

Production - Engineering - Distribution

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RADIO Industries

The Radio Manufacturers' Monthly

FEBRUARY • 1933

Europe Listens Over The Wires

The Design of Modern Sound Systems

The Engineering of Water Cooled Tubes

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Radio Engineering

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Associate Professor of Electrical Engineering, Stanford University

688 Pages, 6x9x,

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This book is for the engineer who is interested not only in qualitative descriptions of radio phenomena, but also in making quantitative analyses for facilitating design and research.

The first part of the book is devoted to the theory of tuned circuits and the fundamental properties of vacuum tubes and vacuum tube applications, in the light of their importance and interest to every electrical engineer.

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- universal resonance curve
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- analysis of Class B (linear) power amplifier
- analysis of regeneration resulting from a common plate impedance
- concept of the effective Q of the tuned amplifier
- treatment of the voltage and current relations existing in the screen-grid tube, etc.

This important volume was reviewed at considerable length by *Radio Industries* in our December issue.

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Numbers 9-10

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... EDITORIALS ...

AGAIN, THAT COUNTRY MARKET

"Good Roads," answer critics of those who contend radio sales should penetrate the country and

small towns just as well as auto sales do. But we respond that radio people, particularly manufacturers, have been too citified, too much obsessed with New York and Chicago, to realize that for radio the small communities have "good roads" too. It's just like the really large independent telephone business which is so little known: writers, advertisers and other pace-setters live in the larger cities where it happens the Bell company has gained exclusive rights.

In this day of 50 kilowatt broadcasting stations and the super-het circuit applied to most every receiver, geographical distance is no longer an obstacle, and since the operations of Insull and others in the late lamented period of prosperity, it is surprising where 110 volts, a.c., is found.

But if we are going to sell, we must go into the territory: *we must put merchandise there*. Your editor had an experience that indicates we aren't doing it. In a small county seat, not over two hours from a metropolitan center of a large Southern state, he set up one of these new tiny midgets of the a.c.-d.c. variety and stepped out to get thirty feet of small gauge wire for an aerial. The search took him to the town's hardware store, independent telephone office, and power plant (110 v., a.c.) with the discovery that not a radio set or part was for sale in town. Finally, the old reliable drug store (go there when you can't get it elsewhere) dug up some bell wire for him. Yet in the same town was one full-fledged garage with agency for a car, and three filling stations who fixed flats, sold some accessories.

TALENT AND NEW DEVELOPMENTS

At the recent national auto shows, whose popularity the radio industry might well as-

pire to, much attention was given improvements in cars. Observers were just a little startled to find that most improvements in autos were the work of independent inventors and were developed by parts-makers and not the fruit of the great laboratories maintained by General Motors and others.

Some such condition exists in the radio industry as, for example, few of the basic patents, now so closely owned, were inventions born in the lap of luxury. Today, however, as never before, judging from the reported strain on the patent office at Washington, is an era of intense activity for the free lance in radio.

The gap is between the inventor and commercialization of his brain child. His method, as reading between the lines in the "personals" in engineering journals and watching professional cards indicates, is to sell himself and developments to receiver manufacturers. It's no secret that many of our present host of consulting engineers are "resting," as they say in the show business.

Most competent consultants were formerly connected with set-makers and naturally look at that class of manufacturers as clients as well as employers. But as the automobile industry found at this juncture, there's something to be said for the parts manufacturer. He's a lot more susceptible to new ideas in their highly technical stage; he's more used to working with raw materials; and he's got the contacts with set people to sell them if a good idea is hatched. In contrast to the set man, he can sell the latter from a sample; he doesn't have to go into production and put a few items on each of a hundred jobbers' floors. Give them a try.

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KEITH HENNEY, Editor-in-Chief
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Within the covers of a convenient 583-page volume has been compressed a great deal of constantly needed reference material covering all fields and aspects of radio engineering, from fundamentals to latest practical applications.

5 important features of this book

- 1 The book is thoroughly technical in nature—written by engineers for engineers—gives emphasis to design data rather than descriptions of apparatus.
- 2 Every section has been written by an engineer or physicist chosen because of his expert knowledge of a particular phase of the subject matter. In many cases the authors are daily engaged in the design, manufacture, or operation of the apparatus they describe.
- 3 The scope is broad, ranging from fundamentals to discussion of newest tubes, newest circuits, class B amplifiers, power supply systems, short-wave systems, etc.
- 4 The book is right up to the minute, covering television, sound motion picture, facsimile transmission and aircraft applications.
- 5 The book abounds in circuit diagrams, tables, charts, formulas, design equations, and data. The circuits described quantitatively are those in use today, or soon to be widely used.

Section Headings

- | | |
|---------------------------------------|---|
| 1. Mathematical and Electrical Tables | 13. Receiving Systems |
| 2. Electric and Magnetic Circuits | 14. Broadcasting |
| 3. Resistance | 15. Rectifiers and Power-supply Systems |
| 4. Inductance | 16. Loudspeakers and Acoustics |
| 5. Capacity | 17. High-frequency Transmission and Reception |
| 6. Combined Circuits of L, C, and R | 18. Code Transmission and Reception |
| 7. Measuring Instruments | 19. Television |
| 8. Vacuum Tubes | 20. Facsimile Transmission |
| 9. Oscillating Circuits | 21. Aircraft Radio |
| 10. Detection and Modulation | 22. Photocells |
| 11. Audio-frequency Amplifiers | 23. Sound Motion Pictures |
| 12. Radio-frequency Amplifiers | |

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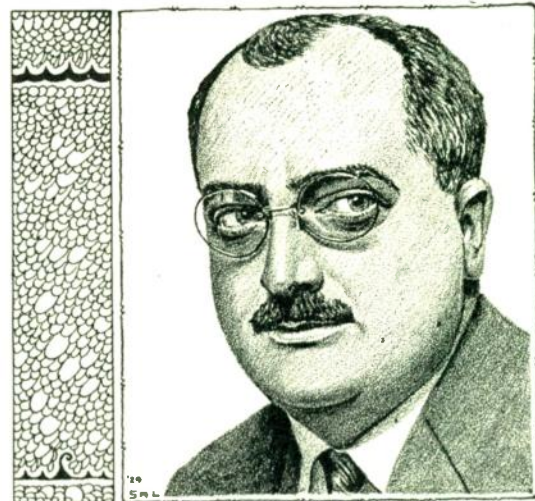
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Now I am going to further enlarge my field of endeavor by taking on representation for a select list of eastern lines . . . some of the old standard radio lines, but more especially the new television field.

In any case where it seems impractical to take on a line myself, I am in a position to advise and suggest those who can give service and coverage in this vast market area.

RALPH L. POWER, Ph. D.,
and **ASSOCIATES**

580 Crane Boulevard

LOS ANGELES,

CALIFORNIA

Europe Listens Over The Wires

By J. J. FRIS

MORE than two hundred and fifty thousand families are listening in to radio over the wires in Holland alone; this represents roughly one million people, or more than one-seventh of the total population of the Netherlands. Before the end of the current year these figures will, I am confident, be increased by ten to twenty per cent.

The transmission of broadcast programs by means of wires is commonly called "relay" or rediffusion. I shall hereafter refer to it as "relay" as it is shorter and seems more to the point.

Relay commenced in a very small way in Holland about six years ago. Powerful influences attempted to kill it at birth. Naturally there was not much love lost between the manufacturers and retailers of radio sets and the relayers. It survived because the underlying principle is sound; because it created a real service and supplied a huge popular demand.

It enabled people to enjoy radio programs at a considerable lower cost than that entailed in the purchase and maintenance of a privately owned radio receiver. It gave them the wizardry of modern radio without the trouble, fuss and complicated tuning apparatus always associated with the ownership of a wireless receiving set. Another advantage of the relay system is that nothing can go wrong, there are no tubes to blow or break, and no batteries to be re-charged. In addition it possesses the advantage of being delightfully simple to manipulate, as easy in point of fact, as turning on your gas or electric light.

I will endeavour in as few words as possible to tell you what relay is and how it works.



Method of wiring main group or subscribers cables in inconspicuous position. Clipped to brickwork by plugs and screws.

It is possible to feed more than one loud speaker from one radio receiver. If you picture a receiver feeding, let us say, five or six speakers, you will have the idea of a relay service. To make it a commercial proposition, it is necessary that many hundreds of speakers should be connected to this one receiver, and still give the same satisfactory performance. This of course would be too heavy a load for the one receiver unaided. Something must be found to help it, so amplifiers are brought into use, thereby making it possible, with amplifiers of sufficient capacity to feed several thousand loud speakers from one receiver. It is not necessary for all these loud speakers to be near the reception point or central receiving station, as it is possible, provided of course installation, line material and other equipment are up to specification, to ensure a highly satisfactory service to subscribers

living several miles away from the station. If Mr. Jones who lives in the area where the service is operating wishes to become a subscriber, a small lead covered cable is branched off the main



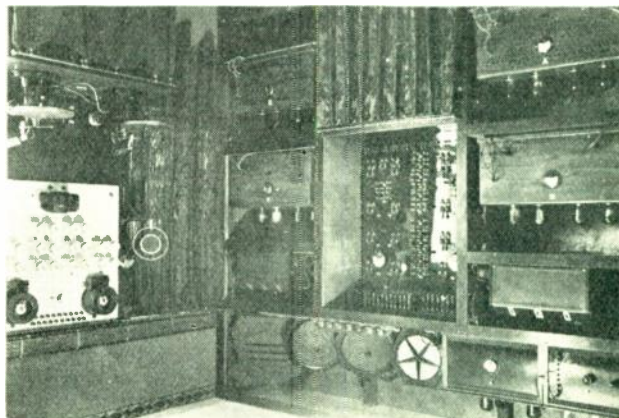
Our contributor, Herr Fris, is Chairman of the Dutch National Relay Association and a consultant to British and German relay systems. His article reaches us from our European Editor, Mr. Bruchiss.

feeder line into Mr. Jones' house, terminating in two or more sockets accepting the loud speaker plug. This plug is very similar to the ordinary switch arrangement so common in every day use.

A few words should be given to the central receiving station. First and foremost is the situation of the station. It is essential that it should be situated away from all possible sources of interference, so as to ensure perfect reception at good signal strength. This is a very important point, especially in the case of a densely populated town, dotted with factories, electric elevators, etc., where satisfactory reception on a privately owned receiver is impossible. In such cases it is usually found necessary to install the receiving and amplifying apparatus well away from the crowded area, on the outskirts of the town and free from electrical interference.

How Many Programs?

In the early days of relay only one program was relayed, (Please turn to page 116)



Amplifier and receiver control switchboard, giving combination control of any receiver connected to any amplifier.

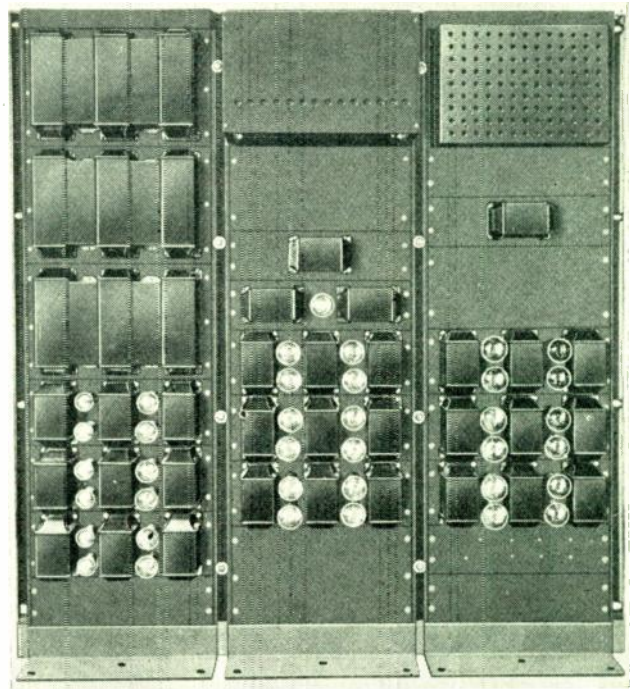
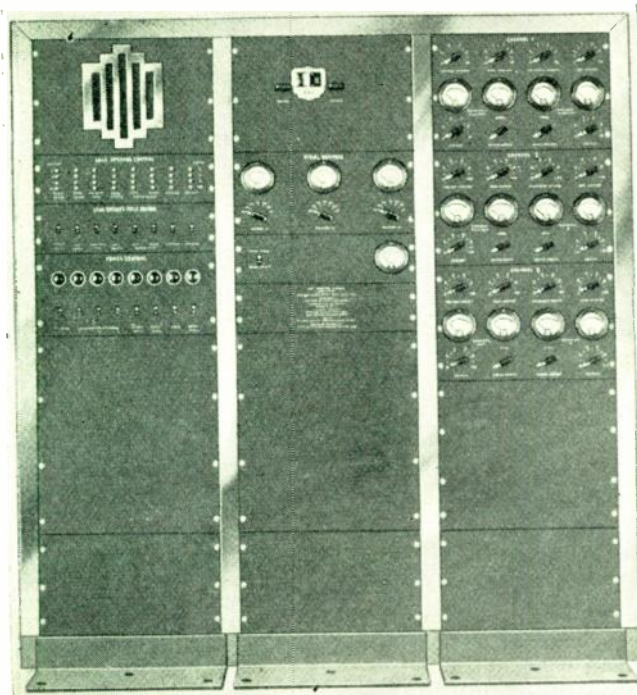
SOUND SYSTEMS

By GILBERT SMILEY
Engineering Dept., Samson Electric Co.

Note: Illustrations are of an installation at Louisiana State University.

COINCIDENT with the rise of radio broadcasting to public prominence within the past decade, has been the rise of a related, though separately integrated art, that of the controlled distribution and reproduction of program material, locally or remotely originated, which art is that of the sound system. Because the public has not had direct contact with this latter development, as has been the case with radio, its rise has been accomplished with no accompanying furore, and, in most instances, the public accepts its various manifestations almost unconsciously. In the fields of voice reinforcement or "orchestra boosting," for example, the sound equipment becomes conspicuous only by its failure. Such unconscious acceptance of a service indicates chiefly that the service not only fulfills a natural need, but fulfills it so perfectly that the need remains unrecognized until its satisfaction is inopportunately removed. Yet the growing recognition of the importance of sound system equipment in the minds of those responsible for the planning of schools, hotels, public buildings and hospitals, to mention but a few possible installation fields, has resulted in a uniform demand, in specifications, for such systems. Almost without exception, the modern building specification includes, if not the sound system itself, the wiring necessary for a future installation. Thus sound systems have grown from a novelty into an essential, their manufacture has assumed its place in the industrial picture, and all this has been accomplished so quietly that the man on the street is scarcely aware of their existence. It is because of this freedom from publicity that this article is being written, for, so quietly have sound systems come upon us—with the exception of some of the more blatant advertising excrescences—that an exact knowledge of their function and design is the property of but a few.

The modern sound system is not a heterogeneous collection of miscellaneous radio parts assembled on a breadboard, with a few meters impressively mounted on a panel, it is workmanlike as-



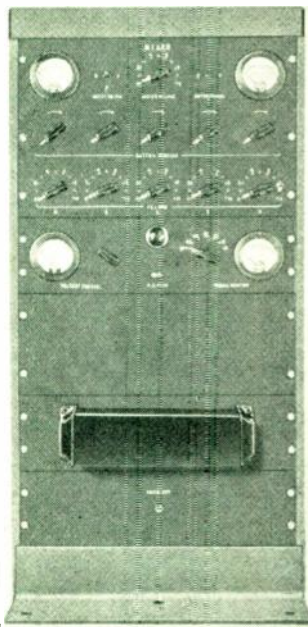
sembly of specific units designed for specific functions. Because, in some of its aspects it is similar to radio equipment, there exists about it an extensive series of popular misconceptions, which misconceptions have done much harm to the industry in its efforts towards an orderly and rational development.

The primary function of the sound system is to serve humanity in the mass. Unlike the radio, it is not subject to distribution as a consumer item, which imposes an immediate limit on the possible production quantities involved. Also, unlike the radio, it must suit not one particular listener, but all listeners, and its failure assumes far greater importance inasmuch as such failure may involve the disappointment of a large audience. Furthermore it involves sources of program material other than broadcast programs, involving certain complexities of control foreign to radio design, and it generally implies power capacity far beyond the average radio set output.

Actually, sound system equipment must be considered as more closely related to broadcast transmitter equipment and to certain telephone apparatus than to radio receiver equipment, and it is from this aspect that it must be studied if a true comprehension of the factors involved is to result.

For purposes of discussion, a sound system may be broken up into the following components—

1. Sources, including microphone transmitters, recorded material radio receiving equipment and the like.
2. Source selection and control, by which program continuity and makeup is made subject to the will of the operator.
3. Amplification, consisting of—
 - a. Gain amplification to pull feeble source voltages up to a level for the operation of—
 - b. Power amplification, the nature and extent of which is determined by the number of and volume requirements for reproducing devices.



4. Reproduction devices — comprising loud-speaking telephone devices or head-sets.
5. Distribution control or the determination of which reproducers shall be in operation from which sources.
6. Volume control and indication—visual monitors.
7. Power control for the determination of equipment to be operated.
8. Source adjustment and indication—such as button-current regulation with carbon button transmitters.
9. Voltage adjustment for the proper operation of included apparatus from power sources, comprising indicating instruments.

The factors involved in design considerations are approximated in the following, though the relative importance of the

separate factors are interpreted differently by each designer—

1. Service. Interpreted as freedom from operating breakdowns for the longest possible period and ease of repair when such breakdowns inadvertently occur.
2. Quality. In which is included the overall fidelity of the system proper and accessories.
3. Power. Sufficient for the maximum demand possible.
4. Simplicity of operation and control.
5. Appearance.
6. Price.

Having listed the component parts and the requirements to be met in sound system design, this article must now enter the controversial field of specific design, or, rather, the interpretation of the requirements as evolved in modern apparatus, of specific manufacture.

Considering sources in the light of the requirements it is fairly obvious that a well-designed sound system must include only apparatus of demonstrable merit. The service and quality factors predominate here. For acceptable reproduction the microphone equipment must certainly be not inferior to that generally obtaining in the better broadcast stations for similar applications. Thus, for straight voice work, the stretched duralumin diaphragm microphone of the carbon-button type may be considered acceptable if the button construction is rugged enough to withstand the service without frequent overhauling, but for music reproduction it is hard to see where anything less than a condenser or dynamic head may be considered acceptable in modern practice. Likewise, the pick-up device for record reproduction must have better than ordinary fidelity and durability, and the turntable should be adaptable to either thirty-three and one-third or seventy-eight r. p. m. records and should maintain speed under all normal conditions. The radio tuner must conform to requirements of selectivity and fidelity in excess of its consumer counterpart, implying an application of the band pass principle, with silent tuning and a. v. c. almost essential. All source power supplies, if a-c. operated, must be both mechanically and electrically quiet to a degree beyond consumer item requirements, as the relatively greater audio-frequency amplification involved in sound systems magnifies power supply defects enormously.

Modern practice no longer tolerates the cumbersome "input switching" so long a standby of the sound system. In its place has come the mixer which permits a smooth transition between

program sections, and better balance between program components. In order that the mixer shall be free from "interlock" general practice indicates constant impedance controls, which permit individual source adjustments without affecting the volume level from other sources. However, constant impedance controls may be dispensed with provided the designer is willing to sacrifice a portion of the gain in the mixer at the expense of added amplification later. In the interest of simplicity, the simple voltage divider type of control is preferable and its freedom from service is a further advantage.

In the design of the actual amplifying equipment there seems to be considerable justification for the concentration of all "gain" in a single voltage amplifier unit capable of

swinging the requisite number of power stages. The gain amplifier must be thoroughly shielded to prevent instability, and must have an exceptionally low hum level and distortion factor. The power amplification, in the interest of manufacturing economy may well consist of as many stages in multiple as are needed to meet the requirements. The recent introduction of tubes capable of operating class B with zero grid bias and mercury vapor rectifiers for their supply has opened a fruitful field. Though these tubes introduce a more or less constant distortion at all levels, the harmonics generated are of such order and magnitude as to compare favorably with the harmonic distortion inherent in the best available accessories, and they do reduce the cost and complexity of equipment for higher power requirements as well as maintenance costs. In a choice between a class A power stage that might be overloaded in meeting the power requirements, or a class B stage with the the new tubes, the class B stage would seem to hold more promise, for, even overloaded, the distortion characteristic is less objectionable due to the absence of the higher order harmonics inherent in the class A stage when pushed beyond rating.

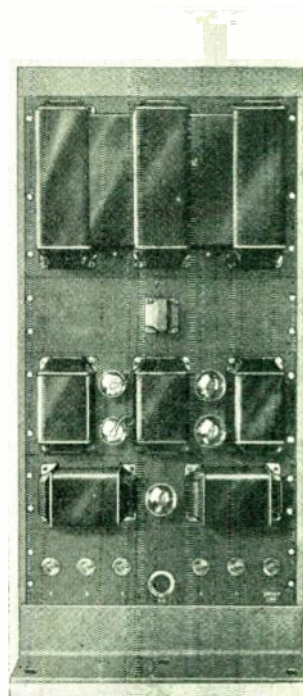
Further to simplify design and assembly, each amplifier unit should be complete with its own power supply, so that installation consists of the connection of input, output and a-c. wiring only.

As for reproducers, obviously they must be both efficient and faithful. While some designs contemplate a centralized power supply for dynamic unit fields, the preferable method seems to the writer to be the unit complete with power supply. Permanent magnet units have not yet proved themselves as permanent or efficient as the service demands, and the shortcomings of the balanced armature design fairly well eliminate it from installations in which price is not the major consideration. A recent "power speaker" development has introduced an entirely new efficiency mark for the industry to shoot at, and permits a considerable saving in output power on installations in which it is included.

Head-sets are still as they have been, whether worn by the listener or incased in a pillow. This type of unit, however, is a cheap and practical form of reproducer where individuals form the audience, and where the volume must be held down to an upper limit.

The modern sound system includes distributing panels on which

(Please turn to page 116)



The Engineering of Water Cooled Tubes

By HARRY F. DART

Engineering Dept., Westinghouse Lamp Co.

AFTER successfully making several types of air cooled transmitting tubes for some years, the production of water cooled tubes was started by the Westinghouse Elec. & Mfg. Co. in East Pittsburgh in 1923. The main use of the various types and styles of transmitting tubes at that time was in the broadcasting transmitter of Station KDKA.

The tube shown in Fig. 1 is of practically the original design and is shown in operating position. The water jacket at the top enclosed the plate almost completely and was designed to provide proper cooling with a flow of 3 gallons of water per minute. The combined length of the tube and jacket is approximately 24 inches. The copper glass seal shows up as the dark band just

Fig. 1

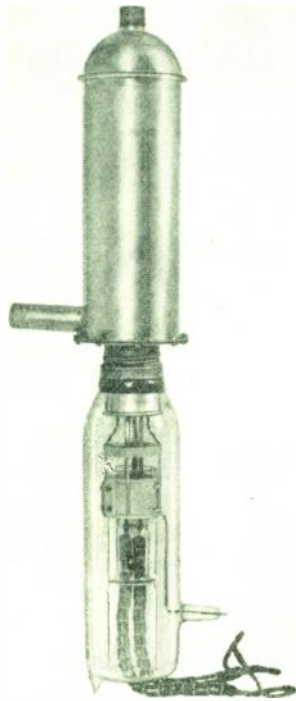
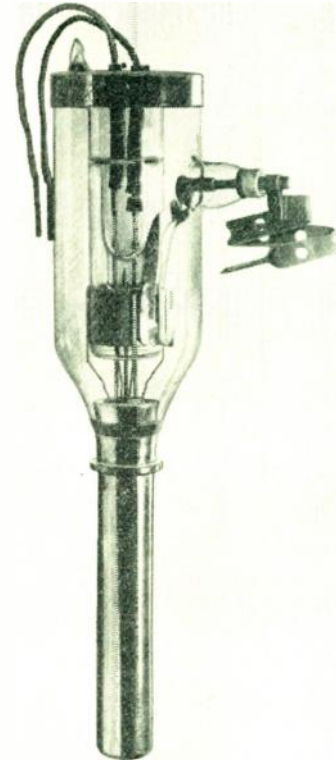


Fig. 2



Fig. 3



Without going into numerous details, the water cooled type of tube was desired so that greater power output could be secured than was possible with existing types of air cooled transmitting tubes which were limited to an output of several hundred watts or, roughly, less than one horsepower. The change to a water cooled plate for the tube immediately jumped the possible output by several fold and helped KDKA maintain its leadership in the field of radio broadcasting in the good old days of regenerative and home-made receivers.

The water cooled tube as made at that time consisted of a copper tube about one and one-half inches in diameter surrounding the active filament and grid assembly. One end of this cylinder was sealed to the glass bulb by a copper-to-glass seal and the other end was closed by a similar short seal. The details of making the copper-to-glass seal or union required a large amount of experimental work in determining the correct taper to be used on the copper, methods of applying the glass to the copper, annealing after the seal was completed and other features.

Copper in the form of tubing was used for the plates in the first water cooled tubes largely because of its general availability. Trouble was soon encountered in keeping the copper tubing vacuum tight, a consideration which was not important in the more usual services in which such tubing was employed. This fact, and the necessity for an extra glass seal to merely close one end, led to the adoption of a cylinder closed at one end which was made by drawing the copper into approximately the correct shape by special tools.

a little below the water jacket. The grid lead, which is discussed in some detail later, is the small lead wire extending to the right through the small glass arm near the bottom of the bulb.

Present-day water cooled tubes do not vary in most major details nor in the critical electrical characteristics from the earliest type, although certain developments have occurred. Most of the advances have resulted in quality and operation improvements. The early tubes employed standard transmitting tube practice in many details and the changes have been brought about by improvements in manufacturing technique and by the irresistible demand for increased output and ability to operate readily and safely in any type of service. No matter how well the tubes met the existing service requirements, the tendency was toward new and sometimes pioneering elds. Even if the tubes met most of the new requirements and were limited in one or two respects, there was an immediate demand that these deficiencies be corrected. Such has been the story in connection with many parts of the water cooled tube and especially with the grid lead.

When first designed, the water cooled tube handled the load and operated very satisfactorily under the transmitter conditions then in effect. Practically the only use was in broadcast transmitters operating at moderately long wave lengths or at reasonably low frequencies. The grid lead design, in particular, was ample to carry the modulator excitation in which service the tube was sometimes used and the circulating radio frequency currents met with at other times.

(Please turn to page 117)

Bulletins From The R. M. A.

RMA OFFICES MOVED

The office of the Radio Manufacturers Association has been moved from Chicago to the American Building, 1317 F Street, N. W., Washington, D. C., in charge of Bond Geddes, executive vice president and general manager. Members of the Association and others are requested to note the change of address in their records and address all RMA communications to the new address.

WIDE USE BEGUN OF RMA OFFICIAL SEAL

Receiving sets bearing the new official seal of the RMA now are being distributed to the trade and the public.

Many thousands of the new RMA seal already have been ordered by members of the Association. The seal plan has met wide and immediate favorable response not only from manufacturers of the RMA, but also from many jobbers and dealers. Even the U. S. Department of Commerce has taken favorable note of the new RMA plan for placing "certified" seals on receiving sets of its members and interest also has been displayed by other industrial and trade bodies, such as the Consumers' Research organization.

RMA members now affixing the certified seal to their receiving sets include many of the leading set manufacturers. Others have advised Association headquarters of their early adoption and use of the official seal. President Williams of the RMA, Chairman Murray of the set division and other Association officials are much gratified over the initial and most favorable receipt not only by members, but by the trade, of the official seal plan.

In addition to the metal RMA seal, the Association is now arranging to secure seals of paper or other composition which may be desired by members. The RMA seal is being registered as the Association's trademark with the U. S. Patent Office at Washington so that its use and benefits may be reserved for RMA members only.

The Department of Commerce advised the RMA of the great success enjoyed by other industries and trade associations in adopting similar "certification" plans in promoting public use and acceptance of their products. Plans of "certifying" the products similar to that of the RMA have been used successfully according to the Government authorities, by seventy-four other trade associations and industries.

RMA TRAFFIC MAN RESIGNS

Following the suspension of the RMA traffic bureau, announcement was made of the resignation of W. J. M. Lahl, for four years manager of the RMA traffic bureau, effective January 31. Mr. Lahl will remain in radio traffic work in a private capacity. Traffic interests of the RMA will be continued by its traffic committee, of which Captain William Sparks of Jackson, Michigan, is chairman.

"HUM" OF BROADCAST TRANSMITTERS

The movement for co-operation between broadcast engineers and those of receiving set manufacturers on the problem of "hum" of some broadcast transmitters in various sections of the country is being forwarded by the National Association of Broadcasters and the RMA. Director Loucks of the broadcasters' organization will soon present to the NAB board of directors the proposal from the RMA for a joint meeting of broadcast and receiving set engineers to consider efforts for reduction of interference caused by transmitters.

SWITZERLAND PROVIDES RADIO QUOTAS

Following the action of France, the Swiss Government established import quota restrictions on radio and other products effective January 1, according to the U. S. Department of Commerce. The Swiss import control system provides allotment of quotas to individual countries, which are not made public, and requires import permits for each shipment.

ADMINISTRATION OF FRENCH IMPORT QUOTA ARRANGED

The RMA has been advised by the American Chamber of Commerce at Paris of administrative arrangements for operation of the radio import quotas on shipments of France. The American Chamber of Commerce at Paris states that it intends to do everything possible to maintain and increase, if possible, the American quota allotments in 1933 although there are reports also that France may adopt a prohibitive tariff on radio to build up manufacturing in France.

The quota plan arranged by the American Chamber of Commerce in France provides for allotments to radio exporters for each quarter of the year based on three factors: (a) the relative importance of the radio product in America determined by total 1931 output, (b) total exports to France of the manufacturer's product in 1931, and (c) actual monthly sales in France from June, 1931, to June, 1932. The method, it is conceded, is complicated but was agreed upon with the French Minister of Commerce after conferences with various representatives in France of American radio manufacturers. Provision is made in the quota administration for special cases where radio material had been held for a long time before October 1 in French customs houses.

The American Chamber of Commerce at Paris states that two most important results have been accomplished, in the equitable division of the limited quota among important American radio manufacturers and the very definite obstruction to job-lot material sent to France.

"We are doing everything we can to encourage the establishment of definite agencies in France for reputable American makes of sets, tubes, and spare parts," the letter to the RMA from the American Chamber of Commerce states, "and in the future allotments will be made in each case only to authorized distributors when such exist. The Radio Manufacturers' Association could help us in this matter by explaining the situation to its members.

"We have had expressions of satisfaction recently regarding the Chamber's handling of the radio quota from the American Commercial Attache, the French Minister of Commerce and the radio exporters and feel, therefore, that the basis of operation adopted is sound and should be continued as long as radio quota arrangements exist in France."

REPLACEMENT CONES ANNOUNCED BY MANUFACTURER

Latest parts manufacturer to enter the replacement field is United Pressed Products Company, Chicago, and is of course offering speaker diaphragms. Frank Raffles, head of United, explains there has developed a demand from service men, and now his firm is furnishing through jobbers and direct cones and other type diaphragms to fit any speaker made.

It has been found that poor reproduction in sets serviced was often due to the seam of speaker cone being open or the voice coil torn loose. Repair was difficult and until now a replacement diaphragm was not always readily available for many speakers.

TWO WELL KNOWN ENGINEERS BECOME CONSULTANTS

Dr. A. N. Goldsmith, long engineering head of R. C. A., has resigned and entered private practice, numbering, however, among his first clients the Radio Corporation of America, in whose building at 570 Lexington Avenue, New York City, he will continue to make his headquarters.

L. G. Pacent, while continuing as head of the Pacent Electric Company, New York, announces a consulting firm with himself devoting most of his time to it, and with offices at 79 Madison Avenue, New York City.

* *

Ever notice? On the stock market it's "Radio," to employees it's just "the Corp." but to most of us, "RCA." The telephone company fares likewise: We hear quoted the stock of "American Telephone"; other groups say, "Bell" or "A. T. & T."

NEWS OF THE INDUSTRY

R. C. A. TO APPLY FOR PERMISSION TO COMPETE WITH TELEGRAPH FIRMS

The Radio Corporation of America recently informed the Radio Commission that it planned to apply for permission to create a domestic-radio-telegraph system operating on an unusually high frequency to compete with commercial wire telegraph companies.

"It seems probable," the corporation said in a letter, "that equipment now considered most useful for domestic telegraphy will be on the road to obsolescence when devices and methods which the engineers now foresee have been further developed and that then entirely different frequencies will be found most useful for the purpose."

The corporation also said it intended to abandon applications filed in 1927, now tied up in court litigation, for frequencies of 6,000 to 23,000 kilocycles in favor of frequencies of more than 30,000 kilocycles.

The commercial use of frequencies above 30,000 kilocycles, the corporation said, began with the development and installation by it of the inter-island radio telephone system in Hawaii, which has been successfully operated for more than a year by the Mutual Telephone Company.

The letter added:

"The most recent developments involve the successful operation of a very high frequency 'repeater' station which combined with other experimental data indicates the possibilities of using these frequencies efficiently and economically over great distances for domestic radio transmission of commercial telegraphy, telephony, teletype or facsimile and for combinations of these services.

"Both the laboratory experiments and field demonstrations indicate that the present dot-dash language of telegraph will not be found best suited for our purpose but will be superseded by a swifter, more accurate and less expensive system whereby messages offered at the point of origin will be reproduced in facsimile at the point of destination."

* *

MAJESTIC PROMOTES RADIO MEN

W. G. Peirce, assistant vice president in charge of the radio division of the Grigsby-Grunow Company, recently announced the following promotions in that organization: Ray Erlandson has been made sales manager of the newly created auto-radio division where he will devote his entire time to the development of sales for the new Motor Majestic.

A. A. Trostler has been transferred from Columbia at New York to succeed Mr. Erlandson as assistant sales manager of the radio division. M. E. Paradise, who

SERVICE MEN IN SUCCESSFUL MEET

The first convention of the Institute of Radio Service Men held at Chicago in January proved highly successful. The enthusiasm demonstrated by the exhibitors, registrants, and lookers-on drew comments from all sides, and the executive officers of the Institute were assured voluntarily of the continued support of those who displayed their wares before the groups assembled.

Service men from distant points such as Minneapolis, Louisville, Omaha, Waterloo, Detroit, and intermediate cities and towns registered during the three-day session. Several of them had arranged their affairs so as to not miss a single feature of the activities that were provided.

One of the most remarkable things about the convention was the fact that the booth space was oversold, and on the morning that the convention opened there were four applications which could not be filled. And, what is more remarkable there was no solicitation subsequent to three weeks after the executive office of the association decided to proceed with the convention.

The convention program covered a broad scope. The technical sessions included the presentation of papers on developments, service problems, advertising methods, broadcasting, merchandising, test equipment, vacuum tubes, public address systems, and, in fact, practically everything that is of vital importance to the service men in the conduct of their business.

Among the noted personalities who attended the event were Bond Geddes, executive vice president of the Radio Manufacturers' Association; E. N. Rauland, treasurer, RMA; W. S. Hedges, manager, WMAQ; John Rider, president, John F. Rider Publications; J. C. Hoover, president, Hoover Laboratories, Detroit; Phillip Lenz, former director, Radio Manufacturers' Association; and Jack Spangler, manager, tube division, National Carbon Company. Old timers around radio shows, including A. J. (Nick) Carter and Arthur T. Haugh, an early president of the RMA, together with Charles W. Glaser, lent an atmosphere that bespoke of the "good old days" when radio was new.

* *

EBY REOPENS CHICAGO OFFICE

The H. H. Eby Mfg. Co., parts manufacturers, Philadelphia, have reopened a Chicago office at 154 E. Erie Street. Ed. R. Peel will be in charge, and a complete stock of more than 150 items of Eby products will be maintained.

has been associated with Majestic since 1928, has been made chief engineer of the radio division.

ANOTHER SUIT AGAINST RCA OFF

A \$30,000,000 suit brought in Federal court in Kansas City, June, 1930, by the Grigsby-Grunow Company of Chicago against the Radio Corporation of America and affiliated organizations, has been dismissed by Judge Alber L. Reeves.

The dismissal followed the filing of a stipulation based on a settlement made Dec. 30 in Westchester County, New York. The terms of the settlement were not revealed by the stipulation.

The suit, filed by former Senator James A. Reed, alleged that the Radio Corporation of America and its affiliated companies, named as the General Electric Company, Westinghouse Electric and Manufacturing Company, and others, had formed a patent pool, resulting in worldwide control of radio manufacturing.

A statement issued by David Sarnoff, president of the Radio Corporation of America, said an amicable agreement had been reached "in order to avoid further economic waste and business disorganization."

"The Grigsby-Grunow Company had executed the standard supplemental radio receiving license," the statement said. "The standard tube license has also been issued to the Grigsby-Grunow Company for a period of five years with an option to extend it for an additional five-year period.

"The Radio Corporation of America, General Electric Company and Westinghouse companies obtain licenses, with the right to license others, under the radio patents of the Grigsby-Grunow Company."

* *

NEW HAZELTINE LICENSEES

Radio Chassis, Inc., New York City, has acquired a license for use of all patents granted the Hazeltine Corporation, which solidifies its patent position. The company is already a licensee of the Radio Corporation of America and affiliated companies.

Pierce Airo, Inc., New York City, manufacturers of DeWald radio receivers, has also become a licensee under Hazeltine Corporation and Latour Corporation patents which cover a number of important developments in receivers as well as other radio improvements. Pierce Airo has been manufacturing under R. C. A. license during the past ten years. David Wald is president and Louis N. Weiss, general manager.

The trade mark Motortone has been duly registered by Pierce Airo to designate the auto radio sets being manufactured by that organization.

NEWS OF THE INDUSTRY

CLARION PASSWORD "TURNOVER"

Fourteen divisional sales managers for Transformer Corporation of America recently spent an entire week in Chicago for the purpose of working out Clarion's greatest sales plan. After a week of intensive study and instruction these men were equipped with individual territorial ammunition which, it is fully expected, will result in a tremendous increase of sales volume. Distributors from all parts of the country were in a general meeting and presented with the new line. "Clarion Challenges First Place" was immediately adopted as the 1933 slogan.

E. J. Dykstra, sales chief, gave a resume of Clarion's activity for the past six months and explained that Clarion had 7,000 dealers throughout the United States and a drive is being made to step up this figure to 10,000. Sixty-five jobbers, operating 100 branches, are available to handle distribution for the increased output of the factory. Mr. Dykstra further stated that jobbers' and dealers' inventories of Clarion merchandise were low and that the entire organization was in an exceptional position to accept a new line. J. J. McCarthy, vice president, and E. J. Doyle, chief engineer, explained that the production and engineering departments have devoted night and day in the development and refinement of new models and that practically every important major improvement known to radio is incorporated in the chassis.

Ross D. Siragusa, president, in his address, stated: "This mighty line has been designed to assure dealers of the one most important factor in 1933 merchandising—turnover."

* *

VAN SICKLE NOW PARTS HOUSE

Geo. W. Van Sickle, president of the Geo. W. Van Sickle Co., St. Louis, wholesale distributor during the past year of Lyric radios and Mohawk refrigerators, recently announced that the sales activities of his company have been extended to now include radio tubes, parts, accessories and auto radios. In line with this the company's name has been changed to Van Sickle Radio Company.

Mr. Van Sickle also announced the addition of James P. Broadwell and Dan P. Buckley to his organization, both former members of Van Ashe Radio Co. As vice president, Mr. Broadwell will direct the purchasing department and Mr. Buckley will act as business manager and secretary-treasurer. Service department and auto radio installations will be under the supervision of John Devereux.

RADIO CLUB HOLDS FORUM

Engineers representing nearly all of the leading radio receiver manufacturers joined in the first Radio Forum conducted by the Radio Club of America, at Havemeyer Hall, Columbia University, New York City, during which a general discussion concerning various methods for attacking the problem of reducing extraneous noises usually picked up by radio receivers was discussed. This is the first time the Club has sponsored a meeting of the forum type and it was done in the nature of an experiment.

An extremely interesting paper was first presented by Captain E. C. Brigham, chief engineer of the Kolster Co., outlining the engineering behind the attack made by his company on this important problem. Captain Brigham indicated that the problem of noise was an ever increasing one and that its importance is becoming greater as the radio public realizes that the noise which it has tolerated up to now can, in most instances, be almost entirely eliminated on the regular broadcast waves. Important contributions to the evening's discussion were made by C. W. Horn, general engineer of the National Broadcasting Co., F. X. Rettenmeyer, of the Western Electric Co., and Dr. J. G. Aceves, who was for many years in Professor Pupin's laboratory at Columbia.

The Radio Forum was conducted by Ralph H. Langley, a consulting engineer and formerly assistant to the president of the Crosley Manufacturing Company, Cincinnati. Members of the club indicated that they were very well pleased with the experiment and the meeting did not break up until well after midnight.

Many illuminating remarks concerning the practical application of these new systems were made by Arthur H. Lynch, president of the Lynch Manufacturing Co., who indicated that the pioneering work which has already been started by such companies as Kolster and Atwater-Kent would make it absolutely necessary for most other receiver manufacturers to supply some suitable antenna systems, incorporating noise-reducing properties, if they are to keep pace with normal development.

* *

ROSENFELD JOINS RADIO CHASSIS, INC.

It was announced by Radio Chassis, Inc., New York City, that Roy Rosenfeld of Boston would represent Radio Chassis, Inc., throughout New England. Mr. Rosenfeld is well known in the trade, having had years of experience in the radio industry. He was formerly sales manager with the Audiola Company, Chicago.

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EUROPE LISTENS OVER WIRES

(Continued from page 109)

often over one wire, using the earth as return. Later the authorities ruling the granting of licenses, dictated that a return wire should be used. The position then was that two wires were used to relay one program. Subscribers had no alternate choice but were compelled to listen to the programs chosen by the manager of the central receiving station. This, however, did not prove the handicap one would imagine at first glance, as at that period crystal sets and earphones were still widely used and almost anything was considered good enough.

Nowadays most subscribers to a relay service have a continuous choice of four programs: *viz.*, the complete programs broadcast by the two national transmitting stations, Hilversum and Huizen, and the best of the foreign programs. Nevertheless the subscription fee has remained the same and amounts to twenty cents (American) per week, payable either weekly or monthly, as the individual subscriber desires.

Government and Local Authorities

In order to be able to operate a relay service in Holland it is necessary to obtain a concession from the P. T. T. (Department of Post, Telegraphy and Telephony) and the local authorities. Concessions are usually granted for at least five years with possible extensions for a similar period, in order that the companies engaged in the enterprise may write off the cost of installation and equipment and show a profit. All relay companies have to comply with stringent regulations laid down by the P. T. T. governing equipment, installation and the routine to be followed. The Government has formed what in effect is a relay advisory committee comprised of Government officials and representatives of the National Relayers Association. This committee decides claims and discusses new schemes and ideas suggested by the Relayers Association, and it has proved a strong link between the Dutch Government and the very active and successful association. This suggests another aspect of this enterprise, the importance of which cannot be overestimated from the point of view of a National Government, whose success depends upon its ability to mould public opinion with a definite and conscious purpose corresponding to its policy. How fortunate is the position of a Government that can, where necessary, influence the value and nature of radio programs relayed into the homes of a large portion of the electorate. Several instances come to mind where great advantage could have been taken of these factors—such as the emergency decrees in the German national crisis; a national appeal for the conversion of war loan by the British Government; the Buy British movement, the anti-communist propaganda, etc., etc. In the foregoing, I have attempted, in as few words as possible, what can of necessity be only a very brief outline of the nature and status of Radio Relay in Holland, but now I desire to devote some space to its development in other countries.

Undoubtedly the most important development at the moment is taking place in England, where about one hundred and thirty companies are operating, and others beginning almost daily. The most illuminating feature in that country is that large concerns, hitherto engaged solely in the manufacture of electrical appliances and cables, have interested themselves in relay. At present licenses are granted by the Postmaster General until the end of 1936, with probable extensions for an indefinite period after that date.

In Germany general conditions have been so bad during recent years that industrialists are nervous of investing capital in any new enterprise. Political disturbances, unemployment and general insecurity are the main reasons that at the moment only some thirty stations are operating in the country. Three important concerns are awaiting the course of events and if and when conditions in general improve, there is no doubt that we

shall see a speedy increase in the number of companies operating there.

Several applications have been made for concessions to operate in Belgium and at the time of writing, these applications are receiving the attention of the Belgium Government. Negotiations are in a very advanced stage and I anticipate that it will only be a matter of weeks before the concessions are granted.

In France the negotiations are in a more preliminary stage than is the case in Belgium.

Two large combines are operating in Switzerland, but owing to the Ministry of Posts and Telegraphs, stipulating that all wire and cable should be laid underground (which in my opinion is bound to obviate the natural development of relay), reports about progress are unfavourable.

I anticipate that within the next few years the relaying of wireless will have become a *fait accompli* in Denmark, Italy and Austria.

Experiments are being made and in fact one concern claims to have solved the problem of transmitting broadcast programs via the existing electric mains. According to expert opinion, however, this scheme is unsatisfactory in its practical application, and is in addition too expensive, as 2- or 3-tube apparatus must be installed at each receiving point.

Will you excuse me if before ending this narrative, I yield to the temptation to visualize the future of radio relay:

I see all progressive relay companies connected to the studios of the national broadcast stations by means of special lines which will mean that interference of any description will be eliminated. (The foregoing actually is not a vision but a cold fact, as this system is in use at the moment in Holland) Then I see the time when permission will be granted to the relay companies to relay gramophone music originated at the central receiving stations, and finally I see the enormous scope which will be afforded to "relay" when television is a few years older. That will be the time I think when The World Will Listen Over the Wires.

DESIGN OF MODERN SOUND SYSTEMS

(Continued from page 111)

switches are mounted for the selection of individual or grouped reproducers. An application of the three-way switch principle permits master control of all circuits when such emergency need arises. With class B stages the distributing switches must further control the insertion or extraction of "dummy loads" as the reproducer loads are switched so that the terminating impedance of the class B stage shall remain essentially constant. Field supply selection may accompany such load selection in the centralized equipment. On multi-channel systems the writer has used a push-button control of the release and lock type—"bi-une" mechanism—with marked success. Such a device permits instant switching of a load to any channel without passing through intermediate channels as might be the case with rotary switching.

The mixer, previously mentioned, makes up a part of the volume control facilities. As a rule, the mixer incorporates a master control to which all the mixed sources are simultaneously subject. In addition, the load circuits may be adjusted by output volume controls—capable, of course, of dissipating the required power—which controls may be centralized or located at the reproducers, depending upon the application. Volume indication is currently attained by the use of a rectifier instrument, the scale of which bears a decibel calibration, and the sensitivity of which is adjustable to suit changing load levels. The decibel concept of volume adjustment is carried out in all controls in the modern system, as such control yields predictable and repeating results, and, in effect, is the smoothest possible taper.

Modern systems operate in their entirety from the power mains. Even the supply of button current for carbon-button micro-

phones, or the necessary operating currents and voltages for condenser heads and amplifiers are supplied from the mains. These supply devices require control, which is, most properly, centrally located. A selector switch and two milli-ammeters permit the measurement of the button current on each mixer position, and simple controls permit adjustment where necessary. In the interest of simplicity, however, many installations operate without button current control or indication, and, as transmitters are improved, these factors may well be dispensed with.

The power circuits for the various sources and for each channel, and part thereof, should be subject to switch control with pilot indication from which the system operator can tell at a glance the system set up. Placing all branch circuits under the control of a main switch further simplifies operation, while separate branch switches permit the disconnection of such units as are not demanded in the operating set-up for the particular work involved.

The question of line voltage adjustment is dependent upon local power supply conditions. However, since vacuum tubes are sensitive to five per cent changes in operating voltages, the inclusion of line voltage regulating equipment is usually warranted. An auto-transformer, switch-controlled plus a voltmeter will usually suffice, since automatic regulation is not generally applicable to loads of varying value.

Whether the equipment be the smallest portable type or a multi-channel rack installation, it must all be tested thoroughly for service. More than anything else, the modern sound system must stand up. Owing to the long hours of continuous operation, the frequent changing of tubes and the generally harder service to which sound equipment is subjected as compared to radio receivers, the components must be selected on a far more conservative basis if the service is to be fully satisfactory. As the probability of failure increases directly with the complexity, each part must be given thorough attention during design, manufacture and testing.

Though the factor of safety was not included in the list of operating requirements, it must be obvious that no manufacturer can hope to sell man-killers and remain in business. Total enclosure of wiring is a fundamental of good design. As for appearance, good workmanship must look the part.

The illustrations show, better than words, the layout and appearance of modern equipment. When next you have occasion to use a sound system, consider it in the light of the requirements, and decide as you listen whether a fair balance of the factors has been made.

ENGINEERING OF WATER COOLED TUBES

(Continued from page 112)

With the discovery that short waves were so useful commercially and the necessity for tubes to supply power for transmitter operation at these wave lengths, the water cooled tube was pressed into this type of service. This new field overtaxed the grid lead by virtue of the large circulating currents which coursed up and down the grid lead with each alternation of the energy at sometimes as many as 20,000,000 times per second. These currents were simply too large for the grid lead and produced overheating and failure of the glass at the seal. An improvement in the grid seal and also in the method of attachment of the grid lead inside the bulb resulted in the design illustrated by Figure 2. If all went well and the operators adjusted the set as they had been instructed, this type of grid lead would stand up quite satisfactorily. Also as long as the tube was handled carefully, the grid lead was not apt to be broken.

In addition to the tube changes, it might be well to mention in passing a couple of test equipment developments or steps advanced by Westinghouse.

The first testing of water cooled tubes presented a real problem

and raised a question as to what test would tell the most about the tube so as to insure its satisfactory operation when placed in service. Obviously, the already growing tendency to operate the tubes at shorter wave lengths required a radical test set operating at what was considered to be well below the wave-lengths anyone would ever use. The transmitter engineers were given the task and in 1924 built a 57 meter test set which is still in use for a considerable amount of test work.

Subsequently, operation at still shorter wave lengths near 15 meters had proved to be particularly advantageous in causing signals to consistently jump natural and political boundaries to European and South American stations and made it desirable to add still shorter wave length tests. Accordingly, a special test set built much like a current transmitter and operating in this wave length range was installed in 1927 and has been in continuous service ever since. This load test equipment was the first of its type to be installed solely for transmitting tube testing.

Experience with this test set, and by observations in the field, indicated that when the radio frequency energy got beyond control, the grid seals were still failing at too high a rate. A so-called thimble type of metal-to-glass seal was developed patterned largely after the main plate seal, and placed in production. Combined with this was a redesign of the inner grid lead using large copper conducting rods and ribbons so that local overheating was eliminated. Figure 3 shows the latest type of tube with all of the above changes. The operation and service advantages of this type of grid seal and construction have led to its adoption for nearly all types of water cooled tubes.

Another effect of operation at short wave lengths or high frequencies was the relentless lashing of the grid by the team of controlling tubes connected just ahead. Sometimes this abuse, at least it was not the most pleasant thing in the world for the tube, would eventually produce erratic and unstable operation due to secondary emission. The use of tantalum grid wire with its peculiar but highly desirable characteristics practically eliminated this type of trouble.

Another factor which entered into the manufacture of the tube for operation at the shorter wave lengths was the necessity for greater uniformity of electrical capacitance between the grid and plate. Ordinarily, the capacitance is not important, but at short wave lengths any unbalance in the circuit is just too bad and extreme efforts must be exerted to prevent such a condition. For this reason the grid assembly, although it is seldom seen by the customer, must be made exactly right.

A related limit was that the grid and filament assembly must be carefully sealed in centrally and symmetrically with respect to the plate. In order to check this alignment, x-ray photographs had to be taken to show the relative positions of the electrodes with respect to each other and to the plate. This provided a method for insuring proper positioning when two such pictures were taken at right angles with respect to each other.

Numerous other changes and improvements of a somewhat less conspicuous nature have been introduced at various times and as necessity dictated. From the foregoing, it is not implied that the ease of operation of tubes by the user has not advanced, as many improvements have been made in equipment and manipulation to help the tubes to live to ripe old ages. One of the most direct changes was a redesign of the water jacket from the robust type shown in Fig. 1 to a contour more in keeping with the modern styles.

This discussion also deals with other factors in the production of such tubes; such as, the general manufacture and problems of water cooled tube assembly. Many of the improvements which at one time seemed to be idealistic, in that they had never been used before on a commercial basis, were placed in manufacture by the co-operation and adaptability of various groups of the manufacturing department. Furthermore, the improvements represent changes backed up by the management in an effort to produce a tube of the highest possible quality.

BOOK REVIEW

AIRCRAFT RADIO, by Myron F. Eddy. The Ronald Press Co., New York, 284 pages, 68 illustrations, cloth, Price \$4.50.

The author conscientiously dedicates his book principally to students of aviation, executives of air-transport companies and tyro radio operators. One might say the book was especially written for the foregoing classes as mathematics and complicated technicalities are almost entirely excluded.

The first chapter is devoted to a brief history of aeronautical radio. The succeeding chapters are a review of the fundamental principles of electricity and its application to radio, written in a simple, yet fairly complete way. The why's and wherefor's of electricity, never easy to explain to the novice, are gone over step by step. The facts of capacity, resistance, impedance, etc., are presented in a way which avoids the dry reading of many texts. The theory of vacuum tubes complete the study of fundamentals. Briefly the author tells how tubes are made and the main points about their use as detectors, amplifiers and oscillators.

Transmitters and receivers, designed specifically for aircraft communication, are next fully described. Full data and schematic diagrams are given for Western Electric, RCA, and Stromberg-Carlson equipment. Considerable space is given to the subject of radio aids to aerial navigation. Set forth are the principles, designs, and schematics of radio beacons, compasses, directive beacons, aural and visual type beacon transmitters and receivers. The equipment described, in nearly every case, is the equipment in use at the present time, and this is of incalculable value to the student seeking an aeronautical radio license.

In the last chapters methods of bonding and shielding of aircraft to be equipped with radio are discussed; next design of antennas, equipment installation methods, and storage batteries are covered; and finally there is a resume of the statutes and regulations pertaining to aircraft radio. At the very end is a list of definitions of terms used in radio, together with pictures of symbols applying.

It is to be regretted that meteorology is not given attention in this book as it forms a part of practical aeronautical operating. Its inclusion would have made the text complete, and candidates for a radio operator's license for service in this field would not have to go elsewhere for material. But, of course, meteorology is not a radio subject, and, as descriptive literature on commercial radio equipment for aircraft use has been difficult to obtain, much credit is due Lieutenant Eddy for compiling this data and writing his book.

—H. J. Buckley, Municipal Airport, Chicago.

POWERFUL TELEVISION TRANSMITTER COMPLETED

Completion of the most powerful television transmitter in the West, and among the most powerful in the United States, was announced by the Don Lee Broadcasting System, through Harry R. Lubcke, director of television for the network. Rated at 1000 watts, and with 4000 watts maximum output for signal peaks, the new transmitter, with call-letters W6XS, went on the air, for the first time on regular schedule, late in December from 6:00 to 7:00 P. M., broadcasting action reels and close-ups of motion picture stars, according to Lubcke. This schedule will be maintained daily, except Sundays and holidays, it is announced.

Embodying many far-advanced features, many refinements of which have been worked out by Lubcke and his staff, W6XS is ten times more powerful than the sister television transmitter W6XAO which has pioneered several significant achievements in the ultra short-wave field, notably the transmission of a motion picture image to an airplane speeding high above Los Angeles last summer.

Opening on regular schedule on the first anniversary of W6XAO, the new high-powered television transmitter of W6XS, will operate on a frequency of 2150 kilocycles, or 140 meters. Grid modulation, new air-cooled vacuum tubes and other modern features of the 1000-watter, are expected to provide signal coverage of the entire state.

FREE LITERATURE

Brief reviews of current booklets, pamphlets, catalogs, and other data prepared by manufacturers for the trade. Buyers, engineers, and other readers, write direct to the various organizations for copies you are interested in. Mention RADIO INDUSTRIES. This is a service to buyer and seller alike.

CONTINENTAL-DIAMOND FIBRE

Continental-Diamond Fibre Co., Newark, Delaware, has just issued its Dilecto Catalog which thoroughly covers the subject of laminated synthetic products. Its comparative tables are valuable.

* *

SYLVANIA TUBE CHARACTERISTIC SHEET

A revised Sylvania Tube Characteristic Sheet has been issued by the engineering department of the Hygrade Sylvania Corporation. The chart lists average characteristics of all Sylvania tubes, with illustrations of bulb shapes and base connections, and describes new types and special tubes. Copies may be obtained from the Hygrade Sylvania Corporation, Emporium, Pa.

* *

WARD LEONARD

Circular 507 just issued by Ward Leonard Electric Co., Mount Vernon, New York, is of first interest to a number of classes of radio people. Set designers will want it for the listing of voltage dividers, bleeder resistors, and general purpose resistors. Owners of amateur transmitters will be interested in the descriptions of grid leaks and relays. And finally service men will find handy the table of replacement voltage dividers for many sets as well as a brief explanation of Ohm's law and its use in solving common resistor problems.

* *

UNIVERSAL MIKES

The 1933 catalog of the Universal Microphone Co., Inglewood, California, has been added to with the publication of a supplement which lists three new microphones, two new desk mounts, an input stage, floor stand and a remote control panel.

* *

WUNDERLICH

The Wunderlich Corporation, 1337 Fargo Ave., Chicago, has just issued still another technical data booklet on the Wunderlich tube and its applications. Of especial interest to designers are the wiring diagrams and component values given for such receivers as the Wells-Gardner, Scott, Clarion Deluxe, Motorola and a number of others employing the Wunderlich tube.

* *

ELECTRAD

The 1933 catalog of Electrad, Inc., 173 Varick St., New York City is now available. Service men will be interested in the new line of replacement controls listed, manufacturers in the older line, with new units, of fixed resistors. Electrad announces some new public address amplifiers employing the latest tubes. A page of resistor computations and data completes the booklet.

HYGRADE EXECUTIVE OFFICE TO N. Y. C.

Announcement has been made by the Hygrade Sylvania Corporation that larger New York offices will be opened at 500 Fifth Avenue, New York. The entire 50th floor has been leased and the work of laying out and furnishing the offices is going ahead at full speed. For the present the following will make their offices in New York: E. J. Poor, chairman of the board; B. G. Erskine, president; Walter E. Poor, vice president; Stanley N. Abbott; Charles G. Pyle; H. P. Gilpin; and P. S. Ellison. The main lamp sales offices will be at Salem, Mass., and the main tube sales offices at Emporium, Pa., as heretofore.

The Hygrade Sylvania Corporation is a result of a consolidation which took place in the spring of 1931 when the Hygrade Lamp Company, the Sylvania Products Company and the Nilco Lamps Works were brought together in one corporation. All of these individual companies had a history of highly successful and profitable operation over a period of from fifteen to thirty years.

NEW DEVELOPMENTS

UNIVERSAL HANDI-MIKE

Universal Microphone Co., at Inglewood, Cal., has gone into production for a new model of its single-button handi-mike. This model is for voice only and in this field it has a maximum volume with clear and clean-cut speech reproduction.

There will be two models of the Handi-Mike—"regular" and "home recording." Both models will be finished in polish plate and equipped with an "on" and "off" thumb switch and a 15 foot cord and an eye-hook for hanging. The unit will be scientifically con-



structed with gold-faced button and mounted in sound damping, resilient felt. The regular model will be numbered 200 and the home recording type as number 50. Net weight 1 lb., packed weight 1½ lbs.

Universal's double-button Handi-Mike, a regular catalog number, is a clear, highly damped hand microphone. Unlike the single button Handi-Mike, it has a three-conductor cord and the switch breaks the circuit in the center conductor. 200 ohms per button. Single-button list \$10.00. Double-button list \$15.00.—*Radio Industries*, February, 1933.

* *

ADJUSTABLE PYROHM RESISTORS

The Aerovox Corporation, Brooklyn, N. Y., announced a new line of adjustable Pyrohm (vitreous enamel) resistors designed to meet all voltage divider requirements and other uses where adjustable heavy-duty resistors are required. These new resistors are similar in general design and construction to the standard Aerovox Pyrohm resistors, except that each unit is provided with an adjustable slider contact lug so arranged that any desired value, from zero to the maximum value of the resistor can be obtained by a quick and easy operation.

None of the advantages of the Pyrohm resistor have been sacrificed in the development of these new resistors. They are made of the highest grade resistance wire, wound on refractory tubing and coated with a porcelain enamel especially and exclusively developed for Aerovox Pyrohm resistors. The terminal contacts are made by brazing the resistance wire to the lugs at a temperature almost equal to that at which the enamel melts, hence insuring positive contacts against the possibility of opening in service.

By means of a special method, a narrow strip of the wire, windings along the length of the unit is left free of enamel in order that contact may be made with the adjustable slider at any point of the exposed wire. However, while the surface of the wire is exposed, the enamel between the turns holds them firmly in place. Markings on the side of the unit permit reasonably accurate setting of the adjustable lug to obtain any desired value of resistance without the necessity of actually measuring the resistance with a meter.

Aerovox Adjustable Pyrohm resistors are rated in strict accordance with the RMA code, as follows: Type No. 952—25 watts, Type No. 954—50 watts, and Type No. 956—75 watts.

These resistors are actually capable of withstanding even considerably greater loads than those at which they are rated. Consequently, the user may safely operate these resistors within the ratings specified without danger of break-down in service. All units are ½ inch in diameter while the lengths are 2, 4, and 6 inches for types No. 952, No. 954 and No. 956 respectively. The resistance values range from 1 to 50,000 ohms. For convenience, each Aerovox Adjustable Pyrohm Resistor is supplied with two special horizontal type mounting brackets and one adjustable slider lug.—*Radio Industries*, February, 1933.

EMERSON "B" POWER UNIT

In order to keep pace with new automobile radio and car developments. The Emerson Electric Mfg. Company of St. Louis has announced a new Emerson "B" Power Unit embodying important improvements. These improvements are meeting with the same widespread approval that greeted the introduction of the original Emerson "B" Power Unit some eight months ago.

The improvements in no way serve to alter the original function of the unit, which is to replace the "B" batteries and deliver constant and adequate voltage to automobile and motor boat radio sets, thereby assuring maximum efficiency in reception and tone quality at all times.

The new Emerson "B" Power Unit has been made approximately 15% more compact than the previous model through an improved design which places the dynamotor directly over the filter pack instead of to one side of it. It may be installed in any car, either under the floor board, in the body, or in the regular "B" battery box. The weight of the original unit has been reduced 5½ pounds. The new unit measures 7¾x4½x6⅞ inches and weighs only 12½ pounds.—*Radio Industries*, February, 1933.



LEAR AIRPORT RECEIVER

Lear Developments, Inc., 847 W. Harrison Street, Chicago, announced their new Radio-Aire airport radio receiver which is now in production. The new Radio-Aire airport receiver is a distinct departure in a long wave set covering the entire frequency band of 235 to 720 kc. It is a portable radio of special interest to airports, hangars, pilots, aircraft officials and everyone interested in aircraft operation. It enables air enthusiasts to keep in touch with weather conditions, naval communications and also to enjoy entertainment program broadcasts.

Radio-Aire airport radio receiver is a combined radio beacon signal—weather report—naval communication — and entertainment broadcast receiver. It is self-contained, all electric, A. C. operated, with full dynamic speaker.

The tone quality on the entertainment broadcast range matches the finest home radio. Latz wire, low loss, high gain inductances invented and developed by Lear enables the wide tuning range, high sensitivity and sharp selectivity. Tube equipment includes 3—81 screen grid amplifiers, 1—24 screen grid power detector, 1—47 pentode power amplifier, and 1—82 mercury rectifier tube. The list price is \$89.50.—*Radio Industries*, February, 1933.

* *

COMPETENT PHYSICIST—12 years laboratory experience with vacuum tubes, photoelectric cells, and neon lamps. desires development work with vacuum or radio frequency devices. Box 38, RADIO INDUSTRIES.

SPECIAL CARDWELL CONDENSERS

The Allen D. Cardwell Manufacturing Corp., Brooklyn, N. Y., has announced three new special model variable condensers, designed for radio amateur usage.

The Midway "Featherweight" Band-Spread Condenser, shown in Fig. 1, is available in two stock sizes each consisting of a low capacity section and a high capacity section, built into the Midway "Featherweight" frame. Each rotor is controlled by a separate shaft. A ball bearing between the inner ends of the two shafts, in addition to

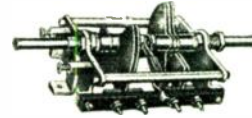


Fig. 1

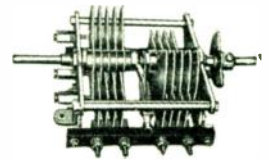


Fig. 2

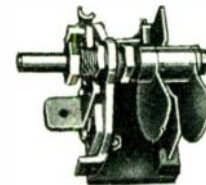


Fig. 3

end plate bearings, prevents end-play and permits smooth, uniform operation. Like all other Midway models, this condenser is extremely light and compact. It is arranged either for shelf or for panel mounting and is equipped with a positive, non-mutilating rotor lock on the high capacity section. Figure 1 serves to illustrate both models of the "Featherweight" Band-Spread condenser. Model 517 has a 25 mfd. section and a 50 mfd. section. Model No. 518 has a 25 mfd. section and a 100 mfd. section. Other combinations are available on special order.

Another interesting new Cardwell condenser is shown in Fig. 2. This is the type 516 Double End condenser. This model is built into a standard size Cardwell frame and has two separate rotors and stators, each rotor being controlled by its own shaft. A rotor lock is provided on one section for fixing the rotor at any desired point. A ball bearing between the inside ends of the rotor shafts prevents end-play and insures uniformity of rotation. The model 516 condenser has a capacity of 90 mfd. per section. It is of stock size and has nine plates, double spaced in each section. It may be mounted on a panel or on a chassis shelf.

Figure 3 illustrates the new Cardwell type 519 Neutralizing condenser for 852 tubes. This is a compact three plate condenser, having extra wide spacing. One rotor plate is readily removable, if so desired, leaving a two-plate variable condenser with adjustable air-gap. A positive non-mutilating rotor lock is provided on the No. 519 condenser. This condenser is designed either for panel or for shelf mounting. It is insulated with Mycalex.—*Radio Industries*, February, 1933.

* *

POSITION ON BROADCASTING station technical staff or in radio factory. Single, 25 years, H. S. and technical graduate, 2½ yrs. college E.E. course, four yrs. experience in designing and operation of broadcasting stations, and a licensed operator. Best references. Donald H. Ebbeler, 25-40 Cason St., Lafayette, Indiana.

MADRID CONFERENCE OVER

Judge E. O. Sykes, vice chairman of the Federal Radio Commission, and chairman of the American delegation to the International Radio Conference held at Madrid, Spain, returned to Washington well satisfied with the results accomplished.

The outstanding result of the conference, said Judge Sykes, was the adoption of a single convention, the first ever adopted by the nations of the world, which covers communication in general—not only radio but telegraphy and telephony. He explained that the United States, because of its peculiar position, differed from the other nations, since its telegraph and telephone services are handled by private companies, and was not a signatory to the telegraph and telephone regulations but only to the part relating to radio.

After many years of hard fighting the United States won a signal victory at the conference by obtaining the use of English on a par with French, for discussions and debates at the conference, while retaining the French language alone for official documents.

Dr. C. B. Jolliffe, chief engineer of the Radio Commission, another American delegate and Gerald C. Gross, of the engineering staff of the Commission, one of the technical advisers at the conference, have also returned to their official duties at the Commission.

BOSCH CONTEST CLOSES

The United American Bosch Radio Star Popularity Poll has come to a close. Arthur D. Murray, president of the United American Bosch Corporation announced the eight cup winners were:

Rudy Vallee, most popular orchestra leader; Morton Downey, most popular man singer; Jessica Dragonette, most popular woman singer; John S. Young, most popular announcer; Ed Wynn, most popular comedian; Richard Gordon (Sherlock Holmes), most popular dramatic actor; David Rubinoff, most popular in instrumental class; and Harry Horlick, director of the most popular programs in the miscellaneous class (A & P Gypsies).

Interesting highlights of the balloting are that better than 3,100 radio stars were voted on by the public. The ballots were presented to the public through the newspapers. Each ballot provided an opportunity to vote for eight performers in different classifications. More than 25,000,000 individual votes were recorded. A force of 93 tabulators were given the stupendous job of recording these votes in a short period, and over 100 persons were necessary to handle the volume of mail which came from all parts of the country.

The purpose of the poll was to learn the interest in the stars and their technique and to furnish some reliable index of the public's preference for various types

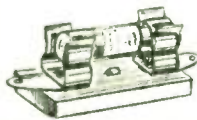
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of programs. This is the first time that any serious nationwide poll has been conducted to record the basic facts for the guidance of the radio industry.

MORE PATENTS HELD INVALID
Decision has just been handed down by Judge R. P. Patterson in the U. S. District Court of the Southern District of New York in the case of the Aerovox Wireless Corp. suing the Concourse Electric Co. on the Georgiev Patents Nos. 1,789,949 and 1,815,768, covering electrolytic condensers. The Georgiev patents were declared invalid. This decision affects condensers used in practically all radio broadcast receivers made today.

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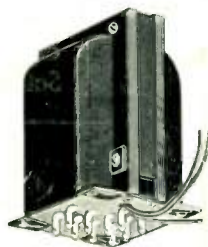
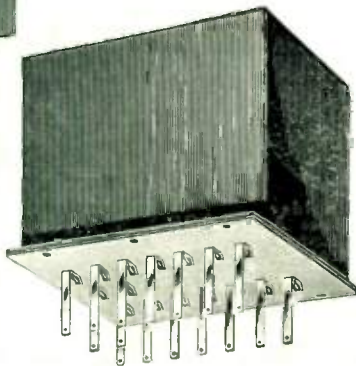
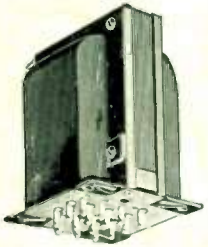
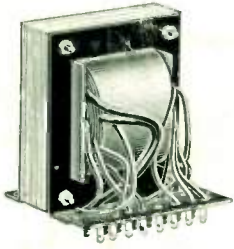
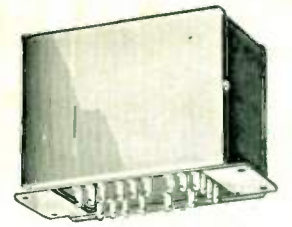
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