Chapter Nine

Developments in Tetrodes

Screen Grid

Following the triode in generic sequence, as in the case of battery tube development, came the tetrode or screen-grid tube. In June 1928[1] the C.E. Mfg. Co. announced an AC-operated type having unspecified characteristics or type number. This tube was later identified as CeCo type AC-22 and it was stated to have similar characteristics to the battery-operated UX-222. The heater rating was 2.5 volts, 1.75 amps.

An announcement published in October 1928 by Arcturus claimed that their 15-volt SG tube, type A22, was 'the first shielded-grid tube on the market'. Though no date was mentioned this claim was obviously intended to apply only to AC tubes. Just which of the two companies was actually first in the field is open to question but their respective claims could probably be settled on the basis that CeCo marketed the first standard type having a 2.5-volt heater while Arcturus produced the first (and only) 15-volt type.

In spite of this early start the AC screen-grid tube did not really get off the ground until RCA announced the type UY-224 in May 1929.[2] This tube used the same heater-cathode structure and same 5-pin base as the existing type 227 triode. Its external appearance was quite similar to the battery-type UX-222 as it used the same S-14 bulb and top cap connector. As might be expected the 224 offered a considerably better performance by comparison with its battery counterpart.

By the end of the year all manufacturers of AC tubes had the type 224 in production with Arcturus claiming their type 124 to be the first quick-heating version. RCA's type UY-224A appeared some time later, the suffix 'A' in the type number indicating a quick-heating version. Other manufacturers quickly changed over to producing this type of tube and by 1931 the 24-A had completely superseded the earlier type. In 1932 the bulb shape was changed to the then new ST style.

In April 1929 the firm of C.R. Leutz Inc. claimed to be the first manufacturer to produce a receiver using AC

Radio News for March, 1929

CeCo Announced This Type AC-22 Screen Grid Tube

The five prong tube of the separate heater type operating directly on alternating current

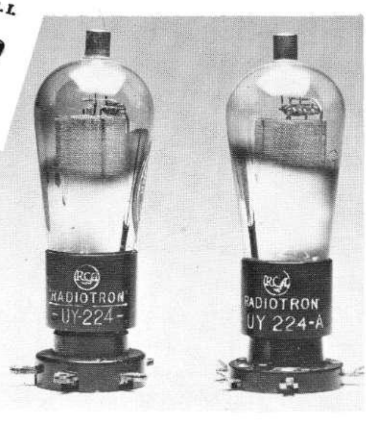
—now recognized as the most outstandingly successful amplifying tube of the season.

CeCo pioneered—and did its pioneering without the fanfare of trumpets. But it is pleasing to know that an increasing number of radio engineers and experts look with confidence to the CeCo laboratories for each new development in the tube industry... a reward not measured in dollars and profits.

Do not miss CeCo's entertaining radio broadcast each Monday evening at 8:30 Eastern time (7:30 Central time) over the Columbia Broadcasting System.

CeCo Mfg. Co., Inc., Providence, R.I.

CeCo Radio Tubes



screen-grid tubes; three Sonatron type AC222 were used in that company's 'Seven Seas' model. It was only by a slim margin that this claim could stand for by July of that year several of the largest receiver manufacturers such as Atwater Kent, Crosley, and Stewart Warner were marketing screen-grid models.

Within a remarkably short space of time the AC screen-grid tube rendered the triode obsolete as an RF amplifier and even as a detector, but in spite of its suitability for the purpose was never employed as a resistance-coupled voltage amplifier in AF circuits in commercially built receivers. The reason for this was probably because of the transformer coupled fixation on the part of engineers on both sides of the Atlantic at the time.

JUNE, 1929 QST

Another New Amplifier Tube added to the advance line of

Cunningham RADIO TUBES

AC Heater Type Screen Grid Amplifier

C-324

2.5 Volt, 1.75 Ampere

This tube combines the unusual performance obtainable from a screen grid radio frequency amplifier with AC heater type alternating current operation. It is recommended for use as a radio frequency amplifier and as a detector.

E. T. CUNNINGHAM, INC.

NEW YORK CHICAGO SAN FRANCISCO
DALLAS ATLANTA

Early production model UY-224. Note fork-shaped screen assembly.

A solitary exception may be found in the case of a power amplifier marketed in 1930 in which a type 24 tetrode was used in the first stage and 'direct-coupled' to the output triode. Such amplifiers were sold under the name 'Loftin-White' by the Electrad Co. of New York. It was the only known commercial application of a screen-grid tube as an AF voltage amplifier. It must be emphasised here that although several small radio manufacturers incorporated the Loftin-White direct-coupled circuit in their receivers during 1930 the 24 tube was used as a biassed detector, not as an audio amplifier. Extravagant claims, based largely on the omission of the coupling condenser, were made for the performance of the Loftin-White circuit but history relates that it did not stand the test of time and after a little more than twelve months had passed quietly into oblivion.

Another application for the 24A was as a 'dynatron' oscillator. In this case the negative-resistance characteristic exhibited by the tube under certain operating conditions allows it to function as a specialised type of oscillator when the plate voltage is held lower than the screen voltage. Used in this mode the 24A found little practical application though a solitary manufacturer (Crosley) did incorporate a dynatron oscillator in certain early superheterodyne receivers made during 1931–32.

It is a matter of record, however, that as things turned out this particular application was largely unsuccessful though not because of the dynatron oscillator as such. It was found that later 24A tubes when used as replacements for earlier types would function erratically or not at all. This was because the dynatron principle depended for its