

March, 1931

RADIO

REG.
U.S. PAT
OFF

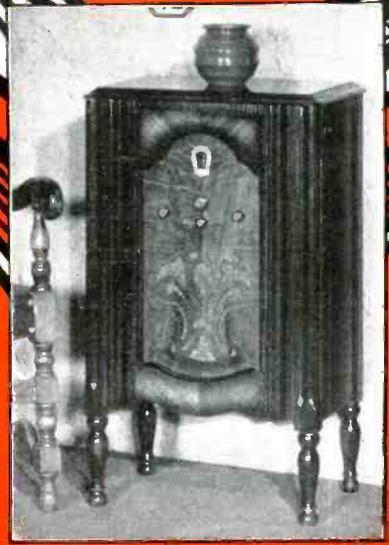
AND REFRIGERATION

What do *your* prospects buy in radio? They buy entertainment, the most possible entertainment per dollar—and that's what you've got to sell if you expect to eat this year. The new Silver-Marshall eight-tube Superheterodynes — Compact at \$79.90, and Cadet at \$89.90 with tubes—give four to five times the entertainment that any other sets in their price class do. So the answer to your sales problem is to give these new sets to your prospects and watch their happy grins—for you've given them more radio entertainment than they can get anywhere else for the same number of dollars.



\$79⁹⁰

\$89⁹⁰



SILVER-MARSHALL

Superheterodyne

RADIO

6401 West
65th Street . . .

Chicago
U. S. A.



Now...let's all pull together!

Now is the time when the whole industry needs as never before the sincere cooperation of dealer, jobber and manufacturer. We believe that our dealers and jobbers know that they can depend on Brunswick. We believe that we can depend on them... and we invite

inquiries from other dealers who are seeking a quality line, strongly merchandised, with a clean reputation of three generations of men behind it.

Brunswick Radio Corporation
 MANUFACTURERS OF RADIO, PANATROPE AND
 THE WORLD-FAMOUS BRUNSWICK RECORDS
 NEW YORK — CHICAGO — TORONTO
 Subsidiary of WARNER BROS. PICTURES, Inc.



BRUNSWICK LOWBOY
 MODEL 15

Armored chassis with 4 screen-grid tubes and two 45's in parallel. Uni-Selector and Illuminated Horizontal Tuning Scale. Tone Control. Cabinet of seasoned and selected butternut with carved front panels. **\$13950**
 Other models \$170 up (less tubes)

BRUNSWICK RADIO



The **NEW** Echophone RADIO

A **SUPERHETERODYNE**

Sensationally New

Delightfully Different

Emphatically Better

ECHOPHONE, long recognized in the radio industry as an instrument of the finest proven quality in every detail, now challenges the world for superlative performance superiority under all conditions.

ECHOPHONE is unique in the compact arrangement of unit construction. Amazingly sensitive, it penetrates to extreme distances. Highly developed selectivity permits you to USE its great power without restraint or fear of interference by close-in stations.

Specifications

CIRCUIT: Improved Super-heterodyne circuit employing a new Push-Pull audio system, resistance coupled—thereby insuring uniform tone response.

TONE-CONTROL: Permits the listener to adjust the tone of any program to his individual taste—thus bringing added enjoyment to the programs broadcast today.

VOLUME CONTROL DESIGN: New improvement resulting in elimination of Super-heterodyne noise.

VERNIER DIAL: Illuminated—dial calibrated to read directly in kilocycles.

IMPROVED ELECTRO-DYNAMIC SPEAKER: Embodying the latest refinements and designed scientifically to match the acoustics of the cabinet.

PUSH-PULL AUDIO CIRCUIT RESISTANCE COUPLED: Insuring perfect uniform tone response.

BAND-PASS COUPLING: Providing smooth, distortionless tone qualities.

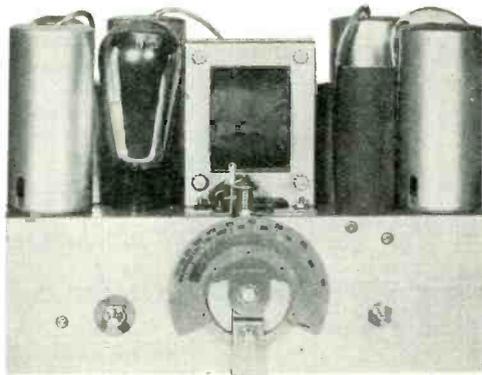
PHONOGRAPH PICK-UP JACKS: Automatically closes circuit for radio reception when pick-up leads are removed.

SCREEN GRID POWER DETECTOR.

LOCAL DISTANCE SWITCH.

COMPLETELY SHIELDED.

*Licensed under R C A patents,
also Hazeltine and Latour patents*



\$69⁵⁰

COMPLETE WITH TUBES

From the highest treble to the lowest bass, ECHOPHONE accurately reproduces both voice and instrument with all the warmth and charm of actual presence of the artists themselves.

ECHOPHONE RADIO MFG. CO., LTD.

Factory: 104 LAKEVIEW AVE., WAUKEGAN, ILL.

Pacific Coast Warehouse: 968 NORTH FORMOSA AVENUE, HOLLYWOOD, CALIF.

Tell them you saw it in RADIO

It's Easy To Identify 1931 Tubes

Look for Practical Quick Heaters

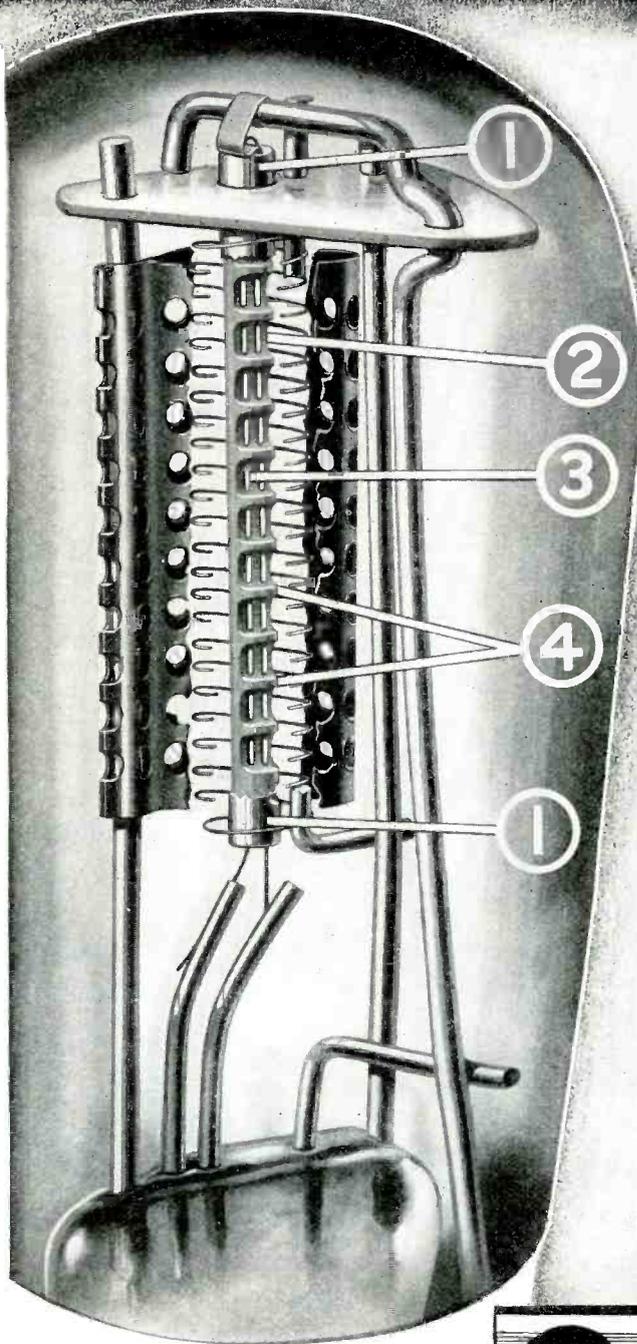
A radio set should start up in a few seconds. But are you willing to pay the usual price of short tube life and uncertain performance? De Forest engineers have eliminated the gamble by unique design:

1. Full-length cathode sleeve, minimizing hum and crackle. One-thirtieth usual hum level.
2. Notched insulator (patent applied for) reducing bulk yet retaining twin-hole insulator advantages.
3. Special hair-pin filament for neutralized A. C. field. Lower operating temperature than coiled type with freedom from brittleness.
4. Filament supported at twelve points. Cannot vibrate to cause microphonic noises. Cannot short circuit.

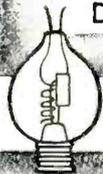
These and many other advanced features found in every type of fresh De Forest Audion, insure the 1931 performance of the 1931 radio sets.

This is the third of a series of debunking messages dealing with 1931 radio tube features. Would you like the entire story at this time?

DE FOREST RADIO CO., PASSAIC, N. J.



de Forest
AUDIONS
RADIO TUBES



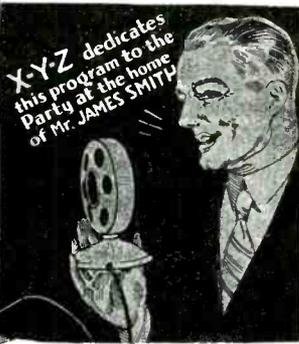
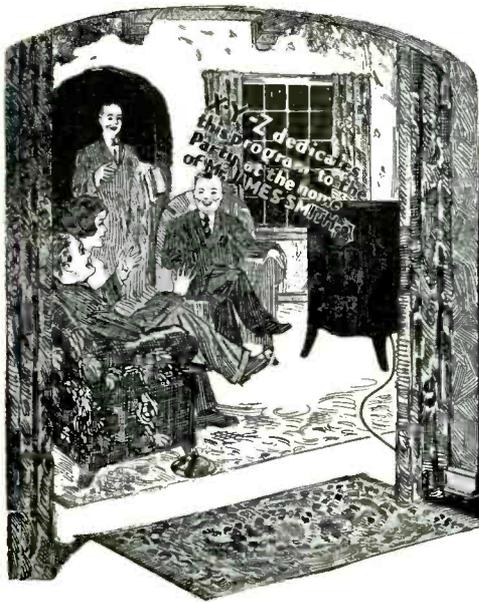
After all, there's no substitute for 25 years' experience



The NOVO MIKE

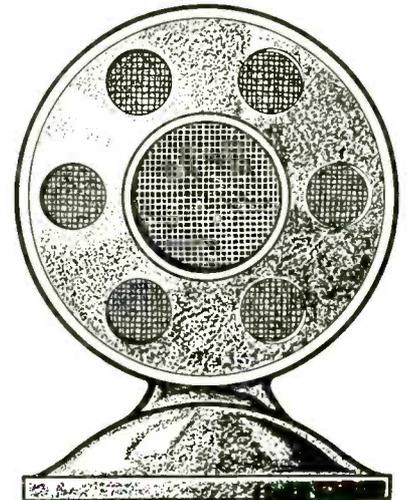
HOME BROADCASTING MICROPHONE

HERE IS YOUR YEAR 'ROUND SELLER



through the set. Release it and the radio set plays. Makes your radio set a combination broadcaster and receiver.

tomers through the "NOVO-MIKE" and the sale is easily closed. Its use is widespread. And its performance is **DEPENDABLE**. . . .



Works with Any Set

One wire connects to the detector tube. Another to the ground post. Press the button on the MIKE and talk

The Attractive, Colorful Counter Display Card

\$5.00
LIST PRICE

Usual trade discounts to dealers and jobbers. Your initial order brings you the NOVO-MIKE and the display card on which the "MIKE" is mounted. Fill in the order blank!

ORDER A SAMPLE

The Counter Display Card as partly shown in the illustration above is furnished to every dealer. On this display card is mounted a NOVO-MIKE. Put this display card in your window—on your showcase—and it will **SELL NOVO-MIKES** for YOU.

PROMOTES SALES

Broadcast your announcements through your radio with the NOVO-MIKE . . in your store . . at home . . ANYWHERE. Dealers all over the country realize its important merchandising value. Be sure to order a sample today.

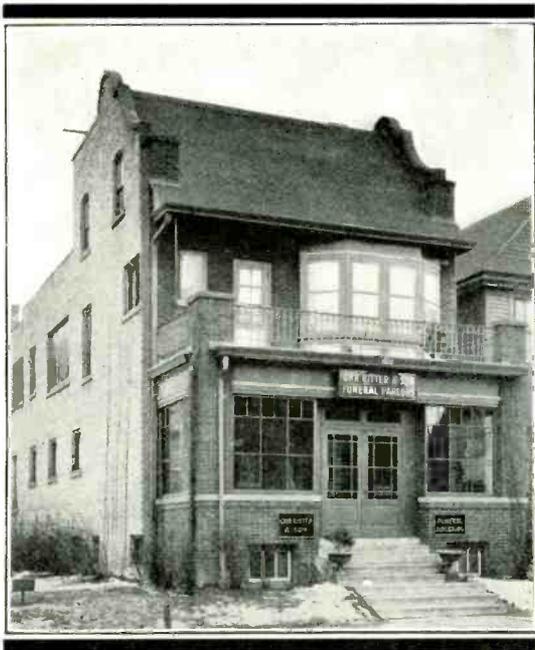
AMERICAN LABORATORIES, LTD.
2903 Beverly Boulevard Los Angeles, California

AMERICAN LABORATORIES, LTD. 2903 Beverly Boulevard, Los Angeles, Calif.	RADIO
Send _____ NOVO-MIKES and _____ display cards at once. Ship C.O.D.	
at NET price.	
Name _____	
Address _____	
City and State _____	



The Speaker of the Year

Take Advantage of the Many Opportunities To Sell Sound Equipment



A unique sound equipment installation in funeral parlor of Ritter & Son, Milwaukee, Wisconsin. WRIGHT-DE COSTER SPEAKER is mounted in back of drapes in center, and music is furnished continuously by phonograph with automatic record changer. As a result, much of the gloom is dispelled.

THE immense market for sound equipment has hardly been scratched. Unlimited possibilities, with great potential profits, await those who have the vision to capitalize on this remarkable opportunity. Many types of business can use sound equipment, and you can get the orders by telling them how to use it.

The use of WRIGHT-DE COSTER SPEAKERS in your installations assure satisfactory reproduction. Their clarity, tonal quality and volume are unsurpassable for music or voice. You can depend upon your customers liking them.

{ Write for complete information
and address of nearest sales office }

WRIGHT-DE COSTER, INC.

2217 University Avenue

Export Dept., M. SIMONS & SON CO., 25 Warren Street, New York
Cable Address: Simontrice, New York

St. Paul, Minnesota

The Speaker of the Year



Tell them you saw it in RADIO

RITTER & SON
Funeral Directors
Milwaukee, Wis.

January 31, 1931.

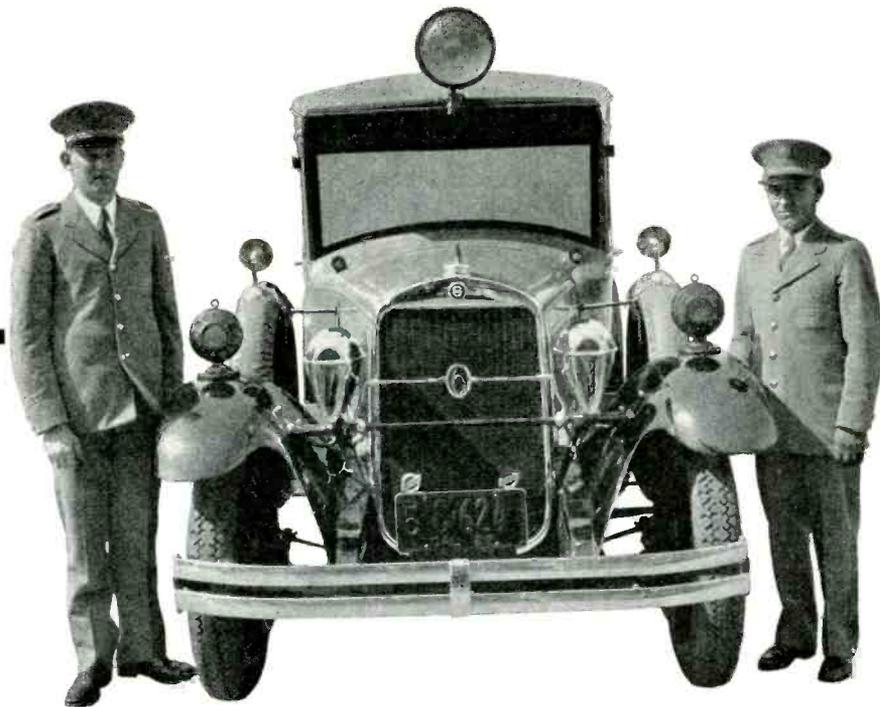
Wisconsin Electronics Co.,
1713 N. Water St.,
Milwaukee, Wis.

Gentlemen:

We have used your WRIGHT-DE COSTER Reproducer since October, 1930. It has given us entire satisfaction. The fine quality of music which it reproduces adds solemnity to the occasions for which we use it. We cheerfully recommend the same.

Very truly yours,

RITTER & SON,
By Walter Ritter.



Complete Public Address Truck For Sale At Less Than Cost

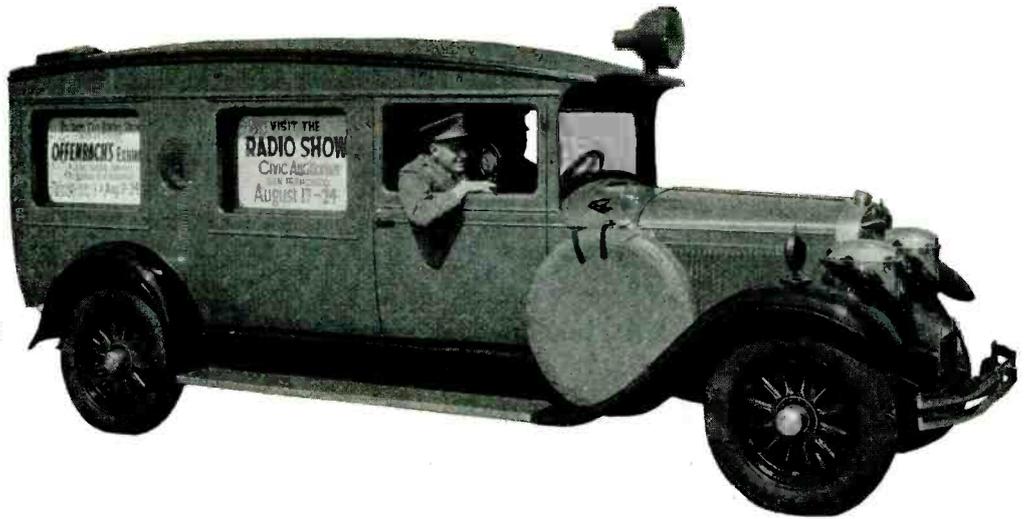
AN OPPORTUNITY for you to purchase an almost new and complete mobile public address and sound truck at less than the cost of the parts. The owners of this elaborate vehicle have no further use for it and desire to dispose of it at a bargain price for quick sale. The vehicle is only a little more than one year old. The car, the power plant, and allied equipment is in perfect operating condition. It cannot be told from new, because it has received unusually good care. It has produced large cash revenue for its owners and has been widely used by civic officials and business houses for numerous outdoor advertising purposes. It has embodied in it a number of special features not found in any other car of its type. The specifications on the facing page tell the whole story.

IT IS COMPLETE in every respect, built to withstand the hardest kind of service. Heavy duty shock absorbers and celotex lining of the body assure complete elimination of noise. This car can furnish speech and music while in motion. It can be used in the city . . . in the country . . . on the highway . . . anywhere. Its super-power amplifier system gives enough volume to address and entertain an audience of 65,000 people. The car itself is a specially designed Studebaker custom-built job, with special headlights, new spare tires, and a powerful searchlight mounted on the top for the purpose of flood-lighting outdoor places at night. Your own cable extensions can be used to supply speech and entertainment to points 1000 feet distant from where the car is in operation. Sockets for cable plug-in are installed in the car. Rental charges have produced a minimum of \$50.00 daily when in use.

COST \$6,381⁰⁰ TO BUILD
WILL SELL FOR \$3,750⁰⁰

ILLUMINATED SIGNS

On both sides of the car are two illuminated windows for posters, size 19" x 30". Another large illuminated window is at the rear. Easily accessible racks for quickly changing the posters are built-in.



Here Are The Specifications

MANY EXTRAS

Spare parts, tools, two new spare tires, microphone housings on fenders, special beam headlights, tire covers, bumpers, cowl lights, supply of phonograph records and other essentials are part of the equipment of this vehicle, "The Car of a Thousand Voices."

This car shows but little signs of wear. It has traveled only eighteen hundred miles and has always been kept in tip-top shape. The finish is a brilliant blue . . . just like new. The plate glass display windows in this car alone cost \$300. It has a heavy velour-lined announcer's compartment, where all control panels and the phonograph are within easy reach of the operator.

A TRAVELING custom-built de-luxe public address automobile with the following standard equipment built-in: Heavy duty Wright-DeCoster speakers, one on each side of the car, baffled with extra heavy celotex of large space area. One PAM No. 5 Samson two-stage input amplifier; three PAM No. 25 Samson single-stage push-pull output amplifiers and one MIK-1 Microphone input amplifier. Six type 250 super-power tubes in parallel push-pull deliver an undistorted output of no less than 45 watts. Johnson double-button microphone for announcing purposes, built especially for this work. Speech is audible to a point 1000 feet distant from where the car is in operation. Power for the battery of amplifiers, for interior lighting of the car, for the five illuminated window signs, and for the 500-watt floodlight is provided by a KOHLER four-cylinder gasoline-elec-

tric plant developing 2000 watts at 110 volts D.C. Current from this source is fed to an ESCO DC-AC Converter with an output capacity of 10 amperes . . . sufficient to take care of all the amplifiers and the speaker fields. Every part of the interior of the car is lined with CELOTEX. The control board consists of three panels mounted on a steel frame. Weston meters are used to check all vital circuits. Behind the driver's seat is a Bodine electric motor. The microphone is suspended close to the announcer's seat in the driving compartment. An AUDAK pickup is used for phonograph music reproducing. Frequency range of the amplifier is unusually wide. Brilliant reproduction of sound is always assured. It required more than three months of painstaking design and construction before this car was ready for use. You can buy it for less than our actual labor cost.

For Further Information Wire or Write to . . .

Can be shipped anywhere by freight, rail or steamship; or we can arrange for a competent driver who will bring the car to its destination at small cost to you.

Offenbach Electric Co.

1452 Market Street

SAN FRANCISCO

CALIFORNIA

R A D I O T O R I A L

How Do They Do It?

● HOW is it possible to deliver a radio set complete with tubes and electro-dynamic speaker for \$49.50? This question has been asked innumerable times, but seldom has it been adequately answered. So, in order to refute erroneous figures that have recently been rather widely circulated, one of the largest manufacturers of midget sets has disclosed all the facts and requested that RADIO publish them for the benefit of its readers.

He is making money in making sets whose regular retail price is less than fifty dollars. His jobbers are making money in distributing them. The dealers are making money in selling them. If midgets had not been made and sold last year it is not likely that half the number of radios would have been sold as were sold. The majority of buyers were willing, and perhaps able, to pay no more than fifty dollars for a set. So they bought midgets.

In this fact resides half the reason why midget sets can be sold at a profit. It is in volume of sales, in a large number of sales at a small profit, rather than in a few sales at a big profit, that money is made. The success of the "five-and-ten" attests this fact. The manufacturer who makes a profit of \$2.93 on each of one hundred sets produced every day has the same profit as the factory that makes \$29.30 on each of ten sets which it produced daily.

The manufacturer who has supplied the facts which are herein interpreted gets \$22.28 net from the jobbers. Each set, including the salesman's commission of 55 cents, costs him \$19.90. His profit is \$2.93. How can he make a set for \$19.35? A visit to his factory tells the answer.

◆ ◆ ◆
Down with the Overhead

● YOU will find the factory in a former garage building in the outskirts of the city. The rent is \$60.00 a month, \$2.00 a day, 2 cents per set if he makes a hun-

dred sets a day, or 6 cents per set if he makes only a thousand sets a month. The roof is almost his only overhead.

You'll find the boss, who is also the engineer, the production manager, the treasurer and what-not, in a little two-by-four office in front. No Oriental rugs are on the floor. No mahogany desk is in sight. No sweet-looking confidential secretary takes your card in to the president. He is right there working at a desk which is almost snowed under with an avalanche of orders and checks. He sells for cash on delivery at his door. He has no billing department, no bad accounts, and no salesmen on salary. They all work on commission—2½ per cent.

The boss himself is a chiseler, and proud of it. He shows you a small chisel and hammer that he got as a "favor" at a radio trade dinner the other day. He chisels and hammers down the price of everything that he buys. Yet he buys only the best material. He pays cash for it, originally because he couldn't get it otherwise, but now because he gets it cheaper that way.

The total cost of all the parts in his midget set, including the tubes, is \$13.00. Piece-work labor in assembling is \$1.50. He gets his cabinets for \$1.60 apiece. He pays a patent royalty of \$2.25, and he allows \$1.00 per set for overhead.

Get that last item again—\$1.00 for all overhead! That's the other half of the secret as to why a radio set can be bought for \$49.50. The whole story in a peanut shell is maximum turnover and minimum overhead. He keeps his overhead down and his turnover up.

◆ ◆ ◆
The Profit Is There

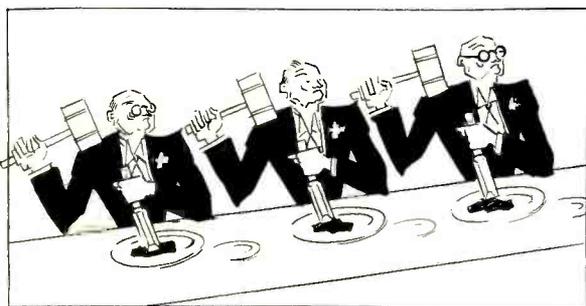
● HE doesn't know anything about radio seasons. He may sell more sets in July than in December. He'll joke and tell you that radio sales are unlike oysters, because the sales are good in the 'R'less months. He can't afford to

C O M M E N T

advertise very much. He lets the jobbers do that because they work on a bigger profit margin.

What about the jobber? He buys a midget for \$22.98 net, and sells it to the dealer for \$29.70. He makes a gross profit of \$7.42 on each set that he sells. One jobber says that it costs him \$5.00 to sell a set. That's too high, but even then he makes \$2.42 on each set. He's been selling midget sets for a year and intends to stay with it. Of course, he also handles a larger and more expensive set, as well as a line of tubes and various small accessories. The midgets pay for his bread and oleomargarine.

Finally, there's the dealer. He buys for \$29.70 and sells for \$49.50, giving a gross profit of \$19.80 on each set that he sells. Yet some dealers are losing money in selling midgets. Why? The whole answer is again in a nutshell, minimum turn-over and maximum overhead. Need more be said?



Nearly 50% of Sales Are for Midgets

THE outlook for sales of midget sets during the next radio season is even better than for last year, when they contributed nearly half the volume of unit sales of new production sets. The superheterodyne midget promises to replace the tuned radio-frequency model in the public favor, notwithstanding its higher price. The midget's present weak point, an inherent inability to satisfactorily reproduce fundamental tones below middle C, will no doubt be improved. Its small size is not compatible with the large baffle area which is necessary to reproduce the low notes.

Anyhow the dealer's bread and butter will come from volume sales of low-priced midgets and his cake from the sale of medium-priced consoles. Until he can determine from which direction will come the public demand he will be wise in stocking medium priced consoles in addition to his stock of each of the midget models, the t.r.f. and the superheterodyne.

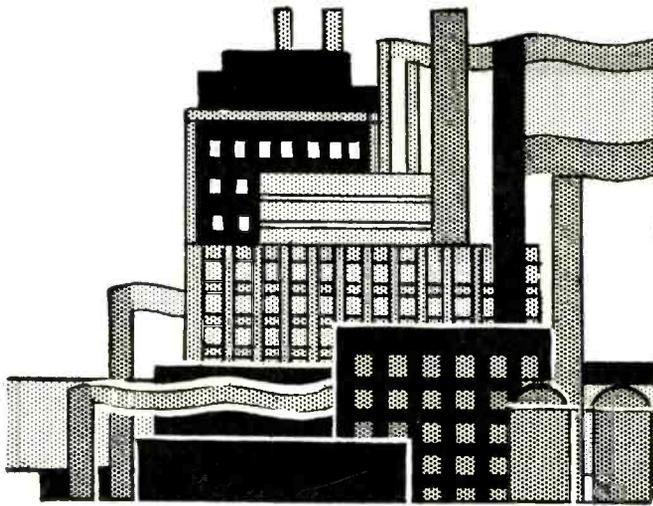
Short Wave Sets Sell

THE dealer who shrugs his shoulders and says that the short wave set won't work is driving away good business. The new model short wave sets do work and are so attractively priced that a store demonstration often results in a sale.

Interest in short wave reception has revived almost overnight. Manufacturers report brisk business and overtime work to catch up on back orders. The reason is a superior product that satisfies the human urge to visit distant places, vicariously if not personally. The super DX hound is still barking and willing to pay good money for the means thereof. To encourage him is good business.

Relegate Distance to Short Waves

MOST radio owners object to having one member of the family fish for distance on the broadcast receiver, especially during the hours of good local programs. Some dealers therefore advise the additional purchase of a short wave set for the distance fan of the family, thus adding to the sale, and keeping the customer's mind off the broadcast set's ability to get distance. Even though the latter might be excellent, dealers have found that promises of distance reception are dangerous, due to varying conditions and surroundings.



The Trend of

Make the Midget Justify Its Existence

WITHOUT a doubt the midget radio receiver has done the industry a lot of harm. This has not been the fault of the manufacturers of the little mantle set, however, but should be blamed entirely upon the laziness of the radio dealer who has allowed his customer to buy a midget when he ought to have sold him a more expensive console. The midget has its place; a very definitely defined place. It is full of potentialities as a profit builder, but it should be confined to its own sphere and not allowed to interfere with the market of the larger set. The midget set meets the need of the person who cannot afford a higher priced console, but many of these people, who are not supposed to be prospects for expensive merchandise, have been buying \$150 and \$200 receivers for years. It isn't always the list price that decides for them, it's the terms they are offered. Therefore the radio dealer should not size a person up when he enters the store and decide that he is a midget prospect. Start high and stay high until forced down. If the prospect asks about a midget he has seen advertised, turn the tables on him and work him *up* until he buys a more expensive receiver.

One Set Ought to Be a Console

THE time is ripe for every home to have at least two receivers. One of them ought to be a console; the others may be midgets. The multiple radio home is not just a pipe dream; many have tried it and become extremely enthusiastic over it. One program cannot appeal to all members of a family; nor can all members of the family stay in the same room all the time. Two radio sets are more important than two cars, and far more easily acquired—yet the automotive industry has put the two-car idea over very successfully. It's up to the manufacturer in his consumer advertising and the dealer in his local advertising and sales talks to convince

the public of the value of the second radio in the home. The owners of midget sets are just as good prospects for a console as are the owners of consoles for midgets, especially if the former are inclined to become dissatisfied with the midget as a parlor set.

Looking Forward to the Summer

SUMMERTIME will soon be with us again. And with it will come the usual falling off of radio sets for the home. The automobile set will offer an opportunity for those who can peddle this type of merchandise; will probably be far more popular than it was last year, as it got off to a bad start. People are beginning to talk automotive radio this spring; last year they jeered it. It might be a good idea to hook up with some upholsterer or top man and let him handle the aerial installations.

The Big Summer Business

THE big business this summer will be in refrigerators. Mr. Cullen, of the Kelvinator Company, points out some very impressive facts in his article in this issue. From him one learns that electric refrigeration is not a baby industry, that the amount of business done last year was not far below that done in the radio industry, and most important of all, that during the months when the radio business was poor the refrigeration totals were high, and the reverse. It seems that the two industries were made for each other. Proper merchandizing of both lines would leave the dealer with no dull season to worry about.

New Tube Makes Its Appearance

THE new tube that has been announced by several of the prominent tube manufacturers is not destined to materially affect the retail end of radio for some time. It is not interchangeable with the '24 due to the fact that the plate resistance is about half

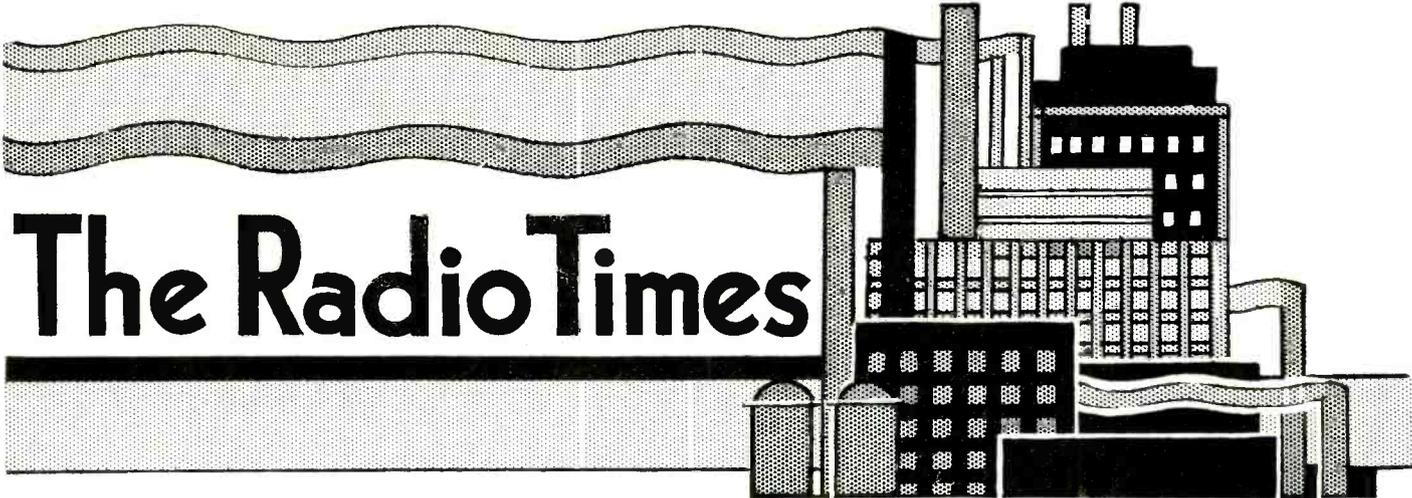
that of the latter and the plate current is much higher. In time, however, receiving sets will be designed for this type of tube because in certain circuits it has several very distinct advantages over the old. Non-technically speaking, these advantages of the '35, as the new tube will be known, are reduction in cross modulation and control of a larger range of signal voltages. The use of them will make the design of receivers somewhat simpler as well as improve set performance.

Combination Sales Should Increase with Introduction of Automatic Feature

NOW that the automatic phonograph can be combined with a radio receiver and housed in a cabinet no larger than the average non-automatic combination, and sold for a price equally attractive, there is no reason why the record-loving but lazy public will not respond with fervor. Practically the only reason why radio has nosed the phonograph out of its place in the home entertainment field is that the business of changing records every three or four minutes was annoying. The owner of the automatic can play from ten to fourteen records at a time, on one side or on both sides, depending upon the style of machine he uses. Ten records played on one side will last for about three-quarters of an hour, long enough for plenty of rest and relaxation between changing. Records are finer today than ever before. It seems certain that many music lovers will welcome the combination automatic phonograph and radio as the ultimate in radio until television comes along.

New York Puts Taboo on Midgets

ACCORDING to the latest reports, the majority of radio merchants in New York have banded together and decided that the midget business is an unnecessary evil. "Death on midgets," they say, "We'd rather sell large sets at



The Radio Times

a loss. Well—midget receivers are here, nevertheless, and somebody is going to handle them. Why not use the midget for a leader and *sell* the larger set? Why not put the midget in the bedroom? Why not—but the hundred and one possibilities in handling the midget will soon enough make themselves apparent to the wide-awake dealer; and he'll *not* allow midget sales to interfere with his console business.

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Midgets Are Shrinking

THERE'S been too much about midget receivers in these two pages already, but it is interesting to note that midgets are going down—in size, not price. The midget we have known heretofore will soon have to relinquish that title; it is as bulky, compared to the new ones, as is the large console compared to the old midget. These new ones measure around eleven inches high by eight or nine inches wide. Without seeming to sacrifice anything in quality, workmanship or efficiency, several of the midget manufacturers have introduced this baby midget at prices similar to the other t.r.f. midgets. These little instruments seem to suggest themselves for bedroom or kitchen. It may be that the smaller size will become a safety factor for the console receiver; that the public will take it for granted that these diminutive receivers are intended to *supplement* the larger set, not *supplant* it.

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Sales Opportunities Await the Service Man

THE service man enters the home to repair an ailing radio receiver. While there it is perfectly natural that he should test all the tubes and suggest replacements if necessary. In the course of conversation with the owner of the set it is quite likely that he will get a chance to elaborate upon the pleasure and convenience of having an extra speaker wired into another room. Microphones, automatic shut-off switches and other accessories may find their way into the conversation. If the

set is not right up to date, the service man can plant a few seeds of desire for a more modern receiver, a phonograph combination, perhaps. As for the second receiver in the home, no one has a better opportunity for putting this idea over than the service man. Selling ability in the service man should be second only to his technical knowledge, and not far second at that. Dealers should remember, however, that the customer's confidence in the service man's ability and knowledge is the latter's strong suit, with which he should be able to take many a trick if he takes advantage of his opportunities.

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DeForest Wins Suit Against R. C. A.

THE Federal Circuit Court of Appeals, sitting in Philadelphia, affirmed a previous decree of the District Court of Delaware in its decision that the R. C. A. and its co-defendants had attained a "patent pooling" monopoly over the sale of vacuum tubes to dealers and manufacturers. The DeForest Company, in a statement to the press, says that this decision brings to a close the long-drawn-out case of three years' duration. The Radio Corporation, however, in its statement to the press, says that it will apply as promptly as possible to the Supreme Court of the United States for a Writ of Certiorari, an order for the correction of errors and irregularities of an inferior court. It is the defendant's contention that the clause to which the litigation was directed has not been in force since July 1928. If the decision of the Federal Circuit Court does turn out to be final, several damage suits which have been filed but are awaiting the outcome of this case will be brought into court.

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Minnesota Takes Lead in Banning Radio Interference

A BILL has been introduced in the Senate of Minnesota declaring radio interference a public nuisance and providing for the appointment of a

county radio commission of five members in each county in the state. The penalty for proven violations is not less than \$10 nor more than \$100. There are hundreds of towns and cities in the country that have local interference ordinances, but Minnesota is the first to propose a state law of this type. It begins to look as if one more radio evil were doomed.

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Automobile Sets Employ Pentode

SEVERAL of the more prominent manufacturers of automobile receivers are now using the power pentode tube in the last stage, thereby getting about 50 per cent greater output and drawing no more plate current than with the type '12 tube. This development makes it possible to overcome the greatest drawback in auto radio, which has been lack of audio gain with the types of tubes that could be used on dry B batteries. Another indication that this summer will see automotive radio find its place.

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RMA Plans for 25,000 at Trade Show

ACCORDING to Bond Geddes, Executive Vice-President of the Radio Manufacturers' Association, plans are being laid to welcome some 25,000 visitors at the annual convention and trade show of the R. M. A. at Chicago next June. Although business rather than ballyhoo is the keynote of the show this year, plenty of entertainment is to be provided. An informal stag dinner with headline vaudeville talent is being planned instead of the usual formal banquet. Prominent speakers are being secured for the several business sessions of the Association and other radio meetings, and plans are being made for the proper reception of the industry throng. Judging by all the evidence, the show committee plans to make this year's show a thing of value for every man in the industry who takes off the time to attend.

YORKVILLE RADIO CO.



DOES NOT GAMBLE WITH GOODWILL

By SIDNEY VORZIMER

How can the dealer sell higher priced merchandise than the midget? Easily! By running a business instead of a hockshop. By being a merchandiser instead of a price-cutter. By giving service.

In six months last year we sold over \$1,000,000 worth of merchandise. The figures are on our books. None of it was dumped, old, inferior or bootleg stock. It was all "current merchandise" and nationally advertised. We tried midgets, found them a bad merchandise article, and threw them out.

We don't give away clocks, benches, nor premiums. But we do give SERVICE. We won't price cut nor handle any line that allows dumping. The results have been proved in that our average unit of sale since January 1, this year, has been \$165. People have come to know that we tell the truth about a radio and that our installation and service is of the best. We give a one-year written guarantee—without loopholes.

We were the first radio store in our district and the fifth in Greater New York. That was nine years ago. For the past eight years we have been convinced that the right sort of advertising pays. Every Sunday we have a musical pro-

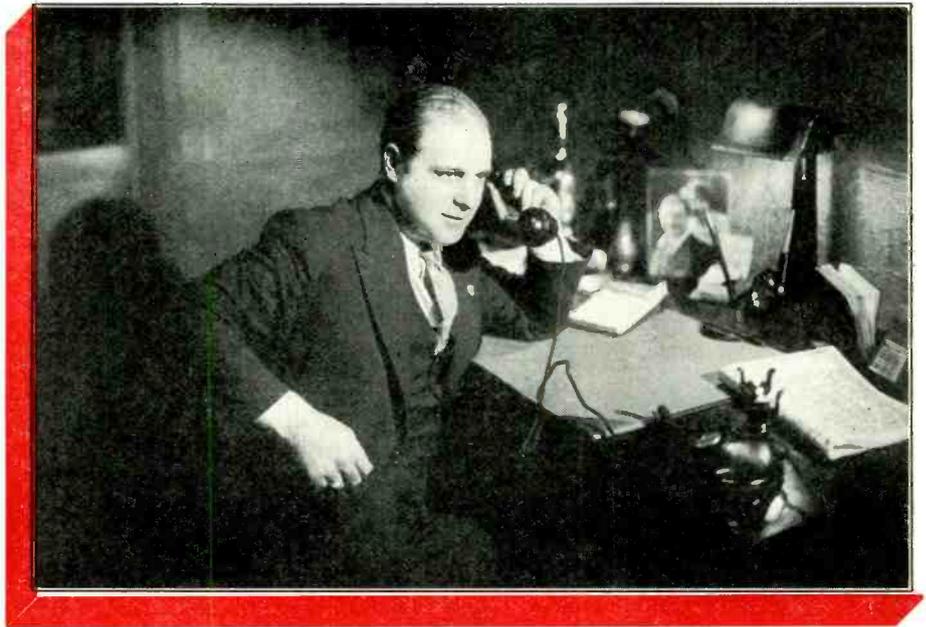
gram on the air for one hour, in connection with which we run contests. This gives us our leads, and has proven the best form of advertising for us from both leads and direct sales angles.

In that time we have spent over \$600,000 on newspaper and radio broadcast advertising. The newspaper style of copy has changed. For many years we used sensational ads featuring price first. Now the public has found that price means so little to actual enjoyment of the radio that we feature first the Store, then Service, then Years in Business, then Trade Names of Sets, and lastly, Price. We use a great deal of direct mail, and we go the limit. Expense is non-important. If we can't afford to mail out something that will attract attention, we don't mail anything.

We use the telephone a great deal on follow-ups from leads. Every salesman is given a list each day and is expected to get in touch with these people by one means or another.

Fortunately, our franchise is worth as much to the manufacturer as his is to us. We're in business for ourselves and not for him. If his business isn't as clean as the standards we maintain for ourselves, we don't want his stock. At the present time we handle only Stromberg-Carlson, General

"It is better business," says New York's largest radio dealer, "to lose a sale than to sell a set with which you can't afford to give good service."



Electric, Grebe, Brunswick and Atwater Kent, knowing we can recommend these without fear of bad merchandise nor price cutting next door.

The public is becoming educated to good reception. They want to receive a program just the way it's broadcast, which they cannot do with cheap radios. When anyone wants to buy a midget, we explain the situation and ask them to think it over before purchasing. Ninety per cent come back for a larger set.

By price cutting we could double our business—and cut our profits in half. By selling at standard prices we are able to install and service the radio in the best possible way, thereby building good will which is more important than anything else. People soon forget the price of a set, but they never forget the performance.

Seventy per cent of our trade is outside our territory. Broadcast advertising does much towards increasing this business, but goodwill and word of mouth does more. One of our goodwill stunts is to give away all trade-ins after we have reconditioned them. The customer may name the person or charity to which he wishes the set sent.

Courtesy is one of our bywords. Our salesmen are instructed to give the utmost attention to people even though they are only "window shopping." They are impressed and

usually come back, sometimes six months or a year later, for a purchase.

Window displays, if properly worked out, not only catch the eye of the passerby, but cut sales time on the floor. For instance, this week we are campaigning against midgets. In our window is a chassis with a sign, "This cost \$8.00 to build." We have a poster of the symphony orchestra near it. This gets over the idea, how can an \$8.00 set give good reception? We also have a chart showing the tone reception of a midget and of a big set. In the background is our slogan, "Good Service Keeps Our Business."

Our salesmen work on a sliding commission plus salary. Their commission is based on the amount of the sale plus the amount of down payment. Twenty per cent is our minimum down payment and ten months maximum time for the balance. A larger equity cuts the number of repossessions, of which we had less than fifty last year.

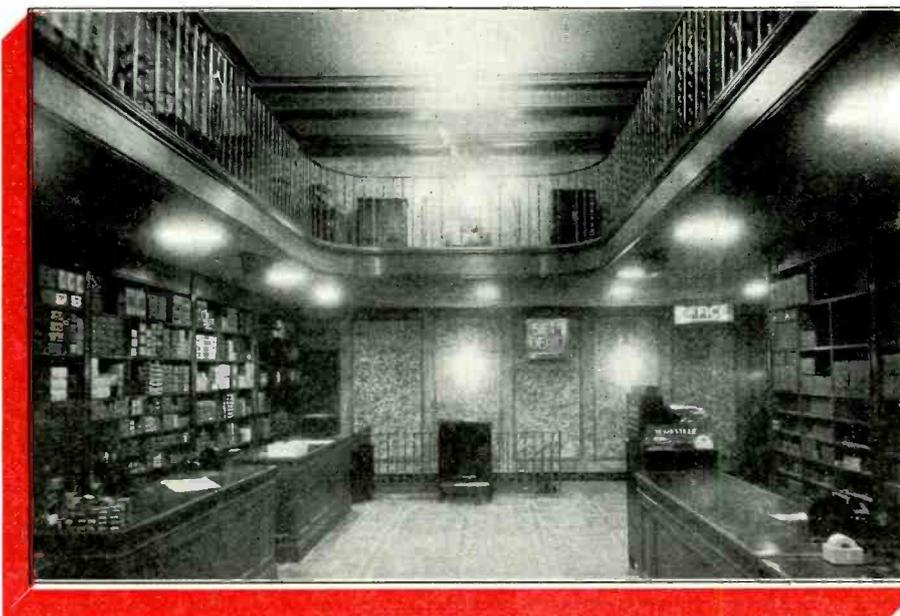
Inside the store we keep sets grouped so as to avoid wasted time in comparison. Each make is exhibited in a separate room. We also carry lamps, radio equipment, phonographs and records. The combination business is steadily increasing.

This year we contemplate putting in electrical appliances. Our customers are demanding it. We won't carry refrigerators because of the peculiar status of our territory, but I think every rural dealer should.

Each month when billing our customers we enclose a letter suggesting that they send in some of their friends and receive credit for any sales made. They receive three coupons, each with their account number. We allow a \$5 credit for a hundred dollar sale, \$10 for two hundred, etc. The prospect is told to ask for Mr. Knight and receive special privileges.

We have no Mr. Knight in our employ but this shows the salesman meeting the prospect that the down payment must be sufficient to include this credit.

In short, merchandising is the whole problem. A clear cut plan, a store run on a business basis, service, courtesy, truth, advertising, and not too much fear of a lost sale or spent dollar, and any dealer can be successful. But not if he's going to sell merchandise which he can't afford to install and service properly. The loss of goodwill is too expensive.





Taking a Look at Refrigeration

By GEO. R. CULLEN*

THAT some one of the various radio publications would, sooner or later, come out with a merger of its title with that of refrigeration has seemed inevitable to those in the manufacturing end of the refrigeration business. So many radio dealers have taken on electric refrigeration as a side line and so many electric refrigeration dealers have taken on radio, both seeking to fill out the seasonal curve in volume of business, that the trade journals of both lines have of necessity been filled with two lines. It was quite natural, too, that the other line, to complement radio, should be the "juice" consumer, electric refrigeration. The big season for radio is winter. The big season for electric refrigeration is summer. Both probably ought to be year 'rounders, probably *are*, but the buying public uses the off season in each line for its buying. Wherefore, they are good merchandise to handle under one roof. When one isn't going big, the other is. Fortunately, there is sufficient progress in the manufacture of both radio and electric refrigeration to supply sufficient newness and novelty in development from season to season to furnish wide awake merchants "something to talk about." The manufacturers of both radio and electric refrigeration are "big time" operators, who advertise in a big way nationally and put into the hands of their selling organizations an ample supply of selling literature and sales promotion helps.

There are many reasons why those who market radio sets can make the sale of electric refrigeration an additional sales volume maker.

The radio merchant is invariably well established in his community. He has an attractive store with good display windows, attractive sales rooms, and he has contact with the home people who are likely prospects for electric refrigerators. And, of course, it works the other way 'round. Both lines of merchandise require well-trained salesmen, who have a working knowledge of the operation of electric appliances. They deal with the particular type of people who desire and buy the things that make life more convenient and enjoyable. It is quite natural to think that people who enjoy music and other entertainment in their home also would enjoy the protection, the convenience, and the long-run economy which come with a dependable electric refrigerator.

Well established radio merchants may, with confidence, take on a line of electric refrigerators and figure on the line paying their overhead at least; and at the same time adding to the commissions of their salesmen. Nothing is more conducive to that *esprit de corps* that makes for a constant stream of sales than a sales organization made happy by commissions that roll in every month in the year. Constant sales keeps selling men on their toes, keeps them alert, increases their ambition, and makes them more valuable to the house.

A great many of the leading Kelvinator distributors have carried radio as a part of their merchandising activities for a long time. During the year 1930 the number increased. There were many radio distributors who took on electric

*Publicity Manager, Kelvinator Company, and Editor of *Cold Facts*.

refrigeration. There were many electric refrigeration distributors who added radio. There are today many merchants in other lines—hardware, furniture, plumbing and other kinds of merchants who have added one or the other of the two lines to their “string” and profited greatly by doing so. There are many big general merchandising houses in key cities of the nation who are carrying both lines successfully.

Figures That Show Advantages of Combined Line

Here are some authentic figures, based on the 1929 experience of dealers in both radio and electric refrigeration, which speak volumes:

	Refrig.	Radio	Comb.
January	2%	10.18%	12.16%
February	4%	8.23%	12.63%
March	9%	6.61%	15.61%
April	17%	4.89%	21.89%
May	16%	4.26%	20.26%
June	14%	3.48%	17.48%
July	10%	3.96%	13.96%
August	8%	5.67%	13.67%
September	6%	8.94%	14.94%
October	6%	12.27%	18.27%
November	4%	14.23%	18.23%
December	4%	17.30%	21.30%
	100%	100%	200%

It will be observed that the refrigeration percentage is low when the radio percentage is high and the reverse. But the combined sales of both go to make the 100 per cent of sustained year 'round sales volume that makes a happy merchant and a contented sales staff.

The electric refrigeration business was the sensation of 1930. In a year that, in general, sales in most lines were below normal, electric refrigeration showed a substantial increase. The whole electric appliance field was out in front, but it seems that public demand made the electric refrigeration business stand out as the biggest seller in a dull year.

At first blush it might seem a very remarkable thing that the demand for domestic electric refrigerators should have grown so rapidly, especially when it is such a new thing, considered in terms of years, on the market.

The Kelvinator Corporation celebrates its seventeenth anniversary March 11. It was the pioneer of electric refrigerators in the home. Within those seventeen years, Kelvinator has perfected and beautified its product to its present state of splendid performance and attractiveness as a piece of household equipment. Other electric refrigerator manufacturers have kept pace so that now all of the leaders are finding a ready market for their product.

While developing their product, they have developed their skill as advertisers and sales promotion experts. Just as the automobile industry educated the public through the phases of pleasure riding to the use of the automobile for both pleasure and transportation, and from the open to the closed car for all year 'round use, so has the electric refrigerator manufacturer educated the public to the convenience of its product—then to its necessity as a means of food protection and the preservation of health.

Every ten-year-old child knows about the motor car, knows its mechanism and can drive one. Today all adults know the why and wherefore of an electric refrigerator in the home. The acceptance of the public has made this business grow by leaps and bounds during the last two or three years.

More Figures That Tell the Tale

From 1910 to 1930, there were sold 2,671,000 household refrigerators. In 1929, the number was 730,000. In 1930 there were sold 770,000 household electric refrigerators with

a dollar volume of \$223,320,000. Add the commercial sales of 232,000 complete installations, with a dollar volume of \$156,800,000 and you get the huge total of \$380,120,000 for the year.

It is shrewdly estimated that more than one million household refrigerators will be marketed in 1931, with a dollar volume of \$286,000,000. Commercial is expected to add \$189,000,000, bring the estimated sales for the year to the vast sum of \$475,000,000.

How about the oft discussed question of saturation of the market? Here are some figures on that point: There are at present time, 20,438,774 wired homes in the United States.

Three million families are now using electric refrigeration. The saturation is only about 14 per cent. The best informed on merchandising consider that the cream of this market will not be skimmed until there is a 30 per cent saturation. Thus it will be seen that the market is still a very open one. It will be several years before the replacement period arrives, since the great majority of electric refrigerators in use are only a few years old.

There has been talk for many years of the saturation of the automobile market. It has not arrived yet. Replacements are more frequent. The pick-up in this field will be when folks open up

and replace their old cars and when a million or more people who would have bought their first cars did not do so because of the so-called business depression which caused a pulling up of purse strings.

That stringency of cash *did not* stop the march of electric refrigeration sales in 1930.

In the face of the facts and figures here presented, the radio and electric refrigeration business, combined, would seem to be the *outstanding merchandising opportunity of this era*. They perfectly complement each other as a year 'round business.

It might be mentioned in this article that the Kelvinator Company has in its Yukon 5 and Yukon 7 models, two self-contained electric refrigerators, marked at popular prices, which are considered to be “over-the-counter” merchandise that may be carried with a minimum of difficulty by small radio merchants. Their cooling and refrigerating units are removable in one easy operation, and units may be exchanged in twenty minutes. Those taken out may be sent to factory or nearest distributing house for servicing, should such a thing be required. Installation is easy—placed in position and plugged into a wall socket.

For the larger radio merchants, with ample window and floor space, for display, the whole Kelvinator line provides a sparkling exhibition of twelve models to meet the requirements of every sized family. The cabinets are beautiful beyond compare. They are provided with all the improvements refinements and conveniences which modern ingenuity has been able to devise. They are very saleable merchandise. The only question the prospect has to decide is the amount of food storage space needed in the home and the amount of money to invest, and the Refrigeration Discount Company is always standing by with the distributor or dealer to make the purchase easy on the deferred payment plan.

All things considered, the radio dealer who takes on a good line of electric refrigerators in time for the peak season of 1931 is going to see a profit story that will bring much joy. Long before the leaves (that have now only begun to bud) wither and crackle, the story of 1931 in electric refrigeration will be told. All signs point to a story of epic success.

HERE are facts and figures about the electric refrigeration industry that will startle most radio dealers who have not already made it their business to investigate this sister line. It will be very evident, after reading Mr. Cullen's excellent analysis of the situation, that refrigeration is to be a popularly elected running-mate of radio. The radio dealer who labors under the impression that summer-time is time for a forced vacation would do well to study this subject further.



DOORBELLS & ICE BOXES

By THOMAS CALVERT McCLARY

THESE words meant over \$10,000,000 to Rex Cole, Inc., General Electric Refrigerator distributor in New York, last year. If predictions hold true, they will mean half again as much in 1931.

Rex Cole is one of the few distributors in America who has a sales policy of definite help to even the smallest dealer. The corporation, founded in 1927 with a staff of four men, today numbers almost fifteen hundred employees and is both distributor and dealer. They have over one hundred outlets, many of them retail salesrooms of the company. Their policies, at first laughed at by the trade, have proven good in cold dollars and cents—and plenty of them!

First, then, they *picked* their salesmen for ability and character. Better to have a short staff than an unreliable one, they decided. Every man in the organization can be called the "executive type." These salesmen are schooled for days of intensive study in the Rex Cole Refrigeration Institute.

They are then sent into the field for two weeks with an experienced sales director who guides them along the hard but lucrative road of salesmanship.

The company has the utmost belief in punching doorbells as the best medium of sales. Salesmen are held to an average of twenty-three calls per day, most of them "cold turkey." While the telephone is used as a means of follow-up to some extent, it is considered out of date by the organization. "Get out and sell," are the salesman's instructions.

And sell they must. They are paid 10 per cent of the f. o. b. price as a flat commission with bonuses at the end of the year. Rex Cole, Inc., make money and want their men to do the same. This is merely good sense. It raises the morale of the organization to have the men happy and able to live well. As an example of this, the first thirty salesmen's earnings for 1930 averaged over \$4200 per man. However, the men are not "orphans of the sales field," as are many knights

of the road. They are backed to the limit by an organization which does as fine a piece of promotion work as is done by any one in the country. Entirely independently of the tremendous General Electric advertising program, this company spends five per cent of its gross sales annually on promotion, advertising and publicity.

As you walk into the Rex Cole offices at Fourth Avenue and Twenty-sixth Street your first impression is the fact that not even the smallest item that could be "dressed up" is neglected. Errand boys, dressed in Rex Cole outfits, run busily around, past triumphs of advertising layouts decorate the walls, everybody is busy, yet nobody is needlessly rushed, every office has several reminders that you are visiting the distributor of G. E. refrigerators.

Downstairs, in front of the entire floor showroom, you may see one of the fleet of white motorcycles with sidecars built in replica of a refrigerator or one of the twenty odd white delivery trucks kept spotlessly clean. You leave with the feeling that you have been in the office of a very successful man who thinks in terms of tomorrow and you go to tell your friends about the Rex Cole offices and GE refrigerators.

Aside from such promotion within the office, this distributor takes advantage of every opportunity to have his name known and talked about all over Greater New York. Wherever you turn is a signboard, window display, poster, advertisement, neon sign, credit line on a program or menu, publicity, talk of the Rex Cole Mountaineers radio program over the NBC chain. This is a daily feature, sponsored not by General Electric, but by Rex Cole, Inc., on behalf of their many retail display rooms.

It is part of the policy of this organization to regard their retail display rooms as exactly that, and not as salesrooms. They are placed at convenient locations so that outside salesmen can take their prospects to see the merchandise under the most favorable conditions. Salesmen stationed at these rooms work on a flat salary and a very small commission.

As showrooms, they are almost unique for the east. No expense has been spared to make them the most attractive and impressive display centers in the city. The high polish of the windows and metal work surrounding the entrance bespeaks the policy of the company.

It was no secret when electric refrigeration first came on the market that most of the trade considered it merchandise for expensive apartments and wealthy families only. At the time this was true. The average buyer was rated at better than \$10,000 a year. This year,

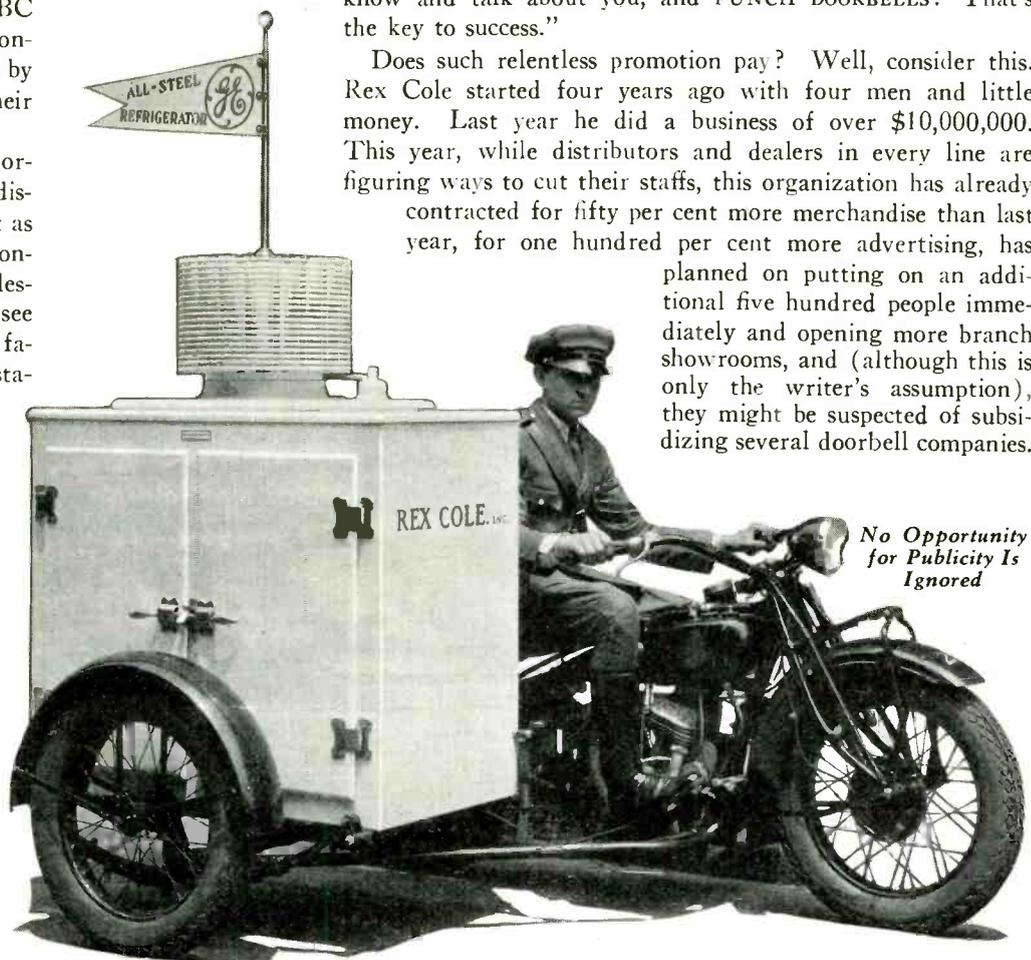


REX COLE

statistics show, the average buyer is rated at from \$50 per week up. Rex Cole was one of the first to foresee that the public could be educated to using electric refrigeration. "Cultivate the middle class people. They will be the buyers of the future," he told his salesmen. To make this possible, each man was given a protected territory. All sales within this area belong to him unless made by a junior salesman working in his territory.

If, as a dealer, you should ask Rex Cole, Inc., their recipe for success they would tell you, "Pick the right salesmen, work with them, protect their territories, promote everything from the blotter up, advertise in every way, make people know and talk about you, and PUNCH DOORBELLS! That's the key to success."

Does such relentless promotion pay? Well, consider this. Rex Cole started four years ago with four men and little money. Last year he did a business of over \$10,000,000. This year, while distributors and dealers in every line are figuring ways to cut their staffs, this organization has already contracted for fifty per cent more merchandise than last year, for one hundred per cent more advertising, has planned on putting on an additional five hundred people immediately and opening more branch showrooms, and (although this is only the writer's assumption), they might be suspected of subsidizing several doorbell companies.

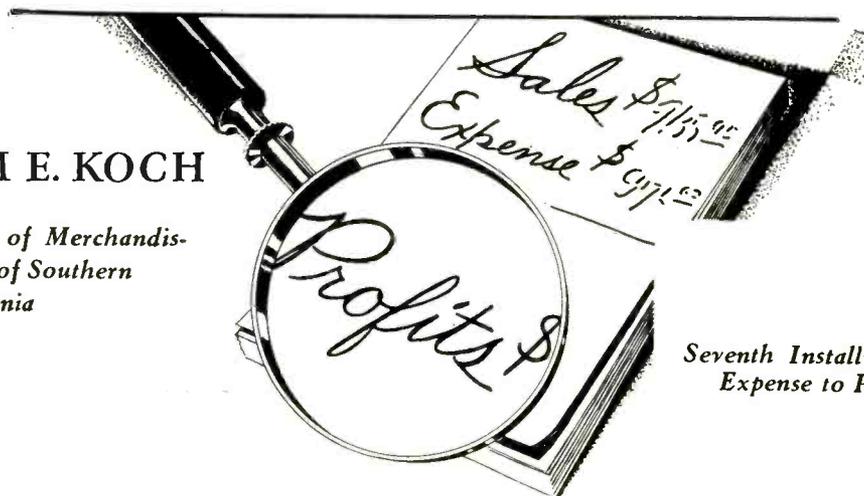


*No Opportunity
for Publicity Is
Ignored*

Guarding the Profits

By WILLIAM E. KOCH

Associate Professor of Merchandising,
University of Southern California



Seventh Installment—"From Necessary Expense to Profitable Investment"

WHAT radio dealer will say that his expense or cost of doing business is exactly what it should be? How many radio dealers have ever stopped to figure out just what will make his cost of doing business exactly what it should be? Clearly, expense presents a real problem in radio merchandising.

Every radio dealer knows, of course, that the expense percentage is a constantly changing element—low when sales are high, high when sales are low. This is the basic situation which makes the expense problem worthy of every radio retailer's careful study.

In the study of this great problem you will find nothing more important to bear constantly in mind than the fundamental fact that profit volume can be produced only in proportion as the four essential elements or working parts of the business are properly on the job. Nor will you find anything more helpful in the production of maximum profit than keeping this fact in mind.

Of course we all know that the first great aid in arriving at a definite goal is careful planning. That is why the first step in reaching our goal of maximum profit is to plan ahead for each of the four essential elements—sales, stocks, margins and expenses. Not merely to plan each of them separately, but also to plan all of them together as one complete working unit.

Remember that we refer to these essential elements or vital working parts, while planning ahead, as sales quotas, stock limits, mark-ups or discounts and expense budgets. Though our present discussion pertains primarily to the expense part of the plan, it will prove helpful to keep all four of the vital parts clearly in mind. Our insert summarizes the chief purpose of each.

Purposes of the Budget

In the summary we find that the chief purpose of the expense budget is to determine in advance what expense is necessary in reaching the expected volume of sales. A number of additional purposes are worthy of consideration, though they all are related in one way or another to the chief purpose.

The budget, for example, may aim very definitely at making it possible to increase the volume of sales. It may call

Expense percentages change constantly. A good expense budget aims to control rather than to reduce expenditures. Expense is controlled when it harmonizes with the other parts of the profit-making process. The manager's job is to make his expense budget fit his own business and to turn every expense into a profitable investment. Comparisons are necessary.

for such expense as might be involved in modernizing the arrangement and appearance of the store, increasing the sales force, making advertising more effective, or anything else that could be undertaken to boost the sales.

Another indefinite purpose of the budget is to avoid unnecessary expense. It does this by helping us analyze our expenditures before they are made. Without that analysis we cannot determine whether a given item of expense or any part of it really is essential to the profit-making process.

Still another purpose of the expense budget is to help us make sure that all of the necessary expense is included. It is quite as possible, you know, to miss the profit target by not making necessary expenditures as by spending money unnecessarily.

Between the two extremes of spending too much and not spending enough lies the point of "just-rightness." This is the point at which the right kind of an expense budget always aims. Of course none of us ever hit that point exactly. There simply is no such thing as perfect commercial marksmanship.

But the benefit any of us obtain from thoughtfully striving for this never-to-be-quite-reached point of just-rightness is far too great to be in any way neglected. And what can help us more in that direction than carefully making and thoughtfully using a complete expense budget?

The big point is to control our expenses, not merely to reduce them. Expenses are controlled when they fit in properly with the other vital parts of the profit-making process—when every expense is justified as a means for producing the aimed-at profit under the existing conditions—when every expense is a profitable investment.

Expense or Investment?

In fact, we might all be better off if we were to call it an investment budget rather than an expense budget. I confess that I do not like the word expense as applied to business. The word somehow seems to imply that the money is spent—gone—never to return.

But we do not really spend money just that way in business. We always expect to get a fair return. We expect the money we pay out to do some good work for us. We plant it, like seed, for an increase in kind. It actually is more in the

nature of an investment than an expense, taking the common understanding of what these terms mean.

Consider the dictionary definition of invest: "To lay out money or capital in business with a view to obtaining income or profit." Does not that seem to fit our commercial requirement? Is not all of our budget made up with a view to obtaining "income or profit?"

Of course we will not attempt to give up the term expense budget and adopt investment budget. The customary term is far too well established for that. But it certainly is worth while to back our expense budget thinking with the idea conveyed by investment budget.

That will help us to keep more constantly in mind the unquestionable fact that every business expenditure should be made with a view to obtaining a reasonable return in income or profit either directly or indirectly. Every radio dealer has this well-known fact in mind, certainly, but who is ready to say that he does not let it slip now and then?

We might sum up all purposes of the expense budget by simply saying that it is to help us turn every necessary expense into a profitable investment. Unless the budget does that through our making and using it, it certainly is falling down on the job.

How the Budget Works

First of all, let us be sure to remember that the budget idea is about as simple as anything can very well be. There is nothing to it beyond the making of a plan, and then using that plan.

All that is necessary is a bit of careful looking back to see what has happened in the past, and why; and then looking ahead to determine what should be made to happen in the future. The whole thing might be called a combination of hindsight and foresight. Anyone who can operate a radio store can make a good expense budget and use it to help him get a greater volume out of his business.

Any radio dealer who decides on how much his cost of doing business should be in the month or year or any other period ahead has, to that extent, made an expense budget. Probably not the best budget it is possible for him to make; but, nevertheless, an expense budget. From that simple beginning he can go on and on, making his budget increasingly better without reachable limit.

All of the possible improvement lies in getting a definite plan of what can be spent or "invested" to the best advantage. Every radio dealer must make the final decision himself because no one else can understand the condition as he does. Each must make his budget fit his own business. Each must determine what expense divisions or accounts he can use to the best advantage, and what expense percentages will bring the best results in his own store.

And that is how the budget works. Once we have started right, we get more and more information that will help us decide more and more accurately what expense will bring the best results—what expense will be the best investment.

CHIEF PURPOSES OF THE FOUR ESSENTIAL ELEMENTS IN PLANNING FOR PROFIT

<i>Element in the Profit-Making Plan</i>	<i>Its Chief Purpose</i>
SALES QUOTA	To establish the volume of sales which the store or any part of it should reach in a given period ahead.
STOCK LIMIT	To determine the minimum investment in merchandise with which the expected volume of sales can be reached.
MARK-UP OR DISCOUNT	To determine the average mark-up or discount that will be necessary to yield the margin needed to meet all cost of doing business (visible and invisible) and leave the aimed-at profit.
EXPENSE BUDGET	To determine in advance what expense is necessary in reaching the expected volume of sales.

How Records Help

Some radio dealers are quite thoroughly convinced that they have little use for bookkeeping because the business is not too large to permit being in close personal touch with everything. They seem to think that enough bookkeeping to get by on income tax reports is all that they need.

Other radio retailers realize, however, that the chief purpose of records is not to help make out the income tax report, but to help the manager make his business produce more profit. Or, in other words, they know that the chief purpose of records is to help

the manager do a better job of managing. With this viewpoint it is clearly seen that no radio store is too small to require good information-revealing records.

After all, a business succeeds only in proportion as its manager uses good judgment in reaching conclusions on what can be done to the best advantage, and how it can best be done. Furthermore, no judgment can be better than the information on which it is based. This applies to the cost of doing business or expense as well as to every other phase of business.

To whatever extent we replace memory-guided guess with record-guided judgment we are on the way "from necessary expense to profitable investment." That is why every radio dealer needs to give careful attention to the information he gets from his records and how he uses that information.

Better records lead to better profit-making plans, and better profit-making plans lead to greater profit volume. Records help by developing helpful information, and in no other way. Just look over your expense records and ask yourself whether they give you all the information that you can put to good profit-making use.

How to Use an Expense Budget

Of course it is impossible to use an expense budget without first making it, but it is decidedly possible to make an expense budget without using it to the best advantage. All of the benefits depend upon how well the budget is made and how well it is used.

There is, in fact, only one way to use figure information of any kind. That way is to make comparisons. The only reason for having a number of expense accounts, rather than just one, is to help us in making comparisons of like expenditures. And the only reason for making these comparisons is to help us make more profitable expenditures in the future.

Frequent comparison of planned figures with figures of actual accomplishment also is necessary. That is the way to judge the soundness of our planning and the efficiency of our operation. And the big point to remember is that the ultimate purpose of it all is to help us see how to make our future operations more profitable. Other practical uses of the expense budget readily suggest themselves.

THIS IS THE FIRST AUTHORIZED AND PERSONAL INTERVIEW OF A MIDGET MANUFACTURER YET PUBLISHED AND WAS GIVEN TO "RADIO" BY THE AUTHOR IN A SINCERE ENDEAVOR TO TELL THE RADIO DEALER WHAT THE MIDGET BUSINESS IS ALL ABOUT AND WHAT TO EXPECT OF IT.



The Midget Set Will Be Here As Long as Ford Builds Fords

By **HERB. A. BELL**

General Manager, Jackson Bell Manufacturing Company

I BELIEVE that the midget business has done more to bring business to the radio dealer in the hectic year of 1930 than any other single factor in radio, and I do not believe the midget has taken much business away from the manufacturers of higher priced receivers. I know from my own surveys that in one particular state where the so-called saturation point of radio sets in the homes was supposed to have almost been reached, we sold MORE midgets in that particular state than in any other state in the Union. This proves my contention that the midget is the SECOND SET for the home.

Further investigation has convinced me that the midget has opened wide that market for the laboring classes and for the large masses who for the first time have been able to take radio with them on their vacations. To further give credence and proof of my assertions let me state that we began building small sets more than five years ago. At that time we were pioneers of small sets, al-

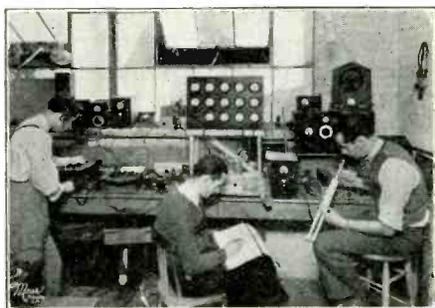
though they were not known as midgets at that time. It was a small, low-priced table receiver and dealers welcomed its arrival because it gave them the needed wedge to fill in that sales gap between rich man, poor man, beggar man, and those who wanted something low in price to use as the second set in the home. I made it my business to develop the second-set-in-the-home-market years ago, before the midget was known, and on the success of this venture the midget set of today was born. We were the first in this market with this type of merchandise and our selling efforts were confined almost solely to the State of California until, at this writing, we have jobbers in every state in the Union, some sixty-four in number, who do an annual volume of business for us to such an extent that our production schedule for March calls for the manufacture of ten thousand midgets.

We have had midget sets since the beginning of broadcasting, although the name "midget" was not applied until recently. Tonal quality was poor even up to a year ago; but in those days it wasn't much of an item compared with price.

OUR SECOND YEAR of making small sets saw a surprising increase in sales. But tone quality was still lagging behind price appeal. And when the first midget as you know it today came into the market the tone quality was not at all what the average person wanted and the sets were sold on PRICE

alone. People who appreciated tone quality could not afford the price of a set capable of delivering good tone and they had to be content with what they could buy at a PRICE. And there you have the reason for the midget set. It was forced upon the industry by popular demand and as the demand increased production costs tumbled with a crash, large scale buying came into the market for parts and accessories and tubes, prices came still further down, overhead was reduced by growing manufacturing facilities and with a nation-wide selling organization it became possible to at last build a midget set in which was combined the tone quality needed, the price which the man could pay, and the eye appeal of the merchandise itself. With the betterment of tone quality and a still further reduction in price of our midgets our market has broadened month after month until we now find ourselves in a dominant position in the manufacture of midgets, building more of them than any other midget manufacturer west of Chicago. Our sales are now divided in all sections of the nation and with the introduction of new cabinet models of more pleasing eye appeal we now enter our record month for manufacturing midgets.

Contrary to belief, we did not urge the dealer to sell midgets when we first began. HE URGED US TO MAKE MIDGETS FOR HIM. The demand was there. We merely filled this demand with a product as good as we could make at the price.



A section of the Testing Laboratory



TWO VIEWS OF THE JACKSON-BELL ASSEMBLY PLANT. FROM FOUR HUNDRED AND FIFTY TO NINE HUNDRED PEOPLE ARE EMPLOYED IN THIS FACTORY THE YEAR 'ROUND

My contention is that the midget in radio is like the Ford in autos. Many people cannot afford anything higher in price than a Ford. It's the same in radio. Why deprive these people of the joys of radio? As a second set in the home, we find this our greatest market, more so, by far, than the original purchase of the first radio set. We have widened the market. We have not helped demoralize it. Our product is a contribution to the industry and it came at a time when many thousands of people could ill-afford to buy anything in a price range above that which we had to offer. Right now we find our market in the second-set scope, ever growing, with midgets going into places where radio formerly never found its way. We have helped the foreign market to a vast extent with the low-priced merchandise we build.

We have created new business for American business houses. Our business is conducted along sound, ethical lines. We refuse to permit our merchandise to be offered under names other than our own at a price reduction. We have maintained a definite standard of price and quality and our success can be traced to this. Our dealers tell us that our midget has helped them stay in business when the going was hard. What would 1930 have been for many a dealer had it not been for the midget radio?

It is my firm belief that the midget has as prominent a place in radio as the Ford has in the automotive world. I believe that the manufacturer who builds the finest midget at the most competitive price will alone survive.

I know that unless a cabinet style is changed at least three times a year that a midget manufacturer will not survive. The trade becomes stale if a certain cabinet design is adhered to for an entire

year—or even half a year. We change our cabinet styles three times a year and the flare of enthusiasm again bursts forth in the trade when a new cabinet style is announced. The salesmen like the idea. It helps them get up that added pep needed to keep the ball rolling all year 'round.

The most important thing about a midget today is the eye appeal. Next is tone, then price. Because of the tremendous importance of cabinet design and the ever-changing trend in design, we decided to buy our own cabinet manufacturing plant, which was the first step in economy of production. We make many of the essential parts which go into our product.

We make three classes of midgets; one at \$49.50 with tubes, one at \$59.50 with tubes, and the third at \$69.50 with tubes. The second is our best seller. The third is built in an elegant cabinet of larger proportions, using eight tubes and having enough sensitivity for rural use. With this set we hope to get our business from the rural centers. We shall not manufacture a superheterodyne until

we can make one which will outperform our present eight-tube job.

In January, 1930, we manufactured only 1065 midgets. In January, 1931, we manufactured and sold 6000 midgets. In March of this year we have our production plans laid for building 10,000 midgets. The price tendency of the midget is UP, decidedly, and NOT DOWN. Perhaps our \$69.50 set may outsell our \$59.50 set. But we will build the type and price of midget that the dealer and consumer want. His demands are the basis on which we operate. We never overproduce. Our jobbers report to us each week and we make only as many sets each week as we actually have orders for in our files. We take no credit risks. The overhead charged to each set is 33 1/4% of the distributor's cost.

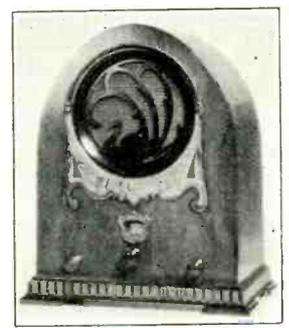
I believe the midget is a genuine developer of radio and not at all a deterrent, as some dealers say it is. The dealer who knocks the midget knocks his own profit. The grand rush for midgets began in earnest in September, 1930. Dozens of new midgets came into the market. So great was the demand for

(Continued on Page 33)

The three present models of the Jackson-Bell midget.



The midget manufacturer must change his cabinet styles at least three times a year or go broke



If I Owned a Radio Store

—— I'd Have a Department Like That Described Below
—— and I Think That I'd Make It Pay for Itself

By DR. RALPH L. POWER

IT SEEMS to me that a good many radio retailers can take a lesson or two from the automobile men. If I ever get around to my now mythical radio store, about which I write a good deal, one of the first things to be installed will be a "repair it yourself" department.

There are hundreds of the "repair it yourself" garages in the larger cities, and some of the smaller places as well. The motor car owner drives his favorite family chariot into the garage, uses the firm's tools, and tinkers around to his heart's content, either at a flat rate for whatever job he is undertaking or on an hourly basis.

This is exactly what I would do in my retail establishment. I would fix up a room in the rear of the shop and make it plenty comfortable—electric fans by summer and heat in the winter, a drinking fountain, storage lockers for customers, closets to hang coats and hats in—maybe even a shower.

By the time it was fashioned ready for occupancy, it would be a cross between a dance hall reception room and a pool palace—not quite so ritzy as the one, and not so ordinary as the other.

The "repair it yourself" department would have plenty of shelves stuck around the place. There would be hooks and nails galore all over the walls. There would be a central tool table and a half dozen or more individual benches in the place.

Each of these would have plenty of sunlight in the day, and all the electric light necessary at night time, plenty of elbow room, a stool on which to perch and rest the weary feet.

The work benches would be equipped with plenty of the small things—light sockets to plug in, and an assortment of gadgets, solder, screws, wire, tape, pliers and other small tools used almost every second while doing repair work.

The central collection would be in the middle of the room with the more expensive things, those not used so frequently, and stuff that is liable to be bulky and cumbersome. Tools not found on the individual benches would

be resting on the central table, including all types of testing apparatus, a speaker or two, some head phones, and the usual line of apparatus and equipment.

I'd do a pretty thorough job of this "repair it yourself" thing, for it has big possibilities. It wouldn't cost so very much to make it complete to the last detail—a serviceable work apron hung on each bench, a visor for those who would work nights, even a cuspidor—but no sawdust on the floor.

Just who would come into my utopian service room? Well, I think you would be surprised at the number and variety of potential customers. There is James Smith, who likes to fuss around and putter with his radio. He keeps one for a sort of spare equipment, and although the parlor set is always working in fair order, he is never really happy until one of them has to be completely overhauled.

Jim likes to fuss around with the outfit, but the kids bother him, climbing around the place and asking questions all the time, and his home isn't quite big enough for a workroom shut completely off from the rest of the house. I think there are a good many Jim Smiths who would really welcome the "repair it yourself" idea.

Then there is John Brown, who has lots of space to work around in and all the time to do it in, but he never has any spare parts on hand.

Somebody told him that, besides our tariff, it is uneconomical to tie up any money in parts. So he works the idea to a fetish and never has an extra fuse, a hunk of solder or even a bit of wire handy.

I suspect that Jack would instantly see the possibilities of using the "repair it yourself" shop, especially for overhaul work, because everything would be there for the work, and in the front store would be all the parts needed. Besides repair work he might even want to build an entire set.

Think, too, of the apartment house dwellers and the boarding house folks who are chased around from pillar to post whenever they begin to repair sets and squawk all over the place.

Nobody would shush 'em up over at my place except, perhaps, at midnight, if the city fathers made me close up when the miniature golf courses close down and the speakeasies open up—the bewitching hour of midnight.

Besides all these, there are scores of people who have the inclination to putter around with their sets, but they don't have much of a chance to ask for advice. What a selling talk for the "repair it yourself" idea! They could swap experiences and glean advice from other workers in the room or from my service man.

DID you ever stop to consider what a good technical book collection would do? Well, here's one place where it would work. I'd put in a good, workable collection so the boys could read right there in the room.

It wouldn't be long before they'd want to take the volumes home, so almost before I knew it perhaps a circulating radio library would develop.

Then I would get two copies of each volume—one for shop reference and the other for circulating—probably a nickel a day, for radio tomes are high-priced things. Eventually, I am satisfied, this circulating idea would develop into a lucrative book business as a side line for some of the men, on reading the book via the circulation route, would want to acquire one for their own collections.

Now, of course some of you fellows may think that this is getting off the main track. But it isn't. If the books create goodwill it helps the main "repair it yourself" business by bringing them back again and by telling their friends about the new idea in service work.

ONE of the most difficult problems of this "repair it yourself" plan would be that of hangers-on. It wouldn't be possible to keep the room deathly silent like a musty old library. Neither would it be well to make it a pool hall loafing place. Somewhere in between is a constructive halfway place.

I think this might be accomplished by limiting the room to those actually hir-

ing the benches, plus one guest for each of them. But this wouldn't be any hard and fast rule. Telephone men, interference investigators and others might wander in from time to time and they would be welcome.

How much would I charge? Not so very much. In fact, I would eventually gauge it pretty much according to the individual, as the clientele became established.

There would be some dead beats who would want to pay a dime an hour and no more. On the other hand, some would be a bargain at a nickel an hour, for they would order technical books through me, as well as tubes and parts.

After all, in case I didn't mention it before, while the "repair it yourself" scheme would be an accommodation for the fan, it would be a profit maker to the store through the sale of parts and accessories.

The amount of rent I pay, whether the district is a thickly settled one, and sundry other factors would go a long way toward determining the fee for the new idea. But, after all is said and done, I think twenty cents an hour would be fair, considering the fact that the place is light and airy, electrically lighted and well equipped. But during the day I'd make a charge of only fifteen cents an hour. Of course this is flexible. If I owned the building, perhaps the price could be chiseled down a nickel an hour. If it was in the center

of a big city, it might have to be five cents more than this scale.

First declaring a standard rate, I'd thereafter use my own judgment. If a man got into the habit of coming in often, I believe I'd make him a flat rate of two dollars a week for time not exceeding 15 hours weekly, day or night, and of course non-transferable.

As the time progressed, I'd want to favor patrons by giving a slight discount on tubes and parts with the distinct understanding that this applied only to the parts actually used in the work at the "repair it yourself" room.

In other words, they couldn't come in the front door of the retail part of the business and buy stuff wholesale for themselves and friends.

I think that the gist of the entire situation is the use of a strictly cash system. This may be hard to do in some localities, but could be solved as an individual matter. But the average charge account business isn't so "hot" these days.

There is no question that the drop in numbers of set builders and those who like to putter around receivers has been considerable the last five years. Some people set the present number of those semi-technically inclined at one-tenth of what it was eight and ten years ago. Still, I am inclined to believe that one out of every hundred has a hankering to monkey around the radio, and, even with this ratio, the "repair it yourself"

gag could pay its way as a legitimate business, and not as simply another radio racket.

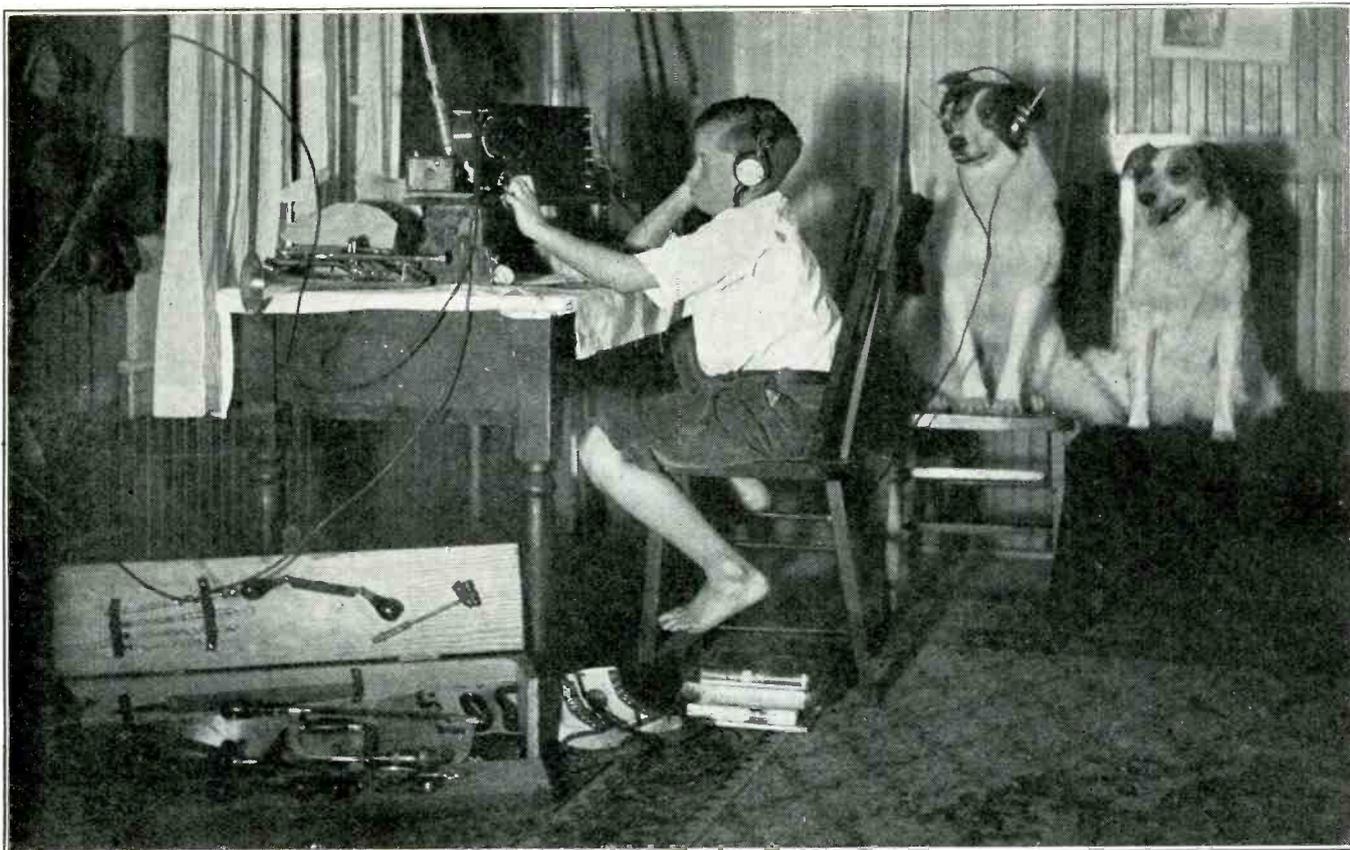
There is likely to be the danger of making the shop merely a loafing retreat. This could be eliminated by rigidly enforcing the "pay as you enter" rule, and perhaps by installing a turnstile from the front shop retail quarters to the "repair it yourself" department in the rear.

In time the patrons of the repair place might want to get together and have a room where they could meet, smoke and chat, keep some books and magazines and lounge around. But this would have to come from them, and not from me.

Even so, if the boys wanted to form a sort of radio club, organizing, financing and managing it themselves, I'd be glad to have it next door and with an entrance through my retail establishment.

When money is tight and goods move slowly, we have to get out and dig for the business. This would be my plan for developing an entirely new idea, and a profitable one at that.

It would not pay huge dividends, but it would bring in enough to make it well worth while, providing that the "repair it yourself" department was inaugurated with due and proper regard to any and all local conditions, whether in densely populated metropolitan areas, in the suburban districts, at cross roads travel points or elsewhere.



The boy set builder of ten years ago is now a young man. Many of them are still interested in the whys and wherefores of ready-made sets and in assembling outfits of their own.

One Avenue of Approach That Is Often Overlooked

By A. R. THOMASON

In those stores where the manager or owner is not technically inclined, he is very apt to take his service man's word for the mechanical and electrical advantages of a radio set. A very successful factory representative who has consistently worked this angle gives out a few hints on how he does it.

MANY is the service man who has helped me sign up a new dealer. Usually he knows what my game is when I walk in with a radio set on my back, but always each of us thinks he has the advantage of the other because we both know he can't sign on the dotted line. The service man thinks he has it and is therefore unwary—when he has let me have my say he knows he can easily get rid of me without hurting my feelings. I know I have the advantage of him, just because of that reason—he will let me have my say. And my say is usually plenty.

I think it is safe to say that the average service man, in fact any man who is technically inclined, is endowed with a goodly percentage of natural curiosity. Most service men started in on that line of work because they were fascinated by "seeing the wheels go 'round"—and they never get over a desire to see the insides of a new radio set. In most cases it is pretty hard for a service man to forego the opportunity I offer him; the temptation is great—too great.

So much for getting the audience of the service man. The only possible setback in my plans is an occasional refusal of the store manager to allow me to see his service man. This happens rarely; and while it is always a danger, it is absolutely essential that the man in charge be consulted before the service man is interviewed, for political reasons.

While the sales force hasn't any more

respect for the service man's calling than the service man has for that of the former, the salesman and especially the manager usually have a great deal of confidence in his knowledge of radio apparatus. Otherwise he'd not be holding down his job. The manager wants to know two things about a radio set that he can usually get only from the service man; How well does the set perform? and, Will it require much servicing? Sometimes the latter is more important than the former. As for eye appeal, ear appeal, etc., the dealer can form his own opinions.

On approaching the lord of the laboratory it is well to take in all his equipment with a sweeping glance and, if it is not necessary to stretch the point too far, make a few complimentary remarks about it. Ask him if it is alright to set up your radio set; observing, of course, that he is very busy; and tell him that you will only take a couple of minutes, but that you want him to glean a little first hand information about this set. Then point out the fact that the factory has designed a circuit a little different from any other on the market, explaining, if possible, just wherein the slight difference lies. Get it hooked up and get him to twist the dials. Show him the selectivity, sensitivity, quality, then clinch the argument by showing him a set of the factory's curves, provided the factory has supplied you with these graphic explanations of what it's all

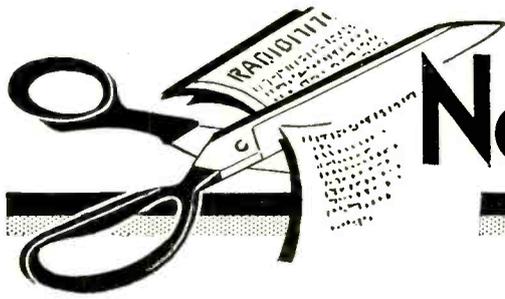
about. Most service men enjoy looking at curves, whether they know what they mean or not, perhaps from the gratification of thinking they understand them. There are plenty of service men who do understand them; all about them.

Have the circuit diagram on tap, and show the manufacturer's instructions, if they are complete enough, just to let the service man know he can rely on the factory for support and coöperation. If the color code of the wiring, a voltage table, and the values of all condensers and resistors are included in these instructions don't fail to call the service man's attention to this fact, for he will appreciate the thoughtfulness of the factory engineers. Don't bother to explain any of this stuff; it's the general impression it will make on him that counts.

The biggest pulling item in the whole visit to the shop is the set's mechanical construction (if it has any) and the safety factor of all parts. To the man who knows, these things mean good service and long life. If shields are rigidly built and solidly mounted get your one man audience to try to wiggle them with his fingers. If the power transformer is large, point out the fact that it has lots of iron in it and the wire is too large to heat. Instead of using the stock phrase "100 per cent safety factor" it is very pointed to say that a certain resistor was built and tested to carry 16 milliamperes and is used to carry only eight; or that a filter condenser was designed for 600 volts working voltage and is subjected to but 300. These figures are obtainable from the factory engineers, and while they require a little study, a couple half-hours well spent will do the trick nicely.

It's true the service man doesn't sign the orders. He doesn't even volunteer any information, unless unusually enthusiastic. But when the dealer wants to know whether the set will really perform, and whether or not it will stay sold, without too much discouraging, profit-eating service work, he is mighty glad to have some first hand, unbiased information from his service man. That's why I've made a science of selling the service man, as well as the manager or owner and his salesmen.

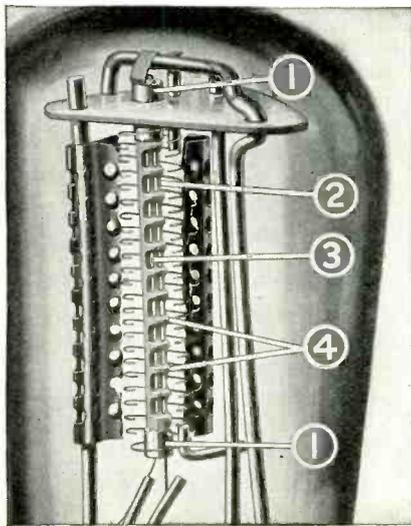




News of the Month

Quick Heater Tubes for DeForest

The De Forest 427 and 424 Audions are now using quick heater type filaments as shown in the accompanying illustration. The full length cathode sleeve (1) serves to shield the field of the a-c filament in order to reduce hum and crackle to negligible proportions; the notched cathode insulator (2) contains twin holes to take the hair-pin filament (3) and is materially reduced in bulk for quicker heating. The filament is firmly supported at thirteen points (4) so that it cannot vibrate to cause microphonic howls or sag to cause a short circuit with the cathode sleeve. The heating time is well under ten seconds. The quick-heating faculty is one of the most important developments in vacuum tube design, making it possible to avoid the usual long delay in warming up.



Woodward Wight to Distribute Lyric in New Orleans

Mr. E. H. Farny, President of the All American Mohawk Corporation, has announced that Woodward Wight & Company, Ltd., of New Orleans, has been appointed wholesale distributors for Lyric Radio. This new distributing organization is particularly well manned and headed by the most popular members of the Southern Wholesale Fraternities, and is one of the largest companies of its kind in the South.

V. A. Norman Joins Gulbransen

V. A. Norman, widely known by radio distributors and dealers in the southeastern states, has joined the sales force of the Gulbransen Company of Chicago. He will represent the states of North and South Carolina, Georgia, Florida and Alabama. Previous to his connection with the Gulbransen Company, Mr. Norman served as a representative of the United American Bosch Corporation, and the Sonora Corporation.

Bosch Appoints Northwest Distributor

Appointment of the P. J. Cronin Company of Seattle as distributors of Bosch Radio for that territory, has just been announced by G. W. Stackman, Pacific Coast Division Manager of the United American Bosch Corporation, makers of Bosch Radio. This distributor is one of the oldest business organizations in the Pacific Northwest, having been established as automotive and specialty products distributors for the past fifty years. J. P. Cronin, son of the founder, is President of the company.

Radio specialty men have been added to the existing field staff, and extensive advertising and sales promotion activities launched. The superior sales and service facilities of the new company, at their offices and warehouse located at 1101 E. Pike Street, Seattle, assure to Bosch radio dealers in that territory quick and prompt service.

Multicoupler Antenna System Discussed

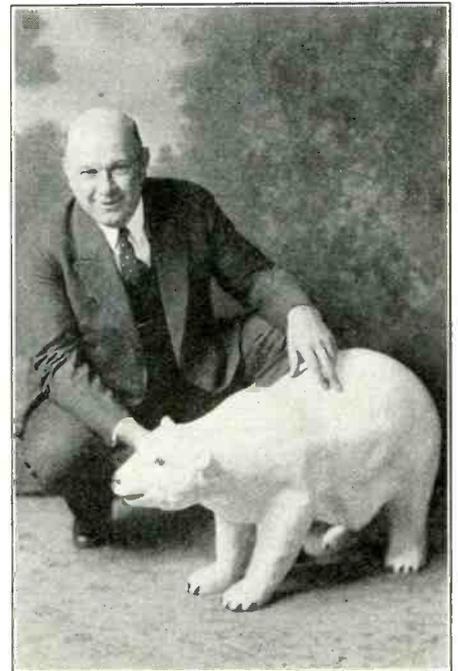
The development of a radio wave distributing system for the operation of the innumerable radio sets in apartment houses, was the subject of a paper delivered before the last meeting of the Radio Club of America by J. G. Aceves in cooperation with E. V. Amy and Frank King, co-inventors of the multicoupler system.

The multicoupler antenna system comprises a well designed and suitably located common or group antenna provided with a down lead to which thirty or more radio receivers may be connected by means of specially designed coupling devices known as multicouplers.

Carl T. McKelvy Returns to Musical Instrument Field

R. W. Jackson, Vice-President of the Brunswick Radio Corporation, announced that Carl T. McKelvy had become sales manager of the Musical Instrument Division of that organization, succeeding A. A. Trostler, resigned.

Mr. McKelvy was at one time one of the best known figures in the music industry, having aided materially in introducing the first Brunswick Panatropé in 1924. He has been away from this field for several years, but returns to be welcomed heartily by hundreds of his former friends and associates in the Brunswick Company.

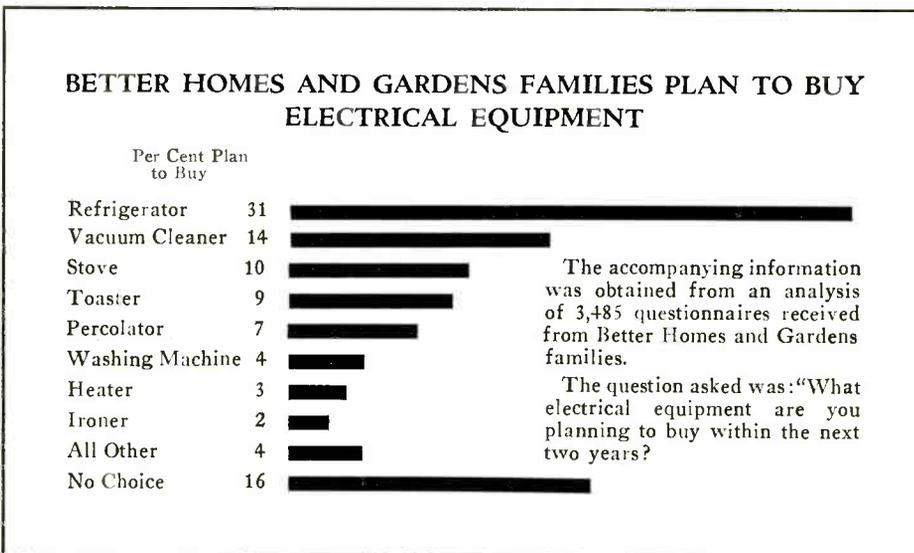


Wins Prize for Refrigerator Sales

Henry S. Nelson, pictured above with the little polar bear, sold 21 Majestic Refrigerators during a six-week contest recently held in St. Joseph, Mo. Besides his usual commissions "Hank" won a \$40 cash prize for his work. The bear, which seems so willing to eat out of Hank's hand, is one of the papier mache animals made available by Majestic as representing its refrigerator, much as the Eagle has been the mascot for the "Mighty Monarch of the Air" radio receivers.

Survey Shows Desire for Electric Refrigerators

The following chart, which was reproduced in *Frigid Era*, gives the results of a survey made by *Better Homes and Gardens* magazine. It is an analysis of 3,485 questionnaires received from the readers of the latter magazine in which they were asked this question: "What electrical equipment are you planning to buy within the next two years?" It shows rather conclusively that the home owning public is rapidly accepting the electric refrigeration idea.



Covers Large Field with Demonstration Record

A very novel stunt for obtaining effective publicity and advertising that has been worked out by an Atwater Kent dealer in Norway, Michigan, is worth recording. The Christanelli Music & Electric Shop of that city is located almost in the middle of the business block. Christanelli was not satisfied with demonstrating only to those people who happened to be in his store so he arranged with six other merchants in the same block for permission to install speakers in their stores, controlled by a central control in his own store.

When the programs are good Christanelli constantly provides them with that music. At other times he uses the combination and plays records. At regular intervals during the day he plays the Atwater Kent demonstration record. He has traced many sales to the effective salesmanship of the extra speaker installations.

New Peoria Distributor for Victor

According to an announcement by A. A. Brandt, Sales Manager of the Victor Division of the RCA Victor Company, the Klaus Radio and Electric Company of Peoria, Illinois, has been appointed to distribute Victor products in that territory.

Down in Louisville, Kentucky, the Smith Radio Corporation has assumed the distribution of these products, formerly handled by the Griffith Victor Distributing Company.

Good Information in Resistor Guide

The recently announced *Resistor Replacement Guide*, published by the International Resistance Company, 2006 Chestnut Street, Philadelphia, is one of the handiest publications of its kind available. It contains charts for something over forty standard radio receivers, listing each resistor used in the circuit and giving, in separate columns for each: indication of faulty resistor, purpose of resistor, connections to resistor, color code of original, value, and recommended Durham replacement resistor. Supplementary sheets are to be mailed from time to time as new receivers are put on the market.

Engelhart Elected President of Kester

At a meeting of the Board of Directors of the Wester Solder Company, February 17, Mr. F. C. Engelhart was elected President of the company. Mr. Engelhart has been the directing head of the company for twenty years, acting in the position of General Manager and Treasurer. Under his guidance the company has grown from a small organization to the present large and complete plant at 4201 Wrightwood, Chicago, as well as the plant in Newark, New Jersey.

Mr. J. A. Reitzel, formerly Sales Promotion Manager, has been elected to the position of General Sales Manager of this company.

Fada Increases Production

According to a statement by Mr. Frank Andrea, President of the FADA Radio Company, it has been necessary for this plant to increase production since February 1.

"In fact," says Mr. Andrea, "our February production will be nearly double that of January and we look forward to an excellent year. Except for a short inventory taking period in December, the wheels of our plant in Long Island City, N. Y., have not stopped running since we started production last spring on the present line of FADA sets."

Philco Makes Changes in Executive Personnel

Edward Davis, President and one of the founders of the Philco Company, has been elevated to the position of chairman of the Board of Directors, and James M. Skinner, Vice-President and General Manager, became President at a recent election. Two new officers were also named: George E. Deming, new Executive Vice-President, and Walter E. Holland, formerly chief engineer, has become Vice-President in charge of engineering. Deming was formerly Works Manager.

Mr. Davis will continue to take the same active part in the management of the company as heretofore. Secretary and Treasurer when the company was formed in 1906, he has seen it develop from an organization of eighteen employees to one carrying nearly 6000 on the payroll during peak seasons.

Westinghouse Reorganizes Merchandising Department

A complete reorganization of the Merchandising Department to unify its sales efforts and to broaden and make more flexible its activities has been announced by C. E. Allen, Commercial Vice-President of the Westinghouse Electric and Manufacturing Company. The department is now separated into two main divisions, one under M. C. Morrow, Sales Manager, and the other under F. R. Kohnstamm, Director of Merchandise.

R. J. Noel Not to Represent Gilbert

In the January issue of *RADIO* it was announced that the R. J. Noel Company, of Los Angeles, San Francisco and Seattle, had been appointed representatives for the R. W. Gilbert Company, manufacturers of midget radio sets. According to Mr. Noel, the company that bears his name has never sold or assisted in selling any one particular receiver.

HAND-TO-MOUTH BUYING

By R. O. EASTMAN

PROBABLY no one thing contributed so much to save the country from financial panic in 1930 as the tendency developed during the past few years toward what we term "hand-to-mouth" buying. If, following the crash of last November, there had been the inventories of 1921 to liquidate, factories would have had to completely close instead of merely curtailing production, and widespread disaster would have been inevitable.

Hand-to-mouth buying has taken the slack out of the line of distribution which unites the buyer and producer, so when the slump hit us, there was no slack to be taken up. Thus, this tendency has proved a blessing in disguise even to many interests that have deplored it.

Hand-to-mouth buying was a natural result of improved and speedier service in getting goods from where they are made to where they are used. It is as futile to fight against it as to battle against a flowing tide. It was as inevitable that rapid turnover should replace long stocks as that the electric should supplant the gas light or radio the old fashioned phonograph.

But it can be overdone and is today being overdone! If hand-to-mouth buying is to be effective, the hand must at least, reach the mouth.

Merchants cannot and must not restrain their buying to the point that they are not rendering acceptable service to

their consumer trade. Yet, too many of them are doing this today.

The balance of trade that makes up the difference between prosperity and depression consists of *unplanned consumer purchases*—dollars that are lured out of people's pocketbooks by attractive merchandise, attractively displayed.

In times of business quietude, consumers will generally *buy* necessities only. They have to be sold luxuries. And a luxury may be a necessity that can be put off until tomorrow or next month.

We can do without luxuries but we can't do without the luxury *business*. For the makers of luxuries depend upon their sales in order to buy their own necessities.

From all over the country come reports of pitifully depleted stocks. The hand isn't reaching the mouth. The consumer won't ask for what she doesn't see.

To get this balance of business back, the merchants must act first. The buying wave must come in the back door of the store, before it goes out the front.

There's a hundred million dollars worth of this business a week waiting to be gathered in.—*Window Shade Merchandising*.

New Distributor for Majestic

A telegram from V. W. Collamore, executive sales head for Majestic, states that F. D. Pitts Company of Boston, Massachusetts, has become the Majestic Distributor for Eastern New England. This company is one of the most successful and best liked distributors in that section.

Rosenfelds Join Audiola

Mr. LeRoy L. Rosenfeld and his brother, Mr. Morris W. Rosenfeld, formerly New England representatives for the Audiola Radio Company, have recently assumed the positions of Sales Manager and Sales Promotion Manager, respectively, of that firm. While Roy Rosenfeld has moved to Chicago to take over his duties, his brother is to remain in Boston for the time being in order to supervise the company's eastern sales activities.

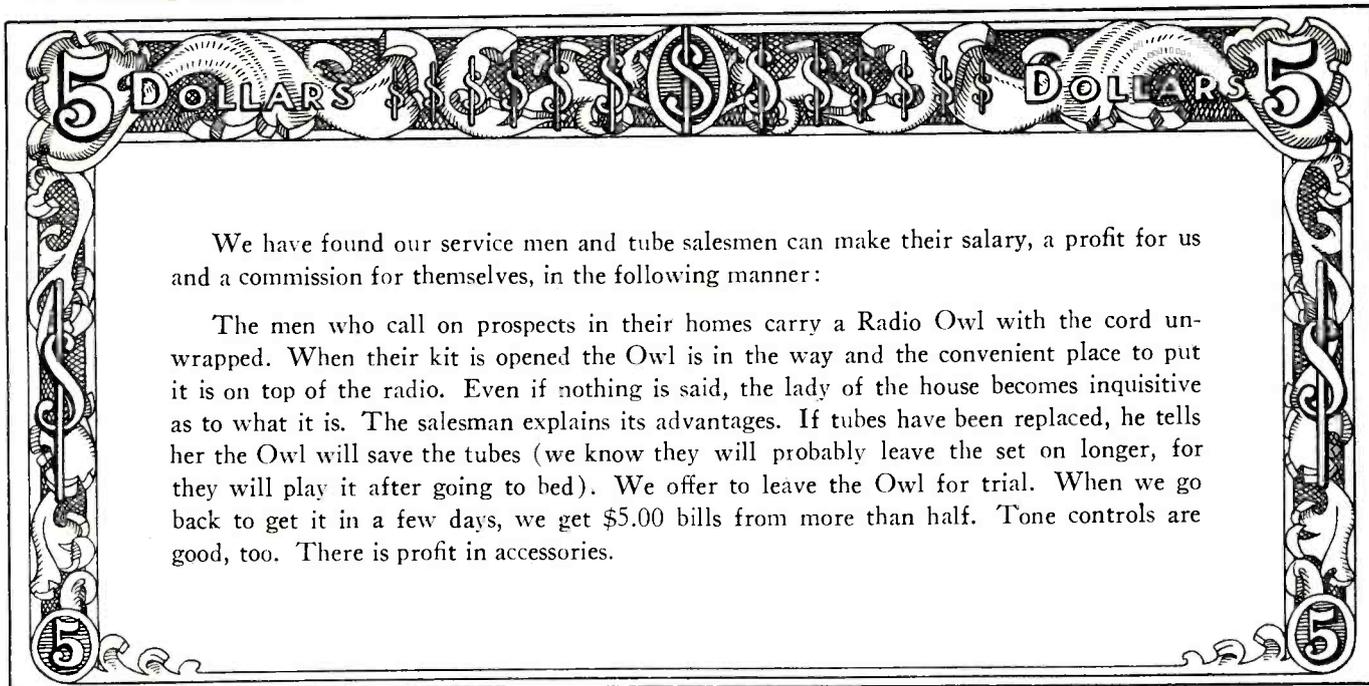
BOOK REVIEWS

PRACTICAL TESTING SYSTEMS, Rider. 147 pages. \$1 per copy. Bound in cloth. Radio Treatise Co., Inc., 1440 Broadway, New York City.

Presents a number of practical testing systems suitable for application in connection with radio equipment. Subjects covered: Measuring instruments; resistance units; oscillators; tube testers; vacuum tube voltmeters; capacity tests; inductance tests; audio and output systems.

New Catalogs

"Broadcast Station Equipment," a 24-page catalog of equipment and supplies for broadcast station requirements. Covers data on microphones, program supply systems, amplifiers, gain controls, panels, repeater racks, etc. General Industries Corporation 222 Grove Street, Waltham, Mass.



We have found our service men and tube salesmen can make their salary, a profit for us and a commission for themselves, in the following manner:

The men who call on prospects in their homes carry a Radio Owl with the cord unwrapped. When their kit is opened the Owl is in the way and the convenient place to put it is on top of the radio. Even if nothing is said, the lady of the house becomes inquisitive as to what it is. The salesman explains its advantages. If tubes have been replaced, he tells her the Owl will save the tubes (we know they will probably leave the set on longer, for they will play it after going to bed). We offer to leave the Owl for trial. When we go back to get it in a few days, we get \$5.00 bills from more than half. Tone controls are good, too. There is profit in accessories.

Here's a money-making idea from Gilbert's Radio Store, 155 So. Garey Street, Pomona, California. Last month the honors went to Sol Marcus, of Brooklyn, N. Y., who cashed in on marriage licences. Send your idea for next month's issue to RADIO, 415 Lexington Avenue, New York City; Pacific Building, San Francisco, or the nearest branch office.

TOBE Filterette

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VOL. 2. NO. 3.

MARCH, 1931

CANTON, MASS.

Operation of Call Systems Causes Interference

Stores, Offices and Hospitals Affected

WITH the increasing use of call systems in factories, offices, department stores, and hospitals, a new source of radio interference has become prominent. This interference is likely to affect all receivers being operated in the building in which the call system is located, and may be distributed over a considerably wider area.

Aside from the possibility of interference to individual broadcast listeners, the effect of this disturbance on radio reception in the immediate vicinity of the call system is such that speedy action is demanded. Two of the more obvious locations in which the operation of call or paging systems may obstruct the progress of business, or may limit the comfort and enjoyment of a large would-be radio audience are department stores and hospitals.

In a department store the radio department may be so affected by the working of the call system that sales are lost. Certainly if, just as a receiver is being demonstrated, a series of loud reports, so violent as to cause shock to the listener, is heard to issue from the loud speaker, a great deal of explanation will be required to convince the prospect that the receiver is behaving normally. It would surely be more conducive to radio sales if the show room were not subjected to radio interference originating on the call system.

The need of filterizing call systems used in hospitals is obvious.

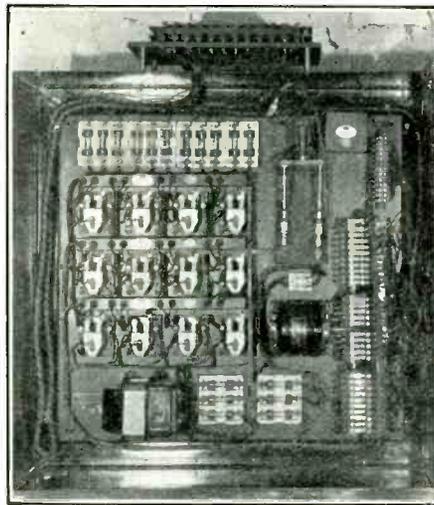


Fig. 4. Filterettes applied to a hospital call system.

When hundreds of patients are dependent on radio for their entertainment, and even for their physical and mental well-being, it is readily seen that radio interference may assume serious proportions. Particularly when the use of head-phones is general, the frequent use of the call system results in many shocks to the nervous systems of the patients. Modern institutions are equipping their call systems with Filterettes so that the pleasure of their patients may not be affected.

(Continued on Page 31)

Interference Film Arousing Great Interest

Power Companies Showing Movie of Filterette Uses

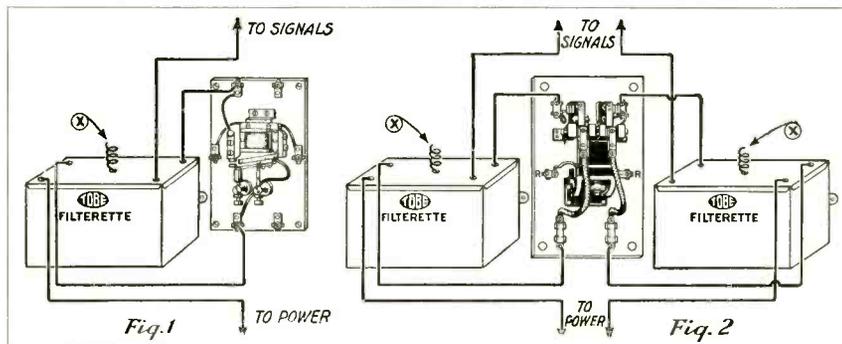
AN INTERFERENCE and instructive presentation of the radio interference problem is contained in a 1000-foot motion picture film recently released by the Tobe Deutschmann Corporation. This film shows the more common causes of radio interference and illustrates the manner in which the individual broadcast listener may improve his radio reception.

A thread of story runs through the subject matter so that the layman's interest may be more readily captured and held. The film shows the installation of a modern A.C. operated receiver in the home, the erection of an inside antenna, and the early satisfaction of the customer. The next scene, however, shows the entrance of "Old Man Interference," invited into the receiver by the careless way in which it was installed.

Next the interference investigator arrives and explains to the customer the many possible sources of interference in her own home. As each appliance is shown, the type of interference it causes, and the manner of suppressing the interference are shown. The electric refrigerator is shown.

and the fact that its motor should cause no interference is explained. The action of the thermostat is indicated by an animated wiring diagram which illustrates the distribution of this interference along the power supply line.

The film shows the electric sewing machine, vacuum cleaner,



Filterettes applied to single contact and double contact call system relays.

drink mixer, fruit juice extractor, and other home electrical appliances. Among the store and office appliances shown are the cash register, dictating machine, adding machine and bookkeeping machine.

The diathermy machine is shown in operation, with the type of Filterette and screening necessary to prevent the distribution of interference created by this and other electro-medical apparatus. The feed-back of this interference into the power line, and its radiation from the body of the patient being treated, are shown in animated diagram.

Further animated diagrams show the distribution of radio interference along the power lines, its inductive transfer from one wiring circuit to another, and the entrance of the interference to the receiver through the antenna and ground connections as well as through the power line.

The importance of erecting the aerial out of the field of interference is stressed, and the use of shielded lead-in wire is explained.

The film has been of material benefit in the formation of radio clubs, and in the organization of interference campaigns. Power companies, radio trade associations, service clubs and chambers of commerce are showing this film at both private and public gatherings.

Why not present this film to a representative audience in your city? All that is required for its showing is a screen and a 16 millimeter projector. The entire film may be shown in one-half hour, leaving the remainder of the evening for the formation of a radio club, or the discussion of radio interference problems. There is a nominal rental charge for the use of this film.

Operation of Call Systems Causes Interference

(Continued from Page 30)

For the benefit of those desirous of filterizing various types of call systems the following information is presented. Most call systems operate through a sys-

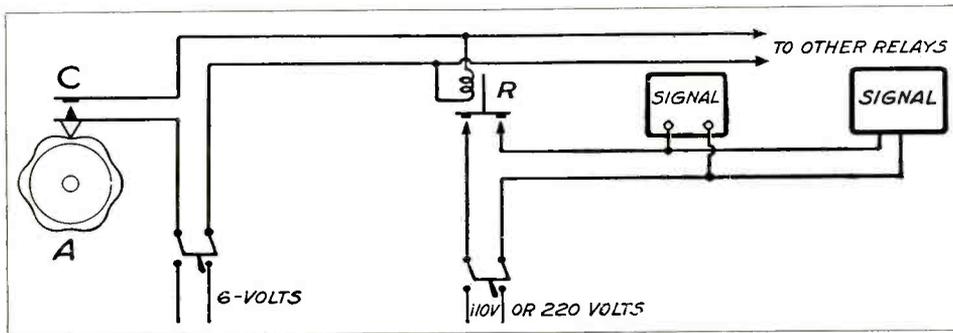


Fig. 3. Elementary call system circuit.

tem of relays similar to that indicated by the wiring diagram in Figure 3. "A" is a rotating device which closes contact "C" the desired number of times, thus causing the armature of relay "R" to pull up, closing the secondary circuit and energizing the various signals. By varying the manner of contacting in the primary relay circuit several types of call system may be produced, all of which have similar interference creating characteristics.

From a study of Figure 3 it will be seen that every call system contains several potential interference sources. These are the motor which drives the primary contactor, the primary contactor, the secondary contactor and the signals. In practice it has been found that the motor, the primary contactor, and the signals usually create no interference. Therefore, the problem of filterizing the call system usually resolves itself into one of applying a suitable filterette to the secondary relay contacts.

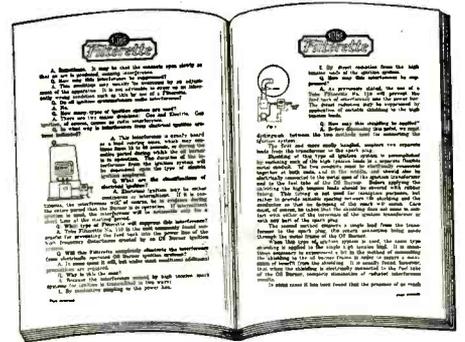
In order to determine the correct type of Filterette for application to these contacts, it is necessary to know the type of relay being used, and the manner in which the interference is distributed. By reference to Figure 3, it will be seen that interference due to the operation of the signal relay may be fed back into the power supply line or may be carried along the lines between the relay and the signals—Figures 1 and 2 show the two types of relay most commonly used. The relay shown in Figure 1 is of the single contact type and breaks only one side of the signal line; that shown in Figure 2 is of the double contact type, breaking both sides of the signal line. Since the interference travels in both directions from the contact, it is obvious that twice the filterettes required for the single contactor will be necessary to suppress the interference due to the operation of the double contactor.

The Filterette for suppressing the interference created by a single contactor is connected in series with both sides of the contactor as shown in Figure 1. The Filterette used is model HS-3A, and

Third Edition of "Radio Noises and Their Cure" Is Now Available

The third edition of "Radio Noises and Their Cure" is now off the press, and is being distributed to those who were prompt in ordering their copies. This edition has been increased to 96 pages, and is devoted entirely to information relating to the elimination of radio interference. Many photographs of actual Filterette installations are contained in the pages of this book as well as wiring diagrams of electrical devices with Filterettes installed.

Due to the increased size of this book, it has been necessary to advance the price to 35c per copy.



Facsimile pages of "Radio Noises and Their Cure"

may be connected in any circuit operating at 110 volts, 5 amperes or less.

In filtering a double contact signal relay, the relay is treated as two single contact units, and Filterettes are connected in series with both sides of both contacts. This connection is shown in Figure 2.

The cost of filterizing a call system will depend upon the number and type of relays used as well as the voltage at which they are operated. It is generally found that one relay is used on each floor, although in the case of a large building there may be several relays on each floor.

In order to determine the number of relays requiring filterizing, each relay may be operated by hand, and the resultant interference noted.

The hospital call system differs from the department store or factory call system in that several relays are usually operated at the same time to set up a combination on an annunciator system. With this type of call system it is necessary to filterize all of the relay contacts on the control panel to prevent the distribution of interference along the wiring between the control panel and the various signal units. The filterette sections designed for this type of call system are shown, installed, in Figure 4.

TOBE DEUTSCHMANN CORPORATION

Filterette Division • CANTON, MASSACHUSETTS

The Acknowledged Authority on Radio Interference—Makers of FILTERETTES, the Accepted Remedy

New Radio Products

New Suphet Series Introduced by Crosley

The Crosley Radio Corporation has just announced a series of superheterodynes, in which are the Super-Administrator, to retail at \$109.50; the Super-Rondeau, at \$119.50, and the Super-Sondo, a combination radio-phonograph, at \$189.50. None of these receivers are of the midget type. All employ four type '24 screen-grid tubes, one '27, two power output tubes, type '45, and an '80 rectifier.



Clarostat Adds Tone Control

According to John J. Mucher, President of the Clarostat Manufacturing Co., Inc., a panel type tone control has been developed by this company, a device which incorporates all the features of the popular Clarostat Tone Control, in a new form. Everything is enclosed in a bakelite case, free from dust and atmospheric effects. It mounts through one 3/8-inch hole and has an extra long bushing with double mounting nuts to fit any panel thickness or cabinet wall. This unit is known as the Clarostat Graphotone, and should be the means of many an extra sale on the part of the service man.



Sprague Enters Home Talkie Field

According to Mr. R. C. Sprague, President of the Sprague Specialties Company, Quincy and North Adams, Massachusetts, this company has contracted for the exclusive manufacturing and sales rights for a home talking picture machine that can be produced at an attractively low list price. Two models will be manufactured, one consisting of a talking picture unit to plug into a radio set using the amplifier and speaker of the radio, and another incorporating an amplifier and speaker to operate independently of a radio set.

Keller-Fuller Brings Out Junior Model

The Keller-Fuller Mfg. Co., Ltd., of 1573 W. Jefferson Blvd., Los Angeles, has developed a midget receiver not two-thirds the size of the average midget. The exact measurements of the cabinet are 8 x 10 x 13 inches. The chassis is fully shielded and has a cadmium plated steel chassis, three tuned circuits, pre-selector circuit, screen-grid power detector, two stages of resistance coupled audio frequency, tone control, and all the other things ordinarily found in midget receivers.



Story & Clark Introduce Console Petite

A very small console receiver, 25 1/2 in. high, 16 in. wide and 10 in. deep has been added to the Story & Clark line. This receiver, complete with tubes, will list for \$89.50. It is equipped with Unified Control, a new and exclusive device developed by Story & Clark in which the station finder, volume control and on and off switch are in one. Three '24 tubes, one '27, two '45s and an '80 are used.



I. C. A. Brings Out New Instruments

A clever little a-c receiver for ear phone reception has been developed by the Insuline Corporation of America, for use in traveling or at home as an "individual" receiver. A detector tube and an '80 rectifier are the only tubes used. The set is built into a black leather carrying case, weighs but ten pounds, and lists for \$25 with phones but without tubes.

The I. C. A. Automatic Radio-Tel Switch is another ingenious piece of merchandise developed by this company. It is mounted below the telephone and turns the radio set off when the receiver is taken off the hook.

Handy Meter Scales Available

The International Resistance Company, 2006 Chestnut Street, Philadelphia, are giving away free of charge an ohmmeter scale to fit a Weston Model 301 meter or a Jewell Pattern 88 0-1 milliammeter. With the correct battery voltage and calibrating resistance any milliammeter can be made to read directly in ohms with one of these scales. This data will be supplied by the above mentioned firm.



Dual Wire Wound Control Unit by Wirt

The Wirt Company, of Germantown, Philadelphia, has added to its line a dual wire-wound control unit which combines simplicity and accuracy in design and ruggedness. The resistance coils are completely housed in a black bakelite case which protects it from the outside elements and it is practically noiseless. The diameter of this control is 1 3/4 inches and it is 1 inch deep.

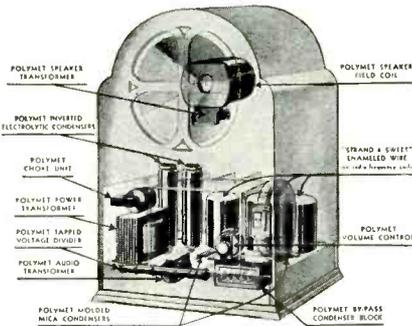


General Motors Marketing Battery Set

The General Motors Radio Corporation now has the "Pioneer" in the hands of all its dealers. This receiver is priced to retail at \$136, including tubes and batteries. It was brought out to meet a rapidly growing demand from the rural sections, where lack of power lines bars the use of an a-c set. Using the two-volt tubes and battery to coincide, the "Pioneer" will operate over a period of approximately a year, three hours a day, without a change or charge of batteries. The A battery used is the special air cell battery developed by the National Carbon Company. The circuit of this receiver employs three '32 tubes in the r-f stages, one screen-grid power detector with a '32 tube, one '30 and two '31 power tubes in the audio amplifier.

New Testing Equipment by I. C. A.

Among the new testing apparatus introduced by the Insuline Corporation of America, is a pair of handy test leads, one red and the other black, for continuity testing. Two types are available, one with tips and the other with spades. Another handy instrument is the neutralizing and aligning tool kit, which consists of a fully insulated screwdriver, large and small socket wrench, and a special magnet steel for picking up and placing screws, bolts, etc. The tools telescope not only for ready portability, but for maximum convenience.



Polymet Manufactures Midget Parts

After months of laboratory investigation and experimentation, the Polymet Mfg. Corp. announces that it manufactures almost every essential part for midget set manufacture, in addition to making parts for standard models. These midget parts include speaker transformers, electrolytic condensers, volume controls, by-pass condenser blocks, power transformers, tapped voltage dividers, chokes, coils and magnet wire.



MIDGETS HAVE THEIR PLACE

(Continued from Page 23)

midgets in September that not all of the midget factories combined could cope with the situation. Now they are going, one by one, and only the firmly established factories will remain. Our best months for selling midgets are October and November. The slackest months are December and January. Summer business is excellent. Of the 240,000 midget sets built in Los Angeles in 1930, we produced slightly over 100,000.

My advice to the radio dealer is that he carry a line of good midget sets and use these to supply the market for those who cannot afford a higher priced set and to those who want the second, third and even fourth set in the home. I find that some of our dealers have sold as many as four sets to an individual for his home.



Dubilier Announces Hi-Mike Condenser

The Dubilier Condenser Corporation has recently announced a refined, semi-dry, high voltage electrolytic condenser. It is in an aluminum can $4\frac{1}{2} \times 1\frac{3}{8}$ inches, and is interchangeable with other standard electrolytic units. It has a standard capacity of 8 mfd, at a working voltage conservatively rated at 400; is fully self-healing, and has very low leakage at high voltages.



Westinghouse Columaire Is Novel Design

The "Columaire" receiver, by Westinghouse, is perhaps the most novel thing that has hit the radio business this season. The receiver is housed in a slim, vertical cabinet with the speaker in the top, a Westinghouse electric clock on the front face and the control knobs inconspicuously located on one side. The cabinet is modern, almost patterned after the present day skyscraper. It is five feet high and occupies a floor area of but 10×12 inches, making it very suitable for small apartments. The Westinghouse remote control attachment may be used with it if desired.

National Union Has New Tube

The production of a new screen-grid tube specifically designed for automobile and d-c district radio receiver operation was announced this week by Dr. Ralph E. Myers, Vice-President in charge of engineering of the National Union Radio Corporation. This tube, designated as the NY 64, is of the unipotential cathode type, having a 6.3-volt, .4-ampere filament. The voltage value was chosen after a study of the manufacture of automobile head light lamps. 6.3 volts seemed to represent the average voltage of the battery. The new NY 64 is said to consume less current than the type '24 screen-grid tube.



Trimm Brings Out New Headphone

The Trimm Radio Mfg. Co., of Chicago, has developed a new featherweight headphone which is probably the lightest of its kind ever produced in this country. The receiver is only $1\frac{13}{16}$ in. in outside diameter, $\frac{3}{4}$ in. at its greatest thickness, and weighs but one and a half ounces. A high grade cobalt steel is used for the magnets, being retained in the bakelite case with inset clips, similar to the method of fastening high grade watch movements. This allows a greater dimension of magnet to be used, and as no holes are drilled into them the entire cross section of the magnets is utilized. Their lightness and the lack of pressure on the ears make them very comfortable.



Audiola Adds Junior Line

Three new receivers have been added to the Audiola Radio Company's line; one midget, known as the Audiola Junior, retailing at \$43.50; the Audiola Console, which is the Junior mounted on a Gothic stand, selling for \$49.50, and the No. 60 Junior Console, a low-boy 34 in. high with very short legs. The last mentioned lists for \$53.95, all prices quoted having been without tubes.

The Public Buys Tubes - - - - - - - - and HOW!

By CHARLES C. CHINN

THE "Gyp" radio merchant operates on Barnum's famous theory: "There's a fool born every minute." If this theory were not more or less true the "Gyp" would long since have been out of business; as it is he seems to be thriving.

Apparently the honest radio dealer believes that there is no use trying to mend the ways of a fool; that experience is the only teacher, and once stuck he becomes a prospective customer for the legitimate dealer. The trouble is, however, that the average customer has no way of knowing why one dealer is honest and another is not. Having had experience with a dishonest man he mistrusts legitimate dealers in the radio business, with the result that sales resistance is increased enormously. Radio trade associations and better business bureaus must feel the same about it because these "Gyps" continue to prosper in this nefarious business of misrepresentation and petty larceny.

Take the tube business, for example. Here are a few of the more common practices of these radio freebooters that infest every city in the country; practices that are everyday occurrences in any "Gyp" radio store. To an honest man they read like fiction; like a far-fetched murder thriller; but no stretch of the imagination was required to make these jottings. If you are unconvinced get a job in a store of this calibre—a couple of days will suffice.

In the first place wagon loads of tubes are available to the "Gyp" dealer at an average price of 15c apiece. Most of us would consider this an excellent opportunity to make a killing by selling them for two-bits each. But no! Not the "Gyp." He packs them in attractive cartons and sells them for the list price of standard tubes. They are displayed in the windows intermingled with tubes of well known brands with no reference to price. Just above these tubes is an assortment of the same tubes in plain boxes, priced at "39c for All Types, 3 for \$1.00." The potential tube buyer comes into the store to ask about these cheap tubes and is informed by the clerk in a very confidential manner that those tubes are seconds and have no guarantee as to life or performance. "Furthermore," he will whisper, "cheap tubes like those are liable to cause many troubles with the radio set." He has, however, the tube that is guaranteed for one year, and although it costs a little more it works much better, and of course it protects the radio set as well. Then he brings up the

point that the year guarantee means that if the tubes do give out they will be replaced free of charge, which will prove more economical in a year's time than buying cheap tubes. As they are not likely to give out within two or three years they not only save money but inconvenience.

The result is that the purchaser buys a set of the 15c tubes for the full list price with an impossible guarantee. In case the tubes prove unsatisfactory, as they usually do in a very few weeks, the customer confidently returns with the bad tube or tubes. He is immediately asked for his sales slip. If he hasn't kept it (he never does) the salesman explains that the guarantee is not good without it, as they have no way of knowing for sure that the tubes were originally purchased there, and if they were, how long ago. Of course the factory will not make good to the dealer without this information.

In event of a "squawk," which is quite common in this class of store, the tube is tested and, as usual, will be found burned out. Then the customer is advised that the guarantee did not cover burn-outs in the first place. This would be impossible; unfair to the dealer; as unscrupulous people would use the tubes ten months or so and deliberately burn them out in order to get new ones. Salesmen in this class of store do not hesitate to make these assertions to the public with a "what are you going to do about it" attitude. Gaining good will is not a part of their game, and, strange to say, they are still at it after several years of this procedure. The salesman is paid a premium for sales of this type and naturally tries to work his game on every customer.

Even though the last reduction on tubes was very widely publicized there were many customers who were not aware of it until several weeks after it went into effect. The "Gyps" took advantage of this situation and sold many of their cheap 15c tubes for the old list prices instead of the new. If they were caught in this snafu they claimed that the price of tubes had dropped for the ordinary brands but not for their brand, because of the extraordinary high quality and the guarantee of the latter. In this way they bluffed the buyer from complaining to the better business bureaus, or even resorting to a good old-fashioned shotgun filled with ice cream salt.

To continue—recently a large quantity of seconds of a well known brand

TUBE PRICES SLASHED !!

Brand New and Meter Tested
Before U Buy !!

Values up to \$3.30

201-A Type
199 Type
226 Type
227 Type
171-A Type
112-A Type
280 Type
224 Type
245 Type

ON SALE

49c
EA.

VALUES UP TO \$3.30

Practically All Types for Both Electric and
Battery Sets—Hurry!!

BRING IN YOUR OLD
TUBES FOR FREE TEST

MAIL ORDERS filled upon receipt of
P. O. Money Order. No C. O. D.

of tubes was released by the factory in plain white boxes and sold by the "Gyp" for list price. The name of the manufacturer was not withheld. Every customer, of course, asked why the regular box was not used, and the answer was always to the effect that the factory had run short of boxes at the time they were shipped. Then when the tubes started to come back and the dealer had tested them and found the guarantee void, he sold the customer new ones, or at least picked up the bad ones left on his counter, put them in standard cartons, for which he is always on the lookout, and got replacements on them from the factory. Thus do both ends meet the middle.

That leads us to testing. All radio dealers test tubes free, but the "Gyp" goes them one better. Naturally he finds one or more bad tubes in every bunch that is brought in. Then, if he can sell new tubes to the customer he wraps them up and hands them over at another place on the counter, giving the purchaser every chance to leave his old tubes lie by the tester. These he takes up after the customer has gone, finds boxes to match, and puts back on his shelves to be sold as new tubes at list price.

The "Gyp's" service man can and usually does make a killing. He charges for his service, sells a couple of new tubes at list prices on almost every call, and takes the old ones back to the store to find a new home.

The "Trade in your old tube" game is also a profitable racket and one worthy of mention in this catalog of nauseating, dishonest practices. A large sign is usually displayed in front of the store, offering a 25c allowance on old tubes turned in on the purchase of a new one. Thousands of tubes are sold in this manner and as many old tubes are traded in. Of these more than half are good, owing to the method used in testing. It is surprising how many of them are standard brands which are sold at list to some other unsuspecting customer.

A New

Cunningham RADIO TUBE



C-335

E. T. Cunningham, Inc., 370 7th Avenue, New York, N. Y., has recently announced to set manufacturers a new screen grid tube designed primarily for use in radio-frequency and intermediate-frequency amplifier stages. This Cunningham Radio Tube is not ordinarily interchangeable with any other Cunningham Tube and must be used in circuits especially designed for its characteristics.

This new Cunningham Radio Tube, designated as C-335, is extremely effective in reducing cross-modulation, and modulation distortion. Furthermore, its design is such as to permit easy control of a large range of signal voltages without the use of local-distance switches or antenna potentiometers, making the tube adaptable to automatic volume control design.

This new Cunningham Radio Tube is designed for AC operation and employs a cathode of the quick heater type.

The remarkable ease of volume control obtainable with the C-335 is due to the gradual and smooth variation in mutual conductance over a wide range with change in grid voltage. The mutual conductance at -40 volts on the grid is nominally 10 micromhos, and at -1.5 volts, 1100 micromhos. This gives a useful mutual conductance ratio of 110 for a single stage.

With these characteristics the C-335 offers very attractive possibilities to designers in obtaining improved set performance with simplified circuits.

The tentative ratings and normal characteristics for the C-335 are given below:

Filament Voltage	2.5 Volts
Filament Current	1.75 Amperes
Plate Voltage (Recommended) . .	180 Volts
Screen Voltage (Recommended) .	75 Volts
Grid Voltage	-1.5 Volts
Plate Current	9 Milliampères
Screen Current	Not Over 1/3 of Plate Current
Plate Resistance . .	200,000 ohms (approx.)
Mutual Conductance . . .	1100 Micromhos

Approximate Interelectrode Capacitances:

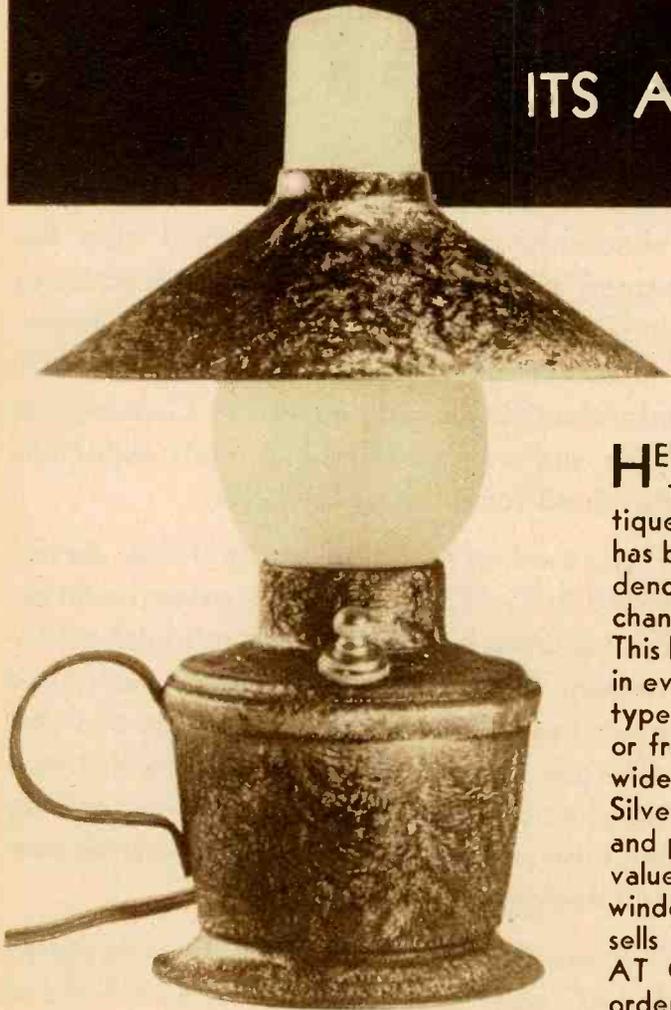
Grid to Plate	0.010 uuf. Maximum
Input Capacitance	5 uuf.
Output Capacitance	10 uuf.

Over-all Dimensions:

Length	4 11/16 - 5 1/4"
Diameter	(Maximum) 1 13/16"
Cap	0.346 - 0.369"
Socket	C Type (Five Prong)

YOU CAN SELL THIS NOVELTY "ANTEEK-LITE" TO ANYBODY

ITS APPEAL IS UNIVERSAL



RADIO DEALERS AND
JOBBER ACCLAIM IT---
A SURE FIRE SELLER!

HERE is a new side-line money-maker for the radio merchant, the novelty ANTEEK-LITE. The sudden demand for antique lamps can be supplied by YOU at a PROFIT. This lamp has been on the market but a short time and its appeal is evidenced by the repeat order business from those radio merchants who see in it an entirely new idea for added profits. This lamp can be used to adorn those many nooks and corners in every home. It has an imported globe, of the old chimney type variety. Can be had with amber colored globe, clear or frosted white. The base is finished in antique effects. A wide choice of colors is available . . . Bronze . . . Green . . . Silver . . . Red . . . Blue. Comes to you complete with cord and plug. Until you SEE this lamp you will not appreciate its value. Display it in your window—in your store. It sells itself. Get a sample AT ONCE. Better yet, order a standard sample carton of six lamps in assorted colors. We assure you that your order will be filled on the day it reaches us.

JOBBERS WANTED

Jobber outlets are wanted now. Wire or write for complete information. Jobbers can sell this lamp to ANY store, be it radio, hardware, novelty, stationery, drug, department or other store. Universal appeal. A year 'round seller. Equalize that summer sales curve with THIS practical and useful "ANTEEK-LITE."

Size: 8 1/4" High. 5 1/4" Wide, Over All

A Sample for \$1.50

Regular List Price \$2.50

Standard Sample of 6 Assorted Lamps
for \$9.00

ORDER A SAMPLE NOW » » »

B. & C. NOVELTY MFG. CO.

1820 FOURTH AVE.
LOS ANGELES, CALIF.

SHIP "ANTEEK-LITES"

at the sample order net price of \$1.50. I enclose

\$ _____ in payment.

If C.O.D. shipment is wanted, please send 50% with order.
Balance when shipment reaches you.

A STANDARD SAMPLE CARTON OF SIX "ANTEEK-LITES" in assorted colors . . . 2 in Bronze, 1 each in Green, Silver, Red, Blue, \$9.00 net

Name _____

Street and No. _____

City _____

State _____

NEW **Echophone**

SUPER-HETERODYNE

\$69.50 COMPLETE WITH GUARANTEED TUBES

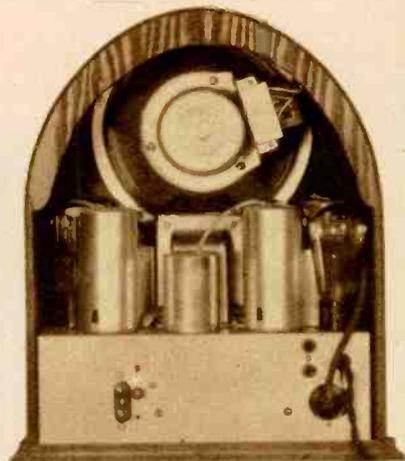
AN Improved Super-Heterodyne by ECHOPHONE with an intermediate frequency of 175 K. C., the best compromise between image frequency interference and high gain stable amplification. The antenna is inductively coupled by means of a large primary which is designed to give maximum response on short antennas.

BEAUTIFUL in cabinet design. Superior in performance, because it uses a stage of tuned radio frequency ahead of the first detector which prevents cross-talk and radiation from the oscillator. One stage of intermediate frequency amplification is used with both primary and secondary circuits tuned to 175 K. C. by means of trimmer condensers accessible through holes in the I. F. coil shield cans. The intermediate amplifier has a total of four tuned circuits adjusted at the factory to 175 K. C.



OTHER IMPORTANT FEATURES

The first detector is of the grid biased type, employing a '24 tube. The second detector is a resistance coupled power detector using a type '24 tube. The set has a '45 push-pull audio system, phonograph pick-up jack and a tone control with variable resistor and condenser across the plates of the power tubes. 8 M. F. electrolytic filter condenser system. Hum balance circuit. Dynamic Speaker and the usual volume control. In this new ECHOPHONE SUPER-HETERODYNE you have the last word in midget receiver design and PERFORMANCE. Write or wire at once for further information.



ECHOPHONE RADIO MANUFACTURING CO., LTD.

FACTORY: 104 Lakeview Ave., Waukegan, Illinois
Pacific Coast Warehouse: 968 North Formosa Ave., Hollywood, Calif.

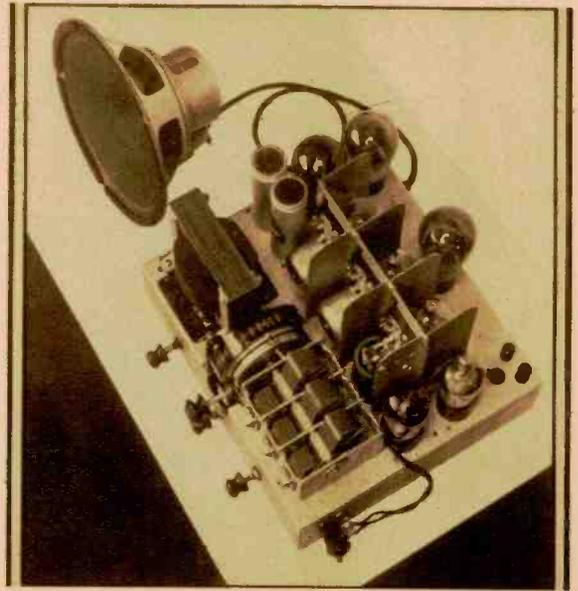
Super-Heterodyne » » » Midget Design

By McMURDO SILVER
President, Silver-Marshall, Inc.



Silver-Marshall Compact Super-heterodyne.

Also a view of Chassis and Speaker.



TWO FACTS, impossible of dispute, have emerged from the welter of the past eight months—the absolute and outstanding superiority of modern superheterodyne broadcast receivers, opening up as they have the entertainment possibilities of the American broadcast band two, three or even four times over what previously was thought possible with the preceding less sensitive and less selective (consequently more noisy) t.r.f. receivers, and that in the t.r.f. field it is possible to so simplify design as to produce very good sets of low cost and low space requirements—in a word, midgets. With these facts before us the question immediately arises as to why the size and cost of modern superheterodynes may not likewise be reduced without a sacrifice of tone, selectivity, or practically usable sensitivity. An answer to this question has been provided by the engineering laboratories of Silver-Marshall, Inc., and the results of their work appear in the new Silver-Marshall types 37 and 38 superheterodynes described herewith—midgets in size, but in the hackneyed phrase “giants in performance.”

The obvious trend in designing such receivers would be to start with a big super and to cut out a tube here, a coil somewhere else, a few condensers; and so on, until the final result would be true midgets—midgets in size, performance and price. While such a course might have been practical (and has been) for some manufacturers, it was out of the question in view of what would be expected by a public fully aware of what a really good super should do after testing and using the large supers already built and sold by Silver-Marshall. As the problem, simply but very meanly, resolved itself down to one of cutting costs and size without cutting performance, the circuit was first worked out, circuit values arrived at, and then by the aid of a very flexible shoe-horn, all of the parts were sandwiched into a chassis 12" long, 10 $\frac{3}{4}$ " deep and 2 $\frac{1}{2}$ " high—no mean feat, as the photos show, if the wiring and individual parts are to be accessible.

The final model employed the circuit of Fig. 3, which is seen to consist of a dual selector circuit preceding a '24 screen grid first detector, a '27 oscillator inductively coupled to this

detector, two stages of '24 screen grid i.f. amplification, a '27 second detector, two '45s in a single push-pull audio output stage, and an '80 rectifier. It would be well to examine its performance curves as shown in Figs. 4, 5 and 6, Fig. 4 depicting selectivity, Fig. 5 fidelity and Fig. 6 sensitivity.

FROM Fig. 4 it is apparent that the bandwidth 100 times down (or the points at which an interfering station would have to be 100 times as strong as the wanted signal to produce equal output) is just 11 kc., while at 1000 times down the width is just 20 kc. These figures show an order of selectivity never even approached in the best of t.r.f. sets. At 10,000 times down the band width is just 28 kc. or within about 15% of that of the most selective radio set ever manufactured.* These figures indicate one thing quite positively—that the receiver will give absolute 10 kc. selectivity against even 50,000 watt stations within a few miles of the receiver, as a number of practical tests have conclusively demonstrated. Selectivity is uniform to within less than 10% over the entire broadcast band, since it is determined almost wholly by the i.f. amplifier selectivity and the “arithmetical selectivity” factor. “But with such selectivity, what about fidelity?”

*Silver-Marshall 714 Tuner.

Fig. 5 tells a deceptive story, since it shows only electrical fidelity, that is, antenna to speaker, while the true story is told by antenna to ear sound-pressure measurements which would include a compensated speaker. Fig. 5 shows the progressive attenuation of the higher audio frequencies, about what would be expected to go with such a selectivity curve as that of Fig. 4. This curve is seen to be flat to less than 3 db. from 60 to 1000 cycles, and to fall off rapidly up to 4000 cycles, the limiting frequency necessary for faithful reproduction (actually a bit too faithful for the average ear). This fall-off is compensated for by employing a speaker designed to have an exactly opposite frequency characteristic, and which nicely boosts the attenuated frequencies up to their original levels as far as the ear is concerned, and the ear after all, is the final judge. A continuously variable tone control is a part of the audio circuit, and as it is turned down, the higher frequencies may be progressively attenuated until the final curve, antenna to ear, would look like the antenna to speaker curve of Fig. 5.

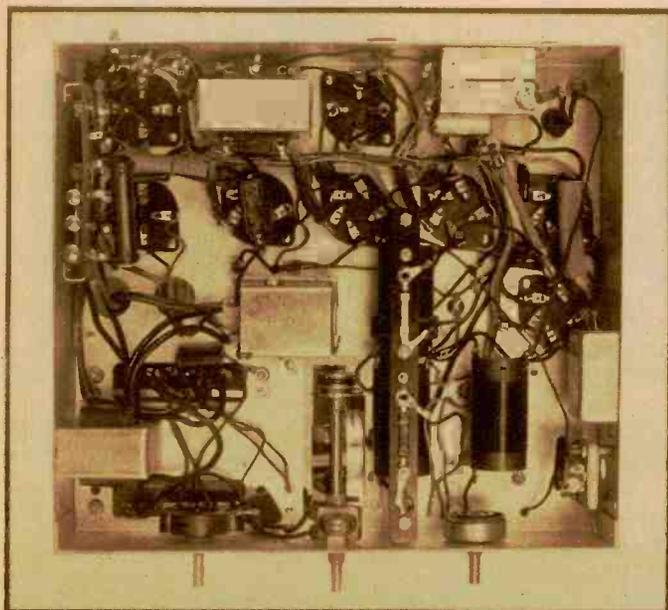


Fig. 2. Showing the wiring and placement of parts beneath the base of the new Silver-Marshall Midget Super-Heterodyne.

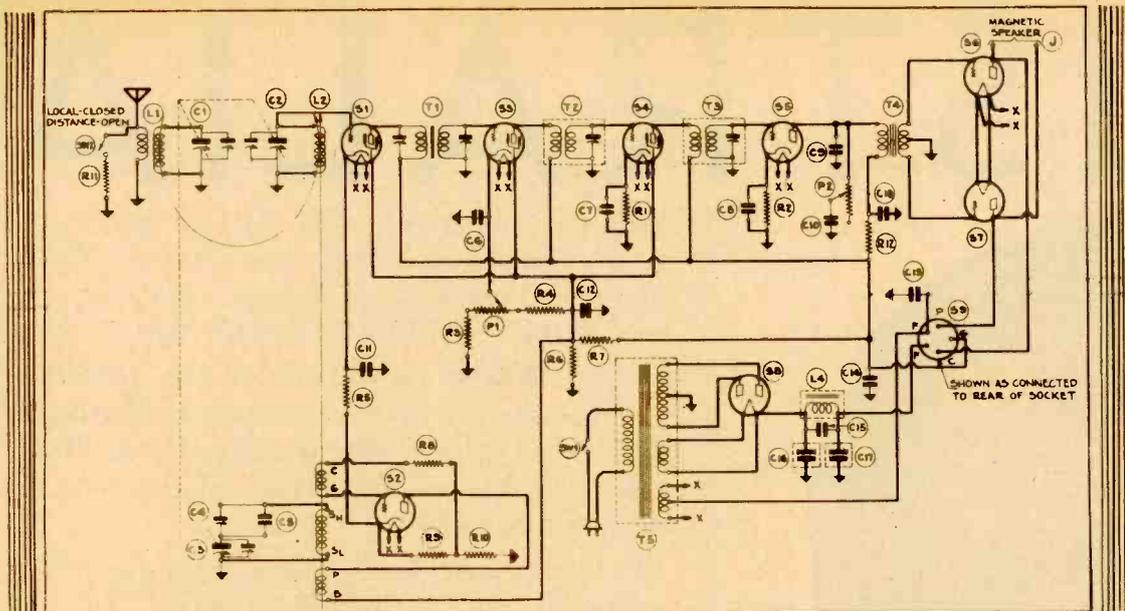


Fig. 3. Wiring Diagram of the new Silver-Marshall Midget Super-Heterodyne.

From Fig. 6 the sensitivity curve, the sensitivity is seen to vary from 6 to 10 microvolts per meter of effective antenna height (assuming the usual arbitrary height of four meters). These figures may appear low, but coupled with the extreme selectivity of the circuit, they translate into the ability to receive at entertainment volume and clarity actually more stations than can be so received on the best t.r.f. set ever built.

As a matter of fact, the effective sensitivity of this superheterodyne of 6 to 10 microvolts per meter is far greater than that of any t.r.f. set of equal electrical sensitivity due to its far greater selectivity and consequently much lower noise level—which simply means that it will give five to six times the number of enjoyable programs that could be had from a 6 to 10 microvolt t.r.f. set. For instance, in a test made in a semi-business, semi-residential location in Chicago, a stock model of this new receiver was placed on a table without antenna or ground connections, next to a four-gang screen grid t.r.f. set having a sensitivity of $\frac{1}{2}$ to 1 mv. per meter, which used a thirty-foot antenna.

On the t.r.f. set just five out-of-town stations could be heard, such as Cincinnati, Nashville and other nearby points, this while using a thirty-foot antenna. This was not due to lack of sensitivity, but to the high noise level of the less selective t.r.f. set, and its poorer selectivity. On the super using the same number of tubes, seventy-seven stations could be tuned in with one rotation of the dial, absolutely without interference or cross-talk, with no antenna or ground, and with far less noise than on the t.r.f. set. These stations ranged from Canada to New England, Florida, Texas and California. Such, then, is what a good super should

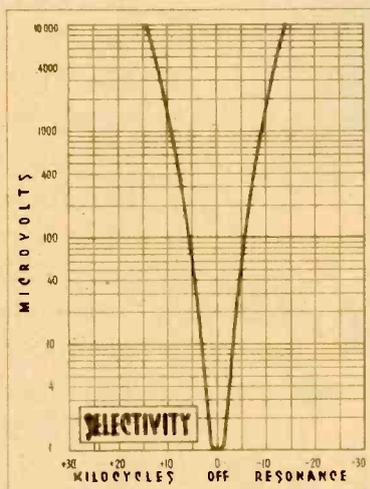


Fig. 4 (above) Selectivity.

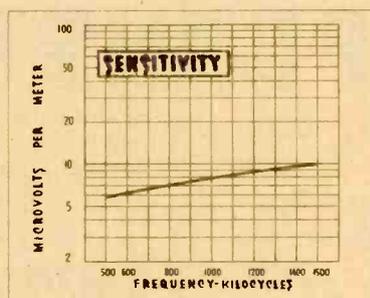


Fig. 5 (above) Sensitivity.

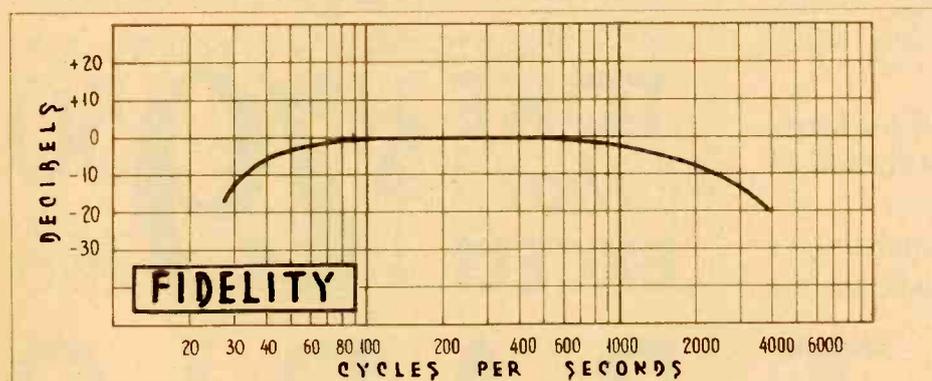


Fig. 6. Fidelity.

and will do, not in a very good location, but simply in a fair one. Adding the 30-foot antenna of the t.r.f. set to the super merely boosted volume, and in no way affected selectivity.

In the photograph of Fig. 1 the three-gang condenser tuning the dual antenna selector and oscillator circuits is seen in the right front of the chassis, and directly behind, the '27 oscillator tube and '24 first detector, with the local distance switch (which throws a 200-ohm resistance across the antenna and ground to permit of satisfactory volume control of very powerful nearby stations) hanging off the side of the chassis on flexible leads, which permit it to be mounted in the side of the receiver cabinet. Behind the gang condenser is a partitioned super-structure, in the rear sections of which are the two '224 i.f. tubes and the '27 second or linear power detector (at the left). Directly in front of these tubes, and in the remaining sections of the partitioned super-structure, are the i.f. transformers and their tuning condensers. The first i.f. transformer is unshielded and is dual tuned, that is, has tuned primary and secondary to provide a very high order of selectivity at the input of the i.f. amplifier. The remaining two i.f. transformers are shielded to prevent reaction with the first i.f. transformer, and have tuned secondaries. The effective selectivity of the receiver, with its four tuned i.f. circuits and three tuned preceding r.f. and oscillator circuits, is best indicated by Fig. 4. At the rear of the chassis are the two '45 push-pull power tubes, and next to the two wet electrolytic filter condensers (which may be optionally dry electrolytic types with no change in performance or life) is the 280 rectifier, while the power transformer is in the left front corner of the chassis.

To the service man interested in the interior placement of parts, the bottom view photograph of Fig. 2 is self-explanatory, and indicates that despite the extreme compactness of the receiver, all parts and wiring are easily accessible.

Beyond these essential features a technical description of the receiver would be essentially a repetition of descriptions previously published of several modern superheterodyne receivers. Suffice it to say that extreme precautions have been taken in the matter of common grounds, short by-pass condenser circuits and other points necessary to insure the absolute stability of a receiver of this type. The '45 push-pull output stage feeds into a small but very sensitive type of electro-dynamic speaker having a split field winding, one field forming a portion of the filter circuit, and the second field serving as the bias resistor for the '45 push-pull stage.

AUSTRALIA



*"Australia
Japan-China*

CAME IN CLEAR
AND WITH EASE ON MY

FLINT SUPERHETERODYNE

radio set," writes Mr. James E. Hanes of Little Rock, California. He states further, "Besides average distant stations I played the following eight Japanese stations: JOAK, Tokyo; JOFK, Hiroshima; JODK, Keijo; JOCK, Nagoya; JOGK, Kumamoto; JOHK, Sendai; JOBK, Osaka and JOJK, Kanazawa. Then with equal ease I tuned in COHB, Harbin, China; COMK, Mukden, China and 4QG, Brisbane, Australia."

Surely we point with pride to such performance, but the most interesting paragraph of Mr. Hanes' letter follows:

"I am not a radio expert. After a hard day's work on my ranch I turn on my set which is my

only entertainment. On my old set I could rarely reach any farther than Denver. Once in a while I could hear Chicago. But now, with my FLINT SUPERHETERODYNE, I have played WEAF, New York; all the Japanese stations; the two Chinese stations and Brisbane, Australia. I forgot to mention that I had KGMB, Honolulu, Hawaii and they tell me that's a hard one to get."

Mr. Hanes is evidently **not** a radio expert . . . with the FLINT SUPERHETERODYNE you **don't have to be** a radio technician to duplicate this performance.

The FLINT SUPERHETERODYNE is easily tuned. It is designed so that **anyone** can bring in great distance. It is a typical **family** superheterodyne. SUPERB in tone quality, SELECTIVE, to remain within the limit of ten kilocycle separation and broadened out sufficiently so that you don't pass the incoming signal without knowing you were on the station.

The outstanding performance of the FLINT SUPERHETERODYNE is creating a constantly growing demand . . . the stability of the FLINT SUPERHETERODYNE is acknowledged by all users.

Every refinement of the highest priced radio . . . tone control . . . local and distance switch . . . vernier dial . . . phonograph connection . . . microphone connection . . . dynamic speaker and 45's in push-pull.

Completely Equipped
WITH
Eight Matched Tubes

R.C.A. RADIOTRONS OR CUNNINGHAMS

EXCELS **TONE** **that** **EXCELS** **\$79.50** LIST PRICE

FLINT RADIO

2425 · WEST · WASHINGTON · BLVD.

JAPAN-CHINA

"Stability MEANS," UNIFORMITY

We quote the service manager of one of our customers, whom we are supplying with two hundred chassis and speakers weekly, in the following: "If it were not contrary to the policy of my firm, I believe that we could dispense with the rechecking and testing of your SUPERS. I am astounded at such uniformity."

This UNIFORMITY we accomplish by the most rigid of inspection methods. Every part is checked and double checked, tested and re-tested and only if it comes up to our required engineering standards is it incorporated into the superheterodyne.

Only experienced radio technicians are employed in the assembling of the FLINT SUPERHETERODYNE. Their ability is reflected in the high class workmanship found in the chassis.

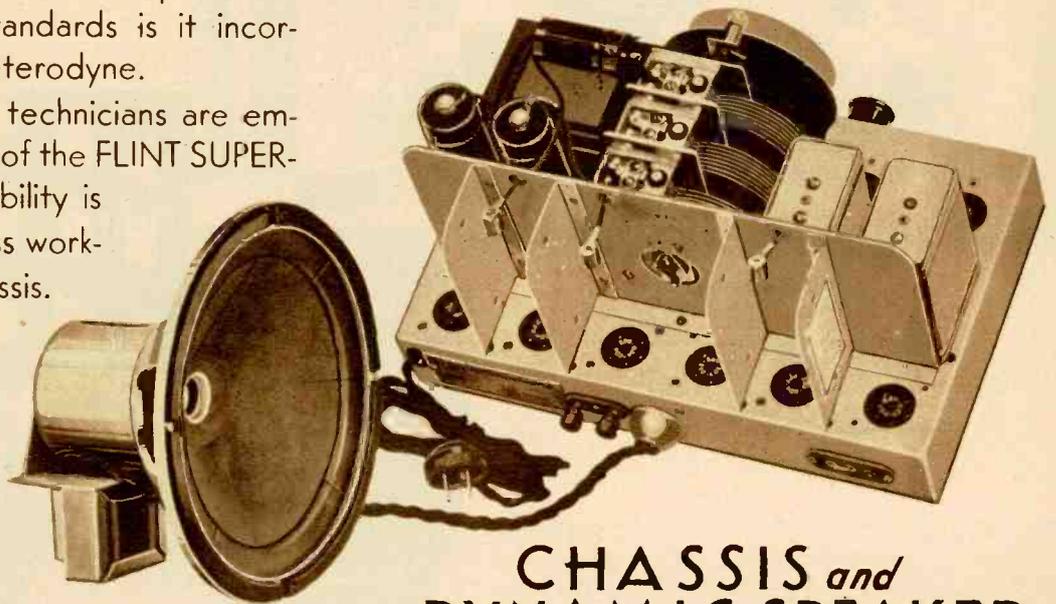
Crystal controlled oscillators are used in checking the accuracy of frequencies... assuring peak uniformity. Before the completed chassis leaves the test booth for the final O.K. it has undergone the same close scrutiny that is ordinarily only devoted to custom-built apparatus.

WE INVITE SAMPLE ORDERS
and solicit your further business strictly on the merits of our product.

The FLINT SUPERHETERODYNE is Licensed by the Radio Corporation of America; designed by engineers of reputation and manufactured in a modern sunlit radio factory that is equipped with the latest precision apparatus.

COMPARE the performance of the FLINT and note in particular the ease of operation, stability, uniformity and above all the surpassing beauty of the

tone



**CHASSIS and
DYNAMIC SPEAKER
ONLY**

tone
that
EXCELS **\$60** LIST PRICE
LESS TUBES

CORPORATION

LOS ANGELES · CALIFORNIA



**E. T. CUNNINGHAM ORGANIZATION
GATHERS IN CONVENTION**

Pictured above is the Cunningham Tube executive personnel from all parts of the United States. District Managers and officials of the company gathered in New York to discuss ways and means of helping the dealer sell more Cunningham Tubes in 1931. An entirely new merchandising plan has been adopted. A nation-wide dealer drive, backed with enormous national advertising and publicity, is now under way. The convention was brought to a close with an announcement that uneconomic methods of distribution and profitless retailing will give way to entirely new selling methods in 1931. The Cunningham executives believe that the industry will see conditions based upon sounder principles than has been the case at any time since the turn of the century.



**PORTUGAL'S PRESIDENT
INSPECTS CLARION RADIO**

At the recent exposition held at Lisbon the President of the republic viewed and inspected Clarion radios which were on display at the booth of Casa Serras, distributor in Portugal for Transformer Corporation of America. Insert right upper corner shows the president inspecting a Clarion chassis.

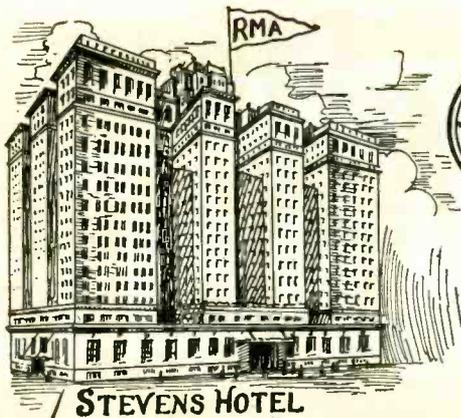


CARLOAD SHIPMENTS OF CLARION

Midnight shipments of Clarion receivers being made by a mammoth automobile truck. The factory is running full blast on night shift to supply the growing demand. This truckload of radio sets is for Electric Lamp and Supply Co., distributors of Clarion in St. Louis.



CAPEHART ALSO INCREASES PRODUCTION
Night scene of the big Capehart factory in Fort Wayne, Indiana. The factory officials report demand greater than supply.



STEVENS HOTEL



ANNOUNCING BUSINESS FOR YOU AT THE FIFTH ANNUAL



BLACKSTONE HOTEL

RMA Trade Show

AND 7TH ANNUAL RMA CONVENTION

CHICAGO

JUNE 8 to 12th



EVERYBODY WILL BE THERE

Every branch of the radio industry will be at Chicago during the week of June 8th. This will be the largest gathering and biggest annual event of the industry.

Thirty thousand (30,000) square feet of radio exhibits in Grand Ball Room and Exhibition Hall of Stevens Hotel.

ADMISSION TO THE TRADE ONLY. NO VACANT BOOTHS—ALL EXHIBITORS REQUIRED TO SHOW CURRENT MERCHANDISE. The newest and latest receiving set models and accessories will be displayed and demonstrated at the show and in hotel demonstration rooms, for the trade to see what the manufacturers offer for the coming season.

25,000 radio manufacturers, jobbers and dealers expected to attend.

Reduced railroad rates—special trains.

Official hotels—Stevens Hotel (headquarters), Blackstone, Congress and Auditorium Hotels, all within short walking distance on Michigan Avenue.

INDUSTRIES AND EXHIBITIONS

Radio industries, June 8-12—RMA, National Federation of Radio Associations and Radio Wholesalers Association.

Music Industry Convention and Show—June 15-17.

Institute of Radio Engineers Annual Convention—June 3-6.

Annual national "Furniture Mart" with 25,000 furniture buyers, jobbers, dealers and manufacturers—June 1-15.

Entertainment galore for visitors—Make a trip to Chicago for business and vacation combined.

Apply now direct to hotels for room reservations.

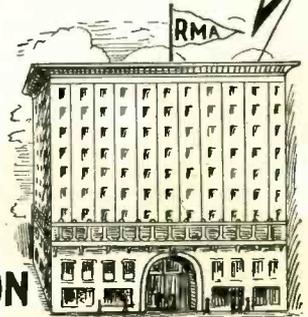
Invitation credentials for the trade show will be mailed to the trade about May 1st.



CONGRESS HOTEL

RADIO MANUFACTURERS ASSOCIATION

11-W. 42ND ST. N.Y. CITY 32 W. RANDOLPH ST. CHICAGO



AUDITORIUM HOTEL

Association



News

NFRA and RWA Conventions Successful

The 5th Annual Convention of the National Federation of Radio Associations and the Radio Wholesalers Association was held at Indianapolis, Indiana, February 15-17th, 1931, inclusive. The meeting was attended by over 450 visiting radio tradesmen from all over the United States. Large delegations came from Philadelphia, Boston, Cincinnati, Milwaukee, Chicago, St. Louis and other points.

The convention lived up to its pre-releases as being a "down-to-facts and remedies" convention, and there can be no doubt but what the associations took aggressive steps to remedy existing evils.

Among the resolutions adopted by the National Federation of Radio Associations and the Radio Wholesalers Association the following excerpts will be of interest to the dealer:

That a promotional fund (detailed description omitted here) be used.

(a) To inaugurate a regular bi-weekly or monthly broadcast program, as revenue will permit, of such national interest as to give that great mass of the American public that does not now own modern radio receivers, or receivers of any kind, the urge to buy.

(b) To carry on a consistent advertising campaign in national magazines and newspapers to inform the public of all programs of national interest and of other reasons why every American household, office and factory should possess at least one modern radio receiver.

(c) To furnish the radio retailer, by means of this activity, with a definite and concrete program which he can exploit and use to decided advantage in the profitable selling of radio receivers.

That set manufacturers, in their written contracts, verbal agreements, declared policies and price guarantees be duly mindful that there are two contracting parties with rights and desires that must be recognized so as to be fair to each other.

That the R. W. A. wishes to go on record as being definitely opposed to the practice of some manufacturers demanding definite purchasing quotas from their distributors for a period of six months to one year. It is our opinion that distributors should place estimates 60 days in advance and firm orders 30 days in advance in order to give manu-

facturers an opportunity to adjust production schedules.

That distributors and dealers are entitled to a price guarantee protection in their contracts because the distributors costs are set by the manufacturers and are therefore the manufacturers responsibility.

That the R. W. A. recognizes the justification of manufacturers requiring that each distributor maintain a properly equipped and efficient service department.

That when a manufacturer finds himself in the position where he considers it necessary to liquidate an overstock of certain models he will first offer to his authorized dealers through his distributors such merchandise at the same prices the manufacturer could otherwise obtain in the open market.

That this association request, urge and demand that radio set manufacturers undertake to:

(a) Exert precaution in market analysis to most conservatively plan their production program.

(b) Secure reports from their distributors weekly showing inventories on hand and sales of units to dealers.

(c) Eliminate as much as possible that element of gamble or luck in calculating their potential sales.

The best interest of the Radio Retail buyer and the Radio Trade will be best served by the Radio Set Manufacturer advertising and pricing Radio Sets including the necessary tubes for initial equipment, and that suitable provision be made by the Radio Manufacturer to pack such tubes with every set and to identify each tube as a part of his Radio Set Equipment.

Radio Better in Sales and Programs

Indianapolis.—Radio sales in 1930 were estimated at between \$550,000,000 and \$600,000,000 and regarded as satisfactory under existing conditions, according to statements of Bond Geddes, Executive Vice President of the Radio Manufacturers Association, in addressing the annual national convention of radio jobbers and dealers. Several hundred of the leading radio distributors were present for the annual meeting of the National Federation of Radio Associations and Radio Wholesalers Association.

The radio business is already picking up, according to the manufacturers' spokesman, through the virtual liquidation of much reduced surplus stocks and disappearance of "bargain" receiving sets. Mr. Geddes said that the surplus carried over into 1931 was very much smaller than that of the previous year and that manufacturers' warehouses now were virtually clear and new 1931 products well under way.

"Our record for 1930 was not bad at all," said Mr. Geddes, "considering that radio was hit harder than almost any other industry and also considering the general business conditions. Our estimated 1930 sales of between \$550,000,000 and \$600,000,000 were most satisfactory, everything considered, and compared with around \$835,000,000 in the big year of 1929."

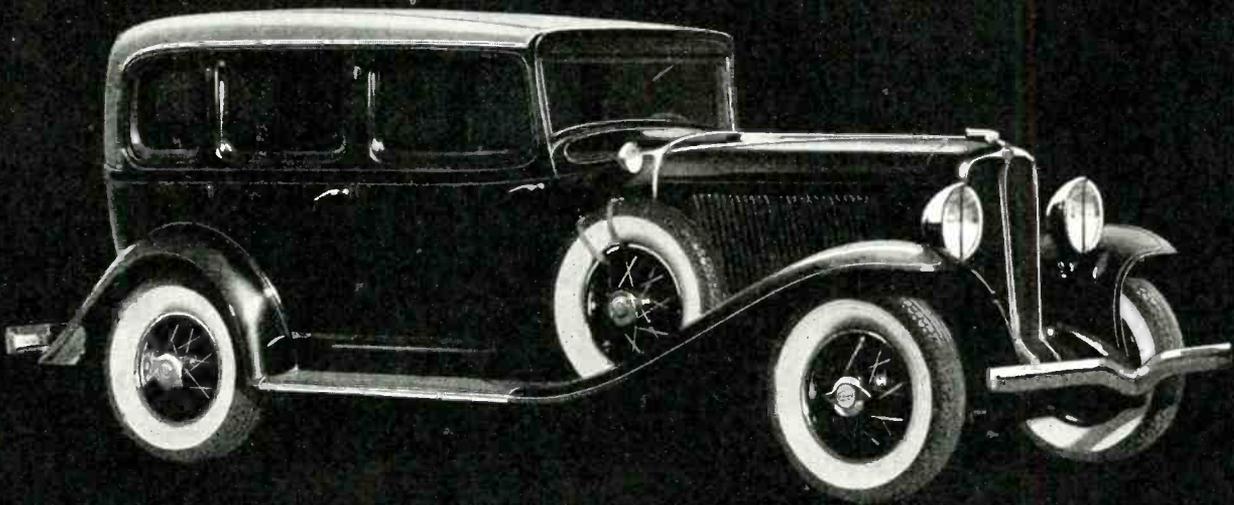
New York and Philadelphia Radio Service Managers Associations Join Hands

A working agreement has been reached between the Radio Service Managers Association of 17 West 60th Street, New York City and the Philadelphia Radio Service Managers Association of 1211 Chestnut Street, Philadelphia, Pa.

By this agreement, the Philadelphia association will use the same set of questions in the examination and certification of service men as is used by the New York association. The grades of the two organizations have been so adjusted that each organization will have equivalent grades and an interchange of certification cards has thus been made possible.

This is the first definite move toward the nationalization program sponsored by the R. S. M. A. which will be followed by the holding of a meeting of service men and service managers in the City of Pittsburgh on February 3rd for the purpose of establishing an R. S. M. A. branch organization in that city.

It is the object of the R. S. M. A. to build up, in the service branch of the industry, an organization that will be to that branch of the industry, the equivalent of the R. M. A. to the manufacturing group and the N. F. R. A. to the merchandising interests. This is the first real effort that has been made to form a National unit devoted solely to radio service and service problems.



It has remained throughout all history, the most prized of man's possessions—a Good Name! Mere money cannot purchase it, nor can this surpassing reward be had for the claiming. To be won, it must be deserved, and it can be held only through keeping faith. Five brand-new Straight Eight Models have been created, not simply for the temporary aim of excelling competition, but for the enduring purpose of adding new luster to, and wider confidence in, the good name of Auburn.

All Custom Models Have Free Wheeling

AUBURN AUTOMOBILE COMPANY, AUBURN, INDIANA

AUBURN
POWERED BY LYCOMING

Custom models 8-98A: 5 pass. 2-door Brougham \$1145; Business Man's Coupe \$1195; Convertible Cabriolet \$1245; 4-door Full Sedan \$1195; Convertible Phaeton Sedan \$1345. All custom models include Free Wheeling. Standard models 8-98: 5-pass. 2-door Brougham \$945; 4-door Full Sedan \$995; Convertible Cabriolet \$1045; Convertible Phaeton Sedan \$1145; Business Man's Coupe \$995. All prices f. o. b. Connersville, Indiana. Equipment other than standard, at extra cost.

Tell them you saw it in RADIO

Presenting . . .
THE MID-WAY
 FEATHERWEIGHT



"STANDARD" SIZE
 CARDWELL XMITTING—
 15 oz.



MID-WAY XMITTING—
 5 oz.
 Note difference in Bulk.
 Both photos same scale.

Receiving condensers 26 to 365 mmfds. capacity, airgap .030", occupying a panel space of only 2 3/4" x 2 1/8" and weighing from 4 to 7 ounces. (Suitable also for transmitters using '10 type tubes).

Transmitting condensers, equally compact and light, for transmitters using up to 75 watt tubes, capacity from 22 to 150 mmfds. airgap .070".

Particularly suitable for aircraft receiving and transmitting equipment, portable sets, oscillator-amplifier outfits or for any use where reduction in weight and bulk is desirable with no

sacrifice in solidity or strength. The construction is identical with that used in the full size CARDWELLS.

Further particulars will be sent upon request.

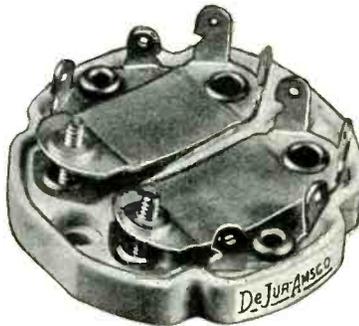
CARDWELL CONDENSERS

»»««

The Allen D. Cardwell Mfg. Corp.
 87 Prospect Street Brooklyn, N. Y.
 "THE STANDARD OF COMPARISON"

VARITOR

ADJUSTABILITY AND PERMANENCE
Effectively Combined for
 STABLE CIRCUIT OPERATION



Advances in radio receiver and oscillator circuits have necessitated the development of semi-variable condensers of an order of excellence far exceeding the elementary devices of the early ganged tuning condenser era.

The DeJur-Amsco Varitor is designed to fulfill the following requirements of the semi-variable or "fixed variable" capacitor in modern radio frequency and super-het circuits:

1. Adequate variation in capacity.
2. Adequate total capacity.
3. Permanence of adjustment, preferably secured by locking.
4. Rapid but micrometric adjustment.
5. High electrical efficiency.
6. Adaptability to production specifications and methods.
7. Absolute guarantee against mechanical or electrical fault requiring replacement.

Write for Booklet Giving Complete Specifications

DeJUR-AMSCO CORP.

Varitors—Variable Condensers—Power Rheostats

95 Morton Street

New York City

Guaranteed for 60 Days!



ARCTRON

SENSATIONAL



Radio Tube Offering

201A	35c	200A
199V		226
199X		224
120		227
WD11		245
WD12		280
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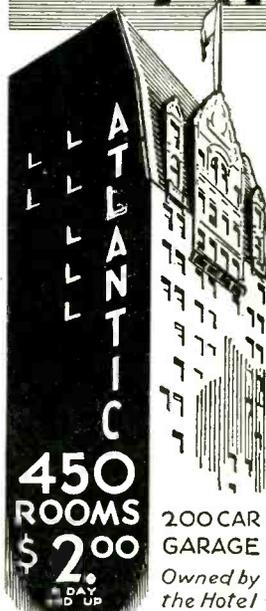
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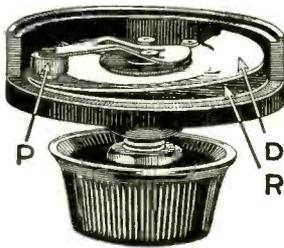
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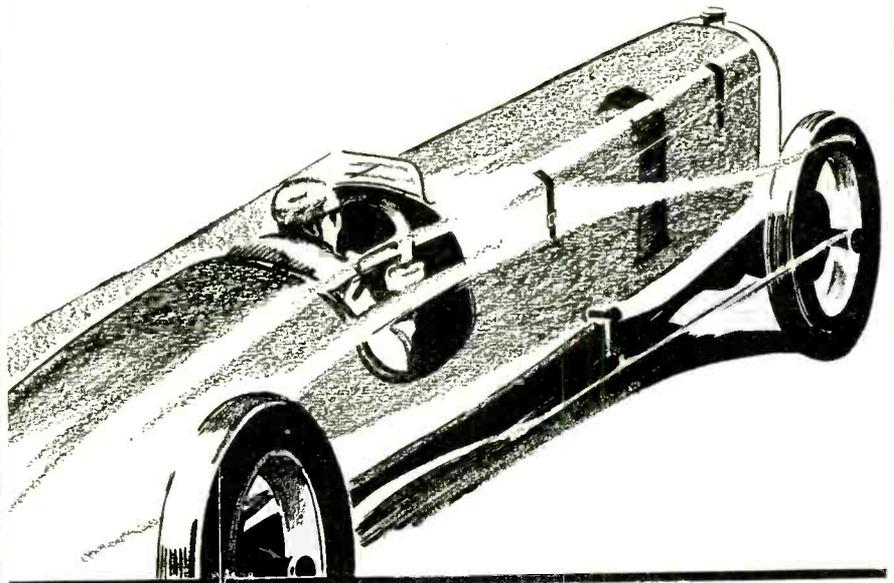
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SECTION II

MARCH, 1931

SERVICE USE for V. T. VOLTMETER

As Described in RADIO for January, 1931

(Continued from the February issue)

By B. E. ESTES

AUDIO frequency measurements are made as shown in Fig. 2. The vacuum tube voltmeter is connected to the output of the audio amplifier in the same manner as in Fig. 1 (February RADIO). The extra terminals on the calibrating panel are connected to

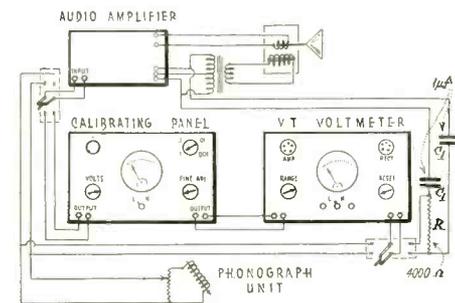


Fig. 2

the input terminals of the audio amplifier so as to furnish a source of calibrated a-c voltage for measurement use. Of course the amplifications measured by this means will be the amplification at 60 cycles.

The ratio arm of the calibrating panel is set on the .1 position and the voltage control varied until there is an output of 14.1 volts across the speaker. As this input voltage can be read directly from the meter on the calibrating panel, the amplification will be the ratio of the input volts to 14.1 volts. For instance, if it took an input voltage of .05 volts to give an output of 20 volts, the amplification would be $\frac{20}{.05} = 400$. The

same arrangement can be used to measure the amount of output power the amplifier will handle without distortion. A milliammeter of preferably 0-1 ma scale or less is connected in the grid circuit of the power tube as shown in Fig. 3. The input voltage is increased

until the milliammeter begins to deflect, showing that the grids are being made positive by the input voltage. The output voltage is then read and the power in watts found from the equation

$$W = \frac{E^2}{R}$$

The input voltage necessary to cause overloading can be read so that the maximum requirements of the detector or the phonograph pickup unit may be found. Since these measurements are taken at 60 cycles, they will not agree with the manufacturers' figures as their measurements are usually made at 400 cycles.

If it is desired to take fidelity curves it will be necessary to use a calibrated audio frequency oscillator, preferably of the beat frequency type. As the cost of such oscillators is quite high and the home-made type is very difficult to calibrate, it is suggested that a good phonograph pickup be used in conjunction with Victor frequency records which give a series of constant amplitude frequencies and can be easily used for this purpose.

It will be necessary to use a D. P. D. T. switch to transfer the vacuum tube voltmeter from the output to the input circuit of the amplifier. There are

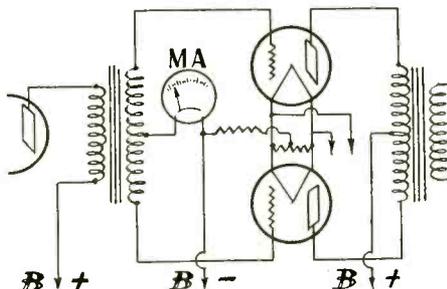


Fig. 3

two ways of plotting the fidelity curve; one is to maintain a constant input at all frequencies and to plot the output voltages against frequency, and the other is to maintain a constant output at approximately the full undistorted output

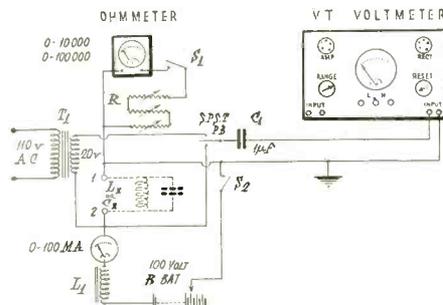


Fig. 4

of the amplifier by means of a volume control across the pickup unit. From a standpoint of convenience, the consistent input method is the best. The input voltage should be of such value that the tubes will not be overloaded at any frequency.

From the standpoint of service, the curves are somewhat superfluous and it should be sufficient to check an amplifier at a few frequencies distributed throughout the audio band, say 60, 500, 1000, 3000 and 6000 cycles. If curves are made, the output voltage should be plotted against frequency on logarithmic paper. These same records may also be used to check the output of phonograph units at the different audio frequencies, the vacuum tube voltmeter being connected directly across the phonograph unit as the records are played. A note book with the output value of different phonograph units at different frequencies will be valuable for service comparison work.

The inductance of filter chokes or a-f transformers and the capacity of

filter condensers may be measured by the use of vacuum tube voltmeter and the auxiliary apparatus shown in Fig. 4. T_1 is a step down transformer which will supply around 20 volts from the commercial lighting circuit. R consists of three variable resistors in series with each other, of 0-100, 0-1,000 and 0-10,000 ohm ratings. The reason for using three different resistors is that it is possible in this way to obtain the value of any resistance from 0 to 100,000 ohms accurately without having the range on any one resistor crowded. Across these variable resistors is connected a double range ohmmeter with a 0-10,000 and a 0-100,000 ohm scale to be used for measuring the resistance to which R is adjusted. The switch S_1 is for the purpose of disconnecting the ohmmeter while balancing the circuit.

The theory of the arrangement is that the unknown capacity or inductance is connected in series with the resistor across the transformer. Since they are both in series and have the same current flowing through them, there will be the same voltage drop across each if the resistance R is equal in value to the reaction of the condenser or the inductance. Since the resistance of R can be readily measured, the value of the reactance can be determined and from that the inductance or capacity may be calculated. Using X_1 as the inductive reaction, the inductance L may be found

$$L = \frac{1}{6.28 \times f \times C} \quad \text{from the equation}$$

assuming that the frequency of the lighting circuit is 60 cycles. Likewise the capacity C may be found from the capacitive reactance X_c by the equation

$$C = \frac{1}{6.28 \times f \times X_c} \quad \text{The table given below will serve to give the equivalent reactance of the more commonly used values of inductance and capacity. The value of } L \text{ derived will not be exactly accurate as the effect of the direct current resistance of the choke has not been taken into account. However, for practical service work this may be neglected. If it is desired to check more closely, the resistance of the choke coil should be measured with the ohmmeter and the true reactance found from the impedance } Z, \text{ which is measured by the vacuum tube voltmeter by means of the equation } X = \sqrt{Z^2 - R^2}.$$

low will serve to give the equivalent reactance of the more commonly used values of inductance and capacity. The value of L derived will not be exactly accurate as the effect of the direct current resistance of the choke has not been taken into account. However, for practical service work this may be neglected. If it is desired to check more closely, the resistance of the choke coil should be measured with the ohmmeter and the true reactance found from the impedance Z , which is measured by the vacuum tube voltmeter by means of the equation $X = \sqrt{Z^2 - R^2}$.

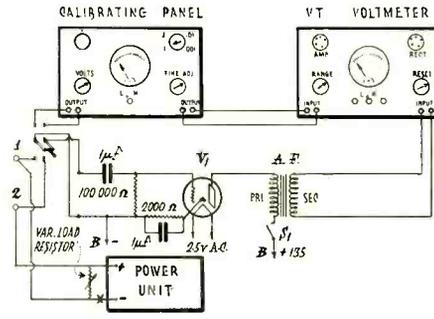


Fig. 5

In operation the capacity or inductance to be measured is connected across the posts 1 and 2. The resistance R is then varied until the S. P. D. T. push button can be changed from one position to the other without changing the needle of the milliammeter in the vacuum tube voltmeter. The switch S_1 is then closed and the value of R is measured by means of the ohmmeter.

If it is desired to measure the inductance of a choke coil at any given flux density, the operation becomes more complicated. The circuit controlled by the switch S_2 is used to supply the direct current for the choke coil and consists of a 100-volt bank of B storage batteries, a 0-100 ma range meter and the choke L_1 , which should have a calibration curve showing its reactance at different values of flux density. If such a choke is not available, one can be calibrated by securing two similar chokes of about 50 henrys inductance and current capacity of at least 80 milliamperes. One choke is used at L_1 and the other connected across posts 1 and 2. A number of measurements are then made at different currents, starting at about 5 ma and running up to 100 ma. Since the two chokes are of the same inductance and are connected in parallel to each other, the reactance measured will be one-half the reaction of one choke and all readings taken by the ohmmeter should be multiplied by two. If many measurements are to be made on audio transformers, it would be advisable to use a choke of at least 200 henrys and 10 ma current capacity in the place of L_1 securing its calibration curve in the manner outlined above.

After the calibration curve is made on L_1 , the inductance of any choke measured while S_2 is closed may be

$$\text{found from the equation } X = \frac{X_1 \times X_2}{X_1 - X_2}$$

where X represents the reactance of the choke being measured, X_1 the resistance of L_1 and X_2 the measured reactance of the combination.

It will be found that an inductance test of a choke coil or an audio transformer will clear up many cases of heretofore unexplainable trouble, as shorted turns in such devices will show up by low inductance measurements and will reduce the working efficiency as well as affect the tone quality of a receiver. It might be mentioned here that in order to get a true idea of the effective inductance of any device, it is necessary to measure it with a direct current, equivalent to the normal current used in it while in operation.

The vacuum tube as connected in Fig. 5 may be used to measure the ripple voltage of power packs or the hum voltage of heater type tubes. $A-F$ is an audio frequency transformer and should be of the better type of 2 or 3 to 1 ratio so that there will be sufficient amplification at 60 cycles. The secondary of this transformer is connected to the vacuum tube voltmeter and the primary is connected to the plate circuit of a '27 type of tube V_1 . The grid circuit of V_1 is made through a 100,000-ohm resistor and is coupled through a $1 \mu f$ condenser to a D. P. D. T. switch so that the input to the tube may be connected to either the power pack on which the measurement is being made, or to the calibrating panel.

In operation the switch is kept in a neutral position and the milliammeter in the vacuum tube voltmeter adjusted to a zero position. The input of V_1 is then connected to the power unit and the reading of the vacuum tube voltmeter taken. The switch then connects V_1 to the calibrating panel and the voltage is adjusted until the reading of the vacuum tube voltmeter is the same as it was with the power unit connected. The voltage output from the calibrating panel will then be the ripple voltage of the power pack. The ripple voltage should be read when the power pack is under a load equivalent to that of actual use. A curve may be plotted with the ripple voltage at different loads, as 20, 60, 80 and 100 milliamperes.

The hum voltage of the tube V_1 may be measured by leaving the D. P. D. T. switch in the neutral position, opening the switch S_1 and adjusting the milliammeter in the vacuum tube voltmeter to zero. The switch S_1 is then closed and the voltage indicated by the vacuum tube voltmeter read. The hum voltage of the tube will be the indicated voltage divided by the step-up ratio of the audio frequency transformer. It is needless to say that either dry B batteries or B storage batteries should be employed for the plate supply of V_1 during these tests. If it is desired to make a test on a screen-grid tube, resistance coupling may be

(Continued on Page 55)

Condenser Capacity in Mfds.	Reactance in Ohms at 60 Cycles	Coil Inductance in Henrys	Reactions in Ohms at 60 Cycles
0.01	266600	0.5	188.5
0.1	26660	1.0	377
0.5	5332	2.0	754
1.0	2666	5.0	885
2.0	1333	10.0	3770
4.0	666	20.0	7540
8.0	333	30.0	11310
10.0	267	40.0	15080
		50.0	18850
		100.0	37700

INDUCTANCE AND REACTANCE TABLE

Sell Something on Every Service Call

By J. EDWARD JONES

Practical directions for installing additional speaker and pick-up units.

ONE problem facing the radio dealer today is how to increase revenue that can be directly applicable to the service department. One solution to this problem, and the only one with which we will here concern ourselves, is increased service sales.

Ninety-nine per cent of all service calls made are just that—service calls, while everyone could be a sale prospect.

upstairs, the sun porch, etc. The entree is obtained, intelligent salesmanship will do the rest.

To continue with the additional speaker, if the customer came right out and asked for one, would the average service man know what kind to recommend? Would he know the cost, and, still further, would he know how to install it on the particular set in

were made to obtain additional field supply from the set, therefore a speaker supplying its own field from the a-c line with either disc or tube rectifier is desirable. The dynamic is chosen because most sets have dynamic speakers already installed and the external speaker should be capable of as good reproduction as the one in the set itself, and the customer can be sold this idea. All service men should have such a speaker available, with its price, installation charge, etc., at his finger tips.

In installation, the output transformer must be located. Usually it is in the set, but sometimes it is an integral part of the speaker. All connections are associated with the primary of this output transformer.

The external speaker must have its own output transformer. Referring to Fig. 1, the external primary can be put either in series or in parallel in *a* and *c*. We prefer series for simplicity of operation because it allows easy manipulation of one or the other or both speakers. See Fig. 2, *a* and *b*. We have simple single pole double throw switches. With switch in neutral, both speakers operate; position *Y*, set speaker only operates; and with the switch in *Z* position, only external speaker operates.

With the two primaries in series also, the impedances are better matched. Theoretically the maximum output is obtained when the load impedance matches the output impedance of the output tube, but on the other hand the output impedance curve of Fig. 3 shows that almost full undistorted output is obtained when the load impedance is double that of the plate impedance.

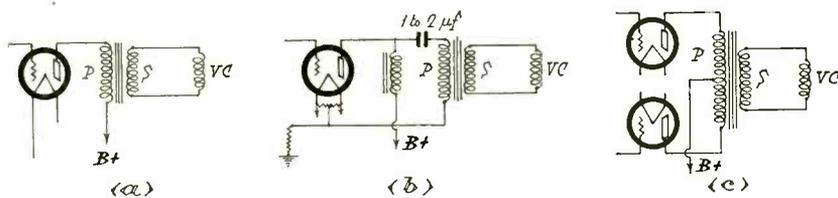


Fig. 1. Methods of Output Coupling.

A service man makes a call on a sick radio; he adjusts, mends or fixes whatever he may find wrong; undoubtedly does his best to put the set into its original condition; nonchalantly obtains a signature and walks out. Perhaps he administers a few pats on his own back for a job well done, and he did a good service job, but if he is an average service man he did a poor sales job and he should be one of the best salesmen employed by his boss.

Firstly, did he attempt to obtain additional prospects, friends, relatives, etc., of his recent customer? Did he intelligently sound out his customer regarding a new late model set if the one just serviced was an old one? Again, on the average—no.

Secondly, and to arrive at the idea of our title and the meat of our story, did he attempt to sell accessories? No? We thought not.

Radio has reached the all-in-one cabinet stage, no more table models, no more separate speakers, therefore no more long extension cords allowing the speaker to be transported with various members of the family—to the kitchen to cook the dinner, to the dining room to eat it, and to the lounge or garden to digest it. The solution? An additional speaker or speakers. Who should sell it? The service man.

There is another point to be brought out before we continue. There are many homes contacted by the service man and never by the dealer or his regular salesmen that are large enough for two sets, especially with the advent of the midget. The maid's room, the den

question? Judging from the innumerable questions on the subject, our answer is No! No! No!

The technical knowledge required to install an additional speaker on any set is exceedingly small, yet it seems to be an unknown quantity. We can put this lack of knowledge to plain negligence, not inability. It is in the same class with lack of knowledge on prices, types handled by and available to the firm, etc.

All we need know about any set upon which we wish to install an additional speaker is the output system. Fig. 1 shows the usual output hook-ups. Ninety-nine per cent of the sets on the market use one or the other of these forms of coupling.

WHAT type of speaker should we use? An a-c dynamic is strongly recommended. Difficulty would be experienced in many instances if attempts

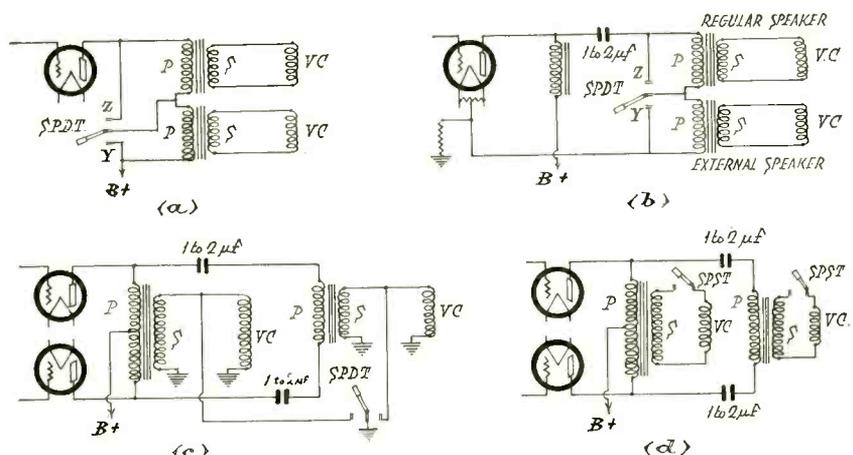


Fig. 2. Methods of Connecting an External Speaker.

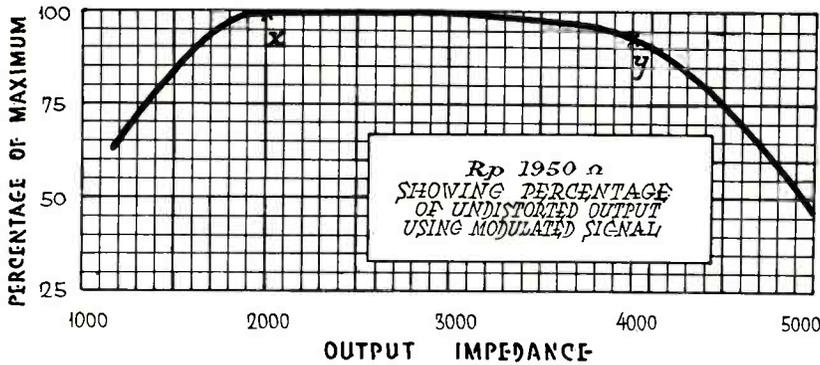


Fig. 3. Output Impedance Curve.

The primary impedance of most internally installed speakers falls around X on the curve, while with an external speaker connected in series the output impedance falls at Y. This shows plainly that the impedance of the two in parallel would fall far down on the

Now the other service man's sale item—the magnetic pickup. Dealers should have one or two makes available and service men should know prices, etc. Electro-magnetic pickups are divided into two fairly distinct classes, commonly called "high im-

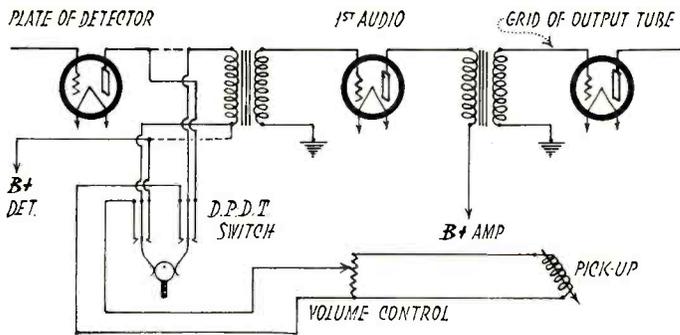


Fig 4
Jonas

Fig. 4. Connection of Pickup Unit to Sets With Two Audio Stages.

slope of the curve, as well as presenting other difficulties.

The one reliable method for connecting an external speaker to a push-pull output is shown in Fig. 2 c. Here a different type of switching must be used. One side of the voice coil can be grounded, in fact it is in many sets. Also, one side of the voice coil of the external speaker can be grounded. Therefore, with ground common, such an arrangement as Fig. 2 c could be used, but this would necessitate an additional wire to the external speaker. Therefore, it is a better arrangement to use a single pole single throw switch connected in the voice coil circuit of each speaker, as shown in Fig. 2 d.

Magnetic speakers can be used externally instead of the dynamics. In Fig. 2 a and b, an output transformer should be used, with a primary impedance matching that of the tube and a secondary impedance matching that of the speaker to be used. In the push-pull output system it can be placed in place of the dynamic as in Fig. 2 d without an additional transformer. The switching arrangement remains the same, except in d where the external speaker switch is placed directly in the speaker circuit.

pedance" and "low impedance," depending upon the coil around the armature. Both must work into an impedance approximately that of the coil.

The high impedance type works well directly into the primary of an ordinary audio transformer, although for quality's

sake a fairly low ratio between primary and secondary is advisable, say not more than 1 to 3. The low impedance pickup requires a special transformer having a very low impedance primary but a ratio as high as 1 to 60 can be used.

As with speakers, installation of pickups varies with certain definite set characteristics and has nothing to do with the name.

First, sets using two stages of transformer coupled audio: With all of this class the high impedance pickup is used, connected as shown in Fig. 4. The

dotted lines show original connections. A SPDT switch can be used in place of double pole shown if desired, but the latter is safer from grounding and from hand effect.

Next, we have the power detector, one audio stage, group, which is by far the largest and most important. It makes no difference whether one output tube is used or whether two tubes are used in either push-pull or parallel. The recommended pick-up arrangement is the same. See Fig. 5. The secondary of the pickup transformer is connected in series with the grid return of the detector tube. By cutting in on the ground side of the coil, the effect of long grid leads is eliminated. The dotted lines show original connections, and it makes no difference that the usual variable condensers across this coil still remain grounded, as it has no apparent effect on voice frequencies.

The switch is laid out as a plain three-pole double throw switch for clarity sake. It should be a regular key switch leaving remaining contacts unused. One section of switch merely opens r-f plate circuit to kill radio end while using pickup. The 2000-ohm resistor shown parallels high bias resistor of power detector, thereby causing tube to function on the amplifying portion of its characteristic curve. Either high or low impedance pickup can be used in this arrangement, providing proper transformer is used.

One other type of amplification is making its appearance on the market—the Loftin White direct resistance coupled. In this circuit the high impedance pickup can be connected directly in series with grid return of detector without transformer, but low impedance

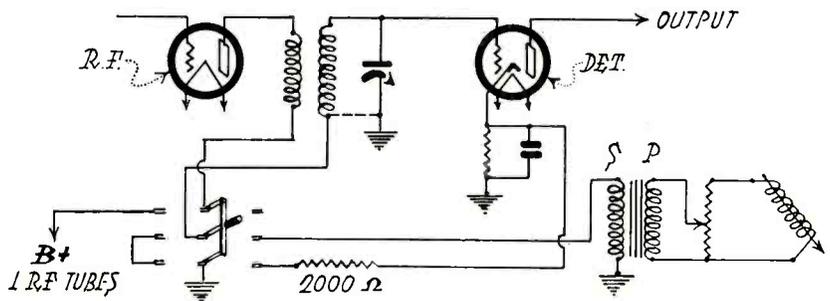


Fig. 5. Connection of Pickup Unit to Sets With One Audio Stage.

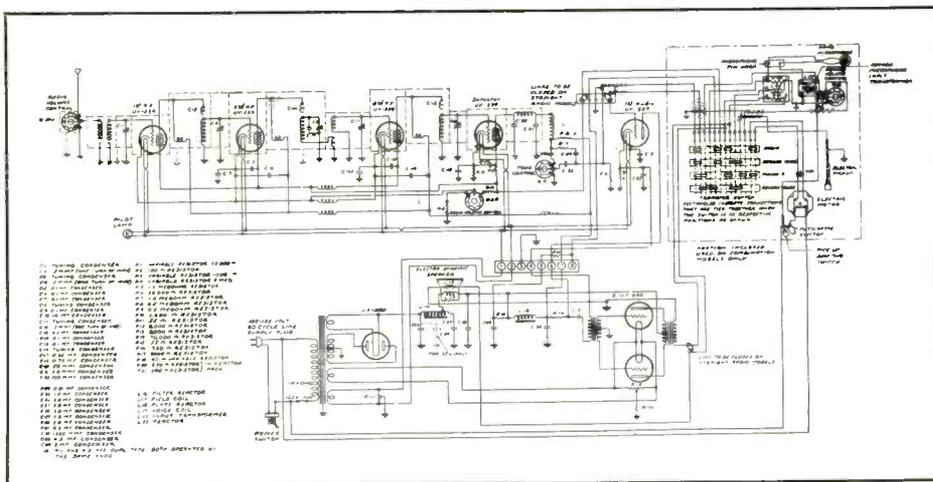
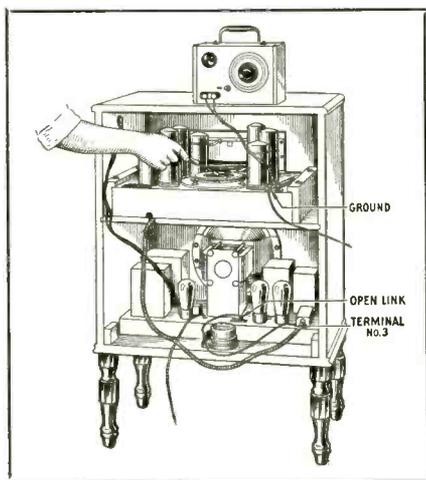
type should use transformer. The only thing to watch in this case is that grid return is connected through a condenser instead of direct, as per dotted line in Fig. 5.

With these pointers in mind in addition to full knowledge of prices and installation charges predetermined, the service man will be fully equipped to make many sales that are now slipping by the board.

More profitable service calls are needed to elevate the entire service business. SERVICE SALES is one answer.

Dealers' Specification Sheet for the Service Department

RCA-Victor Co. -Victor Division -Camden, Mass.



TROUBLE SHOOTING THE VICTOR R-35, R-39, RE-57

THE most unusual feature of the Victor receivers is the micro-synchronous tuning system. While this may seem complicated at first sight it is very simple to adjust with the proper tools. It merely provides a means of trimming for perfect resonance of all circuits at five different frequencies, the change at one frequency having little or no effect upon the alignment at other frequencies. For example, if the receiver is aligned at 550 kc, then tuned to 710 kc and aligned at that frequency, the alignment at 550 kc has not been effected. The next three frequencies at which the Victor should be aligned are 1000, 1300 and 1500 kc. If the stations do not come in at the right places on the dial all of the micro screws must be changed until they do. Improper alignment will result in lack of selectivity, sensitivity and poor tone quality. To do a good job of it the service man should use a modulated oscillator to provide the signal and a 0-4 or 0-8 a-c voltmeter across the voice coil for an output meter.

It will be noticed that on a powerful station the volume will decrease after the volume control has been turned past the so-called saturation point. This is normal, being designed to avoid blasting on too much volume.

If a bad hum is noticed the first place to look for the trouble would be in the '24 tube as detector, (the tube on the left and nearest to you as you face the back of the machine.) Frequently this may be used in one of the r-f sockets without trouble.

Distortion of tone is sometimes caused by a low emission '24 tube. Once you learn to recognize this particular "paper rattle" you will save a lot of time and trouble. Another cause of distortion is an improperly centered speaker cone.

This receiver is equipped with a fuse which will instantly blow out if, for example, a '45 is put into an '80 socket.

Other causes of hum are: Faulty '80 or '27; '45 tubes out of balance; a wire or terminal grounded to chassis, or open circuit in any of the various ground connections to

chassis; open or shorted center tap resistor in amplifier unit; short or partial short in one of the resistors mounted on the under side of the resistor board; shorted or open condenser in condenser bank or faulty connection to condenser bank; defective '80 socket; or faulty connection to tapped section of filter reactor.

A microphonic howl may be caused by a defective radiotron or the speaker not being properly felt insulated from the baffle. Raise the amplifier-speaker unit to obtain access to the felt and readjust the felt properly, making sure that the rim of the speaker is tight against the felt. Loose metal parts might also cause a howl.

Excessive noise may be caused by intermittent short or high resistance contact in any of the soldered joints or in the power switch connections; loose or defective pilot lamp or pilot lamp socket; shorted plates in tuning condenser; faulty power or audio transformer or intermittent short on filter or by-pass condensers.

Oscillation is the result of ungrounded or poorly grounded chassis; removal of shielding from any of the condensers, coils or tubes; too much unshielded exposure of green lead between control grid of '24 and coil; open circuit or poor ground in any of the .1 mfd by-pass condensers; or an ungrounded shield on shielded lead of radio chassis.

The cause of weak reception is usually a faulty antenna or ground connection or a short in one of those systems; low line voltage; low emission tube; or improper alignment of tuning condensers. Poor contact in a tube socket or grid cap will either cause weak reception or complete failure of the set to operate.

The thirteen pole transfer switch shown in the diagram changes from Radio to Record Radio to Phonograph to Record Voice. An understanding of this and its accompanying circuits will enable anyone to make repairs in the phonograph and recording apparatus of the receiver.

Service Use for V. T. Voltmeter

(Continued from Page 50)

substituted for $A-F$ and the proper screen voltage for V_1 taken off by a tap from the B batteries. A noisy tube may also be found by watching to see whether the needle of the milliammeter varies, as the arrangement is sensitive enough to show the variations in voltage caused by a noisy tube.

Quite often it is necessary to determine the *turns ratio of an audio or output transformer*. The arrangement shown in Fig. 6 enables this to be ac-

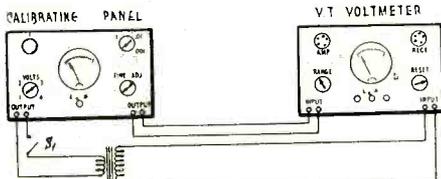


Fig. 6

complished very quickly. The input to the vacuum tube voltmeter is connected either to the primary or to the secondary of the transformer and the other winding to the extra terminals of the calibrating panel. A known voltage from the calibrating panel is put in one of the windings and the reading noted on the vacuum tube voltmeter. Switch S_1 is then opened and the calibrating panel adjusted to give the same reading as was had before on the vacuum tube voltmeter. The ratio of the two voltages from the calibrating panel is the step-up or step-down ratio of the transformer.

Switch S_1 is put in position number 2 and the 20,000-ohm potentiometer across the power unit is adjusted until the needle of the milliammeter indicates the same current as in position 1. The voltage read by the voltmeter connected across the potentiometer is the voltage across the resistor R_1 . Another application of this method is for reading the C bias of the first screen-grid tube or the power tube in a Loftian White circuit as the current across the resistors mentioned is usually on the order of 200 microamperes and an ordinary high resistance voltmeter would draw more current than was flowing in the resistor.

It should be kept in mind that the majority of these measurements described are for service comparison only and no attempt should be made to make a comparison of the working efficiency of dif-

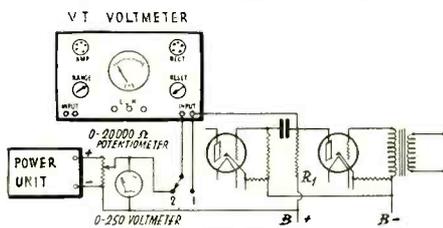


Fig. 7

ferent manufacturers' apparatus. Out of due consideration to these manufacturers, judgment of their apparatus

should be made only when precision type of apparatus is used, with an expert laboratorian making the measurements.

Another use for the vacuum tube voltmeter is to measure the direct current where, because of load conditions, it is not possible to draw any current from the source supplying the current through the resistor. Such a case is in the plate resistor of the resistance coupled audio stage shown in Fig. 7. The vacuum tube voltmeter is connected across the resistor, making certain that the lead which is connected to the grid of the tube in the vacuum tube voltmeter goes to the negative side of the resistor. Switch S_1 is in position 1. The range control is then adjusted until the needle of the milliammeter is at zero or some

other point on the scale which is taken as a zero or null point.

Due to an oversight of the author, an error appeared in the description of the calibrating panel in the January issue of RADIO. In the text was stated that a 6000-ohm potentiometer was used to adjust the voltage to the primary of the 10:1 transformer. In the diagram is shown a 400-ohm potentiometer and a 1000-ohm resistance, which is a 75-watt Electrad Tru Volt resistor. The taps on the resistor are adjusted by means of the sliding clips until each tap will cover a range of slightly over 3 volts. This method gives a much more exact judgment of the primary voltage as a fine adjustment can always be obtained by means of the 400-ohm potentiometer.

QUESTIONS and ANSWERS

By J. EDWARD JONES

Q. What is the principal advantage of using push-pull in the output power stage?

A. Because such an arrangement permits high peak grid swing, therefore allows greater power output than the same two tubes connected in parallel. Another advantage is that less filtering is required because the system balances out the second harmonic.

Q. What, in your estimation, is the cause of most noisy heater type tubes?

A. This has been found in most cases to be caused by intermittent shorts and leakages between cathode and heater.

Q. What are the major features to obtain in the installation of an electromagnetic pick-up on a receiver using a grid bias detector feeding directly into power stage?

A. The pick-up should be fed into the input circuit of the detector, either direct from a high impedance pick-up in the neighborhood of 5000 ohms or through a suitable transformer. A resistor should be cut in to parallel the regular biasing resistor of the tube, reducing the bias and causing the tube to function as an amplifier, and means should be taken to "kill" the r-f end of the receiver while operating the pick-up.

Q. Why is it that the mutual conductance of a '27 and a '24 is approximately the same, yet the amplification factor of the '24 is many times that of the '27?

A. The amplification factor of a tube is the product of the mutual conductance and the plate impedance. In the '24 type tube the plate impedance is very high, which accounts for the higher MU, although the mutual conductance is only slightly greater.

Q. What would be the maximum wattage of a speaker field of the shunt

type connected across the power pack of a set using an '80 rectifier, set using 1.45 and drawing normally 60 ma? What would be the limiting factor?

A. Limiting factor would be rectifier tube. Safe maximum load being 100 ma, therefore speaker could draw 40 ma. Usual voltage across filter of such a set is approximately 330 volts, therefore $W = EI$ on $330 \times .040 = 13.2$ watts.

Q. In the foregoing question the load would be maximum and unnecessary, therefore what would the resistance of the field have to be to limit the power to 10 watts and how many ma would then be flowing?

A. $A = \frac{W}{V} = \frac{10}{330} = 30.3$ ma, $R = \frac{E}{I} = \frac{330}{.0303} = 10,891$ ohms.

Q. How can the gas content of a tube be reliably measured and what units are used?

A. Gas in a tube can be measured, or rather arbitrarily estimated, in terms of grid current in microamperes, providing all other conditions relative to proper functioning have been maintained.

Q. In the average tube checker are correct operating voltages maintained while testing a tube?

A. No; tubes are checked with only filament or heater correct, but voltages of all the other elements with respect to each other are wrong, and the tube would not function if placed in a receiving set under similar conditions.

Q. How would you connect a magnetic speaker to a set using push-pull '45 output?

A. By connecting two $\frac{1}{2}$ to 2 mf. condensers, one to each plate of the '45s. The other side of each condenser being the connection for the external speaker.



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NEW FILTERETTE BULLETINS BY TOBE

The Tobe Deutschmann Corporation has recently published three new bulletins. One, the No. 500, is for the set owner and explains, with illustrations, how to make use of shielded antenna and ground wire and the Filterette 110PL. It is priced at fifteen cents but the Tobe Deutschmann Company offers to send it free to subscribers of RADIO who write them for it. The other booklets explain the elimination of interference from oil burners and automatic dial telephones.

Trapping Effect Caused by Tuned Power Lines

By F. D. ROWE

THE effect is a noticeable loss of signal strength of a certain station of known field strength and power, first taking into consideration the absorption possibilities of surrounding metal objects, trees, buildings, etc., at the location of the receiver. Signal strengths are best compared by field strength measurements made in the immediate vicinity. Human ear tests are of little value in measurements of loudness because ears are not all alike and for the same field strengths the volume will vary with the sensitivity of the receiver. To illustrate what the effect is we shall refer to two particular cases, one being somewhat different from the other.

KGO is supposed to have an approximate output of 10,000 watts and its field strength is in a general way known for any particular location within several miles around. We may refer to this as a rough check on how "loud" it generally comes in.

The receiver in this case was located about five miles away on the side of a hill, all current service lines to the house coming in underground. At certain times when the receiver was tuned to KGO, volume adjustment optional, the strength of this station would suddenly drop about one-half, accompanied by a very low hum. No set period of time would elapse when the volume would instantly return to normal.

Naturally, immediate conclusions were "set trouble," such as a defective tube, by-pass or filter condenser. A new set and tubes were installed with the same results. Before giving up entirely, there were four new sets (the same make and model) and dozens of tubes put in; results were always the same. Thus, we positively eliminated the "set trouble" conclusion.

Fading was also eliminated from the analysis, since the volume changed instantly if the aerial were disconnected and then reconnected while the receiver was operating and tune to the station. Removal of both aerial and ground, depending on "line pick-up" for signal voltage did not stop the volume from dropping, which then eliminated the antenna system from the analysis.

This brings us to the point in our discussion. The line supplying any house or building will have a certain amount of inductance and capacity, and a consequent fundamental wavelength. This "inductance" capacity circuit will represent a closed oscillatory circuit. It is well known that radio frequency currents are carried by power lines and in some receivers the volume cannot be materially reduced on account of this.

Now as to the receiver itself. Ex-

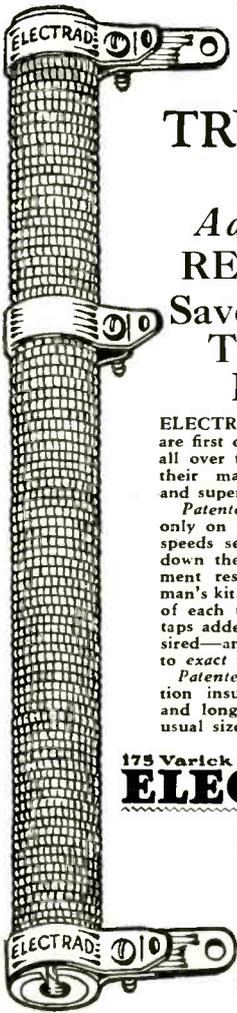
cluding the aerial pickup coil, the tuning apparatus on any set also is a closed oscillatory circuit which is adjustable to various frequencies, of course. A moment ago, we spoke of a power line as being an inductance containing radio frequency currents which forms a closed oscillatory circuit. We also mentioned "line pickup." We then could suppose the following. The receiver might be operating perfectly, and when the volume drop came we could suspect that a certain circuit in parallel with the same line the set was connected to had been either turned on or off, thus affecting the fundamental of that line, because when two closed oscillatory circuits are in resonance there may be absorption.

When a wavemeter is coupled too closely in the adjustment of a transmitter it can be made to literally burn up if the r-f current is powerful enough, this being by reason of the wavemeter being a coil-condenser combination forming a close oscillatory circuit, and when tuned to the transmitter's frequency, it absorbs a certain amount of it. Thus we may suppose the same effect regarding the "line inductance" carrying radio frequency currents, and the tuning apparatus in the receiver.

Our conclusions may be that the "line inductance" may have a fundamental wavelength that falls within the broadcast band and could, of course, be tuned by reason of other parallel circuits, which as mentioned before, would be turned on or off, thus tuning the line to that particular station. Then when the receiver is tuned to that station we would get the "trapping effect." Whether the observed effects are due to absorption of signal strength or that the signal is carried to the set in varying intensity by the house wiring is perhaps an open question.

The installation of a Tobe No. 110 P. O. line filter was a complete remedy by keeping out of the set the "line pickup," which, of course, threw it out of tune with the station.

A second case was somewhat different. The receiver was in perfect order, but the owner was complaining of line noise and KJBS would scarcely be heard even with the volume control wide open and discounting the percentage of interference. There was no intermittent dropping of volume as in the KGO case, but the station in question was always weak. The application of a Tobe No. 110 P. O. line filter reversed results and KJBS signal strength nearly doubled with corresponding drop in the line interference. Hence the same conclusions may be made as in the first case, the difference perhaps being a constant "semi-tuned" condition in the second case.



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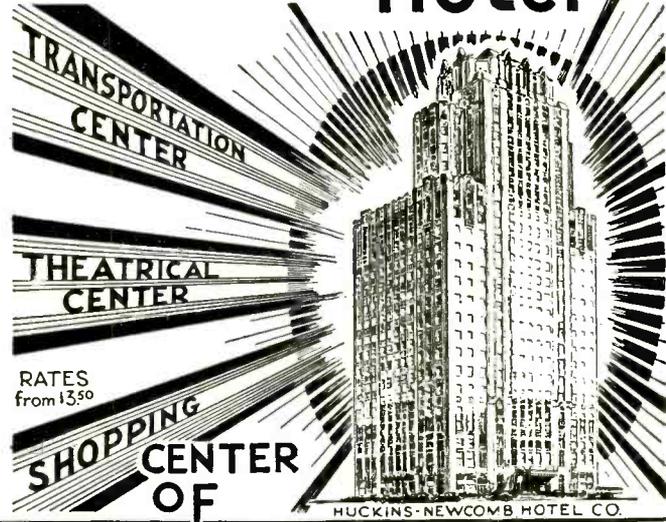
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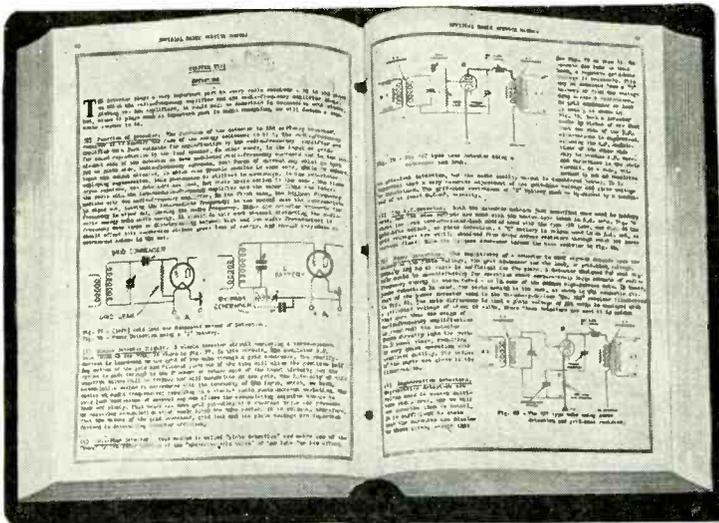


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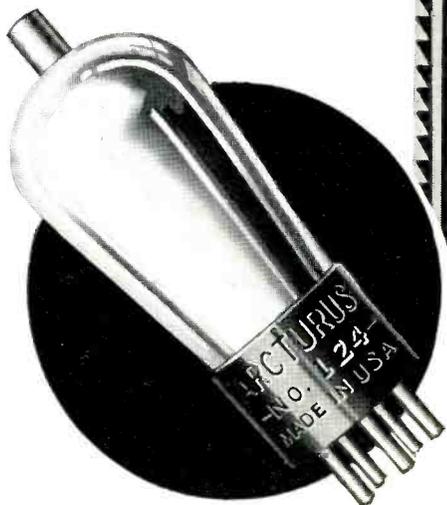
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