

The COMMUNICATION RECEIVER

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TYPE H.R.O. RECEIVER

THE SILVER-MARSHALL "ROUND THE WORLD FOUR"

The S-M "Round the World Four" was one of the first short wave sets to take advantage of the unique characteristics of the new UX-222 screen-grid tube, and it created a considerable stir in amateur circles at the time. For more information on this unique receiver, the reader can refer to the March 1979 issue of the *OTB*.

--W2ICE

The introduction of the screen-grid tube by RCA in October, 1927, is considered one of the landmarks in the advance of communications technology, and at the time the circuit designers were quick to take advantage of it. One of the early commercial applications was the Silver-Marshall Company "Round the World Four" all-wave receiver, our focus of attention for this issue.

The UX222 tube was designed by GE engineers and was the last of the 1921-1930 design group intended for dc filament operation. The objective was to reduce the electrostatic capacitance between the anode and grid of the conventional triode, which contributed to its instability, by introducing and maintaining a "screen" around the anode at RF ground potential. The advantages of this "shield-grid" tube included high gain as an RF amplifier, freedom from neutralizing, an ability to amplify at wave lengths as low as 3 meters, high audio gain, and relative stability as an oscillator. Must background reading includes key articles by Kruse, Bourne, Westman, and other members of the ARRL staff in the December, 1927 *QST*. Another interesting article is by Ross Hull in *QST* for November, 1928. The tube, designated a "tetrode" was also marketed by Cunningham as the CX 322.

In 1928, Silver-Marshall, Inc., a four-year old Chicago company, marketed several products using the new tube. One of these was a short-wave receiver kit designed by the Research Laboratories of Chicago. The circuit

was essentially the well-known regenerative triode detector with two stages of transformer-coupled audio, but with the UX 222 RF stage added. Since the basic circuitry for the RF stage had already been published, no originality for it could be claimed. However, the availability of a complete, preengineered kit with wound coils and employing these latest design concepts at an acceptable price made for a considerable interest in the product among the SWL and amateur ranks.

The RF input stage was untuned, and the receiver boasted only three panel controls. The two National Type B vernier dials controlled the primary tuning and regeneration, while the small central knob regulated the detector filament voltage and also acted as the filament switch. Four coils covered the short-wave frequency ranges from 17 to 204 meters, with two coils for the broadcast band being made available as extras.

All coils were wound on special Silver-Marshall coil forms resembling the increasingly popular 5-prong "tube-base" coils (the so-called "Scottish" idea) although somewhat larger in diameter and longer than the parent. The winding space was 1½" long and 1½" in diameter, with a tickler slot ⅛" deep and 1/16" wide. These coils were a departure from the 2-3-4" diameter ones which had been in common use, and according to the manufacturer, contributed to the good performance of the receiver on the short waves.

The two variable condensers were of solid brass and steel construction, with a unique compression bearing at each end, and embossed with the S-M trademark. Other Silver-Marshall components were the three potted RF chokes and the two heavy duty audio transformers. The receiver was promoted as having the famous high-gain S-M Clough audio system tonal quality.

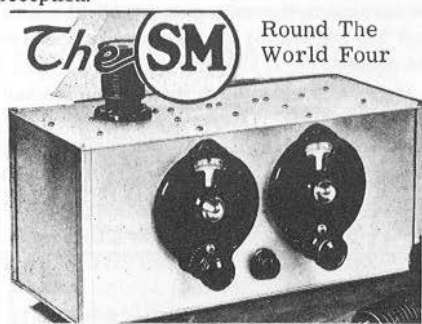
Three versions were made available. The #730 "Complete Kit" included all compo-

All the parts except the coil were squeezed into a compact 6 x 6 x 14" aluminum box with a

If properly assembled, the receiver worked and worked well. Users commented on the excellent audio quality of AM signals and the freedom from detector radiation. Phone signals could be tuned in smoothly, with excellent

[illegible]

control of regeneration, and the use of the RF stage eliminated "dead spots" where a set would not oscillate. Real RF amplification at high frequencies, as low as 15 meters, was now a practical reality; overseas stations could be tuned in on a regular basis. And, the set was also advertised in 1928 as ideal for television reception.



For those who are so inclined, duplication of this interesting circuit is not too difficult. (Note the use of the word "circuit"; finding original components is another story.) A wood base-board 8 x 18 x 1/2" enables the chokes, coil, and tube sockets to be mounted in a straight line (the original S-M kit is rather crowded inside) with the variables and filament control in front and the audios to the rear. The main tuning condenser is a 0.00014 mfd unit and the regeneration condenser is 0.00035 mfd. Both should be chosen carefully; the compression-type bearings of S-M and General Radio units are quiet at 20 meters and give good solid tuning control. The audios are standard 1:3 units, although it may be that the S-M transformers will give better sound. Coil data is given in Table 1, and is for the standard Silver-Marshall forms. All secondary windings are spaced to the full 1 1/2", except that of the #131X, which is 1 1/4" close wound.

In using the receiver, the filaments of the 222 and 201A's should glow quite brightly, and the 112A only a dull cherry red. If the set fails to oscillate as the right dial is advanced, the detector tube can be changed or the detector B+ dropped from 135 to 45V. The 60,000 ohm resistor can be omitted if the audio is stable. If oscillation is not smooth, try a different grid leak and 0.5 or 1.0 mfd bypasses across the power leads. Standard precautions regarding grid and plate leads should be observed.

A "Round the World Four" in original condition is a rare bird. The hams of the 30's, being inveterate experimenters, often used the parts

for other projects or modified the circuit as newer concepts and improved components became available. And as always, a rapidly advancing technology displaced the receiver from the commercial scene; while the screen-grid RF idea persisted, this manufactured product did not. Silver-Marshall, taking advantage of the heady predepression prosperity, had shifted their marketing and sales emphasis by mid-1929 to big-ticket receivers and hi-fi audio components. A collector who has one of these little sets is indeed fortunate.

TABLE 1 COIL DATA

Coil #	Wave Length in Meter	Secondary (pins 1 & 3)		Tickler (pins 2 & 5)	
		Wire	Turns	Wire	Turns
131-T	17.5-32.1	22 e	6 1/2	34 dcc	5 1/2
131-U	30.7-59.0	22 e	13 1/2	34 dcc	5 1/2
131-V	57.2-110	22 e	25 1/2	34 dcc	9 1/2
131-W	104-204	24 dcc	49 1/2	34 dcc	15 1/2
131-X	190-350	24 e	90 1/2	34 dcc	20 1/2
131-Y	350-650	24 e	110 1/2	24 e *	

* Tickler for coil 131-Y wound on separate fiber form fitted inside main form. Turns info not available.

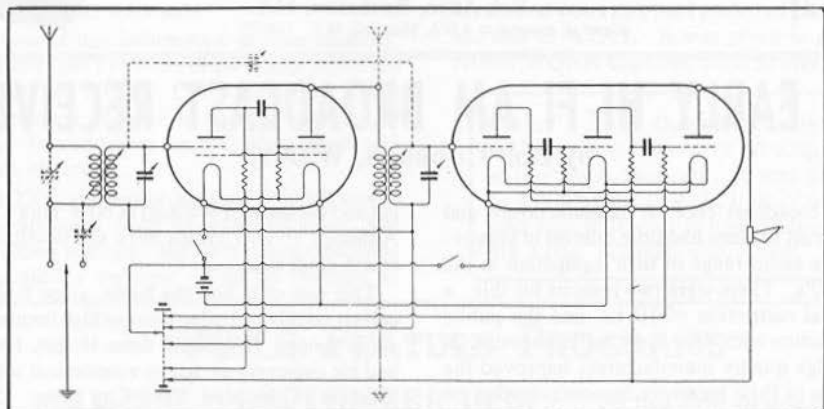
RARE BLUEPRINTS

The AWA Museum has (4) large 22" x 30" bound sets of blueprints showing in detail the construction of pre-WW1 Marconi wireless stations in U.S.A.

These extremely rare blueprints were given to the Association by Marshall Etter, W2ER, retired General Manager of RCA Rocky Point installation. They are available to radio historians doing research or writing a paper on early Marconi equipment. The material cannot be removed from the Museum.

A typical example is a detailed print of the complex timed-spark transmitter used at the Marconi Marion, Mass. station. Another is a fold-out blueprint of the complete wiring at WCC, South Wellfleet, Cape Cod.

This blueprint is 40" in length and shows in detail the complete station starting with a huge Hornsby-Akroyd oil engine driving a 50 kw. AC generator and the high power rotary spark transmitter with the air blast blow-outs. It also includes line drawings of the fan-type antenna and counterpoise system. AWA is most fortunate to have these rare prints in the archives.



Circuit for 5-tube broadcast receiver using 2 Loewe tubes.

One of the big events of the 1926 radio season was the Berlin Wireless Exhibition held in September of that year. The Loewe Radio Company provided one of the more interesting exhibits with the introduction of their multiple valves (*tubes*).

Although other tube companies had manufactured multiple tubes (i.e., 2 triodes in one glass envelope), the Loewe Company outdid them all by having 3 triodes in one envelope. In addition, they also included the necessary resistors and capacitors for a resistance-coupled amplifier in the same envelope! One might say the Loewe valve was the forerunner of the modern IC.

Loewe made several versions of this fascinating tube (see Loewe tube in AWA Museum) which permitted compactness in receiver design and lessened the cost of the

receiver license, which several European countries required. The cost of the license or permit was based on the number of tubes in the receiver.

Dr. Rudiger Walz of Bochum, West Germany, will give an authoritative talk on the subject, illustrating the various types and their uses. A vacuum tube historian, he specializes in making exact replicas of early tubes in his home laboratory. Members who attended the recent London BVWS-AWA Meet may remember his exhibit of home-made WWI British-French "R" tubes.

A chemist by profession, Dr. Walz is president of the German Antique Wireless Association (G.F.G.F.) and is currently editor of their popular journal. He will be our Guest of Honor at the Conference.

On Review

Official Radio Service Manual and Complete Directory of all Commercial Wiring Diagrams 1930

About once a year a publisher will print a highly recommended book for the collector. The "Official Radio Service Manual" is our nomination for 1985. The first few chapters are devoted to basic radio receiver design and then into all the popular circuits from 1922 thru 1930: A-K breadboards, Mod. 20, 60, etc., Crosley 51 2-tuber, Leutz Trans-Atlantic, Victoreen superhet and of course most early AC sets. Buy at Museum Gift Shop or mail check (\$19.95 plus \$2. shipping) to:

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