

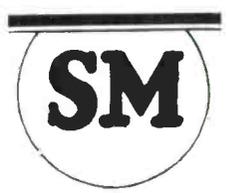
January, 1931

RADIO

REG. U.S. PAT. OFF.

THE NATIONAL TRADE MAGAZINE

1931 ADDITIONS



When the new Silver-Marshall Compact and CADET models were designed, the intention was to produce two radios that would take the "sell" out of selling and put "gimme" in its place. The results are everything we wanted and everything you'll want.

- PRICES are highly competitive—the lowest in Silver-Marshall history.
- SUPERHETERODYNE eight-tube chassis.
- THREE CONTROL.
- TONE CONTROL.
- LOCAL — DISTANCE switch.
- LOW NOISE LEVEL.
- MAXIMUM AMPLIFICATION—extreme sensitivity with more "bong" than any small-perheterodyne can give.
- TEN-KILOCYCLE selectivity that only a superheterodyne can give.
- MORE PROGRAMS per inch on the dial.
- ELECTRO-DYNAMIC SPEAKER.
- ILLUMINATED DRUM-JACK—an exclusive feature—making it possible to have the receiver in the living-room and additional speakers in any remote parts of the house.

No other receiver offers more—no other receiver offers as much—at any price. Beyond these "consumer" features, you are backed by a 99-Year Franchise and a liberal advertising allowance. Write for details and your distributor's name.



SILVER-MARSHALL

SUPERHETERODYNE

RADIO

6401 West 65th Street . . . Chicago U.S.A.



1931 Radio Service Work Demands a Portable Test Oscillator



WHY YOU NEED A TEST
OSCILLATOR

A Necessary Instrument for Adjusting All Receivers

Radio frequency circuits in both Tuned Radio Frequency and Super-heterodyne sets must be adjusted to greater accuracy than is possible by the use of a broadcast wave.

The Jewell Pattern 560 Portable Test Oscillator gives the radio serviceman the only method of making these adjustments accurately.

Simplicity of operation, hair-line accuracy and assured reliability are achieved by constructional and design features found exclusively in the Jewell Pattern 560 Portable Test Oscillator.

Features of the Test Oscillator You've Waited for!

Self-Contained Batteries

The self-contained battery operated oscillator is unquestionably the best type of construction, as it can be perfectly shielded. While it is possible to obtain the same degree of shielding in an A.C. operated job, the cost of construction would be higher. The self-contained battery job also has the advantage of not being dependent on any outside source of power.

Leak-Proof Interlock Shielding

Every part of the Jewell Test Oscillator is enclosed by a combination aluminum and copper interlocking shield. An oscillator with less shielding is unsatisfactory.

Broadcast and Intermediate Bands

The Jewell Pattern 560 Portable Test Oscillator covers the broadcast band from 550 to 1500 K. C. and the intermediate frequency band from 125 to 185 K. C. The Jewell Test Oscillator has been designed for testing every Super-heterodyne receiver built today, and provides for future design in that it covers the entire band from 125 to 185 K. C.

Pattern 560 Test Oscillator, complete with tubes, batteries and output meter. List Price, \$97.00. Dealers' Price, \$72.75.

Pattern 560 Test Oscillator without output meter. List Price, \$82.00. Dealers' Price, \$61.50.

Pattern 559 Output Meter only. List Price, \$15.00. Dealers' Price, \$11.25.

New '30 Type Tubes

Two tubes are used; one a radio frequency oscillator and a second to audibly modulate the radio frequency current generated by the first tube. Shielded tube compartments are of ample size and provide perfect shielding for the tubes themselves.

Output Meter

The Jewell Test Oscillator may be had with or without the Jewell Pattern 559 Portable Output Meter. The meter is carried in a pocket provided in the oscillator case. In use, it is placed near the receiver output circuit to which it is connected, eliminating long leads and preventing any possible coupling to the oscillator.

Easy to Operate

You do not have to study the instruction book to use the Jewell Test Oscillator. A wiring diagram and calibration chart is carried in the cover where it can never be mislaid.



To align gang condensers



To locate defective R. F. coils



To peak intermediate stages



To adjust oscillator trimmers



To make gain tests

30 YEARS MAKING GOOD INSTRUMENTS
JEWELL

Built to the same high standards as the Jewell Tube Checkers and Jewell Ser Analyzers

JEWELL ELECTRICAL INSTRUMENT CO.
1642-I Walnut Street, Chicago, Ill.

Please send bulletin describing the
new Jewell Portable Test Oscillator.

Name.....

Address.....

mail The
Coupon

FOUR-PILLAR TUBES . . . OR TWO?

WHEN THE RADIO-PUBLIC HEARS THE DIFFERENCE AND SEES THE REASON, THE VOTE IS OVERWHELMING FOR FOUR

WHAT'S under the glass? *There* is the vital difference in tubes. Eveready Raytheon Tubes have FOUR pillars supporting the fragile elements within the glass . . . FOUR points of support, instead of two. The stability of 4-legged Eiffel Tower, let us say, compared to the wobbly structure of the 2-legged goal-posts on a football field.

It all comes down to this: There are 4-Pillar tubes (Eveready Raytheons) and . . . all the others. Eveready Raytheons demonstrate their structural and SOUND advantages in the set in the owner's home. National Carbon Company tells you that Eveready Raytheon is here to stay — and grow and grow and grow. It is giving Eveready Raytheon

★ ★ ★

The Eveready Hour, radio's oldest commercial feature, is broadcast every Tuesday evening at nine (Eastern standard time) from WEAJ over a nation-wide N. B. C. network of 27 stations.

dealers the same strong support that four pillars give the tube itself.

Talk "four pillars." It's the new and modern thing in tubes, and a winner on every count.

Eveready Raytheons come in all types, and fit the sockets of every standard A. C. and battery-operated radio in present use. Ask your jobber, or write us for names of jobbers near you.

Information and sales-helps, designed for service-men's use, will gladly be sent to you free. Among them is a blue-print, giving engineering data on Eveready Raytheon 4-Pillar Tubes. Thousands of service-men are using this material to advantage. Write our nearest branch.

NATIONAL CARBON CO., INC.

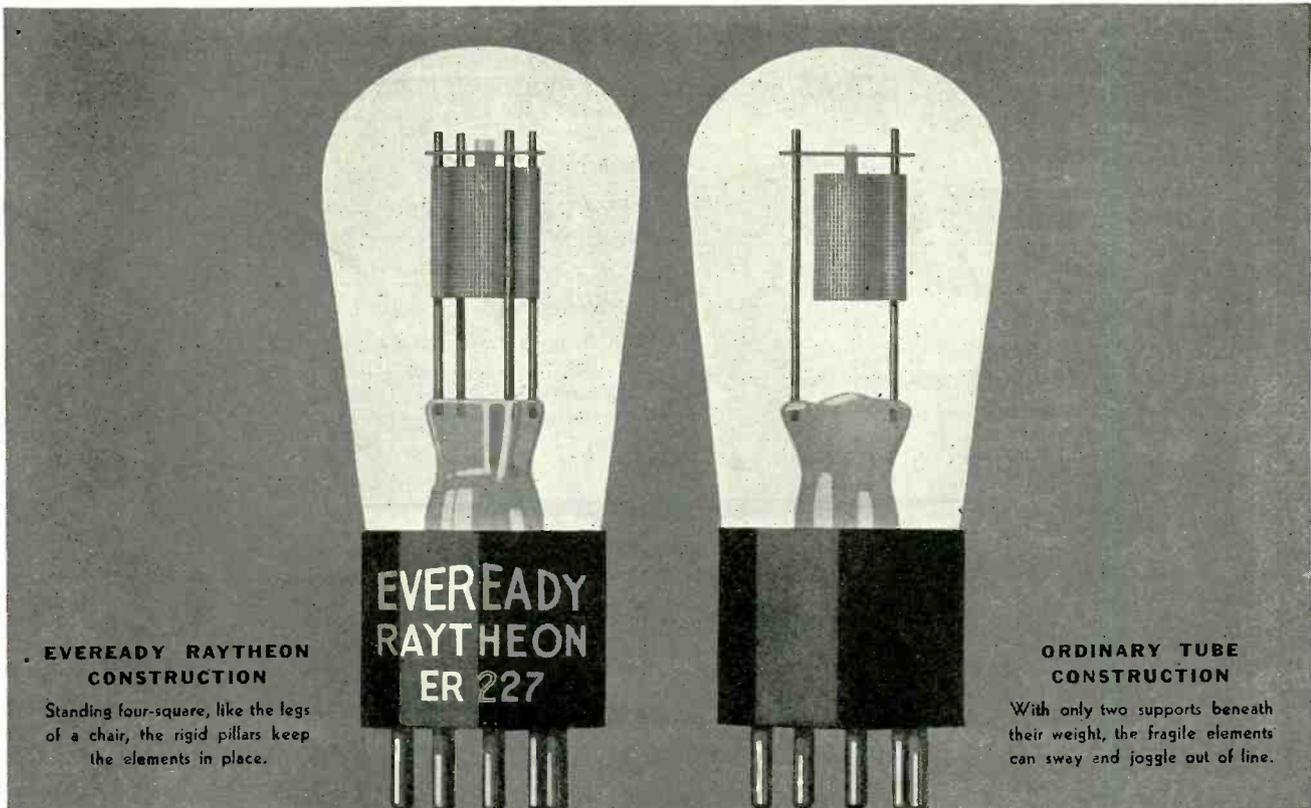
General Offices: New York, N. Y.

Branches: Chicago Kansas City New York
San Francisco

Unit of  and Carbon Corporation



Trade-marks



EVEREADY RAYTHEON CONSTRUCTION

Standing four-square, like the legs of a chair, the rigid pillars keep the elements in place.

EVEREADY
RAYTHEON
ER 227

ORDINARY TUBE CONSTRUCTION

With only two supports beneath their weight, the fragile elements can sway and joggle out of line.

Tell them you saw it in RADIO

Established
1 9 1 7

RADIO

REGISTERED
U. S. Pat. Off.

THE NATIONAL TRADE MAGAZINE

VOLUME 13



NUMBER 1

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P. S. LUCAS, Editor, H. W. DICKOW, Business Manager

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IT'S EASY TO IDENTIFY 1931 TUBES

① Look for Positive Characteristics

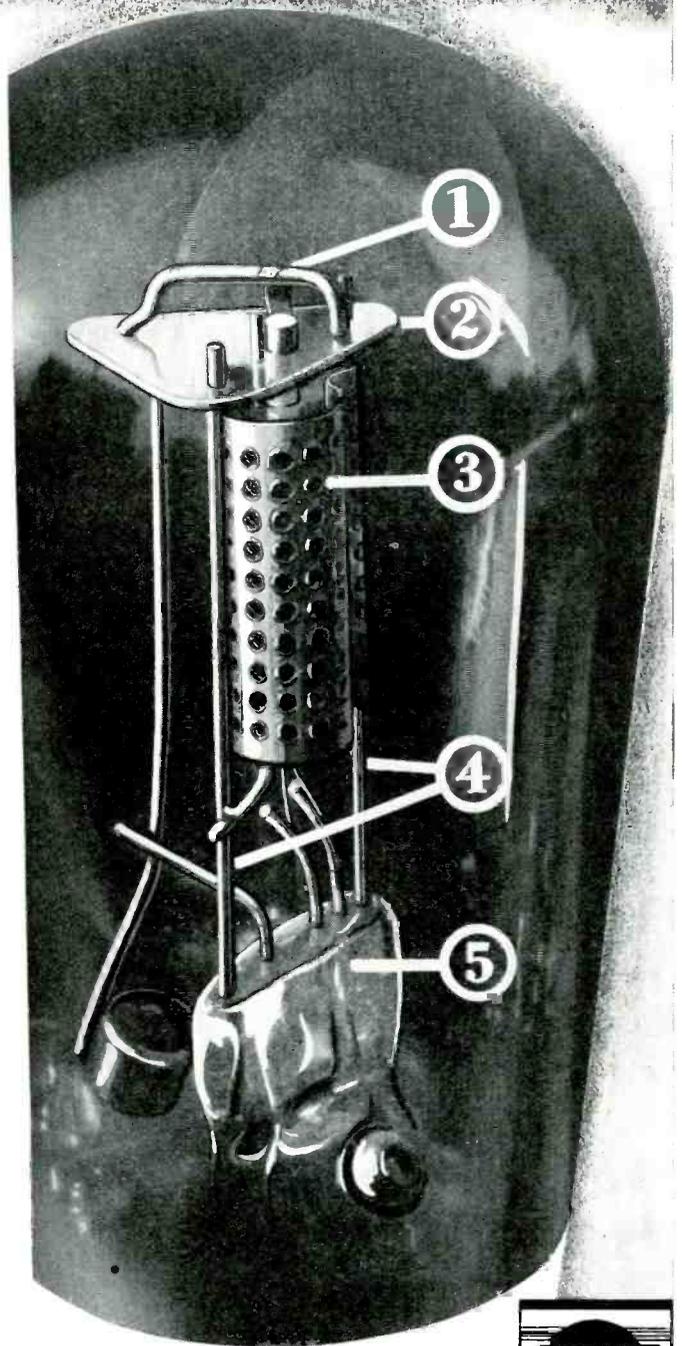
TUBES must do more than light, or ride on testimonials. From factory to ultimate socket, they must provide definite electrical characteristics precisely matched to radio set requirements at all times.

And that is the function of ultra-sturdy De Forest construction:

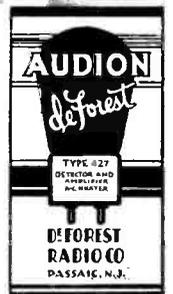
1. Nickel support wires of twice the normal diameter.
2. Heavy, accurately punched mica spacer positively positioning elements at top.
3. Perforated metal plate in place of wire mesh.
4. Heavier side supports providing ample rigidity four ways.
5. Special tempered glass press produced on unique De Forest automatic units, accurately mounting support wires.

These and other advanced features, found in *fresh* De Forest Audions—tubes produced a month or two ahead of sale—insure the 1931 performance of the 1931 radio set.

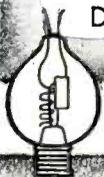
This is the first of a series of *debunking* messages dealing with 1931 radio tube features. Perhaps you would like the entire story at once. If so, we shall gladly send you our literature.



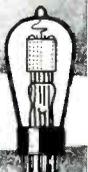
de Forest
AUDIONS
RADIO TUBES



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



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



YES SIR

THERE IS SOMETHING NEW IN THIS RADIO BUSINESS

AREN'T you tired of trying to sell people funny-looking, tinny-sounding "Midg-ets" and huge ungainly white-elephant orphaned sets—tired of flat "selling points" that don't mean a thing to Joe Prospect? Cheer up! There is something new in this radio business! Yes, sir!

Here's the new Clarion Model 70. Isn't it a beauty?

Listen: you never heard such beauty of tone...such true-to-life reality of reproduction...such selectivity...such sensitivity! It's amazing! When your customer sees this new Clarion and hears it...well, there's

nothing else to it besides hitting the cash register!

Clarion Model 70 illustrated on opposite page is priced at **\$87.50** complete with seven Clarion matched tubes—is something to make you sit up and take a lot of notice. Here's a set you can sell. Here's a set they'll buy . . . why, it has more talking points than any radio that ever came off a production line!

There isn't space here to tell you all about it. Write us—wire us—phone us—and all the information you can use will be yours at once. But hurry, folks, this is going to be the biggest selling set 1931 will see!

P. S.—Yes, (we answer that question here and now) the new Clarion Junior 1931 model 61 at \$67.50, complete with tubes, also is ready for delivery. A new beautiful Cabinet — a more complete Chassis — more selectivity, sensitivity and sincere tone quality than ever before attained in this type model.

CLARION MODEL 61—6 TUBES

Tone control, screen grid with power detector. 2—245 tubes Push-Pull power amplifier. 1—280 rectifier tube. T. C. A. dynamic speaker. Complete shielding. Battleship construction throughout. Supplied complete with Clarion matched tubes. Excellent sensitivity and selectivity with stability. Cabinet size—Height, 19¾", Depth, 10½", Width, 16½".

Will you be one of the 12,000 dealers who will reap a Golden Harvest in 1931 with Clarion?

TRANSFORMER CORPORATION OF AMERICA, OGDEN AND KEELER AVENUES, CHICAGO





Clarion Model 70
\$79⁵⁰
 Complete with 7 matched
 Clarion tubes
 Matched Decorative
 Base \$8 extra

CLARION MODEL 70—\$87.50. Complete as illustrated

Tone control. 4-Circuit receiver. Beautifully designed and acoustically perfect cabinet. T. C. A. dynamic speaker—ultra-sensitive. Complete shielding. Battleship construction throughout. Unusual sensitivity, and selectivity over the entire broadcast band with perfect stability. 3—224 screen grid tubes, 1—227 power detector. 2—245 tubes Push-Pull power amplifier. 1—280 rectifier tube. Supplied complete with Clarion matched tubes. Cabinet size —Height, 21" —Depth, 10½" —Width, 17¼" —Stand size, 20½" overall.



Clarion Radio

THE GREATEST RADIO VALUE AT ANY PRICE

Tell them you saw it in RADIO

**for the
finest performance—
install a
WRIGHT-DE COSTER REPRODUCER**

Radio manufacturers who are desirous of having their receivers operate with the utmost satisfaction for their customers, are frank in their approval of the WRIGHT-DE COSTER REPRODUCER. Such old established manufacturers of high quality receivers as Hammarlund-Roberts, Inc., and High Frequency Laboratories, have WRIGHT-DE COSTER SPEAKERS built to their specifications, and furnish them with their receivers to make sure of the very finest performance.



Above—Model 217 Jr. Chassis, suitable for installation in any radio receiver.

At left—Model 217-G, a beautiful cabinet and stand speaker for any receiver, or for use as a secondary speaker in another room.



Above—Model 207 Chassis, an exceptional speaker with great volume.

At right—Model 207-E an attractive cabinet and stand that is a charming addition to any home.



You will appreciate the fine tone and great range of a WRIGHT-DE COSTER REPRODUCER in your set. No other will give you greater pleasure and satisfaction. Write for complete information and address of nearest sales office.

*The Speaker
of
the Year*

WRIGHT-DE COSTER, INC.

2217 UNIVERSITY AVENUE

ST. PAUL, MINNESOTA

Export Department: M. SIMONS & SON CO., 25 Warren St., New York. Cable Address: SIMONTRICE, NEW YORK



Dick the Job You Want and Fill It...in a Few Months!



Prepare at Home

Only an hour or so a day is all you need. This Big League training prepares you for success in all phases of radio . . . manufacturing, servicing, selling, ship and shore broadcasting, photo-radiograms, radio equipment. Our graduates are now in demand everywhere . . . because they are posted right up to the minute in everything in radio. Radio's progress each year is measured by the accomplishment of the great engineers at work in the research laboratories of the Radio Corporation of America. This world-wide organization sets the standard for the industry . . . and stands back of every lesson in the course! A signed agreement by the president of the school assures you absolute satisfaction upon completion of the training—or your money will be promptly refunded.

By means of an actually proven kind of home study training sponsored by the Radio Corporation of America, hundreds of ambitious fellows are today enjoying financial independence in work that is thrilling.

Radio needs you. Opportunities are begging for men. Good money . . . fascinating work . . . adventure galore! Read all about this tremendous modern industry . . . send for this magnificent free book. Mail the coupon now!

THE ONLY COURSE IN RADIO SPONSORED BY R.C.A.

RCA INSTITUTES, INC.

(A division of Radio Corporation of America)



RCA INSTITUTES, Inc.
Dept. R-12
75 Varick St., New York, N. Y.

Gentlemen: Please send me your big FREE 40-page book which tells about the brilliant opportunities in Radio and about your famous laboratory-method of guaranteed radio instruction at home.

Name

Address

Tell them you saw it in RADIO

IT'S
POPULARITY
INCREASES
DAILY



This Record Is **SELLING** RADIO SETS

DEALERS—Increase Your Sales. Demonstrate your radio sets by means of this **TONE TEST DEMONSTRATION RECORD**. It gives the prospect an automatic demonstration of all of the low and high notes in the musical scale—together with short vocal descriptions of what each demonstration means. It's a fascinating and interesting way to convince the prospect that the line of radio sets which **YOU** are selling can pass the **TONE TEST** as recorded on this record. Most of all, it's a **PROFITABLE** way to make more sales. Some dealers have as many as six of these records in use. Get one for yourself—and one for each of your salesmen—**TODAY!**

JOBBERs—Stock these records. Sell them to your dealers. Catalog them. Once the dealer hears this record he will **BUY** it.

SERVICE MEN—This record enables you to make Tone Tests of a receiver before it is placed on the sales floor. A time saver for you—a profit builder for your store.

"RADIO"

PACIFIC BUILDING
SAN FRANCISCO, CALIFORNIA

Ship _____ Tone Test Demonstration

Records at once. I enclose \$ _____
in full payment.

PRICES—\$1.00 Each—or a standard
Package of Six Records for \$5.00

Name _____

Street and Number _____

City _____ State _____

IF C. O. D. SHIPMENT IS WANTED—CHECK HERE

\$1.00 EACH or a Stand-
ard Package of
Six for \$5.00

C. O. D. ORDERS TAKEN

EVERYTHING TO GAIN! AND NOTHING TO LOSE!



Write now for this unparalleled offer and business builder—THE SUPREME SELF-PAYMENT, SELF-SATISFYING PLAN.

OUT of every business depression new leaders emerge—in every community. The opportunity of a lifetime is offered to radio merchants and service men in the SUPREME SELF-PAYMENT—SELF-SATISFYING PLAN. It not only puts the conceded advantages of SUPREME TESTING INSTRUMENTS—"Supreme by Comparison"—within the reach of everyone—on a "make good" basis—but it also includes a merchandising plan that is certain to increase service fees, quicken turn-over in every line of merchandise you handle, with bigger and better net earnings. Invest two cents in an inquiry—without obligation. You have everything to gain and nothing to lose!

SET ANALYZING PLUS

In addition to providing for EVERY test reading afforded by ANY competitive commercial analyzer, Model 90 provides the following test ranges and features NOT embodied in any other analyzer, REGARDLESS OF PRICE:

D-C Plate Voltage ranges, 900/300/90/30/0.
Grid Voltage ranges, 300/90/30/9/3/0.
Positive and Negative Cathode ranges 300/90/30/9/3/0.

A-C 1000-ohms-per-volt ranges of 900/300/90/30/9/3/0.

Plate Current ranges 300/90/30/9/3/0.
Screen-Grid voltage ranges, 300/90/30/0.
Control Grid voltage ranges, 90/30/9/3/0.
Screen-Grid current ranges, 30/9/3/0.
Pentode (space charge) current ranges, 30/9/3/0.

Pentode (space charge) voltage ranges 90/30/9/3/0.

A-C readings in milliamperes; Meter ranges, 300/90/30/9/3/0.

(In the foregoing only the ranges required in servicing present day sets are given, but for all voltage readings, scales of 900/300/90/30/9/3/0 are available and current ranges of 300/90/30/9/3/0, providing an elasticity that will meet any unusual situation and probably take care of all future radio developments.)

Output meter impedance ranges 11.1 to 900,000 ohms.

Universal Analyzer Plug for Pentode, Screen-Grid and Overhead (top) heater tube sockets.
Grid-to-plate analytical continuity tests.

High impedance measurements with 1000-ohms-per-volt A-C voltmeter.

Analytical A-C voltage 1000-ohms-per-volt tests up to 900 volts on each side of center-tapped plate supply transformers.

All connections from radio to analyzer for ALL tubes contained in one single cable.

Screen-Grid analysis without oscillation of circuits under test.

Uses ordinary flashlight battery for continuity and for "grid test" of tubes, the battery being normally connected to continuity pin jacks.

Twenty-two (22) meter ranges available at three (3) insulated pin jacks.

Provides a total of 119 distinct readings and ranges for analytical work compared with a maximum of from 25 to 30 in other instruments.

Every switch identified on the panel so clearly and simply that any radio man can make tests without previous instructions.

Meter withstands 5000 per cent overload.
Meter glass replaceable without meter removal.
No reversing switch necessary.

Measures power transformer secondary voltage directly from helium rectifier socket.

Screen-Grid tests without adapters.

Pentode Tests without adapters.

Maximum simplicity and speed.

Extremely rugged construction; maximum meter protection.

25 TESTING INSTRUMENTS IN 1



List Price . . . \$112.15

Dealers' Net Price . . . \$78.50

F. O. B. Greenwood, Miss.

SUPREME

Tube Checker

MODEL 19

COUNTER TYPE List Price . . . \$38.50

Dealers' Net Price, F.O.B. Greenwood, Miss. \$26.95

PORTABLE TYPE List Price . . . \$42.79

Dealers' Net Price, F.O.B. Greenwood, Miss. \$29.95

A typical Supreme value. Tests all tubes, including Pentode, Screen-Grid and the new 2-volt '30 series tubes at the correct filament voltages, and without the need of adapters. Uses full size transformer—3½" meter with 2 scales—80 and 8 milliamperes—affording easy and accurate reading of all tube values. Extremely simple and speedy in operation.

Replacement tube sales are profitable . . . and the market is tremendous. Use Supreme Model 19 to reach it—in the store, or in the home!

The SUPREME SELF-PAYMENT, SELF-SATISFYING PLAN covers all Supreme Instruments. To facilitate matters, in writing for details of this plan, specify the instrument in which you are most interested.

Descriptive folders will be gladly sent on all of them, if requested.

SUPREME INSTRUMENTS CORPORATION

397 SUPREME BLDG., GREENWOOD, MISS.

Distributors in All Principal Cities

Service Depots in New York, Philadelphia, Pittsburgh, Chicago, Kansas City, Seattle, Toronto, San Francisco

Export Division: 130 West Forty-second Street, New York City
Cable Address: LOPREH, New York.

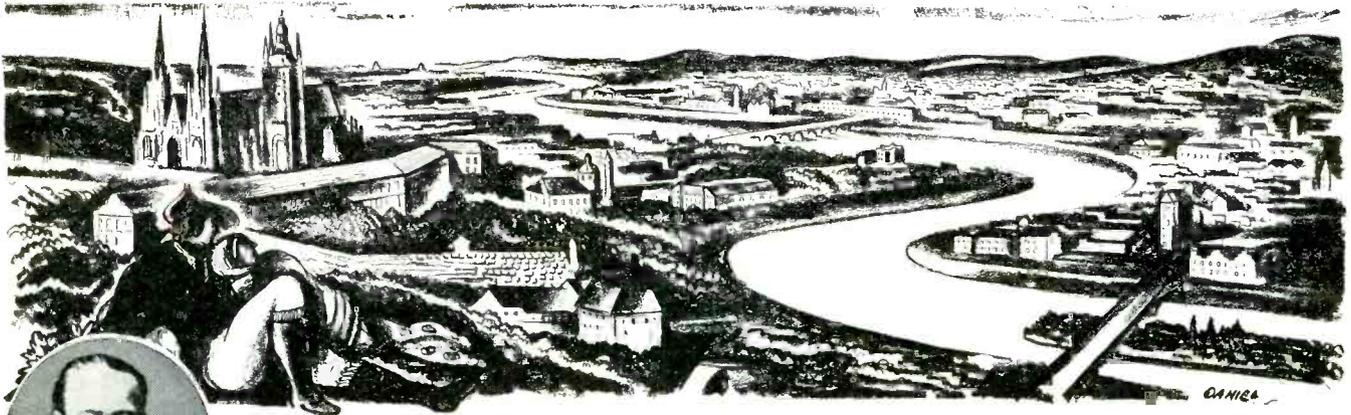
SUPREME Set Analyzer MODEL 90

Model 90, Supreme Set Analyzer . . . with the copper-oxide rectifier wonder meter which gives all A-C and D-C Current and voltage readings, instantaneously and accurately.

The set analyzer that is winning outstanding recognition because of surpassing simplicity, speed, number of tests and readings. Readily out-performs any other set tester. Its functions and flexibility will prove astounding.

To the left is a panel enumerating some of these remarkable facilities, but only sight and actual experience can give you the full comprehension of its unmatched flexibility, minimum size and utter simplicity. Ask any user.





Friedrich Smetana has woven the story of a great river into his famous symphonic poem *THE MOLDAU*. Brunswick Records 90086-87.

WIDER AND WIDER FLOWS THE GROWING STREAM ♦ ♦ ♦

Like a great river spreading its course across the land, with countless brooks and streams to swell its flood until it rolls on with sweeping majesty, the career of a great corporation goes on from success to success.

Not only must past performance be considered, but due emphasis must be laid on what the future holds. To supply what the public wants is no longer enough, the successful merchandiser of today must be ready to give the public more than it expects!

Every wise dealer is now making his alliances for the future, and in doing so he must choose a company that is strong not only in financial backing and public esteem, but in ideas! One idea can make the difference between "just another radio" and an instrument that can stir a nation-wide demand!

We invite inquiries from dealers with open minds . . .

Brunswick Radio Corporation
 MANUFACTURERS OF RADIO, PANATROPE & RECORDS
 Makers of 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 butt-walnut with carved front panels. \$139⁵⁰

Other models \$170 up.

(less tubes)

BRUNSWICK

↑ ↑ ↑ ↑ ↑ ↑

RADIO FUTURA SERIES FOR 1931

Radiotorial Comment

Did RCA Swallow Majestic?

●

THE rumor-mongers insist that RCA has swallowed Majestic Radio and will bring out a new six-tube midget superheterodyne in the seventy-dollar price range. The reports leak from

sources whose predictions have been true in the past and there seems no good reason why they will not prove true in this case. Until they are officially confirmed or denied, comment is somewhat superfluous.

Yet there is an undeniable tendency for the big fish to swallow the little ones in the radio business today, just as there was in the automobile business some years ago. RCA already occupies a position comparable to General Motors, and Crosley has been dubbed the Ford of radio.

Or, coming a little closer to home, there is every indication that the tube business will follow in the footsteps of the Mazda lamp business. Here a large number of independent licensees were gradually absorbed so that the brands of a dozen or more manufacturers were placed upon lamps out of the same barrel. From radio tubes to radio sets is a short step.

There is no saying just how digestible the RCA might find the Majestic morsel to be, especially in its contribution to the nightmare of the government's anti-trust suit. With the appointment of Judge Warren Olney as the prosecuting attorney comes the news that there will be no side-stepping of the issues here involved. As the main line of defense is to be that a monopoly built on patents is entirely legal, the suit may be very far-reaching in changing the fundamental laws which now protect and encourage the inventor.

Every dealer knows that something has to happen at the Majestic factory as well as at certain other factories. Maybe your barber can tell you what has happened.

(Newspaper reports of January 7th state that it is General Motors Corporation that is rumored to be negotiating with Majestic.)

* * * * *

RMA Show Goes to Chicago

●

AT Atlantic City last year the radio industry learned that a circus is not a suitable substitute for a radio trade show.

When jobbers who had flown across the continent in order to see new products which were not exhibited at the show took the next

plane home, the manufacturers realized that a trade show should be a sales agency and not a carnival.

As a consequence there was some talk about discontinuing the RMA show. But better counsel prevailed and decision was made to hold a serious show at Chicago during the second week of June. It will be immediately preceded by the IRE convention and immediately followed by that of the Music Industries Chamber of Commerce and the National Association of Music Merchants.

In the exhibition hall the exhibits will be confined to radio products, and those only of current models. Collateral lines may be shown in the private demonstration rooms of exhibitors who qualify for the exhibition hall. Exhibitors' costs are to be cut to the minimum consistent with an effective business show. With these assurances, the show should be worthy of big attendances.

* * * * *

Home Radio Movies Not Home-made

●

OLD time radio men smirked when a mere boy told the Federal Radio Commission that he can transmit an entertaining motion picture on a channel no

wider than is now used for broadcasting speech and music, thus overcoming the greatest obstacle to radio television. But for once, the old time radio men were wrong. When Philo T. Farnsworth finally discloses the details of this method, as briefly outlined in these columns last month, the scoffers will laugh from the other side of their faces.

Nevertheless, the fact that this is being satisfactorily accomplished in a laboratory is no excuse for not trying to sell radio sets. The new equipment, for a time at least, will be a separate outfit which will supplement the existing set, one set being required for the talkie and another for the movie at both the transmitter and the receiver. In other words, the method is not applicable to the reproduction of sound.

Nor will television be pioneered as a parts business. No handy tinkerer can assemble a few coils, condensers and tubes in order to see pictures. The equipment, when ready, will be marketed as a complete unit, ready for installation by the dealer. And it will be good enough to furnish an irresistible urge for people to spend money in order to have it. That means better business for the radio dealer.



Hospitals

A Highly Specialized Market for the Sale of Small Radio Sets

By H. W. SCRIBNER

"**D**R. WOOLSLEY, I am Mr. Scribner of the Northern Radio Company. We have just completed the installation of a number of radio receivers in one of the largest hospitals of this city and I want to submit a plan to you whereby you can realize an average return of 190 per cent on your investment through the use of radio in your institution."

"Mr. Scribner," said Dr. Woolsley, "we have been considering the radio sets people bring in here a necessary evil. If you can tell us how we can make it pay for itself, not to mention pay us a profit of 190 per cent, I shall be glad to hear your story."

The above conversation is typical of opening conversations which the writer has had with the managing directors of a large number of hospitals, big and little. While the managing director is the man to deal with, don't fail to gain the good will of the house engineer. He can make or break the deal. The plan which has been submitted to them and which has met with enthusiastic approval is discussed in the following paragraphs:

It is proposed that the hospital purchase a number of individual radio sets of the "midget" type for rental to its patients, a rental charge of one dollar per day being recommended, experience having indicated that this rental is readily obtainable. Radio receivers purchased for this purpose will not only provide the hospital with a most handsome financial return, but they constitute a vehicle through which the hospital management can contribute materially to the pleasure and comfort of its patrons.

The additional convenience of radio is a service enthusiastically welcomed

ASK THE NURSE ABOUT RADIO

This Formal Card Is Displayed in Each Room

by the patients, especially those who are convalescent over long periods of time. It keeps his mind occupied and free from thoughts of his confinement and his ills and leaves him more tractable and with a pleasanter remembrance of every type of service rendered him. The "radio" item on the bill may be the only thing the patient will feel good about paying.

Establishment of radio service by the hospital requires neither additional personnel nor elaborate bookkeeping. The patient directs his request for radio service directly to the house engineer and installation is made by the latter or one of his staff as a matter of regular routine.

The patient is acquainted with the availability of radio service in several ways, particular care being taken not to create the impression of commercialism on the part of the hospital. Each floor nurse is acquainted with the service and verbally calls the attention of her patient to the service when he is in a state of convalescence such as to make the use of radio advisable. Two types of printed cards are used. One is displayed in each room where it can easily be seen by the patient, and the second is placed on the first dinner tray sent up to the convalescent patient. Note that this card stresses the fact that the hospital management has made radio available simply as an added convenience for its patrons and that the impression created is one of dignity and not commercialism. These

cards are inexpensive and are supplied to the hospital free of charge as a merchandising service rendered with the sale of the receivers.

Each installation requires, of course, in addition to the receiver itself, an antenna, lead-in wire, ground wire and ground clamp. A number of flat-top antennas equal to the number of radio sets used must be erected on the roof. Each

Cost, Operating and Revenue Chart . . .

Per Set—Per Year

Cost per set	\$64.50
Installation	*
Tube Renewals	30.40
Antenna Installation	5.00
Power Consumption	3.60
Total Costs	\$103.50

RETURN

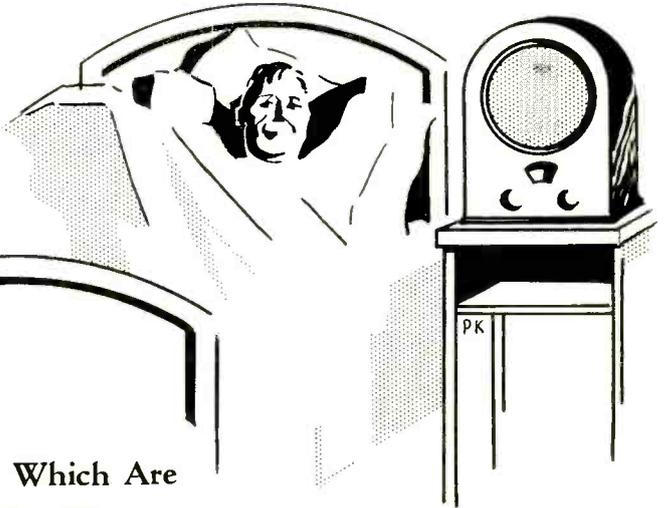
Average gross return per set per year on rental 25 days per month at \$1.00 per day	\$300.00
Revenue	\$300.00
Costs	103.50
Profit	\$196.50
Interest on Investment	190%

*Installation made by House Engineer's staff.

Submitted to the Hospital Management

Use Radio For Profit

**\$19,650 Per Year from
100 Midgets Will Interest
Any Hospital Board**



**How to Overcome Objections Which Are
Made by Hospital Managements**

In accordance with its efforts to contribute to the comforts of its patrons, the management has arranged to supply individual radio sets for each room at a very nominal charge. Ask any attendant for information.

This card reached the Patient on his dinner tray.

antenna may consist of one-half of a straight antenna broken into two equal sections by insulators at the mid-point. The cost of such antennas will be in the neighborhood of five dollars each. The engineering department should keep on hand a quantity of wire suitable for lead-in purpose in lengths suitable for extension from the roof to each of the various floors. Whenever a set is installed the individual making the installation will then simply make connection to one of the unused antennas and drop the lead-in to the room where the set is to be located. This procedure assumes a flat roof. It is being followed by one of the larger hospitals of San Francisco and is proving entirely satisfactory. Other arrangements may prove necessary under special conditions.

Of course permanent individual antenna installations for each room or one of the antenna systems permitting the simultaneous operation of several sets from each antenna would be preferable and should be used in a new building or whenever the expense of installation is felt to be justified.

The ground connection will, in practically all cases, be made to the steam radiator for convenience. A short wire lead and a ground clamp are required for this purpose.

Experience has indicated that if a number of receivers equal to ten per cent of the average number of private patients is employed, each set can be kept in income-bearing service approximately twenty-five days of each month. Assuming an initial purchase price per set complete with tubes of \$64.50, each set will pay for itself in something less than three months when rented at one dollar per day. Average figures given herewith are based on twenty-five days of income operation per set per month, each day consisting of eight operating hours. They are further based on two years of operation, the initial cost of the set being entirely written off the first year. Average tube life has been taken as 1000 operating hours. Power costs have been based on a power consumption of seventy-five watts and a power rate of \$0.02 per kilowatt-hour, which is the industrial rate in San Francisco.

A table of average expense and income figures is given herewith. This table or a similar one should be printed in card form and copies should be left with interested parties in the hospital. The attention of the hospital authorities should also be called to the publicity cards which have been described and to the fact that you will furnish these cards to them free of charge.

It will be noted that figures given herewith are based on a rental rate of one dollar per day. Radio will prove a profitable venture, however, even when the rental charge is fifty cents a day or lower. When rentals of long duration are made special rates which will represent a saving to the patient over the regular one dollar a day rate will be found desirable. A table of suggested rates is given below. Note that a charge of \$2.50 is made for a single

day rental. Responsibility for the quotation of special rates should be fixed when the service is established in the hospital.

Number of Days	Rental Charge
1	\$ 2.50
2	2.00
3	3.00
4	4.00
5	5.00
6	6.00
7	6.00
8	7.00
9	8.00
10	9.00
11	10.00
12	11.00
13	12.00
14	12.00
15	13.00
16	14.00
17	15.00
18	16.00
19	17.00
20	18.00
21	18.00
22	19.00
23	20.00
24	21.00
25	22.00
26	23.00
27	24.00
28	24.00
29	24.00
30	24.00
31	24.00

Tube renewal business to be derived from sets sold in the manner described herein is worth serious consideration also. We have taken average tube life as 1000 operating hours. Since each set is to be in operation twenty-five days of each month, eight hours each day, there will be 2400 operating hours per year. This means that 2.4 sets of tubes will be used per year. Since the cost of a complete set of tubes is included in the purchase price of the set, however, tube renewals required the first year will be only 1.4 sets. Taking the cost of a set of tubes for one set as \$16 and considering the renewals required over a two-year period as 3.8 sets of tubes, the average tube renewal business per set will be \$30.40 per year.

SCOOPS

What Price Dealer Protection? And Why In Allowances? Also a Sample of

WHILE it is readily admitted that the causes for the business depression as a whole are extremely intangible; that they defy even the greatest of economists; it takes very little observation on the part of the layman to fathom the primary cause which has the radio industry in a state of chaos. Read the reproduction of the advertisement spread across the bottom of this page. Read it and weep. It was a two-page spread appearing in a San Francisco newspaper just two days before Christmas. And needless to say, it put an abrupt and decided stop to all the rest of the Majestic dealers' sales in that locality; just as abrupt as if the owner of each store stood out in front with a megaphone, shouting "Go to Hale's."

Be it understood that the department store which used this ad had a perfectly legal and legitimate right to use it. It's everyone for himself in business, cooperation only when cooperation will help "yours truly." All of which

absolves the particular advertiser in question from blame. Who, then, is responsible for a gloomy Christmas for several dozen deserving radio dealers? Or rather, who could have defended them?

It is assumed (to give them the benefit of the doubt) that the manufacturers had nothing to do with this advertisement. Perhaps they didn't. Perhaps they were so glad to get rid of a few trainloads of last year's models they closed their eyes to the pranks of their pet dealer and gave him all the rope he needed.

There was lots of distress merchandise sold last year; and lots of throats cut. This ad is particularly pernicious and noxious because of that little word "SCOOP" up in the right hand corner. It goes on to say that "we have obtained the entire stock for this territory," in order to make it certain in the mind of the reader that there are no other Majestic dealers in the vicinity of

the Golden Gate who amount to a hill of beans when it comes to bargains. It was a scoop for Hales, all right; a scoop not to be passed up. But to one having no experience in jobbing or distributing it would seem that those other Majestic dealers, the ones who don't amount to the aforementioned hill of beans, will have to be very broad-minded to forget the gloomy Christmas of 1930, when protection failed them in the time of need.

There is another lamentable thing about this type of advertising distress merchandise, not because it hurts the other radio dealers, but because it arouses suspicion in the public mind. At the best it confuses the public mind; keeps it waiting until this radio situation gets itself straightened out again. Why not be truthful about the reasons for knocking \$64 off of the original \$163.50? Why expect the public to be as gullible as it has been painted in years past? Why ask it to believe that its old

HALE'S CHRISTMAS RADIO SCOOP!

New Majestic Model 131 Super Screen Grid
Climaxing Our Most Successful Radio Year

Features

1. Latest 1931 Model.
2. Super Screen Grid Circuit.
3. Majestic Tubes.
4. Large Majestic Dynamic Speaker.
5. Beautiful lowboy cabinet.
with rounded corners done in the finest walnut veneers.
6. Dial readings in kilocycles.
7. Local-distance switch.
8. Fully shielded chassis.
9. Installed with Hale's Service, guarantee.



TERMS— your old radio and \$9.⁹⁵ delivers \$2.²⁵ per week or \$9.⁴⁵ per month. on Hale's Budget Plan.

List Price . . . \$163.50

Less Hale's Special Trade-in Allowance \$64.00

Your Price

\$99.50

Complete & Installed . . .



This is the outstanding radio event of the season. Due to the tremendous volume of our radio business and our 10 radio store buying power, we have obtained the entire stock of this remarkable radio for this territory.

Purchases made today will be delivered in time for Christmas! Hours 9 to 6, and in the evening from 7 to 9 for this great event! (Use West Market Street Entrance).
Extra Salespeople for prompt service—Positively no dealers

—Advertisement reproduced in part from daily newspaper.

1931

As It Looks to Me

By Dr. Lee De Forest



THE YEAR 1931, as it looks to me, will see a number of significant happenings in the realm of radio . . . manufacturing, distribution, retailing, invention, broadcasting and all. The business will be there for everyone, although unquestionably it will take greater perseverance to get it . . . a tightening of methods in the factories, still more efficiency in the marketing, an appreciable service angle on the part of stores, and other angles of the business side of radio.

I think that, in large measure, there will be fewer types of models among the receiving sets. The midget, or mantel set, will find in 1931 that the public acceptance of this style of receiver will pour considerable sums of money into the coffers of the radio industry and, at the same time, it will enable thousands to own a small-sized receiver and get more enjoyment out of life. This 1931 brings out the super-heterodyne midget and it, too, will find a satisfactory niche in the scheme of things radio.

The mantel, or midget, set has enabled thousands who never before owned a set to become radio fans. And it has brought about the two-set home by utilizing this type of set for the guest chambers, servants' quarters, children's nursery, the beach or mountain camp and elsewhere.

The small margin of profit, and the necessity for comparatively rapid turnover in stock, probably means that this year will find a change in the set-up of distributing the low-priced receivers, and yet the well established jobber will always find a good paying business in the larger models, tubes and accessories.

Television, apparently, is getting a bit nearer every day, and the Farnsworth activity is being eagerly watched by those in the industry.

Broadcasting, despite some of the vicious sidelights of blatant advertising, is taking wonderful strides forward and international programs are almost becoming commonplace items.

I think that this magazine, "RADIO," is taking a forward step in its work of helping the dealer.

All in all, I think that 1931 has a plentiful store of good things in stock for radio, even though it may require more concerted effort on the part of everyone to extract them and reap the benefits.

Lee de Forest

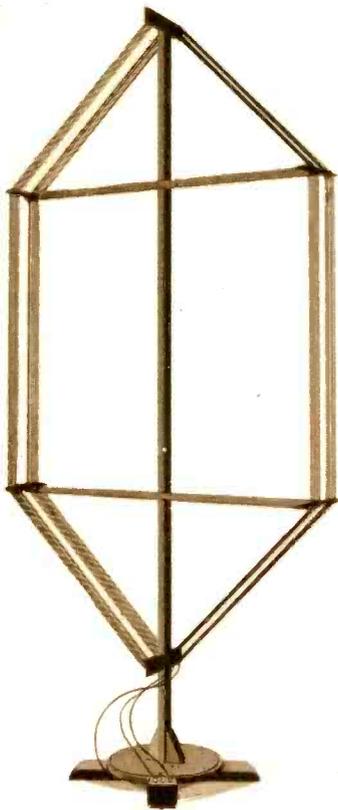
REMLER » » Builder of Super-Heterodyne
SINCE THE DAYS OF THE CRYSTAL SET



Announces a new 931
REMLER SUPER-HETERODYNE
Engineered to compact size

Since the Pioneer Days of Radio the **R E M L E R** SUPER-HETERODYNE has maintained its Reputation for Reliability

EIGHT years ago EIGHT tubes » » EIGHT tubes today



Eight years ago radio suddenly boomed. Hundreds of stations sprang up. Confusion and congestion of the air lanes and overlapping of signals showed the crystal set up for the toy that it was, and thousands of radio fans demanded a new receiver to meet the new conditions.

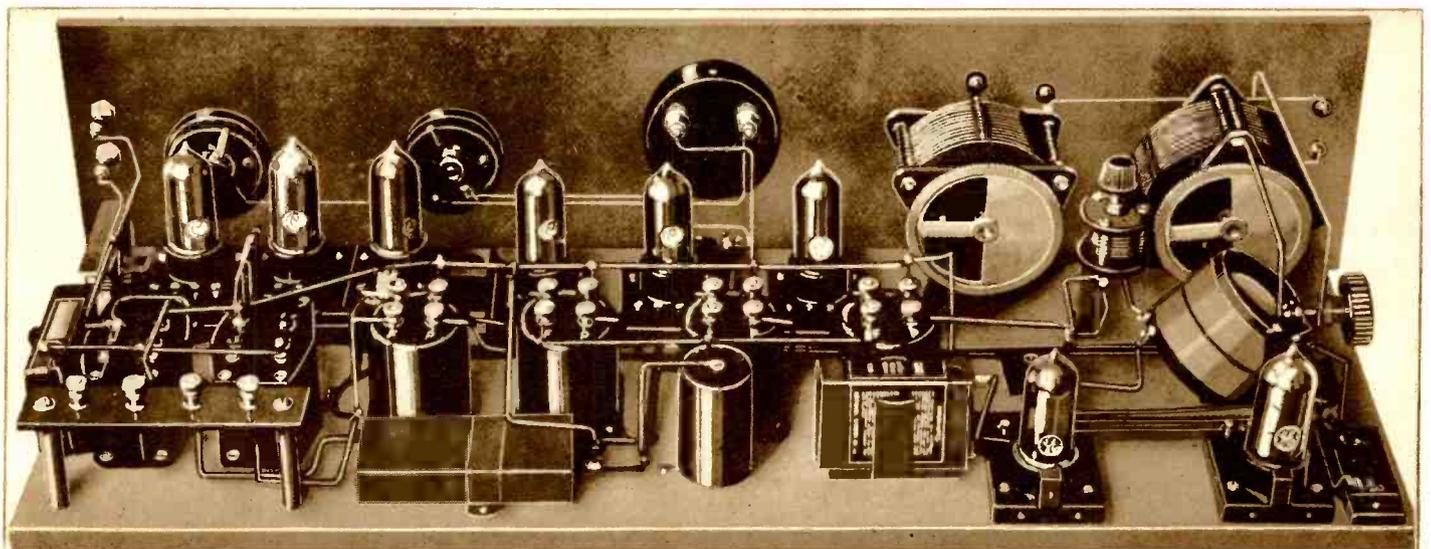
Anticipating this demand by two years, Remler engineers had quietly and perseveringly set to work to perfect the Super-Heterodyne in 1922. The new receiver was not released until May, 1924, when it had proved itself to be a "super" receiver capable of conquering the chaos of the air.

From 1924 to 1929 Remler continued to manufacture the Super-Heterodyne, using the original circuit with only minor changes.

These years of experience in building the Super-Heterodyne are built into the new 1931 Remler Super-Heterodyne, which is engineered to the table-sized model in conformity with the modern demand for economy of space.

» » »

The first "Remler 45,000 cycle Super-Heterodyne" looked like this. It was a massive brute two feet long with a loop aerial almost three feet high. It required several tuning adjustments and additional micrometer tuning devices as compared with the single control used today. The 1924 Remler cost more than two hundred dollars. The new 1931 Remler Super-Heterodyne, with all of its modern refinements, costs just about one-third as much as the Remler of eight years ago.



OFFICIAL
REMLER
SUPER-HETERODYNE
Eight Year Pedigree

1924 Remler introduces first "super-het" in May. Operated from dry batteries. It cost more than \$200.00. Nationwide contest announced to secure ideas for improvements from radio engineers.

1925 The "improved" Remler Super-Heterodyne, using refinements and improvements as submitted by contestants made its appearance late in 1925. The price of the receiver was increased to \$230.00.

1926 This year marked the introduction of the Power Amplifier Tube, with greater volume and improved tone quality. Remler issued information to all owners of its earlier models, explaining the adaptation of this tube to the 1924 and 1925 Super-Het.

1927 Remler Super-Heterodyne circuit altered to operate efficiently with the new Screen Grid Tube.

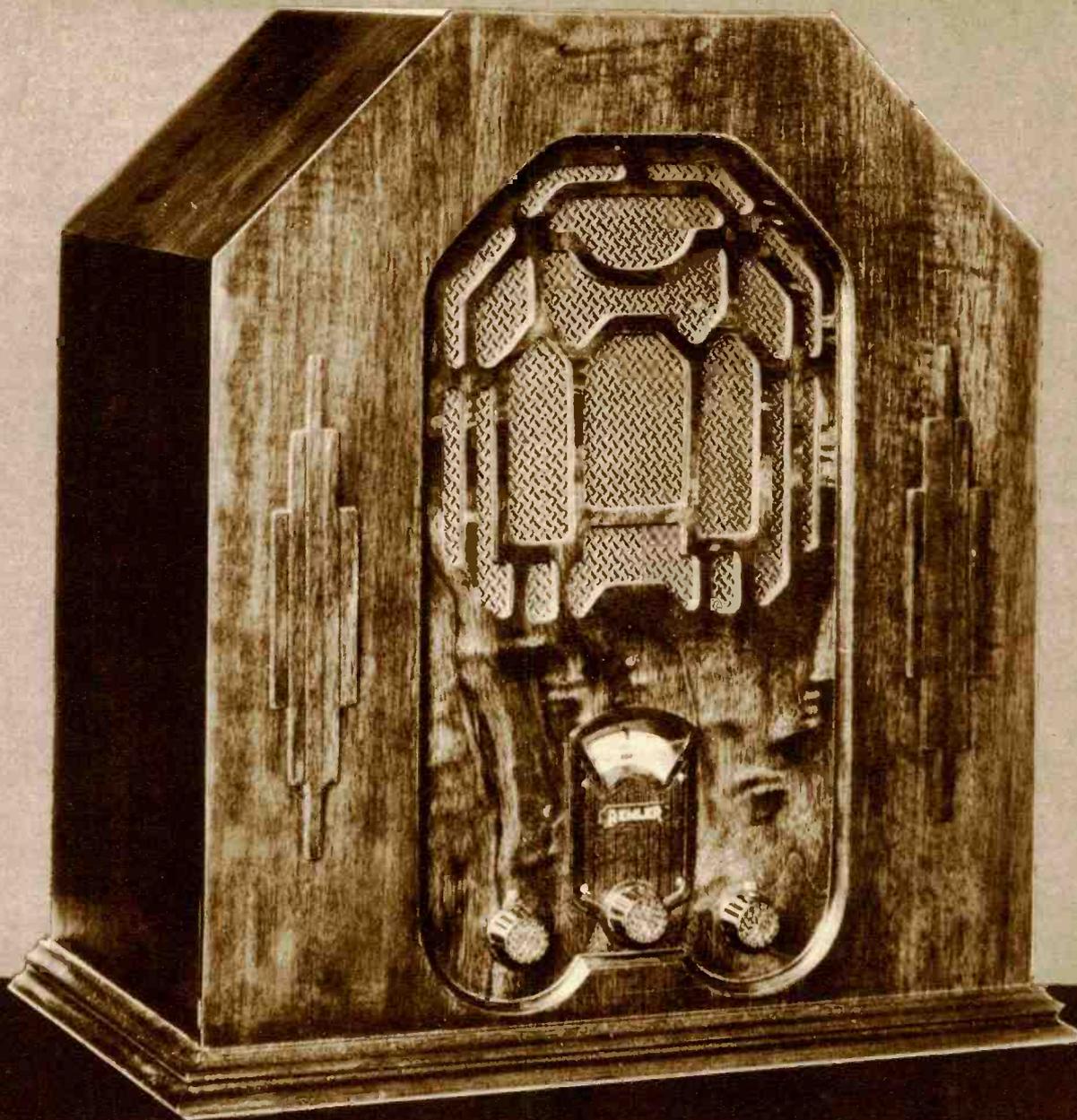
1928 The screen grid tube and "total shielding" incorporated into the 1928 Remler Super-Heterodyne, together with new drum dial and dial light. These innovations are today regarded as commonplace.

1929 Remler Super-Heterodyne popularity increases. Radio Press states: "unequaled sensitivity, selectivity and quietness of operation." This 1929 Super-Heterodyne cost \$300.00 and upwards.

1930 Remler announces the Cameo, a table-sized model. Laboratory work begins on the design of a Super-Heterodyne capable of dependable performance when engineered to compact size.

1931 Remler Super-Heterodyne announced at \$77.50—complete with 8 tubes and an eight-year pedigree behind it.





REMLER CAMEO » » Model 14

\$64⁵⁰
COMPLETE
WITH 6 TUBES

Tuned radio-frequency. Illuminated Dial.
Its classic simplicity of design renders it
harmonious in any scheme of decoration.



REMLER SUPER-HETERODYNE

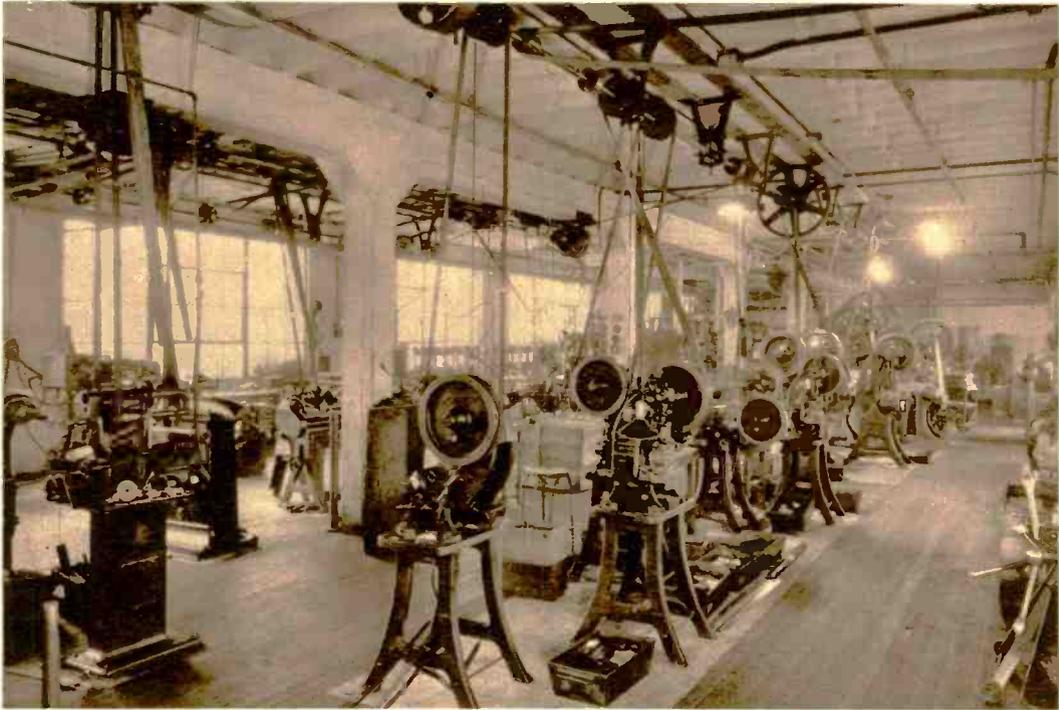
Model 17

\$77⁵⁰

COMPLETE
WITH 8 TUBES

The receiver based on eight years of intensive research. Illuminated Dial. Its Colonial Design is both distinctive and authentic.

REMLER RADIO

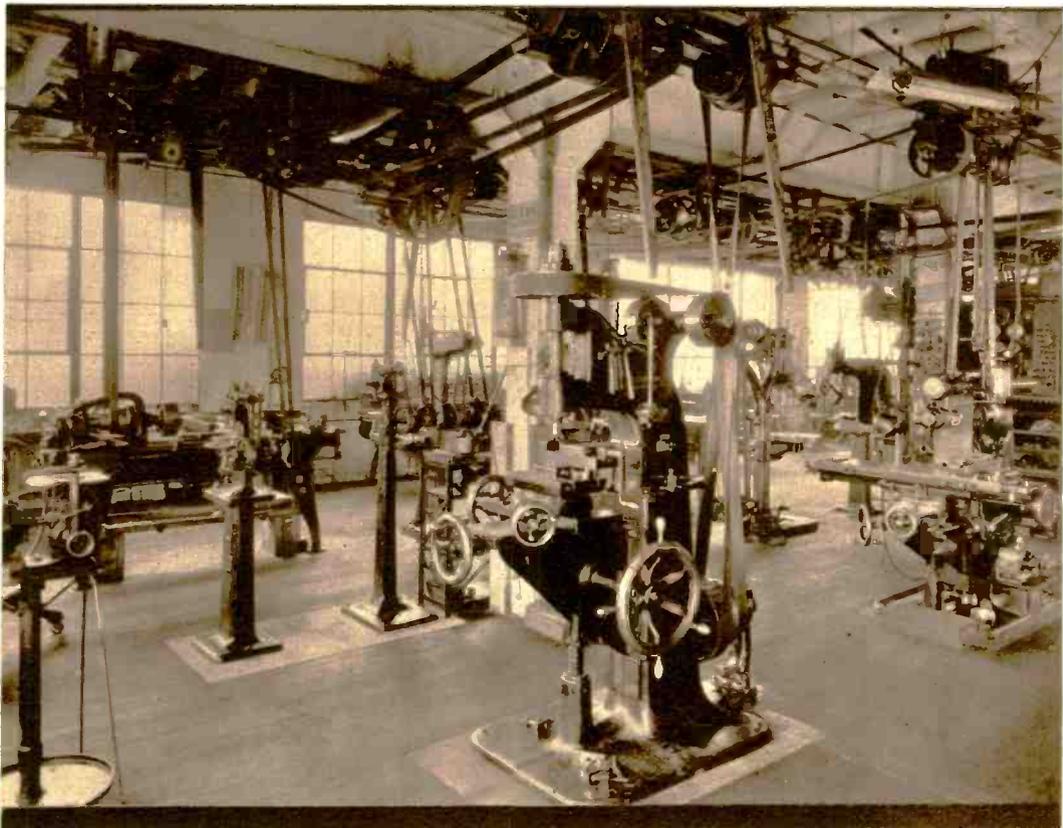


Above—THE GIANT PUNCH PRESSES

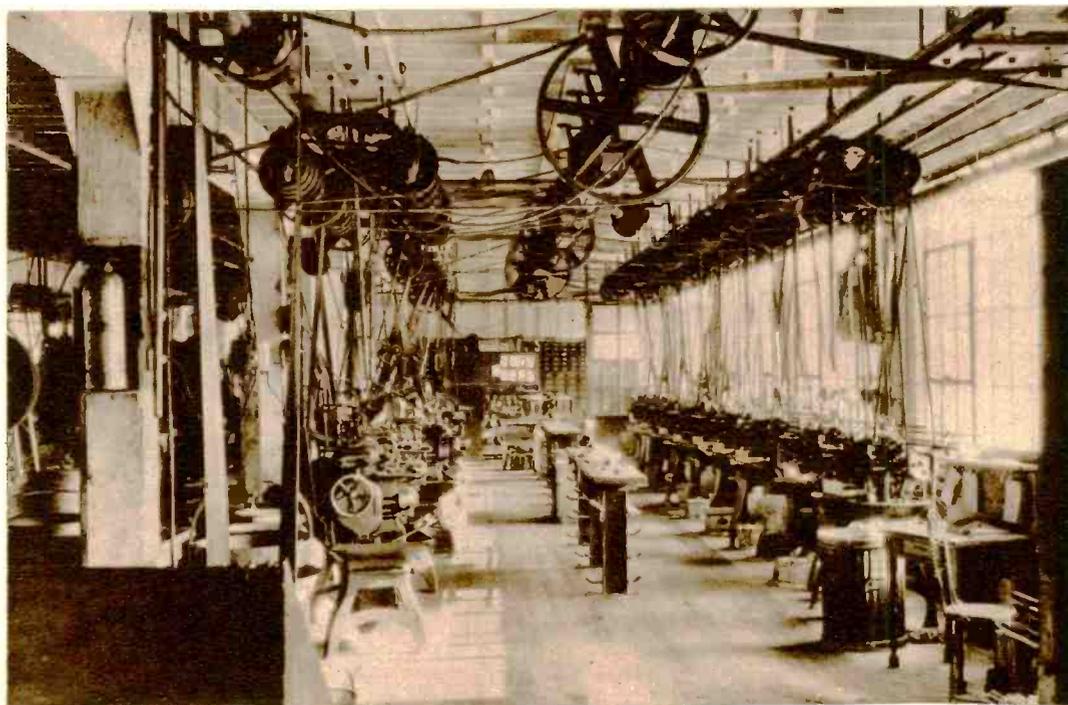
Tons of pressure applied to a sheet of steel by means of these presses results in a completely stamped REMLER RADIO chassis in one single operation. Uniformity in manufacturing is assured by means of these presses. Every REMLER is identical in construction.

Below—THE TOOL AND DIE DIVISION

Dies accurate to one ten-thousandth fraction of an inch for precision manufacturing requirements are made right here in the REMLER plant. The REMLER product is built like a fine watch. Even the tools used in building REMLER RADIO are made in our own factory.



MANUFACTURING PLANT

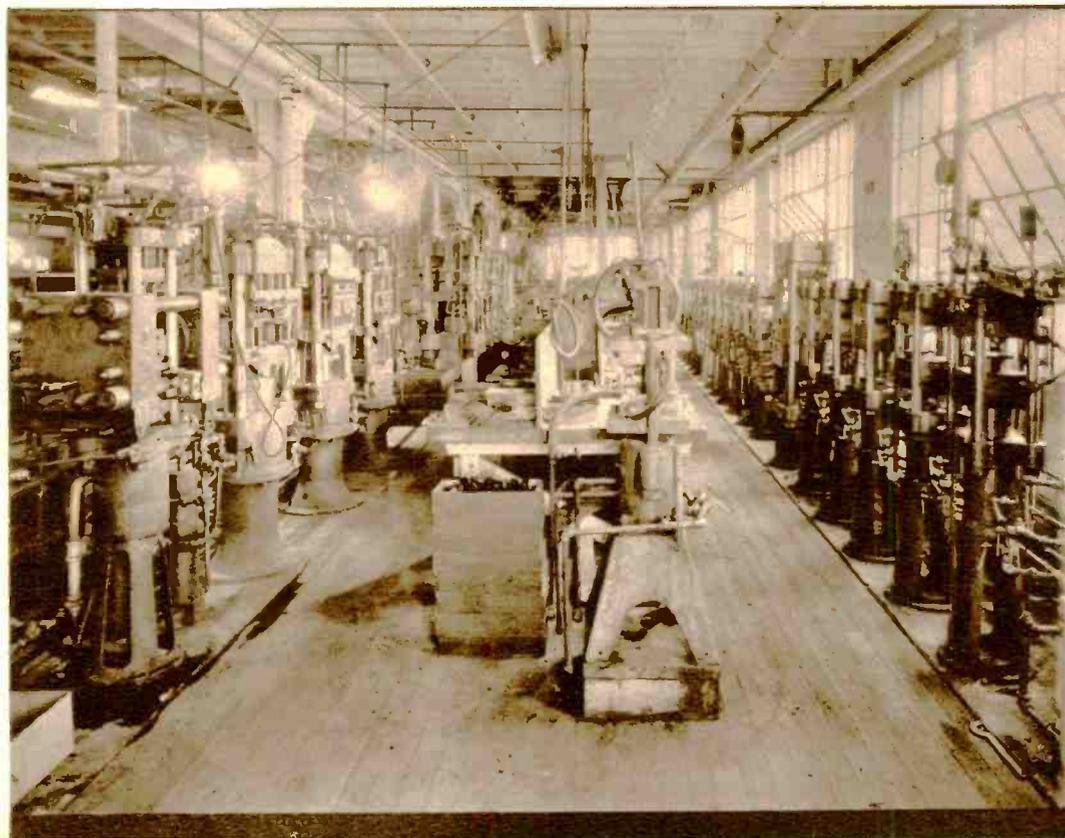


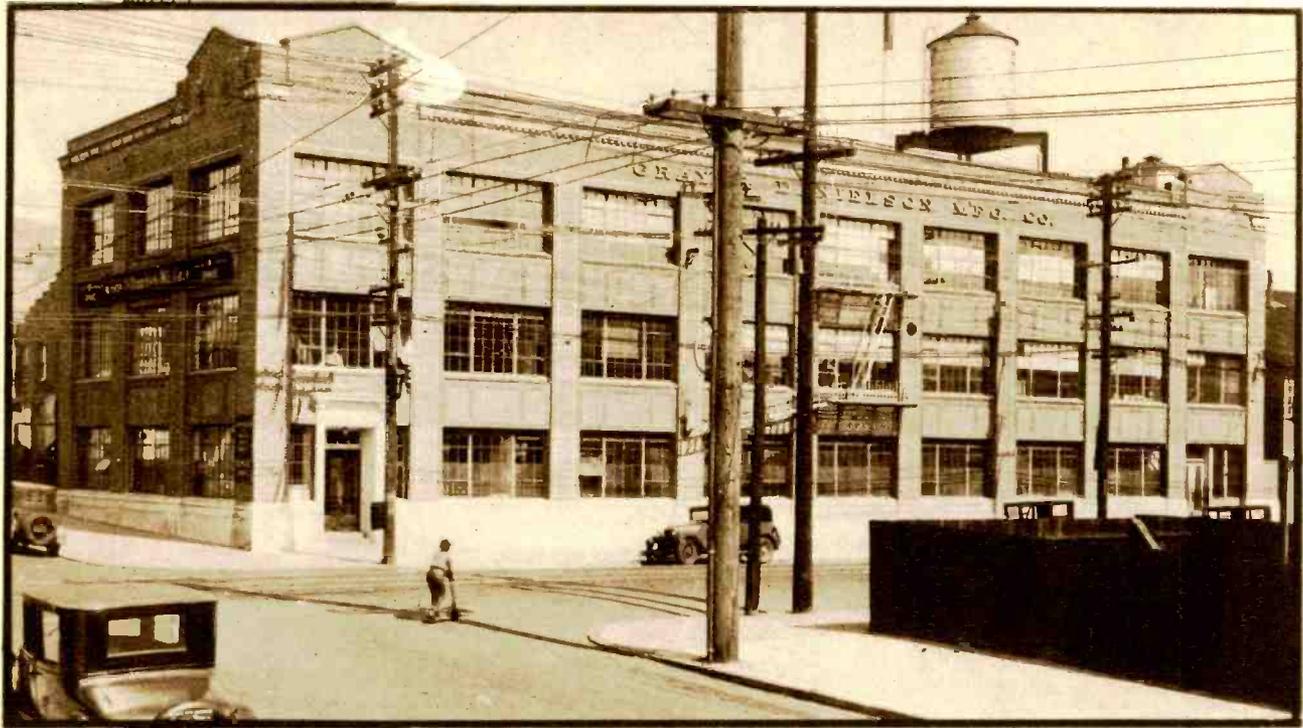
Above—AUTOMATIC SCREW MACHINERY

The hundreds of finely threaded screws and nuts, washers and separators, are made from the raw metal by means of these automatic screw machines. Threading, drilling, knurling, finishing and cutting are all accomplished in a few operations. A half million small fittings per day is the output of this department of the REMLER factory.

Below—BAKELITE MOULDING PRESSES

Our own completely equipped Bakelite moulding plant makes it possible to supply Bakelite fittings on all REMLER Receivers at a nominal cost instead of cheaper and inferior substitute materials usually employed on radio sets.





D EPENDABILITY

Buyers are on the safe and certain ground of Remler Dependability when they purchase the Cameo or the Super-Heterodyne. Twelve years of radio experience in the manufacture of fine parts, units, kits, and sets, is proof of Remler's ability to make reliable, trouble-proof, value-plus receivers.

Every Remler Set is especially distinguished for its depth, fidelity and brilliance of tone. The audio-system, together with Remler tone-control, and a dynamic speaker built to meet rigid specifications, combine to make any Remler model a receiver you can trust to give long years of satisfactory service.

In these two receivers, each built to give far more than customary performance, Remler offers exceptional dependability at the price of ordinary assembled sets.

REMLER COMPANY, LTD.

2101 Bryant Street
San Francisco

2422 First Ave.
SEATTLE

Santa Fe Bldg.
DALLAS

2704 So. Hill St.
LOS ANGELES

North Station Bldg.
BOSTON



REMLER CAMEO
\$64.50 Complete with tubes



REMLER SUPER-HETERODYNE
\$77.50 Complete with tubes

This Dealer Says Customer Is Always WRONG—And Tells Him So

An Interview with One of Our Most Successful Merchants Discloses That He Never Goes to Court . . . Employs No Outside Salesmen . . . Does Not Send Sets on Free Trial . . . Charges No Interest on Payments . . . and Installs an Aerial Free with Each Set Sold. He Goes After Them Strong in His Advertising.

By O. H. BARNHILL

E. H. PEFFER, of Stockton, California, was one of the first music dealers in the West to sell radios, which now constitute his largest, most profitable line. He buys them in hundred lots, and feeds them to a steady stream of customers, whose appetite for these instruments never seems satisfied.

"Saturation point in the radio industry? There isn't any such animal," declares Peffer. "As for hard times, all I know about them is what I read in the papers. Our volume of business grows larger all the time and we don't have any more trouble with collections than we did in other years. Our sales are steadily increasing and customers continue to meet their payments as though there were no money shortage, which there isn't."

One of Peffer's peculiar talents is his ability to make his customers realize they are wrong. But to be safe Peffer demands the utmost efficiency from all his sales and service staff.

This successful Stockton merchant doesn't limit his radio purchases to 100 lots. Last summer he bought and sold 500 sets of one make. Now he is disposing of 200 more, half of them 1931 models, together with large numbers of other makes.

How does he do it? Advertising and terms turn the trick. The publicity is extensive and judicious, the terms exceedingly favorable.

Peffer invests in four kinds of advertising: Newspaper, direct mail, radio broadcast and window display. He occupies the entire second story of a corner building and an L-shaped section of the ground floor, a small drug store sitting in the lap of the letter.

This permits entrances on two streets, each flanked by a spacious display window. Although Peffer carries a big stock of musical instruments and electrical merchandise, his windows always

feature radios, because they are the livest line he handles. In addition to sample machines, receivers and other parts are exhibited, with price tags and dealers' show cards.

Outside each door, in the recessed space by the window, a beautiful radio always is in operation, receiving programs from the broadcasting station KGDM inside. This attracts the attention of passersby and favorably impresses them with tonal quality, as well as handsome appearance of the radio.

One or more full-page newspaper ads are attached to the window beside each door. These ads always feature radios prominently, often with a picture of the instrument. Description, price and terms are printed in letters large enough to be easily read at a distance.

Beside the Market Street entrance is one of the broadcasting studios. Through the glass front, which extends part way around one side, passersby can see the performers whose music is being marvelously reproduced by the radio outside the store entrance, only a half-dozen yards distant. Sometimes people step inside the door, then out again, finding the reproduction better than the original.

In addition to the usual musical and talking programs, KGDM is used to advertise various local business enterprises, of course including the owner's store. Broadcasting time is sold to agents, who secure orders from advertisers and put on musical and publicity programs.

PEFFER originated the advertising plan of making up a large block of newspaper space as a front page, with title, headlines, reading matter and display ads. He uses the entire back page of the week-end edition of the *Stockton Record*, which has over 20,000 subscribers, and charges more than \$100 for this space.

The headlines of "Peffer News" are the sensational kind—big, black-type streamers extending clear across the page, sometimes two or three of them, much like those used by the *Examiner*. The first streamers used were set in small type, which gradually was enlarged as the advantage of using big letters was realized.

The news articles are short and pointed, giving more details about stock and bargains than could be put in a display ad. Of course people know these are advertising stories, but read them, if only to find out what Peffer is up to next. He always has something new to offer, either in merchandise, bargains or customer service.

When a prominent person purchases a radio of Peffer a photograph is made showing the instrument installed in the buyer's home. This is reproduced in Peffer News at a total cost of thirty or forty dollars, but is considered well worth the money. When a new clerk is employed her picture is printed in Peffer News.

Peffer's annual radio show is a big event. The entire main floor is cleared of all other merchandise and filled with a great variety and number of radios. Special programs are put on for the benefit of visitors, who are entertained in various other ways.

Popularity and essay contests attract favorable attention. During one of the former, put on last October, 400,000 votes were given out by KGDM advertisers.

The cost of Peffer's newspaper advertising is \$8,500 per year. One year he ran a page ad every day during the month of December. When his store was reopened after a fire he announced the event in a twenty-page section, the largest newspaper advertisement ever run by a Pacific Coast merchant.

Peffer also originated the idea of printing advertising letters in the form of telegrams. "Peffergrams" are familiar to most postal patrons in the Stockton area. They impress receivers as something important, demanding quick action.

Peffergrams also are used largely for business correspondence. They attract attention as they lie upon a desk, standing out among ordinary letterheads. For this reason they are apt to receive an early reply. Office visitors notice Peffergrams, investigate, and the result is more publicity for Peffer.

How and Why a Dealer Should Sell Tubes

By FRED WILLIAMS

The Manager of the Tube Division of the National Carbon Company calls attention to the necessity of considering the tube in a new light; not as incidental, but as the major line.

THE RETAIL tube business has so far been a step-child industry. Relatively few radio dealers take it seriously. Recently, however, many up and coming radio dealers have begun to convert their tube business into their greatest single profit maker. And this, by no brilliant stroke of genius, but merely by applying good common sense merchandising knowledge to tubes.

But first, why should a dealer sell tubes? For the same reason that a safety razor dealer sells blades, or that a flashlight dealer sells batteries. There is a limitless and ever-flowing stream of profit in any merchandise which is constantly needing replacement. Manufacturers of safety razors were quite surprised to find that in a few years the blade business was the source of real profit. Although dissimilar in many ways, there is this similarity between the radio industry and the safety razor business.

Radio dealers talk in pessimistic terms about market saturation, but they have not yet centered their attention on a market which can never become saturated, because replacements will always keep it active. You can't sell a customer a new set every year, but you can, if you are a good salesman, sell him at least one complete set of radio tubes every year. And you can keep on doing this from now until that mythical day when the non-destructible, everlasting vacuum tube is perfected. The thousands of dollars tube manufacturers are spending in tube advertising is resulting in a national tube consciousness. The public is slowly but surely being educated up to the necessity for periodic replacement of tubes in order to enjoy satisfactory reception. It took the oil industry several years to convince people that crank-case oil should be changed every 500 or 1000 miles. But today every automobile owner is certain that this should be done. That is what undoubtedly will happen to the tube industry. It has been a slow and sometimes discouraging task, but the effects are already apparent.

The tube business is not subject to many of the limitations of radio set sales. It is not particularly seasonal; it is not subject to saturation; it is not affected materially by economic conditions, either good or bad; and it indirectly brings other busi-

ness because it pulls customers into your store who are potential buyers of merchandise other than tubes.

THE QUESTION, "How should a dealer sell tubes?" is not so easily answered. In the first place tubes should be prominently displayed, with appropriate display advertising which will make it impossible for a customer to come into the store without considering the advisability of a tube purchase. In the second place convince every person who comes into your store that "here is the place to buy tubes." A good salesman should never sell a single radio tube without an effort to make the sale one for a complete set. A new tube should never be put in a set with five or six tubes which while still functioning have characteristics entirely different from the new tube being purchased. Tubes should be sold in sets, insofar as it is possible to convince the purchaser of the wisdom of this. And if the dealer can "talk tubes" he can usually convince his customer.

Sometimes a demonstration of the improvement in his reception with an entire set of new tubes will swing the sale. And when you sell a set of tubes this way, you have done more than sell one set; you have very probably made of the buyer a steady repeat customer for a complete set of tubes every nine months or a year. That is the way to build up a tube business worth having—one which gains momentum and brings in a steady flow of repeat orders.

Most important of all is the fundamental necessity for considering the tube business in a new light. It is not an incidental side line, but one of the most profitable and in many ways one of the most desirable aspects of the radio retail business.

But don't think that tube business is coming your way unless you take the initiative. Certain dealers are beginning to emerge as leading tube dealers because they are far-sighted enough to see its possibilities. Other dealers will be the "also rans." They will continue in the future, as they have in the past, to "handle tubes," while their more alert competitors emerge as prosperous tube dealers, reaping a handsome income from what is all too often now considered as an incidental part of the radio retail trade.



A WELL TRIMMED EVEREADY WINDOW
RADIO FOR JANUARY, 1931

Ramblings



Railroad Train Philosophy

By Our Traveling Man



PERHAPS the increase in price to \$79.50 for the new type midget super-heterodynes will permit some manufacturers to adopt a better brand of vacuum tube to supply the trade when sets are shipped "complete." Perhaps a lot of the former angling for almost unheard-of discounts on tubes purchased from manufacturers will be alleviated. Perhaps the tube manufacturers will again be enabled to realize a fair profit from production. Perhaps the dealer will soon point to the tubes in a midget set and tell the customer to "look at the brand." Perhaps the tube manufacturers may be a bit more inclined to help some of the midget set manufacturers over the top in 1931 if a fairer price is paid for tubes. Perhaps 1931 will be a year of more stability in the midget business and bring enough added strength to the right arm of the dealer so that he can use it to deliver a crushing blow to the process server who has been hanging 'round his back door for the past six months with summons in hand. Perhaps.

* * *

All of which recalls a heavy luncheon date with a big tube executive a few weeks ago.

Said we, "How many tubes did you sell to the midget makers?"

Said he, "You wouldn't believe me if I told you. The figures are staggering."

Said we, "Humph! Gonna make a fine financial showing for your factory this year, uh?"

Said he, "If the net profits from this big order pay for the railroad tickets I'll consider myself fortunate."

Said we, "Let's find a cheaper place to eat tonight."

* * *

One wag told us that American Can Company stockholders were ready to greet some of the Los Angeles midget manufacturers with fond embraces. This was a service man who insisted that the majority of midget trouble, next to faulty tubes, was due to loose tin cans over the tubes.

* * *



"Believe it or not," a subscriber to this magazine who sells radios, musical instruments and furniture in a small Missouri town, recently told us that he had been reading our monthly reviews of phonograph records as printed elsewhere in these columns. One particular Victor recording appealed to him. He told us that he had never heard of a Victor record and asked us to tell him where these could be bought. We sent the letter to the RCA-Victor people in a spirit of friendly cooperation to help them increase their sales.

* * *

We have one good dealer friend who decided to clean his shelves of old junk. Piling it on a table he put a sign on it, saying: "Let your conscience be your guide . . . name your price, and deposit the money in the little bean jug." All day long the bean jug clinked—but when he went to get it that night it was empty.

The next day he tried it again; this time with a sign which read: "Yesterday's thief is known. We believe that 99 per cent of our customers are honest. Select . . ." etc. Closing time came again after a day filled with the merry tinkle of coins. And this time our dealer discovered the absence of jug, money and all—including the sign!

That night he decided that the cash register played a more profitable tune than the clink of coins falling into a bean jug.



Selling Radio *by Recorded Music*



A MOST interesting record, and a beautiful one, is that on Columbia 50262-D, in which the Henri Casadesus Society of Ancient Instruments plays a couple of numbers. This society is composed of a Viola d'Amore, Quinton, Viola da Gamba, Bass Viol and Harpsichord. The two selections recorded, "Plaisir D'Amour" and "Minuet of the Land of Love," are played with all the charm and grace of modern types of musical ensembles, if not a great deal more. The sweetness of the tones of all the instruments is remarkable. The bell-like notes of the harpsichord, especially, add a touch of sweetness that can never be rivalled by its successor, the piano.

Victor records Nos. 7321 and 7322 are very remarkable orchestra recordings, containing, "Airs de Ballet," Parts 1, 2 and 3, and "Gavotte in D," Bach-Leopold Damrosch, from Sonata Number 6. All are played by the National Symphony Orchestra under the direction of Walter Damrosch.

The first of the *Airs de Ballet* is the *Slaves' Dance* from *Iphigenia in Aulis*. In it you will find unusual bass and fine sustained tones, both of which are always nicely suited to demonstrating radio combinations. The string work is prominent throughout the first side, violins, violas, violoncellos and bass viols all hard at work. Part 2 contains *Tambourin* from the same suite, followed by *Gavotte* from "*Armide*," and returns to the *Iphigenia in Aulis* suite again with a part of *Chaconne*. In this side of the record the work on the upper part of the musical scale is splendid, violins, flutes and oboes being most prominent. Part 3 contains the conclusion of *Chaconne* with a very rousing ensemble of the whole orchestra. The bass is excellent, especially in the grand finale, with the kettle drums roaring and the tubas and double basses growling for all they're worth. A clarinet passage just prior to the finale is very effective.

On the fourth and last side of this pair of records, Walter Damrosch and his National Symphony Orchestra play the *Gavotte in D*. This recording has an unusual advantage for the radio salesman in that one instrument, or type of instrument, is isolated from the ensemble with a pronounced lead almost all through the performance. This makes it possible to call attention to the high notes of the violins, the mellowness of the clarinets and French horns, or the

deepness of the bass notes. What the salesman and his prospect are interested in, of course, is the ability of the radio receiver to pass those notes, or to "play" them, without muffling their effectiveness or otherwise destroying their beauty. *Gavotte in D* ends up with a tremendous flurry of the base instruments.

As may have been noted in the introduction of the above paragraph, there are two *Damrosches*, Leopold, the composer of the selection, and Walter, the conductor of the orchestra that plays it. Leopold Damrosch was a distinguished German violinist, conductor and composer, educated as a physician in 1854, and later becoming a pupil in music of Hubert Ries, Dehn and Bohmer. While he was playing in the court orchestra at Weimar he became an intimate of Liszt and Wagner. In 1859 and 60 he conducted the Breslau Philharmonic Concerts and in 1862 founded the *Orchesterverein* there, besides leading various other enterprises and often appearing as player. He came to New York in 1871 as conductor of the *Arion Society*, continuing as such until 1884. He organized and directed many societies, musical festivals and operas in New York until his death in 1885.

Walter Damrosch is the son of Leopold. He was born in Breslau, Germany, in 1862. He was the pupil of his father, Rischbieter, Draeseke, Von Inten, Boekelman, Pinner and Von Bulow. He came to New York with his father in 1871 and in 1885 succeeded his father as conductor of the *Oratorio and Symphony Societies*, continuing with the former until 1898 and resuming in 1917, but retiring once more in 1921. In 1894-99 he carried forward the *Damrosch Opera Company*, touring the United States giving German opera, especially Wagnerian works. He, himself, is a composer of great note. At the present he is to be heard on the radio regularly, in his attempts to popularize the finer types of music.

Gabrielle Ritter-Ciampi has recorded a couple of excellent soprano solos on

Brunswick Record No. 90043, the number identifying it as one of the Brunswick European recordings. Miss Ritter-Ciampi sings as her first number, "*L'Amoro Saro Constante*," by Mozart, orchestra accompaniment conducted by Manfred Gurlitt. The voice is clear and beautifully handled. It is so high, in the major portion of this work, that the tone control takes the singer out of the picture entirely. On the other side of this record Miss Ritter-Ciampi sings an *Aria* from *Il Penseroso* by Handel. In this a flute obligato adds color to the bell-like soprano voice, which, at the very end, is at the top of the vocal range.

A new record by Jesse Crawford will prove entertaining and worthy of winning favorable comment for the instrument upon which it is played. This is Victor No. 22557, containing "*Just a Little While*," by Irving Berlin, on one side, and "*So Beats My Heart for You*," from the musical comedy, "*The Street Singer*," on the other. Both sides are full of bass notes; full of everything that Jesse Crawford demands of the great organ when running his fingers over the keys. Crawford's style is all there; his chromatic scales and all his theatrical effects. The radio salesman will be interested to note, especially in the last mentioned selection, that all through it the organist changes from one set of stops to another and back again. One set will sound brilliant, clean cut; the next time the same passage is played, even at the same pitch, it is soft, subdued, just exactly as if the tone control had been turned to the bass position. In fact a little experimenting during the reviewing of this record proved that the brilliant passage, with the tone control at the low end, sounded almost *exactly* the same as the same passage played with softer stops, with the tone control turned back up to high. All of which merely illustrates the fact that by turning the tone control to the "soft" or "low" position the harmonics of the tones are eliminated, just as when Jesse Crawford throws in one set of stops the tones are bright, full of harmonics, then throws in another set, and plays the same tones on a different set of pipes, they are, shall we say, "mellow'd"? A little more work on modern radio sets and we shall be able to take an ordinary organ record and put our own Jesse Crawford into it by manipulating the knobs.

What Does the Rising Sun of '31 Bring With It for the Radio Dealer?

By ERNEST INGOLD

President of Ernest Ingold, Inc., and President of San Francisco's Great Electrical Development League



WITH the end of the year every retailer is quietly looking over his figures and turning serious thought to what the new year holds.

The writer doubts whether there is a retailer, or, in fact, a wholesaler, who does not at times wonder not only what the new year will bring, but also whether the sky is clearing.

The history of the past year in radio for the average retailer has not been satisfactory. This is not a pessimistic statement; just a fact. Every year can't be a good one, nor can every retailer expect each year to result in an increase in business. It is natural for anyone to be concerned about a combination of overproduction and low sales, resulting in instability in price. It is natural for one to be concerned with the sales contracts which he holds or has sold, and with their collectibility under conditions of this type. It is natural for him to find difficulty in a sudden change from a seller's market to a buyer's market; and it is natural for the smaller dealers to wonder about their own business and its future, when confronted with the fact that there have been quantities of unsalable merchandise, available, not to them, but to large buyers, at low prices.

I scarcely think the writer or anybody else can predict exactly what 1931 holds. All of us can now, however, view 1930 and draw a lesson from that year's operations.

If there ever was a time in the radio business when the retailer can be concerned with what line he should handle, it is now. One of the mysteries of our business has been the fact that many dealers seem gluttons for punishment. They buy a line, sell it, and later find their price structure demoralized; they liquidate their own stock at a loss and then with the bringing on of a new model or the coming of a new season promptly buy the same line again, seemingly with no heed to the past. In some cases a retailer has done this for three consecutive seasons; many have done it for two.

Perhaps the greatest single thing the retailer has learned, and by the same token, which the wholesaler has learned, is the need for integrity of price and price structure. Price integrity means more, if he is to stay in business at all, than any other single consideration. I believe that where retailers have taken losses this year most of them will be ascribed to the absence or failure of factory or distributor control of distribution and pricing policy. If the retailer has been shy at all in the past of offending lines, this year he is going to shunt them and cast them off entirely. The average dealer in a strictly price field has little chance. Further, he has little

chance in a market where manufacturers themselves, in many cases, are directly responsible for such price breaks.

I think we will see more efficient retail operation, and we can say the same of wholesale operations. Our cost per dollar of sale will be less, because whether we have liked it or not we have been forced to the realization that we have looked expense in the face and revamped our set-up to meet what was a contracted year of selling.

The fact that the country has ample money supplies, that credit is cheap, that inherently we are a great nation, all count for nothing when it comes to balancing up the books, and the thing that does count in the end is "how much have I sold?" and "have I held my expenses so that my sales were made at a profit?" Adjustments along these lines are bound to continue into 1931, and with even the slightest upswing in the general economic situation, which of course will mean an upswing in radio, we should find store after store operating on a comparably more profitable basis than any time in the past.

Strong radio retailers will find themselves more securely and firmly in the picture; most of the weaker ones have passed on so that from this viewpoint the real leaders in the retailing of radio are beginning to appear, just as the real manufacturers are beginning to stand out definitely.

Among the writer's friends are a great many in the field of radio retailing. Many of them have been in radio since its inception. Their viewpoint is that probably 1930 was a good year to have come upon us, that it has made us watch our business more closely and take care of it more diligently, that it has removed a lot of troublesome competition which, sooner or later, would have to be removed anyway, and that now that it is over we can look forward to much better conditions.

The best minds in the radio business seem to agree that 1931 will be a year of gradually increasing radio prosperity, a gradual bettering of a business not yet by any means stabilized. And while using the word stabilized, it is difficult to find any industry whatever, from steel down, that you might really call stable under varying business conditions.

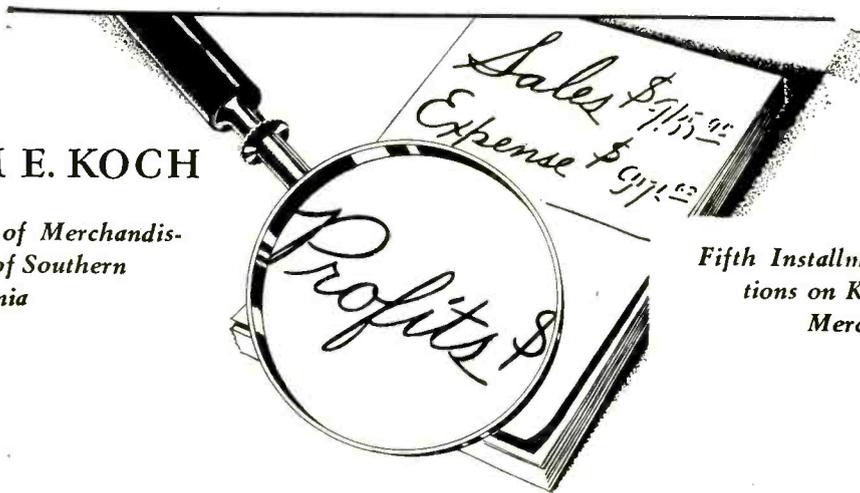
The radio retailers who are able to take care of each individual customer thoroughly, dependably and promptly will find those self-same customers taking care of them.

Wild advertising, unheard of allowances, bad goods, unfair policies, unsound methods, special propositions and low-priced lines will be discarded by those with their eyes on the future, knowing full well that they have meant undermining and ruination in the past.

Guarding the Profits

By WILLIAM E. KOCH

Associate Professor of Merchandising,
University of Southern California



Fifth Installment. Ideas and Suggestions on Keeping Your Eye on Merchandise Stocks

WHILE the control of merchandise stocks in the radio store is decidedly simple as compared with many other lines of retailing, the basic principles remain the same and must be observed to reach the goal of maximum profit.

It is necessary, first of all, to realize that profitable control of merchandise stock is based on two fundamental requirements:

1. Knowing what the stock should be, both as to quantity and kind.

2. Knowing that the stock is as it should be.

The first step in knowing what the stock should be is to determine what the stock limit should be—that is, to determine the minimum investment in merchandise with which the aimed-at volume of sales can be reached with reasonable selling effort.

Of course that's easier said than done. It's another matter in which the point of "just-rightness" frequently remains in the offing—ever to be striven for, not always to be quite reached. But that striving is one of the profitable procedures in modern merchandising, radio or any other line. That is why it pays to devote some studious thinking to getting better control of merchandise stocks. The procedure resolves itself into a two-fold matter of:

1. Building a definite and complete profit-making plan.

2. Using that plan to the best advantage.

No profit-making plan can be complete without suitable stock limits which prove helpful in a variety of ways:

1. In establishing and maintaining the most profitable relationship between buying and selling—keeping buying "in tune" with selling.

2. In establishing and maintaining a consistent assortment of merchandise.

3. In keeping the merchandise stocks always in healthy condition.

4. In keeping the investment in merchandise within consistent bounds.

The best results are obtained only in proportion as we set our stock limits and obtain our stock control with these helps clearly in mind as aids in management, not as substitutes for management. All we can expect from stock limits and stock control is helpful guidance in the ever necessary vigilance which is the price of business success.

Maximum Sales With Minimum Stocks

Of course every radio dealer aims more or less consciously at maximum sales with minimum stocks. The real question

The pith of the profit-producing process is to keep buying and selling "in tune." There's reason back of "pessimist in buying, optimist in selling." Suitable stock limits lead to consistent assortments of merchandise.

concerns itself with the extent to which the aim is realized. It is a question of fundamental importance because maximum profit volume cannot be reached without this combination of maximum sales with minimum stocks.

When we stop to consider how this commercial target can be missed, we readily see that it is in one or the other of these two ways:

1. Keeping any goods in stock longer than they should remain, either through lack of salesmanship or through having the wrong merchandise.

2. Not making sales that might be made, either through lack of salesmanship or through not having the right merchandise.

Obviously, therefore, control of merchandise stocks is by no means all there is to it. The fact remains, however, that the happy combination of maximum sales with minimum stocks is obtained most surely with the aid of adequate stock control. This brings us to the big point that stock limits stand pre-eminently as the "key" to profitable control of merchandise stocks. When we hold to a definite limit for stock which is based on reasonable expectation as to volume of sales, we have an effective guard against both over-buying and under-buying.

Setting a stock limit means nothing more than determining, in advance, how much stock should be carried—what the average inventory should be. Stock control means maintaining that limit and obtaining satisfactory proof that the stock is as it is planned to be. Profitable stock control calls for combination of right buying and right selling, neither of which is possible without the other.

An old veteran in retailing hit it about right when he said "be a pessimist in buying, but an optimist in selling." He reasons that the less we permit ourselves to become enthusiastic over merchandise while considering a purchase, the more wholesome enthusiasm can we have in selling. He aims directly at maximum sales with minimum stocks.

How Stock Limits Boost Sales

Though we keep always in mind the fundamental fact that the real goal of business is profit volume, not sales volume; we never lose sight of the equally fundamental fact that there can be no profit volume without sales volume.

So the only reason for setting stock limits and obtaining stock control is to increase our profit volume through profit-

able selling. Taking a brief look at the sales increasing influence of stock limitation, we find it effective because of two principal factors:

1. The maintaining of suitable stock limits calls for consistent assortments of merchandise which are absolutely essential in reaching the goal of maximum sales.

2. Suitable stock limits, through the call for consistent assortments, help to keep the stocks up-to-date and saleable.

Of course the consistent assortment of merchandise for any given radio store cannot be defined in specific terms. The lines and models that are thoroughly consistent for one store may be decidedly inconsistent for another. But the consistent assortment for any store is the one that will bring the volume of sales which will produce the maximum volume of profit.

The first step is to establish a definite limit for our stock of merchandise, based on the expected volume of sales. The first rough figure is obtained by dividing the expected number of stock turns into the expected volume of sales, a simple and easy procedure.

The next step is to determine just what merchandise will maintain the most saleable stock within that limit, by no means so simple and easy. Here the game depends more directly upon judgment—upon a combination of information and imagination.

Stock limitation is only an aid in establishing and maintaining the consistent assortment. It merely sets the boundary line. Yet it boosts sales effectively because it constantly forces attention to the essential relationship between stocks and sales.

Stock limits, as we use the term, are measured in money value, just as are sales quotas.

Assortments, however, are entirely a matter of merchandise units. Though the problem of assortments is not as continuous in the radio store as in many others, its fundamental importance is quite as great.

In fact, the consistent assortment of merchandise is the final test of the buyer's ability for any line. It cannot be maintained, of course, without equally efficient sales work. In the last analysis, buying and selling stand as one operation with one objective. Nothing helps right buying more than good selling; nothing helps good selling more than right buying.

Yet, to some extent, buying always must be considered as a separate operation with a direct aim at selling. And nothing counts for more in buying than ability to judge what customers and possible customers are willing to buy or can with reasonable effort, be made willing to buy at profitable prices.

Even in the smaller radio store, where general observation serves to keep the entire stock and its movements in mind with remarkable accuracy, the buyer's judgment can be guided and helped by a record of the merchandise units that have been sold in the past.

Stock records always are needed. They will not lessen the necessity for considering all other factors that influence sales, but they play an important part in the selection of consistent assortments. Best results are obtained when both the dollar measure and the unit measure are applied, the one checking the other.

Stock Limits and Stock Turns

We readily see that setting a stock limit is primarily a matter of reversing the customary method of figuring turnover; and dealing with what is expected to be made to happen, rather than with what already has happened. It gives us a thoroughly practical use for turnover information. This is true because:

Knowing how many times we have turned our stock in the past helps us to determine how many times we should be able to turn it in the period ahead, which is the really important thing. Knowing what has happened in the past is chiefly helpful in determining what can be made to happen in the future though merely as a general guide.

All planning bases future accomplishment on past performance and recognized possibilities. Just as we use our average inventory information in finding out how many times our stock has turned in the past, we use this stock-turn information in determining what the average inventory or basic stock limit should be in the future.

We come now to a point that can be given more profitable consideration in any radio store, even though it handles nothing but sets and tubes: *The rate of stock turns for the store as a whole does not apply to each line or item of merchandise.* The turnover for the store is merely a general average; the turnover for each merchandise division gives more specific information.

We need to know our rate of stock turns for each merchandise division primarily because it will guide us

in setting a suitable stock limit for each. With that accomplished we are in a position to develop more consistent stock assortments, as well as to obtain more positive stock control.

How the Principle Is Applied

Briefly to illustrate how easily divisional planning can be applied to setting stock limits and obtaining better control of merchandise stocks, let us assume that a given radio store has established a sales quota of \$60,000 for the year ahead and that it expects to turn its stock seven and one-half times. Obviously the basic stock limit or expected average inventory will then be \$8,000 at retail prices.

Let us also assume that in analyzing this particular sales quota according to four merchandise divisions the new radio sales should amount to \$45,000 with nine stock turns, the used radio sales to \$2,800 with one and four-tenths stock turns, the tube sales to \$10,000 with twenty stock turns, and the parts and accessories to \$1,200 with two and four-tenths stock turns. The situation can then be summarized in simple tabular form as shown in our illustration.

Of course this basic radio stock control plan will be adjusted and readjusted as frequently as changes in existing or expected conditions may demand. The chief objective is always to have a clear picture, in figures, of how the parts will make up the whole both as to sales quotas and stock limits.

EDITOR'S NOTE: *The subject of Mr. Koch's next profit-promotion article will be "Profitable Analysis of the Selling Price."*

BASIC RADIO STOCK CONTROL PLAN					
Merchandise Division	Sales Quota	Stock Turns (average)	Months In Stock (average)	STOCK LIMIT (average inventory)	
				At Retail	At Cost
New Radio	\$45,000	9.0	1.3	\$5,000	
Used Radio	2,800	1.4	8.6	2,000	
Tubes	10,000	20.0	.6	500	
Parts and Accessories	1,200	2.4	2.0	500	
Store	\$60,000	7.5	1.6	\$8,000	

Service labor sales are not included in this schedule because no merchandise stock is involved. Turnover should always be figured on merchandise sales, exclusive of service charges.

Months in stock is included for each division to make the rate of stock turns more significant. It is obtained by dividing the rate of stock turns into twelve (months).

The stock limit or average inventory at cost is not an essential part of this plan, but will always prove helpful.

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Sample of Stock Control Form



KEEPING THE SHERIFF AWAY

HOW SOME DEALERS ARE MAKING A GO OF IT

I'D LIKE to get a radio, Mr. Smith, but I'd feel foolish in front of my friends if I didn't get a discount," remarked a very successful executive of a large washing machine corporation to a radio dealer in the Middle West. "They all tell me they get the wholesale price on radios."

"You've presented the case candidly enough, Mr. Jones," the radio dealer answered. "Come to think of it I guess that's why lots of people think they ought to get a discount on radio sets. And there's a lot of sense to the reasoning. Let's see, you're a member of the Chamber of Commerce, are you not?"

"I am."

"And your firm belongs to the Better Business Bureau?"

"Yes."

"Well, then, you will readily understand my reasons for not being able to comply with your request. First, the Better Business Bureau advocates truthful advertising, doesn't it?"

"Oh, sure."

"But it isn't truthful to advertise a list price and then make reductions to certain people, even though they be friends. I believe the dealer owes it to his customers to uphold the list price. What if one of them finds out that somebody else bought a radio at a discount? He'd be pretty sore."

"No doubt he would."

"In the second place, the dealer owes it to his vocation and the other dealers to maintain list prices. Do you ever sell washing machines to your friends at less than list?"

"Yes, quite frequently."

"What do your dealers think of it?"

"They don't know it."

"Ah! You hide it. Your conscience hurts you because you know you've cut one of them out of a sale."

"That's a point for you," smiled Mr. Jones sheepishly. "What are your other reasons?"

"In the third place the dealer who makes a practice of selling his friends and his friends' friends at wholesale price, or even at twenty off, soon gets himself in darn hot water. Discrimination becomes embarrassing, and friendships become expensive."

"That's true," the washing machine man admitted, "but it doesn't really cost the dealer anything—"

"Except a sale. Some dealer loses what might have been a legitimate profit. Furthermore, it costs money to pick up the set, even if no delivery is required, and it costs money to keep books and to give the radio the once over before it goes out.

"Now, I suppose you think I'm just naturally too tight to come through with my discount. It isn't that, and just to prove it I'm going to make you a present of a radio set, with my compliments. In doing that I will keep my conscience clear and my 'no discount' policy intact. Make your pick."

"I've already picked it, Mr. Smith. And I appreciate your offer. However, I am going to pay you the list price, and I'm going to announce to all my friends that I've paid the list price. Furthermore, anyone that starts bragging about his discount is going to be in for some hot razzing."

The above conversation actually took place. It is interesting because it shows how, by the use of tact and reasonable argument, a radio dealer convinced his customer that it wasn't fair to ask for a discount and it wasn't right for the dealer to grant it. He had to know his man, of course, before he made any offer that might have got him "in Dutch." But his argument is just as effective without the offer that was designed to shame the man into buying.

This discount business has always been one of the frailties of the radio industry. It has been so bad that some dealers have acquired a sort of fatalistic attitude toward it, feeling that if a man is on the trail in search of a radio set at a discount he is going to keep looking until he gets it, and that he, the dealer, might as well make a profitless turnover and be done with it. Not so, however, for the sooner the radio dealers learn to hold out, to tactfully refuse such requests, the sooner the radio business will take on the appearance of a legitimate livelihood and discard the semblance of a hobby. Time was when "friends" were able to buy everything from caskets to wooden legs at the dealer's discount. Possibly a good many people are still able to "work the angles" and obtain whatever they want for the kitchen or bathroom at less than it costs ordinary human beings. But it is not fair, as the Mr. Smith of the above dialogue points out, either to the legitimate customer or the legitimate dealer. It is especially unfair to legitimate business as a whole.

And one last thought—a thought which sort of questions the preacher: Do you, as a radio dealer, ever buy a stove or a length of garden hose at a discount?

Because of the Intimacy of the Above Incident, Our Correspondent Wishes to Remain Anonymous

Happy Workmen Make Better Radios

A STAFF INTERVIEW WITH E. H. FARNY



Eugene H. Farny, President of All-American Mohawk Corporation, makers of Lyric Radio. Mr. Farny has just been elected a member of the Board of Directors of the R. M. A. He is the youngest member of the Board.

THIS is the mechanical age. But it is ruled by human beings. It does not rule them." This is the theory of Eugene Farny, president of the All-American Mohawk Corporation, manufacturers of Lyric radios.

"When humans are ruled by machines," Mr. Farny continued, "the result shows in the product. In the Wurlitzer factory at North Tonawanda, N. Y., where Lyrics are made, we have striven to keep the human touch, the in-



J. W. Johnstone, radio engineer, who is making Lyric's survey of tropical radio conditions.

terest, the true love of the workman for his craft. And the results have proven the value.

"We believe that we have the happiest city of workmen in the world. To visit it as a stranger, aside from the giant factory, is like a trip back into the old world of centuries ago. The traditional love of craftsmen for the detail and exquisiteness of the work of their hands is everywhere apparent.

"We have done everything in our power to help the men take pride in their work. Our insurance plan, stock purchasing privileges, pension, hospital, welfare committee, recreations, libraries; in short our social and educational interest in the lives of our employees has given them something to rely on and work for.

"When a man joins us he is imme-

diately made one of the family. If he is inexperienced he is tried out in several departments until he finds one where he feels a real interest in his work. He is given a living wage and a little more. He works with the newest types of machinery under the expert eye of old timers. He has every protection of life and limb. He knows that he's being watched by men who love their work and he strives to do as well as they.

"The belt, which we call the 'progressive system,' is interesting. Wurlitzers were the first factory in America to install the system. From the time the finishing of the cabinets begins, the radio set is not taken off the belt until it reaches the inspector's room, this side of the crating quarters. If any part is wrong, it is taken off the going side of the belt and put on the return side.

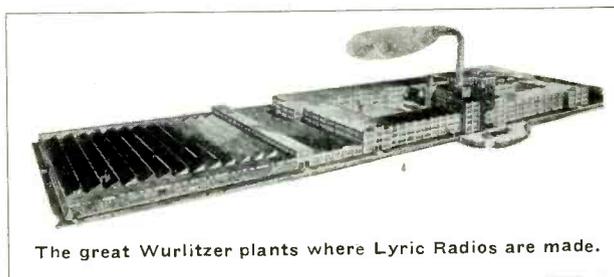
"And believe this. Every man is on the lookout for any inferior work. It is as much a disgrace in our factory for any department to let something slip by unnoticed as it is in the army to have dirty shoes on dress parade.

"Most of our employees are the sons or grandsons of our first workers. They are brought up with the tradition of Wurlitzer—the finest workmanship. They know that no matter what progress is made in machinery, they will always have the best to work with. They know that their lives are of interest to us and that should they wish to leave at any time they can get work in any factory in the world if they are Wurlitzer trained. Needless to say, few leave.

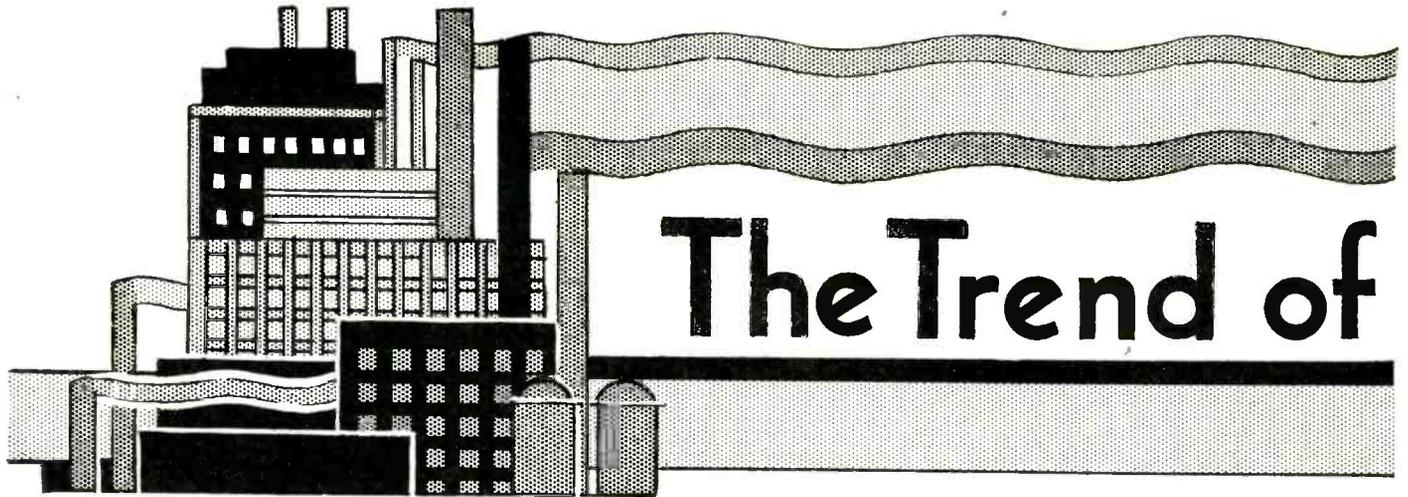
"The result shows in their craft. The smallest

details which mark a well made product from ordinary, are of the finest care and workmanship."

Thus speaks a man who has been eminently successful in the manufacture of radio receivers, and who represents a firm that has been one of the leaders in the musical instrument industry for many decades. In this day and age when the industrial revolution is probably at its peak; when the vast armies of workers the world over are in constant doubt as to whether their line of work will be done by hand or by machine a year from now, it must be a very satisfactory feeling to know that the factory to which they give their best efforts will stand behind them. It pays a factory to have well-satisfied employees. Better work, faster work, less errors are some of the cumulative dividends derived from the investment of human interest. If each employee is made to feel that he is "one of the family," as Mr. Farny puts it, he will not harbor thoughts of dissatisfaction or the impression of servility. Nor will he be devoid of interest in the company's welfare. Probably the first step in obtaining the extreme loyalty of employees is that of taking them in on a partnership basis.



The great Wurlitzer plants where Lyric Radios are made.



The Trend of

Saturation Point Remote

TO PROVE that the saturation point has not been reached in radio, W. J. Zucker, Vice-President of the Stewart-Warner Corporation, cites the fact that there are twelve million homes in the United States wired for electricity, but not equipped with radios.

Here, as in many other aspects, he contends the radio business resembles the automobile industry. "As long ago as 1912 it was contended that all the people who could, or would, buy cars had bought them. But car manufacturers continued to improve designs and to produce new models. The number sold year after year kept on increasing. A survey made recently in a typical mid-western city showed that one person out of every four owned a car, yet automobile manufacturers are making even more ambitious plans for 1931 production.

"In radio, the government census shows that there are now many homes without sets. Of these some twelve million are wired for electricity and numerous projects under way for the development of high power lines and an extension of electrification in widespread rural districts will undoubtedly raise this number in 1931.

"It is to be expected that the coming year will see a large increase in radio sales in the rural and small town field. Radio offers the farmer a daily service as important to him as the ticker tape is to a Wall Street operator. Living in the country is not the hardship it once was. With a Stewart-Warner, or any fine modern radio set, people are no farther from Broadway than the turn of a dial.

"Undoubtedly the Stewart-Warner new small console will find as wide an acceptance in this field as it has in large cities. Housed in a beautiful matched walnut enclosure which harmonizes with any room setting, this powerful eight-tube screen-grid chassis delivers an amazing performance. A radio set is no

Synchronization Approved

THE Federal Radio Commission's approval during December of the plan evolved by the National Broadcasting Company, WTIC, Hartford and WBAL, Baltimore, for synchronizing transmitters on the same wavelength was the signal to begin immediate construction of the necessary apparatus, according to C. W. Horn, general engineer for NBC.

"We hope to have synchronization on an operating basis within a few months," Horn declared. "Our experimental tests have proved definitely that the operation of two or more broadcast transmitters on a single wavelength is beyond the laboratory stage. Engineers from the RCA-Victor Company have already visited Hartford and Baltimore, have studied the situation thoroughly, and compiled their specifications for the special equipment. And now, with Federal approval granted, this working application of synchronization is only a matter of time."

According to the terms of the petition approved today, WTIC and WBAL will synchronize on alternate days with one of NBC's key stations in New York. WTIC will be linked with WEOF, and WBAL will coordinate its transmitter with WJZ.

This means, in layman's language, that the stations when operating in synchronism, will utilize a single broadcast channel.

The immediate advantage of the synchronizing plan about to be placed in effect, Horn pointed out, is that it will afford WBAL and WTIC full-time broadcasting schedules in their respective service areas. Hitherto the two stations have shared a wavelength, and one of them has necessarily remained silent

(Continued on Page 31)

longer a luxury, but rather a staple article of furniture, so there is no reason to believe the so-called saturation point will ever be reached."

Many Radio Aids Developed For Aviation

The year 1930 just ended has been one of the most outstanding of all time with respect to the development of radio aids for air transportation, declares George K. Throckmorton, Executive Vice-President and General Manager of E. T. Cunningham, Inc., radio tube company.

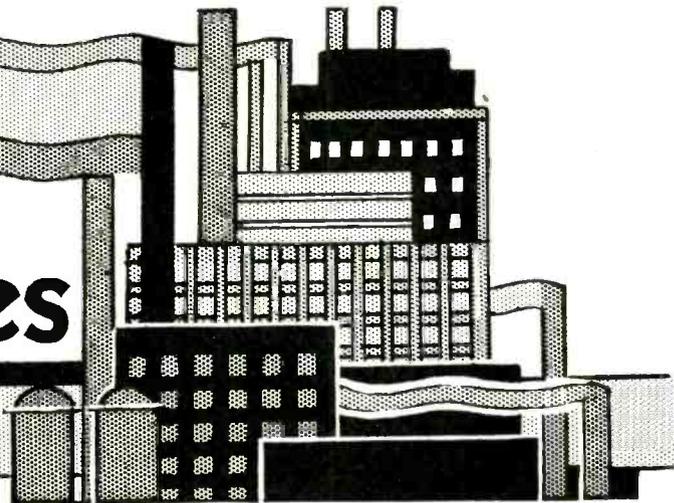
Among some of the major advancements noted by Mr. Throckmorton during this period are: The practical application of radio range beacon systems for keeping aircraft on course irrespective of weather conditions; experimental development of radio aids to permit blind landing of aircraft during times of fog or only partial visibility; and the compilation of considerable research data looking toward the development finally, of a practical directional finder instrument for aircraft and receiving equipment.

General Motors Will Include Tubes in List Price of Sets

According to announcement just made by R. J. Emmert, president and general manager of the General Motors Radio Corporation at Dayton, Ohio, list prices on all models of General Motors Radio after January 15 will include Radiotrons. This will make the price range from \$74.60 to \$270.

"We are making this change," said Mr. Emmert, "because a purchaser must buy tubes to make the set operative, and we believe he should be quoted a price which includes tubes. This step will eliminate the confusion regarding the total price the prospective buyer must pay in order to get the set complete and ready for operation. In the case of the General Motors radios, eight Radiotrons are furnished for the a-c console models and six for the Little General clock-size radio."

The Radio Times



Educational Advantages for RCA-Victor Men

A GREAT university and one of the leading companies of a great industry have joined hands in one of the most far-sighted plans for the training of personnel that business has ever witnessed. No longer need a college graduate terminate his academic pursuits when he enters the world of business, for the RCA Victor Company, through the coöperation of the University of Pennsylvania, offers him the opportunity of pursuing graduate courses while continuing in the employ of the company, according to E. E. Shumaker, President of the RCA Victor Company.

"The RCA Victor Company, located in the center of the world's radio industry at Camden, New Jersey," said Mr. Shumaker, "has arranged with the University of Pennsylvania, which is situated just across the river, for special graduate courses which a college graduate with a B. S. degree or its

equivalent may take while he is in the employ of the RCA Victor Company. We feel that such a plan is essential to a company which looks ahead and wishes to be assured of a trained personnel, not only for its immediate needs, but also for the years to come."

The student wishing to take these courses has two opinions. He may study engineering or business. The engineering course has been planned for those particularly interested in research, design, construction or testing radios. Major stress in this course is laid on a more extensive training in the technical principles of electrical engineering, including the associated subjects of mathematics and physics. Several complementary courses in business are also offered in order that the student may obtain a wider knowledge of the problems involved in the manufacture and distribution of electrical products.

The course in business is planned for those who have technical training in engineering, but wish to acquire additional knowledge of the commercial and economic aspects of the radio industry. Complementary technical courses are also included, particularly a course in the fundamentals of radio communication to give the student an understanding of the problems involved in the design and manufacture of radio equipment. The business course is particularly helpful to men interested in the production, distribution and sale of radio apparatus.

To be eligible for these courses a student, in addition to having a B.S. or equivalent degree must also pass an examination covering the theory of electric, magnetic and electro-static circuits and the elementary theory of alternating currents.

A separate examination has been prepared for each course as the technical requirements for the course in business administration are naturally less rigid. The examination is divided into two parts:

(1) Questions on Fundamental Theory (to be answered without reference to any text or notes;

(2) Problems, to be solved with text, handbook, notes, etc. Applicants who fail to pass these entrance examinations are required to take the technical courses available at the RCA Victor plant.

For the degree of Master of Science in Electrical Engineering or for the degree of Master of Business Administration, the student must complete with credit at least twenty-four semester hours of graduate work, including all of those courses designated in the respective options as required courses; and in addition, must submit an acceptable thesis on a subject approved by the faculty of the school in which he is registered. The two courses are so

(Continued on Page 31)

OUTLOOK FOR 1931 FAVORABLE

Frank Andrea says Midgets will not replace larger console sets.

"I AM pleased to state that we find ourselves in a very favorable position at this time through having little merchandise in our own stock and in the hands of our distributors, enabling us to keep faith with all FADA dealers, especially those dealers who have made time sales, by refraining from the pursuit of any activities which would tend to undermine their position.

"The coming year will undoubtedly bring its share of prosperity to those manufacturers, distributors and dealers who have been able to follow the conservative course which conditions throughout the past year made necessary, and in the field which has opened in connection with the new small type set so popular recently it is believed there is an opportunity for real profit for the manufacturer who can offer the public a high grade piece of merchandise in this class at reasonable value. It is not felt that this small set will replace the regular larger console type, but will have a place of its own, separate and distinct from the larger set.

"Yet for those high-grade manufacturers who have learned through their experiences of the past year how to mold their activities so as to operate efficiently and economically the outlook is very favorable." —From a statement to "RADIO."



F. A. D. ANDREA
President of "Fada"

Sell the Tube on What the Customer can SEE—

SELL CONSTRUCTION

By **WALTER L. KRAHL**
Chief Engineer, Arcturus Radio Tube Company

FOLLOWING a thorough investigation of the causes for failures in existing vacuum tubes, a new structural principle has been applied to the design of electronic tubes by the Research Department of the Arcturus Radio Tube Company of Newark, New Jersey.

Provided uniformly efficient emitters are employed and tubes are properly processed, the major characteristics: plate current emission, plate resistance, amplification constant, and mutual conductance, are entirely controlled by the dimensions and relative positions of the tubes' electrodes. Obviously, therefore, the structural design in vacuum tubes is extremely important. These tube parameters, which determine the sensitivity, fidelity, and power output of radio receiving sets, are appreciably affected by variations as small as one thousandth (0.001) inch in the dimensions of, and spacing between the plates, grids, and cathodes.

Uniformity of inter-electrode capacities, immunity to short-circuited electrodes, ability to withstand shock or continuous vibration without alteration in characteristics, and freedom from microphonism and other tube noises, which are controlled by the structural design of tubes, are additional factors of vital importance to both consumer and producer.

In tubes of the usual design, the electrodes are spaced at the top by the adjustment of bead wires or by insulators, and spaced at the bottom by visual adjustment of wires sealed into the stem. These stem wires are also called upon to support the entire mass of the electrodes at the disadvantage of an appreciable leverage between the rigid stem and the center of gravity of the mount.

The most painstaking adjustment of an experienced assembler of such tubes can scarcely control the exacting spacing between electrodes to one hundredth (0.01) inch, and the alignment of parts by an average operator is far less accurate.

Then, if the tubes are roughly handled, as in shipment, the support wires are distorted, those carrying the heavier electrodes being distorted more than those to which the lighter parts are secured, and the critical adjustment of the spacing between electrodes may be altered.

A striking example of the effect of shock upon the characteristics of present-day radio tubes is

THERE is one thing the layman can appreciate about radio tubes, and that is their mechanical construction. Here are some details about the new unitary structure principle of the Arcturus tube that make good sales points in selling tubes. No, they are not all technical—and they do impress the customer.

the common practice of many tube manufacturers, of thumping tubes with undesirable characteristics until they pass the test requirements. This procedure is termed "bumping in."

The unitary structure principle, as its name implies, constitutes assembling the electrodes of a vacuum tube as a rigid unit in which the electrodes are inter-dependent and cannot move with relation to one another. All electrodes, in such a tube, are supported at both ends by yokes in planes

perpendicular to the axis of the electrodes.

These yokes are anchored by riveting, clamping, or otherwise securing them to the most rigid electrode of the tube, or to an additional part, if none of the electrodes possess the required rigidity. The tube shown in the accompanying illustration is an example of this principle as applied in the new Arcturus Type 127 detector and amplifier.

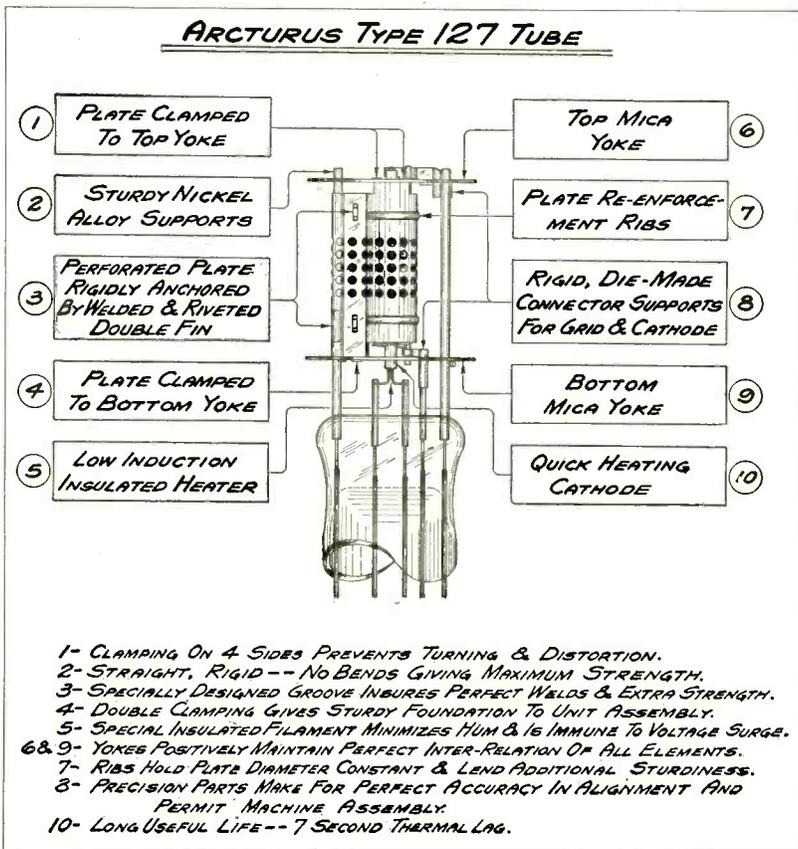
The plate of this tube is a rigid cylinder of nickel, perforated to permit radiation of heat, and ribbed to increase its sturdiness. A mica yoke is clamped to the top and another to the bottom of this plate. The grid and cathode are secured to and automatically spaced by them in relation to each other and to the plate with the precision of the die upon which these yokes are blanked.

The yokes in this tube are supplemented by a cathode collar and grid clip, both accurate die-made parts. These reinforce the unit and serve as electrical connections between

the electrodes and base terminals. The grid clip is so designed that it also prevents any rotation of the single control grid support in the holes through the yokes.

The electrodes in a tube designed in accordance with the unitary structure principle, are assembled in a jig to form a rigid unit, independent of the stem. Each part fits into this unit in exactly its proper location, and cannot be inserted in any position other than the correct one. No adjustment is required, and the "human element" is thereby eliminated. The unit, thus assembled, slips over the stem wires and is spot-welded to them.

It is obvious, therefore, that the characteristics of these unitary structure tubes are more uniform than those of ordinary tubes, and that they are virtually "matched" tubes.



Listening in on Condenser Paper Imperfections

THE long strips of paper tissue that go into the making of filter or by-pass condenser must be relatively free from metallic or foreign particles. Every speck of conducting material imbedded in the tissue is a potential source of trouble, since the electrical charge in the condenser concentrates its full force on the weak spots in the long dielectric that separates the two conducting tin-foil plates. Unfortunately, however, the troublesome specks are usually too small to be detected by the naked eye, and thereby hangs the following tale.

Some troublesome specks can be seen by means of a high-power microscope, appearing very much like lumps of coal. Other specks are absolutely invisible, irrespective of magnification. There is, however, one positive method of detecting and counting the metallic particles per unit area of condenser tissue, which has been developed by the Dubilier condenser specialists. This method is a "listening-in" process. Briefly, the condenser tissue roll is placed in a device which comprises winding and unwinding rolls and contact members. In passing from one roll to another, the paper tissue passes between two brass contact rolls in circuit with a pair of headphones. The pressure between the contact rolls may be adjusted. The operator, slowly turning the winding crank, listens by means of the headphones to the clicks caused by metallic or conducting specks, and determines the number per unit area, which must fall below the tolerance set for that grade of tissue. A further development is an automatic counter which keeps score of the number of electrical weak spots per unit area of the tissue being inspected.

And so another gamble is eliminated in the delicate process of making reliable filter and by-pass condensers. While it is physically impossible to obtain a paper tissue that is absolutely free from conducting particles, the condenser specialists set a minimum of such weak spots per unit area, and depend upon a plurality of condenser tissue layers or "papers" to provide the highest possible dielectric strength at every point throughout the length of the paper condenser winding.

Elaborate as the foregoing test may seem, it is just one of fourteen tests to which all condenser tissue is subjected before its incorporation in Dubilier condensers.

Few Radio Tube Lines Remain Complete

ALTHOUGH there is still a considerable demand for the various types of battery-operated radio tubes, as well as the larger power tubes employed in the

earlier socket-power radio sets and amplifiers, the available sources of supply are steadily shrinking. Most tube manufacturers today produce just the four popular a-c tubes, namely, the '27, '24, '45 and '80 types.

"Although we fully appreciate the economic advantages of concentrating all production and merchandising efforts on the four popular types of a-c tubes, we nevertheless feel that the radio public and radio industry at large are entitled to a continuation of the other types," states William J. Barkley, Vice-President of the DeForest Radio Company, Passaic, N. J. "The DeForest line of audions or radio tubes remains complete, even to the '99 and '20 type dry battery tubes, but little used today. We have constantly sought to keep faith with owners of old radio sets, as well as with experimenters and engineers whose activities demand a wider choice of tube characteristics than can possibly be offered by the four popular a-c tubes. Although some manufacturers have concentrated on the more popular types and have bought other types from outside manufacturers in rounding out their lines to the necessary extent, we have steadfastly maintained a complete line no only in our production but, what is more important, in our research and engineering activities. We have endeavored to bring each and every standard type of tube up to the highest possible standards, irrespective of the degree of demand, in providing a 100 per cent complete line of radio tubes."

Synchronization Approved

(Continued on Page 28)

every other day. When synchronization goes into effect, WBAL and WTIC will retain their joint wavelength, using it as formerly; but on alternate days, the "silent" station will remain on the air by synchronizing with its key station in New York.

"Synchronization is another gratifying proof to the engineers," Horn declares, "that research and experiment can solve the new problems in broadcasting as they arise. Full service in two important regions and clearer reception will be the results of the present plan."

Horn has been the leader in experimental work leading toward synchronization ever since the idea was first conceived.

Fada Battery Receiver Popularity Not Confined to Agricultural Areas

According to F. A. D. Andrea, president of the Fada Radio Company, the new battery receiver which uses the two-volt tubes and the new air cell "A" battery has found a very favorable mar-

ket both in areas monopolized by the farmer and in more congested districts where alternating current is available. The reasons for the latter popularity, Mr. Andrea believes, are due to the fact that many people are still critical of the slight hum frequently present in a-c radio sets, and to excessive electrical disturbances in manufacturing areas which are led into the receiver by the a-c supply lines.

J. E. Broyles Writes of Recurring Profits

In a letter from J. E. Broyles, Secretary of the Capehart Corporation, the writer brings out the point that the dealer who merchandises the automatic phonograph combinations along with his radio, automatically puts himself in a position of continuous profits. The purchaser of an instrument of this type, being music-minded as radio set owners are rapidly becoming, is being constantly "sold" new records by the broadcast programs, themselves. The live wire dealer should see to it that each customer becomes a steady source of business.

Educational Advantages

(Continued on Page 29)

designated that either one may be completed within two years, but it is suggested that the work be spread over three or four years at least. To be recommended for the Master's Degree, the student must complete the entire twenty-four semester hours within a period not exceeding six consecutive years, and the thesis within seven years from the date of initial registration.

In order that as many as possible may have an opportunity to take advantage of these courses, men who do not have the required B. S. degree or its equivalent may be allowed to register as "Special Students" if they meet other requirements. Such students may become candidates for the higher degree only by making up the deficiencies in their previous work.

Hammond Clock Company Pays Dividend

Hammond Clock Company sales for November were approximately two and one-half times those of the same month last year, F. H. Redmond, vice-president and general manager, stated recently. For the eleven months ending with November, 1930, sales were more than four times larger than for the corresponding period of 1929. "Despite the business depression," said Mr. Redmond, "electric clock sales have mounted steadily in each month of 1930."

Net profits of Hammond Clock for the eight months ended November 30, are estimated at \$3 a share.

New Radio Products

Superhet-Plus Star of New Philco Line

A complete line of superheterodyne receivers, available in three furniture styles, and a screen-grid radio-phonograph retailing at \$99.50 are the new models Philco will offer the trade for 1931, it was announced today.

Former models in the line will be retained, so that Philco now offers a complete array of receivers ranging from the seven-tube screen-grid Baby Grand at \$49.50 to the new eleven-tube Superheterodyne-Plus Radio-Phonograph with automatic record changer.

The Superheterodyne-Plus Receiver utilizes eleven tubes: Four type 24 screen-grid tubes, four type '27, two type 45 power amplifier tubes, and one type 80 rectifier tube. A double-tuned input circuit prevents crosstalk and permits the use of any length antenna without affecting selectivity.

A range switch at the back of the cabinet permits changing from normal sensitivity to supersensitivity for use in zones of extra low broadcast signal strength. Philco engineers declare that the set is so powerful that it will operate successfully in "dead spots" in which reception has heretofore been unsatisfactory.



De Forest Announces Two-Volt Audions

THREE standard two-volt audions including an all-purpose type, a screen-grid type and a power tube, are announced by the DeForest Radio Company of Passaic, N. J.

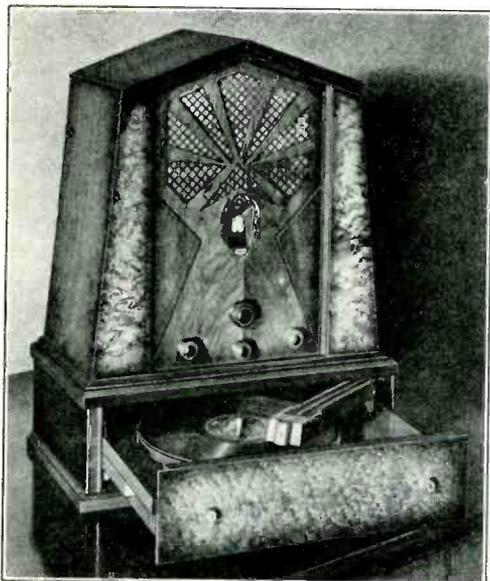
The DeForest 430 audion is an all-purpose tube with the following char-

acteristics: Filament voltage, 2.0 volts; filament current, 60 milliamperes; maximum plate voltage, 90 volts; grid voltage, $-4\frac{1}{2}$; plate current, 2 milliamperes; amplification factor, 8.8; plate resistance, 12,500 ohms; mutual conductance, 700 micromhos.

The DeForest 431 audion is a screen-grid amplifier, with the following characteristics: Filament voltage, 2 volts; filament current, 60 milliamperes; maximum plate voltage, 135 volts; plate current, 1.5 milliamperes; control grid, 3 volts; screen grid, $67\frac{1}{2}$ volts; amplification factor, 440; plate resistance, 800,000 ohms; mutual conductance, 550 micromhos.

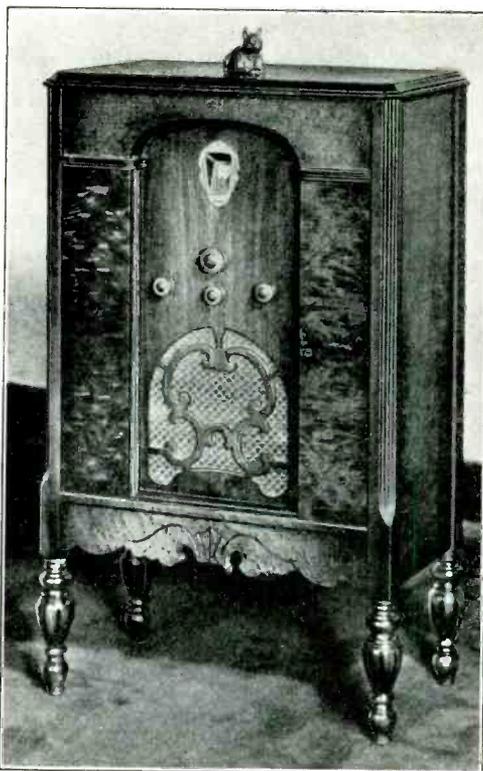
The DeForest 432 audion is a power tube, with the following characteristics: Filament voltage, 2 volts; filament current, 130 milliamperes; maximum plate voltage, 135 volts; grid voltage, 22.5 volts; plate current, 8.0 milliamperes; amplification factor, 3.5; plate resistance, 4,000 ohms; mutual conductance, 875 micromhos; undistorted power output, 170 milliwatts.

The DeForest engineering staff spent many months developing these two-volt audions. A higher emission, together with longer life, marks these tubes intended for battery-operated receivers.



STEINITE SUPERHETERODYNE MIDGET PHONO-RADIO COMBINATION—MODEL NO. 605 (Playing Position)

RCA Licensed Superheterodyne circuit combined with Electric Phonograph. Plays ten and twelve-inch records. Price \$99.50, less tubes.



STEINITE SUPERHETERODYNE CONSOLE—MODEL NO. 630

RCA Licensed Superheterodyne circuit. Walnut finished birdseye maple, butt walnut, and other rare woods combine to make this an unusually beautiful cabinet. Price \$79.50, less tubes.



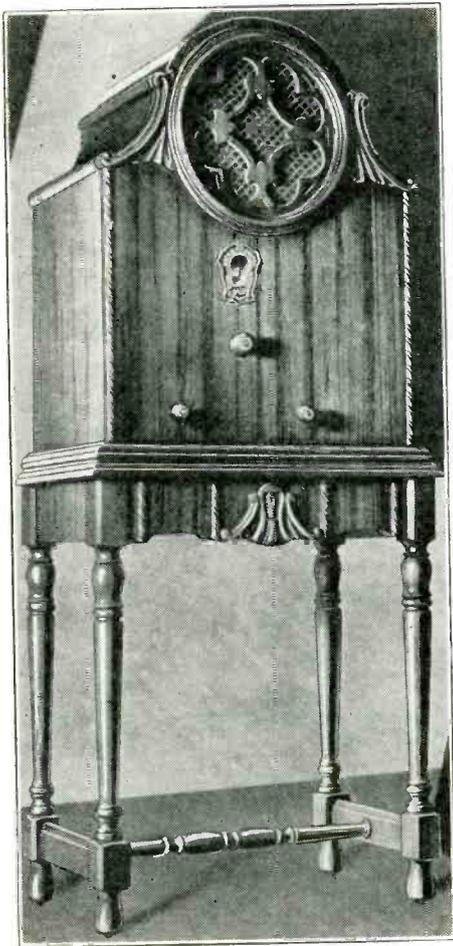
STEINITE SUPERHETERODYNE MIDGET RADIO—MODEL NO. 600

RCA Licensed Superheterodyne circuit, eight tubes, tone control, local distance switch, '45s push-pull, super-power dynamic speaker, triple screen-grid, illuminated one-dial control. Price \$69.50, less tubes.

Clarion Announces Two New Models

ROSS D. SIRAGUSA, President of Transformer Corporation of America, announces two new Clarion models which are being offered to the January trade. They represent the ultimate in small sets, in the opinion of the entire Clarion organization, and will be named the Model 61 and Model 70 respectively. They will be sold complete with tubes.

The model 61 will be a mantel type radio, housed in a beautiful cabinet of distinctive and harmonious lines. Its heavy construction to insure richness and depth of tone, lends ability to reproduce musical scale with an ease and



CLARION MODEL 70

power that is remarkable. It is a six-tube receiver, screen-grid type, employing two '45 tubes in push-pull and an '80 rectifier. The detector is of the power type.

Complete shielding is a chassis feature, the variable condenser is die cast, of battleship construction, built by Transformer Corporation of America and the single unit volume control performing a dual function insures perfectly smooth control with no effect on tuning.

The power transformer and filter unit are oversized and especially designed for



CLARION MODEL 61

the receiver, fabricated entirely in Transformer Corporation of America's plants, while the filter and by-pass condensers being wound in the Clarion factory are especially processed beyond the usual impregnation, making them practically ageless.

The Clarion Model 70 has been aptly termed a new small "large" set and has been pronounced a beauty by all who have seen it. The graceful cabinetry, with or without the stand, which is supplied with it, is strongly appealing and tasteful in every detail.

The receiver employs seven tubes, three '24 screen-grid tubes in the radio frequency system provide tremendous amplification and make possible daylight reception that has not been attained by other receivers in this class.

A '27 power detector permits perfect match to the audio system and realizes the maximum in tone quality and power output. Two '45 tubes in matched push-pull supply the T. C. A. dynamic speaker and reproduces the complete tonal range with unusual power and fidelity. Tone control is also a feature of this model and all the prominent characteristics of the Model 61 are included.

Superheterodyne by Ware

The Ware Manufacturing Corporation, under the superheterodyne license recently granted to them by R. C. A., is contemplating immediate production on a low priced, high quality superheterodyne, to be merchandised in a console cabinet.

Paul Ware, president of the company, and designer of the new superheterodyne, has stated that the new Ware super will disclose several innova-

tions in superheterodyne design. Several features of the new receiver have been developed over a period of years of study by Paul Ware, and the present chassis is the result of several months of concentrated engineering work. The new design, simultaneous with an increase in quality, still maintaining typical superheterodyne high gain and selectivity, permits of a low rate manufacturing cost. It is said that the retail price of the new Ware super will be as interesting a piece of news as the release of the set itself.

The exact date that the new set will be ready for the market has not been stated, but it is thought that it is some time in the very near future.



Silver Compact Super-heterodyne; One of the New Eight Tube, Three Screen Grid Models, with Tone Control, Local-Distance Switch and Other Advanced Features.



Silver Superheterodyne Cadet. The Same Chassis as That Used in the Compact. Illustration of Chassis Shown on Page 55.

The FORWARD MARCH of the INDUSTRY

By DAVID SARNOFF

President, Radio Corporation of America

PROSPERITY faces a new turning point in 1931. The forward march of industry, I am confident, will begin under the stimulus of new developments from the laboratory, new services to the public and new industries which initiative and necessity will combine to create. The one inescapable fact of our experience is that whenever and whatever the occasion of an industrial crisis, the country has come out at least one step ahead. Always with higher standards of living, higher wages, and a new industrial prosperity. We have been going through the valley of depression, but it is the depth of the valley that makes the mountain so high.

THE barometer of depression is always clear enough—changing colors on the balance sheet, receding stock quotations, reduced consumption and sales, facts and figures of unemployment. But the ascending signs of prosperity are rarely evident until prosperity is fully upon us. It is inevitable that it should be so. The scientist, the research man, the technician—these do not work with the blare of fife and drum. What goes on in the laboratory does not become news until research is translated into a new invention, a new service, or a new product.

THE fact of greatest promise to renewed prosperity in many of our leading industries, I believe, is that for the past eighteen months old Mother Necessity, with sleeves rolled up, has been busy in the leading laboratories of the nation. We have been going through an industrial phase where production and consumption, the forces of supply and demand, have constantly sought to outstrip each other; we are coming to see that true prosperity lies in the balancing of these forces. But that does

not mean the world can, or will, restrict its needs. On the contrary, not by slowing up industry, but by speeding up research, shall we solve our problems.

NCESSITY is energizing our inventive and industrial genius. Today research has been given the signal of full speed ahead, the laboratories of the nation are hot with development, and the tracks are being laid for new industries and new services.

CONSIDER the position of electrical entertainment, inherent in radio, in broadcasting services and in the talking motion picture screen. Sufficient progress has not yet been made toward practical television to set a date or a time for its introduction upon a nation-wide service basis. Nevertheless, progress is continuous. Every contribution to the art now being made in a laboratory is another brick in a new industrial structure, another indication of a new industrial development, a further approach to the creation of a new industry which will need to employ more men, more money and more material. In the meantime, of course, there are many services involving sound rather than sight in the field of electrical entertainment which are yet to be developed.

IN THE field of modern screen entertainment, the key to greater progress is better pictures, it is evident. Recreation and entertainment are vital forces in the everyday life of millions of our people. The public at any time will beat a new path to the door of the best play or the best book or the best film that meets these essential requirements. There, again, the strongest urge for progress has come from the fact that during a period of depression the public shops for entertainment as it shops for any other commodity that it needs.

THERE may be temporary maladjustment and industrial confusion, but there is no such thing as overproduction in the services of recreation and entertainment, of information and education. In these lie the motives of permanent progress in the new arts of electrical entertainment.

THE only real danger, I believe, to natural and widespread economic recovery in the United States is the continuance of archaic political and legislative conceptions regarding large-scale industry. There are many great industries in the country today which are handicapped by overcrowding, overproduction and overexploitation. There are many unsound factors which create nothing, contribute nothing, add nothing to the essential structure of an industry. To argue that any condition which results in market disorganization, financial loss, and finally unemployment, is a sound principle of progress merely because it is labeled "competition" is to fly in the face of economic facts. The right to compete also implies an obligation to serve.

I AM not pleading for monopoly in industry, for I am a firm believer in the stimulus of healthy competition; I speak only of the destructive forces of competition in those industries which are overcrowded and geared to production far in excess of the reasonable requirements of consumers. For in the end, the evils of overproduction strike the consumer as well as the producer.

THE year 1931 will discover, I believe, the great stimulus which science and research will develop on many fronts to lift us out of the period of world-wide industrial depression through which we are now passing.



David J. ...



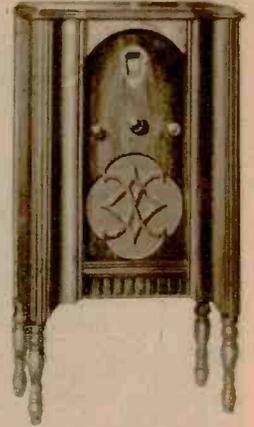
Two New Steinite Models

The STEINITE Jr. Midget carries a list of \$49.50 less tubes; \$65.00 complete with tubes. Sold with matched tubes. Tube requirements, 3-224s; 2-245s; 1-280.

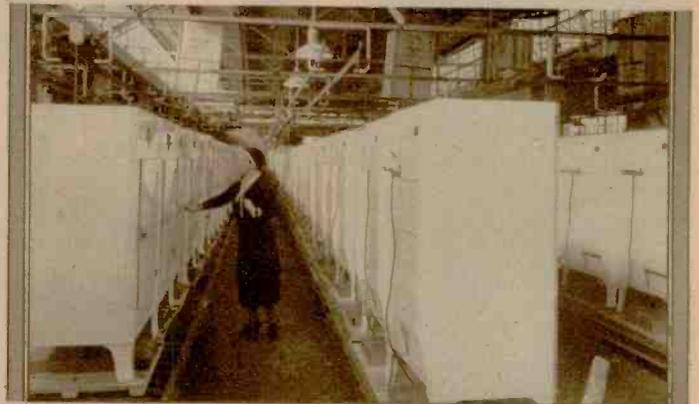
The Consolette lists at \$64.50 without tubes, and \$80.00 with tubes, and is sold either with or without tubes.

The dimensions of the STEINITE Jr. are as follows: 18 $\frac{1}{4}$ " high; 15 $\frac{3}{4}$ " wide; 8 $\frac{3}{4}$ " deep. Steinite Consolette, 33" high; 19" wide, 11 $\frac{3}{4}$ " deep.

These two new models are being received with great enthusiasm among Steinite distributors and dealers, which fact accounts for the ever growing number of employees' automobiles which may be seen swarming around Steinite's big factory in Fort Wayne, Indiana.



MAJESTIC'S MASS PRODUCTION

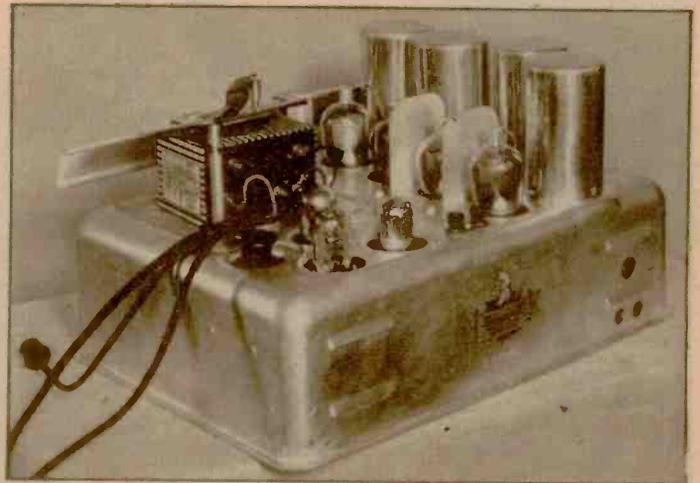


Ida Bailey Allen, famous broadcasting home economist, looking over rows of Majestic Refrigerators on their slowly moving, ball-bearing platforms. At this stage of construction, the units have been installed and each machine is ready for the top and the packing cases, to be seen coming in on conveyor chains at the top of the picture.

Majestic Radio is handled to the United Kingdom and Continental Europe through the Majestic Electric Co., Ltd., at London, England. This interesting photograph shows one of the first shipments of Majestic's Model 52 being unpacked, tested and re-created for distribution to sub-distributors in other countries of the Continent. So satisfactory were these early shipments that a score of carloads have followed.

BRUNSWICK "AIR CELL" Powered Screen Grid Chassis

Because of the precision methods of manufacture required in the making of the superheterodyne, all wiring in Silver-Marshall receivers is pre-formed and laced into cables by thirty girls in this cable forming department.

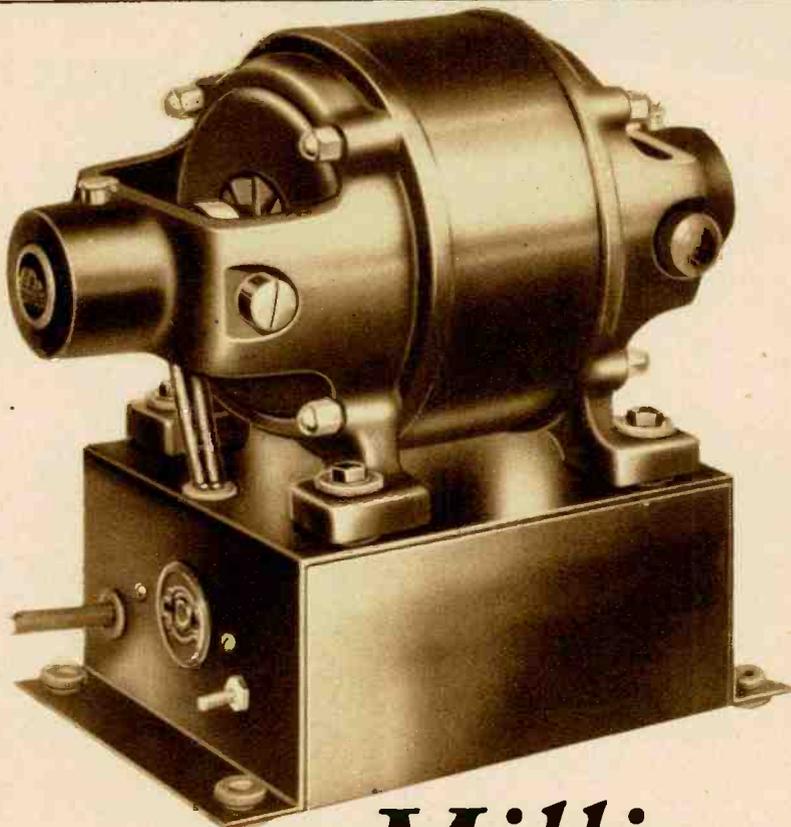


Indian Princess singing over Capehart system installed in an automobile of the Clear-tone Radio Co. of Vancouver, Washington.

Brunswick Radio Model B15, which meets the problem of a constant voltage battery powered radio receiver. It is controlled by a Uni-Selector—a single control of many uses and features tone control and the "armored chassis."

THE NEW JANETTE

TYPE CA-20-F
*Rotary
Converter*



Only
\$49⁵⁰
LIST

Creates Millions OF NEW A. C. RADIO PROSPECTS

This new JANETTE Converter answers the question uppermost in the minds of every radio dealer, jobber and manufacturer in the country, "Where and how can I sell more A. C. receivers?"

Sell them in D. C. Districts!

Over 500,000 American farmers are the owners of 32 and 110 volt D. C. lighting plants. Every one of them automatically becomes an A. C. radio prospect, not to mention the hundreds of thousand of prospects living in the D. C. districts of our large cities—a vast, untouched market. At the low price

quoted the JANETTE CA-20-F Converter appeals to the buyers of popular priced receivers as well as the buyers of more expensive sets.

Lowest Priced Converter Ever Offered!

\$49.50 is a record low price for a converter—and this price includes filter, cord, plug and A. C. receptacle.

The JANETTE operates quietly. Has double-wound armature. Perfect filtering—not a trace of ripple or interference in the receiving set. Capacity 110 watts.

*Mail
the coupon
Today!*

JANETTE MANUFACTURING CO.
557 W. Monroe St., Chicago, Illinois

Singer Bldg., 149 Broadway, New York, N. Y. Real Estate Trust Bldg., Philadelphia, Pa.
Harrison Sales Co., 314 Ninth Ave. N., Seattle, Wash.

JANETTE MFG. CO. 557 W. Monroe St., Chicago, Ill.

Please send me full information and discount on your new type CA-20-F Converter.

Name _____

Street and No. _____

City and State _____

FLINT RADIO CORPORATION
2425 West Washington Boulevard
Los Angeles

December 30, 1930.

Mr. H. W. Dickow,
Business Manager "Radio",
428 Pacific Building,
San Francisco, Calif.

My dear Mr. Dickow:

Please utilize this letter of acknowledged satisfaction to fill one of the two pages that we have contracted for in the coming issue. The remaining page we present to you to use in any way you may see fit.

This unusual way of fulfilling our contract should be credited to the extraordinary pulling power of your publication. Our double spread ad appearing in your previous issue produced to date six hundred and eighty three inquiries and we are positively elated at the remarkable results obtained.

We contemplate the preparation of some very interesting advertising material for the next issue, but for the present we desire an opportunity to catch up with the initial orders received from our regular distributors and from those who responded to our recent advertisement.

Extending to your publication and staff our best wishes for a Happy and Prosperous New Year, we remain,

Cordially yours,
R. A. Steele
Flint Radio Corp.

RAS/VK

RADIO

ESTABLISHED 1917

THE NATIONAL TRADE MAGAZINE

ARTHUR H. MALLORAN
EDITOR
HECKERT L. PARKER
MERCHANDISING EDITOR
P. S. LUCAS
ASSOCIATE EDITOR
H. W. DICKOW
ADVERTISING MANAGER

PUBLICATION OFFICE
PACIFIC BUILDING
SAN FRANCISCO, CALIFORNIA

January 3, 1931.

BRANCH OFFICES
NEW YORK CITY
415 LEXINGTON AVE.
CHICAGO
307 NO. MICHIGAN AVE.
BOSTON
88 ST. BOTOLOPH ST.

Mr. R. A. Stolle,
Flint Radio Corporation,
2425 W. Washington Blvd.,
Los Angeles, Calif.

Dear Mr. Stolle:

It was a genuine pleasure to learn from your letter of December 31st that you have received six hundred and eighty three inquiries to your rotogravure advertisement which we published for you in the December issue of "RADIO". The issue was in distribution only two weeks when your letter reached us.

It is evident that the radio dealers of America awaited the introduction of a midget super-heterodyne such as you advertised in our publication.

The large number of inquiries received from your advertisement also proves the faith which the dealers have in "RADIO". Likewise, they have faith in you and faith in the product which you offer for sale.

FLINT RADIO has enjoyed a splendid reputation in the radio trade. When we learned that you were about to introduce a midget super-heterodyne we instructed our Southern Manager to solicit your advertising for "RADIO". We believed that your scoop announcement to the trade would bring you a profitable return on your advertising investment and we are happy to know that you are elated to find that "RADIO" pays.

"RADIO" begins its fifteenth year of publication with a policy of service to the retailer and to the manufacturer. It pleases us to learn that you will continue to use two pages of rotogravure in future issues of "RADIO". Space is being reserved for you in our next issue. It is our sincere hope that our publication will open new markets for you...bring you greater profits during 1931....make your product known and used from Maine to California.

Success to you.

H. W. Dickow:MC

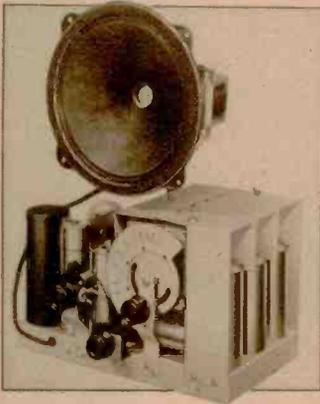
Yours very truly
H. W. Dickow
Business Manager.

影攝宴秋司公片唱明開國美



BRUNSWICK IN CHINA

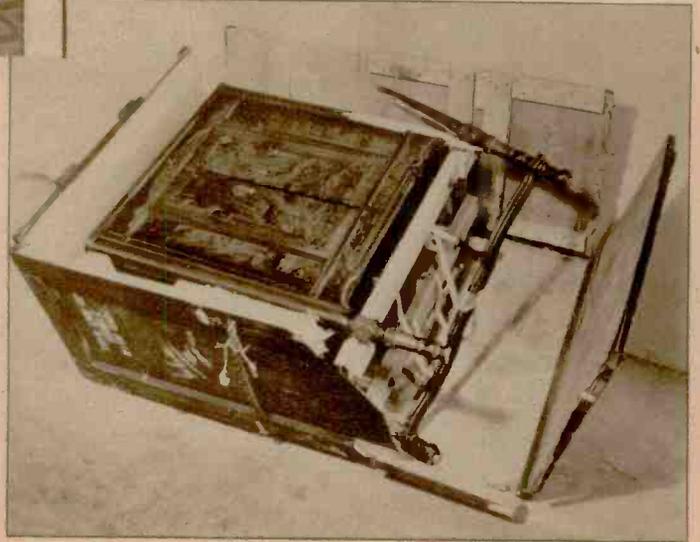
Dealer meetings are dealer meetings the world over and when Mr. Schoch, Shanghai (China) Brunswick distributor, decided to tell the Warner Bros.-Brunswick Radio story, why he most naturally held a dealer gathering. Practically every music merchant in this, the most cosmopolitan city of China, attended, which may be noted in the above picture by the divergence in costume of those present.



Chassis of "The Little General," new "clock size" radio by General Motors Radio.



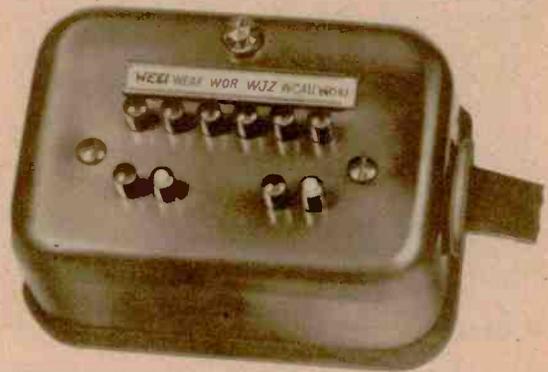
New "clock size" radio with tone selector and six tubes, four of them screen grid, presented by General Motors Radio.



Pictured here is a Victor radio R-39, which has just undergone a durability test which few radios have ever had to withstand. It was being rushed to a dealer meeting in Provo, Utah, when the truck in which it was reposing collided, head on, with another machine. Although the cabinet suffered extensive damage, so compactly and sturdily are Victor radios made that the chassis was uninjured and the receiver performed perfectly at the Provo get-together.



Radiola 82 with the pre-selector arrangement for the new RCA Remote Control and automatic tuning device. Six stations are pre-selected at the receiver and any of these stations may be automatically tuned in thereafter either at the set itself or from the remote control tablet. A special connecting cable only an eighth of an inch thick and about an inch wide which is not so subject to kinking or raveling as ordinary cable, and which may be concealed under the rug or along the molding, joins the remote control tablet to the receiving set. Complete operation of the receiving set may be had from the remote control tablet or at the receiver itself.

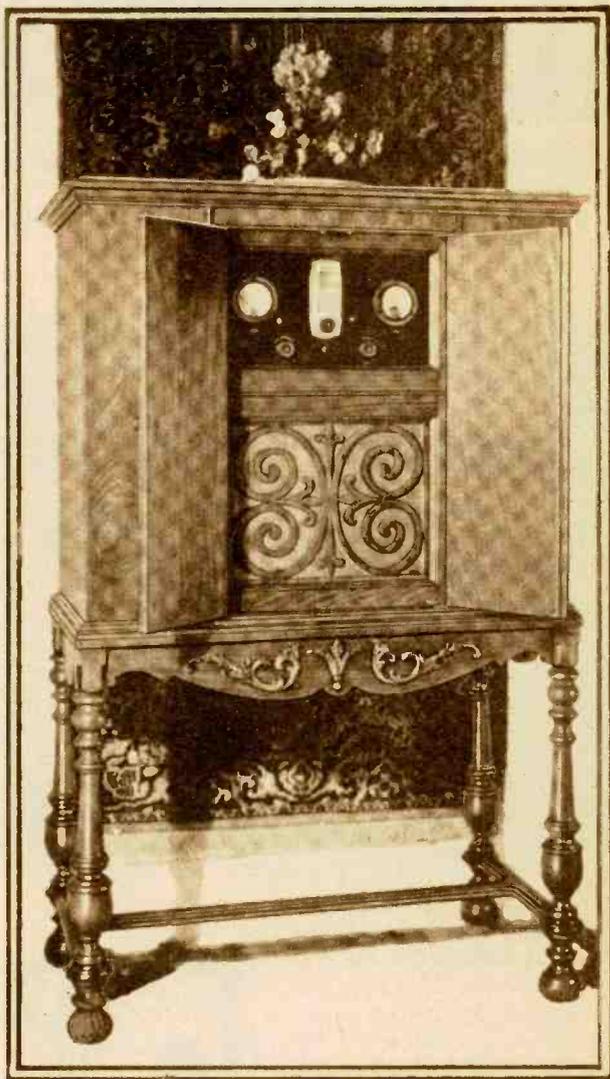


The new RCA Remote Control tablet which is connected to the Radiolas 82 and 86 with a twenty-five foot length of a special cable-tape. The tablet, which measures approximately $4\frac{1}{2} \times 3 \times 1$ inches, provides complete control of the receiving set from an easy chair, a bridge table, or some other convenient location away from the receiver itself. A slight pressure on any of six push buttons automatically tunes in as many stations. Two additional sets of buttons control the volume and shut the receiving set on or off. A jewelled indicator lamp on the tablet shows when the set is on and off, and by its varying brilliance indicates whether the station is tuned in exactly.



Short Waves » » Long Profits

Radio dealers everywhere are grasping the opportunity to increase their profits by the sale of short wave radio receivers. The past season has witnessed the introduction of short wave receivers that are fool-proof in construction and sure-fire in performance. The most reliable short wave receiver is the new Norden Hauck Admiralty Super-12. All electric. 14 Tubes. Double Push-Pull audio. Compound Volume Control. Automatic Sensitivity Regulation. Line Voltage Control. Tone Modulator. Screen Grid Tubes. 250 Super Power Tubes. Panel Meters. Local-Distance Switch. Pre-selector Tuning. 10 K. C. Band-Pass Filters. Custom Built Throughout. A wide choice of elegant console cabinets is available.



Supply the ever-growing demand for QUALITY merchandise by writing now for further information.

NORDEN-HAUCK, INC.

"Builders of the Highest Class Radio Equipment in the World"
Marine Building » South St. at Delaware Ave. » Philadelphia, Pa.

SOME ATTRACTIVE DEALER WINDOW DISPLAYS



Striking Atwater Kent radio display which was featured all during the week of Atwater Kent Salon showing in the Tremont Street window of the Boston "Herald," Boston, Mass.



The 32 Edison Shops scattered all over Metropolitan Boston and operated by the Edison Electric Illuminating Co. are now selling Edison Light-O-Matic Radios exclusively. Photo shows the Edison Radio window display at the main store of this large retail chain on Boylston Street.



A model Christmas window display which the RCA Radiola Division prepared for its dealers. Inexpensive crepe paper and holly wreaths form the background for this window. A cardboard cut-out of a good old fashioned and hearty Santa Claus displaying his bounty of the good things on the air is in the foreground. The Santa Claus, the placard resting on the receiver, and the decorative lettering, all in appropriate Christmas colors, were furnished without cost to RCA Dealers.



ACTION!!

An unusually graphic set of panel posters which the RCA Radiola Division sent to dealers subscribing to a special monthly window display service. Some of the country's leading poster artists will seek to tell a vivid story in color each month through these posters.

In order to create real enthusiasm among the Warner theatre managers, the Northern Distributing Company of Newark, N. J., offered an award for the most interesting Brunswick lobby display created during a recent week. One of the prize winning displays is seen above. Every theatre brought the Brunswick-Warner tie-up firmly before their audiences.

Association



News

Next Show to Be Business Proposition

EVERY effort was made at the meeting of the RMA Show Committee to cause the next trade show to be a constructive selling force with the least possible expense to the exhibitors. The committee members and the board of directors are united in their desire to effect every reasonable economy consistent with a real and successful business show, devoid of all circus ballyhoo.

They regard the trade show in the light of a dignified and serious function with unlimited sales and profit-making opportunities for the exhibitors. They view the carnival spirit displayed in recent shows as being detrimental to this purpose.

It was decided that the next show will be held in the city of Chicago, June 8 to 12, inclusive. As formerly decided, the show will be held under one roof, giving opportunities for displays in an exhibition hall and private hotel demonstration rooms. The selection of the hotel will be made at an early date. The Show Committee has been advised that the Institute of Radio Engineers will hold their convention June 4 to 6, immediately preceding the RMA Trade Show, and that the Music Industries Chamber of Commerce and the National Association of Music Merchants will hold their convention, June 15 to 18, immediately following the RMA Trade Show, in the same locality.

Exhibitors are required to show current merchandise or be denied the privilege of having either a booth in the exhibition hall or the use of hotel demonstration rooms.

Radio products only may be displayed in the exhibition hall. Exhibiting members are permitted to exhibit radio products and products of their own manufacture other than radio products in demonstration rooms, provided such products are offered for distribution through the jobber and dealer channels represented by the trade show attendance.

Many savings to exhibitors will be effected which include lower rates for booth decoration, furniture, electrical and other necessary services. There will be no charge for the necessary labor and hand-trucks to place exhibitors' dis-

play materials in the exhibition booths, the respective booths at the close of the show and when merchandise has been repacked or crated by exhibitor, to remove the same to the receiving room.

All information in regard to space applications, rules and regulations, and other matters appertaining to the trade show will be sent in one mailing, registered, to the prospective exhibitors, thereby avoiding the confusion occasioned in the past.

The space in the exhibition hall will be sold in units of approximately 10 feet by 10 feet at a cost of \$2 per square foot, including standard booth with name and address sign. No additional charges will be made for porter service between booths and loading platforms, cleaner or watchman service. It is urged that exhibitors refrain from any lavish decorations in addition to the standard booth and furniture services, but in any event all booth decoration must comply with the rules and regulations prescribed by the Show Committee.

All space allotments will be made by disinterested third parties functioning for the Show Committee. Reductions in railroad fares and reasonable hotel rates will prevail.

The committee believes that the RMA members are awake to the essential advantages to be derived from their annual trade show and that they will refrain from extravagant entertainment, detrimental to their objectives and costly to their pocketbooks.

(Signed) H. P. DISBECKER,
Show Manager.

NFRA and RWA Appoint Advisory Committee for Century of Progress

In order that the radio industry might have proper representation in the planning of the radio buildings for the Century of Progress to be held in 1933 in Chicago, the joint boards of directors authorized a committee of five to act as advisory committee to the World's Fair officials in making their plans for

Board of Directors Meeting of RWA and NFRA in New York Considers Important Problems

AT A meeting of the board of directors of the R.W.A. and N.F.R.A. in New York on Tuesday, December 16, several steps were taken in the interest of better merchandising conditions for the coming year. The report by the Merchandising Committee calling for closer cooperation between the manufacturer, wholesaler and the retailer, was acted upon favorably, and it is expected that some early action will be taken in this respect.

Plans for the coming annual convention were made and a series of topics to be discussed were taken up. It is the plan of the R.W.A. to take up, by a series of round table discussions, the many individual problems that are now affecting the radio wholesaler. Serious consideration is being given the subjects brought up, and the discussion will be started by men who have thoroughly investigated the particular problem to which they have been assigned. The board of directors will hold a meeting on February 15, preceding the annual meeting, February 16-17, 1931. Steps were taken to insure a larger attendance than ever before.

J. Newcomb Blackman, chairman of the Tube Committee, presented a report concerning their activities on this very important problem and stated that pending some future conference they would submit a very comprehensive report for discussion and action at the convention.

Executive Vice-President Erstrom reported on the activities of the executives offices on the interference situation, wherein Chicago is being taken as a proving ground for a plan to be evolved and used nationally for the elimination of interference complaints in each local community.

their radio activities. This is considered to be a very important step in behalf of the entire industry and the guidance of the trades interests will be of great value in the promotion of that event. The appointments will be announced at a later date.

New Code of Business Practices Adopted

THE following Code of Business Practices for Radio Dealers was officially approved by the board of directors of the NFRA and recommended for radio trade associations and dealers everywhere. This Code replaces the one issued in the summer of '29 which enjoyed a circulation of over 20,000 copies. It is anticipated at the executive offices that the demand will be far greater for this Code than the previous one, inasmuch as business conditions at the present time warrant the highest degree of coöperation in order to stabilize the merchandising policies of the industries.

WE SUGGEST:

1. That, prospective customers shall not be allowed a free trial or home demonstration in excess of 48 hours.

2. That, an adequate interest charge should be made on all time-payment contracts and that contracts do not extend beyond one year. These are standard practices in all other forms of time-payment selling.

3. That, when an outside aerial must be put up when a set is installed, a charge of at least \$7.50 should be made to meet the cost of labor and materials.

That when an inside aerial must be put up when a set is installed a charge of at least \$5 should be made to meet the cost of labor and materials.

4. That, no free service be rendered after 60 days or after a certain number of calls specified at the time of sale. In case of defective parts in the radio receivers after the 60-day free service period, if the manufacturers warranty covers free replacement of parts and if the instrument has not been tampered with, the dealer should replace these parts, charging only for the labor involved.

5. That, if the free service period has expired a minimum service charge of \$2.00 should be made. If the call is of half-hour or more duration, that a specified rate per hour plus cost of material should be charged.

6. That, truth in advertising must be observed to preserve the good reputation of the individual dealer and the entire trade and that the Standards for Radio Advertising as recommended by the National Federation of Radio Associations should be followed.

7. That, extreme care be exercised when offering a trade-in allowance in order to protect the dealer's necessary margin of profit.

8. That, instruments for trade-in should be confined to radio equipment and musical instruments.

9. That, the list price should be clearly designated in consumer advertising as the cash price.

Broadcast Stations Urge Public to Buy Radio

RADIO manufacturers, jobbers and dealers are indebted to many broadcasting stations for valuable aid given in promoting pre-holiday sales of radio. At the request of the Radio Manufacturers' Association, many broadcasting stations helped to sell radio by brief daily announcements from their stations by urging the public to buy radio for Christmas.

The broadcasters contributed their aid and time from their stations in a fine spirit of coöperation with the radio manufacturers and trade. Beginning two weeks before Christmas, the broadcast stations, including some of the largest in the country, arranged for the broadcasting each day of a "minute-man" announcement urging the public to buy modern radio.

The plan was evolved in the merchandising program of the Radio Manufacturers' Association, under President Morris Metcalf and Chairman R. W. Jackson, of the Association's Merchandising Committee. It followed soon after another RMA merchandising service which urged about 2000 radio jobbers to tie up their own and their dealer's sales promotion and advertising with current broadcasting features. Prominent broadcasting interest coöperated with the RMA in arranging for the daily sales appeals from broadcast stations, which followed a letter sent to all broadcast stations of the country by Bond Geddes, executive vice-president of the RMA.

The letter which was sent to the broadcast stations and which met with wide and splendid response from the broadcasting interests follows:

"On behalf of the Radio Manufacturers' Association I am writing to request your coöperation and contribution of a very little time for a daily announcement from your station, in your interest as well as that of radio manufacturers.

"As a coöperative measure and after conferences between radio broadcasting and manufacturing interests, it has been decided to request all radio stations of the country to make a 'minute man'

10. That, dealers should not offer for sale, by advertising in any form, or my quoting prices, any radio merchandise for which they are not duly franchised dealers.

It is the belief of the board of directors of the National Federation of Radio Associations that if this code of business practices is followed by the dealer, he should operate on a more substantial and profitable basis.

Williams Named Chairman of RMA Committee

FRED D. WILLIAMS of the National Carbon Company of New York has been appointed by President Morris Metcalf of the RMA to be chairman of the association's Committee on Fair Trade Practices. This committee adjusts complaints between and against members under the RMA code of ethics. Mr. Williams, director of the RMA, succeeds Lester E. Noble, formerly of the United Reproducers Company of Springfield, Ohio. Other members of the RMA Fair Trade Practice Committee serving with Chairman Williams are:

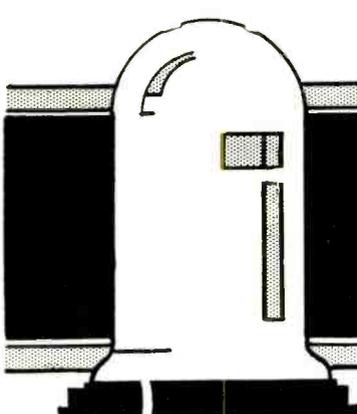
J. McWilliam Stone of the Operadio Manufacturing Company, St. Charles, Illinois; E. V. Hughes of the Wasmuth Goodrich Company, Peru, Indiana; Peter L. Jensen of the Jensen Radio Manufacturing Company, Chicago, Illinois; Colin B. Kennedy of the Colin B. Kennedy Corporation, South Bend, Indiana; and I. E. Lambert of the RCA Victor Company, Inc., Camden, New Jersey.

brief announcement daily urging the public to purchase modern radio sets, new tubes, etc., for Christmas. This plan has been approved already by some important broadcasting interests and stations, and we are asking you to have a similar brief announcement made daily, on a sustaining program or a time convenient to you, from now until Christmas and, of course, occasionally thereafter as you may find it possible.

"The form of the announcement from your station and the time you can contribute are in your discretion. It is suggested that such announcements include the following ideas:

"Modern programs of the highest order are being offered and are broadcast by the most modern and costly equipment. Modern, up-to-date receivers are necessary to render fidelity of reproduction and to enjoy these wonderful programs. During the past two years the art of program making has improved by leaps and bounds—so have the qualities of the new receivers. This, then, is the coöperative message of the entire industry: Now is the time to modernize radio equipment for non-owners to buy. Today's set is practically perfect. Buy a lasting radio receiver or that gift set *now*. Give enjoyment to others and employment to thousands.

"At this time the radio industry especially needs and will sincerely appreciate your coöperation in the plan outlined above which will, we believe, materially aid our mutual interests."



Financial

N. Y. Stock Market, 1930 Sales

Radio Stocks

Radio Corp.	34,353,630
General Elect.	22,975,300
Warner Bros.	17,386,300
Radio Keith	16,510,400
Westinghouse	11,224,600
Columbia Graph.	8,137,700
Grigsby Grunow	5,106,500
Sparks With.	826,000
Stewart Warn.	760,600
Zenith	520,200
Weston Inst.	196,300
Crosley	188,200
Kolster	12,900

Four Radio Stocks Show Higher Levels Over Month Ago

As of January 6, the only radio stocks showing a higher tendency in price are Zenith at $3\frac{7}{8}$, a gain of seven-eighths over its price as of December 6. Grigsby-Grunow at $4\frac{1}{2}$ shows a gain of three-eighths. On the New York Curb, Arcturus at 6 shows a gain of $1\frac{1}{4}$. Dubilier at $4\frac{1}{4}$, a gain of one-fourth. Losses are shown by Radio Corporation at $14\frac{1}{8}$, compared with $15\frac{5}{8}$ a month ago. Crosley off one-fourth at 5. Kolster off one-eighth at 1. Westinghouse off $3\frac{3}{8}$ at $95\frac{3}{8}$. General Electric off three-quarters at $46\frac{1}{2}$. Sparks-Withington off one-fourth at $10\frac{3}{4}$.

On the San Francisco Stock Exchange, Magnavox gained one-eighth at $1\frac{1}{2}$. In 1930, 947,368 shares of Magnavox were traded. The table to the left shows some 1930 sales of radio stocks on the New York Stock Exchange.

"Business Good," Reports Stewart-Warner Distributors

O. F. Jester, radio sales manager, Stewart-Warner Corporation, Chicago, believes prospects for 1931 radio business are very good and bases his optimism on reports received from Stewart-Warner Sales Company representatives recently visiting the factory—Mr. Morrison, Louisville, Ky.; Harry Laughlin, Buffalo, N. Y.; Norman Riggs, Portland, Ore.; C. A. Roesch, Los Angeles; L. L. Banford, Indianapolis, Ind.; William Jutras, Providence, R. I.; C. A. Winne, Minneapolis Minn.; and S. Isaac, Auto Rad Supply Co., Cincinnati, Ohio.

Outlook Optimistic

On January 7 a spot survey of large department store radio retail outlets shows that the sale of radio sets beginning early in January is greater than the number of sets sold during a proportionate number of days during the pre-holiday season.

Production of 1929 Radios Gains 62 Per Cent Over 1927

Washington, D. C., Dec. 26.—Production of radio equipment and phonographs in 1929 was worth \$439,961,000 f. o. b. factory, as compared with \$270,497,000 in 1927, the Bureau of the Census reports.

Phonographs, including dictating machines, fell from \$42,825,000 in 1927 to \$20,559,000 in 1929. Combination phonographs and radios increased from \$6,416,000 in 1927 to \$22,193,000 in 1929, the number made in the latter year being 152,106.

Figures on radio receiving sets not including tubes, showed a preponderance of seven tubes and more. Production of this class numbered 4,000,494, valued at \$195,926,000. Production of six tubes and fewer was 637,921, \$31,264,000. Others, not reported by size, numbered 299,684, \$23,410,000. Other sets valued at \$472,000 completed the record in this division. Comparable figures for other years are not available.

Value of transmitting sets increased from \$2,233,000 in 1927 to \$5,788,000 in 1929; loudspeakers, from \$18,838,000 to \$30,279,000; transformers, from \$5,447,000 to \$9,478,000.

Radio accessories and parts, such as amplifiers, power packs, etc., increased from \$54,591,000 in 1927 to \$57,027,000 in 1929 and production of phonograph parts and accessories increased from \$31,781,000 to \$34,128,000.—*Advertising Age*.

Westinghouse Buys Distributing Body

The electric supply distributing business of Stanley & Patterson, Inc., New York, has been bought by the Westinghouse Electric Supply Company, distributing subsidiary of the Westinghouse Electric and Manufacturing Company.

Only the distributing organization of Stanley & Patterson is affected.

Westinghouse will form the Stanley & Patterson Electrical Supply Company to conduct its wholesale business in the metropolitan area.

Hot Shots Direct from Midget Headquarters

By DR. RALPH L. POWERS

SINCE the Flint announcement in the columns of RADIO last month that it offers a new 1931 model of its midget set in the form of a superheterodyne, considerable activity has been noticeable in forthcoming plans of midget manufacturers for the coming twelve-month period.

This has largely taken form in plans and preparations for new models, and a goodly number of these will be superheterodyne types.

This has caused a large percentage of factories in and around Los Angeles to either suspend operations for a couple of weeks or to work on limited production a short time until schedules are ready for new lines.

I should not want members of the trade to believe that the day of the original type midget is over. Far from it. But certain it is that the market will hereafter be divided into two fields—that of the usual type small set and the new type super affair.

Jackson-Bell reports that it continues the regular small-size midget receiver and also plans a superheterodyne model for production late this month or early in February.

Angelus likewise makes extensive plans to go into immediate production for a superheterodyne, but also intends to keep its other small-set midget models in stock.

Master is almost ready to release its two new small-set models, one of which will be of unusually compact size for which there is evident demand from many sources.

Plymouth continues to market its new type midget which has been in the market. This firm is doing a sizeable Australian business, as well as taking care of its distributors in this country.

Cardinal is going strong with its Cinderella models—small, table-size model that can be used with or without a stand. Production continues for its mantel model, as well as its combination radio-phonograph midget.

Powell reports business as usual with midget size in demand, both under its trade name and also as private brand stock for distributors elsewhere.

Keller-Fuller continues plans for its new mantel set, and is also said to be

actively engaged in plans for getting out a superheterodyne, too.

Colbliss Radio Manufacturing Company is a new firm at 827 South Hoover Street, specializing in midgets particularly for Mexican trade.

Herbert H. Horn continues the midget model, and is also said to be busy at plans for making and marketing a superheterodyne.

Champion is getting out a new model midget which will probably be similar in type to the old-style set, but with minor technical changes.

Falck continues its one or two mantel-type receivers, together with contemplated plans for immediate production of a superheterodyne.

Brown-Manhart are getting out their small-size table models, similar to midgets in size, which may be used with or without legs. They also produce a similar set for Fey and Krause distribution. Their production will continue for their usual lines, as well as their midgets.

Austin, joining the merry throng, continues its mantels and also announces that they will have a superheterodyne model ready in a few weeks.

Kemper has announced no plans so far, but it is assumed that they will continue their mantels with and without carrying cases.

Patterson retains his present models—midgets and consoles—and is also contemplating a superheterodyne mantel.

Hollywood Radio Manufacturing Company (Frank Damon), 420 South San Pedro Street, a comparative newcomer to the manufacturing field, is getting out two new midget models.

Gilbert retains its regular mantel line, which it announces it will continue to market through usual mantel channels.

Mission-Bell, continuing its mantels, will get out a brand-new one early in February, according to latest information.

Royale midgets, engineered by Dr. de Forest, are to appear in new cabinet design, but no announcement has been made that this line will go into the superheterodyne field as yet.

Embassy, 207 South Daly Street, not long in the field, is featuring its two screen grid job for a low priced line of midgets.

Electric Products Company (Ted White and Ken Clark) are having a Los Angeles manufacturer make their Air King and Select lines—both midget types, which they distribute to dealers.

No-Ellen (N. C. Downs) is getting out a limited quantity of midgets and also their custom-built automobile set.

Palm Radio Company continues its auto radio set, featuring direct and remote control types, four screen grid job.

Trojan, making a few consoles as usual, continues midget sets with their present model.

Pacific Radio Sales Corporation, 2415 West Washington Boulevard, gets out its midget set and also another mantel model that is unusually small in size—either with or without an electric clock, cabinet in extremely futuristic design.

Taylor-Travers Corporation, also makers of Radio Owl, are getting out their Triumph midget—four screen grids—for the trade.

Waltham continues to produce and market its present midget model with strong prospects that they, too, will have a superheterodyne model before many days.

These are some of the factories and models that will greet the trade during the first quarter of 1931 from the Southwest. Opinion is about evenly divided as to whether the new superheterodyne will lead the field of midgets. For the first few months, at least, the old type midgets will continue in production and sales, but it is predicted that the new super will rapidly come upward in total volume to run the others a close race for volume and profits to everybody.



New Distributors

New Sales Outlet for Benton Microphones

W. P. Brush, of 139 North Clark Street, Chicago, sends us an announcement that he has been appointed sales outlet for Benton Microphones for the entire United States. These microphones are manufactured in two types; carbon and condenser; and are being offered for the first time to sound engineers. They have been used in broadcasting studios and recording laboratories for several years.



THE BENTON MICROPHONE

New Distributors for Fada

L. J. Chatten, general sales manager of the Fada Radio Company, has just announced the appointment of the Daugherty Supply Company of Chattanooga, Tennessee, and the North Coast Electric Company of Portland, Oregon, as Fada Wholesale Distributors. The former will cover the state of Tennessee and parts of Alabama and Georgia, while the Oregon firm will cover the entire state of Oregon and parts of Idaho.

National Union Radio Corporation

Henry A. Hutchins, general sales manager of National Radio Corporation, announces the appointment of fif-

teen new distributing outlets for National Union Radio tubes as follows: Billings Hardware Co., Billings, Montana; Southern New York Electrical Co., Binghamton, N. Y.; Sargent Baker, Inc., Rochester, N. Y.; Standard Battery and Electric Co., Cedar Rapids, Iowa; Baumgardner & Co., Toledo, Ohio; Bush & Lane, Holland, Mich.; Wattydyne, 4 Rue Bernard Pallisy, St. Etienne, France; The York Supply Co., Dayton, Ohio; Hudson Valley Asbestos Corp., Albany, N. Y.; Crason Electrical Supply, New York City; R. K. Carter & Co., New York City; Friedman Electric Co., Easton, Pa.; Collins Piano Co., New Orleans, La.; Messrs. Rencoret Y Cia, Santiago De Chile; Dixie Drug Co., Goldsboro, N. C.

London Firm to Represent Capehart

AFTER a series of telegrams and a long distance telephone call, H. R. Moore, director and general manager of Giffens-Spares, Ltd., London, decided to take the S. S. *Aquitania* for the United States to visit the Capehart plant. Giffens-Spares, Ltd., maintain a large field organization, covering the entire British Isles, and they expect to make the Capehart automatic phonograph very popular there.

Sentinel

The United Air Cleaner Corporation, manufacturers of Sentinel Radio, announce the following new jobber connections: Southern Sales Company, Oklahoma City, Okla., for the state of Oklahoma; Redding Radio, Inc., Baltimore, Md., for the territory surrounding Baltimore, Md., and Washington, D. C.; Farrar-Brown, Inc., Portland, Maine, for the state of Maine, northern part of New Hampshire, and northern Vermont; Providence Electric Company, Providence, R. I., for the state of Rhode Island and part of Connecticut.

Gilbert

R. W. Gilbert, manufacturer of Gilbert radio, a midget receiver, announces the appointment of R. J. Noel Co. as representatives with offices in Los Angeles, San Francisco and Seattle.

The new Gilbert midget uses four screen grid tubes, one of which is a power detector. One '45 and one '80 tube are also used. It has an electrodynamic speaker and phonograph jack.

Ware Appointees

Newly appointed distributors for Ware radio, including the Bantam, include the following: Federal Radio and Electric Company, Paterson, New Jersey; Lewis Radio Jobbers, Philadelphia, Pa.; Musical Products Distributing Co., New York City; Southern Tier Electrical Supply Company, Binghamton, New York; Stewart-Warner Sales Co., Syracuse and Utica, New York; John D. Williams Export Corporation, New York City; Plymouth Electric Company, New Haven, Connecticut, and Providence, Rhode Island; Fiske Radio Supply Company, Albany, New York; Fort Pitt Distributing Company, Pittsburgh, Pennsylvania.

Bosch

San Diego Standard Electric Corporation, 1407 Columbia Street, San Diego, Calif., has been appointed distributors of Bosch Radio for San Diego and Imperial Counties. The Montana Hardware Department of Anaconda Copper Mining Co. at Butte is the new distributor for this district.

Lyric

Republic Radio Corporation, Grand Rapids, Mich., has been appointed distributor for Lyric radio by the All-American Mohawk Corporation of Chicago.



News of the Month

Bert B. Perkins Now With Brunswick

AFTER an affiliation of two decades with the amusement field, Bert B. Perkins has now become associated with the radio industry, according to an announcement made Monday, November 24, by Paul S. Ellison, advertising manager of the Brunswick Radio Corporation, which organization Mr. Perkins has now joined.

Mr. Perkins comes to the radio field from the First National Pictures, another subsidiary of the Warner Bros. Pictures, Inc., Brunswick's parent company and his particular assignment with the radio firm is that of General Field Manager of the Theatre Contact Department, a new arm of the advertising



BERT PERKINS

division. It will be Mr. Perkins' function to coordinate the promotional activities of the Brunswick organization with that of the many theatre subsidiaries of the Warner group, the parent company desiring to collect fully upon the fact that it has over five hundred theatres and over two hundred and fifty Warner booked, independent theatres. These will represent to the Brunswick group the equivalent of 750 newspapers in which indirect advertising may be placed without cost.

According to Mr. Perkins, there is no better time to "sell" prospective buyers of radio receivers than when they are "out for a good time." It is then, he claims, that they are most open "to the power of suggestion" and it is then that the Warner Theatres and Warner Pictures can materially aid Brunswick in selling.

Mr. Perkins has a wide background of promotional and publicity work. From the days when he was booking manager for the "101 Ranch" pictures through his association with the Crandall Theatres, Harold Lloyd, Metro-Goldwyn, F. B. O. and Universal, in various capacities from title writer, "gag" man and publicity director to exploitation manager, he has always been selling the amusement business in some form or another.

In the radio field he will still continue, stresses Mr. Ellison, who determines the "ad" policies of Brunswick, selling amusement—something the radio industry at large seems to forget is its basic job. Radio is first and foremost entertainment and the Brunswick associated companies are pledged to keep hammering this fact home.

C. E. Allen Is Appointed Commercial Vice-President for Westinghouse

CLAXTON E. ALLEN, formerly manager of the Southwestern District of the Westinghouse Electric and Manufacturing Company, was elected a commercial vice-president of that company at a recent meeting of its board of directors.

In announcing the election F. A. Merrick, Westinghouse president, stated: "The distribution of our products which pass through merchandising channels has made substantial growth in recent years and in order to further the effectiveness of our efforts in these lines through more definite coordination of the various activities involved, it has been decided to provide a general direction in the entire field of this class of distribution.

"Accordingly, Mr. Allen has been elected Commercial Vice-President, reporting to W. S. Rugg, vice-president in charge of sales.

"Mr. Allen's duties of coordination will extend over the Domestic Appliance Division and other divisions serving the household market, such as refrigeration, radio, etc., and also the jobbing outlets, and other outlets as may be appropriately developed."

Mr. Allen, who has been associated with the Westinghouse Company since 1909 is a native of Virginia. After attending high school in that state he was graduated with the degree of Bachelor of Science in electrical engineering from the Virginia Polytechnic Institute in 1901. His first position with Westinghouse was as head of the transformer division of the detail and supply department. Three years later he was appointed assistant to manager of that department. For a short time in 1915 he was attached to the sales department of the New York district office and then was made manager of the supply division and central station division of the Chicago office, which position he held until 1922, when he was appointed manager of the St. Louis district office.

Remler Company, Ltd.

The formation of the Remler Company, Ltd., brings into existence a corporation to carry on the business of the Gray & Danielson Manufacturing Co. It means no change of interest or of management. It is a forward step in a business that for eighteen years has been under the same management and control.

Officers: E. G. Danielson, president; H. J. Banta, vice-president; T. B. Gray, secretary and treasurer.

Radiola Jobber Picks Adverse Demonstrating Conditions

Taking a Radiola 80 out of a dealer's stock, and without any previous preparation, J. Fulton Duff, San Diego representative of the Leo J. Meyberg Company, placed it on the roof of the U. S. Grant Hotel in San Diego, directly under the antenna of Station KFSD. Then, before a party of newspaper representatives and Radiola dealers, he proceeded to tune in station after station with flawless reception. Long Beach and Los Angeles stations came in with splendid results.

Sound Equipment Invades Exclusive New York Dance Studio

A most interesting sound amplification system has just been completed at the Arthur Murray Studio of Dancing in New York City, which occupies six stories in two separate buildings. Twenty-seven Wright-De Coster dynamic reproducers are utilized in the installation, which has been very carefully planned and engineered and presents a number of unusually effective innovations and special features. Both alternating and direct current are available and full advantage has been taken of this fact. The direct current is used for the speaker fields, while the alternating current is supplied to the amplifiers.

Four Samson PAM 29's are used for amplification, above which are six electric phonograph turntables, equipped with the new Capehart automatic record changing mechanism. Six of the recently developed Audak Polyphase electro-chromatic pick-ups are used, being equipped with tone controls. Provision has also been made for the installation of a Capehart Orchestrope, capable of playing twenty-eight records on both sides and able to give a four-hour program of dance music without a single repetition and entirely automatically.

Sound Merchandising to Be 1931 Radio Key-Word

"Sound merchandising" will be the key-word of sales activities for the entire radio industry during 1931, is the expressed opinion of M. F. Burns, vice-president and general sales manager of E. T. Cunningham, Inc., radio tube company.

"The past decade of radio development," Mr. Burns states in detail, "has seen the major share of attention concentrated on advancements along mechanical and scientific lines. In consequence, the development of sound manufacturing and general merchandising plans has frequently been overlooked in the enthusiasm generated for the laboratory product.

"An evolutionary process such as the foregoing is perhaps the necessary and logical process to which a new industry is invariably subjected. In our case, at least, we believe much of value has been gained. This is most aptly illustrated by the fact that types of receivers are now well standardized; costs have been brought into line with production; extreme changes in engineering design have been eliminated, and set values among various manufacturers' models have become well equalized.

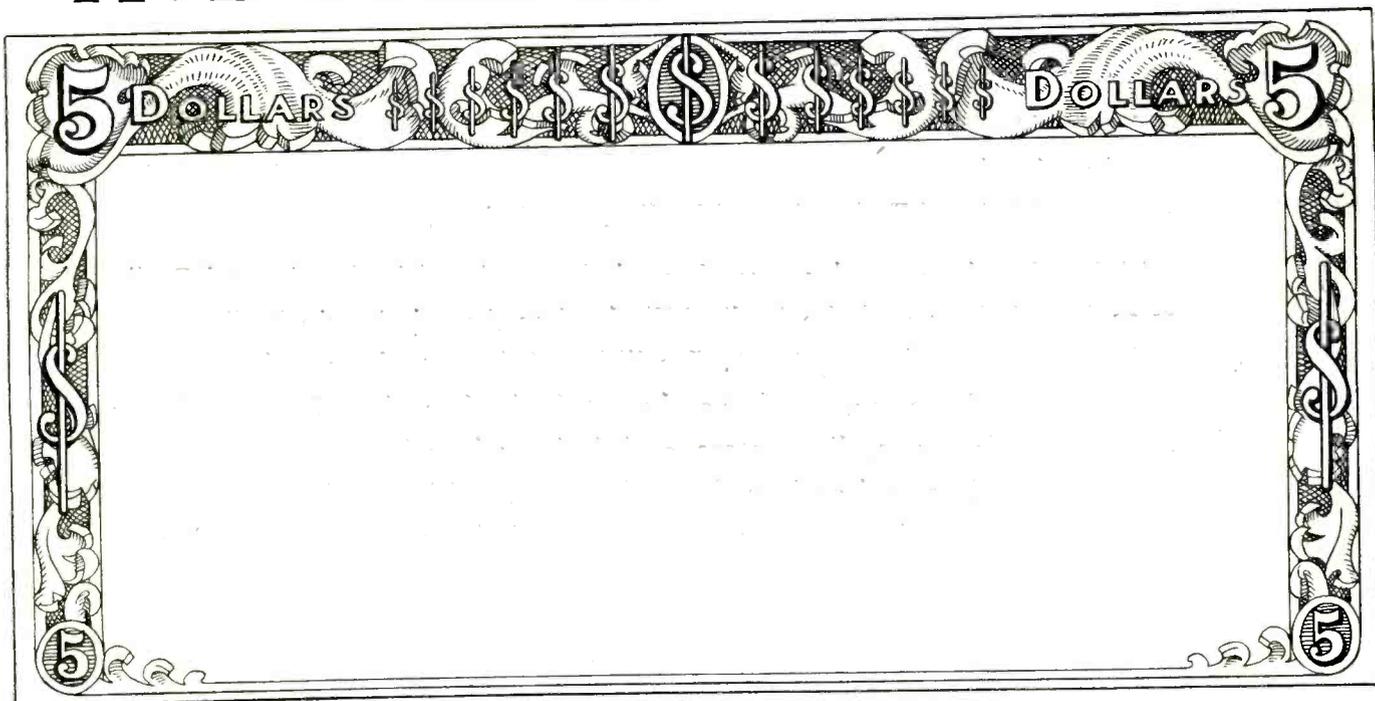
"Thus, with the foregoing phases of

design and production stabilized, the logical step appears to be in the direction of establishing equal stability in the jobbing and retail field. This is now evidenced, I believe, in the constructive and selective merchandising plans already being put into effect in major consumer centers throughout the country—plans which call for keener sales methods and more intensive follow-ups, the elimination of underselling, the establishment of organized service departments, and the maintenance of established codes of quality."

Atwater Kent Dealer Schools

A series of Atwater Kent radio dealer schools for dealers and their sales staff is being held by the Harrison Smith Company, Atwater Kent radio distributors in Dallas, Texas, in the towns of Tyler, Waco and Sherman. The dealer schools in all three cities will be held at prominent hotels and preceded by a luncheon, after which officials of the Harrison Smith Company and Mr. James Pancoast, Atwater Kent radio supervisor in that territory, will present interesting sales ideas and answer questions dealing with the problems of retail merchandising that any one present may want to ask.

FIVE DOLLARS FOR AN IDEA



FIVE DOLLARS! This isn't a five-dollar bill, but it's just as good. RADIO will pay Five Dollars (\$5.00) each month to the radio dealer who sends us the best money-making idea to fill the space above. It must be in our San Francisco office on or before the 20th of each month. It must contain not more than 250 words. And it must explain a plan that enabled you to make money in the radio game.

EXPERIENCE — The Best Teacher

WHAT would many give to have had as "foresight" in the summer of 1929 their "hindsight" of today?

THE successful lawyer, doctor and merchant is not "self-sufficient." They avail themselves of consultation, an exchange of experiences, and a study of the accomplishments of outstanding men in their field of endeavor.

NOW and then you meet the person who "knows it all"—who will not join the Chamber of Commerce, the Board of Trade, his local trade association, or avail himself of the opportunity to rub elbows with those who are successful.

IT HAS become permissible to admit that "times are bad." People are getting into a huddle and discussing it and comparing notes and experiences. These are times when coöperation through organized constructive thought and action is urgently needed to accomplish a quick recovery to normal conditions.

IF YOU believe Experience is the best teacher, make available to yourself the experiences of others, contribute your own, and qualify as one of the "Who's Who" in the Radio Industry. If you are a Radio Distributor, join the Radio Wholesalers Association; if you are a Radio Dealer, join the best local association and urge the affiliation of your local association with the National Federation of Radio Associations.

ATTEND the annual convention of the National Federation of Radio Associations and the Radio Wholesalers Association in Indianapolis February 16th and 17th, 1931. It will be a "down to facts and remedies" convention. Come as a member and meet the leaders of the Radio Industry—the manufacturers, distributors, and dealers who will point the way to a resumption of normal and profitable business. Write for information regarding membership and plan now to attend the coming convention at Indianapolis.

Radio Wholesalers Association

Executive Offices
32 West Randolph Street
Chicago, Illinois

H. G. ERSTROM
Executive Vice-President

Three New Supreme Instruments

Supreme Diagnetometer Oscillator

AS A part of its many functions, the Supreme Diagnetometer Model 400-B has always contained an oscillator for neutralizing and aligning condensers. In order to meet the new conditions that have arisen with the popularity of the superheterodyne, a special calibrated coil, which is interchangeable with the standard coil, is now available with the Diagnetometer. This coil is calibrated at intermediate frequencies of 130 kc, 172½ kc, 175 kc, 177½ kc, and 180 kc, with provisions for varying these frequencies by means of a variable condenser, thus meeting the requirements for "flat topping" intermediates as prescribed by some set manufacturers.

Supreme Oscillator Model 70

This oscillator is offered in response to the demand for a thoroughly reliable servicing oscillator at a moderate price. It is adequately shielded, being contained in a 1/16" aluminum case surmounted with a 1/8" aluminum panel with 1/16" interior shielding; shielded leads, etc., are furnished, providing a controlled output. A '30 type tube is employed and calibration curves are furnished with each instrument. It may be operated from 110-volt a-c or d-c supply or batteries.

Model 70 makes available any desired frequency over the broadcast band by means of a variable condenser, and also intermediate frequencies of 130 kc and 170 kc to 180 kc, selected by means of a simple toggle switch.

For convenient portability the entire unit is placed in a beautifully finished hardwood case 4¼ x 9¼ x 11¼" with carrying handle and slip hinged top. This case also provides space for an output meter, a-c and d-c line cord and plug, shielded leads and other required accessories and a chart showing the calibration curve of the instrument is mounted in the lid of the case. The output meter is optional.

Supreme Signal Driver Model 60

Model 60 is a modulated radio frequency attenuated oscillator of the very highest type, d-c operated, batteries being self-contained. It is believed that the most effective shielding thus far attained has been accomplished.

The instrument is contained in a moulded aluminum case, and each component part is separately shielded by means of moulded compartments. Surmounting the case is a ¼-inch aluminum panel, fitted thereto on carefully milled surfaces. By means of this construction it has been possible to reduce the r-f leakage to infinitesimal proportions. The oscillator covers both the

broadcast frequency band and the intermediate frequency bands over a range of from 125 kc to 185 kc by means of a large ratio vernier tuning dial. Individually calibrated charts of all tuning ranges are furnished with each instrument. Constant output over the entire tuning ranges is accomplished in the oscillator and modulator circuits so that separate ratio output meter may be calibrated in units having a definite relationship to the oscillator output which is controlled by a very efficient attenuation system. A shielded dummy antenna system is included for coupling the oscillator output to the input terminals of a radio. Constant modulation is provided with a second tube.

Remler Cameo Super-heterodyne

The Remler Company, Ltd., formerly Gray and Danielson, of San Francisco, Calif., are announcing a new Remler Cameo Super-heterodyne to sell for \$77.50. It has eight tubes; one '45, two '27s, four '24s and one '80; and is to be sold direct to the dealer. Delivery is to commence on January 15.

Stromberg-Carlson Declares Regular Dividend

Directors of the Stromberg-Carlson Telephone Manufacturing Company of Rochester, New York, declared a regular quarterly dividend at \$1.62½ on the preferred and the regular quarterly dividend of 25 cents payable December 1 to stockholders of record at the close of business November 17.

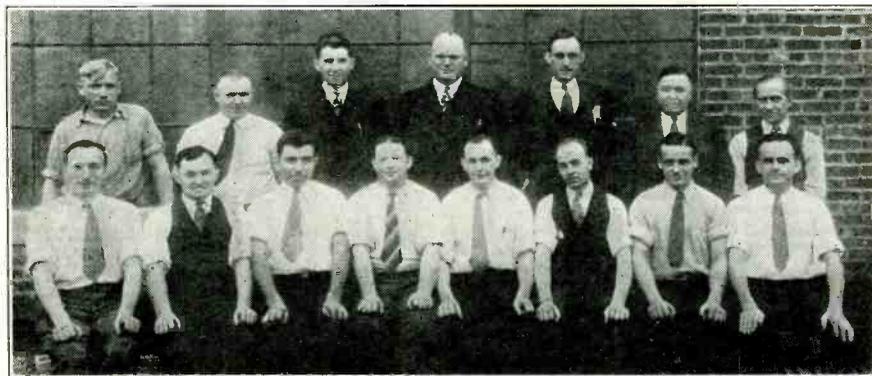
De Forest Court Tangle Settled

A compromise settlement of litigation over the use of the name "De Forest" in the manufacture and sale of radios was approved in federal court in Los Angeles. The action was brought by the De Forest Radio Company of New Jersey against the Lee de Forest Manufacturing Company of Los Angeles.

Under the agreement the Los Angeles general company cannot use the name "De Forest" on its products unless specifically designating them as not produced by the original De Forest company. The complaint said Lee de Forest, radio inventor, was given \$3,000,000 for his interest in the New Jersey company.

156 Years of Manufacturing Experience

When F. F. Wallen, superintendent of National Union Radio Corporation, State Street, Newark plant, gathered fourteen of the old-timers working under his supervision all together in a group, he discovered he had an aggregate of one hundred and fifty-six years of experience being used to direct the making of radio tubes. Some of these boys started with the Westinghouse Lamp Company when the old carbon filament electric lamp was still a novelty. When the vacuum tube became a necessity in radio their lamp-making experience came in handy in the direction of tube-making processes. Now when Wallen gives an order he can be sure his department chiefs speak his vacuum-tube language fluently.



Front row, left to right—Arthur McBride, machinist, 8 years; Andrew Smith, flare maintenance, 11 years; Frank Bruno, sealing-in maintenance, 6 years; George Wicks, basing maintenance, 5 years; Clarence White, hydrogen baking, 7 years; Jesse Burnett, electrical maintenance, 7 years; Albert Kapperer, mounting maintenance, 8 years; Bert Leonard, hand glass worker, 8 years; Charles Sandrue, exhaust maintenance, 22 years; Frank Rochow, grid maintenance, 10 years; C. E. Swiss, sealing exhaust foreman, 17 years; F. F. Wallen, superintendent, 10 years; A. A. Priest, mounting foreman, 2 years; J. H. Leggett, stem making foreman, 23 years; A. L. Baramore, parts making foreman, 12 years.

Save Money!

"RADIO ENGINEERING" and
"RADIO"—both for a full year

\$3.00

"RADIO NEWS" and "RADIO"
Both for a full year

\$3.00

"CITIZENS RADIO CALL
BOOK" and "RADIO"—Both
for a full year—

\$3.00

"MOTION PICTURE MAGA-
ZINE" and "RADIO"—Both
for a full year—

\$3.00

Two Magazines for a little more
than the price of one.

Subscribe Now!

"RADIO"

Pacific Building San Francisco



When You Replace CONDENSERS

Use the BEST!

TO CURE condenser troubles, install condensers that don't cause trouble. Surely no one can deny the wisdom of that advice.

Whatever variable condensers you need—for tuning, balancing or other circuit control, there is a Hammarlund model to fit the need.

Hammarlund Condensers greatly simplify replacements and service work—and they are backed by quality workmanship, proved by more than 30 years of engineering precision devices for telegraph, telephone and radio work.

Write Dept. DS-1 for
Descriptive Literature

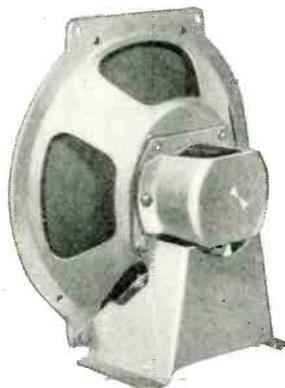
HAMMARLUND MFG. CO.
424-438 W. 33rd St., New York

For Better Radio
Hammarlund
PRECISION
PRODUCTS

Magnavox Midget Dynamic

The Magnavox Midget Dynamic Speaker, designed primarily for the manufacture of midget radio sets, may be used as additional speakers for other radios. If more than one speaker is used in multiple the load circuit should theoretically have twice the impedance of the power tube or tubes. In practice the load impedance may equal the tube impedance, or it may be as great as three and a half times the impedance with very little change in efficiency.

Power tubes of the '71, '45 and '50 types have a plate impedance of approximately 2000 ohms. Two tubes in push-pull have an impedance of 4000 ohms, in parallel, 1000 ohms. The impedance of the Magnavox midget speaker with a push-pull transformer is 7000 ohms, with a single transformer, 4000 ohms, and when using one-half of the primary



MAGNAVOX MIDGET

winding of the push-pull transformer, 1800 ohms. Therefore when two '45s or '50s are used in push-pull and two speakers are used, the latter should be connected in series and used with single tube transformers. When four speakers are used for the same tube arrangement push-pull transformers should be used with speakers connected in series parallel.

Universal Handi-Mike

The Universal Microphone Company, of Inglewood, Calif., is manufacturing a small carbon microphone called the "Handi-mike," and designed to meet the needs of the amateur operator. It has also proved a rapid seller from the angle of novelty.

Filter Condensers for Western Trade

The Girard-Hopkins Radio Laboratories, 1437 Twenty-third Avenue, Oakland, Calif., have a complete line of filter condensers for receiving and transmitting sets and battery eliminators. They specialize in replacement condensers, the line including all capacities, ranging from 300 to 3000 working volts.

Jewell Announces Portable Test Oscillator

A portable test oscillator has been added to the line of radio servicing equipment manufactured by the Jewell Electrical Instrument Company, 1650 Walnut Street, Chicago, Ill. Its use speeds and simplifies radio set servicing, and makes possible more accurate adjustment of radio frequency circuits in both t-r-f and super-heterodyne receivers. Both the broadcast and intermediate frequency bands are covered. The intermediate frequency range of 125 to 185 kc is used either for "peaking" or "flat topping" both 130 and 175 kc super-heterodynes. The oscillator is operated from a set of long-lived batteries completely self-contained. Battery operation makes it possible to test any type of receiver, regardless of the power supply. As there is no connection to the light lines, feed back to r-f energy to the receiver under test is eliminated, allowing much more accurate adjustment of the receiver.

Two '30 type tubes in series for battery economy, simple frequency selection and complete control of signal output from full-on to absolute zero are some of the unusual features of the Pattern 560 test oscillator.

Pattern 560 portable test oscillator complete, ready to operate, with tubes, batteries, and triple scale output meter—net price, \$97.00. Dealers' price, \$72.75.

Pattern 560 test oscillator complete, ready to operate, less output meter—net price, \$82.00. Dealers' price, \$61.50.

Midwest Hotel Lobbies Being Brunswickized

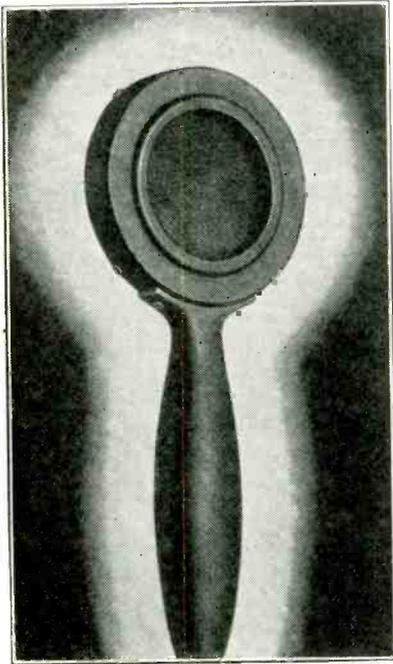
Ken Reed, Brunswick man in the Midwest, reports that the traveling man in the wheat states sits in his hotel lobby enjoying the best in radio today via a Brunswick-Futura model. He cites as an example the newly remodeled Wahlsawsaw Hotel at Fort Dodge, Iowa, whose Brunswick was installed by the Jones Piano Company in competition with five other well-known manufacturers' equipment.

The Jamestown Hotel of Jamestown, N. D., on the other hand, has gone Ritz with an automatic combination model Brunswick No. 42 for its lobby, giving the tired salesman the choice of record or broadcast entertainment. This installation was planned by Jack Henderson of the Grand Forks Supply Company and made by the Eddy Furniture Company. The Ochs Brothers Music Store had a simple job bringing the new hotel in Fairbault, Minn., into line for Brunswick, the hotel being named New Brunswick.

Tell them you saw it in RADIO

Kellogg Has New Hand Microphone

H. E. Billington, general sales manager of the Kellogg Switchboard and Supply Company, informs us that his company has recently placed on the market several new products designed for



home recording, experimenting and amateur work. Of especial interest are a new hand microphone and modulating transformer designed to couple the "mike" to the amplifier of the radio set. The little microphone No. 29 is only 6½ inches long, and weighs about 10 ounces. It is sturdily constructed and reproduces the entire musical scale with the utmost fidelity.

Cardwell Announces a New, Compact, Light Condenser

The Allen D. Cardwell Manufacturing Corporation announces the development of a variable condenser known as the "Midway," which is very light and extremely compact. It is built for transmitting purposes as well as receiving, having a breakdown voltage, for the former purpose, of 3000 volts. The Midway is well suited for aircraft and other mobile receiving and transmitting installations.

Short-Wave Manual

The Manual of Short Wave Radio, compiled and edited by Zeh Bouck, is the title of a 64-page book put out by the National Company, of Malden, Mass. It is filled with articles on the construction of all the latest in short-wave receivers, prepared by the foremost writers and experimenters in that line. It sells for fifty cents.

Tone Controls for the Serviceman

These portable type tone controls with the long flexible wires and easily connected adapters are designed for the radio listener who likes to hook up his own equipment.

The serviceman and dealer, however, wants to put the control right on the panel so as to have a neat, professional looking job. Incidentally, this adds to his revenue by way of compensation for the installation.

To supply this more recent demand for the panel type tone control, the Clarostat Manufacturing Company of Brooklyn, New York, has brought out the Clarostat graphotone, a device that 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 three-eighths inch hole and has an extra long bushing with double mounting nuts to fit any panel thickness or cabinet wall.

Although some prefer to use the disk-shaped adapters under the power tubes as a means of connection, it is recommended that the serviceman or fan who is handy with the soldering iron, wire the graphotone directly to the secondary of the last audio transformer or to the grid terminals on the sockets of the push-pull power tubes. The Clarostat graphotone has two soldering lugs for this purpose and is supplied with wire or adapters if desired.

Victory Dynamic

The Victory Speaker Company, of Oakland, Calif., has introduced a new 12-inch dynamic speaker to go with the larger models for theater and public address use. The outside dimensions of the cone are 13⅞ inches. A two-inch movable coil is used, and the height of the unit is 13¼ inches. Field excitation of 225 volts is supplied through an '80 rectifier tube. Twenty watts are consumed in the field. This speaker is designed for both home use and public address work.



Tell them you saw it in RADIO

UNEQUALLED



WESTON MODEL 565

The Weston Model 565 is virtually a complete portable radio laboratory. It makes the required tests on every model radio set, checks every type tube, A.C., D.C., Pentode, and both plates of Rectifiers. As a tube checker, it operates directly from any 50/60 cycle, 90/135 volt A.C. line. Model 565 contains an R.F. Oscillator, Direct Reading Ohmmeter, A.C. Ammeter, D.C. Milliammeter, A.C. and D.C. Voltmeter, providing unusual wide ranges of measurement.

With the increasing demand for quality service work, radio dealers and service men need the most dependable service equipment. Those who want the best will appreciate the refinements in design, the ruggedness in construction, precision manufacture and the unequalled reliability in performance of Model 565, the complete radio test set.

OTHER RADIO SERVICE INSTRUMENTS

Model 566—An inexpensive, reliable, 2 meter Test Set designed for radio servicing in homes. Tests all model radio sets. Checks all type tubes under same conditions as in their sockets.

Model 564 Volt-ohm-meter—6 D.C. ranges for 600/300/30/3 volts, 0-10,000/0-100,000 ohms. All ranges brought out to binding posts. Equipped with 30' test cables with prods and self-contained 4½ volt battery. Used for checking resistance and continuity of circuits.

Write for Circular HH

{ For more complete information write for Circular HH }

PACIFIC COAST REPRESENTATIVES
 Graybar Electric Co., Inc.
 84 Marion St.
 Seattle, Wash.
 J. H. Southard
 San Francisco, Calif.

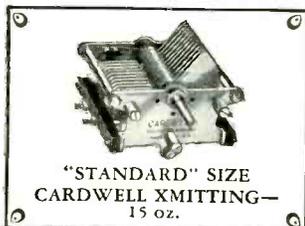
A. A. Barbara
 Los Angeles, Calif.
 Repair Service Laboratory
 682 Mission Street
 San Francisco, Calif.

Weston
 PIONEERS SINCE 1888
INSTRUMENTS
 WESTON ELECTRICAL INSTRUMENT CORPORATION
 600 Frelinghuysen Ave. Newark, N. J.

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 $2\frac{3}{4}$ " x $2\frac{1}{8}$ " 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"

Radio Lamps and Ornaments Bring Profits

DEALERS now realize that side-lines help pay overhead expenses. RADIO LAMPS are sold in large quantities by dealers everywhere. Ornaments, such as our 70-A Tiger, will add beauty to any radio console. Order a sample stock. Watch them sell.



TIGER—No. 70-A
14" long. \$1.50 ea., net
\$18.00 per doz.



RADIO LAMP

No. 742
85c Net

Six for \$5.10

Complete with ground glass reflector, cord and plug. New style Intermediate Base Socket. Globe 25c extra.

No orders accepted for less than six of one item or an assortment of three of each of our two items illustrated here. C. O. D. orders must be accompanied with 50% cash. Immediate deliveries. Write for catalog of other lamps and ornaments.

Radio Division of
FLORENCE ART
MFG. CO.

1401 Folsom St.
San Francisco, Calif.

Sparks-Withington Business Expands

The Sparks-Withington Company will come through its fiscal year with its dividend for the period fully earned.

In a letter to the stockholders accompanying the dividend checks, Captain William Sparks, president, said the company is turning out the largest number of radio units a day in its history.

Sparks-Withington has been operating on full time since early October and recently has been on full day and night shifts for six days a week.

The company has entered the export field and recently closed important business in Europe.

New Condenser for Interference Elimination

An entirely new type of fixed condenser known as the third plate interference elimination condenser has been recently introduced by Radio Service Manufacturing and Supply Company of Detroit, Mich.

The design is such that by use of its four terminals the condenser can be placed directly into the line leading to motors and sign-flashers, etc. The fifth terminal is its third plate, which is not merely a central tap in the condenser, it is reported, but a special copper plate that acts as a collector of the undesirable electro-static discharges.

The condenser's dielectric and conductors are a combination of tinfoil, paper and mica, and it is guaranteed for 240 volts a-c. The mica arrangement is such that the condenser is easily protected from a short-circuit potential of 2000 volts d-c.

Cabinet Size Is Important in Radio Reproduction

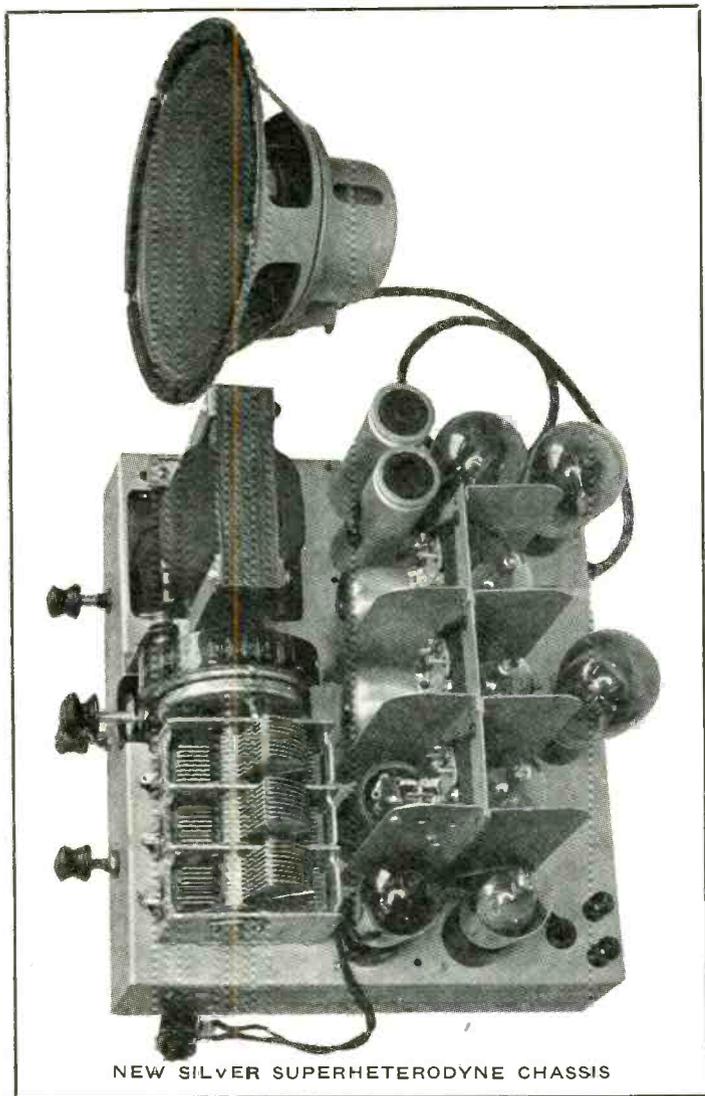
By RAY H. MANSON

Chief Engineer, Stromberg-Carlson Telephone Mfg. Company

DURING the past three years the public has learned to appreciate the improvements in audio reproduction of a broadcast receiver that have been made possible through the correct use of the electro-dynamic type of speaker, when mounted in a full-size radio cabinet.

The few radio receiver manufacturers who have acoustical laboratories and advanced design of equipment for measuring the sound pressures from loudspeaker and radio receiver know from actual tests the great importance of adequate size of baffle area in the correct reproduction of the low frequencies or fundamental bass notes in musical reproduction. Even though the receiver chassis and loudspeaker are designed to give a fairly low response, reducing the size of the cabinet will limit this response.

Other things being equal, the larger the radio cabinet, the better the audio reproduction, and reducing of cabinet size down to the miniature or clock type shape will reduce the true bass response, resulting in very inferior reproduction of both speech and music. Thus, there is a practical minimum limit in the dimensions of a radio cabinet, which must be equaled or exceeded if the reproduction is to be truthful and natural. For example, a cabinet 27 inches wide, 32 inches high and 18 inches deep will on the average cut off all frequencies below 80 cycles and a cabinet only 13 inches by 13 inches by 8 inches will omit tones below 250 cycles or middle "C" on the piano. Listeners may imagine that lower fundamental tones are present, but it is only the harmonics of these tones that they hear. This drawing on the imagination is what makes radio tiresome as well as unnatural, and is avoided by ample cabinet size together with correct instrument design.



NEW SILVER SUPERHETERODYNE CHASSIS



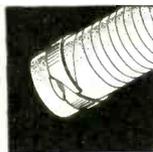
"I can't pay you much salary but I can teach you to be a successful merchant."

VITROHM RESISTORS

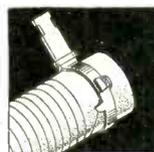


One Million Is a Lot—But

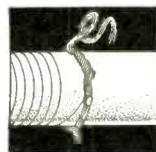
DURING the past 39 years, Ward Leonard has made more than 5 BILLION joints between resistance wire and terminal in the manufacture of VITROHM  RESISTORS.



Here are shown 6 of the methods for fastening resistance wire



To the terminal connection. As would be supposed, ONE method



Cannot meet all needs. This is logical when wire and

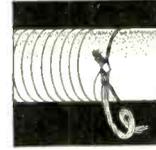
Various methods are used in making the joints. Wire size, refractory base characteristics and duty dictate the choice of methods.



Terminal sizes and shapes are considered. Whether a



Joint shall be of the pressure type, brazed, or soldered



Depends on the use. Ward Leonard uses every type.

These 5 BILLION joints are of real value to our customers. Here is experience already earned, not to be gained at their expense. All doubt of satisfactory performance with any type is eliminated. Using VITROHM  RESISTORS is a guarantee of satisfaction—Specify them.

WARD LEONARD ELECTRIC CO.
Mount Vernon, New York
resistor specialists for more than 39 years



Dealers! Here Is a Window Display Sign That Attracts Attention

A Miniature Illuminated Flashing Billboard

\$9.50

This price does not include lamps or display card. Add 50 cents for a set of two lamps and \$1.00 for standard display card as illustration shows. Sold without sign, but with lamps, for \$10.00. Prices are NET. We sell direct from factory to dealer.

Pays for Itself From One Sale

CROWDS gather at your store window to watch this clever sign flash on and off. Dealers who are now using this Miniature Illuminated Billboard tell us that it is a profitable attention-compelling salesman . . . repeating its message over and over again, politely, quietly and **EFFECTIVELY**. Beautifully decorated in pleasing color combinations and equipped with automatic flasher that alternately turns billboard lights on and off. Comes to you completely wired and ready to operate from 110 volts, AC or DC. Shipments can be made immediately from stock. Get one of these automatic salesmen and watch your sales curve climb. The cost is so reasonable that even the smallest dealer can well afford to own one.

Terms: Fifty per cent must accompany order. Balance C.O.D.

Write or Wire to Radio Division of

FLORENCE ART MANUFACTURING CO.
1401 Folsom Street
San Francisco, Calif.

An Instant Success

An automatic Salesman . . . Always on the job. . . . Change your announcement card as often as desired. We can supply this sign with or without advertising cards.

Length _____ 22 inches
Height _____ 17 inches
Depth _____ 6 inches

PATENTED

Interchangeable display card rack. Your own cards made to order at \$1.00 each. Any colors.

Send for our Catalog of Radio Lamps, ornamental radio objects and art novelties that are bringing extra profits to radio dealers.

ANNOUNCING the Sargent Short - Wave SUPER-RANGER

This Set
Contains
Every
Feature
Demanded
by the
Discriminating
Short Wave
Buyer



Beautiful
Satin-
Grained
Cadmium
Finish

Made in
A.C. and
D.C. Models

Look at This List of Outstanding Features!

1. Receives Broadcast, Phone, or C. W.
2. Supplied in All-Electric or D.C. Models.
3. Universal Output. Full Efficiency on Dynamic or Magnetic Speaker or Head-phones.
4. Vernier Tuning on All Waves.
5. 100 Degree "Band-Spreader" for Amateur 20, 40 and 80 Meter Bands.
6. Wavelength Range, 12 to 115 Meters. (10 to 12 Meter and 100 to 200 Meter Coils on Special Order.)
7. Mechanically Rugged. Neat, Workmanlike Appearance.
8. Receiving Range, 3,000 to 10,000 Miles.
9. The Best All-Round Short-Wave Receiver That Can Be Bought at Any Price.

Cable Address—"RADIOSTRUX"

DEALERS—

The year 1931 is going to be a short-wave year. For the last ten years short-wave broadcasting has been on the increase, more stations, more listeners, more "DX." During the last two years, hundreds of thousands of small regenerative short-wave sets have been sold. These have educated the public to what can be done with short waves. Meantime these pioneers who bought the small sets are now ready for outfits that will really go out and get the "DX" stations. The market is ready right now for the alert dealer to cash in. The Sargent SUPER RANGER fills the need, and the price and performance are right. Profits await the dealers who send in the coupon.

Send This Coupon for Details and Prices

RADIO CONSTRUCTORS COMPANY,
357 Twelfth Street, Dept. R
Oakland, Calif.

I am interested in your Sargent Short-Wave Super-Ranger, as advertised in RADIO. Please send me descriptive folder and dealer prices by return mail.

Name _____

Address _____

City and State _____

SERVICE MEN and DEALERS:

WE SPECIALIZE IN REPLACEMENT PARTS

Send for Our Latest Bargain Bulletin



BAL-RAD Replacement Block

For Atwater Kent No. 37

This unit contains the proper chokes and high voltage condensers. All flexible wire colored leads identical to the original. Fully guaranteed. \$4.95 each

Bal-rad Hy Voltage Surge-Proof Condensers

For General Repair and Power-Pack Work



We guarantee these condensers for 100 per cent. free replacement. Repairs should carry a few dozen in stock.

	MFD.	Working Volts	Each
One	600	"	30c
Two	600	"	40c
Four	600	"	60c
One	800	"	50c
One-half	300	"	25c

PIGTAIL CARBON RESISTANCES

500 ohm	15000 ohm	10000 ohm	} \$1.00 Per doz.
1000 ohm	25000 ohm	20000 ohm	
4700 ohm	2 megohm	75000 ohm	

General

Replacement Transformer

Can be used as replacement in all sets using 224-245-280 and 227 tubes.

Our Price \$2.75



Thordarson Power Transformer

For Sets using 226, 227, 245 and 280 tubes.

Our Price \$2.75

PEERLESS A.B.C. POWER TRANSFORMER

For use with 245, 280, 224, 227. Also has a 3-volt winding for 199 tubes or amperita voltage control.

Our Price \$3.75



VICTOR A.B.C. POWER TRANSFORMER

Used in all Victor Sets. For use with 6-226, 2-245, 1-227 and 1-280 tube. Can also be used for any Power Amplifier using 245 tubes.

Our Price \$2.75

Genuine PHILCO Power Transformer

Using 4-226, 1-227, 2-245 and 1-285 tubes.

Our Price \$3.75



— SPECIALS —

United Electric Motor and Turntable	\$ 7.95
Pacnet Phonovox	4.95
R.C.A. Power Transformer, Part No. 8335	3.95
R.C.A. Part No. 8333	1.50
R.C.A. Part No. 5996	.35
Zenith Power Transformer	3.50
Earl-Freed Power Transformers	4.50
Victor Push-Full Transformers	2.50
Zenith Audio Transformer	.95
Zenith Output Transformer	.90
Zenith Inter-Stage Audio Transformer	1.25
Freshman Replacement Transformer	.45
Edison Audio Transformer	.85
Crosley Double 30 Henry Chokes	1.50
Polymet HI Volt. 1 Mfd.	.35
Polymet 2 Mfd.	.35
Potter 1/2 Mfd. Condenser	.25
Crosley 1/2 Mfd. Condenser	.25
Ballrad Replacement Block Majestic B Eliminator	2.95
Kolster Condenser Block	.95
Quam Magnetic Speaker	3.75
Muter Dynamic Speaker	8.95
R.C.A. 106 Speaker	14.50
Kolster K-6 Speaker	4.95
R.C.A. 100B Speaker	4.50
R.C.A. 103 Speaker	5.25
Brandes Cone Speaker	2.45
Brandes Type "H" Speaker	1.45
R.C.A. No. 103 Speaker Chassis	3.25
Kolster K-6 Speaker Chassis	2.45
Baldwin Rival Unit	.75
Westinghouse PT Meters	1.00

TERMS: 20% with order, balance C. O. D. 2% discount allowed for full remittance with order only.

No Orders Accepted for Less Than \$2.50

BALTIMORE RADIO CORP.

47-R MURRAY ST., N. Y. C.

Send for Our Latest Bargain Bulletin

United Reproducers Sell

All of the radio assets of the United Reproducers Corporation, Springfield, Ohio, former manufacturers of the Courier, Peerless and Kylelectron radio receivers, have been purchased by the Kylelectron Radio Corporation, an Ohio corporation, Springfield, Ohio.

The Gray Electric Company, Springfield, Ohio, has acquired from the Kylelectron Radio Corporation the entire factory service division, including testing equipment, measuring instruments, man power, a large supply of original replacement parts and engineering data.

Correspondence pertaining to service should be addressed to Kylelectron Division of the Gray Electric Company, Springfield, Ohio.

Dewald Companion Receiver

Pierce-Aero, Inc., New York City, chassis manufacturers, are producing the Dewald midget, which employs three '24 tubes in its r-f and power detector circuits, a '45 in the audio stage and an '80 rectifier. The walnut cabinet, 16 by 14 by 8 1/2 inches, houses an electro-dynamic speaker.

Radio Tax Valid

The Georgia tax on dealers in radio was held constitutional by the State Supreme Court, which ruled that the tax of \$100 in cities of more than fifty thousand is not confiscatory.

Full Line of Replacement Parts

for

Earl :- Freed :- Freshman Receivers

AK 37 replacement blocks (90-day guarantee) \$3.75

Carbon metallized resistors (manufactured by Durham) 20 values in stock, per doz. \$1.00

Freshman Q-power transformers (can be used in midget sets) \$3.25

Write for Service Parts Bulletin

FREED RADIO SALES & SERVICE

16A Hudson Street New York City

DEALERS AND SERVICEMEN!



Standardize on
LYNCH
RESISTORS

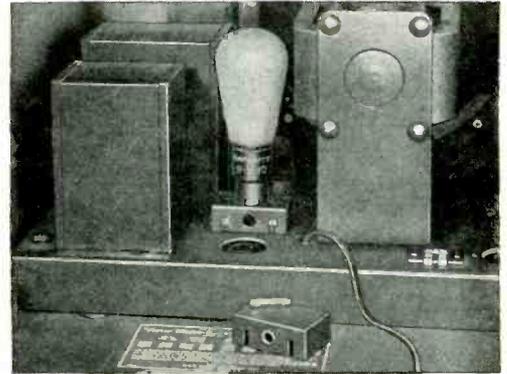
For Permanent Replacement—Accurate Guaranteed

Write for descriptive catalogue "PR"

LYNCH MFG. CO., INC., 1775 B'way, N. Y.

Amperite To Replace Receiver's Fuse

The Amperite Corporation reports the development of a socket assembly for providing line voltage regulation for the Victor, General Electric, Radiola, Westinghouse and Graybar receivers. The system merely consists of an adapter to fit over the fuse block of the above mentioned sets, the fuse being replaced

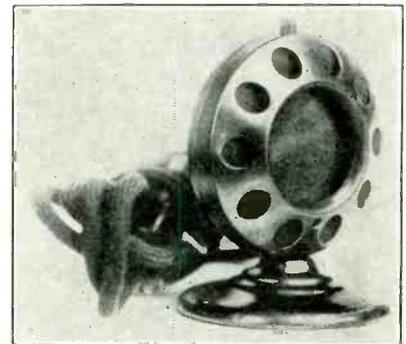


AMPERITE VOLTAGE REGULATOR

thereby with the well-known Amperite self-adjusting line voltage regulator. This regulator is claimed to hold down the fluctuation of the a-c supply voltage to a variation of plus or minus 6 volts, even though the supply may jump from 100 to 140 volts.

In Step With Midget Era

Along with the movement for things miniature, the midget mike has come into the field of radio accessories. Universal Microphone Company of Inglewood, Calif., is producing a baby microphone, with a twenty-five-foot extension cord to connect to the home receiver. This may be used for home recording or for speaking through the radio set's loudspeaker.



UNIVERSAL BABY MIKE

BINDERS

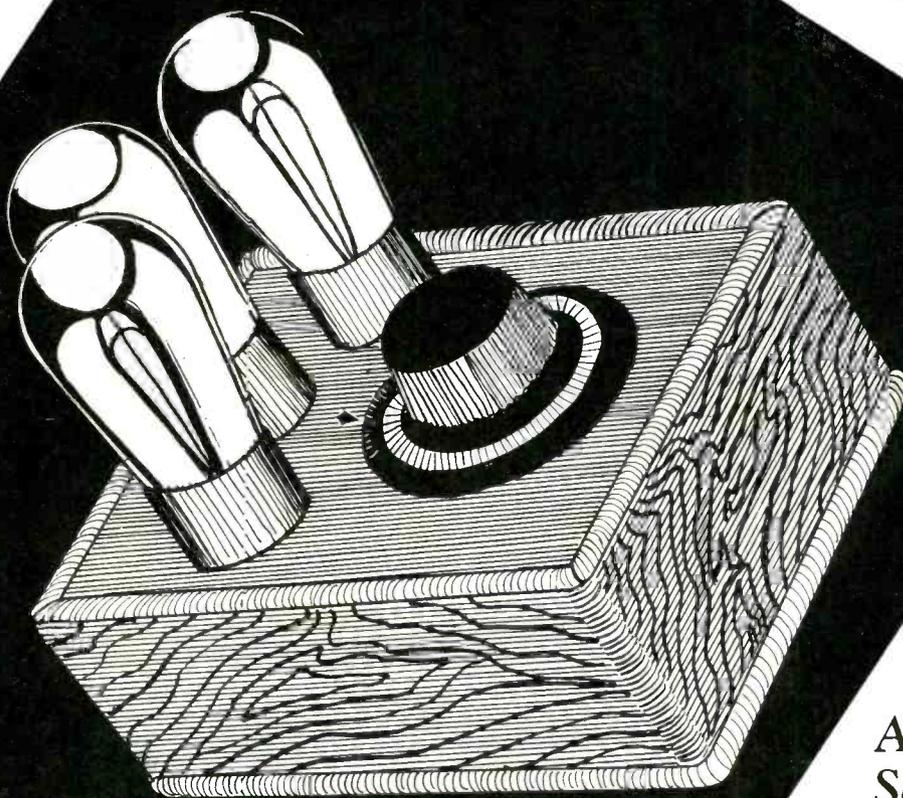
For preserving your copies of "Radio" \$1.00 Postpaid

PUBLISHERS OF "RADIO"
Pacific Building San Francisco

SHORT WAVES

For only

\$5.00



*A Little
Box of
Magic*

**A Big
Sales
Builder**

BRING in short waves on a regular broadcast receiver and you will fascinate your customers. Do it with apparatus that costs very little and you will make them "buy now." The two chief objections to short-wave converters, first, that they don't work, and second, that they cost too much even if they did work, have been removed. Radio World, the first and only national radio weekly, will be glad to lay the information before you that shows how readily success is achieved.

Reasons Why It's Vital to You!

1 You can make the sale of a broadcast receiver an easy matter if you can show the customer you can inexpensively equip him for short-wave reception as well.

2 You can demonstrate short-wave reception, an enticing novelty, instead of always reproducing broadcast transmission, to attract attention of passersby, and make them goers-in.

3 You can put in your window a cabinet only $7\frac{3}{4}$ x $5\frac{3}{4}$ x $2\frac{3}{4}$ in., and truthfully announce that this little Box of Magic brings in short waves on the speaker, when used with a broadcast set.

4 If you have customers who complain of being in dead spots or in static belts—arguments manufacturers partly must meet in export trade—you can supply them nothing that will make the broadcast set (which you anxious to sell) really operative.

Let RADIO WORLD Help Boost Your Sales!

Each week *Radio World*, now in its *ninth* year, is published. It contains valuable data on how to service receivers, including diagrams of the 1931 sets, with helpful textual explanations to assist service men. Send \$1.00 for an eight-weeks' subscription (the regular price) and get FREE the November 8, 15 and 22 issues that contain the full data on the short-wave converter.

RADIO WORLD, 145 West 45th Street, New York, N. Y.

Enclosed please find \$1.00 for which enter my subscription for RADIO WORLD for eight weeks (eight copies, one copy each week, beginning at once) and send me free, as a premium, the November 8, 15 and 22 issues, explaining all about the \$5 model 3-tube short-wave converter.

Name

Address

City State (RSF)

A SPECIAL—While They Last

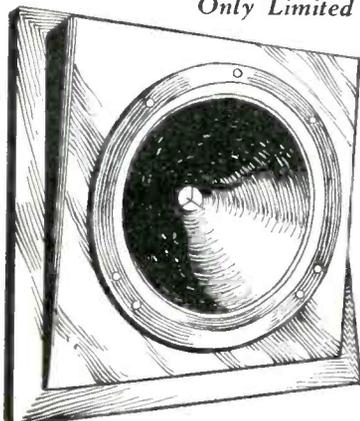
\$110.00 PHOTOPHONE SPEAKERS



12-inch
Dynamic

Brand New
In Original Cases
Only Limited Number

\$15



Never before was such an astounding value offered. Every carnival owner, motion picture house, theatre, church, fair, American Legion Post, club, sound engineers and radio experimenters will want one.

12-inch Dynamic Field Supply; 110 volts D-C; Field Resistance, 1000 ohms; Voice Coil, 8 ohms; Mounting. Steel angle frame. For adaptation to A-C operation, \$6.50 additional.

M & H Sporting Goods Co.

512 Market Street, Philadelphia

SEND FOR CATALOG

Terms: 25% with order
Balance C.O.D. or Sight Draft
Specify Express or Freight

Radio's Biggest Values

Up-to-the-minute offerings at lowest wholesale prices. Includes newest Tone Control, Screen Grid Superheterodyne, Radio-Phonograph combinations, short wave receivers, automobile radios, public address. Attractive walnut consoles and latest accessories, parts and kits. Don't buy until you see our big catalog.

Send for **FREE** Complete Catalog

Western Radio Mfg. Co.
128 W. Lake St. CHICAGO

HOTEL

Greystone

BROADWAY
at 91st STREET
NEW YORK

A modern, three million dollar building, overlooking the Hudson; Subway Station at door; 10 minutes from shopping and theater center.

500 ROOMS - 500 BATHS

Single from \$3.50 Double from \$5.00

SPECIAL WEEKLY RATES

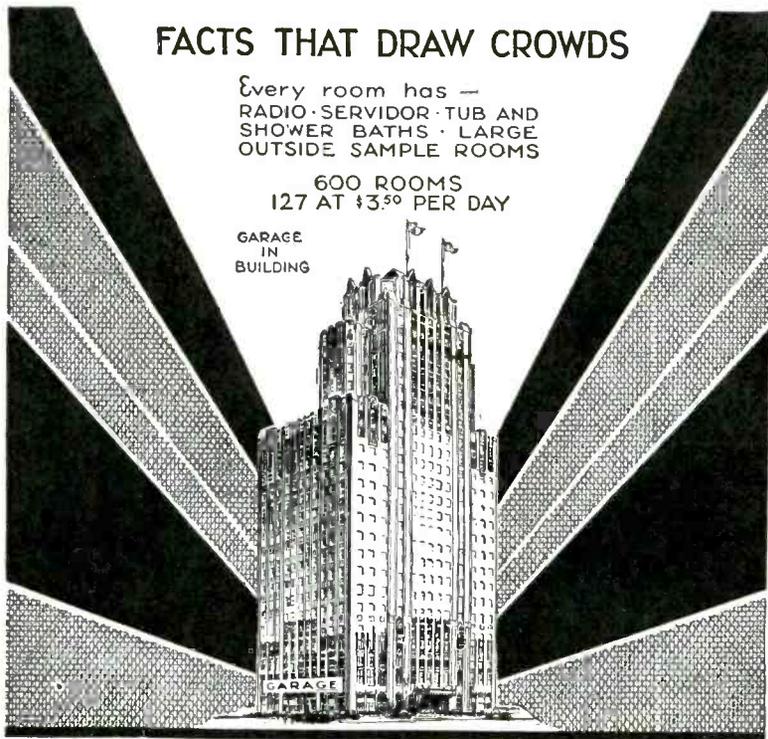
Now under the management of
CARL SWORD

FACTS THAT DRAW CROWDS

Every room has —
RADIO · SERVIDOR · TUB AND
SHOWER BATHS · LARGE
OUTSIDE SAMPLE ROOMS

600 ROOMS
127 AT \$3.50 PER DAY

GARAGE
IN
BUILDING



Hotel Sir Francis Drake
SAN FRANCISCO

HUCKINS-NEWCOMB HOTEL COMPANY

DEALERS AND SERVICEMEN
SEND FOR IT

Write for Your FREE Copy of this BIG Catalog 40 PAGES OVER 1000 ITEMS OF REPLACEMENT PARTS FOR ALL STANDARD SETS

Federated Purchaser
22-B Hudson St., New York City, N. Y.

SERVICE ON
WESTON INSTRUMENTS

Repairing - Rebuilding
Re-Calibrating

Arthur Honeyck

682 Mission St.
San Francisco.

Sound Truck Stimulates Sales

F. J. Reynolds, distributor of Zenith radio at Tampa, Florida, uses a truck equipped with a public address system to demonstrate the new Zenith "70 line" in each town in his territory. The models are carried inside the truck and are displayed by opening the rear doors. Two large dynamic speakers are mounted on the sides of the truck and another on the top with a swinging horn for directional sound. The truck and sound system are operated by one man, who makes his own announcements, sales talks, demonstrations, etc.

Book Reviews

"THE HANDBOOK OF TECHNICAL INSTRUCTION FOR WIRELESS TELEGRAPHISTS," by H. M. Dowsett, M.I.E.E., F. INST. P. M. Inst. R.E., fourth edition, 478 pages, 459 diagrams and illustrations. Published by Iliffe & Sons, Ltd., Dorset House, Tudor Street, London, E.C.4. Price 25/-net, by Post, 25/9d.

This book is designed to provide a complete theoretical course for the commercial wireless operator. Throughout the book the practical is closely allied with the theoretical. The first chapter on the electric charge and the condenser is followed by a chapter on the condenser in practice. Direct current and Ohm's law, and scalar and vector quantities and curve plotting are made practical by chapters on primary batteries and accumulators or storage batteries, as they are called in this country. Magnetism and self-induction lead into dynamo electric machines and measuring instruments. A thorough treatise on alternating current appears in the thirteenth and fourteenth chapters, and is followed by the transformer and multiphase working. Chapter sixteen enters into high frequency study, starting with damped oscillations. The remaining twelve chapters concern commercial types of spark transmitters, aerials and radiation, receiver circuits, thermionics, valve transmitters, wavemeters, direction finders, distress call apparatus, lifeboat and emergency outfits and the maintenance of marine installations and possible faults. All apparatus, of course is of British manufacture, but is interesting to those who wish to compare notes.

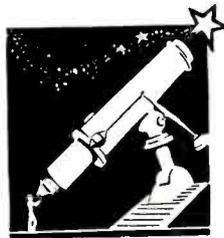
"HOW TO BECOME A RADIO AMATEUR." 32 pages, 7½x10 inches. Published by The American Radio Relay League, Hartford, Conn. Price 10c.

This booklet sets forth in clear and understandable language the essential principles of short-wave radio and contains instructions for the construction and operation of a simple amateur transmitting and receiving station. It briefly describes the procedure necessary in obtaining a license and in learning the code.

Gosilco

cker Co., of Seattle, Wash-
been appointd exclusive
entatives for the Gosilco
s Co., of Huntington
eir territory comprises
on, Idaho, Montana
ia.

Searching the Infinite



OUT across space, thousands of light years away, new suns and new nebulae are being discovered, mapped and weighed with giant telescopes. Delicate controls keep the point of light exactly in the field for hours at a time. In millions of radio receivers, CENTRALAB volume controls are helping to reach out across space to bring in noiseless, sputterless reception. . . . Here also is a case of delicate control.



W r i t e

sending 25c for new VOLUME CONTROL GUIDE, that enables you to service all old and new sets with a small stock of CENTRALAB controls.



This shows the exclusive rocking disc construction of Centralab volume control. "R" is the resistance. Contact disc "D" has only a rocking action on the resistance. Pressure arm "P," together with shaft and bushing, is fully insulated.

Centralab

CENTRAL RADIO LABORATORIES

Dept. 103-A

14 Keefe Avenue

Milwaukee, Wis.

Tell them you saw it in RADIO

RADIOADS

A Classified Advertising Section Read by Better Buyers

Discontinued Merchandise and Job Lot Advertising Must Be Plainly Indicated as Such

RATES: 8 CENTS PER WORD
\$6.00 PER DISPLAY INCH

Remittance Must Accompany All Ads

Radioads for the February Issue Should Reach Us by February 1

BARGAINS! BARGAINS! BARGAINS!

Our new "Bargain Bulletin" contains many items at prices that will astound you. Send for it today.

It will save you money! Harrison Radio Co., Dept. P, 189 Franklin St., New York City.

POWER PACK REPAIRING

WHOLESALE RADIO SERVICE. Power Pack rebuilding, Shop equipment built and repaired. Coils matched, All kinds of Solenoid winding, B & B Radio Lab., 509 Terry Ave., North, Seattle, Wash.

POWER PACK SERVICE and transformer winding. Quick service and fair prices for all types of power transformers and chokes. Condenser blocks replaced. Guaranteed work. California Radio Laboratories, 2523 South Hill St., Los Angeles, Calif.

COMPLETE POWER-PACK SERVICE. Transformers rewound, Condenser blocks repaired. Resistors repaired or duplicated. Specially equipped shop. Work guaranteed. Clark Brothers Radio Co., Albia, Iowa.

POLYMET 8 mfd. 430 volt working voltage electrolytic condensers, latest type, inverted or upright. \$1.35 each, plus postage. Weight, packed, 1 1/4 pounds. California Radio Laboratories, 2523 South Hill St., Los Angeles, Calif.

WHOLESALE DISCOUNTS. Approved parts. \$50,000.00 stock. Over four pounds, catalog, circuits, data. 50c. prepaid (outside U. S., \$1.00). Weekly (new items, test reports), bulletins, 20 wks., \$1.00. Experimenters, 56-page house organ, 25c., prepaid. Kladag Radio Laboratories (established 1920, over 4,000 radiowise customers), Kent, Ohio.

RADIO FANS would you like to change that three-tube Uncle Sam or other battery set with three or more tubes into a modern up-to-date AC Electric set at a cost of not more than \$15 complete, including tubes. This is not an eliminator, it is all electric. If this information is worth one dollar to you, let us hear from you.—Economy Sales Co., Pa. Ave. Station, Washington, D. C.

STORAGE "B" BATTERY WANTED

WANTED—90 or 135-volt storage "B" Battery. Must be in good condition. Fry Ayrshire Farm, Waterford, Calif.

WANTED—Men to work with National radio service organization, no selling scheme. Radio Doctors, Inc., Dept. R, 131 Essex Street, Salem, Mass.

BUSINESS OPPORTUNITIES

Screw-holding Screw Drivers! Remove, insert screws from inaccessible places! Factories, garages, electricians, mechanics, auto. radio owners buy on sight! Exclusive territory. Free trial! Toolco 1747 Water Street, Boston.

New Sales Representatives

Supreme Instruments Corporation, Greenwood, Miss., announce the appointment of the following new district sales representatives: W. B. Masland Company, 105 E. Franklin St., Baltimore, Md.; Wood & Anderson Co., 915 Olive St., St. Louis, Mo.; Ed. H. Troan, 140 Nunda Blvd., Rochester, N. Y.; Sam H. Fowlkes, 1232 West Peachtree St., N. W., Atlanta, Ga.; C. C. Baines, 26-27 Hale Ave., Louisville, Ky.; Walter A. Stevens, 4018 Marburg Ave., Cincinnati, Ohio.

A Message To Manufacturers—Jobbers—Dealers

A Slight Error

in a big mathematical problem makes the whole problem wrong—in an advertising campaign a wrong appeal, or an unattractive and poorly arranged piece of literature materially reduces the effectiveness of the whole campaign.

Why not be sure that your letters, folders, broadsides or catalogs are as effective as it is possible to make them. For more than ten years I have been preparing attractive and resultful advertisements and direct advertising material and I am sure that a trial will convince you that I can give you the most effective literature at the lowest cost, and can increase your sales.

It will cost you nothing unless you are satisfied. Just send me the literature that you are using at the present time and tell me what you have in mind. I will make up recommendations and suggestions and send them to you for your approval. If you like them—pay; if not—no pay. That's fair enough, isn't it?

Why not write today

G. Thomas Bowden

4752 East 93rd Street

Cleveland, Ohio

For POWER LINE INTERFERENCE



\$
4.00
Net

\$
4.00
Net

NOISY RADIO SETS?

DEALERS! Why let those sets go back. Fix them . . . make more money. Radio Service Electricians write for our genuine **BUSINESS OPPORTUNITY** for 1931. Order your **EXPERIMENTAL** sample immediately—get the jump on your competitor. We want **EXCLUSIVE REPRESENTATION** in smaller cities.

Two thousand-volt DC short-circuit test **GUARANTEED**. "The Condenser that is a Condenser."

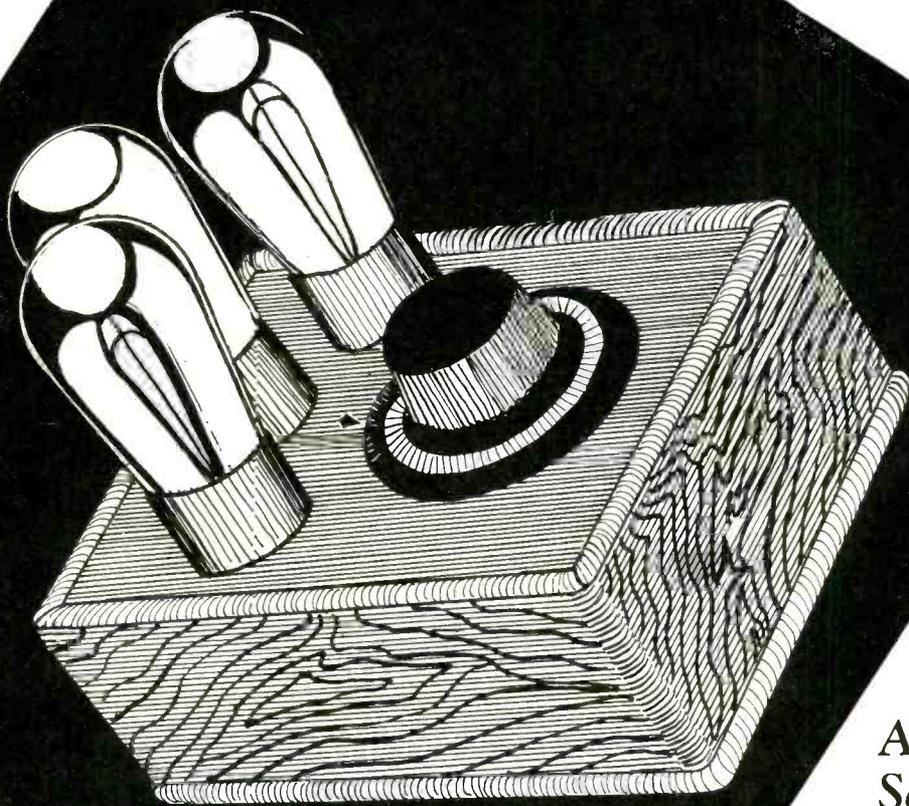
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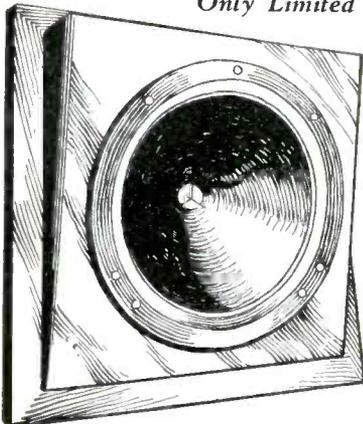
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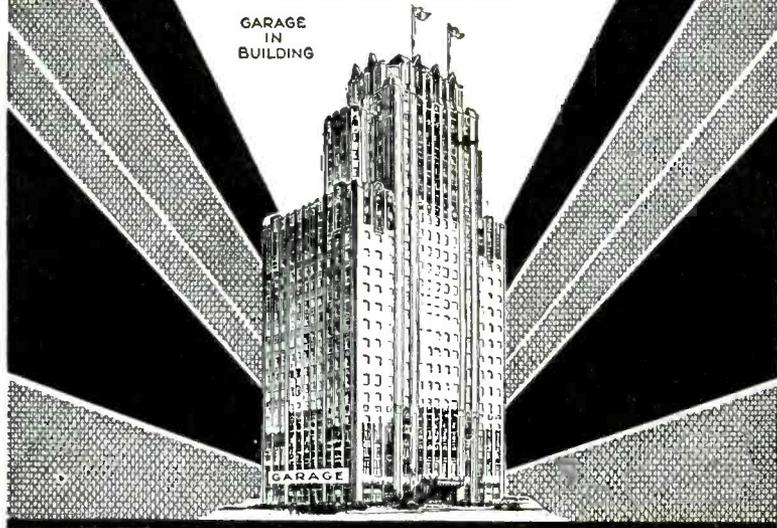
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Book Reviews

"THE HANDBOOK OF TECHNICAL INSTRUCTION FOR WIRELESS TELEGRAPHISTS," by H. M. Dowsett, M.I.E.E., F. INST. P. M. Inst. R.E., fourth edition, 478 pages, 459 diagrams and illustrations. Published by Iliffe & Sons, Ltd., Dorset House, Tudor Street, London, E.C.4. Price 25/-—net, by Post, 25/9d.

This book is designed to provide a complete theoretical course for the commercial wireless operator. Throughout the book the practical is closely allied with the theoretical. The first chapter on the electric charge and the condenser is followed by a chapter on the condenser in practice. Direct current and Ohm's law, and scalar and vector quantities and curve plotting are made practical by chapters on primary batteries and accumulators or storage batteries, as they are called in this country. Magnetism and self-induction lead into dynamo electric machines and measuring instruments. A thorough treatise on alternating current appears in the thirteenth and fourteenth chapters, and is followed by the transformer and multiphase working. Chapter sixteen enters into high frequency study, starting with damped oscillations. The remaining twelve chapters concern commercial types of spark transmitters, aerials and radiation, receiver circuits, thermionics, valve transmitters, wavemeters, direction finders, distress call apparatus, lifeboat and emergency outfits and the maintenance of marine installations and possible faults. All apparatus, of course is of British manufacture, but is interesting to those who wish to compare notes.

"HOW TO BECOME A RADIO AMATEUR." 32 pages, 7½x10 inches. Published by The American Radio Relay League, Hartford, Conn. Price 10c.

This booklet sets forth in clear and understandable language the essential principles of short-wave radio and contains instructions for the construction and operation of a simple amateur transmitting and receiving station. It briefly describes the procedure necessary in obtaining a license and in learning the code.

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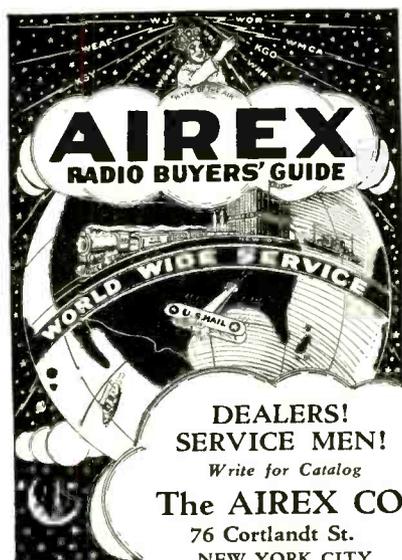
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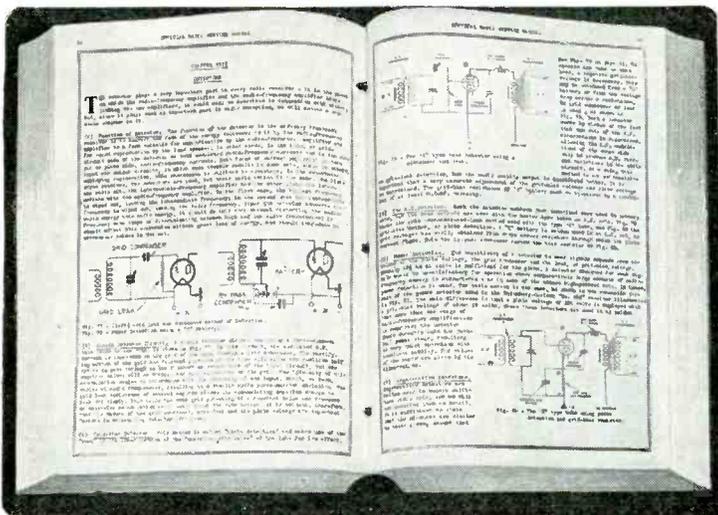
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SECTION II

JANUARY, 1931

AN A-C OPERATED VACUUM TUBE VOLTMETER

By B. E. ESTES

THE vacuum tube voltmeter described in this article is operated entirely from the alternating power line and has a practical voltage range of .05 to 100 R.M.S. volts, and may, by careful adjustment, be made to give indications on voltages as low as .01 of a volt. This range is sufficient for all audio frequency work and may be used to advantage on radio frequencies, although, due to the type of range calibrating switches used, the input capacity is somewhat high for this use.

By means of a separate calibrating circuit the voltages being measured can be read directly from the scale of an alternating current voltmeter, thus eliminating the need for calibration with its attendant graphs. While the range of voltages covered is quite large, the scale of the indicating instrument is at no time crowded, as the range switch and the range potentiometer may be used to adjust the scale so that it covers only a small voltage range in the vicinity of the voltage which is being measured.

The circuit employed used a '24 type of screen grid tube, a plate circuit rectifier and a '27 type of tube as a direct current rectifier. The arrangement has a practically flat frequency response and may even be used to measure direct current voltages. The theory of the circuit has been discussed fully by the exponents of the Loftin White circuit and will not be repeated here except for the particular operations involved in adjusting the circuit to operating conditions. The only precaution necessary is to see that all connections are firmly soldered, as a poor connection in any place in the circuit will destroy the stability when measuring very low voltages.

The resistance R_1 and R_2 , Fig. 1, are 1-watt metalized resistors of 500,000 and 60,000 ohms, respectively, and are connected to the low-high range switch in such manner that they act as voltage

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- Measure the ripple voltage of power packs.
- Measure the output of phonograph pick-up units.
- Measure the inductance of filter chokes.
- Measure the capacity of filter condensers.
- Measure the inductance of audio transformers.
- Measure the step-up ratio of audio transformers.
- Align receivers.
- Make fidelity curves of audio amplifiers.
- Make selectivity curves of radio amplifiers.
- Measure dc voltages where no current can be drawn from the circuit.
- Check the inductance and capacity of r-f coils.

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DESCRIBED IN THIS ARTICLE**

dividing resistor across the output and connect either one-tenth or the whole of the voltage across the resistances to the input circuit of the screen grid tube. In operation the effective range in the low position of the switch is .05 to 10 volts and 10 to 100 volts in the high position. R_1 is mounted in grid clips on the front of the panel so that it may be easily removed on special occasions where it is desired that the input resistance of the tube be higher than 560,000 ohms.

Resistance R_3 is a 0-200-ohm rheostat and is used to provide the grid bias necessary to place the operating point of the screen grid tube on the most sensitive point of the characteristic curve for rectification. This rheostat is mounted behind the panel, as it needs to be adjusted only once for any particular tube.

Resistance R_4 is a 400-ohm Carter tapered potentiometer and is connected with the low resistance variation end of the taper to R_3 . This potentiometer is used as a range control and adjusts the scale of the instrument by increasing the grid bias of the screen grid tube beyond the cut-off point of the characteristic curve. This cut-off point is the point where any further increase in negative grid bias of the tube will not cause any further decrease in plate current of the tube, and with the particular screen grid used was obtained at approximately three volts negative grid bias. Any increase of negative grid bias beyond this point will increase the range of the instrument by the amount of increase in the grid bias. For instance, a negative grid bias of 13 volts will give a maximum range of 10 volts.

Resistance R_5 is a 400-ohm potentiometer and is used for adjusting the screen voltage of the screen grid tube to the proper point. It needs to be adjusted only once for any particular tube and is therefore mounted behind the panel.

Resistance R_6 is a 50-watt 8000-ohm resistor of the baked enamel type and is used to supply the proper voltage drop for the plate of the screen grid tube.

R_7 is a 200-ohm resistor of the grid suppressor type and is used to bias the '27 tube negatively about five volts so

that there will be no danger at any time of the grid of this tube drawing current and decreasing the sensitivity of the instrument. Any higher bias than this is not needed, as the action of a voltage applied to the input of the screen grid tube is to increase the negative bias of the '27 tube so that there is no danger at any time of this tube going positive unless the meter is very much overloaded.

The voltage drop across R_8 , which is a 50-watt 3000-ohm resistor of the same type as R_6 , is to provide the plate potential of the '27 tube. This voltage drop

output of the power pack to a value where there are 25 ma. flowing in the resistance network of the circuit just described. It is connected in the manner shown instead of as a series resistor so that it will provide additional loss current in the power pack for the purpose of stabilizing the voltage output. This resistance can well be a 12,000-ohm 75-watt Electrad Tru-Volt resistor with a sliding clip for adjustment.

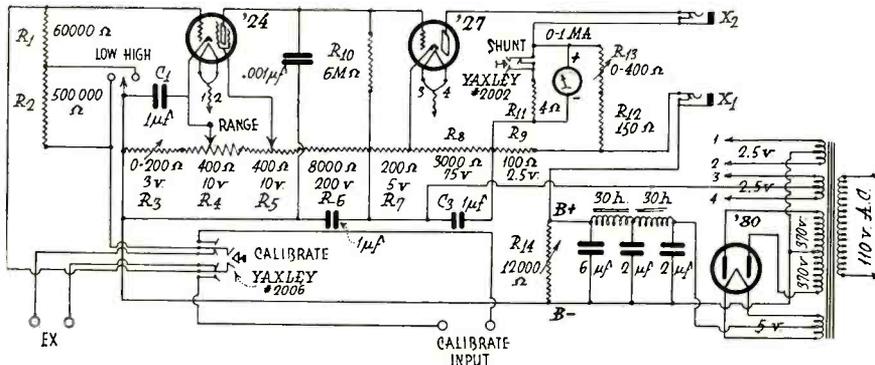
The power pack can be of any type which is convenient as long as it meets the voltage requirements. It is an advantage, however, to have a low resist-

the voltage dividing resistance is connected across the secondary of the transformer and the a-c meter and the voltage across the resistances is the voltage indicated by the meter. When the calibrating range is on high the voltage dividing resistance is connected across the primary of the transformer. As the meter is left connected to the secondary, the voltage across the primary and the voltage dividing resistance will be ten times the voltage indicated by the meter, due to the fact that the step-down ratio of the transformer is 10 to 1. The switch used is a Yaxley No. 760.

The voltage across the primary, and consequently the secondary of the transformer, is adjusted by means of a 6000-ohm Carter potentiometer. The voltage to the primary is controlled by a line switch which is very handy for adjusting the vacuum tube voltmeter to maximum sensitivity.

The voltage-dividing resistor is composed of 2-watt carbon resistors of the values indicated by the diagram. These resistors are connected to a Yaxley four-point switch in such a manner that the voltage across the output of the switch can be made 1, .1 or .01 times the total voltage indicated by the a-c voltmeter. Resistance R_5 is a 10,000-ohm wire-wound Yaxley potentiometer and is used for fine adjustment of the output. A dial with a 100-degree scale is used on this potentiometer so that the percentage of the voltage from any particular ratio being used can be easily determined. If extreme accuracy is required, the carbon resistor can be obtained in the next lower resistance obtainable and the resistance adjusted to exactly the right value by filing the carbon until it checks at the right value by measurement with a very accurate ohmmeter or a Wheatstone bridge. After the resistors have been filed they should be dipped in paraffin so that there will be no danger of moisture affecting the value at a later date. The resistors should be adjusted with the ratio arm to the fine adjustment potentiometer in the .1 position so as to give the minimum error due to the resistance of the potentiometer shunting the voltage dividing resistors. Two sets of output posts are used, as they will be required in certain measurements to be described in a later article.

When the vacuum tube voltmeter and calibration circuit are finished, they are connected, and the circuit is ready for operation. The EX terminals of the vacuum tube voltmeter are shorted and the range potentiometer set at zero. A milliammeter is now plugged in at X_1 and R_{14} is adjusted until the current in the resistance circuit is 25 milliamperes. The meter is now changed to X_2 and resistance R_3 adjusted to about two-thirds value of 150 ohms.



CIRCUIT OF AC VACUUM TUBE VOLTMETER

is 75 volts, which is sufficient for the purpose for which the tube is used.

Resistance R_9 is a 100-ohm grid resistor and is used to give a voltage drop for bucking out the steady plate current of the '27 tube which is around 5 ma. This current is bucked out so that the scale of the indicating instrument may have a range of 0-1 milliamperes for greater sensitivity.

R_{10} is a 6-megohm grid leak and is used for the plate circuit load of the screen grid tube and is connected so that any increase of current through it will increase the negative grid bias of the '27 tube.

R_{11} is a 4-ohm filament resistor and is used in conjunction with a push button as a shunt to protect the 0-1 milliammeter against overloading while adjusting the range potentiometer of the instrument. This push button is connected so that the shunt is connected in the normal position of the push button. It is best to adjust the resistor so that one-tenth of the scale, when the shunt is connected, represents one ma. In other words, shunt the meter so that it has a 10-ma. range.

Resistance R_{12} and R_{13} are used to regulate the amount of current used to buck back the 0-1 milliammeter to zero. R_{12} is a 150-ohm grid resistor, and R_{13} is a 400-ohm rheostat mounted on the panel and used as a reset control to adjust the meter to exact zero. The two extra jacks, X_1 and X_2 , are used to connect another milliammeter in the circuit while making the preliminary adjustments to the circuit.

Resistance R_{14} is used to adjust the

ance filter circuit as the regulation of the power pack is increased. The last condenser should be at least 6 μf , as very good filtration is required. A type of power transformer which uses a line ballast would be of advantage, as the variations caused by a change in line voltage is a disadvantage when measuring voltages on the order of .01 volts, and these variations may cause a change in voltage across the grid bias resistor of the same magnitude as the voltage being measured, which would result in very difficult operation of the instrument.

The leads from the input to the screen grid tube are connected to the push button marked "calibrate" in such manner that in the normal position the input is connected to the tip jacks marked EX, which are for the unknown voltage being measured. When the button is depressed, the input is to the jacks marked "calibrate input," which are for connection to the calibrating panel which will next be described.

The connections for the calibrating panel are shown in Fig. 2. In the author's apparatus, the vacuum tube voltmeter and calibrating circuit were built on separate panels, but there is no reason why they could not be built as one piece of apparatus.

The most important piece of apparatus is the transformer T , which is built for use on a 110-volt 60-cycle line. The step-down ratio of the transformer should be exactly 10 to 1. The reason for doing this is to make the 0-10-volt a-c meter indicate both on the low and high range of the calibrating switch. When the calibrating switch is on low,

Potentiometer R_3 is now adjusted until the milliammeter at X_2 rises to maximum value, which will be around 5 ma. The screen grid tube is now adjusted to the cut-off point of the curve. R_3 is now turned back until the milliammeter indicates about 1 ma. below maximum value. This point will be approximately the most sensitive point on the curve. The calibrating circuit is now set at 1 volt on the a-c meter, .1 on the ratio switch and 50 deg. on the fine adjustment potentiometer. This combination will give an output of .05 volts. The a-c line voltage is then switched off.

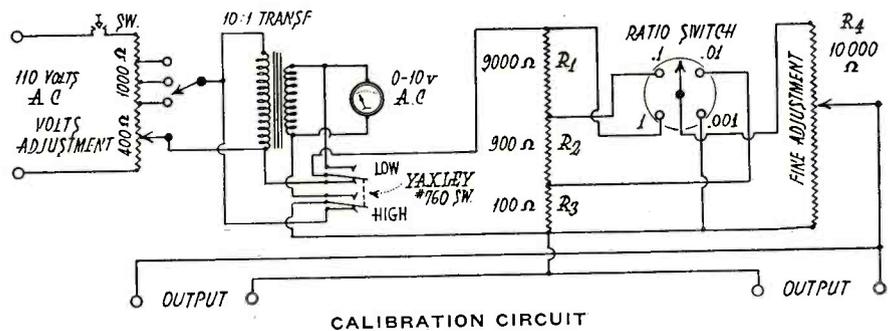
The 0-1 milliammeter is now adjusted to zero by means of the reset control. Approximate zero may be obtained with the shunt button in the normal position and exact zero with the shunt button depressed. After zero is obtained, the shunt button is held in and the a-c line switch to the calibrating panel turned on and off and the change in the milliammeter noted. The resistance R_3 is changed a slight amount, the milliammeter adjusted to zero again and the a-c line voltage turned on and off again. This procedure should be repeated until the greatest change in plate current of the '27 tube is obtained. The vacuum tube voltmeter will now be adjusted to the greatest sensitivity. The range potentiometer R_4 is now increased until the milliammeter connected at X_2 reaches a maximum reading and a mark made on the panel at that point so it can be readily duplicated. This point is the cutoff point, and if the sensitivity is great enough, the screen grid tube should always be operated at or beyond this point as the stability of the instrument is good beyond the cutoff point, and it is not necessary to readjust the reset control for zero every time the range control is changed, after this point has been reached.

When measuring an unknown voltage, the range switch is set on low if the voltage is thought to be under ten volts, or high if the voltage is thought to be over ten volts. The leads from the unknown voltage are connected at EX. As the voltage is applied, the indicating hand of the shunted 0-1 milliammeter will swing up. The range control should then be adjusted until the meter indicates less than 1 ma., the calibrate button pressed and the ratio switch and volts potentiometer of the calibrating panel adjusted until there is approximately the same reading on the milliammeter as there was before the calibrate button was pressed. The calibrate button is now released and the shunt button pressed and the exact reading of the milliammeter noted. The calibrate button is pressed again and the fine adjustment potentiometer adjusted until the same reading is obtained on the milliammeter as was had before the calibrate button was pressed. The un-

known voltage can now be read from the calibrating panel. For instance, say that the a-c meter showed 6 volts, the ratio switch was on .1 and the fine adjustment potentiometer on 60 degrees. The voltage would be $.1 \times 6 \text{ volts} \times .6 = .36 \text{ volts}$, the unknown voltage. While these operations may sound complicated, it will be found that with a little practice it will be very simple to check the value of any unknown voltage. Where the need for higher sensitivity requires that the screen grid tube be operated above the cutoff point, the measurement of voltages will be more difficult, as it will be necessary to readjust the reset

control every time the range control is changed. Also, due to the variations caused by line voltage changes and other factors tending toward instability, it will be necessary to keep one hand on the reset control while reading the meter and take the readings by pressing the calibrate button, adjusting the meter to zero, releasing the button and estimating the reading before it has a

chance to change. After the reading is secured, the unknown voltage is disconnected, the post EX shorted, and the same procedure repeated, only in this case using the calibrating circuit as the source of voltage and adjusting the controls to a point which will give the same swing on the milliammeter as that given by the unknown voltage. However, in this case, the milliammeter is adjusted to zero in the normal position of the calibrate button and read when the calibrate button is depressed.



control every time the range control is changed. Also, due to the variations caused by line voltage changes and other factors tending toward instability, it will be necessary to keep one hand on the reset control while reading the meter and take the readings by pressing the calibrate button, adjusting the meter to zero, releasing the button and estimating the reading before it has a

tube voltmeter can be used to facilitate service work as well as for a number of interesting tests which were formerly considered possible only with expensive laboratory equipment. As a last suggestion, it is recommended that a number of screen grid tubes be tried in the vacuum tube voltmeter, as some tubes will be found to be much better rectifiers than others.

Watch for next month's article in which Mr. Estes points out and describes the many uses for the AC Vacuum Tube Voltmeter, described in this issue.

Given two known values, the third may be found by the use of the correct formula as shown in the following chart. This was worked up by Harry Webb, service manager for Ernest Ingold, Inc., Atwater Kent distributors in the West.

FORMULAE FOR DETERMINING RESISTANCE VALUES AND TYPES

Voltage in Volts	Current in MA	Resistance in Ohms	Power in Watts
Known	Known	$\frac{1000 \times \text{Volts}}{\text{MA}}$	$\frac{\text{Volts} \times \text{MA}}{1000}$
Known	$\frac{1000 \times \text{Volts}}{\text{Ohms}}$	Known	$\frac{\text{Volts} \times \text{Volts}}{\text{Ohms}}$
Known	$\frac{1000 \times \text{Watts}}{\text{Volts}}$	$\frac{\text{Volts} \times \text{Volts}}{\text{Watts}}$	Known
$\frac{\text{MA} \times \text{Ohms}}{1000}$	Known	Known	$\frac{\text{MA} \times \text{MA} \times \text{Ohms}}{1,000,000}$
$\frac{1000 \times \text{Watts}}{\text{MA}}$	Known	$\frac{1,000,000 \times \text{Watts}}{\text{MA} \times \text{MA}}$	Known
$\sqrt{\text{Ohms} \times \text{Watts}}$	$\frac{1000 \sqrt{\text{Watts}}}{\text{Ohms}}$	Known	Known

A Radio Trade Association

Recognizes the Service Man....Examines Him....
And Stands Back of Him

GOOD news for the man who knows his stuff; but there'll be weeping and wailing and gnashing of teeth among those who have been trying to slide by without boning up on the little things they should know about the whys and wherefores of radio. Being "certified"; being recognized and backed by a big organization like the Pacific Radio Trade Association or similar body somewhere else; has several very worth while advantages for the service man. By far the most important of these are the psychological reactions on the customer and on the employer. Some radio dealers don't know a cathode resistor from a piece of friction tape. Why should they? They expect their service man to know those things;—and if the latter has proven to the trade association that he does know his stuff, then the boss can



The Identification Card

quit fretting about what goes on in the shop. And he probably will.

The reaction of the customer is even more important. Some customers take it for granted that the service man knows his stuff—until the bill is presented for a new Mershon condenser, say, at ten bucks. "Wowie! That guy didn't look like he knew what it was all about when he came in!" Or: "Well, he

CALL A
CERTIFIED
RADIO
SERVICE
MAN



PACIFIC RADIO
TRADE ASS'N.

Cover and Title of the Pacific Radio Trade Association's Circular

is certified by an association or something; he ought to know." It always pays to carry credentials; just like a radio operator's license, it speaks for itself.

A REPRINT OF THE TEXT MATTER CONTAINED IN THE CIRCULAR IS SHOWN BELOW

BACKED BY PACIFIC RADIO TRADE ASSOCIATION

Certified Radio Service is now available to set owners as a result of a plan inaugurated by the Pacific Radio Trade Association, a mutual organization formed in 1921 to service the interest of broadcaster, manufacturers, distributors, retailers and radio set owners.

SERVICE STANDARDS

The Certified Radio Service Man carries a card of identification. He is a highly qualified radio technician who has met the requirements of the Association, and who has successfully passed a rigid examination to determine his fitness for the work. He attends extension classes twice a month which are conducted by engineers connected with the leading manufacturers who explain in minutest detail all of the latest improvements, the methods of operation and testing, so that he will be entirely familiar with all makes of radio receivers.

FIXING RESPONSIBILITY

The advantages of Certified Radio Service to the set owner are obvious. They include: standard charges, expert service and direct responsibility. The latter is of particular importance. The set owner who for any reason is not entirely satisfied with Certified Radio Service, or with the charges made for this service, may register his complaint with the arbitration committee of the

Pacific Radio Trade Association, which is composed of men from reliable concerns who are primarily interested in seeing that the radio set owner is completely satisfied. In other words, the Certified Radio Service plan eliminates the unqualified radio tinkerer, and does away with the possibilities of unreasonable service charges.

IDENTIFYING THE CERTIFIED RADIO SERVICE MAN

The card, illustrated above, with its identifying photograph, and the signature of the bearer, is assurance that the Pacific Radio Trade Association has determined the fitness of the repairman to do a thoroughly competent job. When you call for service, insist on a Certified Radio Service Man, and insist that he show you his card.

SPECIAL GROUND AND AERIAL SYSTEMS

Radio set owners who experience difficulty in securing good reception due to disagreeable noises caused by the proximity of electric equipment may have interference located and eliminated. Recurrence of this nuisance may be permanently overcome by the installation of good ground and aerial systems as recommended for the particular locality by our Radio Interference Engineers.

THIRTY DAYS' FREE SERVICE

The public will readily understand that sales profits do not warrant unlim-

ited free service. This being the case, members of the Pacific Radio Trade Association urge the advisability of looking for the "catch" when offers of unlimited free service are extended at the time of purchase.

Members of the Association give free Certified Radio Service for a period of thirty days to those who purchase new sets. This service also applies to new tubes and to replacements, and is an assurance against defects.

SERVICE CHARGES

The Certified Radio Service Man uses an automobile in his work in order to speed up service. He carries with him modern testing equipment and a complete stock of tubes and replacements. This minimizes the time necessary for servicing sets.

The actual charge is based on:

1. The fixed costs involved, which do not depend on the length of time required to service the set, such as bookkeeping entries.
2. The actual time which elapses from the minute the Certified Radio Service Man leaves the shop until he returns.

This business-like method of handling service charges, together with the high standard of efficiency maintained throughout, has proven highly satisfactory to set owners who use Certified Radio Service.

Shop Convenience Is Shop Efficiency

says **VIRDEN MABRY**
of *Beaumont, Texas*

NEXT to the efficiency and versatility of the radio shop's testing apparatus is the convenience and ease with which the service man can make use of it. It's perfectly all right to have delicate meters safely wrapped up in cotton batting and filed in boxes, and to have a shelf full of oscillators, vacuum tube voltmeters, capacity bridges, etc., right where the service man can lay his hands on them when he wants them; but if promises are to be kept, if valuable time is to be saved, all the equipment that need ever be used should be mounted up in front in a permanent location. Each unit must be all wired up and ready for use, so that the ailing receiver may be dumped on the bench, completely checked and overhauled without taking time out to unwrap a meter, to heat a soldering iron, or even to plug in an oscillator.

The test bench illustrated below is built up, it just so happens, around the Supreme test panel and Model 400B Diagnometer. This tester is placed in the center panel with the meters and all the voltage jacks facing the front. The tip jacks that are brought to the side of the diagnometer cabinet are connected to similar tip jacks on the panel below the meters, and the 100-watt lamp that is used in the supply line to the tester power pack is mounted above.

Below the main panel is a long horizontal panel with battery leads for battery receivers. The batteries are mounted below the bench on a shelf. To the left, bottom, is an a-c ammeter in series with an a-c receptacle for the purpose of measuring the current consumption of any receiver or other electrical device. The receptacles (double) and a series toggle switch are mounted behind brass flush plates for business-like appearance.

Just above this panel is a three-range ohmmeter with two tip jacks at the bottom to receive the leads. Throughout the bench tip jacks have been used, and all cords removed between jobs, not only for the sake of neatness, but for orderliness and the avoidance of confusion.

At the right is another panel with a double receptacle, one socket of which is generally used for the soldering iron. With this is an aerial and ground flush plate to match. The panel above this one contains a broadcast oscillator, carefully calibrated so that the dials of receivers under test may be properly adjusted as to frequency. A loudspeaker is mounted above the works, on each side of which is a lamp with a flexible spout that may be adjusted to peer down into any dark cranny.

All alignment tests are made with the Diagnometer, using the oscillator for excitation and the d-c voltmeter, which, by bridging three of the tip jacks below, becomes a thermocouple output meter, to show the exact peak of the signal. This beats relying on the ear for maximal signal strength all hollow.

The main panel is also the tube tester, having both the oscillation test and the emission test available. The vacant panels are kept in reserve for future additions to the equipment, such as a vacuum tube voltmeter, a more accurate capacity bridge than that in the Diagnometer perhaps, or whatever may be of interest whether necessary or not. The essentials are all there.



Mabry's Test Bench was designed for efficiency and speedy service. Note the blank panels for future ideas.

It is possible that a good power amplifier will be built to fill one of the empty spaces. A phonograph turntable and pick-up are mounted on the extreme right hand side of the bench for the purpose of testing audio equipment, or for determining the best place to install phonograph jacks in the various receivers. Drawers are provided for tools, screw assortments, test leads and spare parts.

This bench was built out of second-hand lumber in my spare time. It has been a very economical job and has proven very efficient in enabling me to go through a testing job quickly and without waste of precious moments, looking for my equipment, setting it up and taking it down again. I have gotten plenty of ideas from other contributors to RADIO and hope that I can partly repay them.

Perhaps the most valuable feature of the bench does not show up in the photograph. It merely consists of a filing system or information and technical data gathered together over a period of several years, and kept in the top center drawer where it is handy. This system can be used by anybody, of course, regardless of what his bench looks like, but such a file is worth raving a bit about. It contains all the circuit diagrams of factory-built receivers that have ever come under my eye, all the formulae that I can ever use in building equipment or making tests, all the performance curves for standard receivers that I have ever run across, all the information on resistor and capacitor sizes for many sets; in short, anything and every-

thing I have ever seen that I have thought I might eventually use. It is all filed alphabetically, in a couple of "accordion" files easily accessible. And it has saved time for me on innumerable jobs, and by using it when I needed it, instead of getting around it by the use of the "hunt and try" system, I have had occasion to increase my knowledge of the fundamentals a great deal.

TOBE Filterette

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New Development in Radio Interference Locating Equipment

Tobe Model 230 Interference Locator Now Available

AMONG the most recent of the developments of the Tobe Interference Laboratory is the Model 230 Radio Interference Locator. This instrument was designed and constructed to meet the demand for interference locating equipment, which would be more readily portable than any apparatus which had heretofore been available. A number of exclusive features are incorporated which render the instrument particularly well suited for use by the individual trouble shooter.

The two features of an interference locator which usually receive first consideration are sensitivity and portability. Portability is assured in this instrument by the use of aluminum wherever it is possible. The chassis is mounted on cast aluminum frames and is enclosed in a polished plate steel case. The back and front panels are of bakelite, so braced that a maximum of strength is obtained with a minimum of weight. A wide strap of heavy webbing is provided to allow for carrying the instrument over the shoulder. This strap is adjustable, and ample length is provided to allow the instrument to be carried in any way the operator may desire. The total weight of the Model 230 Interference Locator, fully equipped with batteries and tubes, is 35½ pounds.

Sensitivity is assured in addition to extreme portability by use of the new Type 230 and Type 232 tubes in a radio frequency circuit having four tuned stages. The audio frequency amplifier consists of two transformer-coupled stages feeding an output transformer. The output of this transformer may be supplied to headphones or loud-



MODEL 230 TOBE INTERFERENCE
LOCATOR

speaker or a silver oxide rectifier and microammeter. The sensitivity of this instrument is somewhat under two microvolts per meter.

In addition to the two characteristics already discussed, it is also necessary that an interference locating instrument, to be generally satisfactory, be designed for convenience of operation, for ease of calibration, for uniformity of sensitivity over the entire broadcast band, for sturdiness, and for operation at either radio frequencies or audio frequencies.

Convenience of operation is obtained in the Tobe Interference Locator by mounting the controls and indicating meters on the top panel rather than on one of the side panels, as is usually the case. The meters and controls are clearly visible and easily accessible, whether the instrument is slung from the shoulder of the operator or whether it is placed in an automobile beside him.

The controls provided on this instrument are the on and off switch, the filament rheostat, the volume control, a switch for cutting the intensity meter in and out of the circuit, a switch for transferring the input signal from the radio frequency amplifier to the audio frequency amplifier and a drum type dial for adjusting the receiver to vari-

(Continued on Page 71)

Making the Dial Telephone an Acceptable Member of the Family

Disturbance Generally Believed Necessary Now Suppressed by New Filterette

WHEN the development of the automatic dial telephone was announced most telephone users hailed it as a blessing. Lately, however, there has been an increasing tendency for radio listeners to entertain a contrary opinion. This is particularly true of owners of a-c operated receivers located in apartment buildings. These listeners have been annoyed for some time by bursts of machine gun fire issuing from the loud-speaker coincident with the operation of the telephone dial. The indication given in the receiver was so clear that many persons could tell exactly what number was being called. Dwellers in buildings equipped with automatic dial telephones need no longer endure the nervous strain caused by the interference from the dialing operation. A small filter which may be mounted in the base of the instrument has been developed



TOBE DIAL FILTERETTE

for application to dial telephones. The design of this filter is such that it does not affect the operation of the telephone nor the quality of speech transmission.

The price of this Filterette is \$3.50.

New Development in Radio Interference Locating Equipment

(Continued from Page 70)

ous frequencies in the broadcast band. This frequency selector dial is located at the extreme right of the Interference Locator, where it may easily be reached by the operator; thus only one hand is required for operating the frequency selector and for steadying the instrument if it is being used while slung from the operator's shoulder.

Two meters are provided on the control panel of the Model 230 Interference Locator. One of these is a voltmeter connected across the filaments of the tubes. By adjusting the filament control so that the proper voltage, as indicated by this meter, is always applied to the tube filaments, the operator of this instrument is assured of obtaining satisfactory tube life and uniformity of instrument operation. The second meter is calibrated in intensity units and is provided in order that the operator may not be forced to depend upon the ear alone as an indication of interference intensity.

Experience has proved that when the ear is depended upon for comparison of sound intensities, it is seldom possible to obtain accurate comparisons. The reason for this is that the ear does not respond in direct proportion to the volume of sound. After a certain sound level is reached, the increase in response of the ear is so slight that little indication is given for a considerable change in actual sound volume. By using a meter calibrated in intensity units, the operator of an interference locating instrument can obtain more accurate comparisons of sound intensity than would be possible if the ear alone were depended upon.

Ease of calibration of the Model 230 Interference Locator is obtained by use of the two meters and the volume control. By operating the tubes at their rated filament voltage and by noting the difference in deflection of intensity meter for each setting of the volume control, the intensity of interference from various sources or at various frequencies may be compared. Uniform sensitivity over the entire frequency range of the instrument is obtained by careful design and construction.

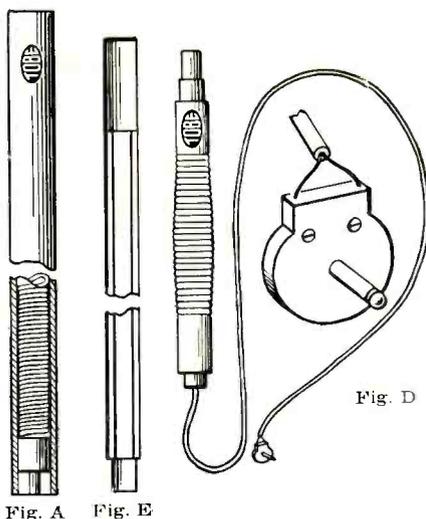


Fig. A Fig. B Fig. C

Fig. D

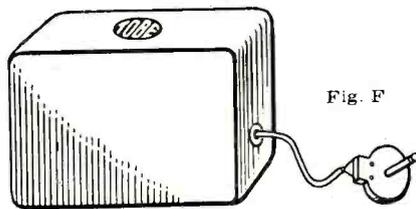


Fig. F

PICK-UP UNITS FOR USE WITH INTERFERENCE LOCATOR

The use of a switch to transfer the energy input from the radio frequency amplifier to the audio frequency amplifier enables the operator of the Model 230 Interference Locator to locate interference within close limits. Just as the human ear is unable to distinguish changes in sound intensity if it is located too close to the source of the sound, so an instrument depending on radio frequency pick-up tends to give a constant indication of signal intensity over a considerable distance from the source of the signal. In locating radio interference it has been found that there is generally an audio frequency component which may be active but a short distance from the interference source. By impressing the signal on the audio frequency amplifier rather than the radio frequency amplifier, it is possible to utilize this audio frequency component to

Improved Interference Text Published

A REVISED and extended edition of "Radio Noises and Their Cure" is now being published. In addition to the information contained in the earlier editions, this book contains a discussion of interference from street cars, elevators, dial telephones, flour bleachers, and many other types of electrical equipment. This book contains 96 pages of wiring diagrams, photographs of Filterette installations, and instructions for suppressing interference by use of Filters and by shielding, grounding, etc. Readers of this magazine may obtain the new edition of "Radio Noises and Their Cure" by mailing the coupon below with 25 cents.

obtain an accurate location of the interference source. This feature of the Model 230 Interference Locator will be found particularly valuable when a number of interference sources are located in one building or when, in tracing an interference, the field of a second interference is encountered.

The pick-up devices used with this instrument are a resonance pole and inductive pick-up unit, the pole consisting of three sections, a handle extension section, and resonance coil is seven feet one inch in length. Its total weight is three pounds. Thus this pick-up unit may easily be held at arm's length by the operator and may be used to check most service entrances. It is insulated to withstand 2300 volts, which is the highest potential with which an interference trouble shooter is likely to come in close proximity.

Due to the features already outlined, this instrument is particularly well suited for use in patrolling high tension lines or for use in the many instances in which a locating instrument permanently installed in a service car would not be suitable.

TOBE DEUTSCHMANN CORP.,
Filterette Division,
Canton, Mass.

Gentlemen:

Enclosed please find twenty-five cents in stamps to cover printing and mailing to meet the third edition of "Radio Noises and Their Cure," as described in RADIO for February, 1930.

My name is

My address is Street City State

I am a dealer.

TOBE DEUTSCHMANN CORPORATION

Filterette Division
CANTON, MASSACHUSETTS

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Your Radio Needs AMPERITE Voltage Control

Get from your electric radio the quality that was built into it. AMPERITE automatically regulates line voltage fluctuations. Provides stable, constant voltage supply. Saves tubes. Trouble-proof—long lasting.

Greatly improves any electric radio. Many of the better-known makes are equipped for AMPERITE.

Demand it when you buy a radio, include it when you build. No radio is modern without it. Install the new AMPERITE in every set you service.

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LINE VOLTAGE CONTROL

QUESTIONS

That Will Help to Prepare Forthcoming

Q. Give a short explanation of the function of the grid in an amplifying tube.

A. The grid swings more or less negative according to the signal impressed upon it. This controls the flow of electrons across the space from filament to plate. Fewer electrons flow as the grid swings more negative and more electrons flow as the grid swings less negative. Thus a small difference of potential on the grid directly controls a greater plate variation, which is how amplification is obtained. The terms "more negative" and "less negative" are used because the grid must swing positive with respect to the filament or the grid takes current and distortion results.

Q. If you had a shorted radio frequency plate by-pass condenser, what would be the effect upon the plate voltages of (a) radio frequency tubes, (b) audio frequency tubes? Why would these conditions be apparent?

A. On (a) no plate voltage, (B) audio plate voltage would be low. The shorted condenser would pass the r-f voltage to ground, and would also tend to pass excessive current. This extra drain would tend to decrease all other plate voltages in set.

Q. What is the usual cause of trouble when a radio set is inoperative and the only apparent effect is all voltages slightly lower than usual?

A. In a case like this it is advisable to look for an open grid circuit. This can be in the tube itself but is usually found where the fine wire of the coil itself is threaded through the form and soldered to the connecting lug. With a test kit the circuit in question can readily be found because the associated tube will have excessive plate current. It is this excess that slightly pulls down all voltages.

Q. In a superheterodyne what is the usual trouble when a receiver brings in loud local stations at about a quarter volume, but several degrees off their true dial setting?

A. This is caused by a defect in the oscillator or heterodyne circuit. Either it has stopped oscillating or the coupling between it and the input to the first detector has failed. A defective oscillator tube is the chief cause for a non-oscillating condition. Lack of coupling is usually caused by an open circuit. A

shorted trimmer or open loading condenser or partially shorted coil may throw oscillating circuit far from its usual frequency and thus give the appearance of being either non-oscillating or uncoupled to detector circuit.

Q. What is the usual cause of plate and cathode voltages of detector tube being equal, with plate lower and cathode higher than usual. Why is this condition rarely found in any other but the detector tube?

A. This is caused by shorted condenser between detector plate and cathode. A detector tube is not a perfect rectifier and therefore considerable radio frequency energy finds its way into the plate circuit. In a transformer coupled set the primary of the audio transformer is connected in the detector plate circuit, while in a resistance coupled audio system a high resistance is used. These two couplings offer very high resistance to the aforesaid stray radio frequency currents while their presence on the plate of the tube is very detrimental to good reproduction, therefore must be removed without removing any of the rectified audio frequency currents. A small fixed condenser offers very high reactance or resistance to audio frequency but is almost a perfect conductor to radio frequency currents, and that is why the by-pass condenser is used on a detector tube and rarely on any others.

Q. In relation to broadcasting what is the difference between radio and audio frequencies?

A. Radio frequencies are electrical, both in the so-called ether and in the radio frequency circuits up to the detector. They have a frequency for broadcasting from 550,000 to 1,500,000 cycles per second. Audio frequencies are electrical and in the form of air waves. Their frequencies in most broadcasting is from 50 to 5,000 cycles per second. They are superimposed, or made to ride, so to speak, on the radio frequency currents in the broadcasting station; are thus carried through space and through the receiver to the detector where they are separated. They pass alone through the audio end and vibrate the speaker cone which starts the air in motion and thus become sound.

Q. What is the general effect of an open cathode in a receiver?

A. Usually voltages at the terminal strip or power pack output will be

Tell them you saw it in RADIO

and ANSWERS

the Service Man for the Examinations

higher. If the open is on one tube only the increase will be slight. If several tubes obtain their bias from the same resistor and that goes open the increase will be much greater. A test kit plugged into the individual sockets will quickly show which tubes are affected as a tube with an open cathode will show no plate current.

Q. What effect does a shorted cathode have upon the terminal voltages of a defective receiver, and how can the defect and the defective part be readily found?

A. A shorted cathode would tend to lower all voltages at the terminal strip, usually to a greater degree than would an open grid, for an open grid affects directly only one tube, while a shorted cathode may affect several tubes. A test kit plugged into individual sockets will show high plate current on tube or tubes affected. Cathode resistors are usually by-passed and this by-pass condenser is the usual source of trouble. A ground on the tube side of this resistor condenser combination will also short the bias. It is advisable to remove wires from resistor and tube cathode and use continuity meter to locate ground or short.

Q. In a set using push-pull 245's and it is found that voltages at terminal strip are not much more than half of normal, what is the first advisable procedure, especially where signals come in at about half volume and very much distorted?

A. Plug test kit into one of the 245 sockets, test for plate current. If this is found to be about double it is obvious the bias resistor is shorted. Turn set off, test for continuity from filament to ground. Check pilot light socket for ground. This is usual trouble and can often be remedied without removing any part of set from cabinet. The bias resistor of 245's push-pull is by-passed with a condenser which may be shorted, or any socket to same filament winding may be grounded.

Q. What is the best way to find an intermittent cut-off?

A. Become familiar with all voltages when set is normal. Test all voltages when set is out. Best method is to remove chassis from cabinet and turn upside down and test quickly from cathode to plate terminal of each socket. No plate voltage indicates open cathode

for that particular tube. If cut off is caused by poor connection or intermittent short, shaking and prodding of all cables and wiring will show up this defect. Cut-outs that snap into operation as soon as meter is touched to set are usually caused by breaking down resistor and usually can only be found by painstaking process of elimination.

Q. Given a single output 245 with the bias resistor open and standard replacement not available, how would you compute substitute?

A. Technical data sheets give the following characteristics for the 245. Plate voltage 250, plate current 32 mils, bias 50 volts. Using Ohms law we have the I and the E known with the R as the unknown. Therefore:

$$I = \frac{E}{R} \text{ or } R = \frac{E}{I}, \text{ substituting}$$

$$R = \frac{50}{.032} = 1953 \text{ ohms for biasing resistor.}$$

This value would be sufficiently correct even though tube had lower plate voltage, because a lower plate voltage would give lower current and lower current would cause correspondingly lower voltage drop.

Q. What is the most common cause of poor control of volume on Radiola 80 series when not apparently too close to broadcasting station?

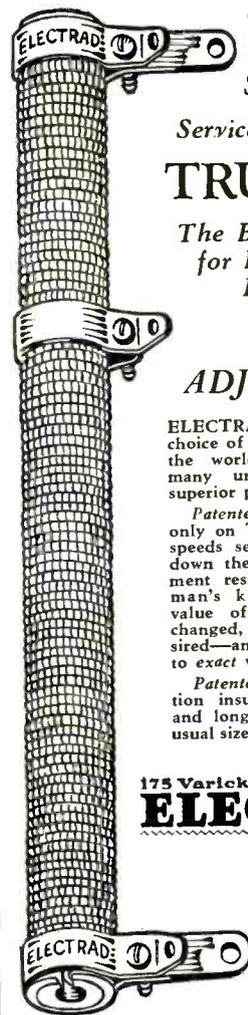
A. If it is found that all voltages are about normal, the most likely cause is a defective 18,000-ohm resistor. If this resistor "goes high," it raises the screen and oscillator plate voltages to be insufficient on local stations.

Q. Can the new 230 tube be substituted for the old 199 type by just changing the filament voltage?

A. Generally no. The new tube is considerably more efficient and will tend to cause undue oscillation. RENEUTRALIZING and rebalancing of entire circuit is usually necessary.

Q. Why do most tuned radio frequency sets tend to oscillate more readily at the higher frequencies?

A. Chiefly because the coupling between input and output circuits is greater at the higher frequencies. The interelectrode capacity of the tube itself and the mutual inductance between circuits increases with increase of frequency.



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