osc.			
6BJ6 I.F. Amp	250 v	125 v	1 v
6AQ6 1st Audio	50 v		
6AK6 2nd Audio	245 v	250 v	9 v

All voltages measured with a Vacuum Tube Voltmeter such as the RCA VoltOhmyst*.

* Registered Trade Mark.

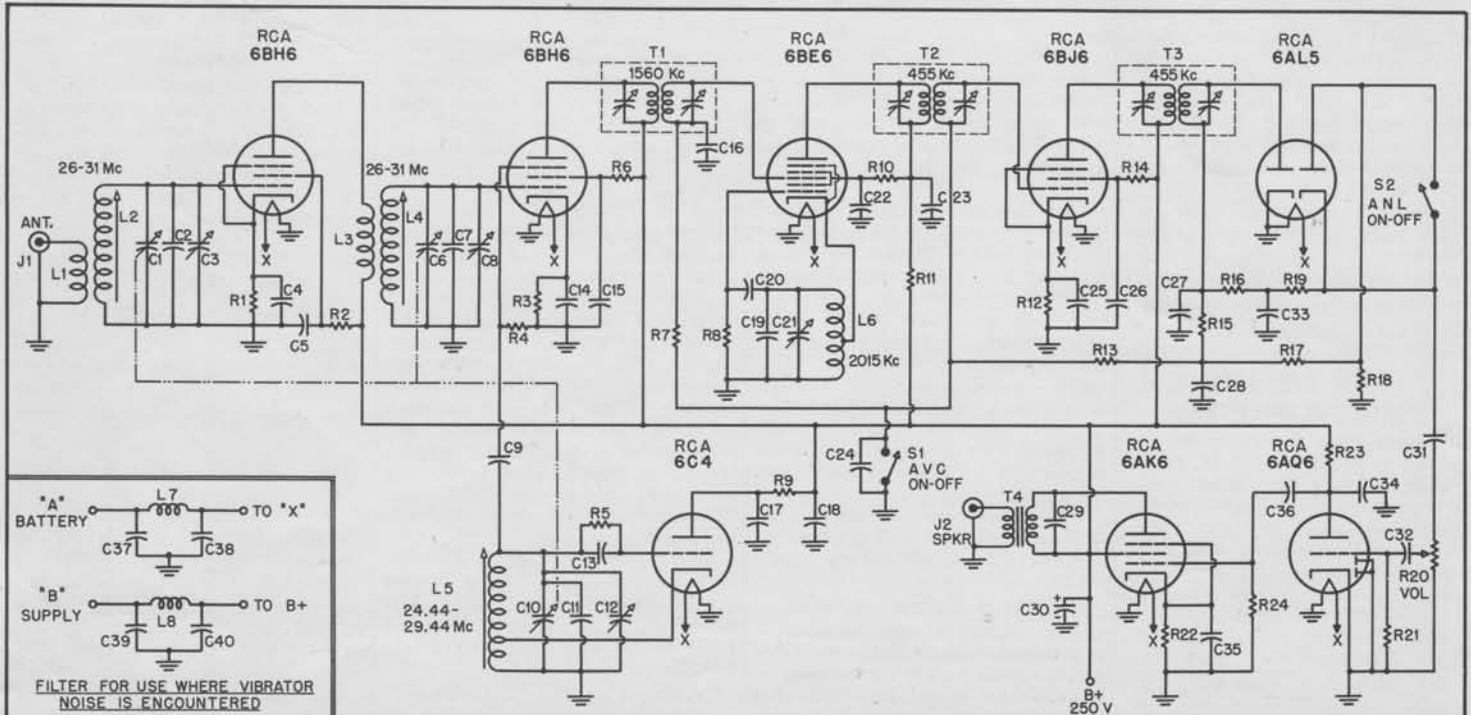


Fig. 2. Complete schematic of the Tiny-Ceiver 8 tube double-conversion 10-meter superhet.

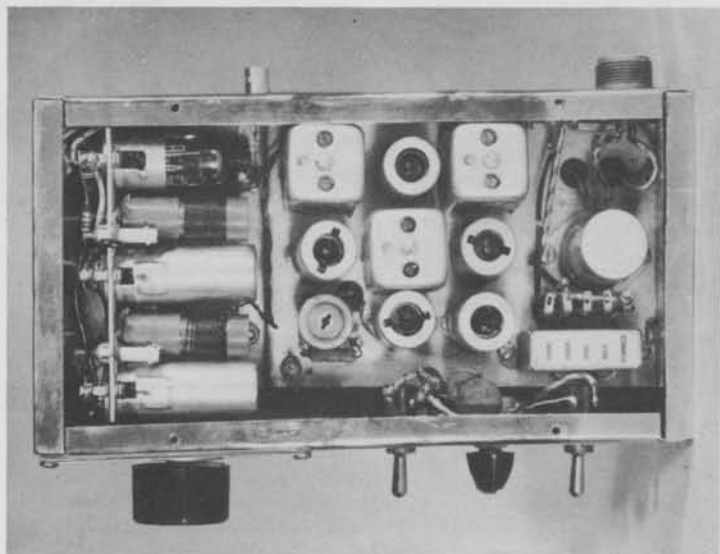


Fig. 3. Top view of the finished assembly showing placement of individual converter and if-a chassis within the compact case.

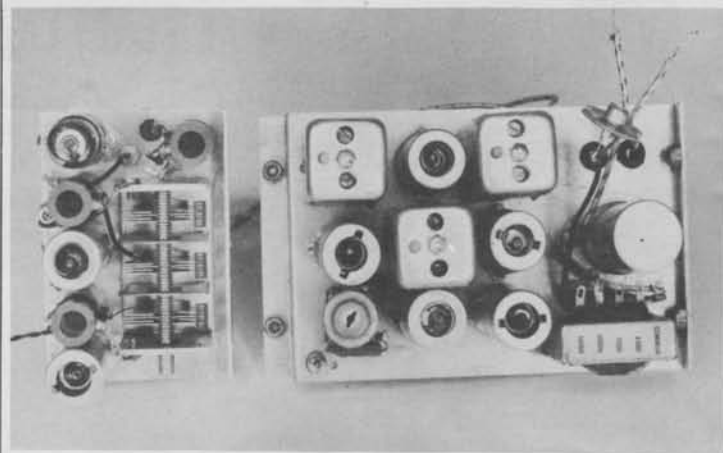


Fig. 4. Top view of the two units removed from the case shows placement of parts on both sub-chassis.

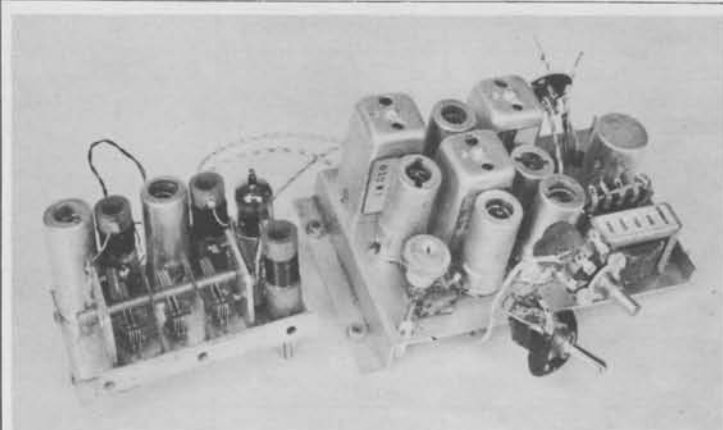


Fig. 5. A three-quarter view of both units reveals a maximum utilization of available space.

TINY-CEIVER PARTS LIST

C1, C6, C10	General Instrument Type 2801 3-gang variable, modified to have 2 rotor plates and 2 stator plates. (Note: Frame of this capacitor measures 1 3/4" x 1 3/4" x 2 1/4" long).	L8	2.5 mh RFC.
C2, C7, C11	10 uuf silver mica El Menco CM 20-100.	S1, S2	SPST Switch.
C3, C8, C12, C21	1-8 uuf variable tubular Erie 532.	R1	100 ohms.
C4, C5, C17, C29	5000 uuf Centralab Hi-Kap DA 048-001A.	R2, R4, R14, R15	47000 ohms.
C9	10 uuf Erie Ceramicon Type K.	R3, R11	1000 ohms.
C13, C20, C27, C28, C34	100 uuf silver mica El Menco CM 20-101.	R5, R8, R9, R10	22000 ohms.
C14, C15, C16, C18, C22, C23, C25, C26, C31, C32, C36	0.01 uf Centralab Hi-Kap.	R6	150000 ohms.
C19	62.5 uuf Erie Ceramicon Type L.	R7	100000 ohms.
C24, C33	0.01 uf 400v paper. Sprague 68P8.	R12	82 ohms.
C30	20 uf 450v (Part of Mallory FP332—2 10 uf 450-volt sections in parallel) See C35.	R13	2.2 megohms.
C35	10 uf 25v (Part of Mallory FP332) See C30.	R17, R18, R23	270000 ohms.
C37	0.001 uf.	R19	820000 ohms.
C38	0.5 uf 25v.	R20	500000-ohm potentiometer.
C39	0.001 uf.	R21	10 megohms.
C40	8 uf 350v.	R22	560000 ohms.
L1	2 turns #20E close-wound over cold end of L2.	R24	470000 ohms.
L2, L4	9 turns #20E, spaced to occupy winding area of National XR-50 coil form.	J1	Amphenol BNC 31-003.
L3	5 turns #36DSC, interwound at cold end of L4.	J2	Bud., JP-248.
L5	Same as L2 plus tap at 3 turns from ground end.	T1	1560-ke if transformer. — Miller Type 012W1.
L6	Oscillator coil — Miller 5481-C.	T2	455-ke if transformer. — Miller Type 012C1.
L7	20 turns #14, 1/2" diameter-close-wound air core.	T3	455-ke if transformer. — Miller Type 012C4.
		T4	Output transformer for matching impedance of 6-8 ohm coil to 10,000 ohm load.
		Dial Assembly	National MCN.

All capacitors are 400-volts unless otherwise specified.
All resistors are 1/2 watt unless otherwise specified.

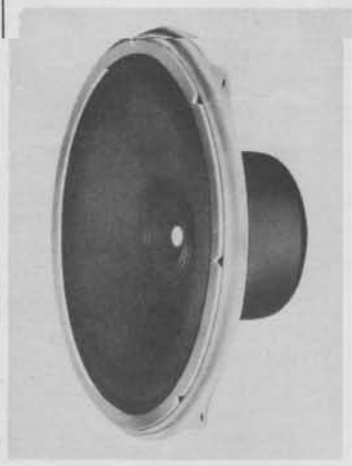
The make and type numbers of the above parts are the ones used in the original construction. Substitutions may be made if physical and electrical characteristics are similar.

DUO-CONE SPEAKER

Continued from Page 1 with RCA-515S1. For operation from line-to-voice coil, RCA-213T1 output transformer is recommended. For operation from tube-to-voice coil, RCA-214T1 output transformer is recommended. These units are multi-tapped for several input impedances.

Be sure to see the RCA-515S1 Duo-Cone speaker at your local RCA distributor.

515S1 DATA		
Power-Handling Capability.....	25 watts	
Input Impedance (At 400 cps)....	16 ohms	
Diameter of	Low-Frequency Voice Coil	2 inches
	High-Frequency Voice Coil	3/4 inch
Magnet Weight	2 pounds	
Speaker Weight	15 pounds	
Frequency Response	40-12,000 cps	
Speaker Resonance (With baffle) ..	40-55 cps	
Total Angle of Directivity	60 degrees	



The RCA-515S1 Duo-Cone Speaker.

COMING ATTRACTIONS . . .

The kind of keying that lets you look your neighbor in the eye, will be described in a timely article on "Electronic Keying Systems" by Mack Seybold, W2RYI, in the next issue of RCA Ham Tips. A well known author-amateur, Mack will be remembered for his outstanding work on low- and high-pass filters. Be sure to get the Jan.-Feb. Ham Tips from your local Distributor.

ECHOES —

The Frequency Chart in the September-October issue of HAM TIPS contains an error. The third line of the 10-meter band indicated NBFM authorized from 29.0 to 29.7 Mc and FM from 28.5 to 29.0 Mc. It should have indicated NBFM authorized from 28.5 to 29.7 Mc and FM from 29.0 to 29.7 Mc.



The Worked All States Log of _____



STATE	CAPITAL	CALL AREA	STATION WORKED	DATE	TIME	BAND	A ₁ A ₃	REPORT		Q S L	
								His	Mine	Sent	Rcd.
Alabama	Montgomery	4									
Arizona	Phoenix	7									
Arkansas	Little Rock	5									
California	Sacramento	6									
Colorado	Denver	Ø									
Connecticut	Hartford	1									
Delaware	Dover	3									
Florida	Tallahassee	4									
Georgia	Atlanta	4									
Idaho	Boise	7									
Illinois	Springfield	9									
Indiana	Indianapolis	9									
Iowa	Des Moines	Ø									
Kansas	Topeka	Ø									
Kentucky	Frankfort	4									
Louisiana	Baton Rouge	5									
Maine	Augusta	1									
Maryland	Annapolis	3									
Massachusetts	Boston	1									
Michigan	Lansing	8									
Minnesota	St. Paul	Ø									
Mississippi	Jackson	5									
Missouri	Jefferson City	Ø									
Montana	Helena	7									
Nebraska	Lincoln	Ø									
Nevada	Carson City	7									
New Hampshire	Concord	1									
New Jersey	Trenton	2									
New Mexico	Santa Fe	5									
New York	Albany	2									
North Carolina	Raleigh	4									
North Dakota	Bismark	Ø									
Ohio	Columbus	8									
Oklahoma	Oklahoma City	5									
Oregon	Salem	7									
Pennsylvania	Harrisburg	3									
Rhode Island	Providence	1									
South Carolina	Columbia	4									
South Dakota	Pierre	Ø									
Tennessee	Nashville	4									
Texas	Austin	5									
Utah	Salt Lake City	7									
Vermont	Montpelier	1									
Virginia	Richmond	4									
Washington	Olympia	7									
West Virginia	Charleston	8									
Wisconsin	Madison	9									
Wyoming	Cheyenne	7									

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 T. A. 'PAT' PATTERSON, W2VBL Editor

Here is your Worked-All-States log—ready and waiting to be filled in.

P. S. To log the 48 faster, and with better reports, equip your rig with RCA. For economy and dependability in transmitting and receiving tubes, insist on genuine RCA tubes in the familiar Red, Black, and White cartons. See your RCA Distributor today.

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