

CHAIN METHOD STILL BEST

So neither the higher-powered transmitter nor the modern phonograph proves to be a completely satisfactory substitute for chain broadcasting just now.

It may well be, of course, that a combination of the two will, in the not too distant future, supplant networks to a large extent.

Instead of being broadcast through a few score of stations linked by telephone lines, programs of the ordinary type may be recorded and transmitted by many locals, supplemented by a dozen or two truly super-power stations so placed as to supply regional service; and with chain facilities making possible the connecting of all for the airing of outstanding events. Such a

compromise arrangement would afford maximum service to the listener and, accordingly, is a possibility which can be anticipated with interest as developments take shape.

But, in the meantime, chain broadcasting as at present constituted seems certain not only to remain, but to continue its expansion, notwithstanding these promising substitutes.

The Advantages of the Broadcast Networks

By Dr. Alfred N. Goldsmith

NETWORK operation has been subject to much commendation and to some criticism. Its more enthusiastic supporters have seen in it the only effective means of serving the country as a whole with programs of the highest quality. Others, however, have expressed the fear that network broadcasting would tend to needlessly standardize operation of unified groups of powerful stations; and have doubted whether such a plan was socially desirable.

It would not be appropriate to consider here matters involving political controversy. It is assumed that if the radio listener is pleased by the excellent service which he gets from broadcast stations, the problems of governmental regulation of broadcasting will be greatly simplified and, in large part, automatically solved. After all, the fundamental aim of broadcasting is that the listener shall be pleased and instructed. Translated into more specific terms, this means that programs, of both the entertainment and educational varieties, must be radiated in such a way that practically every person in the United States can get clear, reliable reception with a certain reasonable amount of program choice.

ECONOMIC CONSIDERATIONS

Considering first the commercial aspects of sponsored programs (containing indirect advertising), it should be remembered that this is an age of nationally-distributed products. The great industries of the United States sell their products on a nation-wide scale and are interested in reaching the entire population as prospective purchasers.

The tendency towards the national distribution of products has extended even into the fields of art and literature. It has been found that musical and literary talent naturally gravitates to the larger cities; and that those so fortunate as to possess it in a high degree require correspondingly large financial returns for their efforts. Hence the best entertainment cannot be used to satisfy small groups of people having limited purchasing power.

Radio broadcasting employs artistic and other talent of which there is but a limited supply and that found only in relatively few parts of the country in readily available form. The purchasing power of the audience of an individual station is sometimes insufficient to justify the commercial sponsors of a program in using the best available talent.

Fortunately, network broadcasting by

groups of fairly high-power stations enables the obtaining of an audience of high purchasing power, such as will economically justify the finest possible programs utilizing the most capable (and generally expensive) performers. There is in addition a large class of non-commercial features which can reach the public nationally through network broadcasting or not at all.

On occasion it has been pointed out that commercial broadcasting is justified if the additional profits due to broadcasting, obtained by the sponsor organizations through the sale of their products to the audience of the broadcasting stations, are considerably larger than the cost of providing the programs given to such audiences. This important general principle at once leads to the conclusion that nationally-advertised products require national distribution of the finest possible programs, if an economic setup is hoped for.

TECHNICAL CONSIDERATIONS

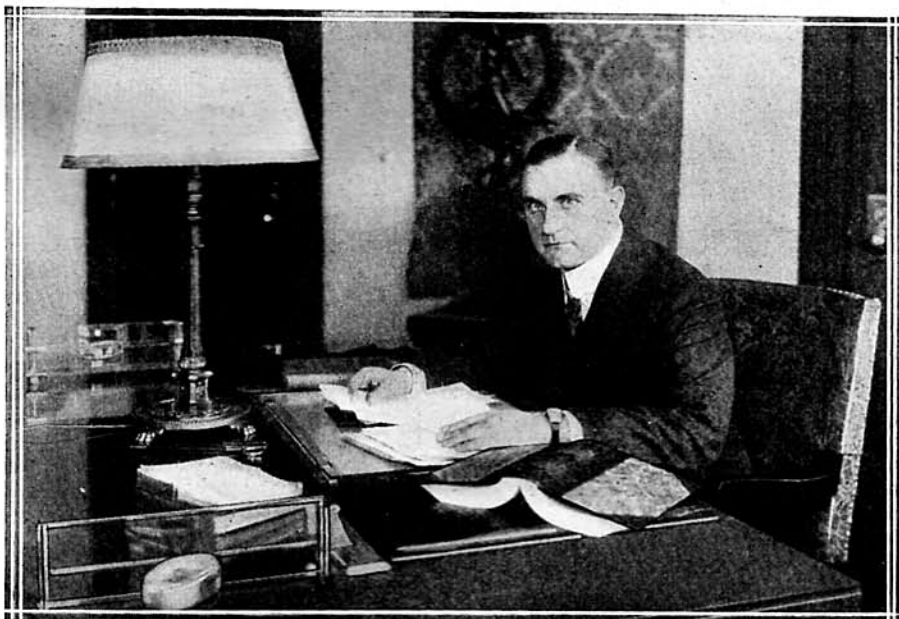
From time to time the suggestion has been made that, perhaps, the United States could be adequately covered by a very few extremely high-power broadcast stations. Without denying the ultimate possibility of

such an achievement, it is nevertheless a fact that it is not possible indefinitely to increase the reliably-reached audience of a broadcast station, by merely increasing the transmitting power, using any technical methods now available.

In the present state of our engineering knowledge, we do not know how to overcome marked fading or irregular fluctuation and distortion of signals, which effect begins to detract from the quality of the received program at distances between approximately 75 and 150 miles from the transmitting station.

If, accordingly, we aim at a 150-mile range as the greatest feasible service range now technically available, and use stations of 50 kilowatts or more to secure such a range (perhaps even going to powers as high as 1,000 kilowatts in certain special districts), we shall accomplish about all that can be expected of a single broadcast station, using present-day methods of transmission and serving listeners using existing methods of reception. In some cases the audience of such a station is not large enough to justify economically the best possible programs.

(Continued on page 942)



Dr. Alfred N. Goldsmith, Chairman of the Board of Consulting Engineers, National Broadcasting Co., and one of the world's leading broadcast authorities.

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The Effects of Broadcasting on Religion

(Continued from page 883)

people from attending their own churches. That statement has, indeed, been made to the writer in so many words by a man in an excellent position to know.

Services by radio have had profound effects on the lives of many individuals. Not only have they brought incalculable comfort to many persons lonely or ill or despairing, but they have actually brought persons up from moral failure to moral success. Persons who had not been inside a church for a score of years have, by radio, been led to see the value not only of worshipping, but of worshipping with their fellows. Many aged, ill, and infirm people attend worship by radio regularly.

Rabbi S. M. Cohen, of the Jewish committee, reports that congregations have been started in certain places because the consciences of Jews in them were quickened by the Jewish midweek broadcast. Those broadcasts, by the way, are heard by many non-Jews, some of whom regularly write in their comments.

Perhaps one of the most effective ways in which religious services via radio touch the heart is through their music. The thousands of letters that pour into the larger

stations show clearly that well-known hymns mean a great deal to large numbers.

Many other details as to the effect of religious broadcasting might be given; but certain general conclusions should be drawn, leaving no room for those details.

The most important general conclusion is, undoubtedly, that the radio has brought, and will continue to bring, an enlarged understanding, by all of us, of what each thinks, feels, and hopes for in religion. Controversy, at least the ill-natured kind, cannot survive. *Radio is bringing about good manners* in religious discussion. Sensationalism, likewise, cannot stand the test of broadcasting. What people insist on is the essentials of the speaker's faith, and that what he says shall be, as nearly as possible, universally helpful.

And this well-marked preference by the public for what is universally helpful points the way, perhaps, to the gradual elimination in America of the multitudinous minor differences between sects, and parts of sects, which now divide the church and make it less effective than its leaders rightly feel it should be.

The Advantages of the Broadcast Networks

(Continued from page 871)

We are therefore forced to seek a method of increasing the reliably-reached audience, and the obvious solution is the linking together of a group of such stations separated by distances preferably not in excess of 200 or 300 miles (except in very sparsely-populated districts).

We may go so far as to say that probably the ideal broadcast system for any country, so far as we can now envisage it, comprises a plurality of nation-covering networks of high-power stations, these networks sending out suitably diversified programs.

THE INDIVIDUAL BROADCASTER

There can be no question that network operation has been a great advantage to the average broadcaster. It has brought him program features which would otherwise have been utterly unobtainable, either because of economic limitations or because of the location of his station in remote regions.

The local broadcast station, therefore, has assumed an institutional aspect, as the means whereby the surrounding community within its service area is brought into contact with the nation at large. It is a safe statement that, just as the local newspaper could hardly serve its community adequately except with the assistance of press associations and feature syndicates, so in even larger measure, the individual broadcast stations are assisted by network operation.

THE ARTISTS

Artists are admittedly a specialized group of human beings, entitled to unusual consideration because of the important creative nature of their work and, in many cases,

requiring unusual encouragement to produce their best efforts. Network operation of broadcast stations has a curious double influence on artists. It really all depends on whether the artist is good or not; it is already clear that the rule of "the survival of the fittest" will hold strictly. To put it boldly, network broadcasting may make life harder for the mediocre artist, but it will certainly make it easier for the talented student or the great artist. Many a so-called musician may in the future be properly assigned to riveting or bookkeeping or some other appropriate occupation. Nevertheless, previously-discouraged students or artists of ability will find themselves given fresh opportunities of the most attractive sort.

Furthermore, by increasing tremendously the public interest in music and literature, national broadcasting encourages art and artists. It will permit the survival of otherwise threatened high-grade musical organizations previously catering to small audiences. And it will insure the permanence of still larger musical organizations and the provision of numerous opportunities for capable artists.

THE RADIO LISTENER

The radio listener on the side lines, will surely find all of the previous considerations most encouraging and pleasing from his point of view. He wants clear reception of excellent programs with program diversity, and this is just what multiple network operation of high-power stations can provide. It can bring to the homes in the small village or in the countryside the same carefully-planned and beautifully-executed pro-

grams that would otherwise be available only to residents in the larger cities.

Unduly-pessimistic prophets have predicted that network operation would somewhat curtail the program choice of the listener. Assuming a number of national networks in successful operation, every listener will be able to make his choice between their thoroughly worthwhile programs.

It is true that network broadcasting, by steadily raising the level of programs, will ultimately restrict the choice of the listener who, for some mysterious reason, wants a very poor program. But why should the listener worry about having his freedom to pick up an exceptionally bad program, arriving in mangled form from some distant station, somewhat restricted? It is better to concentrate our attention on providing freedom for the listener to select from among as many high-quality programs as possible from excellent nearby stations.

RECEIVING SET DESIGN

It is but natural that so powerful an agency as network broadcasting through high-power stations should have a marked influence on the design of receiving sets and that it should somewhat simplify the problem of the engineer and manufacturer. There was a time, not so long ago, when the ideal receiving set was supposedly designed to receive any station anywhere, no matter how many local stations were in operation on nearby frequencies (or wavelengths) and regardless of atmospheric conditions and local disturbances. Engineers were driven to the verge of mental breakdown in an attempt to meet such excessive requirements and manufacturers found it increasingly difficult to stabilize a radio market having such requirements.

In the past such extreme requirements may have been partly justified. As long as a man searching for the one good program which might be given on a particular evening (perhaps from a distant city) had to "fish" for distant stations, while powerful stations in his own vicinity interfered, receiving-set design was much hampered.

Network broadcasting, by making several good programs available as local programs,

40 Non-Technical Radio Articles

every month for the beginner, the layman and those who like radio from the non-technical side.

SCIENCE AND INVENTION, which can be bought at any newsstand, contains the largest and most interesting section of radio articles of any non-radio magazine in existence.

Plenty of "How to Make It" radio articles and plenty of simplified hook-ups for the layman and experimenter. The radio section of SCIENCE AND INVENTION is so good that many RADIO NEWS readers buy it solely for this feature.

Radio Articles Appearing in February Science & Invention Magazine

Television, Radio and Astronomy—By Donald H. Menzel, Ph.D., Lick Observatory.

The Radio Airplane "Detective." Home Broadcasting a New Pleasure—By Paul Welker.

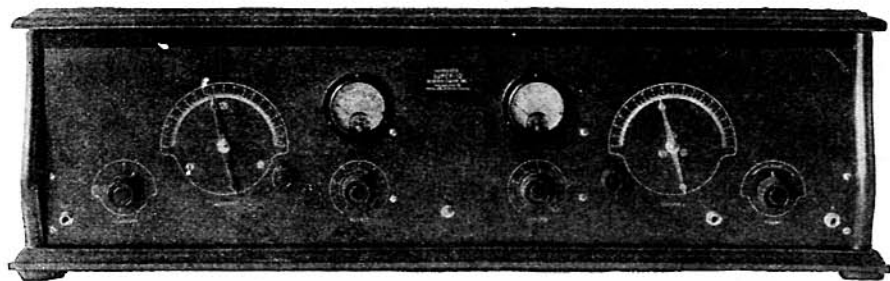
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Material and workmanship conform to U. S. Navy specifications.

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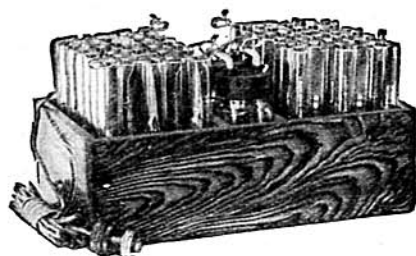
The Sterling Power Output Transformer connected between the radio set and loudspeaker absolutely prevents the high voltages now delivered by "B" Power Units from ruining the speaker. This transformer is more than a protective device. It permits closer adjustment of speaker diaphragm, increasing its sensitivity to weak signals. Prevents shock when using headphones. Eliminates tube noises and IMPROVES TONE QUALITY of the speaker. Attach in two minutes, leave permanently connected, Model R-360—\$5.00.

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simplifies receiver design in a manner which is perfectly clear to any competent engineer. The resulting economy of effort and expense is sure to be appreciated by the public and the manufacturers alike. The listeners will be able to purchase more simply-operated receivers, yielding finer tone quality than

would otherwise be economically possible; and in consequence the manufacturers of radio receivers will be able to reach a larger potential market.

(From an address to the National Electrical Manufacturers' Association, at its midwinter meeting in Chicago.)

Network Broadcast Stations

Following is a list of the radio stations comprising the four national networks.

RED NETWORK

Basic Red Network (National Broadcasting Company): WEAF, New York; WEEL, Boston; WTIC, Hartford; WJAR, Providence; WTAG, Worcester; WCSH, Portland, Me.; WLIT-WFI, Philadelphia; WRC, Washington; WGY, Schenectady; WGR, Buffalo; WCAE, Pittsburgh; WTAM-WEAR, Cleveland; WWJ, Detroit; WSAI, Cincinnati; WGN-WLIB, Chicago.

Supplementary Stations: KSD, St. Louis; WCCO-WRHM, Minneapolis-St. Paul; WTMJ, Milwaukee.

Midwestern Group: WOC, Davenport; WHO, Des Moines; WOW, Omaha; WDAF, Kansas City; KVOO, Tulsa; WFAA, Dallas; WBAP, Fort Worth.

Southern Group: WHAS, Louisville; WSM, Nashville; WMC, Memphis; WSB, Atlanta; WBT, Charlotte.

Special Network Additions: WJAX, Jacksonville.

BLUE NETWORK

Basic Blue Network (National Broadcasting Company): WJZ, New York; WBZA, Boston; WBZ, Springfield; WBAL, Baltimore; WHAM, Rochester; KDKA, Pittsburgh; WJR, Detroit; WLW, Cincinnati; KYW-WEBH, Chicago.

Supplementary Stations: KWK-KSD, St. Louis; WCCO-WRHM, Minneapolis-St. Paul; WTMJ, Milwaukee.

Midwestern Group: WOC, Davenport; WHO, Des Moines; WOW, Omaha; WDAF, Kansas City; KVOO, Tulsa; WBAP, Fort Worth.

Southern Group: WHAS, Louisville; WSM, Nashville; WMC, Memphis; WSB, Atlanta; WBT, Charlotte.

Special Network Additions: KPRC, Houston; WRVA, Richmond; WJAX, Jacksonville.

PACIFIC NETWORK

The Pacific Coast Network (National Broadcasting Company), comprises: KPO-KGO, San Francisco; KFI, Los Angeles; KGW, Portland, Ore.; KFOA-KOMO, Seattle; KHQ, Spokane.

COLUMBIA CHAIN

Columbia Broadcasting System: WOR, New York; WEAN, Providence, R. I.; WNAC, Boston, Mass.; WKRC, Cincinnati, O.; WAIU, Columbus, O.; WADC, Akron, O.; KMOX, St. Louis, Mo.; WMAQ, Chicago, Ill.; WMAK, Buffalo, N. Y.; WGHP, Detroit, Mich.; KOIL, Council Bluffs, Iowa; WCAO, Baltimore, Md.; WFBL, Syracuse, N. Y.; WCAU, Philadelphia, Pa.; WJAS, Pittsburgh, Pa.

Why the A.C. Equamatic System Is Different

THE Karas A.C. Equamatic, which was described in last month's issue of RADIO NEWS, embodies five A.C.-operated tubes which function just under the point of oscillation; not at certain points on the wave-range, but at every wavelength setting from 200 to 600 meters. The tendency of the set to oscillate throughout the broadcast waveband has been eliminated by the method of neutralization employed.

This high tube efficiency at all wavelengths is obtained by the constant and equal transfer of energy between the primary and secondary of the three R.F. transformers.

The primary and secondary windings are entirely separated from each other. The primaries are mounted on the extended shafts of the variable tuning condensers, so that they turn automatically with the turning of the condenser dials. Each secondary coil is adjusted, both as to its distance from the primary coil and as to the angle it makes with the primary at any one setting. By reason of this design and of the numerous adjustments it allows, it is a simple matter to obtain an adjustment which will allow the same transfer of energy at 200 meters as at 600 meters. When the proper adjustment is made, and the dials are operated over the broadcast band, the result is a variable coupling between primary and

secondary; varying automatically at a rate which maintains the tubes at their highest point of efficiency (just under oscillation) at every wavelength setting.

By reason of this design, the Equamatic System does away with the necessity for lesser methods, such as high variable resistors in the tuning circuits, potentiometers, and expedients which involve magnetic absorption.

Because of this flexibility of the coupling adjustment between primary and secondary coils, the A.C. Equamatic receiver tunes with a sharpness and selectivity that makes it valuable and effective in even the most congested broadcast areas.

A few hints on adjusting the neutralizing condensers will undoubtedly be appreciated by radio fans who built this excellent receiver.

With the adjusting thumb-screws of the neutralizing condensers turned entirely up, tune the receiver to some high-powered, low-wave station. Set the 0.2-ohm rheostat (R4) so that the receiver is just oscillating, with the control and volume dials turned entirely up; turn down the thumb-screws a little at a time until the signal clears up. Now turn up R4 and turn the dials back and forth across the point at which the station was tuned in. If the receiver still oscillates, make a slight adjustment on the