MARCH, 1926

RADIO IN THE HOME

ted by HENRY M. NEELY

In this issue : The SAMSON "T-C" HOOK-UP

TROUBLE SHOOTIN ; on the "D AMONI (F THE AIR"

REALLY A NECESSITY

For the Best Quality Reception— and tube economy on Your Radiola

To get the fine quality radio reception your Radiola is capable of, the tubes must be operated at the correct filament voltage. Too low voltage means poor reception, and too high voltage not only wastes the "A" battery energy, but rapidly shortens the life of the tubes to the point where good reception becomes impossible.

Correct Filament Voltage on RADIOLAS 25 and 28

When you use the Sterling R25-28 Filament Voltmeter you are expressly following the set manufacturer's instructions for a high resistance meter that will give you precisely 3.0 volts. Consumes less than 1-5 the current of a single tube. The Sterling plugs into the two jacks provided on the panel. It is convenient to read—faced up—no attention to polarity necessary—no cords nor loose connections to fuss with.

A handsome looking meter to grace the panel of your set—a necessity for good reception and a tube saver.

Ask your Radiola Merchant or write us for a Sterling folder.

THE STERLING MANUFACTURING CO.

2831-53 Prospect Ave.,
Cleveland, Ohio
Dept. K.

Sterling R25-28 Filament Voltmeter

Price $7.50

Nightingale

THE UTMOST IN RADIO

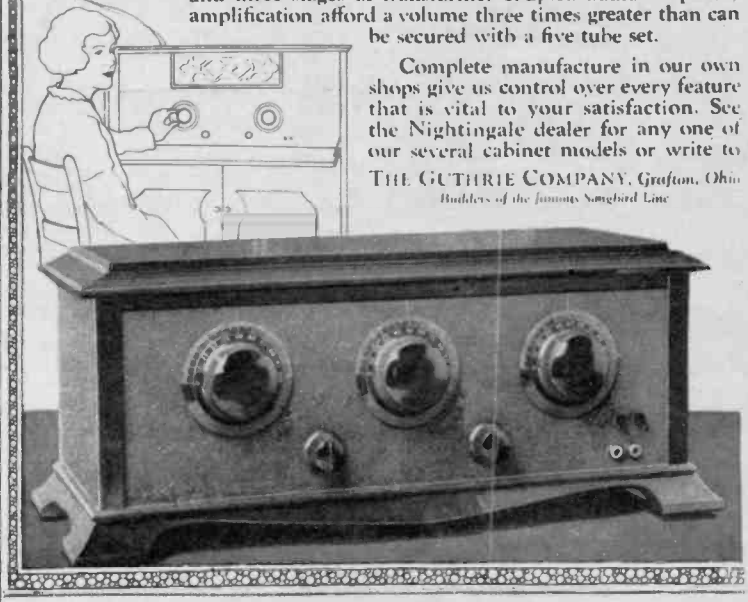
DISTANCE, volume, purity of tone—all are at your command in unstinted measure when you make the Nightingale Six, the companion of your evening hours.

With the golden tube contacts, straight line wave condensers and other special features of the Guthrie Songbird Line, the Nightingale Six represents supreme radio value housed in cabinets of strikingly rich and appropriate design and finish.

Two stages of tuned radio frequency amplification, detector and three stages of transformer coupled audio frequency amplification afford a volume three times greater than can be secured with a five tube set.

Complete manufacture in our own shops give us control over every feature that is vital to your satisfaction. See the Nightingale dealer for any one of our several cabinet models or write to

THE GUTHRIE COMPANY, *Grafton, Ohio*
Builders of the famous Songbird Line

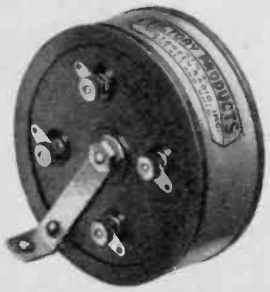


Verified Reception from Paris by Cadiz, Ohio, Radio Fan

Coast to Coast On a Loop

is easy with a

VICTOREEN Superheterodyne



Victoreen No. 170 R. F. Transformer — Neat and Compact, 3" in diameter, 1" thick.

4—No. 170 R. F. TRANSFORMERS at $7.00 each and
1—No. 150 Oscillator Coil at $5.50.

Constitute The Heart of The Circuit

No oscillations, howls or squeals—no matching of tubes.

Complete parts to build the "Victoreen" can be purchased of your dealers for between $50.00 and $75.00—depending on quality of materials selected.

Victoreen Air Core Transformers are more than matched—they are actually tuned to guaranteed precision of 1/3 of 1%—a Victoreen feature.

Either UV199 or 201A tubes may be used—another Victoreen feature.

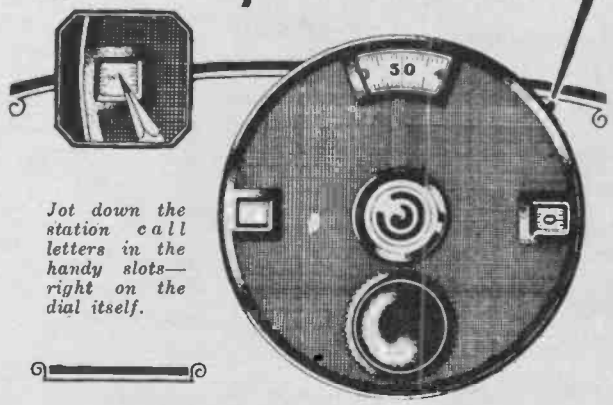
Ask your dealer for a free folder and hook-up of the Victoreen set or write directly to us. Your dealer can supply you with all necessary parts.

THE GEORGE W. WALKER CO.

6511 Carnegie Ave. Cleveland, Ohio

Branches in Principal Cities

Don't put it off



Jot down the station call letters in the handy slots—right on the dial itself.

SCORES of this season's most advanced circuit-designs, depend on MAR-CO dials, for the searching, responsive tuning needed today. You have seen MAR-CO dials used on Radio-in-the-Home's most popular sets—you will find them in this issue.

So put MAR-CO dials on your own set now. To put it off is to *miss* the best your set can do.

Most dealers feature MAR-CO dials. They fit all sets. Martin Copeland Co., Providence, R. I.

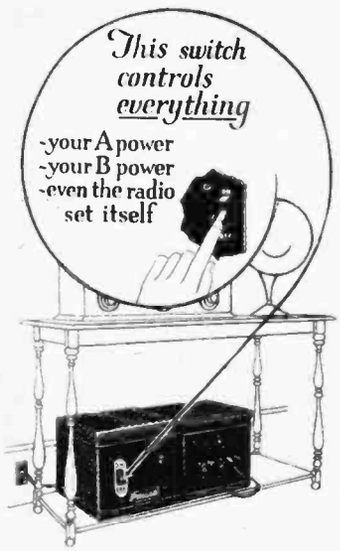
Hair-trigger response

MAR-CO DIALS

Micrometer-like action

The 1926 model tuning control

~and then he got his Philco A and B Socket Power



Snap it "ON" and enjoy your radio
Snap it "OFF" and go to bed

Philco Socket Power—*at the snap of one switch* changes your ordinary house current into smooth, HUM-FREE power for your radio.

Socket Power "B" eliminates *all* "B" batteries *on any set*. Full-wave—therefore HUM-FREE. No tubes—no acid—no water to add. Costs only ¼ cent a day to operate.

Socket Power "A" is a complete "A" power unit for 6-volt tube sets. Used with Socket Power "B," *one switch controls everything*—"A" power, "B" power, even the radio set itself.

Socket Power "AB" has both "A" and "B" power built into one case for all 3-volt (dry-cell) tube sets, including Super-heterodynes. Has one-switch control. Costs only a cent a day to operate.

Sold and demonstrated by leading radio and music stores and by Philco Diamond Grid Battery Dealers.

Philadelphia Storage Battery Company
Philadelphia

Detroit, Mich.
Jan. 10, 1926.

Philadelphia Storage Battery Company
Philadelphia, Pennsylvania.

I am - radio-speaking - what you might call an "old-timer". Have tried pretty nearly everything "new" in radio since the days of crystals and "cat-whiskers".

Several nights ago - at the request of a friend who sells radio equipment - I hooked up both your Socket Power "A" and "B" units to my 5-tube Atwater-Kent set - plugged into a wall socket - and turned on the switch.

Boy - oh boy! I stayed up till 3 o'clock that morning (ask my wife!) boxing the radio compass. Got 46 stations - a number of them new on my radio log - and all at loud-speaker volume.

And the astonishing thing to me was the entire absence of any hum or distortion - two very noticeable and objectionable features about several well-known "eliminators" I had previously tried out.

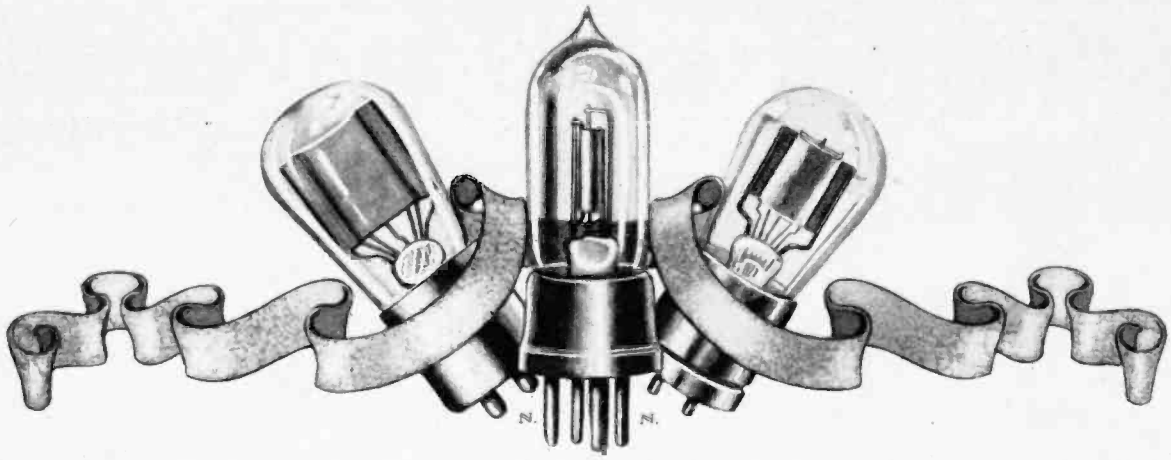
With your one-switch control of both "A" power, "B" power and the set itself, it is my humble opinion that Philco Socket Power has added more to the convenience and pleasure of radio than any other single invention.

As a pioneer radio "bug", and as a lover of radio, I want to congratulate Philco on this splendid achievement.

Very truly yours,
A. Jackson Huber

Philco also builds rechargeable radio "A" and "B" batteries which you may connect permanently to your radio and recharge in your living room without changing a single wire. Charge indicators tell you when and how much to recharge. Philco Radio Batteries are *Drynamic*—DRY but CHARGED. Their life doesn't start until the dealer pours in the electrolyte. You can't get a stale *Drynamic* Philco.

Buy a Philco Diamond-Grid Battery for your automobile



EDITORIALLY SPEAKING

About Those Department Store "Bargains"

By Henry M. Neely

DURING the last two seasons, the radio business has suffered a sudden demoralization by the "dumping" of radio sets on the public by the department stores all over the country. If the effects of this dumping were confined to the manufacturer and the dealer, it would hardly fall within the field of this magazine to comment upon it. Putting it in another way, if these "bargains" were offering to the public a substantial saving in the cost of really first-class outfits and equipment, our only duty would be to welcome this annual campaign because, by spreading enthusiasm for radio, it would possibly spread the circulation of *Radio in the Home* and would thereby enable us to make more money.

But a magazine like this must constantly keep two things in view. It must think of its own income as a business proposition in order to survive and it must think of its duty as an adviser to its readers in questions of its own specialty. From both of these viewpoints, therefore, this department store dumping becomes a matter of vital importance to us and to you. It is for this reason that we are printing the article by Mr. Turner which begins on page 7 of this issue.

Many of the sets advertised in these bargains bear names which are widely known through manufacturers' purchase of large advertising space in newspapers and magazines of general circulation. Now, while these media are excellent for the merchandising of virtually all goods, they have not yet sufficiently specialized in the new science of radio to be able to exercise over their radio advertising the same scrupulous care which many of them exercise over their general accounts. This specialization in the present stage of radio art requires the equipment and maintenance of an expensive laboratory, manned by experts in a widely specialized work. Only the radio magazines—and only a few of them—have gone to the trouble and expense of doing this. It is only a few radio magazines, therefore, whose advertising columns can be depended upon as a guide to the non-technical purchaser who is considering the installation of his first radio outfit.

As I have said, some of the sets dumped by the department stores this year bear names which are quite well known to the non-technical public because of advertising in newspapers and magazines and on the uncritical billboards. The natural thought which you, as a non-technical prospect, might have would be that, as you are familiar with these names through advertising, the sets are probably good ones.

Yet if you were to ask about them of some one who is closely identified with the development of the radio industry, he might be able to point out to you several other interesting things to consider.

In the first place, he might open his morning newspaper to the financial page and turn to the daily quotations of stock on the New York curb market. If you scrutinized a list of the makes of radio sets that are being dumped at cut prices, you would find that in every case—at least in every case that I have noticed in New York and Philadelphia—the stocks of those companies are selling so low as to be almost unquotable. Two of them have dropped to $1 per share, the others range from $1 to $5. For many days in succession you will not hear them quoted because nobody will buy them, even at these ridiculous prices, and when they are quoted, the quantity dealt in is so small as to make the transaction of no importance.

Now, as a business man, if I were to go to you and try to make you invest money in a concern whose stock has crashed down through the basement to the subcellar and whose product has been dumped right and left at ridiculous prices, I think you would immediately ask me if I thought you had gone crazy. Yet buying one of these sets is investing your money in one of these companies. What is the answer?

Let us talk, for the moment, about the conditions which Mr. Turner found in his investigations. Disregarding for the moment the question of the possible value of the radio set itself, we find nameless batteries, bootleg tubes and unspeakable loud-speakers. Suppose we take the very best radio set in the world and install any such conditions as these—what will be the result?

During their short useful life, the nameless batteries, the bootleg tubes and the unspeakable loud-speaker will, we admit, deliver sounds which, aided by a sufficiently vivid imagination, may be identified as remotely resembling the sounds originally produced in the broadcasting studio.

If you throw away the unspeakable loud-speaker and substitute a good one, the nameless batteries and the bootleg tubes may give you some pretty good radio for a time. The nameless batteries or bootleg tubes simply won't last; they are born into the world with congenital weaknesses that even the best of care will not overcome, and they are foredoomed to an early and pathetic demise through atrophy of every vital part.

I have seen some department stores advertise a named set with Radio Corporation or Cunningham tubes and with batteries which have a good standing in the trade. Here is a case that is likely to

(Continued on Page 25)

Unfailing radio power from the **LIGHT SOCKET** *with*

Balkite Radio Power Units

Balkite Radio Power Units give unfailing, uniform current for both circuits from the light socket. One very popular Balkite installation, especially for heavy duty sets where reserve "A" power is required is with the Balkite Battery Charger and Balkite "B." Here the noiseless, high-rate Balkite Battery Charger is ideal. If your battery should be low, you merely turn on the charger and operate the set. Balkite "B" eliminates "B" batteries entirely and supplies plate current from the light socket.

Balkite light socket equipment

Another very popular Balkite installation is with the Balkite Trickle Charger and Balkite "B." The Balkite Trickle Charger converts your "A" battery into an automatic "A" power unit that provides "A" current from the light socket, so that both circuits operate from the lighting circuit. This installation enables you to convert your present receiver into a light socket set.

Noiseless—No bulbs—Permanent

All Balkite Radio Power Units are permanent pieces of equipment, entirely noiseless, have no bulbs, nothing to break, replace or get out of order. Their current consumption is very low. All operate from 110-120 volt AC current, with models for 50, 60 and other cycles. *All are tested and listed as standard by the Underwriters' Laboratories.*

The Balkite Railway Signal Rectifier is now standard equipment on over 50 leading American and Canadian Railroads

FANSTEEL

Balkite *Radio Power Units*

MANUFACTURED BY FANSTEEL PRODUCTS COMPANY, INC., NORTH CHICAGO, ILLINOIS

Balkite *Trickle Charger*

Converts any 6-volt "A" battery of 30 ampere hours or more into an automatic "A" power unit that furnishes "A" current from the light socket. With 4-volt and smaller 6-volt batteries may be used as an intermittent charger. Or as a trickle charger if a resistance is added. $10. West of Rockies, $10.50. In Canada, $15.

Balkite *Battery Charger*

The popular rapid charger for 6-volt "A" batteries. Noiseless. If your battery should be low you merely turn on the charger and operate the set. Special model for 25-40 cycles. $19.50. West of Rockies, $20. In Canada, $27.50.

Balkite "B"

Eliminates "B" batteries and supplies plate current from the light socket. Keeps the "B" circuit always at full power. For sets of 6 tubes and less. $35. In Canada, $49.50.

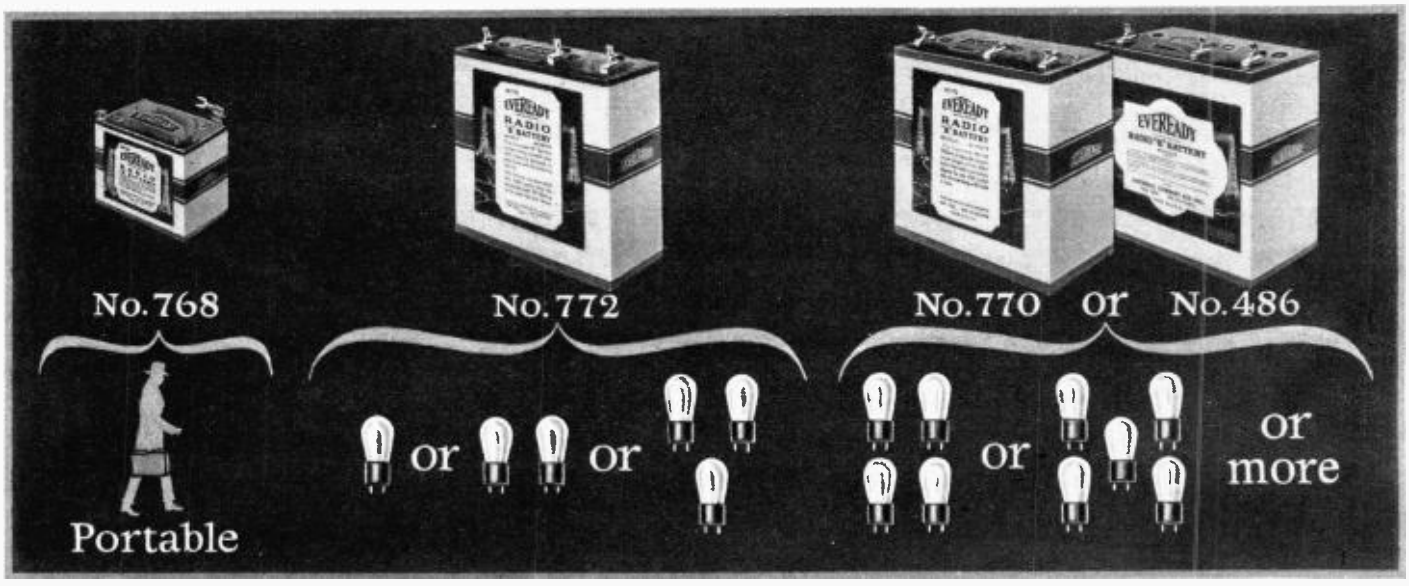
Balkite "B" II

Supplies plate current from the light socket. Will serve any standard set. Especially adapted to sets of 6 tubes or more, $55. In Canada, $75.

Sole Licensees in the United Kingdom: Messrs. Radio Accessories Ltd., 9-13 Hythe Rd., Wellesden, London, N. W. 10

"Perhaps you too can cut your 'B' battery cost in half"

Just follow the chart. It gives you the secret of 'B' battery economy



THOUSANDS of people have made this discovery. Eveready "B" Batteries, when used in the proper size and with a "C" battery*, are the most economical, reliable and satisfactory source of radio current.

On one to three tubes, Eveready "B" Battery No. 772, used with a "C" battery, will last a year or longer, usually longer. On four and five tubes either of the larger Heavy Duty Eveready Batteries No. 770 or No. 486, used with a "C" battery*, will last eight months or more.

Here is the secret of "B" battery satisfaction and economy:

With 1 to 3 tubes, use Eveready No. 772.

With 4 or more tubes, use the Heavy Duty Batteries, either No. 770, or the even longer-lived Eveready Layerbilt No. 486.

Use a "C" battery on all but single tube sets.

These figures are based on the average use of receivers, which a country-wide survey has shown to be two hours daily throughout the year. If you listen longer, of course, your batteries will have a somewhat shorter life, and if you listen less, they will last just that much longer.

Eveready give you their remarkable service to the full when they are correctly matched in capacity to the demands made upon them by your receiver. It is wasteful to buy batteries that are too small. Follow the chart.

In addition to the batteries illustrated, which fit practically all of the receivers in use, we also make a number of other types for special purposes. There is an Eveready Radio Battery for every radio use. To learn more about the entire Eveready line, write for the booklet, "Choosing and Using the Right Radio Batteries," which we will be glad to send you on request. This booklet also tells about the proper battery equipment for use with the new power tubes. There is an Eveready dealer nearby.

Manufactured and guaranteed by

NATIONAL CARBON COMPANY, Inc.
New York San Francisco
Canadian National Carbon Co., Limited, Toronto, Ontario

*NOTE: In addition to the increased life which an Eveready "C" Battery gives to your "B" batteries, it will add a quality of reception unobtainable without it.

EVEREADY
Radio Batteries
-they last longer

Tuesday night means Eveready Hour — 9 P. M., Eastern Standard Time, through the following stations:

WEAF–*New York*	WSAI–*Cincinnati*
WJAR–*Providence*	WEAR–*Cleveland*
WEEI–*Boston*	WWJ–*Detroit*
WTAG–*Worcester*	WGN–*Chicago*
WFI–*Philadelphia*	WOC–*Davenport*
WGR–*Buffalo*	WCCO {*Minneapolis* / *St. Paul*
WCAE–*Pittsburgh*	

KSD–*St. Louis*
KGO–*San Francisco, 8 P. M. Pacific Coast Time*

Those Department Store "BARGAINS"

A Job in the Service Department of One of the Stores Shows Mr. Turner the Kind of Stuff the Public Is Being Induced to Buy

By Ulmer G. Turner, Jr.

Technical Assistant in the Laboratory of "Radio in the Home"

A NUMBER of the regular visitors to our laboratory at Delanco, N. J., have recently noticed that Turner was not in his accustomed place and asked us where he was. We told them that he had left us. And so he had—officially. But, as a matter of fact, I had given him the hardest kind of assignment. I wanted to know the inside story of two things—the way the average manufactured set was standing up in general public use and the kind of apparatus being offered in department store "bargains."

Turner has just returned to us after getting jobs as service man with a distributor who does a lot of business with manufactured sets and as service man in a department store nationally known in the "dumping" of radio sets and as a big advertiser of low-priced radio combinations at "bargain" prices.

This article by Turner and my editorial in this issue are the result of his investigations. H. M. N.

IT WAS impossible!

H. M. N. was walking the floor deep in thought. Allen stood by, meditatively. In fact, it would not have taken a Sherlock to tell that all was not well at Station 3XP. Even old Pep, the official mascot, was scratching his head—and it wasn't fleas, either, for Pep isn't that kind of a dog!

Meanwhile, I sat at the typewriter, a letter in my hand. It was a typical letter at 3 XP, one of the kind which we receive very often. The writer wanted information which was vital to him and hundreds of others. He asked: "At the Blank Department Store they sell a complete five-tube set for $49.90. This includes batteries, tubes and *everything!* Now our local dealer sell a five-tube set, but wants $100 for the set alone! It would cost me over $135 to complete the collection and have it installed! Why this great difference in price?

I said "typical" in referring to the above letter, but that was meant in a general way. Some of the letters were more violent in condemning the local dealer for "profiteering" and suggested, diplomatically, that he he hanged.

Reading it aloud once more, I endeavored to get some light on the proper answer. H. M. N. picked up the nearest weapon, a radio signal, and threw it at me!

"We've got to find out about this sort of business!" he said. "It's impossible! The local dealer is not such a profiteer, and how on earth *can* the Blank people buy this set and put it on the market at that price? We *will* find out! Get your hat, Turner, and go to Philadelphia. Get a job in the service department of the first price-cutting store you come to! Learn how it is done!"

Thus, I left the desk at 3XP and started out on this mission. I was to find just how even a large concern could sell a $150 set for only $49.90—and *still make a profit!*

Walking up to the service manager of a well-known department store, I asked if I might get placed there. In less than five minutes I had been introduced to the assistant manager, whose business it was to break in the raw recruits—to give the service men their lessons in "Blank Etiquette." His words were somewhat to this effect:

"* * * and always remember that you are a Blank man! Regardless of how bad a set, a battery or the tubes are, you must *never* 'knock' it until you find whether Blank sold it or not! Get me?"

I got him. Noticing that he had given me several tubes of the variety we throw away at the laboratory, I asked what they were for. They were "replacements"—to be used where I found other bad tubes. I knew that the first set I came upon which used these tubes would not be working satisfactorily, so suggested that I would need more than a half dozen in the course of the day's work.

"Oh, never!" he replied, "here's how to do that. When you come to a set which has five good tubes in it, which works O. K. with a bad one in it, then just substitute the bad one! Get me? Then you will have a good tube!"

Thoughts of how lenient the gyps were in comparison with these men—operating under the good name of a reputable concern—began to trickle through my mind. However, at that moment I forgot myself and asked what was gained by spending thousands of dollars for "good-will" advertising only to break up the prestige thus gained by such cheap and unscrupulous practices.

"Oh, well," the assistant manager replied, "you'd never convince the boss of that. Besides, every department store is doing it—why can't we?"

Thus, I saw that if I was to be a Blank man for a few days, I must adopt the same attitude. I determined right then and there that I was going to be some hard-boiled baby from then on! With the determination to be "successful" thoroughly imbedded in my heart, I set upon my mission—to help "gyp" every one from the President down to Will Rogers!

I was given at least a dozen calls to start me. I was to get 90 cents per call, so I had to make lots of calls in one day in order to make anything at all. That meant stinting the service to those who most needed it. Furthermore, it was agreed that I was to pay my own carfare from this! Such is the life of a service man in this section!

First I went to a house in North Philadelphia. A kind old lady came to the door. After informing her of the nature of my call I went in and took a look at the radio. It had been sold to her by a smooth-tongued salesman. I assured her that I would have the set going in "just a few minutes," but after checking over the whole set and finding things worse each time I looked, I stuck two bootleg tubes in the set and told her that the trouble was only in the tubes. Little did she realize the depth of the truth in this statement. Luckily I tuned in WOO, but I knew that the tubes I had substituted were good only for a week or so! Then she asked if I was not from the South—judging from my pronunciation and accent. Then came a little story.

Somewhere near Charleston, S. C., is a son who has not forgotten mother, back home. He saved up his money for a whole year that she might buy a radio

set and listen to the outside world while her boy roamed it—via the United States Navy. I had never heard of him before, of course, and never expect to see him—but through these columns I wish to tell him that his mother certainly does appreciate that set! All she gets is Philadelphia—and the set has five tubes, too. Still, she is content, or is just using the characteristics that all mothers have to make us believe it—but we all know the set should get more than it does! Bad tubes and very poor design. That's the trouble.

I visited more than a hundred homes in all my experience with the various "gyp" activities in Philadelphia. Never once did I see a satisfied customer! Every set that I called to see had been a patched-up job by some former service man from Blank's, or I was the first, due to the set having just been installed. The art of "passing the buck" was practiced to a great extent among the service men, but I do not blame them! With bad tubes and sets, how on earth is one to do anything that will produce real results?

Instead of Eveready, Burgess, Ray-o-Vac or other good makes of "B" batteries, I found a type I had never seen before. Where they came from I do not know yet! All I *do* know is that these batteries stayed up about a week or so—perhaps half that time—and then died a pathetic death at a rapid rate The batteries probably cost this concern half of what good batteries cost. Thus you are beginning to see, dear readers, just how a set *can* be sold for $49.90.

My next job was to satisfy an immigrant family—Swedish, I think—that their set was absolutely all that it should be. This was very hard, as it was far from it. Bad tubes, batteries, bad set—bad everything! However, thanks to the man who put the antenna up for Blank's, I did not have to crawl out on the roof. That was the only part of the make-up which I could look at without feeling ashamed. It appears that the father of this family was very well educated in his old country, but that his ways did not match so well the ways of Americans. Consequently, so that the two little kids might grow up to be Americans, the family had denied themselves many things in order to buy a radio set. Father had figured that nothing would help them all get used to the ways of America better than a radio set! Here, by the way, we find another "job" for radio—to help Americanize our foreign citizens who are susceptible, while they sit in their home among the surroundings they like.

Anyway, I'm telling of the set—not the people:

Not being able to get any farther than the local stations, and these very weak, I advised the father to take the batteries to the store and have them replaced. He had had them but a couple of days—and they had not been in use! I could see that myself. He did carry them to Blank's. They would not replace them. The man, being a very nice sort of fellow, bought new ones. I hated to see him do it, for I knew that once he started buying there were many other things he had to buy. Next time I visited his house I advised him to get tubes. He had to buy these, too.

As the matter now stands, he is able to get Philadelphia stations fairly loud on a five-tube set; New York *might* come in sometimes, on rare occasions, but I doubt it! He cannot take the set back to Blank's, for his "time limit" (whatever that is) has been exceeded while trying to get the set to work!

A heart-rending sight I had to look upon

Mitzi, the popular musical-comedy star, is an ardent listener-in. The set is a Radiola Superheterodyne
Photograph by MOFFETT

was that of a perfectly good superheterodyne, of well-known make, practically torn up. It seems that Mr. Webster, the owner, had bought it some time ago from Blank's. The signals began to be very weak—so he took it to Blank's Service Department. There it was subjected to the scrutiny of the radio "experts." When it came back to Mr. Webster, two wires were hanging loose—probably forgotten in the mad rush to give prompt service (or did the repairman know where they belonged?).

I was to fix the set. Arriving at Mr. Webster's place, I found that the main compartment which held the "works" was also left hanging in the air. The set resembled a house that had weathered a Kansas cyclone. I reported that I could do nothing with it—not wanting to become entangled in the fuss I knew was bound to come when the set was sent to the factory. Instead of endeavoring to help the owner any further, the service department informed him that they could do nothing with the set—that they didn't want to "bother with it!" The moral to be had from this is—see that definite service is *guaranteed* you before buying apparatus from any one. Do not expect it to be free, but you have a right to ask your dealer to get the proper man to work on it, at least.

Strange to say, one of the cheaper models of Blank's line is the best they have! Do not judge by price alone when buying a set from such people. This little set I speak of is of the regenerative type. Given good tubes and batteries, as well as an extra-good antenna system, I feel sure that this set is worth the price. However, Blank's ruin it by their usual policy of selling the set so low in price that they have to substitute bootleg tubes for good ones! Oh! If they would only add two dollars to the set and give three *good tubes* with it! Then they would have satisfied customers and less servicing to be done!

I almost told a lady the truth about the tubes, once. She happened to have a set which I think would have tuned in Chicago (maybe) if it had good tubes. She said her husband didn't like the brand of tubes that Blank's had sent, etc., etc. A friend, it seems, had told him to buy a well-known make. He was willing to do it. However, I knew that if I told her to have him do so, he would go down next morning to Blank's and tell them all about it—and I had at least another day to be there yet. So I said nothing.

The climax of my experience with Blank's came when I was looking for something to halt it. I was sent to "make a slight adjustment" on a nine-tube home-made superhet! I was to get 90 cents (less carfare) for the trip. When I arrived I saw that some one who knew more about some other line than radio had built the set. As all readers know, a superheterodyne *must* be properly built. The set needed rebuilding. Although the owner had the set in a fine location and had used it a year, he had received nothing but Philadelphia! Nine tubes! Built by a radio "expert"! Listening further, I found that the service manager and at least two others—"experts," of course—from Blank's had attempted to make this "slight adjustment." In fact, the service manager had spent several evenings with the blooming thing! All in vain. I had to be the "sucker"!

After reporting that I could do nothing with the set, I was urged to return on the job. In fact, I was offered the astounding sum of double pay (amounting to about $1 in all) if I would finish the set. The tip from the owner, a very nice gentleman, would have been more than that! He promised me a bonus of $10 if I got Chicago—even on the headphones!

The owner of the store—one of the Blanks, I suppose—had given a Christmas present of a radio set to two family

(Continued on Page 25)

Why Don't You WRITE?

Women Are More Helpful to Program Managers Than Men, but the Task of Deciding on Features Is a Perplexing One

Jean Sargent

By Jean Sargent

Director of Women's Features at Station WBT, Chicago

SUPPOSING that you had to supply a program for four hours a day, yes, even one hour a day, six days a week, for women — many thousands that you never see—and could only have as your guide the letters that are written you, and, so you beg and beg that they write you, for, as you tell them, it is the only way that you can give them the kind of program they want—through their expressions, either of kindly comment or sincere criticism.

Just suppose this, and then one morning when you open your early mail the first letter reads:

"Dear Miss Sargent: Will you please give us more of the talks on art, literature, books, etc.? We are fed up on foods and how to prepare them; they are all right, but any woman can have that information, and it's so hard to hear good speakers on the subjects mentioned." And you open the next, which reads:

"Dear Miss Sargent: Your programs are fine. I am unable to find one bit of fault or to suggest one thing. Just keep on as you are; we will all be satisfied."

That is a lovely letter. You fondly lay it to one side and think, "Now, I bet she is a cultured woman, and one who knows good things."

All of this time you are slitting open the next, which bears a nearby city postmark. The writing is excellent and so is the stationery. Of course, that lovely letter has made music come into your mind, and you settle back in the office chair that always leans back too far, and you have to scramble to safety to read this next wonderful letter, and it begins:

"Miss Sargent, Dear Madam: You have been giving us very poor programs of late. They are filled with so much that we who make up your radio audience do not like that I think it would be well to make changes at once, that is, if you wish to retain your listeners. I do not tune in to your station now, and will not until you change the program."

Phew! that was a jolt, and you sink as far down as that queer-acting chair permits and meekly open the next letter. Suddenly you step up and think, "Why, how in the world does she know they are rotten if she does not listen, and how will she approve of them later if she is not listening?"

Now that has been settled, and you are already framing in your mind the kind of a reply that your position will allow you to make, and with more bravado slit the next letter. You look at this, read the first page, glance through the second and turn back to the first. Can you believe your eyes? Yes, it's there. Here is what this says:

"Dear Miss Sargent: Ever since you came here and began your morning programs I have been a constant listener, except the few times I have been out of the city, or the days the children were ill, or the days that we had guests that did not like the radio, or when we went on a vacation. I must say that it has been disappointing. You see, what we women who are at home, mothers of children and housekeepers, want is more of the domestic side of life. You have been putting on talks on art, books, pictures, music and other things that are not for homemakers and busy women. I want to suggest that you have more talks on foods and how to prepare them and things of that sort."

Now, with your mind a chaos, you turn back to No. 1 letter—less food, more art. Then to No. 2 letter—your program is perfect. Then No. 3—you have rotten programs, and then to No. 4 and find it's food that radio women want, and just where are you to begin, for, in addition to all of that, it is your duty to inject also a lot of music of all kinds, stories, reviews and fashions, homemaking and decorating into your program?

But is is the way that you build up your programs, for if there were not the varied opinions, criticisms and comments, however made, you would just allow the programs to run wild and where would you be? Nowhere, but just having a hit-or-miss time with the air. Of course, you have several hours, but there are the big features that must be handled as well as the market reports and farm information that the farm men and women alike want and can get in quick order only through the medium of the radio. And so each week, as well as each day, it is your duty and your pleasure to create, plan and place a program that will be educational, entertaining and not too long on any one subject. One that will be the kind that appeals to the woman who cooks her life away, one who is striving after all the higher ideals and the one who takes all and is thankful.

Of course, a few years ago there were none of these problems, as there were few if any real programs for women catering to the things that women at home are interested in. But today every first-class station has several hours devoted to women. It may be the early morning hours, the late afternoon or the midday, but there is a special place in the broadcast hours of the up-to-date station that is for women.

Since this has been accomplished—and it came about through the demand of women who sensed the real worth of what they were receiving over the radio—it occurred to me that from the start there were children's hours, and that proves that at first radio was taken almost without exception as a means of amusement, whereas now it is an accepted educational factor in the daily lives of the entire country. Radio in its comparatively few years has made a greater stride than did the motion-picture industry in the same length of time. It has come to be classed with that art as well as in the same class as the automobile—three big babies here to stay.

Handling a program for women is no small task. If you schedule talks by women or men, it behooves you to find out first if they are qualified to talk on the subject—or are they just talkers? If they are giving food recipes or food values, or anything where measurements are used, have they any method of knowing if all the ingredients are there and if the proportions are accurate? Does that seem foolish? Well, if it does, listen to this: "Dear Miss Sargent:

(Continued on Page 12)

The TRAGEDY of the SOS

When Your Favorite Stations Suddenly Sign Off, Just Give a Thought to the Heroes of the Sea Who Are Frantically Striving to Rush Help to Fellow Men in Distress

By H. M. N.

THE broadcast listeners have never had brought home to them the importance of S O S calls at sea more strongly than they have had during the first two nights of International Radio Test Week, when, on both evenings, all broadcasting stations on the Atlantic Coast were ordered to keep silent because of calls for help sent from off shore by ships in distress.

On both of these occasions we at the laboratory at Station 3XP immediately shifted over to another set and, tuning up to 600 meters, were able to get all of the thrill out of hearing the messages flying back and forth and the constant and strenuous efforts of all of the shore stations in order to protect the ship in distress in its efforts to get assistance to silence every ship which tried to send out ordinary commercial signals.

On the second night, early in the exchange of messages, and while various stations were asking for the position of the vessel in distress, there was one message which came in and which stated that the sender thought that the ship in distress was in the Caribbean Sea. When we copied this message at our laboratory, a neighbor who was present asked a question which I have no doubt many broadcast listeners asked on that night.

"Why," he said, "is it necessary for all stations up as far North as this to be shut down in order to get a message from a ship way down in the Caribbean Sea? I should think that they would have those things divided into zones so that only the particular part of the world in which the wreck has occurred would be compelled to stay silent."

This would, on the surface, appear to be a perfectly reasonable point of view, but the fact remains that it is not.

There is one fundamental consideration that must never be overlooked in considering the matter of wrecks, and this is the fact the vast majority of ordinary merchant ships are equipped with comparatively inefficient wireless apparatus. If they have a dependable range of 200 miles at nighttime, they are very lucky. In most of the cases the receivers are just the ordinary crystal tuners, and the crystal, in itself, limits the possibilities of two-way communication.

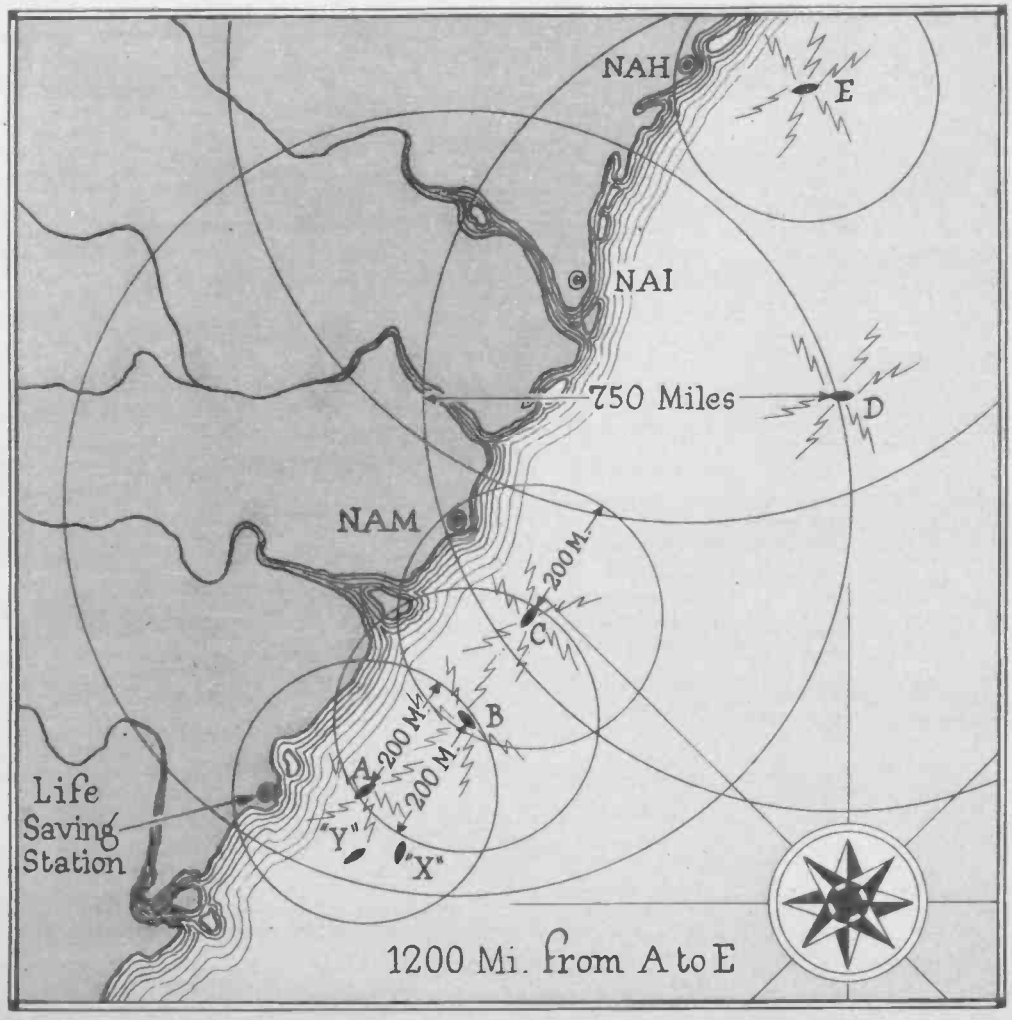
Let us take a case such as the one shown on the diagram on this page—and I want to assure you that such a case is not at all unusual.

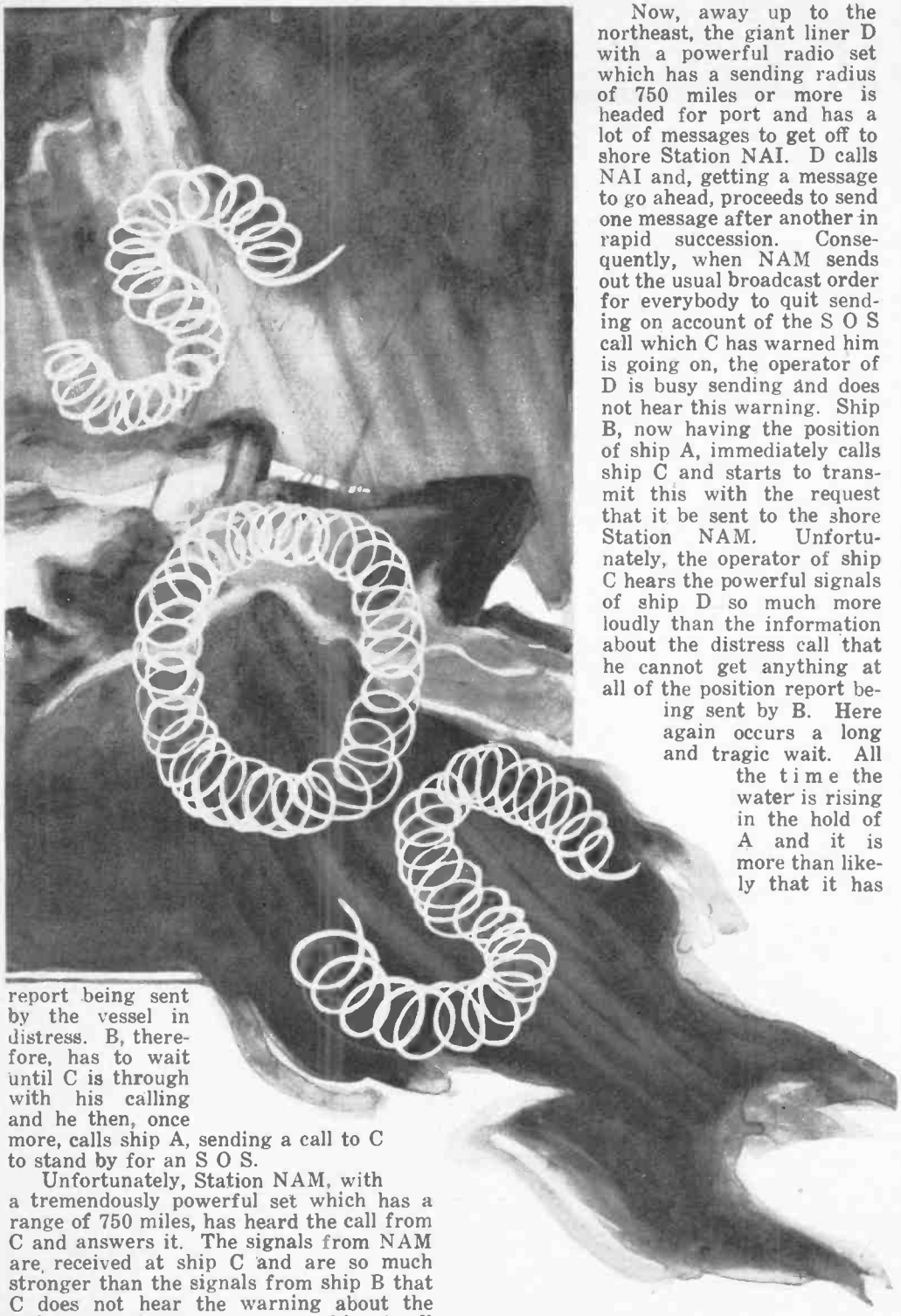
Down at the bottom of the diagram we see the ship A. She has struck a submerged wreck and has stove in her bow. The water is pouring in, and the men at the pump, together with the steam-pumping apparatus, cannot get ahead of the torrents that pour in through the gash.

She settles slowly but surely, and the captain, sending for the wireless operator, instructs him to send out an S O S call. Quite near at hand are the ships X and Y, but their operators have not yet finished dinner or else are sitting around the mess table smoking and chatting. Most merchant vessels have only one wireless operator and he seldom stands regular watch. About 7 or 8 o'clock in the evening he will go up to the wireless shop and put on the "cans" and listen in for a while, particularly to get the regular 8 o'clock weather reports and shipping information. But we will assume that this is just before 8 o'clock as it was on the second night of the international test. The operator on ship A sends out his S O S broadcast over the radius of 200 miles, which is the maximum for his sending set as received by the average crystal receiver on the average merchant ship.

Just within the outer limits of this range the ship B is plying through the sea and her operator is, fortunately, on watch. He hears the faint call of S O S and immediately he sends for the captain of his ship to come to the wireless shack while he gets in communication with the vessel in distress.

Ship B, then, immediately calls ship A and asks for position. Ship A starts to tell what is the matter, but, just as he does, ship C, nearly 200 miles to the north of B, starts to call the shore station, NAM. Ship C, of course, is out of range of ship A and has not heard the S O S. He has probably started to call NAM before ship B called ship A and so, being totally ignorant of the tragic mistake which he is making, he calls NAM a number of times. His signals, as heard by ship B, are just as loud as the signals from ship A, and the consequence is that B is unable to receive the position





report being sent by the vessel in distress. B, therefore, has to wait until C is through with his calling and he then, once more, calls ship A, sending a call to C to stand by for an S O S.

Unfortunately, Station NAM, with a tremendously powerful set which has a range of 750 miles, has heard the call from C and answers it. The signals from NAM are received at ship C and are so much stronger than the signals from ship B that C does not hear the warning about the S O S and, thinking that everything is all right, and getting his instructions from NAM to go ahead with the message, ship C starts to send his "traffic." From then on ship B is utterly helpless. The messages from ship C continue to smear up the frantic calls of A for help and the statement of the correct position of A.

All this time is wasted. There is nothing that B can do until C stops sending. He, accordingly, waits, and it may be ten or fifteen minutes before C signs off with NAM and then, if B is quick, he can shoot out an S O S call before NAM opens up. C may hear this S O S, and as soon as NAM is done C will send word for him to stand by because he hears an S O S. C will then send out a query for repetition of the S O S call. B will immediately answer and tell him to stand by—that he is receiving an S O S call from another ship. He will then tell A to go ahead and repeat his position.

Now, away up to the northeast, the giant liner D with a powerful radio set which has a sending radius of 750 miles or more is headed for port and has a lot of messages to get off to shore Station NAI. D calls NAI and, getting a message to go ahead, proceeds to send one message after another in rapid succession. Consequently, when NAM sends out the usual broadcast order for everybody to quit sending on account of the S O S call which C has warned him is going on, the operator of D is busy sending and does not hear this warning. Ship B, now having the position of ship A, immediately calls ship C and starts to transmit this with the request that it be sent to the shore Station NAM. Unfortunately, the operator of ship C hears the powerful signals of ship D so much more loudly than the information about the distress call that he cannot get anything at all of the position report being sent by B. Here again occurs a long and tragic wait. All the time the water is rising in the hold of A and it is more than likely that it has already reached the dynamo and silenced the transmitter on A so that it is helpless from then on to take part in the calls for assistance.

There comes a time, however, when B has all of this message ready and finally manages to get it through to C. In all such cases it is the job of every operator to get the S O S information in at once to the nearest powerful shore station, and then the shore operator takes charge of the situation except in the cases where assistance is very near and requires no further direction. The operators of X and Y are still smoking their cigarettes or, even if they are up in their cabins and are listening in, ship A has already been silenced by the waters which have engulfed the dynamo and both of the nearby ships are beyond the range of the ship B. Therefore, though they may be only five or ten miles away from the sinking vessel, they know nothing whatever of the tragedy.

Ship D may now have finished sending her message and is listening in for a receipt from NAI, and Station NAM takes advantage of this, sends out the call to ship D and tells him to stop sending because there is an S O S. The operators on both X and Y hear that signal from NAM. However, in the early minutes of the S O S call, Station NAM does not send out any definite information because it has not yet been able to get the exact location of A, so X and Y keep on their way, not knowing how badly they are needed almost within sight.

NAM, warning ship D to be quiet on account of the S O S, is caught by an operator at NAI, and he in turn sends out a broadcast warning to all ships to keep quiet. This is heard by operators at land Station NAH, and they in turn send out such a warning. Now, even farther north than NAH, and some 1200 miles away from the ship in distress, we see the ship E. Knowing nothing about this distress call, the operator of E, with a position message to send to NAH, goes up to his cabin, listens in for a few moments and hears that there is not much interference, and then, knowing nothing about the tragedy going on to the south of him, he calls NAH.

Now it would be perfectly possible for ship E to clear his traffic with NAH without in any way interrupting the traffic from NAM to the vessel in distress. The operators at NAH, however, know nothing of the exact position of ship E nor how powerful his set is. He may have a sending set with a great radius and he may be directly to the south of them. Also, they do not know where the wreck is. They have no way of knowing whether the signals from E will interfere with the S O S work and so, in a case where every second may mean human lives, they simply call E and tell him to stop sending because of the S O S.

To any one who understands the dot-and-dash code, listening-in on this constant exchange of traffic all along the coast is one of the greatest thrills that radio offers. One after the other, operators on various ships in various parts of the sea, coming up to their cabins to begin work for the evening and hearing nothing to interrupt them, pull their switches and start to call a shore station in order to get the captain's daily position report started on its way to the owner. Immediately, as soon as they have stopped calling, two or three shore stations and two or three ships will come on with short and snappy orders to stop because of the S O S. Technically, this signal is sent in this way: "Qrt fr S O S."

Qrt means stop sending and fr is simply wireless operators' abbreviation for the word for, so that this code message means "stop sending and wait for an S O S."

On the second night of the International Tests it was particularly maddening to

hear the amount of this kind of traffic and to think of the precious minutes being wasted by constant repetition from one shore station or another to one ship after another to stop sending and to stand by until the S O S traffic was cleared.

In the case in question, we can assume that after one-half to three-quarters of an hour ship B has managed to get the correct position up to ship C, and ship C has managed to relay it to shore Station NAM. Immediately, NAM comes on the air and calls "Qst" several times. This signal means that all stations who hear the call are to copy the message which follows. NAM then sends out the fact that an SOS has been sent out from ship A, and that she is in such and such a latitude and longitude. This time the operators of ships X and Y are on duty and probably hear the message. They at once send it to their captains and find that they are within reaching distance of the ship in distress.

They immediately send a message to A that they are coming and A can receive this message because, while his transmitting set is out of commission, he can still receive. They probably get in touch with another ship which is nearby and send word by relay to NAM giving their exact position and saying that they are on the way to the rescue. NAM, when he gets this message, will immediately broadcast something like this:

"Qst, Qst, Qst de nam nam nam. Steamships X and Y are on way to assist vessel A. S O S is clear. Resume traffic."

Here is where the life of the shore station operator becomes miserable. Some fifty or one hundred vessels, with one or two messages to be sent to shore, have been waiting all this time in silence for the opportunity to get their work done. They have been held up by the order to remain silent.

Just the moment NAM gives the word that traffic may be resumed every one of these boys, in his desperate haste to be the first to attract the attention of the shore station and thus be able to get to bed, jams his switch closed and opens up his set to full power, calling NAM or NAI or NAH. The air becomes a perfect bedlam, and it takes a veteran operator with a cool head and a clear brain to separate one from the other, to pick out the one which he will receive first and silence the others until that traffic is cleared and so gradually let them in one at a time with their traffic and clear the air once more.

Let me say that this case is not at all an exaggerated one. The difficulty of handling the S O S traffic on the night of the International Tests showed that some such thing was happening then. I have myself, during the days of my life as a wireless operator at sea, taken part in just such traffic jams as this, and I remember one in particular off the coast of Africa which came very near meaning the total loss of the ship in distress.

So, next time that you hear all of your favorite broadcasting stations closing down because of an S O S and find out later that the ship was some 2000 miles away, don't get impatient, and remember that it is better for us to do without our broadcasting for one night rather than have our pleasure cost a single human life on the ocean.

Why Don't You Write?

(Continued From Page 9)

One day last week a woman gave a recipe over the radio and it was given as a company dish, and I copied it down as she gave it. The next day I was entertaining several friends at luncheon and made the dish exactly as given. You can imagine my disgust, after using the many things that it called for in extra-large quantities, to find that the dish was a failure. I have talked it over with several friends and they all have the same recipe, but in the one that was given over your station it didn't call for salt and it should have, nor did it mention the shortening, and how can one make things like that? My husband says the owners of your station should be made to pay for the wasted material. I am never going to listen to that woman again, and will tell my friends the same."

Foods are subjects that have an equal amount of interest for both men and women, and we find that there are many men who listen to these daytime programs and take the recipes down. In fact, I know a man who is an expert shorthand man, and while he uses it very little, he has a radio in his office and often takes some things down, and then goes home and has the cook use it.

It is not an uncommon occurrence to be called to the telephone early in the day and asked to give a recipe for frosting or some such thing over the radio for a woman who is entertaining and doesn't know how to make this or that. Or to give hints on how to serve, even to answer as to what made the caramel icing burn, or why didn't the jelly jell. Why, one day a telegram came during the broadcast asking that we give the right temperature for jelly. It was on the stove and would spoil if we couldn't help the bride out. She lived nearly a hundred and fifty miles from the station.

Then there is the fond mother who has no conception of what child-training means. All good stations have that in their weekly programs, so I am told, and S O S calls for information

on what to do—Willie swallowed a pin, so please broadcast the answer — are not infrequent things that women demand from their own program, and they truly expect you to be able to get busy and do as they wish at once.

That might sound as if they were unreasonable, but they are not. For services rendered they can give more and better aid through their letters than men are able to do. For instance, if you are trying out a thought that has come for a feature and you tell them them so frankly and ask for their suggestions or criticisms, they will at least say whether they liked it or not, and the man—well, he will write like this:

"Station HIH: Heard you on the air last evening, broadcasting Dunk, Dink and Dunk. Come again. Keep the good work up." I could strangle the one who coined that "keep - the - good-work-up" phrase. It has made every one connected with radio furious, for it doesn't mean a thing. And after G. L. Blossom, of Highville, has written, used ink and stamps, he hasn't said a word about whether it was good or bad and you ask him please to do so as you wish to know for the future programs. Unmindful that he is one to insist loudly that radio and the air are free and must remain so, he will not help, but sits down and writes, "Keep the good work up—blah."

Now a woman, no matter where she is living, how much she goes out or how many clothes she has, likes to hear what the woman in society wears. She will listen just as she will read the Sunday fashion pages, but she also likes to hear about things she can make or wear in her daily life. However, more comment comes in from a description of the ball held in Washington than from how to make yourself and both babies' dresses from four and a half yards of twenty-seven-inch material and have enough left for a pair of sash curtains.

When my opportunity came to build a program for women, my first thought was to get them formed into some sort of an organization and from time to time get them to meet and express themselves as to the type of subject and entertainment they liked best.

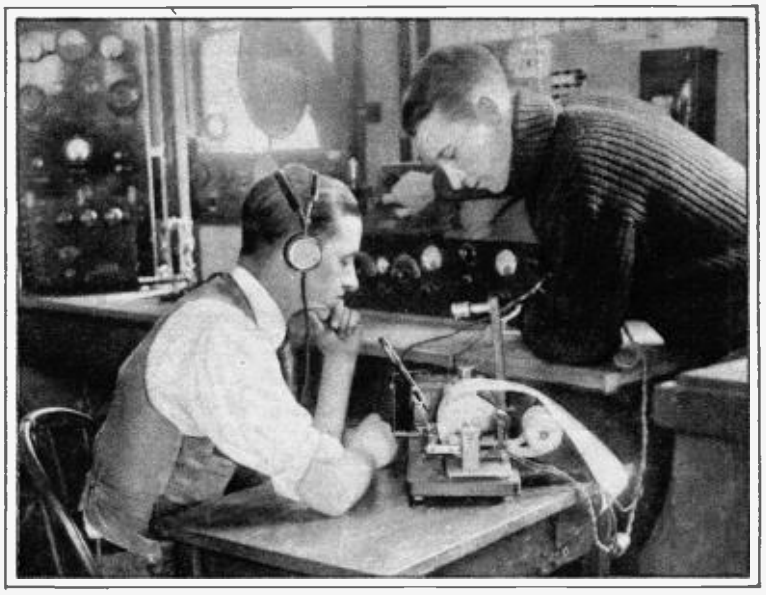
I started a woman's club of the air with that in mind. One cannot belong to that club by writing in they heard the station. It is first necessary to send for an application blank and fill it out and return it to be accepted and a membership card is sent. It is open to radio women everywhere, but they must tell me all they can of themselves, as that is my introduction and I know them that way.

Meetings had to be limited, and so the first one called had a splendid attendance and the many subjects that they wanted were taken down; and to date, with the exception of a few that could not be given, all have been scheduled. This is the first time a radio-listening public has selected its own programs.

Music always has its place, and the better music has more appeal than that of the lighter type. Illustrated talks on music, famous composers and song literature of all nations have been a weekly feature, and songs sung in connection with the talk have given them color.

These are but a few of the highlights of what a program for women has developed into, and all by watching the mail and making a careful study of what women want.

Woman may be the weaker sex. It's a delightful way to think of them always, but they have a power, and that is, they demand the beautiful, they would never be content to listen to whatever might be offered them by a group of rather uninterested men. They want things that women like and in the way women like them, and they get them more and more each day, as is shown by the way radio broadcast stations everywhere are giving more and better as well as consistent attention to radio programs for women.



Making fading records at Station 3XP. G. P. Allen, laboratory chief, is operating the recorder while Ulmer G. Turner, technical assistant, is standing by to cut in resistances and save the galvanometer from damage when sudden surges of volume send too much current into the instrument. The receiving set is the Victoreen super-heterodyne with an extra stage of intermediate-frequency amplification described in Mr. Allen's article in our last issue. Behind Mr. Allen in the picture are two short-wave receiving sets for working dot-and-dash code with amateurs and tuning from 15 meters to 220 meters. At the extreme left is the 100-watt transmitter with a range of 85 to 220 meters. This is Mr. Turner's particular pet

By HENRY M. NEELY

The FREAKS of FADING

Astonishing Variations in Strength of Signals Shown by Many Records Made of Transmissions From Station WGY in Co-operation With the Bureau of Standards

NO MATTER how enthusiastic the radio fan may become, he is, at present, unfortunately compelled to admit that there are two features of radio reception which are most annoying. One of these is the crackling sounds made by static and the other is the phenomena from certain stations.

Engineers are working hard on both of these problems and there is some indication that static may soon be so largely suppressed as to be a minor annoyance. Fading, however, is a more baffling problem because at the present time we have no well-authenticated theory as to what causes it, and until we know what causes it, it is going to be very difficult to prevent it.

The radio division of the Bureau of Standards in Washington is going deeply into this problem of fading and has enlisted the co-operation of a number of radio laboratories in various sections of the country. The laboratory of this magazine, Radio Station 3XP, at Delanco, N. J., is one of these laboratories.

We have instruments for making a continuous and actual record of the intensity of signal strength received from any broadcasting station which we care to tune in. One of the photographs on this page shows our fading recorder connected to a special super-heterodyne set. This recorder consists of an extremely sensitive galvanometer and a mechanism whereby the constant rise and fall of the needle on the galvanometer, indicating the rise and fall in the strength of the signal, can be recorded on the long strip of paper which passes constantly over a drum operated by an electric motor.

I am reproducing with this article certain selected sections from some records made on station WGY. This station was chosen by the Bureau of Standards for special tests, and the General Electric Company co-operated in the test by sending out special signals for the purpose of these measurements.

About the middle of last December the Bureau of Standards sent the co-operating laboratories their hardest task. We had to make measurements on five different days, four of these days being afternoon jobs lasting throughout the afternoon and

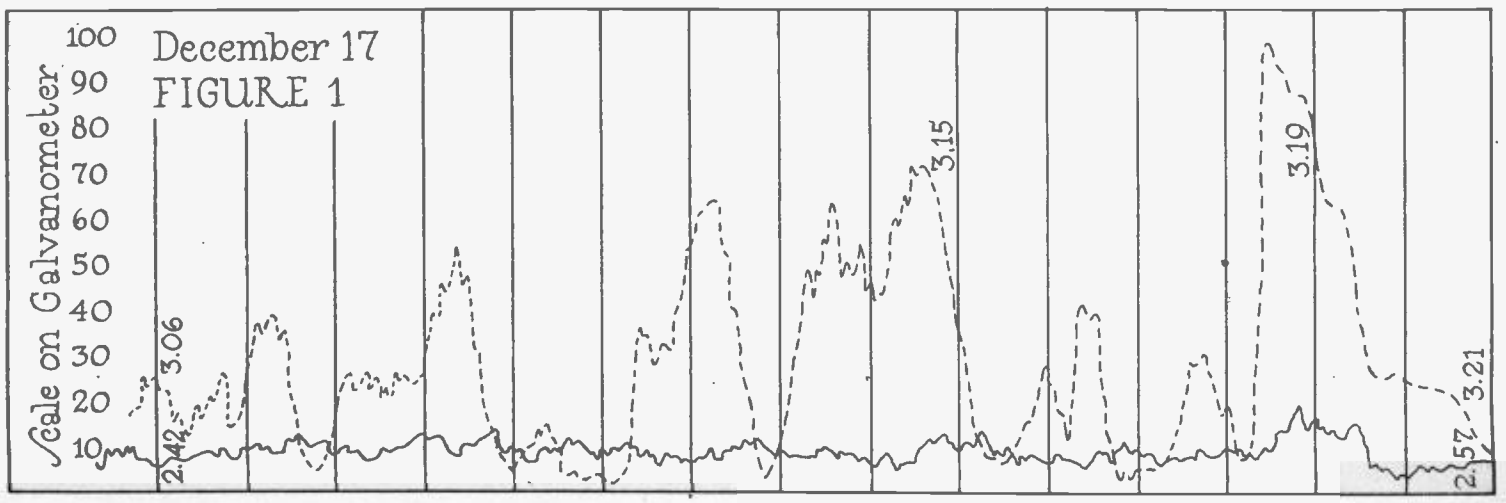


FIG. 1 —The freaks of fading. Two records of WGY fading made on successive days—Dec. 16 and 17—from 4:52 P. M. to 5:08 P. M. The solid line is Dec. 16, the dotted line Dec. 17. The vertical lines are one minute apart. The signal is audible in headphones when the line reaches a galvanometer scale reading of about 5. A reading of about 20 is just audible in a loud-speaker, and a reading of 100 is good loud-speaker volume

until 7:30 o'clock, and the other one began at noon of December 9 and lasted continuously for twenty-four hours, until noon of December 10.

The curves shown with this article were taken from the records of these various days. While most people find it difficult to grasp the meaning of curves of this kind, I think a little word of preliminary explanation will make these diagrams quite clear to any one. If you will look at Figs. 1 and 2, you will see that they are divided by vertical lines running up and down the page. These lines are one minute apart. At the bottom is the base line, which would be zero on the galvanometer scale, and means that no current at all was flowing in the instrument. At the left of Fig. 1 and at the right of Fig. 2, you will see the markings which show the scale of the galvanometer from zero to 100. When the line of fading gets as high as about 5 on that scale, the signal is strong enough to be heard in the headphones. When the line gets up to about 20, the signal would be just about audible in a loud-speaker, and when it gets to 100 it would indicate fairly good loud-speaker volume. The farther up the line goes, the louder the signal is; the farther down it goes, the less audible it becomes. Below about 5 on the galvanometer scale the signal could not be heard even in the headphones.

Now let us first look at Fig. 2, which shows that there is absolutely no similarity in the freakish behavior from one day to another. Fig. 2 shows two lines, one a solid line and the other a dotted one. The solid line was made December 16 and the dotted one December 17. The time of day chosen was identical in the two cases, running from 4:52 P. M. to 5:08 P. M., so that the center line is exactly 5 o'clock in the afternoon.

Now let us follow the solid line made December 16. You can easily see how rapidly the strength of the signal fluctuates. In the one minute from 4:52 to 4.53 it drops suddenly from loud-speaker volume to where it can be barely heard in the headphones, goes up to loud-speaker volume again, then not so high, drops down to low audibility and once more again climbs up to loud-speaker volume—all in the course of a single minute.

So it goes on for the particular section of times shown in this graph, the high point rising and falling constantly.

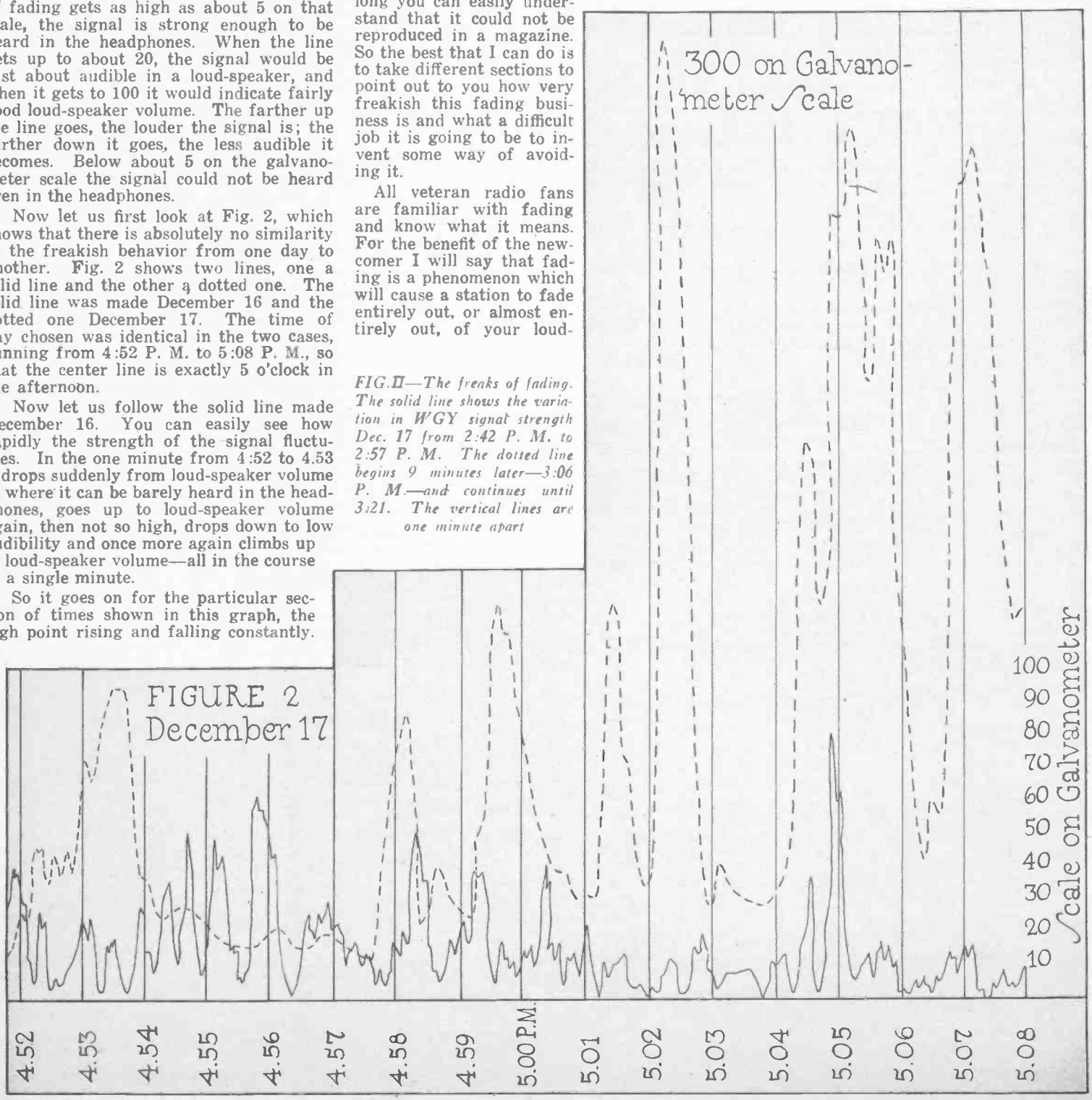
Now let us look at the dotted line made the following day at exactly the same time. You will easily note how totally different the character of the signal is and, in fact, how different the characteristics are. Not only are the high points much higher but the fading does not occur so often within a minute. The most notable point on this dotted line curve is from two minutes after 5 o'clock to three minutes after 5 when, in the short space of sixty seconds, the signal rises from only fair loud-speaker volume up to the point where it is entirely too loud for comfort on any loud-speaker—about 300 on the galvanometer scale—and once more falls down to where it is only fair on the loud-speaker.

It would be interesting to our readers if I could show you the entire set of curves, but when you consider that altogether they are something like 150 feet long you can easily understand that it could not be reproduced in a magazine. So the best that I can do is to take different sections to point out to you how very freakish this fading business is and what a difficult job it is going to be to invent some way of avoiding it.

All veteran radio fans are familiar with fading and know what it means. For the benefit of the newcomer I will say that fading is a phenomenon which will cause a station to fade entirely out, or almost entirely out, of your loud-speaker and then, after a certain interval of time and, without any one touching the set at all, will fade back again, come into its original strength and perhaps grow even beyond that to where it actually rattles the diaphragm of the speaker. Then again, it will fade out or it may stay steady for a while. The phenomenon called "fading" is this constant variation in the strength of a broadcasting station without the receiving set being touched at all to cause it.

The dotted line curve of December 17, shown in Fig. 2, is not at all an unusual phenomenon. Fig. 1 shows two curves taken on that same day earlier in the afternoon. The solid line in Fig. 2 begins at 2:42 P. M. and goes on to 2:57. Then only nine minutes later the dotted line begins at the left-hand side of the page at 3:06 and

FIG. II—The freaks of fading. The solid line shows the variation in WGY signal strength Dec. 17 from 2:42 P. M. to 2:57 P. M. The dotted line begins 9 minutes later—3:06 P. M.—and continues until 3:21. The vertical lines are one minute apart



goes on until 3:21. In other words, both curves were made within thirty-nine minutes; they are so entirely different that you would naturally suppose that they were not even made at the same time of year.

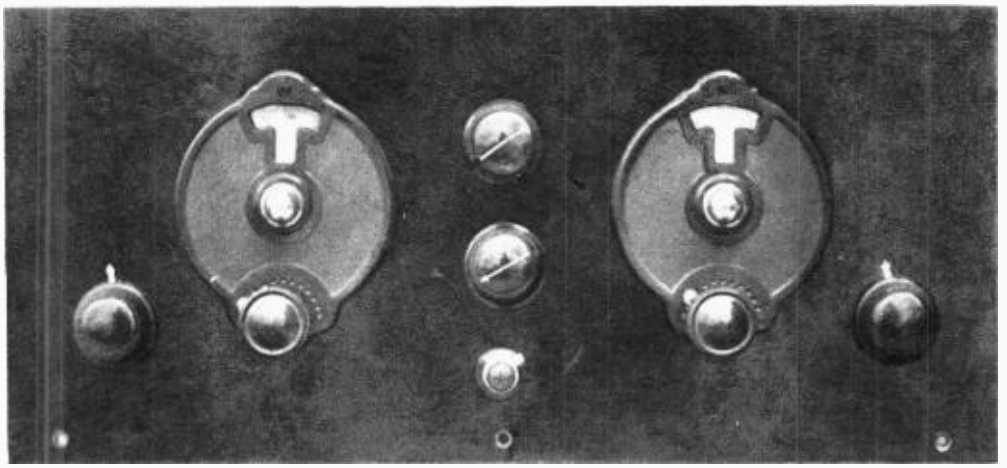
The earlier curve shown by the dotted line and beginning at 2:42 betrays a good deal of rapid fading, but the fluctuations up and down are not very deep and this kind of fading would hardly be detectable by the human ear. But when it comes to the dotted line curve, made a few minutes later, you will see the extremes high and low mark a very wide fluctuation, in several places the signal fading out entirely. If you will count from the left-hand line, indicating six minutes after 3 o'clock, you will see that the signal became inaudible at 3:11 and at 3:13 and, once more, just shortly after 3:17. Yet look at the loud volume which we received at 3:15 and at 3:19.

It is interesting to go over the entire curve for that date—December 17—beginning at 2:30 in the afternoon and ending at 7:30 in the evening. At 2:30 the curves were just about the way the dotted line is shown in Fig. 1 and it continued in that way until just before 3 o'clock. At that time it began to rise and fall much more widely, going from inaudibility up to about thirty on the dial every two or three minutes. Then it took on the form shown in the curved line of Fig. 1, and from then on became even more freakish. At 3:25 the galvanometer had passed up to the full scale of 100 on the dial and we had to cut in a resistance which cut down the galvanometer one-quarter. This was necessary in order to keep the very delicate galvanometer from burning out, due to the increase of current. We had to keep this resistance cut in for eight minutes, and then the signal died down, and then for a minute and a half more it steadily rose again until we had to cut the resistance in once more. From then on this resistance had to be used constantly. Most of the time the resistance had to be cut in because the signal was so strong, and when the signal died down we cut the resistance out, but the signal stayed down only for a half minute at a time and then rose suddenly and we had to cut the resistance in again.

At about 4:30 the characteristic shape of the curve began to change, and instead of showing a constant succession of very rapid fading records, the curves began to take on the form of mountain peaks, rising to great heights, staying there for a while and then falling down into deep valleys again.

At this time these mountain peaks are much broader at the base than are shown in either

(Continued on Page 30)



The panel of the Samson set makes a neat appearance

The SAMSON "T-C" HOOK-UP

Here Is a Circuit Which Is Easy to Build, Good in Appearance, Fine for Distance and Selectivity, and With a Perfectly Smooth and Even Control of Volume and Quality

By G. P. Allen

Chief of the Laboratory at Station 3XP, "Radio in the Home"

"DICK" COTTON, of the Samson Electric Company, really ruined a perfectly smooth-running laboratory staff. We were going along nicely with the superheterodynes and in the course of playing with the Cotton super for publication we made the mistake of writing him about it. Without saying a word to us he sent us a two-rotor coupler, an antenna coil, a choke coil and a neutralizing condenser. Just that—no more! Tucked away in the excelsior was an unobtrusive diagram suggesting a hook-up.

Well, "Dick" is a mighty nice fellow, and as long as he took the trouble to send us the stuff we thought we owed him the courtesy of hooking it together. We thought it was just another of the tuned radio-frequency regenerative-detector hook-ups.

It took us about twenty minutes after we first turned on the tubes to find that we really had a distinctive assembly and not just another set. The tone quality is good, the volume satisfactory and the selectivity excellent. In fact, the set was so good that it wasn't until Cotton sent us another supply of parts that we could get it away from H. M. to wire a set decently for publication.

Now we have T. C. sets all over the test table. There is one with resistance coupling, another with impedance coupling and two with transformer coupling. The wiring of the transformer coupling is the simplest and for that reason it has been chosen to be given first.

In looking at the circuit diagram the first question that you are going to ask is, "Why is there a condenser across the choke coil? Why put a choke coil in to keep the radio-frequency out and then put a condenser in to let it through?"

That is one of the first things that occurred to us. The obvious answer was the actual performance of the set seemed to justify its insertion as well as the ability to use the 201A-type tube and still neutralize the circuit. Still, that did not satisfy us, so I ran up to Canton to see Cotton and find out more about the little choke.

Much of the success of the Samson T. C. is due to the work of Prof. Bowles, of the Massachusetts Institute of Technology, who is the Samson consulting engineer. By the design of the parts, the resulting circuit gives us a selectivity which enables us to listen to WOR while WFI or WLIT are on the air. This is something which we have not been able to do with many sets. Furthermore, there are two degrees of actual silence between WOO and WEAF on the dials. We usually can tune out WOO and get WEAF, but it is rare to have any set give us silence between the two stations.

To get back to the choke coil. In many of the radio-frequency choke coils now on the market, the distributed capacity is so high that it passes a large amount of radio-frequency current. In the choke used in this circuit the distributed capacity is so low that not enough of the radio-frequency gets through to permit the proper operation of the circuit. The condenser acts as a gate or valve and permits the needed amount of radio-frequency to pass through. Do not experiment, as the proper size is given in the list of parts. At the same time, in conjunction with the neutralizing condenser, a balanced circuit is obtained. In order to be sure that the T. C. set does not radiate, as Samson claims, we put a set in H. M.'s home and started the Samson oscillating in the lab. The antenna of H. M.'s set is less than fifty feet away from that used at the lab and parallel to it. The lead-ins come within a few feet of each other. Both sets were grounded to a common ground. We tuned both

I'LL have to plead guilty to the enthusiasm that Allen speaks of in this article. The T-C set seems to me to offer the finest possible answer to the question of the novice, "What set shall I build?" and the constant query of the experimenter, "What shall I try next?"

We are giving the circuit here with transformer coupling. Next month we will give it with Daven or Brach resistance coupling and in the May issue we will show it with impedance coupling, using the Thordarson autoformers. The same panel and baseboard will be used in all so you can build it now and change it afterward.

Now please don't ask us which we think is best. It is entirely a matter of your own personal ear. With transformers, the set requires only four tubes; with both resistance and impedance coupling, it requires five. The difference in results is entirely a difference in the musical quality of the reproduction. The different methods of amplification make no change in the DX ability of the set nor in the selectivity. As a matter of fact, with five average persons out of ten, we can switch from one set to the other in the laboratory and they can't tell which one they are listening to. Personally, I have strong preferences, but I am afflicted with a too-sensitive ear made more so by a life of musical training and ten years' experience as a musical critic on newspapers. But I'm not going to say what my preference is. I would no more take the responsibility of advising you on quality than I would of advising you on which one of a given number of girls to marry. No; I'll amend that statement. If you'd ask me about the girls, I'd unhesitatingly say, "Stay single."

H. M. N.

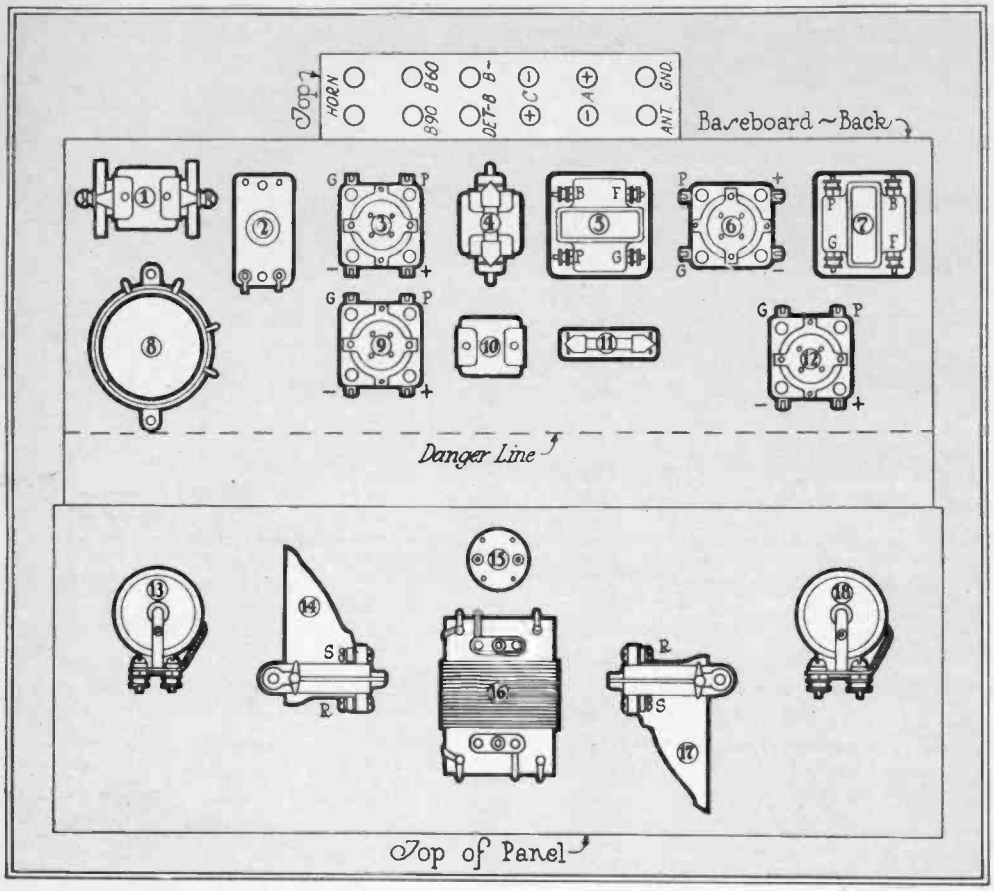


Diagram showing the arrangement of the apparatus

sets to the same station and the oscillating Samson caused very little disturbance in H. M.'s set. So we feel that we are reasonably safe in saying that if you are using a Samson that is properly neutralized, you will not be an annoyance to your neighbors. We only wish that there had been a few more T. C.'s in use during the International Test Week. We knew where the European stations were, but—try and get them through the squeals!

Another good feature of this circuit is the fact that, although it can be made to overregenerate and mush signals, there is no noticeable tendency for it to "spill" while you are listening to a concert. It really is quite stable and easy to tune. You can get just as much or as little selectivity as you wish. The set is not so critical in its operation that the folks cannot use it in the daytime to pick up the valuable women's programs that most stations are now giving.

If you will glance at the photograph of the panel you will see the two condenser dials and two small dials located between them. At either side are two small knobs and a switch in the center at the bottom.

The upper knob in the center is the tickler and controls regeneration. The lower knob governs the coupling between primary and secondary. The knob at the extreme left is the radio-frequency tube rheostat. That at the extreme right is the detector rheostat.

You are probably wondering why there are no jacks in the panel. The radio-frequency rheostat gives such a splendid and smooth control of volume that we felt it was not necessary to use a jack between stages. Accordingly, we deliberately copied the design of some of the best factory sets now on sale and had all our connections from the back. This leaves no wires on the front of the set to spoil the appearance of the living room.

It is possible to set the controls so that all that is necessary to do to get the local stations is to turn the condenser dials. With both the tickler dial and the coupler dial in a vertical position there is little regeneration and the least coupling. Much can be accomplished by just rotating the condenser dials and by varying the regeneration, but the adjustment of the r.-f. and detector rheostats and variation of the coupling give you just the added touch that makes so much for the success of the circuit. As the audio-filament control is not critical, it was placed on automatic ballast cartridges.

Before you proceed to the wiring of the set there are several things that we should like to call to your attention. More than likely these same cautions will be repeated. But we know we are repeating them to save you trouble.

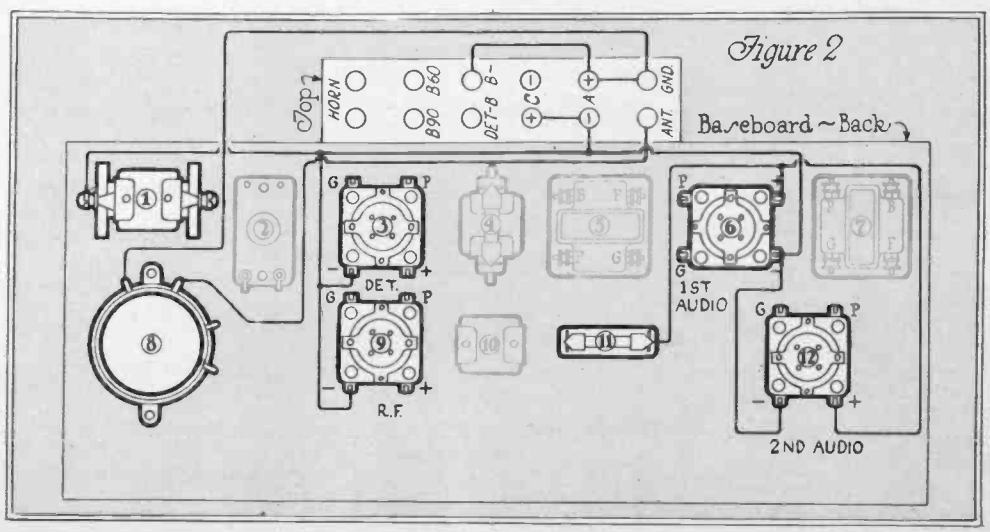
The first is in regard to the mounting of your condensers. We chose a 7 x 18 panel. In order to fit your condensers on the panel you will need to exercise a good deal of care. From the photograph of the back of the panel you will see that we had to mount ours in opposite directions so that we could center them on the panel and at the same time be able to use the condensers after we had mounted them.

Right here, if you are using straight-line condensers, is a chance to ruin your temper and a perfectly good panel unless you are very careful beforehand. Go a little slowly and be sure that you are right before you drill the holes. There are so many good condensers on the market that you may already have one which we did not give you on the panel layout, since we could not be sure of your condenser mountings. The mention of condensers also brings up another point. If your set does not cover the wave band, the trouble is due to the choice of condensers. Some of those you now have at home may have a maximum of less than .0005 mfd. and will not get the higher part of the broadcast wave band.

The next thing for you to do is carefully to tin all parts to which you intend to solder wires before you start to mount the apparatus on the panel or baseboard. It is far easier to scrape and tin lugs outside the assembly than it is after the parts have been fastened in. We tried to lay things out for you so that there are few tight places for you, but the tinning beforehand makes things much easier. Be sure to watch your step when you fasten the sockets to the baseboard and have the terminals pointed in the direction given in the diagrams.

Separate terminals have been given for the detector B and for the radio-frequency amplifier B battery. With some tubes we found that it was possible to operate

Figure 2



View of the baseboard showing the filament wires in place

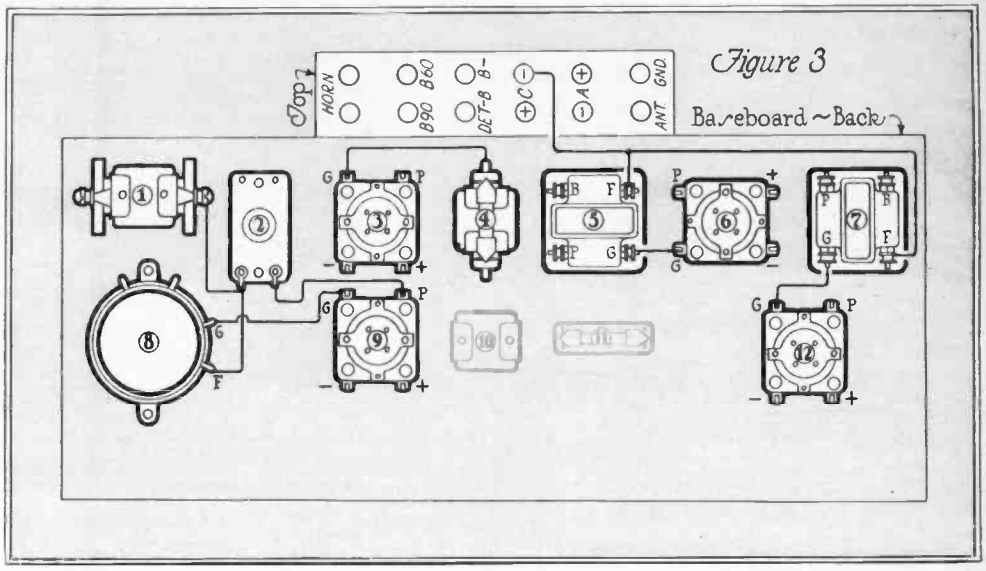
both the detector and the radio-frequency tubes on 45 volts. On other tubes we found that varying the voltage on the plates of these two tubes helped considerably.

The clearance of the condenser blades should be carefully watched so as to be sure that you do not locate any parts where the condenser blades will touch them as they rotate. The real reason for this caution is that yours truly got all the parts on a baseboard seven inches wide and then found that he could not open his SLF condensers. Seven inches is the ideal size, as it permits you to use many of the standard cabinets now on the market. We used a ten-inch baseboard.

The double rotor coil has different sizes of windings on the two rotors. The one with the fewest turns is the tickler and the coil with this winding should be mounted so that it comes upright, or at the top when the unit is mounted in a vertical position.

In following the 3XP style of wire-ups be sure that you remember which is your right hand and which is your left. If you are afraid that you will forget, write it on a piece of paper and tie it to your wrist or else mark the words "right" and "left and "front" and "back" on the baseboard. You will also find it a good plan when you reach the loose leads of bell wire that are to be the final connections from the panel to the baseboard to mark each one so that you will make no mistake in the final connections. We give you an idea of how to do this in the photograph of the back of the panel. The white things that show are slips of paper on which have been marked the terminal on the baseboard to which the wire is to be fastened after the panel is mounted to the baseboard.

After you have completed the wiring and know that the set is O. K., the only thing left to do is to neutralize the set. From past experience you probably know that as the dials of a set are rotated to bring it into resonance a click is heard at the point where a station would come in were it on the air. The T. C. set is neutralized when no click is heard at resonance. Adjust the neutralizing condenser until the click at resonance disappears. We ask you to use the Samson neutralizing condenser here because it has a maximum capacity of .0003, which is considerably greater than many now on the market. With this size neutralizing condenser you should have no trouble in adjusting the circuit so that it will not radiate.



Baseboard with the grid wires in place

If you don't get all over the United States and Canada as soon as you turn on the filaments, don't blame us or the set. You haven't learned to Charleston yet, have you? Remember it takes time to learn how to do things!

We have spent much time and have taken a good deal of trouble in preparing this set for you so that we could give it to you in the simplest possible manner. The circuit is not hard to build if you follow the directions.

The Apparatus Needed

In building this set at Station 3XP, we used a panel of Formica and on one set we turned the black side out and on the other we turned to the front the beautiful burled walnut side. Either side can be used and it is entirely a matter of taste of the builder. The only part in this hook-up which must positively be of a certain make are the four pieces of apparatus built by the Samson Company. These are the radio-frequency choke coil No. 1, the neutralizing condenser No. 2, the antenna coupler No. 8 and the two-rotor coupler No. 16.

In the set shown in these photographs you will see the new National vernier dials. We use the Eby sockets, though any standard socket will do. We used Dubilier fixed condensers and the Rauland Lyric transformers. Any other good make will do for the circuit. Carter or Yaxley 30-ohm rheostats and jack switch and Hammerlund straight-line frequency .0005 variable condensers. Daven condenser and leak mount and Eby binding posts are shown. In using other makes of apparatus than those which we used, be sure that your apparatus has the same values and that it is of standard make. The reader is referred to the "Blue Book" list of radio apparatus, which has been thoroughly tested and is unqualifiedly indorsed by this laboratory and which is printed on another page of this issue.

Diagram No. 1—Layout of Apparatus

In these diagrams the sections are arranged just as they would be if you loosened the panel from the baseboard and simply laid the panel down flat on the table with the bottom of the panel touching the baseboard. This brings the top of the panel nearer to you as you stand looking at it. The strip of Formica or hard rubber for the battery binding posts is shown laid lengthwise so as to permit showing clearly the running of wires in the diagram, but in building the set at Station 3XP we cut a notch in the back of the baseboard and stood this panel upright, as shown in the photograph accompanying this article.

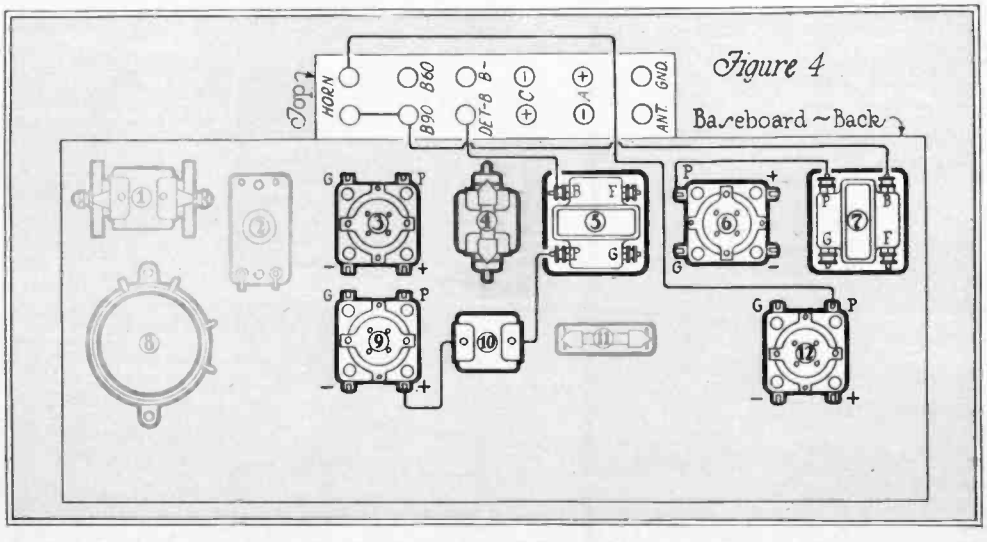
No. 1 is the Samson radio-frequency choke coil with a .00025 fixed condenser shunted across it.

No. 2 is the Samson neutralizing condenser.

Nos. 3, 9, 6 and 12 are the sockets. Notice that they are not all arranged in the same way. Each one is turned in such a manner so as to make the grid lead just as short as possible.

No. 4 is the grid leak and condenser.

Nos. 5 and 7 are the audio-frequency transformers and these are also turned so



Baseboard with the plate leads in place

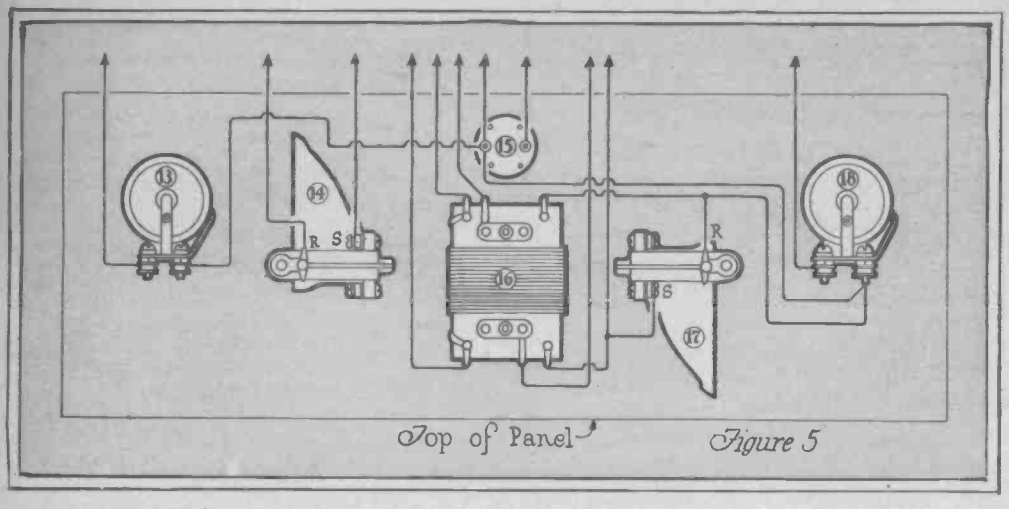


Figure 5

The panel with all the wires ready to be connected to their respective places on the baseboard

as to make the grid leads short.

No. 8 is the Samson antenna coupler.

No. 10 is a .002 fixed condenser and No. 11 is a mount in which we put a ballast filament control for the operation of both of the audio-frequency amplifier tubes. This ballast may be the Daven or the Brach-Stat. Many prefer an individual tube ballast like the amperite. On the panel layout, the instruments appear in the diagram upside down because of the way the panel is laid down on the table.

No. 13 is a 30-ohm rheostat.

Nos. 14 and 17 are .0005 SLF variable condensers.

No. 15 is a filament switch, No. 16 the Samson two-rotor coupler and No. 18 a 30-ohm rheostat.

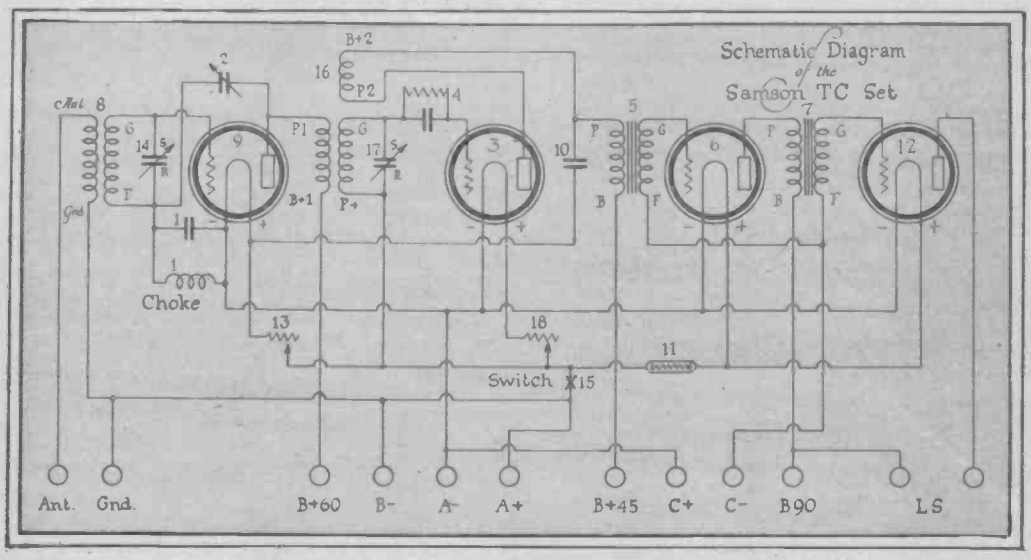
Diagram No. 2—Baseboard—Filament

First hold your panel up against the front of the baseboard and note just how much clearance the plates of your straight-line frequency variable condensers require. Draw a line on the baseboard at least one-quarter of an inch back of the rear rotor plate of the condenser so as to allow good clearance at all settings. Don't mount anything in front of this line in such a way that turning the plates will make them strike another object. Then set the panel aside and proceed to wire the baseboard as follows:

From minus A battery binding post to plus C battery binding post.

Run a wire from minus connection on socket No. 9 to the minus connection on socket No. 3, then over to the minus A battery binding post, then to the minus connection on socket No. 6 and then to the minus connection on socket No. 12.

A wire from the right-hand connection of the ballast tube No. 11 to the positive connection on tube socket No. 6 and over to the positive connection on tube socket No. 12.



The usual schematic diagram of the Sansom set

A wire from the left-hand connection of choke coil No. 1 to any point on the wire from negative on the tube socket No. 3 to the minus A battery binding post.

A wire from the antenna connection of coupling coil No. 8 to the antenna binding posts.

A wire from the ground connection on coupler No. 8 to the ground binding post.

A wire from the ground binding post to plus A binding post.

A wire from the plus A binding post to the minus B binding post.

Diagram No. 3—Grids

A wire from the filament connection of coupler No. 8 to the left-hand connection of neutralizing condenser No. 2.

A wire from that same left-hand connection of neutralizing condenser No. 2 to the right-hand connection of the radio-frequency choke coil No. 1.

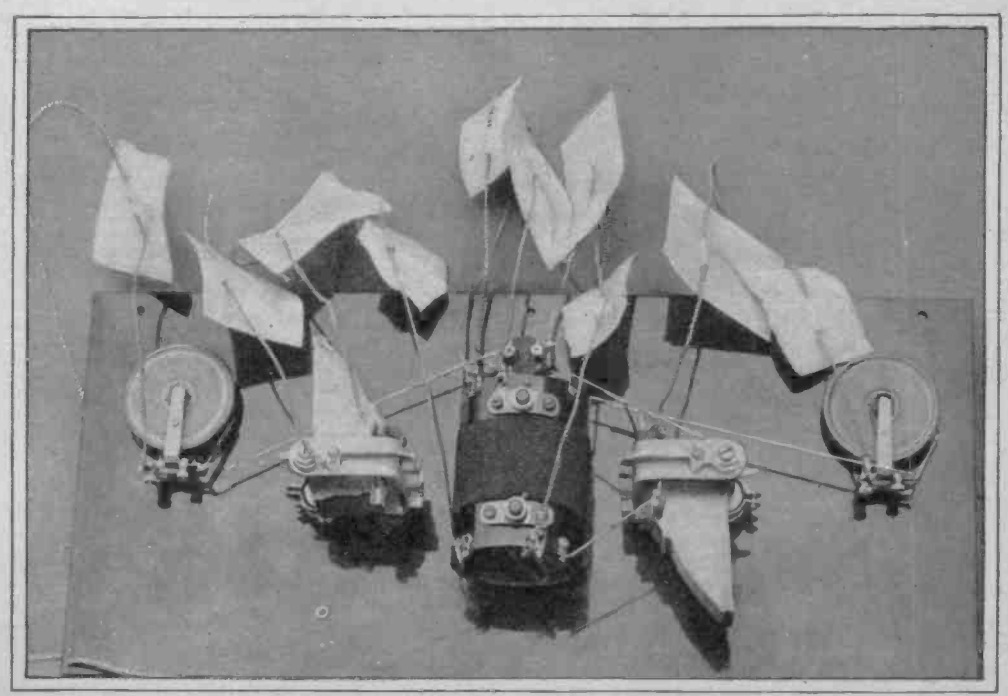
Another wire from that right-hand binding post of neutralizing condenser No. 2 to the plate connection of radio-frequency socket No. 9.

A wire from the grid connection of coupler No. 8 to the grid connection of socket No. 9.

A wire from the grid connection of socket No. 3 to the rear connection of grid leak and condenser No. 4.

A wire from the grid binding post of trans-

(Continued on Page 28)



The back of the panel with all the wires tagged and numbered

The 1926 "Diamond of the Air"

This Second Article Gives Some Hints on How to Go About Looking for Trouble in This Circuit and Will Be Found Very Helpful in Making Adjustments in Almost Any Set

By Sidney E. Finkelstein

Associate, Institute of Radio Engineers

AN AUTHOR, submitting a manuscript to a radio magazine editor, wrote: "Enclosed please find an article on how to build a really efficient radio broadcast receiver. There will be no trouble-shooting article on this because none is necessary. The set simply can't give any trouble."

On the rejection slip enclosed with the homeward-bound manuscript the editor wrote: "When you find a hook-up that simply can't give any trouble, tell it to St. Peter. Such talk is not for this world."

Nor is it. One may agree with the editor and still be a rabidly enthusiastic radioist. Nothing electrical, mechanical, physical, mental, psychological or biological can be honestly guaranteed as unfailingly free from possibility of trouble. On a radio set perhaps trouble will develop, or maybe the cause of annoyance or inefficiency is wholly outside the set, yet it is the receiver that is blamed, and corrective information is indeed advisable.

In the February issue of *Radio in the Home* I described the construction of the 1926 model Diamond of the Air, as designed by Herman Bernard, and with no retraction of any fine words bestowed on that receiver I shall discuss the trouble-shooting feature rather earnestly.

Photo shows the author, Sidney E. Finkelstein, in his laboratory performing various tests on his 1926 Diamond

Suppose the set is built and you do not receive any signals. This probably will be due to one or more of the following causes:

1. A broken connection in the receiver.
2. A break in the aerial system.
3. One or more tubes being dead.
4. Failure to connect wires properly.
5. Over-oscillation.

The hook-up is correct, and if the wiring directions are followed and all the parts, tubes and connections correct, you cannot fail to hear signals, if any are within range. Therefore, lacking them, inspect the receiver for broken connections. These will be easy to find if in any part of the actual wiring that you performed, but if in an audio-transformer, for instance, the location of the trouble will not be so easy. Once in a while a primary or a secondary of an audio-transformer will burn out or become broken through mishandling, although in my personal experience this never has happened.

Use a small dry cell and a pair of phones to test for broken connections at any point, including audio-transformers. One phone cord and one battery post go to the test circuit. A sharp click discloses that the connection is all right. In the case of the audio-transformer, however, the secondary will click with considerably less perceptibility than will the primary, due to the many more turns of wire on the secondary introducing extra resistance. Also, condensers will give a faint click, even when not shorted, due to charge and discharge, but you will have no difficulty in distinguishing these three points, for the condenser short will show up with abundant certainty and your ear will readily learn to be correctly guided.

A break in the aerial system is best located by the eye. Perhaps the lead-in is not connected to the aerial, or the aerial has fallen and is shorted with the ground, or the ground clamp is loose or broken.

The tube test is first performed by changing tubes about. Also you may borrow tubes from a neighbor if need be. If a detector jack is included (though not in the original design), it is easy to test tubes to determine whether they are all right, and at the same time find out whether the radio or the audio side is causing the failure of signals to come through. Thus, if you plug in at the detector output and hear nothing, you may take one of the tubes from the audio side and put it in the detector socket. If still no signals are heard, put the other erstwhile audio tube in the RF socket. Thus combinations can be tried out and the result will be that you will hear signals, disclosing which tube or tubes are at fault, or you still will hear nothing, in which case the likelihood will be that you are not suffering from tube trouble. At any rate, you still may borrow a neighbor's tubes and convince yourself.

If no signals are heard under any conditions, check up on the wiring to the audio input, since the trouble has now been confined to the radio side, unless an undisclosed trouble source also exists in the audio hook-up, which you will determine later.

Failure to connect the wires properly extends broadly from the receiver to the batteries and aerial system. To some extent this has been covered already, but the batteries have not been considered. Also it often happens that a fan, in the excitement attending the completion of a receiver, tries to get signals without aerial or ground being connected, or omits to connect the "B" battery. Hence, see that the aerial and ground are connected. Sure of that, observe whether the "B" minus lead has been connected to the "A" battery (A plus is advisable). If battery cable is used, be sure that you have the high "B" voltage lead going to the amplifier tubes and not to the detector tube, hence try reversing these, for too high a "B" voltage on the detector, combined with the lower voltage intended for the detector being placed on the amplifier, may result in absence of signals.

Another source of no-signal trouble is over-oscillation. This should not be encountered, and by rotating it, it is possible to control oscillations over the entire wavelength band, both for the detector and the RF tubes. Although the tickler coil is primarily in the detector circuit, it is in the RF tube's circuit, also, because the primary of the three-circuit coupler is connected to the plate of the RF tube and because there is the common connection of circuits through the batteries.

For over-oscillation as the cause of signal failure, reduce the "B" plus voltage on the plate of the detector tube, separating the "B" plus RF and "B" plus detector, if need be. If oscillations are too strong only on the lower waves, remove turns

from the tickler, or if generation fails on the higher waves, add turns to the tickler.

We are now in the sphere of trouble-shooting that concerns reception of inferior variety, rather than total absence of reception. If volume falls off perceptibly on the higher waves, it is a sign that your aerial is not long enough. Due to the circuit design and the coil construction the set will stand a long aerial. While a 100-foot aerial should be satisfactory, including lead-in in that 100-foot stretch, under some conditions, due to peculiarities attending the location rather than the receiver, a longer aerial will be necessary, and it is safe to go up to an overall length of 200 feet, including lead-in. The longer aerial may require more turns on the tickler, or, to gain the same tickler effect, you may place a .001 mfd. fixed condenser across the tickler coil.

It is only natural that the amplification should be somewhat less on the higher waves than on the lower ones, for this is true of all forms of tuned or untuned radio-frequency amplification except intermediate frequency.

After general satisfactory reception has been enjoyed, yet several unsuccessful attempts have been made to receive distant stations, constructors begin to read over results letters to make sure that it is true others got great distance with the same hook-up. The problem is what to do to bring in DX on the receiver that refuses to do this.

First make sure that your locality is not at fault, as there are some few places where it is virtually impossible to get distance on any set. You will know quite readily whether this is true in your instance, as you will have tried other sets and will know what neighbors' experiences have been. Be sure that conditions have not changed since you made tests with another set, such as a big steel building having reared its head and shoulders above your low roof.

Waving aside location trouble, for which there is no remedy save to move, to try to get distance where it has failed you resort to the following:

Try other tubes in the radio side, i. e., for RF amplifier and detector. This is of general importance concerning not only distance but local reception, for the object is to have the best radio amplifier in the first tube and the best detector in the second socket, apportioning the remaining tubes to the audio side as best they serve.

Lengthen the aerial. Use up to 200 feet. The failure to receive distance may be due not to the fact the receiver is not sensitive enough to pick it up, but that the incoming impulses are too weak to be made audible by the audio-amplifying part of the set, hence instead of mere AF, use the longer aerial, which affords greater signal strength and better possibility of hearing distant stations.

Experiment with the coil location. Tilt the RF coil at a different angle than the one at which it is placed, as that is not panel-mounted and is the easier one to shift. Stray magnetic feedback will injure DX possibilities very seriously, so avoid that by all means.

Put a fixed condenser, about .001 mfd., between the plate of the RF tube and "A" minus. Be sure that this condenser is not shorted, for if it is the "B" battery voltage will be delivered to the tube filaments and good-by tubes. Do not include this .001 mfd. condenser unless found necessary, as the construction of a considerable number of experimental models of this receiver has proven the unlikelihood of its necessity or desirability.

As another resort, put more turns on the primary of the interstage coupler, even tightening the coupling, if necessary, so that the primary of this three-circuit coil is right alongside of the secondary, with no spacing between. This will transfer more energy, although slightly reducing selectivity.

Experiment with the "B" plus voltages. Test your "B" batteries with a high-resistance voltmeter, and see that the "A" battery is sufficiently strong. If the batteries are all right, increase the RF tube "B" plus voltage, even up to 135, while the detector tube may be given experimental plate voltages from 16½ to 45.

Vary the setting of the Bretwood variable grid leak. Normally a 201A tube requires from 2 to 5 megohms, and this means that if a fixed leak is used you should be prepared to try out several, say 2, 3, 4 and 5 megohms. The 199 tube requires somewhat higher grid-leak resistors than does the 201A. Also remember that any change in the grid leak may require some adjustment of the "B" plus voltage of the detector tube, or of the tickler, or both.

As a final attempt, change the grid return of the detector from plus to minus "A". This is contrary to the accepted way of hooking up a detector tube, but in some few instances better results will be obtained, due to the peculiarities of an individual tube. A detector tube, of course, is an amplifier, too, and perhaps by operating your particular detector tube on the best amplification part of the curve you will get better results. There may be some drop in stability at the expense of added sensitivity.

The Buyer's "BLUE BOOK" List of RADIO APPARATUS

For the Benefit of Readers Who Are Confused by Claims of Salesmen, We Give the Results of Thorough Tests Made at 3XP and the Various Makes Which the Staff Recommends

THIS list contains the names of brands of radio apparatus with which we in our laboratory have worked constantly under all sorts of conditions, both favorable and unfavorable. It specifies the makes which have so consistently made good with us that we unhesitatingly recommend them to our readers.

It must be distinctly understood that in presenting this list we are making no attempt to give the names of ALL worth-while apparatus on the market. Unquestionably there are many other products worthy of a place here, but it is humanly impossible for us to make constant use of everything offered. And, unless we do use a make of apparatus constantly so as to become thoroughly familiar with it, we will not take the serious responsiblity of giving it the unqualified indorsement which its inclusion in this list carries.

This list is intended as an advisory service to our readers to guide them in their buying. We stand squarely in back of every item on it.

Some of this material is advertised in our columns and some is not. Those who wish to purchase may communicate directly with the manufacturer or ask for the material by name at their local dealer's. In the latter case, do not let the dealer sell you something "just as good." If he does not carry the specified article, we advise that you wire or write E. M. Clarke, who does a free shopping service for our readers and whose card is always found in our advertising columns. H. M. N.

Vernier Dials

This is unquestionably the day of the vernier dial. Stations are crowded so closely together and good sets tune so sharply that the finest hair-line adjustment is essential to the most efficient operation. Yet, though extreme slow motion is demanded, there must be no back-lash in the dial even after a long period of hard usage. That means engineering and workmanship of the highest order. The dial is also the most conspicuous feature of the set and, in these days when the radio outfit must harmonize with the tastefully furnished home, the dial must be graceful and pleasing to the eye.

National and Marco are putting out wonderful jobs in black, while the Apex is designed for those who want to add a touch of the brightness of polished gold or silver to the front panel.

Rheostats and Potentiometers

Wire-wound rheostats and potentiometers are regarded as necessary evils in the average set—evils because the ordinary instruments are so badly made that it sounds like a barrage of summer static to turn one of them up and down.

And yet there is no excuse for this junk. Carter, Sterling, Yaxley and Pacent make such good instruments and they are so widely distributed that substitutes are used only through lack of familiarity with conditions or a badly mistaken sense of economy. Bremer-Tully and C. R. L. specialize in fine non-inductive potentiometers of 400 and 2000 ohms.

Variable Condensers

All of the trend in modern set building is for "straight-line frequency," or S. L. F., variable condensers. This usually means an instrument with long and narrow rotor plates subject to the constant liability to mechanical injury or ultimate warping through continuous temperature changes. At our laboratory we are frank enough to predict the abandonment of this form of condenser, but at present our readers can't see our viewpoint, so we'll go along with them and simply warn them that only the most thorough and skillful workmanship and design can produce these instruments with the necessary minimum of electrical losses and maximum of rugged mechanical strength. This costs money, and the number of manufacturers producing such jobs can be counted on your fingers without your toes.

At Station 3XP we recommend Amsco, Bremer - Tully, Cardwell, Hammarlund, Karas, Pacent and Samson—putting them alphabetically. Close your eyes and pick out any one of 'em and you won't go wrong.

Battery Chargers

A good charger is essential equipment for any set operating on storage batteries. But don't be fooled by advertisements telling you to get a high-rate charger and thus cut down the time required to bring your battery up to a reading of 1275 or 1300. No radio battery should be charged at a higher rate than 5 amperes, and this should be used only with batteries of more than 100 ampere-hours capacity. You know very well that it is neither polite nor healthful for you to eat too fast. You can masticate and digest and assimilate only at a certain rate. So can your battery. If you exceed that rate, you're likely to get tummyache. So is your battery. The longer you can charge and the lower the rate. the longer it will be before you'll have to buy a new battery. A "trickle" charge all night after using the set is the ideal, but the average battery will keep fat and healthy on a 2-ampere rate, and a battery of 100 ampere-hours capacity or more will relish a 5-ampere charge. Don't get one of those vibrating chargers. They are a curse to every receiving set in every house within range of your electric light circuit, particularly if your neighbors are using B eliminators or socket antenna plugs. You'll simply ruin their reception.

Balkite and Tungar are standard, high-grade chargers, and either one will make you both a good neighbor and a satisfied fan.

In using any chemical charger or rectifier, always be sure that you keep the solution up to the specified mark.

Tubes

More trouble is caused by bad "independent" tubes than by any other one factor in radio. Under no conditions should you accept unknown tubes, no matter what dealer or department store "guarantees" them. These so-called guarantees mean nothing. If you don't believe that, just try to get them to replace a bad tube.

The R. C. A. and Cunningham tubes have always been the standards of the industry. There are very few independent tubes that are worth wasting time or money on. We have had satisfaction with the

OUR POLICY:

IN CONNECTION with this Blue Book list, it seems fitting to state once more the policy which this magazine inaugurated early in 1924, and which it has consistently adhered to ever since. The statement printed many times in our columns and always carried on our advertising "rate cards" follows:

"'Radio in the Home' is devoted entirely to better-class radio—the only kind that is fit to go into the American home. We are not in the market for general advertising. We make our own tests of apparatus, and we solicit advertising only from those manufacturers whose products we ourselves are willing to guarantee in the light of these researches.

"This is to assure our readers that they can depend on the things they see advertised in our columns.

"It is a reader service."

Brightson True Blue and the Sea Gull.

Audio Transformers

Poor audio transformers will ruin the quality of the best set that you can make. Just as there is a saying, "You don't listen to radio; you listen to your B batteries," so you don't listen to the music in your set—you listen to as much of the music as the audio circuit will pass.

Don't try to save money on audio transformers; it's poor economy. Putting poor transformers on a good circuit is like mounting a dump cart on a Rolls-Royce chassis.

If your dealer offers you a Rauland "Lyric," a Karas "Harmonik," a Pacent "Audioformer" or a Thordarson, hand him your money and go home and be happy—providing the rest of your outfit is as good as these transformers.

Meters

No set owner should be without a good high-resistance voltmeter with a double scale. The real fan should have an ammeter to read the filament drain on his battery and a milliameter to check up constantly on how much juice his set is taking out of his B batteries. In addition to these uses, such instruments give the surest and easiest method of checking over the various circuits in a set and locating any trouble that may develop.

At our own laboratory we have a long shelf full of just about all types of Jewell and Sterling meters—and that means we like 'em, which, in turn, means we recommend 'em.

Tube Sockets

One bad contact in only one socket—and your set is out of commission. And the worst of it is that such a fault is the hardest thing to find in a set that won't work. Almost everything else is comparatively easy to get at and test.

Recent socket-making jobs by Eby, Amsco and Bremer-Tully are as different from the sockets of two years ago as a modern straight eight is from the original one-lungers. It is a source of pride to have them in a set. And as all radio fans know, the Na-Ald has long been standard apparatus. This company is now making a complete line of adapters so that you can use any of the new bulbs in your old sockets.

Those Department Store "Bargains"

(Continued From Page 8)

employes of long standing. His orders to the service department were to "get the best set in stock—test it out—and see that it works!" Naturally, it is to be supposed that here we would find an excellent set—with good tubes. I did not! Same old story. Bad tubes, set out of order, batteries dead, etc. That's how it was delivered.

Only one young lady did I find out of all the customers (dissatisfied, of course) who had taken the liberty to send the set back! Little did that young lady think that, instead of hating her, I really congratulated her down in my heart for telling me when I rang the bell, "Dad said the set was no good. I sent it back and, therefore, have no service job for any of Blank's men!" Hi!!!

It's a pity that all of the customers who are not satisfied do not do that! There are, however, a large percentage of those who are ignorant as to this right—being cowed down by the fact that they have "signed" for the set!

The tube question is a very interesting one with all of us. In fact, I think that a little detailed description of the methods, or some of them, used by Blank's might be highly interesting to the radio public. Perhaps it might save a few from buying tubes from such concerns as Blank's unless the tubes are of standard make.

I would go completely over a set and find nothing particularly wrong with the circuit itself. Of course, that does not include bad technical features which kept the sets from performing properly, but I mean the actual *electrical* circuit of the machine. Finally, I would become disgusted and advise the patron to have his tubes tested at Blank's on his next trip up that way. This they would do. However, in nine cases out of every ten, the man who tested the tubes would inform the customer that I was wrong when I dared to say that the tubes were weak—that they were absolutely O. K.! Naturally, when the customer placed the tubes in the set they worked no better, so I would have to return on that particular job—at my own expense.

On my third morning I decided to have my "test" tubes tested on the machine. I thought surely that a weak one would be readily replaced when it was in the service man's kit—but I was sadly mistaken. Although

(Continued on Page 30)

Editorially Speaking

(Continued From Page 4)

be a genuine bargain to the purchaser. In the course of any business there are, unquestionably, times when it is possible to buy a quantity of standard apparatus at an attractive price. In cases where standard sets are acquired by stores in this way, and where the stores show their good intent by combining with these sets standard tubes and standard batteries, there you have the genuine bargains.

(Continued on Page 27)

RADIO *and the* MUSIC STUDENT

Scheduled for Sunday Evening, March 7

Broadcasting from Stations WJZ and WGY,
Godfrey Ludlow, Violinist, will play Mendelssohn's

"ON WINGS OF SONG"

No Music-Lover Will Want to Miss This

Conducted by G. W. Harris

Mendelssohn's "On Wings of Song"

MENDELSSOHN, one of the most prolific of composers, wrote no fewer than eighty-three solo songs with piano accompaniment. Most of these songs have been almost forgotten, for most of them are now considered monotonous and undistinguished in style.

But six or seven of them deserve the great vogue they enjoyed in their composer's lifetime—are indeed veritable gems that the world of singers and music-lovers will long continue to cherish. And, perhaps, first of all in this small group stands "On Wings of Song," Op. 34, No. 2, which Mendelssohn composed in his 26th year (1834), as a musical setting for a pretty little poem by Heinrich Heine. A singable English translation of the German words, made by G. H. Clutsam, is as follows:

I

On wings of song I'll bear thee,
My heart's love, far away,
Speeding fast over the palm trees
Where Ganges' blue waters play;
Where, hidden in glorious garden,
Beneath the gleaming moon,
The lotus flowers are longing
To see their sister soon.

II

The violets smiling and timid
Greet coyly the stars high above;
Roses are whisp'ring in secret
Their stories of innocent love;
And there in its freedom wanders
The timid, gentle gazelle,
While in the distance murmurs
The flowing stream's soft spell.

III

Together we'll rest, beloved,
Praying the gods will send
A dream that knows no waking,
A love that knows no end.

The music with which Mendelssohn clothed this lyric is fresh and individual, characterized by rare grace and charm, and its expression, while exquisitely finished, is pure and unforced. It mirrors the sense of the words perfectly, and its lovely melody—one of the most beautiful melodies ever created — transports the hearer on feathery pinions to a haven of romance where loveliness, beauty and felicity know no flaw.

The transporting loveliness of that melody was speedily recognized by Franz Liszt, who made of it one of his transcendent transcriptions for the piano. Other celebrated musicians have arranged it for violin, for harp, for organ—in short, for various instruments and combinations of instruments—until today "On Wings of Song" is probably better known to most music-lovers as an instrumental piece than in its original shape as a song.

Jacob Ludwig Felix Mendelssohn-Bartholdy was born in Hamburg, Germany, on February 3, 1809, and was the elder son of Abraham Mendelssohn and a grandson of Moses Mendelssohn, who by reason of his philosophical writings and noble character was known as "the German Socrates." Moses, who was the son of Mendel, a schoolmaster at Dessau, never formally abjured the Jewish faith, although he was rejected and denounced by orthodox Jews; but his son Abraham and his wife, Lea Solomon-Bartholdy, a banker's daughter, brought up their four children as Protestant Christians, and added the name "Bartholdy" to their own in order to distinguish themselves from the branch of the family remaining in the Jewish faith.

It was not in vain that Mendelssohn's mother named him Felix. Indeed, no composer was ever more appropriately named. Felix means fortunate, happy; and Mendelssohn was abundantly blessed with good fortune and happiness. He was a son of wealthy parents, was brought up in a home of refinement, culture and sympathy and was provided with all the advantages that riches could procure—a liberal education and extensive travels, besides a thorough musical training. He was happily married, and his whole life was probably more completely filled with happiness than that of any other composer who ever lived.

He was a remarkably fine pianist, an organist of great ability, and a conductor of extraordinary power and such personal magnetism that he was able to inspire his orchestra with his own feeling and enthusiasm. He did signal service in spreading the knowledge of good music, particularly the works of the old masters, and lived a life of such intense, almost ceaseless activity that the strain of long years of overwork resulted in his sudden death, at Leipzig, on November 4, 1847.

Mendelssohn was a wonderfully precocious child and began to compose music very early. By the time he was 17 years old he reached the beginning of his musical maturity with the marvelous overture to "A Midsummer Night's Dream," which in its symmetry and fine precision of form, its airy delicacy of texture, its poetic suggestiveness and picturesqueness reveals the true Mendelssohn.

His compositions include 121 numbered "works" and many others without opus number—a total of more than 400 pieces, large and small, in great variety of musical forms. Among the more important are two fine oratorios, "Elijah" and "St. Paul"; music to the "Antigone" and the "Oedipus in Colonos" of Sophocles; to Shakespeare's "Midsummer Night's Dream," to Racine's

Godfrey Ludlow, Violinist, broadcasting from Station WJZ, New York City

Athalie," to Goethe's "Walpurgis Night"; many smaller choral works; 140 songs, part songs and duets; four symphonies, seven concert overtures for orchestra, two piano concertos, a violin concerto, an imposing array of chamber music for various instruments; some excellent organ works, and a great number of piano pieces, including fifty "Songs Without Words."

Godfrey Ludlow

Godfrey Ludlow, violinist, was born in Australia, and received his early musical training there, winning the New South Wales gold medal when he was 10 years old. At 14 he left Australia and spent three years in Prague and two in Vienna as a pupil of the great Bohemian master, Otakar Sevcik. When 17 he passed the severest violin examination known in European schools and entered the Master School of the Imperial Academy of Music at Vienna.

In a two years' tour of Continental Europe he gave five "command" performances before the crowned heads of the countries he visited. He went to London when 19, made a triumphant appearance at Queen's Hall, and within a week was commanded to appear at Buckingham Palace. After a short concert tour of the United Kingdom, he went to Russia and studied with Leopold Auer. He was returning through Dresden in the summer of 1914 when he was seized as a prisoner of war and placed in the Ruhleben Prison Camp, where he remained for more than four years. On his release in 1918 he returned to England, and then toured Great Britain with Dame Nellie Melba.

Mr. Ludlow came to New York in 1924, and made a successful American debut in Aeolian Hall. He is now a member of the studio personnel of WJZ.

Aids to Appreciation

Many books have been published about Mendelssohn and his music, and there is even an English novel with Mendelssohn as hero which was intended as a memorial to him. This is "Charles Auchester," by Elizabeth Sheppard, an American edition of which was published by A. C. McClurg & Co., Chicago.

Serviceable biographies in English are: "Mendelssohn," by S. S. Stratton (in the Master Musicians Series), published by E. P. Dutton & Co., New York; and "Lives," by J. C. Haddon (London, 1904), Vernon Blackburn (London, 1904), and W. S. Rockstro (London, 1911). The last named is imported by Charles Scribners' Sons, New York, at $1.25.

"On Wings of Song" (the original song with piano accompaniment) is published by Oliver Ditson Co., Boston, at 50c; and by G. Schirmer, New York, at the same price.

Ditson's publishes Liszt's famous piano transcription (50c); also an easier piano version by August Horn (30c) and a more difficult one by Stephen Heller ($1.00).

"On Wings of Song" is to be had in the following phonograph records:

Victor Records—

Sung by Julia Culp (in German) (1041), $1.50.

Sung by Paul Reimers (German), harp accompaniment (45065), $1.00.

Sung by De Reszke Singers (45491), $1.00.

Played by Jascha Heifetz, violin (6152), $2.00.

Played by Balalaika Orchestra (18060), 75c.

Brunswick Records—

Played by Leopold Godowsky, piano (Liszt transcription) (50016), $2.00.

Recorded interpretations of "On Wings of Song" for reproducing pianos are available in music rolls as follows:

Edison Records—

Sung by Marie Sundelius (82186), $2.00.

Played by Vasa Prihoda, violin (82236), $2.00.

Duo-Art—

Played by Coenraad V. Bos (song accompaniment) (10198-S), $2.00.

Played by Eleanor Shaw (Liszt transcription) (60938), $2.00.

Welte-Mignon—

Played by Emil Sauer (Liszt transcription), (C-882), $2.00.

Ampico—

Played by Josef Lhevinne (Liszt transcription) (63513H), $2.00.

Played by Julia Glass (Liszt transcription) (58255H), $2.00.

Played by Giuseppe Randegger (53384F), $1.50.

Editorially Speaking

(Continued From Page 25)

and the watchman of the store should find you waiting on the steps when he opens the place for business in the morning.

But, you might say, "How am I to know what are standard sets and standard parts?"

The answer is easy. Look through the advertising and editorial pages of one or two radio magazines which really maintain laboratories and see if the parts of these sets are mentioned there. If not, it is a safe presumption—though not necessarily a proof—that the apparatus has failed to pass the highly specialized tests which we, in this magazine at least, subject them to and that, therefore, they cannot measure up to the hard and fast standards of value which we set in our advertising columns for the benefit of our readers.

Those Department Store "Bargains"

(Continued From Page 25)

I handed the tube-testing gentleman a half dozen tubes, he announced that all were perfect. Openly defying him, I went to the tester. After putting the tubes in the machine and seeing that the plate milliameter read the usual five for that type of tube (when 90 volts are used as plate potential), I became inquisitive.

Now I saw that some of my patrons who were fairly well versed in the technical side of radio were right when they said their tubes seemed to be O. K. when tested. They had looked at the reading themselves.

Immediately I thought of terribly high plate voltage being used. Upon interrogating the test man further, I found that only 45 volts were being used! Worse yet!

There was only one more thing that could be possible. Somewhere in the grid circuit was a high positive bias! This was beyond the knowledge of the average fan who bought a set at Blank's, so I figured that it was possible.

Following a couple of wires from the testing machine, I came upon four ordinary "C" batteries which were hooked IN SERIES! Grid? Well, I asked the test man what that was.

"'B' batteries," he replied sarcastically. "The tester wouldn't work without them!"

I looked under the bench, however, and saw the real "B" battery.

As luck would have it, this man left the room a minute, leaving a 201A-type bootleg tube in the machine. Seizing the opportunity, I shorted one of the small "C" batteries. The plate current dropped! I proceeded still further until all were shorted out of the circuit, leaving the grid return tapped onto the "A" battery, as it should have been. Very little emission was registered.

For the first time I began to have a little respect for SOME fellow in Blank's. At least one fellow at the store besides myself knew what was possible with a "C" bias on a tube tester! Not only that, but he had applied his knowledge! I certainly can recommend him as a *true Blank man!* Still, I wonder if he has a clear conscience when he sees some poor radio fan being gypped by his brainwork?

Surely he will not have to worry about the success or failure of the coal strike after he dies. In fact, he had better order an asbestos suit—with negative grid bias!

The pity of this sort of business is that Blank's very low prices and dollar-a-week policy attract the type of people who cannot afford a very high-priced radio set. It so happens that this class of people have been gypped by the installment business for years and years. Are they not entitled to at least a little entertainment after a hard day's work? I think they are. Poverty or low financial standing may not be the best position in the world, but at the same time it is not something for which one should suffer. Why do the department stores and bargain houses continually pick on these people? It is from the daily toil of such people that these stores have been built up. They should be treated with fairness and courtesy for pure business reasons—if no others.

In most of the sets I noticed at Blank's the plates in the variable condensers were short-circuiting at certain settings. So frail were these little condensers that it was utterly impossible to keep them properly set! Furthermore, there were usually no adjustments possible in the condensers. Merely a product of commercial production which had been carried entirely too far!

The coils, the best part of the sets, were usually of "high-loss" variety. This made the sets very broad in tuning. Furthermore, it was ylainly to be seen that the very cheapest sort of labor must have been used to put them in the sets! No two sets looked alike! In some the coils of two different radio-frequency amplifier stages oftentimes were too near each other. Mounted that way *permanently!* In another set of same type and make this feature would be perfectly O. K.!

Audio-frequency transformers of bad design account for some of the poor results obtained with a good many of the sets. Likewise, it would account for still more of the price-cutting that was possible.

When a set was tested in the service department it was tuned to the wave of a station near it. If music came through loud enough to be heard—the set was absolutely "O. K." without further question.

When customers, particularly those of the weaker sex, went to the service department asking for service or advice, they were treated as if they were just so many sheep. All herded up in a small space and told to—"Wait a while! We'll get around to you!!" There were many of them, too. At no time during the business day were there fewer than a dozen customers there seeking aid. Sometimes I have seen as high as fifty at one time!

One might say that this number is very small compared to the number of sets Blank's sells. That sounds reasonable, and was what I told a few customers the first day, but it isn't reasonable. The percentage should not be nearly so large! By counting the number of people who come to the service department of Blank's Department Store or any similar cut-price concern you may tell just how many radios they have sold during that year! Nine of every ten *always need service*—and really *need* it!

Thus, the Great American Public goes on through life. If they do not get gypped they are not satisfied.

And thus it goes! If the Public wants to be gypped I can heartily recommend that it buy its radio set from the fellow who cuts the price. Remember that there *must be some reason for this cut in price! Always!*

Meanwhile, I am back at Station 3XP. In just one more minute I will be answering just such a letter as the one which started all this discussion—and a hundred others like it. In all cases I will say—

"By all means buy the set from your local dealer! The initial cost will be a little higher, but you will get *satisfaction*. Otherwise, all you will get is—STUNG!"

Perhaps the fan who receives such a letter will believe me—perhaps not. However, I know the trouble to which this magazine went in order that we might know exactly the proper answer.

The Freaks of Fadings

(Continued From Page 16)

Fig. 1 or Fig. 2, some of the mountains being so broad as to cover five to ten minutes in duration, and, of course, during this time the signals would be too loud for comfortable reception in the loud-speaker. At 5:15 in the afternoon they became even louder and we had to cut in sufficient resistance to cut the scale reading down to 1-16 of normal. Just after 5:15 the records show one peak, which, if placed upon Fig. 2, would have gone up to 1120 on the scale of the galvanometer. When you consider that the highest point on Fig. 2 is only 300 on the scale, you can easily imagine the tremendous volume which would be indicated by a scale reading of 1120, which we received just shortly after 5:15. From then on, for almost half an hour, we had to keep the deflection cut down to 1-16, but at 5:41, or shortly after that, the signal became even stronger and we had to cut the scale down 1-64. Twice during this period the records show intensities which would have taken us up to 3520 on the galvanometer scale—more than ten times as high as the highest point shown on the dotted line on Fig. 2. At about five minutes after 6 we were able to work on only 1-16 of the scale and we were in hopes that the intensity had died down sufficiently to let us stay there, but at just before 6:19 it once more rose in volume and we had to cut down to 1-64 of the scale again

for a period of six minutes. This happened again at 6:29 and lasted until 6:49, during which very high readings were recorded. Again, at 7 o'clock, we had to cut down to 1-64 for a period of about five minutes and again at 7:23 we were confronted with the same necessity.

Remember, there is nothing in all of these records to indicate that the fault of this fading lies at the door of the transmitting station. If it did, all of the records made in the different co-operating laboratories would show the same general rise and fall at the same time. The most remarkable and the most discouraging feature of all of this series of tests lies in the fact that there is not the slightest similarity between any two records made by the co-operating laboratories, so the explanation of fading must lie entirely outside of the transmitting station.

What I have said about the record made on December 17, showing the growth of the intensity of signal as sunset was approached and then passed, lies well within the experience of any average listener-in. We all know that the reception of radio is better at night than it is in the daytime. Consequently, it was to be expected that these records would gradually grow in height as the afternoon wore on into the evening.

It was for that reason that I was particularly anxious in the twenty-four-hour test. With records showing, as all of ours have in the past, that the galvanometer needle would go to almost unknown heights by the time darkness arrived, I was wondering what we could possibly do with a signal made continuously for twenty-four hours. I was afraid that after midnight the signal would be so strong that we would be unable to handle it, as our instrument will not cut the deflection down more than 1-64.

The record from the beginning at noon on December 9 was just about like the solid line in Fig. 1. It continued this way until shortly after 3 o'clock, when the general average of intensity rose somewhat and there were fairly regular periods of rising and falling each about two minutes long. This continued most monotonously until the shape of these variations began to change by 4:30, and from then on there was much greater contrast in the rise and fall, the needle wavering rather regularly between zero and 60 on the dial.

The first reading of 100 came at about 4:55, and here the craggy mountain peak effect began to be very noticable, with the general average of deflection fairly close around 50 on the dial. These steep and jagged mountain peaks and deep valleys continue until 5:55, when we were forced to cut the deflection in quarter for about a minute and then went back to the normal scale. Sharp mountain and deep valley then continued to follow each other until just about 7:14, when the rise became quite strong and we cut in resistance to quarter the deflection, and three minutes later had to cut it to one-sixteenth. Here the needle became almost a pendulum and swung up and down four or five times in a single minute.

About 7:33, however, this storm period ended and we went back to the normal reading on the dial. This was our first surprise, as we fully expected the 8 o'clock reading to be very much higher than the daytime deflection. However, the normal reading of the instruments was sufficient for all purposes until about 8:34, when we once more cut it in quarter. During this period the variations were not so sharp and the rise and fall was fairly slow and not so deep, until just before 9 o'clock, when the sharp, high crags and valleys once more registered themselves on the paper. They grew in intensity and by 9:30 we had to cut in the resistance to quarter the needle deflection again and about 9:40 we had to cut it to one-sixteenth. This lasted until a few minutes after 10, when we were able to cut it down again to quarters.

At this point Station WMBS, of Miami Beach, Fla., came in on us, interfering with WGY. The Florida station was too high in wave length and was an annoyance for the rest of the evening as long as they continued to broadcast. Once again at 10:30 the signal intensity of WGY came down to such an extent that we were able to cut out the resistances and use the normal scale although the craggy mountain effect continued. Here again was the same surprise at the lack of general intensity in the signal. We had fully expected that as we approached midnight we would be bothered by very intense volume, but the normal scale was sufficient for us and the fading was so slight as to be hardly noticeable by the ear unless the eye watched the needle. This continued in this same uninteresting manner until 12:32, when suddenly the fading in and out began again, each surge occupying about one minute.

From about 12:50 the curves became rather smooth, but very high at the peaks and deep at the valleys, and we had to cut the deflection in quarters shortly after 1 o'clock, and to one-sixteenth at 1:08. From then on the swings became so wide that we constantly cut resistance in and out so as to have the needle follow the fading on the scale. At 1:40 the character of the curves changed entirely and they became smooth hills and curved valleys, but the intensity was such that we had to cut the deflection to one-sixteenth.

These smooth, high curves continued until shortly before 2 o'clock when the intensity fell back and we were able to use the normal setting of the galvanometer without resistance. Surprisingly enough, the fading was not merely so marked from then on and the signal was not really strong enough for satisfactory reception in the headphones until suddenly, at 2:30 A. M., it rose, and about four minutes later we had to cut the deflection in quarter. Here again the high mountains became visible, though they were broad of base and not so deep in the valleys. At 3 o'clock we came suddenly upon a perfect storm of fading in and out, so rapidly that about every two or three minutes we had to cut deflection in quarter, then back to normal, then in to quarter and then back to normal for less than a minute and then back to quarter and so on from normal to quarter until about 3:20. This, of course, meant that the needle was swinging constantly about 10 on the galvanometer scale up to something about 400 or 500. Even when we once more got back to the normal setting of the instruments the extremely steep and sharp mountains and valleys came back again.

At 3:45 began the most difficult part of the reading which had yet occurred, one of us having to stand constantly by the resistances and cut them in and out and in and out, sometimes only half a minute apart. The needle swung from zero up to 1600 and back and forth among all intermediate-frequency readings and did it so rapidly that a translation of the swinging curve is almost impossible.

The fading continued to fluctuate very rapidly, the needle swinging back and forth from one side of the dial to the other four and five times a minute, but around 4:30 o'clock we went back on one-quarter deflection and remained there until 5 o'clock, when we had to cut into one-sixteenth again. This condition continues to make the record unintelligible until 6:43 A. M., when the whole character of the reading suddenly changed back to something like the solid line shown on Fig. 2, although these surges of intensity were very much higher, going up to around 300 once or twice. At 7:15 in the morning we were back on normal setting of the instrument and the curves became smooth and not at all unusual. At 7:35 it settled back to the same kind of reading that we had when we started the record at noon the day before, and here it remained without further change.

The Newest Achievements of

POWEL CROSLEY JR.

Industrialist — Pioneer Radio Builder — Master of Mass Production

Four Entirely New 4 and 5-tube Radio Sets—Also the Crescendon

Never before has Crosley engineering and manufacturing genius been so brilliantly demonstrated as in this group of new Crosley sets.

Here, at prices so low as to be literally revolutionary, are three 5-tube sets and one 4-tube set—entirely new in principle, design, circuit, and appearance—entirely unique in the results they give on distant and local stations—entirely unprecedented in the values they now introduce.

On two of these sets is offered the Crescendon, a new and exclusive Crosley feature—an extra volume control by which average incoming signals can be built up or modified in a manner nothing short of amazing. Introduced on the new 4-29 and 5-38, the Crescendon principle makes its first appearance in the low-price field, its use having hitherto been restricted to one set costing several times as much.

Particular emphasis is directed to the new Crosley RFL receiving sets that utilize an entirely new and patented circuit which provides true cascade amplification and closely approaches the theoretical maximum of efficiency per tube. Non-oscillating at any frequency and absolutely non-radiating, the RFL Crosleys are specifically recommended for use in congested areas and for satisfactory performance in the hands of inexperienced operators.

In addition to their truly marvelous selectivity, sensitivity, and purity of tone, these new Crosleys have been given a new order of beauty that cannot help but win the highest admiration.

We do more than urge you to go to the nearest Crosley dealer for a demonstration! We ask you to go prepared for the most startling revelation in radio ever announced in the entire history of the industry—and predict that your expectations will be more than satisfied!

Crosley manufactures radio receiving sets which are licensed under Armstrong U. S. Patent No. 1,113,149, or under patent applications of Radio Frequency Laboratories, Inc.

THE CROSLEY RADIO CORPORATION, CINCINNATI, OHIO

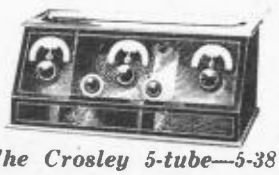
Owning and Operating WLW first remote control super-power broadcasting station in America

The Crescendon

—an amazing new volume control exclusive to Crosley sets. Hear it!

The Crosley 4-tube—4-29

in which the Crescendon is equivalent to one or more additional tubes of tuned radio frequency amplification . . . **$29**

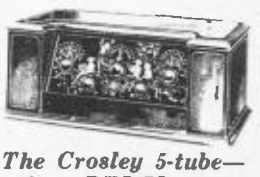


The Crosley 5-tube—5-38

All the volume, selectivity, sensitivity and purity of tone available in the best 5-tube set —*plus the Crescendon* **$38**

The Crosley 5-tube—RFL-60

A set so marvelous in performance that its appearance on the market is bound to create a new standard of comparison **$60**



The Crosley 5-tube—RFL-75

For simplicity and speed in tuning, fidelity of tone, and decorative beauty—it stands unchallenged at twice the price **$75**

West of the Rocky Mountains all prices as published are 10% higher

CROSLEY RADIO

BETTER COSTS LESS