

# HOW TO BUILD A \$1 COIL-WINDER

# A FIVE-TUBE WORLD-BEATER REFLEX

# RADIO WORLD

Title Reg. U. S. Pat. Off.

*White's D-Excellent  
2-Tube Set*

*Constructing Two  
Stages of AF*

*Trouble Shooting  
in the Superdyne*

*Making a Tuned  
Plate Regenerate*

*A Variometer  
Super-Heterodyne*

VOL. 6 NO. 11. ILLUSTRATED EVERY WEEK

**The RADIO PRIMER**  
Information & Instruction  
for the Beginner

**WHICH IS BETTER**  
The 4 tube Superdyne  
or  
The 5-tube Neutrodyne?

**FIX ON ONE TUBE**  


**SOLVE THE REBUS**  
**WRONG DIAGRAM**  
CROSS-WORD PUZZLE  
SCRAMBLED DIAGRAM

**A1-TUBE**  
*Reflex Superdyne*  
Hermann Bernardt



A PUBLIC MANIFESTATION OF THE HOLIDAY BUYING SPIRIT



## More Crosley Customers For You

This December advertisement in the general magazines shown, as well as in all the prominent radio publications and many farm papers, will add even a greater impetus to Crosley Sales.

**BE SURE AND PREPARE TO MEET THE DEMAND  
GOOD JOBBERS EVERYWHERE HANDLE CROSLYS**

*Write For Complete Catalog*

# THE CROSLY RADIO CORPORATION

12401 ALFRED STREET

POWEL CROSLY, JR., President

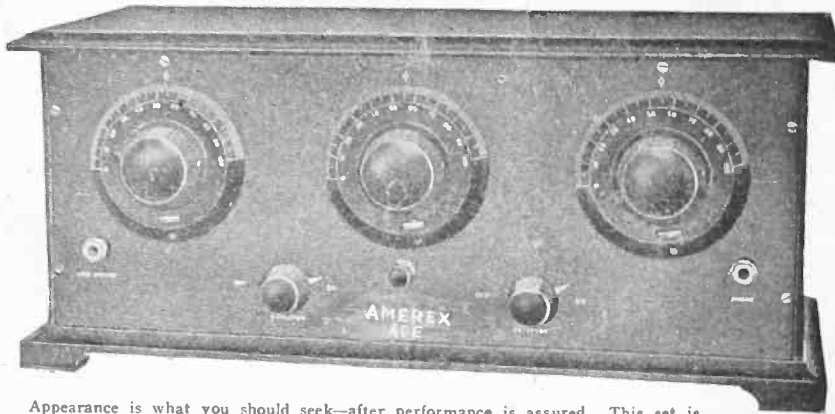
CINCINNATI, OHIO

*Crosley Owns and Operates Broadcasting Station WLIV*



# AMEREX ACE

## The Set That Did Not Get London!



### HONESTY!

Rather than take the experience of one or two people and use their accomplishment as a catch phrase for our advertising, we prefer to wait until enough people in different places and under different conditions have accomplished this feat. When it becomes evident that the average person can do the same thing, then we will advertise it. In other words, we believe in complete honesty in advertising.

We can truthfully tell you that this 5-Tube Tuned Radio Frequency set, built with low loss coils and condensers is the equal of any 5-tube set on the market. In many instances it will perform in a fashion far superior to all others.

It is carefully and scientifically built of the finest materials and is absolutely guaranteed as to design, construction and performance. It will astound you with its

**\$60**

Clarity—Selectivity—  
Volume!

Appearance is what you should seek—after performance is assured. This set is assembled into a solid mahogany cabinet. The panel is mahoganite fitted with mahoganite dials in symmetrical arrangement. All engraving is done in gold. It is a fitting addition to your living room or to any room.

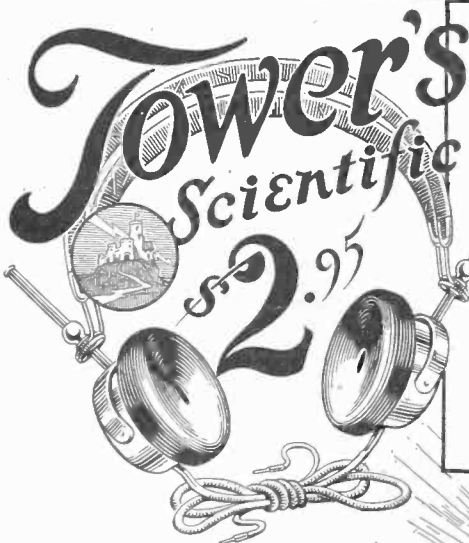
For Sale At All Good Dealers

#### AMEREX LOW LOSS KIT

Consisting of three low loss coils, mounted on three low loss condensers, for those who wish to build their own. Wiring diagram and full instructions are included

**\$16.00**

AMEREX ELECTRIC CO., 232 Greenwich Street, New York, N. Y.



## AIN'T WE GOT FUN!

Tower's Scientifics bring joy and happiness into more than a million homes every day. All the quality of phones selling at much higher prices.

Only Government Licensed Radio Operators are allowed to test and approve TOWER'S Scientific Headsets, thus guaranteeing uniform tone quality.

If your dealer cannot supply you, order direct by post card, and we will ship immediately Parcel Post, C. O. D., plus a few cents postage.

THE TOWER MFG. CORP. WORLD'S GREATEST  
98 BROOKLINE AVE. HEADSET  
Dept. D. BOSTON, MASS. VALUE



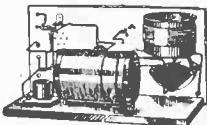
**BARAWIK**

# 60,000 Barawik Sets Prove Our Reliability

We have many thousands of customers all over the world. You take no risk in dealing with us. We are one of the oldest and most reliable radio supply houses. "RADIO WORLD" guarantees our reliability. Let us serve you and save money for you. All orders shipped same day received.

**VALUE**

### COCKADAY CIRCUIT

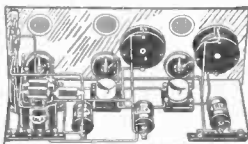


K873 Complete parts, 1 tube set. \$10.25  
K874 Complete parts, 3 tube set. 18.75  
A very selective set that will tune out even nearby stations. A favorite circuit with many builders. One tube set has 7x14 panel, 3 tube 7x21. Panels are drilled for easy assembly. Instructions furnished for assembly.

### IMPROVED COCKADAY CIRCUIT

K875 Complete parts for 5 tube set. \$48.65  
This is the latest model Cockaday circuit with resistance coupled amplifier. Green silk coil wound on bakelite tubing, highest grade grounded rotor low loss condenser and best grade parts throughout. 7x24 panel drilled ready to mount parts. Complete with instructions for assembling.

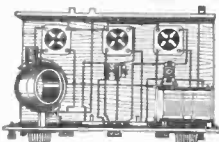
### ERLA REFLEX CIRCUITS



K876 Complete parts, 1 tube set. \$21.50  
K877 Complete parts, 2 tube set. 31.95  
K878 Complete parts, 3 tube set. 38.90

These circuits have opened a new field in radio. One tube does the work of three in an ordinary set, two equal to four, three equal five. Crystal detector improves quality of reproduction, preserving the full mellow tones of the original. Easily handled, will bring in distance well. All parts are genuine ERLA exactly as specified in ERLA circuits. Panels are drilled for easy assembly. One tube set has 6x7 panel, two tube 7x11, three tube 7x18.

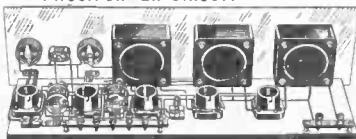
### AMBASSADOR CIRCUIT



K881 Complete parts for 3 tube set \$20.95  
A three circuit set that is very selective and sensitive and brings in distant stations with excellent volume. Genuine Ambassador tuning coil wound throughout with Litz wire permits sharp tuning. Simple to build and operate. Genuine bakelite panel, size 7x18, drilled ready to mount parts. Complete with instructions for assembling.

### PARTS FOR 5 TUBE PHUSIFORMER CIRCUIT

K880 Complete set of parts, including high grade cabinet. \$35.95  
One of the easiest sets to build. Best results assured. Two stages tuned radio frequency amplification detector and two stages audio amplification. Brings in the distant stations with great volume and purest tones. Best grade parts furnished throughout. Genuine bakelite panel 7x26x3/16" drilled ready to mount parts. Complete with instructions for wiring and assembling. Note that all our prices are transportation prepaid.



**SPIDER WEB COIL FOR REINARTZ CIRCUIT**  
K296 Each \$1.05  
A very unusual value. Made of green silk covered wire, spiderweb wound. 21 taps so arranged that crossing avoided. Mounting bracket permits various styles of mounting. Directions included.

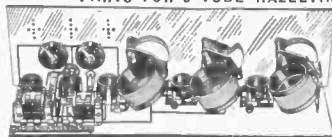
### COCKADAY PARTS

K298 Per set. \$1.55  
Complete set coils for Cockaday circuit. Properly calculated and made to give best results in this new wonder circuit.  
J276 Amplex grid-denser for Cockaday Improved 5 tube circuit. \$1.10

### LARGE CAPACITY FIXED CONDENSERS

Tested for use in the new radio circuits. Metal cases. Soldering lugs for connections. Best materials. Carefully made.  
K358 25 mfd. 55c K359 .5 mfd 8.65  
K360 1. mfd. 85c K361 2. mfd. 1.35

### PARTS FOR 5 TUBE HAZELTINE NEUTRODYNE CIRCUIT



K858 Complete set parts, including mahogany finished cabinet. \$33.50  
All the parts needed to build this circuit which is the leader of all circuits today. Tunes thru interference. Easy to find stations once they have been located. Brings in distant stations on the loud speaker in clear pure tones with wonderful volume. Essential parts licensed under Hazeltine patents. Genuine bakelite panel 7x24. Complete instructions furnished for assembling and wiring. With these parts you can easily build a high grade set at low cost. Note that all our prices are prepaid.

### LICENSED NEUTRODYNE PARTS

K852 Licensed Neutrodyne Kit \$14.95  
Includes three licensed Neutrodynes, 2 neutrodyns, panel layout, template and book of instructions for building up neutrodyne set. By adding other parts a neutrodyne set can be built at low cost.

### TUNED RADIO FREQUENCY UNIT

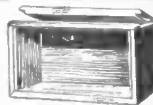
K653 Each \$2.25  
Three for \$7.85  
Consists of radio frequency transformer wound on bakelite tubing and high grade variable condenser. For use in tuned radio frequency circuits. Usually used in sets of three. Condenser shaft 3/4" diam.

### BALANCING CONDENSERS

K664 Pair. \$7.00  
Sold in pairs for neutralizing the capacity in two-stage radio frequency circuits.

### CABINETS

Fine looking cabinets solidly built. Elegant hand rubbed dark mahogany finish. You will be proud of your set mounted in one of these cabinets. Hinged tops. Panels flush in front recess. Panels not included. Inside depth 7 inches except 9x14 12x14, 12x21, which are 10 in. deep. Prices quoted are prepaid and are the lowest ever offered on quality cabinets.



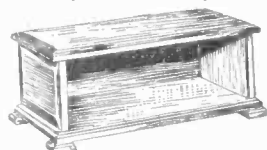
Panel Size	Art. No.	Price Each	Panel Size	Art. No.	Price Each
6x10 1/2"	K422	\$1.95	7x21"	K423	\$3.20
7x10"	K421	2.45	7x26"	K429	3.40
7x12"	K424	2.60	7x26"	K431	3.50
7x14"	K423	2.85	9x14"	K425	3.55
7x18"	K420	2.95	12x14"	K430	4.00
			12x21"	K432	5.05

### BASE BOARDS FOR CABINETS

Fasten to bottom of panel and fit inside cabinets. 3/8" inch thick, 6 1/2" inches wide.

Art. No.	Length Inches	Price Each	Art. No.	Length Inches	Price Each
K435	6 1/2"	17 1/2c	K439	17 1/2"	29c
K436	9 1/2"	23c	K440	20 1/2"	31c
K437	11 1/2"	25c	K441	23 1/2"	33c
K438	13 1/2"	27c	K442	25 1/2"	39c

### DE LUXE CABINET

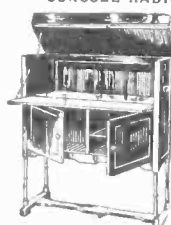


The finest quality cabinet. A piece of furniture worthy of the best set. Made of genuine solid walnut in elegant hand rubbed natural walnut or brown mahogany finish. State which is wanted. Top has piano hinge and lid support. Feet at base add to striking appearance. Inside depth 9 inches.

Panel Size	Art. No.	Price Each	Panel Size	Art. No.	Price Each
7x18	K444	\$7.19	7x28	K447	\$10.50
7x21	K445	8.25	7x28	K449	11.50
7x24	K446	8.95	7x36	K448	13.75

### CONSOLE RADIO CABINET

K902 Prepaid price, each \$37.50  
A high grade piece of furniture. Seat appearance. Elegant finish. Looks well among finest furnishings. Top compartment takes any set or panel size 9 in. high, 10 in. deep, 33 in. long or smaller. Lower compartments hold batteries, chargers and all accessories. Can be entirely closed and locked. Strong durable construction. Paneled doors. Fine mahogany or walnut finish. Size over all, 37 in. wide, 14 in. deep, 42 in. high.



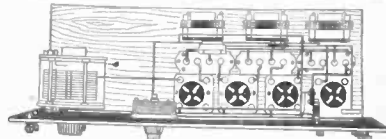
### PARTS FOR REINARTZ CIRCUIT

K862 Complete set of parts one tube set \$10.75  
K863 Complete set of parts three tube set \$17.95  
One of the best circuits for bringing in distant stations. Can be built at very low cost yet produces fine results. Easy to handle. The three tube provides loud speaker volume on distant stations. One tube set has 7x14 panel, 3 tube set 7x21 panel. Panels are drilled for easy assembly. Complete with instructions for assembling.



### ACME REFLEX CIRCUIT

K883 Complete parts for 4 tube set \$44.50  
One of the most efficient circuits known. Combines three stages of radio frequency and audio frequency using only four tubes. Crystal detector gives unusual clarity. Genuine Acme condenser. Pot Rheo, radio and audio frequency transformers supplied. Genuine bakelite panel, size 7x21, drilled ready to mount parts. Complete with instructions for assembling.



### MURDOCK FIVE TUBE NEUTRODYNE SET



K870 Complete with tubes, batteries and accessories as listed below. \$159.50  
A high grade, genuine five tube Neutrodyne set at an unusually attractive price. Manufactured under the Hazeltine patents. Engraved panel and finely finished solid mahogany cabinet lend richness and dignity to its appearance. Easy to tune. When station has been heard once and record made of dial setting you need only set dials at same point and if station is broadcasting it will be heard. Brings in distant stations loud and clear on loud speaker.

### PHUSIFORMER

K546 Each \$6.85  
A new device especially designed for tuned radio frequency circuits. Consists of primary and secondary inductively coupled coils connected with variable condenser, all enclosed in moulded case with binding posts. Dial on shaft of condenser. Size 4 1/2 in. square, 2 in. thick. Three units occupy small space and can be used to make up a very efficient 5 tube set at low cost.



### COILS FOR HARKNESS CIRCUIT

K295 Per set of two \$1.95  
Green silk windings on genuine bakelite tubes. Properly calculated to give best results.  
K879 Complete parts for 2 Tube Harkness Reflex Set with panel drilled for mounting parts and instructions for assembling \$15.85



*The Barawik Co.*  
102 So. Canal St. Chicago, Ill.

BARAWIK

# Prices Now are Lower than Ever Before

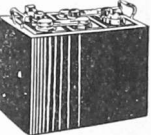
WE PAY TRANSPORTATION CHARGES IN U. S. EAST OF THE ROCKIES  
THE PRICES QUOTED DELIVER THE GOODS TO YOUR DOOR  
ALL ORDERS SHIPPED SAME DAY RECEIVED

QUALITY

THIS GUARANTEE PROTECTS YOU—Examine the goods we ship you. They must suit you in every respect. If you are not satisfied with your purchase return the goods at once and we will refund the price you paid

### STORAGE "A" BATTERY

The best battery buy on the market. Guaranteed for three years. Made of best new materials. Full capacity. Try one of these batteries for 10 days. If at the end of that time you do not return it and we will refund the purchase price. Note our prices are prepaid. Transportation cost considered these are the lowest prices obtainable. We deliver this high quality battery to you for less than the cost of inferior batteries.



K194 6 volt, 60 amp. size. Each \$9.90  
K196 6 volt, 100 amp. size. Each \$13.25

### BATTERY CHARGER

Connect charger to 110 volt 60 cycle light socket and your battery charges automatically over night at a cost of only a few cents. Cord and clips for connections included.



K201 For 6 volt battery.....\$12.95  
K203 For 12 volt battery.....12.95  
Noiseless Rectifier Bulb Charger—Kinz. Tungar or Rectigon.  
K225 2 amp. \$15.95 K256 5 amp. \$24.95  
Extra Bulbs.  
K257 2 amp. \$3.80 K258 5 amp. \$7.60

### HYDROMETER

K190 Each.....48c  
Helps keep battery in better shape by showing exact condition.

### BATTERY CLIPS

K198 Two for.....28c  
Clip onto storage battery terminals, lead coated. Make positive non-corrosive contact at all times.

### "A" BATTERY CORDS

K191 Per pair.....69c  
Two heavy insulated stranded copper wires 5 feet long. Battery clip on one end and binding post terminal on other end. Eliminate shorting of "A" battery. Provide positive connections.



### CONNECTING CORD SET

K192 Each.....52c  
Five connecting cords with braided over all. Each cord has disc end and binding terminals for connections. Makes connecting of both A and B batteries to set easy with no mistakes in polarity or voltage. Will reach from table to floor or use in any type cabinet. Does away with unsightly wires. This is a \$1.00 retail value.

### PLATE CIRCUIT "B" BATTERIES

Reduced prices. A leading standard brand advertised to sell at much higher prices. No better battery made. Longest service.



K180 Small size 2 by 2 1/2 by 3 1/2 inches 2 1/2 volts. Each.....95c  
Ten for.....\$9.00  
K184 Large size, 5 taps. Size 3x1 1/2x 1 1/2, 2 1/2 volts. Each. \$1.65 Ten for. \$14.70  
K188 Large size, 6 taps. Size 3x8x 1 1/2, 4 1/2 volts. Each.....\$2.90 Ten for. \$27.90  
K181 2 1/2 volt. New upright size 3x2 1/2x 1 1/2 in. Takes less space in set. Each.....\$1.50  
K183 4 1/2 volt upright size 3x7x 8 in. Each \$2.90. Ten for \$27.90

### "C" BATTERY

K186 4 1/2 volt C battery size 4x 1 3/4x3 1/2. Ea.42c Ten for.....\$3.95

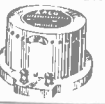
### STORAGE "B" BATTERIES

K202 12 cells, 24 volts. Each.....\$3.95  
More economical than dry cell "D" batteries on sets using 3 or more tubes. Can be recharged when run down. Capacity 2500 milliamperes. A high grade battery. Glass jars with rubber caps. Strong moulded tray. Shipped dry so as to be suitable. No Electrolyte included.



### "B" BATTERY CHARGER

K205 Each.....\$8.95  
Recharges 24 or 18 volt B batteries from 110 volt 60 cycle light socket rapidly and at practically no cost. Keeps batteries in good condition.



### BATTERY METERS

K189 Each.....82c  
Reads 0 to 50 volts. Accurately tells you condition of "110" Battery. Convenient watch size. Tests 2 1/2 and 4 1/2 volt batteries.  
K193 Combination meter.....\$1.30  
Reads 0-50 volts; 0 to 35 amperes. Tests "110" and "A" dry cells.



### PHONOGRAPH ADAPTERS

K771 Fits single unit to tone arm. Each.....39c  
K773 Fits any double headset to tone arm. Each.....65c  
Convert your phonograph into a loud speaker. Take off the reproducer and replace with adapter and unit or headset. Such a combination will equal or surpass in tone and volume may high priced speakers.



### SUPERIOR RADIO PLUGS

Both styles take two sets of cord tips. Polished round barrels.  
K397 With turned fibre barrel. Highest grade obtainable. Each.....46c  
K395 With black moulded composition barrel. Wonderful value. Each.....25c



### NEW STYLE PLUG

K401 Each.....59c  
Cords are held firmly in place but can be detached instantly without taking plug apart. No screws to loosen. Bakelite body. Fits all standard jacks. Best plug made.



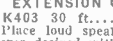
### LOUD SPEAKER UNITS WITH PHONOGRAPH ATTACHMENTS

Make a loud speaker of your phonograph. These attachments consist of a high grade speaker unit arranged to attach to tone arm of phonograph in place of a reproducer. Fit Victor, Sonora, Silvertone and other phonographs having same size tone arm.  
K602 Baldwin.....\$7.45  
K607 Western Electric.....8.50



### EXTENSION CORDS

K403 30 ft.....\$1.95  
Place loud speaker wherever desired without moving set. Consists of high grade receiver cord of length specified with plug on one end and jack on other to take plug on loud speaker cord.



### PHONE CUSHIONS

K774 Pair.....43c  
Made of soft sponge rubber. Light as a feather. Fit any phones. Excludes all noises and make wearing phones a pleasure.



## \$5.25 LOUD SPEAKER

K613 Special Sale Price.....\$5.95  
This speaker is a marvel for volume and quality of tone. It is actually superior to most of the higher priced speakers and at our price is the biggest value on the market. Guaranteed to please you. Beautiful mottled black finished fiber horn. Bell diameter 10 inches. Height 21 inches. Complete with cord.

### BARAWIK QUALITY HEADSET

K770 Spec. Price per Set.....\$2.28  
These headsets are the very best for tone quality and volume. Finest quality. Designed to sell for much higher prices than we ask and at our price are a wonderful bargain. Receiver cases are fine polished black finish. Comfortable fabric covered head band. Complete with 5 foot cord.

### All Orders Shipped Same Day Received

**LIGHT SOCKET ANTENNA**  
K978 Each.....97c  
Screws into any light socket. Replaces the regular out door antenna. Very satisfactory for nearby stations and under favorable conditions will bring in distant stations. Easy to install. No danger. Gives clear reception with little static interference. Ideal for people in apartment buildings.

### FAHNESTOCK CONNECTORS

K366 Single Connector. Dozen for \$1.00  
K367 Double Connector. Dozen for \$1.00  
K368 Angle Connector. Each.....86c

### ANTENNA MAST FITTINGS

K952 For 1/2 inch pipe. Per set.....\$1.00  
K953 For 1 inch pipe. Per set.....\$2.95  
Set includes adjustable base to fit roof peak or flat surface, center guy wire fastening ring and top cap with pulley for rope to raise and lower antenna. No pipe included. Makes the installation of a first class antenna simple and inexpensive.

### ANTENNA OUTFIT

K272 Each.....\$2.70  
Consists of 150 feet stranded copper antenna cable, lightning arrester, four wall insulators, two antenna insulators, antenna lead-in, 25 feet insulated ground wire, ground clamp and 25 feet connecting wire.

### STRANDED ANTENNA WIRE

Cabled of fine copper strands. Very flexible. High tensile strength. Best for aerials.  
K748 100 ft. coil 48c K249 500 ft. coil \$2.30

### SOLID BARE COPPER WIRE

Solid bare copper wire for aerials, leads or wiring instruments. Size 14.  
K240 100 ft. coil 42c K242 500 ft. coil \$2.05

### GROUND CLAMP

K273 Made of soft copper 3/8" wide with Fahnestock connector. Fits any pipe 3/8 to 1 inch wide. Each.....86c

### ANTENNA INSULATORS

K263 Ribbed Porcelain Insulator. 2 1/2 in. long. Ea. 60  
Dozen.....\$5.50  
K265 Ribbed Porcelain Insulator—5 inches long. Each 15c

### ANTENNA LEAD-IN

K259.....15c  
Antenna wire is brought in without drilling a hole. Place on window sill and window can be closed down tight and locked as before. Well insulated. Can be bent into any shape. Made of copper strip properly insulated.

### WALL MOUNTING INSULATOR

K262 Each 7c  
Dozen.....65c  
Galvanized screw mounting. Lead-in wire passes through center of porcelain insulator and is kept away from possible grounds. Easily installed.

### PORCELAIN BASE SWITCHES

Fine white porcelain bases. Copper contacts and blades. Can be used as antenna switches.  
K385 Single Pole Single Throw. Ea. 18c  
K383 Single Pole Double Throw. Ea. 25c  
K384 Double Pole Double Throw. Ea. 45c

### OUTDOOR ARRESTER

K980.....\$1.24  
Protect your instruments with this lightning arrester. Weatherproof Bakelite case. Underwriters approved.

### JEWELL LIGHTNING ARRESTER

K981 Each.....68c  
A dependable protector, always on guard. Small and compact. Weatherproof porcelain case. Easily fastened and connected. Underwriters approved.

### SUPERIOR LIGHTNING ARRESTER

K982 Each.....39c  
Porcelain block with brass binding posts. Dependable and effective.

### COLLAPSIBLE LOOP ANTENNA

K976 Each.....\$3.80  
A full size loop antenna 31 in. high, 28 in. wide. Folds into compact case 18 in. long, 3 in. diam. Well made. Fine looking. Insulated wire, extra flexible. Suitable for use with any loop set. Case included. Quickly set up or taken down.



# The Barawik Co.

102 So. Canal St. Chicago, Ill.



# It is Easy to Build Your Own Radio Set

WE PAY TRANSPORTATION CHARGES IN U. S. EAST OF THE ROCKIES  
THE PRICES QUOTED DELIVER THE GOODS TO YOUR DOOR  
ALL ORDERS SHIPPED SAME DAY RECEIVED

HOW TO ORDER—Write your order plainly, state Article Number, Description and Price of items wanted.  
Send Postoffice or Express Money Order, Certified Check or Bank Draft for Total of Order. Prompt Shipment is assured when these directions are followed.

BARAWIK

QUALITY

### OUR SPECIAL VARIOUPLER:

K418 Each... \$1.80  
The most efficient type of coupler. Primary and secondary windings on bakelite tubes. Primary tapped for fine tuning. 3/16 inch shaft. Range 180 to 650 meters.



### MOULDED VARIOMETER

K412 Each... \$2.30  
Moulded bakelite rotor and stator forms. Maximum inductance with greatest efficiency and minimum distributed capacity. A high grade instrument that will get the best results. Wave length 180 to 600 meters.



### EXCEL 180° VARIOUPLER

K523 Each... \$3.90  
A wonderful value. Produces excellent results. Green silk windings. Rigid mounting support. Primary tapped for fine tuning. 1/4 inch shaft. Range 200-600 Meters. K522 Variometer—same style. Each... \$3.90



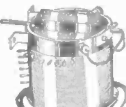
### SUPERIOR BAKELITE VARIOMETER

K525 Each... \$3.35  
Forms moulded of red bakelite. A neat handsome instrument. Green silk windings calculated for highest efficiency. 1/4 inch shaft. Noiseless (metal) connections. Produces superior results in any type circuit 180 to 650 meters. K527 Variocoupler. Same style. Primary tapped for fine tuning. Each... \$3.68



### SUPERIOR VARIOUPLER

K523 Each... \$3.35  
Stator tube and rotor ball of moulded red brown bakelite. Large size green silk windings insure highest efficiency. 1/4 inch shaft. Superior results in circuits for 180 to 650 meters. Tapped primary for finest tuning. Noiseless contacts. K526 Special type for single circuit Regenerative Hook up. Each... \$3.75



### SPLIT STATOR VARIOMETER

K524 Each... \$3.65  
A wonderful value at our price. Polished black bakelite rotor and stator forms. Large size green silk wire insures greatest efficiency. 1/4 inch shaft. Noiseless plate lead connection. Split stator winding.



### PFASTIEHL SPIDER WEB VARIOMETER AND VARIOUPLER

K406 Variometer. Ea. \$3.95  
K407 Variocoupler. Ea. 4.15  
Sharp tuning, high efficiency and responsiveness to distant signals are features of these instruments due to absence of any insulating material in the magnetic field. Low energy loss. Secondary adjustment provides sharp tuning. Panel or table mounting. Complete with dial.



### COTO COMPACT VARIOMETER AND VARIOUPLER

K408 Variometer. Ea. \$4.10  
K409 Variocoupler. Ea. 4.35  
Small in size. Highly efficient. Unequaled for portable sets. Variometer measures 2 1/2 x 1 1/2 x 3/8 inches. Variocoupler 2 3/8 x 1 1/2 x 3/8 inches. Moulded bakelite forms. Silk covered windings. Table or panel mounting. 1/4 inch shafts. Range 200 to 600 meters.



### SWITCH LEVERS

Very neat polished composition knob. Exposed metal parts polished nickel finish. Fitted with panel bushing and two set nuts. A high grade switch. 1 1/2 inch radius. K381 With black knob. Ea. 14c  
K382 With mahogany knob. Each... 18c



### INDUCTANCE SWITCH

K285 Price including knob and dial... \$1.18  
Mounts switch points and contact lever behind panel. Only one hole needed to mount. 12 switch points, any number of which may be used.



### SPIDER WEB COILS

K290—25 turn 39c K292—50 turn 47c  
K291—35 turn 42c K293—75 turn 64c  
K294—100 turn. Each... 68c  
A new popular type of inductance of highest efficiency. Lowest distributed capacity and lowest high frequency resistance. Firm green silk windings with mounting strips.

### SUPERIOR RADIO JACKS

Finest grade jacks. Improved design. Best materials. Phosphor bronze springs. Silver contact points. Nickel finish. Mount on panels 1/2 to 3/4 in. K390 Open circuit. Each... 32c  
K391 Closed circuit. Each... 39c  
K392 Two circuit. Each... 49c  
K393 Single circuit filament control. 46c  
K394 Two circuit filament control... 59c



### RADIO SWITCH

K287 Each... 25c  
Cuts current on and off instantly by a push or pull. Very neat. Well made. Durable. Saves tubes and batteries.



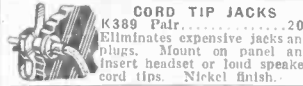
### SUPERIOR RADIO SWITCH

K283 Each... 25c  
A switch fully equal to any on the market at a price about half what is usually asked for a switch of anywhere near equal quality.



### NEW STYLE JACKS

K379 Single circuit. Each... 24c  
K380 Double circuit. Each... 49c  
Occupy less space than other jacks. Binding posts, soldering unnecessary. Well made, durable smooth working. Well insulated.



### CORD TIP JACKS

K389 Pair... 20c  
Eliminates expensive jacks and plugs. Mount on panel and insert headset or loud speaker cord tips. Nickel finish.

### STANDARD JACKS

K387 Open circuit jack. Each... 22c  
K388 Two circuit jack. Each... 28c  
Well made, durable, smooth working, nickel finished frame. Well insulated.

### JACK SWITCHES

K280 Two springs. Usually used as "A" battery switch. Each... 47c  
K281 Three springs. For switching from long to short wave, from one battery to another, etc. Each... 55c



### PANEL MOUNTING VARIABLE CONDENSERS

These are especially high grade condensers and we guarantee them to be mechanically and electrically perfect. Fine polished end plates of heavy bakelite. Shafts 1/4 inch diameter. Sturdy, heavy aluminum alloy plates perfectly spaced to insure smooth, even reliable capacity. Dial and knob on vernier type. No dial on plain type. Our low prices save you money.



No. Plates	Max. Cap.	Plain Type No.	Price	Vernier Type No.	Price
3		K815	\$5.58		
5		K816	.97		
11	.00025	K814	1.13	K825	\$1.95
17	.00035	K817	1.20		
23	.0005	K813	1.27	K824	2.30
43	.001	K812	1.40	K826	2.45

### LOW LOSS VARIABLE CONDENSERS

The latest type condensers. Reduce current losses increasing efficiency of set. Heavy aluminum plates. Vernier type has single vernier plate controlled by lever. 1/4 inch shaft. 3 inch dial required for vernier type.



No. Plates	Max. Cap.	Plain Type No.	Price	Vernier Type No.	Price
11	.00025	K836	\$1.90	K833	\$2.18
23	.0005	K837	2.12	K834	2.90
43	.001	K838	2.90	K835	3.85

### GROUND ROTOR LOW LOSS VARIABLE CONDENSERS

K797 .0003... \$2.74  
K798 .0005... 3.30  
K799 .001... 3.80  
The most efficient type condenser made. Low losses, grounded rotor, straight wave line. Made of the best grade materials throughout. Heavy aluminum plates. Well insulated.



### STANDARD BRAND VARIABLE CONDENSERS

K810	Acme .0005 Vernier	\$5.65
K784	Coto .00025 Vernier	3.90
K785	Coto .0005 Vernier	4.18
K786	Coto .001 Vernier	4.98
K820	Remler .00035	4.45
K821	Remler .0005	4.45
K787	Cardwell .00025	3.95
K788	Cardwell .00035	4.35
K789	Cardwell .0005	4.60
K790	Cardwell .001	5.55
K791	Marco .00025	3.95
K792	Marco .00035	4.45
K793	Marco .0005	4.95
K794	Marco .001	5.85
K795	Flewalling .00025 Vernier	4.50
K796	Flewalling .0005 Vernier	4.95

### FRESHMAN VARIABLE GRID LEAKS

K177 Back of panel style 47c  
K178 Back of panel style with .00025 Condenser... 69c  
K171 Base mounting type with .00025 Condenser... 69c



### C R L VARIABLE GRID LEAK

K173 Without condenser but arranged to take any standard grid condenser... \$1.05  
K175 With .00025 condenser... 1.35  
Turning knob varies resistance from 1/2 to 8 megohms.



### BRADLEY LEAK

Latest improved type. K168 Without condenser. Resistance 1/2 to 10 megohms... \$1.74  
K169 With .00025 cond. 1.95



### TUBULAR GRID LEAKS AND CONDENSERS

Cut shows leak or condenser mounted, but all parts are priced separately. K849 Grid leaks (can be used with Dubilier G01G condensers) 10c  
Resistances 1/2, 1, 2, 3, 5, 7 and 10 megohms. Specify resistance. K831 Grid and Plate Condensers. Ea. 29c  
Capacities .000025, .0001, .00025, .0005. Specify capacity. K840 Single. Each... 15c  
K842 Double. Each... 27c  
K844 Triple. Each... 39c



### TINNED COPPER "BUS BAR" WIRING SETS

Size 14 tinned copper wire. For wiring sets. Best size for neat job and easy soldering. K957 Round Ten feet for... 10c  
K958 Square Ten feet for... 11c

### SPAGHETTI

For covering connecting wires in sets. K955 Finest quality braided and saturated with best baked lustrous transparent insulating varnish. 3 feet for... 14c  
K956 Best quality braid and covered with black insulating compound. 3 feet for... 8c

The Very Latest  
**Radio Book**  
Free  
This Book Full of Radio Bargains.  
Shows Big Savings on parts, sets and accessories.  
Our prices are lowest on highest quality standard goods.  
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### INDUCTANCE COILS (Honeycomb)

Carefully made—fine looking coils. Low resistance—high self inductance. Very firm impregnation. Mounted coils have standard plug mountings. Specify when ordering whether mounted or unmounted type is wanted.



Tns.	Art No.	Net	Mtd	Trns.	Art No.	Net	Mtd
25	K301	\$1.28	\$1.75	200	K307	\$6.66	\$1.20
35	K302	.30	.90	500	K311	.06	1.57
50	K303	.32	.96	1000	K314	1.64	2.18
75	K304	.37	1.02	1250	K315	1.86	2.35
100	K305	.52	1.07	1500	K316	2.10	2.50

### INDUCTANCE COIL MOUNTINGS

K340 3 Coil. \$2.75 K341 2 Coil. \$2.35  
Made of polished black bakelite. Mount on front of panel.  
K342 Mounts back of panel, with knobs or dials on front of panel. Takes 3 coils of any size. Each... \$3.25

### MAGNET WIRE

Prices quoted are for 8 oz. spools unless otherwise stated. Prices are prepaid.

Double Cotton White	Enam. Size	Wire Size	Single Silk Green	Double Silk Green
K990	K992		K991	K993
39c	31c	18	54c	75c
43c	35c	20	60c	82c
49c	39c	22	70c	95c
57c	45c	24	85c	\$1.05
70c	50c	26	95c	1.30
95c	55c	28	1.15	1.60
1.49	65c	30	4oz. .80	4oz. 1.10
	85c	32	4oz. .95	4oz. 1.30
		36	4oz. 1.95	4oz. 2.60

### BAKELITE TUBING

Genuine bakelite tubing. Pieces 3 inches long only. K985 Inside dia. 2 1/2 in. 29c  
K986 Inside dia. 3 in. 35c  
K987 Inside dia. 3 1/2 in. 38c  
K988 Inside dia. 4 in. 43c



### GALENA DETECTOR

Easy fine adjustment. Crystal mounted in cup. Moulded base and knob. Brass parts polished nickel finish. K732 Each... 59c



### FRESHMAN DETECTOR

K760 Each... \$1.10  
A double adjustable crystal detector especially suitable for reflex and other sets requiring a high grade detector. For front or back of panel mounting.



### DETECTOR CRYSTALS

K736 Galena, Arlington tested. piece 19c  
K738 Silicon, Arlington tested. piece 19c  
K735 Tested Galena, Mounted, piece 9c  
K737 Tested Silicon, per piece... 9c  
K746 Dutee Crystal. Each... 27c

### STANDARD BRAND FIXED CRYSTAL DETECTORS

The latest developments in Crystal Detectors. Used in Reflex circuits. K742 Grevol Detector. Each... \$1.10  
K747 RV Detector... 1.15  
K749 Brownlie Detector... 1.79  
K750 Brownlie Renewal... 69

### DUBILIER MICADON TYPE 601

K502.0001.28c K507.0025.32c  
K503.00025.28c K508.003.40c  
K504.0005.28c K509.004.40c  
K505.001.32c K510.005.48c  
K506.002.32c K511.006.57c

### DUBILIER MICADON 601K

Same style condenser as above with mounting for tubular grid leak. No grid leak included. K581 .00025. Ea. 36c  
K582 .0005. Ea. 38c



### DUBILIER MICADON 601T

Consists of a Type 601 condenser with brackets designed to fit over terminals on a d.c. frequency transformers, binding posts, etc. K583 .001 mfd. 40c  
K584 .002 mfd. 40c K585 .0025 mfd. 40c

The Barawik Co.  
102 So. Canal St. Chicago, Ill.

BARAWIK

# With Barawik Standard Radio Goods

SERVICE

We have many thousands of customers all over the world. You take no risk in dealing with us. We are one of the oldest and most reliable radio supply houses. "RADIO WORLD" guarantees our reliability. Let us serve you and save money for you. All orders shipped same day received.

**VACUUM TUBES**  
Standard Brands—Cunningham, Radioron. Every one guaranteed new and perfect and in original carton. We will ship brand in stock unless you specify otherwise.

- K105 Detector, UV200, C300. Each .....\$3.59
- K112 Amplifier, UV201A, C301A. Each ..... 3.59
- K118 3-Watt Transmitter 7.70
- K107 WD11, C11. Each 3.59
- K101 WD13, C13. Each 3.59
- K102 UV199, C399. Ea. 3.59

**ADAPTERS**  
To use dry cell tubes in standard base sockets simply insert one of these adapters in the socket.

- K104 For 199 or 399 tubes 35c
- K109 For WD11 or C11 tubes 35c

**BAKELITE SOCKET**  
K140 Standard base. 27c  
K136 UV199 base. 27c  
K136 C11. 27c  
Moulded of genuine red brown bakelite. Binding post connections. Strong contacts. Real values.

**EXTRA STRONG SOCKET**  
K142 Standard base. 38c  
K138 C299 Base. 38c  
Extra heavy. Solid base. Double reinforced contact springs. For standard base tubes. A wonderful value.

**PANEL MOUNT SOCKET**  
K143 Single Gang. \$1.42  
K144 Three Gang. 1.39  
The best socket value obtainable anywhere. Extra heavy, moulded, genuine brown bakelite. Double reinforced contact springs. Will mount on panel behind rheostat. Standard base.

**METAL TUBE SOCKET**  
K134 Each. 25c  
Nickel plated brass tube set in best grade composition base. Plainly marked binding posts. An excellent value.

**STANDARD TUBE SOCKET**  
K150 Single Gang. \$ .75  
K153 Three Gang. 2.25  
Bakelite base. Polished nickel tube. Highest quality socket on the market. Best insulation. Positive contact. Marked terminals. For base or panel mounting.

**CUSHION BASE SOCKET**  
K145 199 Base. 59c  
K146 Standard Base. 75c  
Moulded of high insulating material. Sponge rubber base. Non microphonic. Plainly marked binding post connections. Neat and compact.

**BINDING POSTS**  
Brass, polished nickel finish. Washer and 6-32 in. screw extending 5/8 in.

- K370 Large size - barrel size with hole and knob 5/8 in. long. Dozen .....70c
- K372 Small size barrel and knob 9-16" long. Dg. 50c Dozen .....35c

**LETTERED BINDING POSTS**  
K375 Set of eight. 39c  
Nickel plated washers. Composition top as shown in illustration. Eliminate engraving. Improve appearance. Sold in sets of eight only.

**COMPOSITION TOP BINDING POSTS**  
K374 Dozen 45c  
Hundred \$3.00  
Composition top, nickel plated body. 6/32 screw with washer.

**SWITCH CONTACT POINTS**  
Brass polished nickel finish. Have 1/8 in. long size 6/32 screws and two nuts.

- K363 Dozen. 10c Hundred. 75c Thousand \$6.75

**Solder Lugs to Fit Contact Points**  
Also for connecting wires to binding posts, etc.

- K365 Dozen. 8c Hundred. 30c Thousand \$2.75

**SWITCH LEVER STOP**  
Brass polished nickel finish.

- K386 Dozen. 15c Hundred. \$1.05 Thousand \$9.75

**BRASS ROD**  
K961 Threaded 6-32, per 8 in. length 6c  
K963 Threaded 8-32, per 8 in. length 8c  
K965 Solid 3-16 in., per 8 in. length 6c  
K967 Solid 1/4 in., per 8 in. length. 9c

**COPPER FOIL**  
K968 Per piece. 25c  
Thin copper foil for shielding panels. 6 inches wide, 2 feet long. .005 in. thick.

**SUPERIOR RHEOSTATS**  
K147 0 ohm. Each. 60c  
K148 30 ohm. Each. 65c  
K149 30 ohm. Each. 70c  
One of the finest rheostats we have ever seen at a price that makes it the best value obtainable anywhere. Genuine bakelite base. Beautifully shaped black bakelite knob with white arrow. Single hole mounting. A rheostat that will be proud to have in your set.

- K156 400 ohm Potentiometer. Matches above rheostats. Each .....89c

**FILAMENT CONTROL RHEOSTATS**  
K132 6 ohm. Each. 32c  
K129 30 ohm. Each. 35c  
K131 30 ohm. Each. 38c  
K135 6 ohm Vernier. 78c  
Best grade. Will give real service. Durable and lasting. High heat resisting base. diam. 3/4 in. Tapered polished black knob 1 1/4" diam. Potentiometers. Match above rheostats. Same high grade construction.

- K151 200 ohm. Ea. 50c K152 400 ohm. Ea. 58c

**OUR SPECIAL A. F. TRANSFORMER**  
K549 3 to 1 ratio \$2.25  
K550 3 to 1 ratio 2.45  
In quality of tone and volume of sound, this transformer is built for we guarantee it to equal or surpass any other transformer. Neatly finished. Carefully made. Fully in appearance. Mounted with plainly marked binding post connections. Wonderful results on one, two or three steps without distortion or howling. A quality item in every respect.

**TRIODE R. F. TRANSFORMER**  
K560 For 201A or 301A Tubes .....\$1.58  
K561 For 199 or 11 or 13 Tubes ..... 1.58  
This transformer will produce wonderful results in any type of regular or reflex radio frequency circuit. Perfect for one, two or three stages. Compact, convenient form, easily mounted. Range 175 to 600 meters.

**RADIO "BAKELITE" PANELS**  
We supply genuine bakelite. Condensate (Ceylon or Borneo), all of which have practically identical properties. Machines well without chipping. Won't warp. Waterproof. One side has attractive natural polished black finish which can be sanded and oiled. Other side mahogany finish. Either side may be used as front.

Panel Size (Inches)	1/4" thick Art. No. Price	3/16" thick Art. No. Price	1/2" thick Art. No. Price
8x7	K480 \$3.55	K480 \$3.80	K470 \$1.15
9x10 1/2	K451 .80	K461 1.16	K471 1.60
7x10		K455 1.28	
7x12		K458 1.64	
7x11	K489 1.38	K488 1.73	K478 2.35
7x18	K483 1.78	K483 2.27	K473 3.10
7x21	K487 2.08	K487 2.65	K477 3.40
7x24	K459 2.42	K469 2.97	
7x26		K462 3.23	
12x10		K464 3.35	K474 3.15
12x14		K485 2.97	K475 3.98
12x17		K460 2.58	K470 3.90

**RUBBER COMPOUND PANELS**  
Made of a special compound having a rubber base. Good in appearance and in all essential points to any other class of panels. Fine smooth polished finish. Can be drilled or cut without chipping. Guaranteed not to warp and to be a perfect insulator for radio use. Smooth, clean edges. Thickness 3/16 inch.

Black Art. No. Price	Size (Inches)	Mahogany Art. No. Price
K481 \$ .80	7x10	K493 \$ .75
K482 .77	7x12	K494 .92
K483 .89	7x14	K495 1.09
K484 1.19	7x18	K496 1.34
K486 1.32	7x21	K497 1.58
K488 1.50	7x24	K498 1.78

**COMPOSITION DIALS**  
Handsome dials moulded in one piece of polished composition. 2 inch size has 100 line scale marked 0 to 100 line engraved in contrasting white enamel. 3 and 4 inch size have 180° scale marked 0 to 180.

Black Art. No. Price	Diam.	Shaft Size	Mahogany Art. No. Price
K921 16c	2"	3/16	K926 16c
K922 16c	2 1/2"	1/4	K927 16c
K923 22c	3"	3/16	K928 20c
K924 22c	3"	1/4	K929 20c
K925 27c	4"	1/4	K930 32c

**GENUINE BAKELITE DIALS**  
K931 2 in. Diam. for 3-16 in. shaft 35c  
K932 2 in. Diam. for 1/4 in. shaft 35c  
K933 3 in. Diam. for 3-16 in. shaft 39c  
K934 3 in. Diam. for 1/4 in. shaft 39c  
K935 4 in. Diam. for 1/4 in. shaft 48c  
Moulded in one piece of genuine bakelite in polished black finish. Finely engraved scale in contrasting white enamel. Sure grip knob that fits the fingers. Higher grade dials for good sets. Match perfectly.

**VERNIER DIAL ADJUSTER**  
K941 Each ..... 14c  
Easily installed at edge of dial, gives finest vernier adjustment of condenser or inductance. A great value. Polished black knob.

**SUPERIOR VERNIER ADJUSTER**  
K942 Each .....  
Polished black knob. "Vernier" engraved in white. Spring adjustment. Need not be disassembled for mounting. Easily installed.

**UNIVERSAL CONTROL DIAL**  
K918 For 3/16 in. shaft, silver dial, black knob ..... \$1.10  
K919 For 1/4 in. shaft, silver dial, black knob ..... \$1.10  
K916 Gold dial, mahogany knob for 1/4 in. shaft. Each. \$1.29  
Replaces ordinary knob or dial. Gives perfect vernier control on condenser, variometer, varicap, tictler, etc. Positive easy action. Looks like silver. Easily installed. Especially desirable in tuning neodyne sets.

**ACCURATONE CONTROL DIAL**  
K914 Checkwork \$3.20  
K915 Controlclock ..... 3.20  
Has four inch silver finished dial with black knob. 30 to 1 ratio give finest tuning adjustment.

**BEZELS**  
Finest quality. Fit any thickness panel.

Size (In.)	Nickel No. Price	Black No. Price	Gold No. Price
1/2	K904 15c	K907 16c	K910 28c
3/4	K905 15c	K908 16c	K911 28c
1	K906 15c	K909 16c	K912 28c

**PANEL ENGRAVINGS**  
K937 Per set ..... 19c  
A complete set of transfers in neat white lettering for marking connections, dials, etc. Easily applied in a few seconds. Look like real machine engravings, contrasts neatly on black or mahogany panels. Plenty of titles for the largest set.

## Super-fine Radio Parts

### ALL-AMERICAN

All-American products are known the world over for their high quality. Every item is fully guaranteed to give satisfactory service.

**AUDIO FREQUENCY TYPE**

- K626 Super Het. Oscillator Coupler .....\$5.00
- K627 Input transformer .....\$3.40
- K628 Universal Coupler. For use in reflex and other circuits .....\$3.60
- K531 10 to 1. Each .....\$4.25
- K532 5 to 1. Each .....\$4.25
- K533 3 to 1. Each .....\$4.05
- K534 Push Pull Pair .....\$10.80
- K535 Intermediate frequency transformer for super heterodyne circuits .....\$5.40
- Rauland Lyric. A transformer designed to reproduce music and voice with all its original purity of tone. K535 Ea. \$8.10
- K629 Shortwave R. F. transformer, range 250 to 550 meters. For 201A tubes \$4.50  
K630 For 199 tubes only \$4.50

**HOWARD RHEOSTATS**  
A well known line of rheostats and potentiometers that is giving very satisfactory service to its users. Complete with knob and pointer.

- K211 Plain 85c 6ohm K212 Vernier \$1.25
- K213 Plain 85c 25ohm K214 Vernier 1.25
- K215 Plain 85c 40ohm K216 Vernier 1.25
- K218 400 ohm Potentiometer ..... 1.69

Single Hole Mounting Type with Dial  
K350 Plain 85c 6ohm K351 Vernier 1.25  
K352 Plain 85c 25ohm K353 Vernier 1.25  
K354 Plain 85c 40ohm K355 Vernier 1.25  
K357 400 ohm Potentiometer ..... 1.69

**BRADLEYSTAT AND BRADLEYMETER**  
K208 Bradleystat. Each. \$1.74  
Latest improved type. Can be used with all types of tubes.

Bradleymeter  
K209 200 ohm. Each. \$1.89  
K210 400 ohm. Each. 2.89

**ACME POT-RHEO.**  
A rheostat and potentiometer combined in one unit. Does the work of two separate instruments. 300 ohm potentiometer.  
K237 With 6 ohm rheostat. ....\$2.69  
K238 With 30 ohm rheostat. .... 2.69

**AMPERITES**  
Eliminates rheostats on amplifier tubes where adjustment is not critical. Automatically adjust resistance according to flow of current, keeping tubes at proper point for maximum efficiency. Complete with mounting.  
K221 For UV201A or 301A tubes. 95c  
K222 For UV200 or C300 tubes. 85c  
K223 For UV199 or C299 tubes. 95c  
K224 For WD11 or C11 tubes. 95c

- K599 Erla Selectorformer. ....\$4.45
- K740 Erla Crystal Detector. .... .89

**OTHER STANDARD BRAND AUDIO FREQUENCY TRANSFORMERS**  
Fresh Clean Stock in Original Containers.

- K587 Thordarson Ratio 3 1/2 to 1 .....\$3.33
- K588 Thordarson Ratio 6 to 1 ..... 3.70
- K589 Thordarson Ratio 2 to 1 ..... 3.95
- K590 Thordarson Push Pull. Pair. 11.20
- K591 Erla 6 to 1 ..... 3.95
- K592 Erla 3 to 1 ..... 4.05
- K598 Erla 3 1/2 to 1 ..... 3.80
- K591 Modern 10 to 1. Each. 4.50
- K592 Modern Push Pull. Pair. 9.90
- K595 Federal No. 228. Each. 4.45
- K556 Federal No. 65. Each. 6.35
- K712 Radio Corp. Each. .... 5.70

**STANDARD BRAND RADIO FREQUENCY TRANSFORMERS**

- K562 Dubbler Duratron. ....\$3.45
- K565 Acme R2 ..... 3.95
- K566 Acme R3 ..... 3.95
- K567 Acme R4 ..... 3.95
- K568 Erla Reflex No. 1 ..... 4.45
- K579 Erla Reflex No. 2 ..... 4.45

**RESISTANCE COUPLED AMPLIFICATION**  
K570 1st Stage Unit \$2.30  
K571 2nd Stage Unit 2.30  
K572 3rd Stage Unit 2.30  
Amplifies audio frequency. Replaces audio frequency transformers using same circuit. Each unit consists of a mounting with condenser, grid leak and resistance of proper value for best results.

**INSULATED BUS BAR WIRE**  
K959 Package of 5 30-inch pieces. 49c  
Tinned copper bus wire insulated with highest grade varnished covering, 3 pieces, one each color—yellow, brown, black, green and red. Using different colors makes tracing of circuits easy and sure, neater and lower cost.

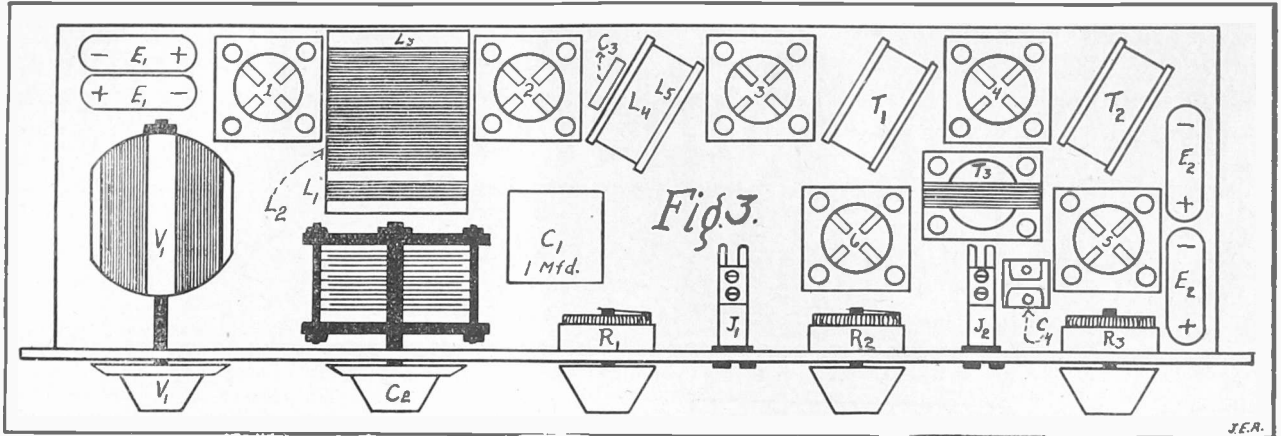
**SCREW ASSORTMENT**  
K960 100 pieces screws and nuts. ....39c  
Contains screws and nuts of size and style needed for assembling any radio set.

*The Barawik Co.*  
102 So. Canal St. Chicago, Ill.





# Parts for Super-Heterodyne



THE instrument layout for the 6-tube Super-Heterodyne. Note the angle of the coupling transformers. This reduces stray intercoupling currents to a minimum.

that can be purchased if good quality is to be expected. Of course, almost any transformer sold as audio frequency transformer will give loud volume if that is the only thing desired.

C1 is a large by-pass condenser across the plate battery to prevent the high and intermediate frequency currents from going through the battery. This is mainly to reduce undesired coupling between the different portions of the receiver. The value of this condenser should be about one microfarad. C2 is the oscillator condenser, the main tuning element. It should have a capacity at a maximum setting of .0005 mfd. A vernier attachment to this condenser is desirable but not essential. C4 is another by-pass condenser across the primary of the audio frequency transformer and across the plate battery. It may be either a .001 or a .002 mica condenser.

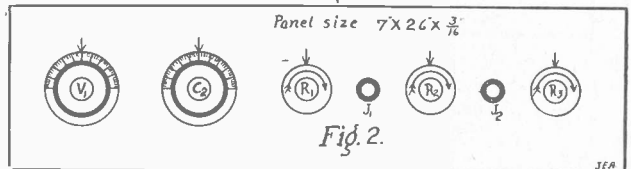
There are three rheostats used in the circuit. The first, R1, is used for the two high-frequency tubes; the second, R2, is used for the intermediate frequency tubes, and the third, R3, is used for the audio-frequency amplifier tube. The resistance of these rheostats depends on the type of tubes used. For 201A and similar tubes R1 and R2 may be 10-ohm instruments and R3 a 20-ohm. For 199 the first two should be 20-ohm rheostats and the last 30. Tubes of the 12-type should take 10-ohm rheostats for R1 and R2 and a 6-ohm for R3. These resistances are based on the assumption that the usual filament voltages will be employed. If higher voltages are used the resistances must be higher.

The plate voltage on all the tubes except the audio-frequency amplifier should be about 60. On the audio amplifier a voltage of as high as 120 may be used to advantage. If only headphones are to be used it is not necessary to use more than 60 volts on the audio tube.

### Negative Bias Used

In both the detectors A2 and A5 the negative grid bias method of detection is used. The negative bias is provided by the two grid batteries E1 and E2. Each of these is a 9-volt battery, two 4.5-volt units. These batteries also provide the negative bias for the amplifier tubes and the oscillator. The grid bias on the two detectors is 9 volts. The bias on the audio frequency amplifier when the plate voltage is 120 volts is also 9 volts. The grid bias on the remaining tubes is 4.5 volts when the plate voltage is 60 volts. If the plate voltage on the audio frequency amplifier is reduced to 60, the grid bias on this tube should be reduced to 4.5 volts. The first grid bias battery E1 is used for the oscillator, the first detector, and the two intermediate frequency amplifiers, while the second, E2, is used for the second detector and the audio frequency amplifier. A single

Fig. 3.



THE panel. Two controls, three rheostats and two jacks are the only instruments mounted on the panel.

grid bias battery may be used for all the tubes, but two are used to shorten the grid leads and to reduce undesired coupling between different portions of the circuit.

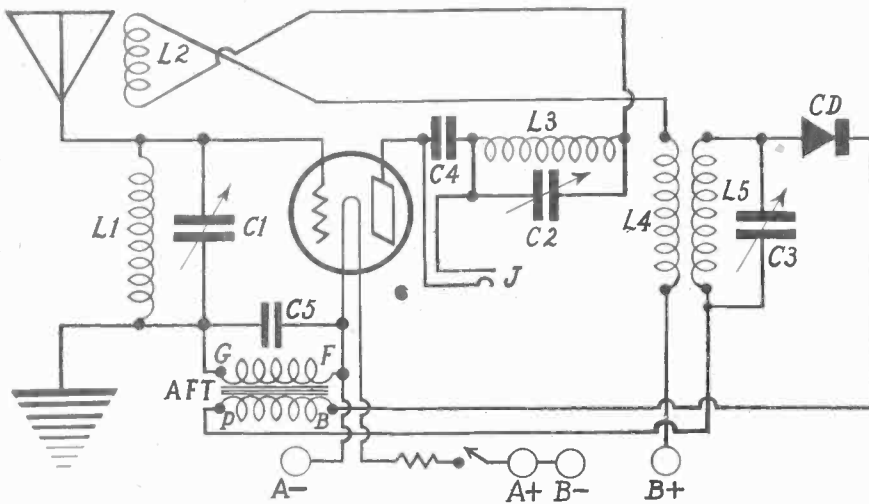
A double-circuit jack J1 is provided in the output of the second detector so that the headset may be plugged in there, and a single-circuit jack, J2, is for headset or the loud speaker operation.

### LIST OF PARTS

- One variometer, V1.
- Three coils, L1, L2, L3, as described.
- One variable air condenser, vernier attachment, .0005 mfd., C2.
- One large fixed mica condenser, 1 mfd., C1.
- One filter condenser, .004 mfd., C3.
- One by-pass condenser, .001 or .002 mfd., C4.
- Two fixed condensers, .0001 mfd. (C5, C6).
- One filter transformer, L4, L5, as described.
- Two intermediate frequency transformers, T1, T2.
- One audio-frequency transformer, ratio about 4-to-1, T3.
- One double-circuit jack, J1.
- One single-circuit jack, J2.
- Three rheostats, value as stated, R1, R2, R3.
- Four 4.5-volt flashlight dry cell batteries, E1 and E2.
- Six binding posts.
- Two 3" dials.
- One panel about 7x24x3-16".
- One cabinet.
- One baseboard about 7x22.5x3/4"
- Six tube sockets, preferably standard.
- Six vacuum tubes, preferably 201A or the like.
- One 6-volt storage battery, 80 to 90 ampere-hours.
- One plate battery, 120 volts.
- One headset and a loud speaker.
- Double plug for headset and loud speaker.
- An open circuit antenna and a good ground connection.

## Audio Transformers Limited to Two

IT is not practical to use more than two audio amplifiers. Manufactured sets are limited to two stages of audio amplification. Extraneous noises and circuit howls are amplified by audio frequency amplification; thus interference and distortion are created if three or more stages are used. Make every wire as short as possible and run wires at right angles rather than parallel. Use an .001 mfd. fixed condenser across the primary of the first amplifying transformer. An exception is a crystal detecting set.



**THE BERNARD REFLEXED SUPERDYNE** (Fig. 1), which employs a stage of non-radiating regenerative radio-frequency amplification, crystal detector and a reflexed audio stage. The windings of all coils are in the same direction, but the manner of connecting them is vital. L1L2 is a home-made coil, L3 and L5 are duolateral coils and L4 is a home-made primary inserted in L5. For simplicity's sake the wiring is shown conventionally, with the aerial on top and the ground on bottom, although the aerial, which goes to stator of C1 and to grid, is actually connected to the bottom of L1 and the ground to the top of L1, as clearly set forth in Fig. 4. C5 is a fixed by-pass condenser, .001 mfd., and C4 is a blocking condenser of the same capacity. The major tuning is done with C1. Then C2 and C3 are brought into resonance successively.

*By Herman Bernard*

**O**FTEN a circuit using a crystal as detector really picks up signals from greater distances than one would normally expect, but the signals cannot be heard because the rectified current is not strong enough to actuate the earphones. If a circuit is used that produces excellent tone quality, and considerable ear-phone volume as well, the range is nevertheless increased by the addition of a stage of audio-frequency amplification. The volume will not be too strong to be comfortable when earphones are used, yet the signals will be made much louder, say ten times as loud as formerly, and the rich, clear tones of the detector suffer no diminution of quality, but will be rounded out and thoroughly enjoyable. This is accomplished in the present circuit, which is a stage of superdyne radio-frequency amplification, crystal detector and a stage of audio reflexed in the radio-frequency tube. This load is not a bit too heavy for the tube to carry, although RF, regeneration and AF are the duties that it is called upon to perform. The regeneration is such that the oscillations are suppressed. Oscillation does occur, indeed, but it is not permitted to get into the antenna, hence there is no radiation.

**Tuning Controls**

The plate coil, L<sup>1</sup>, is tuned by the variable condenser, C<sup>1</sup>, and normally this would be merely regeneration control, or, as

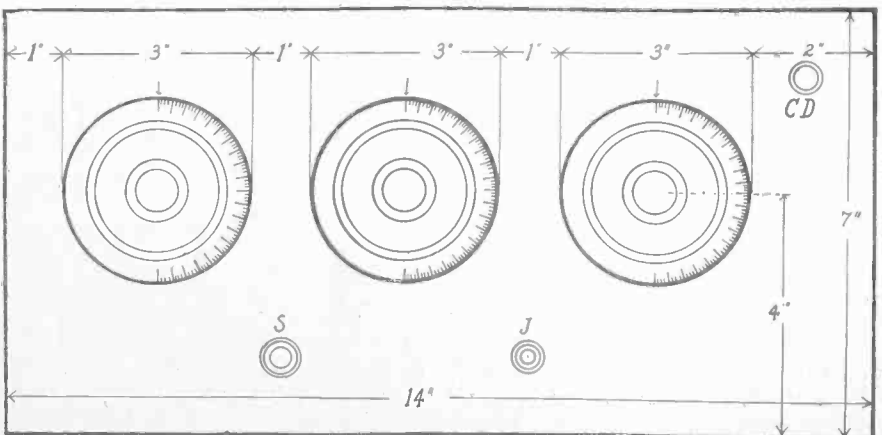
sometimes called, volume control. While this tuned circuit does control volume, it is almost as much of a wavelength tuner as C<sup>1</sup> is across L<sup>1</sup>. This is caused in part by the fact that L<sup>3</sup> is inductively coupled to the aerial coil, L<sup>1</sup>. This coupling is fixed, wherein it differs from the standard superdyne, which uses a tickler here.

Three controls are used in the present circuit, for in that way fine selectivity is obtained. The range is thus increased, for without selectivity there is no chance

in the world of getting any consistent DX reception, or possibly any DX at all. While this circuit is essentially one for quality it should be able to reach out about 300 miles quite consistently, if the receiver is used elsewhere than in a large city. In areas where the ether is congested, as in New York and Chicago, it is virtually impossible to tune through the locals for DX with this set. Under any circumstances, one should not build the set with the idea that he will get great distance, but may be assured of getting all locals with a quality of received signal second to none produced today. The selectivity is sufficient to tune out any local to receive any other local, unless one lives within three miles or less of two powerful broadcasting stations. All stations are considered locals that are not more than 100 miles away.

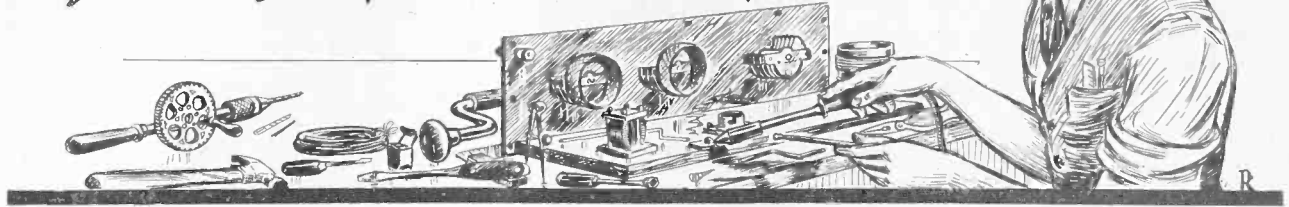
L<sup>1</sup> is a home-made coil, the two other coils being duolateral. The two other coils visible in the assembly plan (Fig. 3) are duolateral or honeycomb coils. One of these has a home-made primary inserted inside. Duolateral coils are recommended, but if home-made coils are to be used throughout, L<sup>3</sup> may be 32 turns of No. 22 double cotton-covered wire on a 3 1/2" diameter tubing at least 3" high, and L<sup>4</sup> L<sup>5</sup> may be wound on another tubing of the same diameter, with the same kind of wire, L<sup>4</sup> being fifteen turns and L<sup>5</sup> 48 turns, with 1/4" spacing between the two coils. All windings on all coils are in the same direction.

There are three controls in this circuit, but the tuning is simple. C<sup>1</sup> and C<sup>2</sup> tune sharply, but not critically, while C<sup>3</sup> tunes broadly, and is rotated until the signal comes in with greatest volume. Often the signal will be heard, no matter what the setting of C<sup>3</sup> may be, but for full utility of the splendid volume in the tube C<sup>3</sup> must be at just the right setting, with



**FIG. 2, panel layout** for the Bernard Reflexed Superdyne. The measurements are for a 7x14" panel. S is the switch and J the jack. CD is the adjustable crystal detector. A fixed crystal may be used but the catwhisker or other adjustable type is usually much better. The dials are 3",

# Wiring Bernard's Set For Fine Volume



a latitude of one degree or possibly two degrees of the dial. On the low waves the tuning with C, which governs the detector circuit, may be much sharper.

### No Tuning in by Whistle

This set behaves wonderfully on the low waves. Even there the station is tuned in by the voice or music and not by the whistle. There will be no whistle if the set is properly constructed and the coupling between L<sup>1</sup> and L<sup>2</sup> at the right spacing. Just what this will be you must determine for yourself, for such things as the internal capacities of the tube, which will vary as among different makes and even among tubes of the same make, play an important part.

The process of neutralizing the set, for this is what the suppression of oscillations amounts to in the circuit, should be made successful on the low waves, for then the assurance exists that there will be no trouble on the high waves. The adjustment is very simple. Whistles may occur in tuning in a station, in the beginning of your experience with this set, but reducing the L<sup>1</sup> L<sup>2</sup> coupling will get them out, if the leads are properly connected. (Fig. 4.)

A fixed resistance is shown in Fig. 1, but a rheostat may be used instead, and the switch then omitted. If a 11 or 12 type tube is used the set will work wonderfully even if there is no resistance, simply a switch being used to turn the tube on and off. As the brilliancy of the tube affects the regeneration, the L<sup>1</sup> L<sup>2</sup> coupling in this case should be adjusted so that there are no whistles in the set when the tube is on full. The spacing between these two coils will usually be 1" or 1½", although as much as 3" has worked and as little as ¼" has been used under certain conditions with success. This is no problem, because if L<sup>2</sup> may be shifted from tighter to looser coupling right on the tubing, which may be cardboard. A few turns are worked in the desired direction, then succeeding stages of turns.

### Winding the Coils

L<sup>1</sup> L<sup>2</sup> are wound on a 3½" diameter cardboard or bakelite or glass tubing. L<sup>1</sup>, the aerial coil, consists of 32 turns of No. 22 double cotton-covered wire. Terminate. An arbitrary space of 1½" is left, then L<sup>2</sup> is wound. This consists of 22 turns of the same wire wound in the same direction as L<sup>1</sup> was wound.

L<sup>3</sup> is a duolateral coil. I always use a 75-turn coil and removed as many turns as are necessary to have a high-wave station, like WEAf, tune with maximum volume at the same dial setting as for C. Thus the set may be logged easily, and almost in step. Usually a 50-turn duolateral coil will be too small an inductance with a .0005 mfd. variable condenser. About 60 turns usually works well. For

L<sup>3</sup> a 75-turn duolateral or honeycomb coil is used, twelve turns being removed. Be sure to tie a string around the winding when removing turns, because otherwise, with the sealing wax off, there will be little binder left, and the winding may spring off more than you desire. Putting it back in the right way is next to impossible for you. The turns are pulled off under the tie-string and finally sealing wax is sparingly applied to keep the terminal in place. Inside this reduced duolateral coil is placed the primary, L<sup>4</sup>, which may be wound from the excess wire taken from the 75-turn coil. The diameter of the primary form should be 1¾", so that the primary will fit inside the secondary. A small vaseline bottle may be used, five or six thin strips of adhesive tape being placed the length of

shown in Fig 2 should be followed. This size panel is a compromise to appease those who do not like large-sized sets, but it is better, though not vital, to use a 7x18" panel. The extra space would be taken up between the variable condensers.

### The Assembly

The disposition of parts (Fig. 3) for a 6½x13" baseboard leaves enough room to place the parts correctly for a 7x14" panel. The duolateral coils may be mounted on the backs of the condensers with bus bar, but should not be closer than 1½" to any condenser plates. It is often possible to mount a duolateral or honeycomb coil atop the condenser, depending on the type of condenser used. The bus bar is brought upright and bent so that it has a spring effect and keeps the coil firm

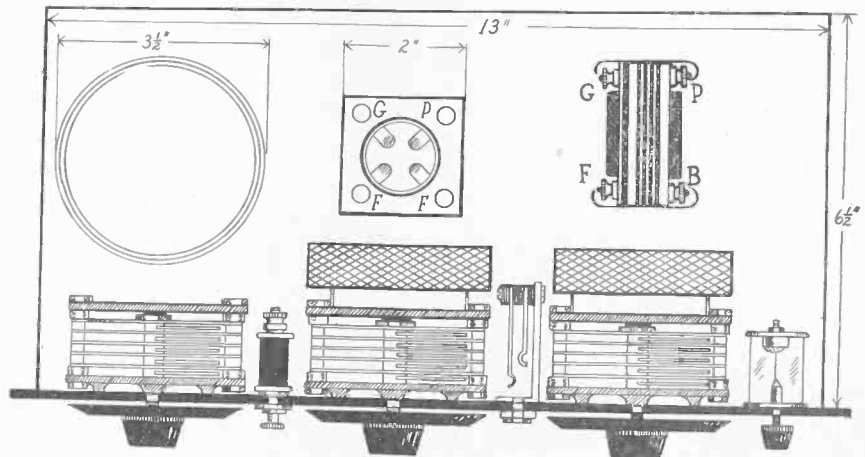


FIG. 3, assembly plan for the Bernard Reflexed Superdyne. The cylinder on which L1L2 are wound is shown at left, rear. The three condensers, left to right, are C1, C2 and C3, respectively. The duolateral coils are mounted on the back of the condensers, but should be at least 1½" away from any plates of the condensers. In some instances it is possible to mount these two coils atop the condensers and it is preferable in that case to have them at right angles. In any case, mount the AFT at right angles to the coil at extreme right.

the bottle with sticky side up. When the winding is completed, about 20 turns, the tape is turned back on the winding and allowed to overlap about ½". The tape is pressed firmly. Then the coil is slipped off the bottle and placed inside the other coil, twine or linen thread being used to keep it in place. The tie-string should be in five or six lengths and each length wound twice around the joint coils at right angles to the direction of the wire winding. In other words, the tie-string goes across the winding of the top or duolateral coil, which is the secondary, then is passed around the side or thickness of the winding and is brought through the inside of the home-made coil to the starting point. Once around again, then tie a knot and cut off the excess string.

If a 7x14" panel is used the dimensions

when the connections are soldered. Then it is easy to move the socket forward and place the AF transformer behind the socket, rather than behind the RFT, as shown. Personal preference will determine many of these points, but in any case keep the coils as far as possible from one another and from the condensers. The right-angle placement of the AFT (Fig. 3) should effectively prevent harmful interplay of currents between radio and audio stages.

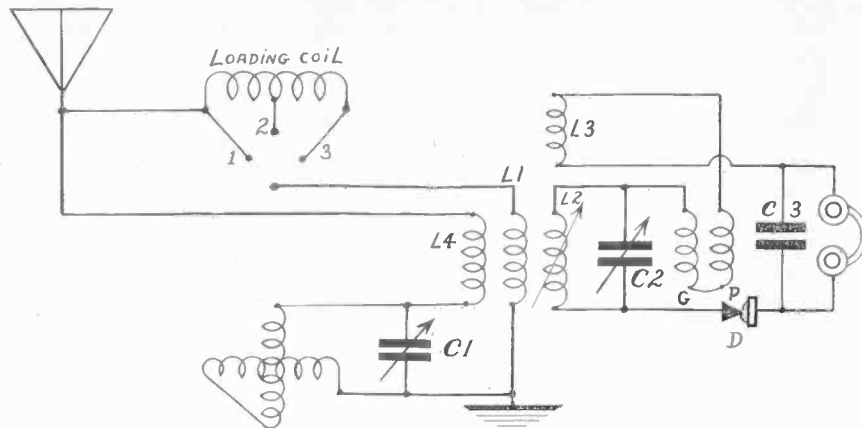
### Wiring Directions

Connect the aerial to the very bottom of the coil L<sup>1</sup> and the ground to the top of this winding. This relationship is not emphasized in Fig. 1, as to do so would greatly complicate the appearance of the circuit network, but it is shown plainly

(Continued on page 32)



# My Crystal Set That Gets DX



A CRYSTAL CIRCUIT that is selective and gets DX! It has four controls, but every one is a big help. Distances up to 1,000 miles have been reported on this set, and 300 to 400 miles average range. It puts many a tube set to shame, says the author. For the loading coil wind 40 feet of wire on a tube 3" in diameter. Tap it at the end of 20 feet. L1 is 25 turns wound on a 4" tubing; L2, 60 turns on a 3" diameter; L3, 30 turns on a 4" tubing. Mount L1 and L3 about 1" apart. L4 is 30 turns wound on a 3" tubing. GP are two 25-turn honeycomb coils.

By G. N. Barkett

MOST writers apparently think a crystal set is merely a toy for the kids. Many persons do not feel financially able to maintain a good tube set. On reading your reply (Page 15, November 8, RADIO WORLD), in which you inform Mr. Day, of Newark, Cal., that 30 miles is a very good distance for a crystal set, I wish you would try my set yourself. Maybe my location is unusually good, but another set made accordingly is doing fine work, and tube sets here do not seem to be getting any better results than elsewhere. I had no trouble getting three to four hundred miles, and fairly regularly picking up Fort Worth, Dallas (620 miles) and WGY (975 miles) with the set I was using then, and this one seems better.

In all crystal hookups I tried previously

I have been unable to tune out WOC, Davenport, 100 miles away, without loss of volume to such an extent that other stations were not loud enough to enjoy, but with this hookup I can accomplish the desired purpose.

All coils are low-loss basket-weave, with the exception of coils G-F, which are 25-turn honeycomb. Other forms will do, but honeycomb is best.

L1, primary has 25 turns on a 4-inch diameter tubing, L3 is 30 turns, same size, L2 is 60 turns on 3-inch diameter. L1 and L3 are mounted about 1 inch apart (test for best setting) by taking a length of insulated wire, bending it at right angles, running it through a hole in coil form and bending the other end into a loop, screwing to the baseboard. Each coil preferably is on a separate mounting. Tie a small block of insulating material or dry wood to one side

of secondary and fasten shaft to it. Use panel for front bearing and directly opposite tie another block with a hole nearly through it, into which a stiff wire from baseboard is inserted for the back bearing. Coils G-P are both 25-turn HC tied together so that both coils are wound in the same direction and mounted at a right angle 3 or 4 inches from other coils. Connect aerial through loading coil to start of primary to ground. From start of L2 to start of GP, finish of GP to start of tickler or L3, remaining two terminals to detector and phones.

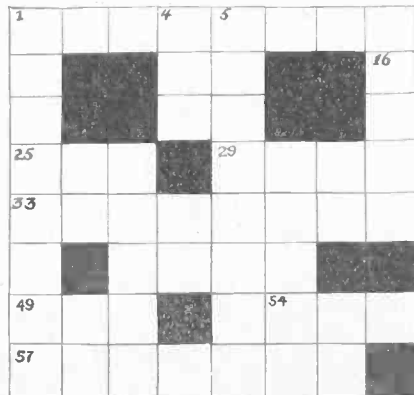
The loading coil length should be determined by test. With my aerial, 37 ft. high, copper ribbon 114 ft. long between insulators, I use 40 ft. of No. 20 wire tapped in middle. Tap No. 1 brings stations in up to about 250 to 370; tap No. 2 to about 450, and tap No. 3 takes care of the higher waves. If this part of circuit is tried another variable condenser .00025 should be shunted around the detector and phones in addition to the fixed phone condenser to make a good selective circuit that can be logged. A variometer may be used in place of coils G-P if set in same position as these coils.

Wind another 30-turn coil on 4-inch diameter tubing and mount it about 1 3/4 inches from primary L1 in same manner, so that it is wound in same direction as other coils. Try this beside primary and also beside tickler L3. Leave it where it works best. Wire this, direct from aerial, not through loading coil, to the start of L4, to variometer, from variometer to ground, with a .00025 variable condenser C1 shunted across terminals of variometer.

We now have a 4-control, selective set, with plenty of volume. It will get DX and can be logged, although it may be necessary at times to make a slight change from log settings.

CRYSTALS successfully used as Oscillators and Amplifiers for the First Time. A two-part article, with diagrams of six hook-ups in Radio World, issues of Aug. 9 and 16. Send 30 cents. Radio World, 1493 Broadway, New York City.

# The Radio Cross-Word Puzzle



CROSS-WORD PUZZLE NO. 2

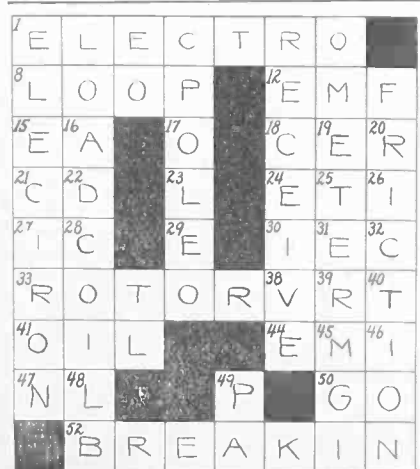
Horizontal

1. Used for high voltage on the plate.
25. Center of a spider-web form.
29. Knockdown apparatus to build a set.
33. To safeguard from short-circuit.
43. Device in which composition for moulded parts is treated.
49. A tradesman whose only object is to fleece customers.
54. The alternative of a dash in code.
57. Devices for accommodating tubes.

Vertical

1. Circular safeguards.
4. Coating used on busbar.
5. Rotatable feedback coil.
16. A detector and amplifier.

Send your solution to Radio Cross-Word Puzzle Editor, RADIO WORLD, 1493 Broadway, New York City. The names of those sending the correct solution will be published. Refer to Radio Cross-Word Puzzle No. 2.



SOLUTION OF RADIO CROSS-WORD PUZZLE NO. 1

Horizontal

- |           |             |
|-----------|-------------|
| 1—electro | 28—C        |
| 8—loop    | 29—E        |
| 12—EMF    | 30—I        |
| 15—E      | 31—E        |
| 16—A      | 32—C        |
| 17—O      | 33—Rotor    |
| 18—C      | 38—V        |
| 19—E      | 39—R        |
| 20—R      | 40—T        |
| 21—C      | 41—eil.     |
| 22—D      | 46—I        |
| 23—L      | 47—N        |
| 24—E      | 48—L        |
| 25—T      | 49—P        |
| 26—I      | 50—Go.      |
| 27—T      | 52—Breakin. |

Vertical

- |             |             |
|-------------|-------------|
| 1—electron  | 13—meter    |
| 2—loadcoil. | 14—Friction |
| 3—E         | 45—W        |
| 6—receive.  | 51—B        |

The solution is shown also in the diagram at left.

# White's D-Excellent 2-Tube Set

## The Circuit That Makes One Equal Two

[Charles H. M. White, by profession a consulting engineer, whose sound advice is eagerly sought by important radio manufacturers, is well known to RADIO WORLD readers through his authoritative constructional contributions. When nearly all technicians were decrying the possibility of combining radio-frequency amplification with regeneration, Mr. White was setting the pace by successfully combining these two DX Media. A graduate in electrical engineering, University of Pennsylvania, and former instructor in that subject in the Massachusetts Institute of Technology, Mr. White, conservative in every move, knew full well what he was doing. Now he offers for the delight of DX fans a 2-tube circuit that uses a stage of RF ahead of a regenerative detector, and that is equal to the usual three tubes of the Neurodyne RF detector circuit. "This is a real wonder for distance," said Mr. White, and this characterization was fully corroborated in the RADIO WORLD laboratory, where this set brought in greater DX than any other 2-tube set.]

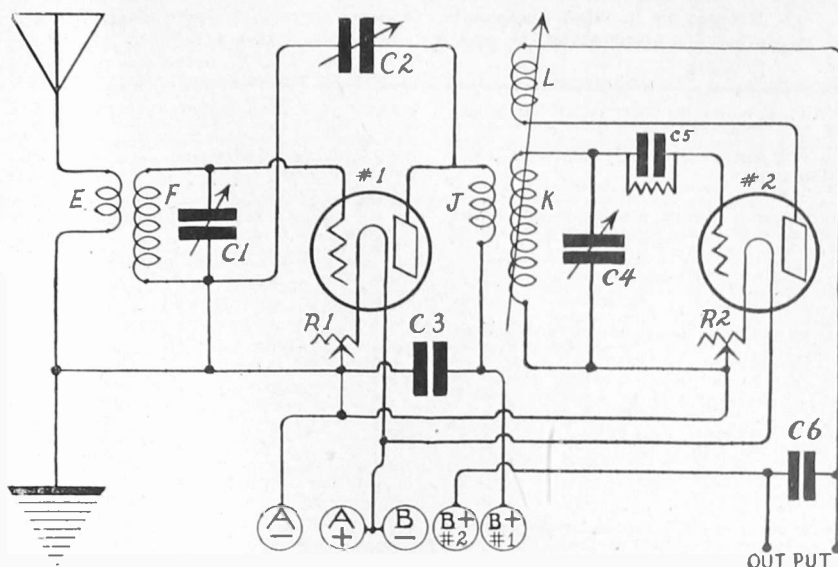
By Charles H. M. White

Consulting Engineer

THE tuned radio-frequency method of amplification indeed received impetus by the gigantic popularity of the neurodyne receiver. The advent of this receiver immediately set into action numerous experimenters who have endeavored either to simplify the Neurodyne or make a better type of tuned radio-frequency circuit. Whether they have as a whole succeeded will be proven this winter when the radio fans in general will try out all the available types and popularly decide. But it must be remembered that the Neurodyne has two stages of tuned RF, while many of the simplified forms have only a single stage of tuned RF. Yet it is possible to get equally good results in most cases with one stage as with two. This is, of course, no serious reflection on the use of two stages, but the fact is apparent that in many of the two-stage combinations the maximum efficiency per tube is not obtained from the two tubes so used, while the one-stage outfits are more compact, therefore have less wiring losses, and are generally more carefully designed to get the maximum amplification per tube. In planning this circuit I tried to so design it that standard parts and apparatus could be used throughout. Only one coil is wound at home. The rest of the circuit is made of standard parts.

### Making One Equal Two

To make a single stage of radio-frequency amplification rival two stages of ordinary radio-frequency amplification care must be taken to see that the losses are kept low and that very good soldering and general assembly wiring is done. The condensers C1 and C4 are .0005 mfd. capacity variable condensers of the low-loss type, which not only conserve the signal energy but also greatly increases sharpness in tuning. The tuning coils are wound with Litz wire to keep the radio-frequency resistance of the circuit as low as possible. The condenser C2 is a midget (Cheten) or 3-plate vernier neutralizing condenser that is used to prevent oscillation of the tube No. 1. This condenser is so adjusted that the tube is kept right on the point of oscillation and therefore acts at its maximum amplifying efficiency. It is possible to balance this single tube more closely than two RF tubes, such as used in the Neurodyne. The condenser C3 is a .5 mfd. by-pass condenser for the plate batteries. The condenser C6 is a .002 mfd. mica fixed condenser, while C5 is a



A REAL DX CIRCUIT. The set as is a wonder for distance and tone clarity. With two stages of audio-frequency amplification added to the output it is all that the heart of a radio enthusiast could desire for speaker operation. It has three tuning controls, but they are very easily managed, as the set is capable of being logged. Low-loss instruments are used. The primary E is semi-apertic. This circuit separates stations very successfully. C2 is a balancing midget condenser, which has a neutralizing effect. This is the circuit Charles H. M. White, noted expert, says is "a real wonder."

.00025 mfd. grid condenser. The units R are automatic self-adjusting rheostats (Amperite), which assure the correct filament current for the tubes as well as simplify the wiring, thereby cutting down the losses. A variable grid leak H will be found essential to get the maximum sensitivity from the detector tube (No. 2).

### What Coils Are Used

Now as to the coils: The unit EF is wound at home on a 3-inch diameter bakelite tubing  $3\frac{1}{2}$  or 4 inches long. The coil F is first wound on the tube with genuine Litz wire, 55 turns in all. Then the coil E is wound with the same type of wire right over the middle of F and has 6 turns of wire in all. It will be found convenient to separate E and F by a little strip of white paper of heavy thickness. The unit JKL is a standard Litz wire tuning element (such as the Bruno or Uncle Sam tuning coils). The coils J and K are wound on the stator, and L is wound on the rotor. In the commercial form these coils are wound with Litz wire of different colors. The coil J is the coil having only a few turns of wire, while K is the stator coils having the larger number of turns of wire. If upon first trial regeneration or oscillation is not obtainable in the detector circuit then reverse the terminal connections to the tickler feedback coil L. In the actual assembly the axis of the units EF and JKL should be placed at right angles to prevent serious inter-coupling.

### Tubes and Batteries

A great deal of the success of any radio-frequency circuit depends upon the tubes and batteries. A steady A and B battery voltage is essential to quiet operation. If you use dry cell tubes do not neglect to purchase an ammeter for testing the dry cell A batteries and a voltmeter of suitable voltage reading to measure the B batteries. A dry cell of the No. 6 size that does not test at least 10 amperes on immediate short circuit is not good for radio use, and a 22.5 volt B battery reading below 18 volts and a 45 volt block reading below 35 volts are likely to be extremely noisy. Storage A and B batteries are the most economical to use if an audio-frequency amplifier is used.

Employ the maximum B battery voltage recommended for tube No. 1, while No. 2 should be operated at the best voltage for detection, which is generally 22.5 to 45 volts. Use 199 or 201A tubes only in this receiver, giving preference to the 201A if storage battery operation is to be employed.

### What the Set Can Do

This receiver offers extreme selectivity and sensitivity and yet there are only three major controls: the condenser C1 and C4, and the coupling of the coil L. As low-loss apparatus is used, great care must be exercised to pick low-loss sockets. It is regrettable that even in many high-grade manufactured radio receivers the quality of the socket contacts are always overlooked. A loose contact not only means decrease in signal strength, but a multitude of mysterious noises similar to static. Be sure to keep the losses low by purchasing the best possible socket design. Build this receiver right and you will have something to be very proud of, especially when it comes to pulling in the distant stations with pep and punch on a loudspeaker when two stages of AF are added.

## Weather Reports Planned Exclusively by Radio

WASHINGTON.

RADIO may be used exclusively for the dissemination of weather reports, if present plans of the Department of Agriculture are carried out. In the Department of Agriculture Year Book for the preceding year it is stated that arrangements are under consideration for a definite form of organization which will replace the telegraphing of forecast messages now sent to centers for distribution.

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# The Radio University

A Question and Answer Department conducted by RADIO WORLD for its Readers by its Staff of Experts. Address Letters to Radio University Department, RADIO WORLD, 1493 Broadway, New York City.

WHAT is meant by "dead ends?" How may they be eliminated? Kindly give me a circuit showing how this is accomplished with a variocoupler.—Chas. J. Mulligan, 680 Ridge Blvd., Brooklyn, N. Y.

Dead end is the unused portion of a coil. It causes a loss in the circuit because part of the high-frequency currents are distributed through the "dead end" of the coil. This may be averted by sending the dead end current back in the aerial circuit. In Fig. 61 "A" shows a dead end not utilized. "B" shows, schematically, how the stray currents are returned to the circuit. "C" is the switch properly in circuit.

IN REFERENCE to the Hirsch Quality Reflex in the issue of Oct. 25: I get locals loud and clear and some DX, but DX comes in very weak and foggy. It makes no difference whether the crystal is on or off contact.—Joe Turner, 2946 N. Carnac St., N. Philadelphia, Pa.

Your set is not reflexing. Either battery polarity is wrong, you have a bad crystal, the set is not hooked up correctly or the wrong capacity condensers are being used. Try placing a .00025 mfd. fixed condenser across the crystal detector.

HOW can I rewind a standard variocoupler for a 3-circuit tuner?—Walter J. Jones.

Wind 40 turns on the stator for the primary, 35 on the rotor for the secondary. Over the primary winding wind 10 turns. All wire No. 22 DCC.

I CAN receive only local stations on the Reinartz that I built according to direction given on page 13 of the issue of Nov. 22. I have the best of everything.—W. E. Ward, 60 Madison Ave., Jersey City, N. J.

See that all your tubes are all right. Test them in another set. Use a 17-plate condenser for the plate coil.

IN REFERENCE to Gelula's DX set in the issue of Nov. 15: Can an Atwater-Kent moulded variometer be used? (2) Can type 11 tubes be used? (3) What should be the capacity of the grid condenser? (4) Is the set subject to whistling? (5) Is the set subject to body effect? (6) Can the set be used in a room on the 5th floor of a steel constructed building in the Bronx, New York? (7) What voltage for the B battery?—J. L. Niesse, 466 Lexington Ave., New York City.

(1) Yes. (2) Yes. (3) .00025 mfd. (4) Yes, but easily controlled. (5) Not if parts are properly placed. (6) The conditions you describe would be very adverse to the best results, although locals should come in all right. Add another stage of audio. (7) 2 1/2 for detector; 45-90 for amplifier.

IS the statement made by Abner J. Gelula in the Nov. 15 issue of RADIO WORLD that a regenerating tube is equal to one and one-half stages of RF correct? (2) Is the 3-circuit, 3-tube set described by Herman Bernard in the same issue reliable?—Robert Howey, 1021 McKinstry, Detroit, Mich.

Yes. (2) Absolutely.

I LIVE 75 miles from the nearest broadcasting station. Which of the following three circuits would you suggest—(1) Bernard 3-circuit tuner that you can log, (2) 3-tube regenerative, (3) reflex?

No. 1.

IN REFERENCE to "A 3-Circuit Tuner That You Can Log," page 8, issue of Nov. 8: What is the capacity of C1 and C2, respectively? (2) I have three 199 tubes. If I use a 30-ohm rheostat in the detector and 6-ohm in the amplifier,

would that be all right?—H. C. Blake, 137 13th St., Oakland, Cal.

C1 is 23 plates (.0005), C2 is 17 plates (.00035). (2) Yes, if both amplifier tubes are worked from the one rheostat.

MAY I use the standard 3-circuit variometer for the Superdync?—R. W. William, 127 W. 74th St., New York City.

Yes. If the set does not come up to your

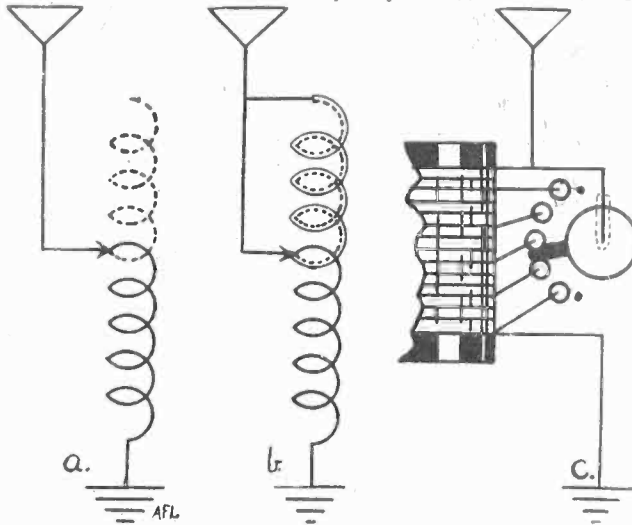


FIG. 61—Curbing dead-end losses. "A" shows the usual way of connecting a switch, dead-end losses occurring in the dotted area. "B" shows how the currents are kept in the circuit. "C" is the standard variocoupler, tapped and equipped with the correct connection as diagrammed in "C".

demands as to selectivity, take off turns from the aperiodic primary.

IN REFERENCE to the circuit on page 11, issue of Nov. 8, will the circuit oscillate? (2) How far apart should the windings L1 and L2 be?—James Shoemaker, Jr.

Yes. (2) They should be fairly close, 1/2" or so. Use a variocoupler or two honeycomb coils.

AS TO the "Ultra" 2-tube set in the issue of Nov. 15: Can the set be operated on dry A batteries? How much resistance should the rheostat have?—Percy Hansen, 1011 Bloomfield Ave., Akron, Ohio.

Yes. The rheostat is dependent upon the type of tube used. For 199, 30 ohms; for others, 6 to 10 ohms.

I HAVE an Ultradync receiver but am unable to get good selectivity. The set was described in the issue of Aug. 30.—Jno. Viellespin, 2123 S. Belle Ave., Lakewood, Ohio.

Selectivity in the Ultradync is dependent upon many things, viz., location, length of aerial, quality of instruments used, wiring, etc. The aerial need not be longer than 30 feet for this set. It would be well to set the coupling-coils at a 57 degree angle.

WOULD a 17-plate condenser improve my Neutrodyne in the place of the 13-plate I have now? (2) In winding low-loss coils as described by Byrt C. Caldwell in the issue of Oct. 18, what turns should the tap be taken from? (3) Will 60 turns on the secondary and 5 to 7 for the primary

work equally as well with the 13 or 17-plate condenser?—William Darling, 711 E. 9th St., New York City.

No. The 17-plate variable condenser will be better only in the event that you are now able to receive amateur code signals below 200 meters and you desire to raise the wavelength of the set. (2) 15th turn. (3) Yes.

I NOTICED in the University Department a few weeks ago that a choke-coil placed in series with the aerial lead-in would eliminate noises from high-tension alternating current lines nearby. Where can this be purchased or how can I build one?—S. M. Kerner, 1438 Boston Rd., Bronx, N. Y.

The actual coil part of a Ford magneto will do very well if the winding is not burnt out. If you desire to build one wind 600 turns of No. 28 DCC wire on a soft iron core.

WILL the Ambassador set give satisfaction in three tubes? (2) Would it be well to add one stage of RF to this set? (3) Can the tickler adjustment be done away with, the set still being regenerative, thus having a single-control set? (4) Is there anything gained by using an adjust-

able grid leak? (5) Is the placing of parts in this circuit of great importance? (6) How does the Superdync compare with the Ambassador circuit in tone, volume and DX?—Jno. Hiel, Marion Junct., S. D.

Yes. (2) Yes. (3) No. The rheostat would become a control then. (4) Yes. It is an important addition to any regenerative set. (5) The placing of parts is important in any circuit. (6) The Superdync is like the Ambassador with a stage of RF ahead of it, the tickler connections reversed.

I HAVE a type 12 tube that is practically new. It lights up and to all appearances is as good as new, but it absolutely refuses to percolate. Is there anything that I can do with it?—Marvin Padgett, Glasgow, Mo.

You should take it back to the dealer from whom you bought it, for exchange.

IN REFERENCE to the Anderson Superdync: What is the lowest wavelength that this set will tune to? (2) Will the set operate without an aerial as well as the standard Superdync? (3) Will the dials keep in step for logging?—Geo. Kiernan, 3965 Temay Ave., Detroit, Mich.

Approximately, with the average aerial, down to 220 meters. (2) Yes. (3) Yes, except the tickler dial.

IN the issue of Nov. 8 in Lieut O'Rourke's article you neglect to state how many turns there are on L3. Can you tell me?—Chas. W. Howell, 42 Stratford PL, Newark, N. J.

Eight to ten turns, according to length of aerial

WILL the Superdync be a good set to cut out local stations and receive DX?—W. C. Hall, Marine Barracks, Washington, D. C.

Yes.

I INTEND building the low-loss Neutrodyne described by N. N. Bernstein in the issue of Aug. 16. Is it selective? Will it get DX? Is volume good?—B. B. Topper, Hillcrest Ave., Ashtabula, O.

Yes, to all three.

REGARDING the 1-tube DX set by Neal Fitzalan in the issue of Nov. 1: Will honeycomb coils be as good as the coupler in this set? (2) Where is the grid leak and condenser placed, if one is used? (3) Is it absolutely necessary to have the condenser across the phones? (4) Has this circuit more volume than a single-circuit set?—Henry Spett, 746 Marcy Ave., Brooklyn, N. Y.

Yes, honeycombs may be used either in place of the coupler or split-variometer. (2) Between the grid and split variometer coil. (3) No. (4) Yes, if properly built.

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# Superdyne Trouble Shooting

By Abner J. Gelula

IN the 4-tube Anderson Superdyne, complete data on which was published in RADIO WORLD, issues of November 22 and 29, the construction of a Superdyne was reduced to the simplest form. Inductive coupling was used between the radio-frequency tube and the detector, instead of the capacitive method. This was done to eliminate, as far as possible, critical tuning. The set is a wonderful performer, both as to tone quality, for which the Superdyne is justly famous, and distance reception.

For those experiencing trouble with this set, especially if no signals or only weak signals are heard, it is a good plan to test the radio frequency side of the circuit first. To be sure this is functioning properly, convert it into a detector circuit temporarily. This is done by putting a grid leak and condenser between the stator of C1 and the grid post of the socket. The grid condenser and leak may be removed from their normal place and used thus, if no extra combination of this sort is on hand. Now put one of the phone tips at the terminal of L4 that is opposite the one connecting to the plate, and the other phone tip on B+ 22½ volts. You now have a regenerative set of the 3-circuit tuner variety, using a semi-a-periodic primary. The set will work thus, no matter whether the beginning of L4, the tickler coil, goes to the plate, and the end to the phone, or vice versa. But the Superdyne principle involves the feeding back of the plate current to the grid in a reverse direction, for counter electromotive force, hence be sure that the end of L4 goes to the plate and the beginning to one phone tip. If a standard coupler is used, or one made at home with all windings in the same direction, the tickler connections are reversed, as explained. But if a special Superdyne coupler is used, or one made at home with the tickler winding in the direction opposite to that of the two others, L0L1, the connections are made in standard fashion, because the reverse feedback is accomplished either by reversing the direction of winding L4 and connecting in standard fashion or by reversing the connections of a tickler wound in uniform direction. If a 180° coupler is used, connect in either fashion.

### System for Check-up

If you hear no signals check up as follows:

1. Test the tube. Maybe it doesn't work at all. Put in another tube.
2. Test C1 for possible short-circuiting due to condenser plates touching. Some-

times a set works only on low waves because the high waves are cut off when the plates touch when nearly completely in mesh.

3. See that B- is connected to A+.

4. Watch out for a short-circuit aerial or ground connection, or a failure to connect to ground clamp or to aerial.

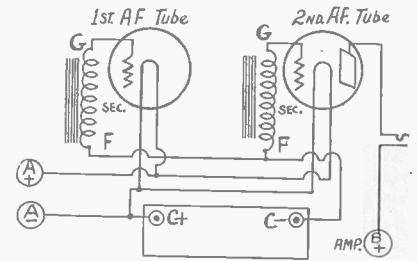
With a little pains this part of the circuit is bound to be made to work. That done, remove the phones and grid leak and condenser and connect the beginning of the grid coil as it was formerly. The terminal of L4 that went to one phone tip goes to L2 and thus connects to B+ 45 to 90 volts.

### Changing the Grid Return

If the set worked fairly well thus far the rest is still easier. If a 200 type tube is the detector and was placed in the first socket wonderful results should have been obtained. If another type of tube was used fair results should have been the outcome, because the grid return was left at A- and most tubes function best as detectors when the grid return is to A+. In the Anderson Superdyne all tubes may be the same—11, 12, 199, 299, 201A, 301A, etc., for the grid return in the detector circuit is to A+. If a 200 or 300 tube is used as detector (in the second socket) change the wiring to have the grid return to A-. Sometimes the type tube works better without grid leak or condenser. Also in either case preferably connect the grid return direct to the A+ or A- (depending on detector tube used) rather than to make this connection to the socket side of the rheostat. This advice contradicts the wiring diagram.

With the detector circuit hooked up, if the tube is working and the A+ is connected to B-, one phone tip should go to the plate of the second tube and the other to B+ 22½ volts, and signals will be heard if L2L3 are not short-circuited or the C3 plates not touching, provided the wiring is correct. If so far so good, yet trouble arises later, it must be in the audio stages or either jack, J1 or J3. Test the audio transformers with wiring disconnected. Use a 1½-volt dry cell, one phone tip to A+, the other to one terminal of the AFT primary. Connect a wire from the - of the dry cell to the other connection post of the primary. If you hear a click be satisfied. If you don't, the primary is burned out. Repeat test for secondary, then for primary and secondary of the second AFT. In this way you will be sure to get results.

Test your A and B batteries, using voltmeter for both, if 6-volt storage battery is used, otherwise voltmeter for B



HOW to connect the C battery (Fig. 2) in the audio stages, the F posts of the AFT going to C-

batteries and ammeter for the dry cells of the A battery block.

If the audio tubes light too brilliantly and distortion or weak signals result, look to your C battery. Remember that the C- goes to where the F- would have gone were there no C battery, i. e., the F post or end of secondaries on the two AFT. C+ goes to A-. Try different C battery voltages, 1½ to 9.

### How to Bring in DX

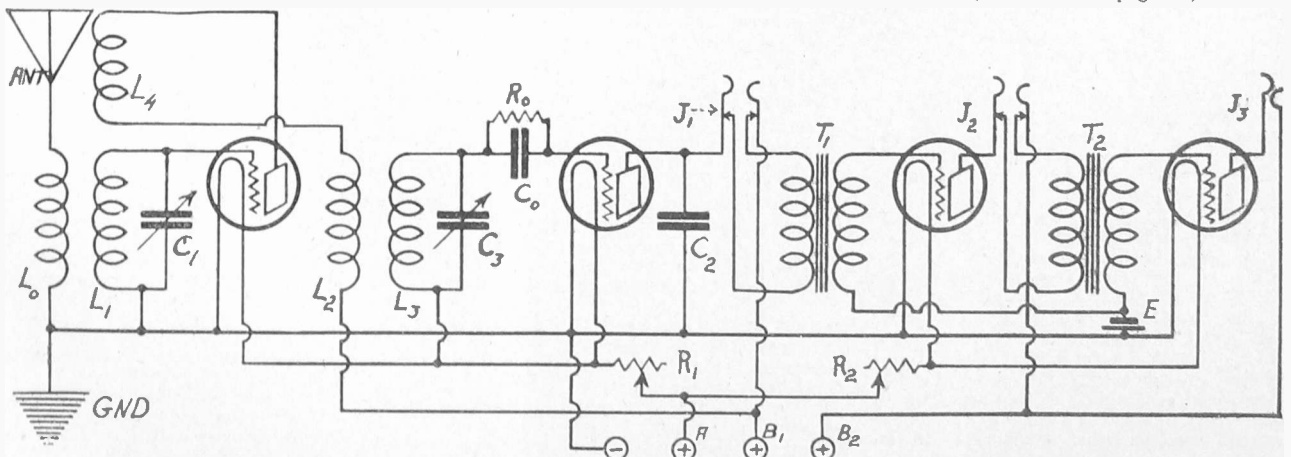
Now, if results are only fair, remember that they should be splendid with this set and hunt some more for the trouble.

If the aerial is poorly insulated you may be sure the weak impulse will be lost. Thus, if you are not getting the distance that you expect, look to your aerial first, and make it 100% efficient.

Too often the ground is sadly neglected. The fact that "almost any ground will work" does not mean to say that a better ground will not give proportionately better results. The ideal receiving ground is the cold water pipe, with the connection firmly made with a ground-clamp.

Noisy operation? What kind of flux did you use in soldering the set? Never use anything but rosin. Other fluxes, if allowed to run between wires or binding posts, form a high resistance leak that means a loss of energy as well as making the set exceedingly noisy. Your B batteries? Are they old and worn out? Have they given you approximately 4 to 6 months of service? Do they read below 14 volts? The noise from a worn out B battery resembles static. In fact, many a novice has claimed that he is badly troubled with static when the whole "static" problem lies in a noisy B battery. If the individual 22½-volt battery read below 14, it is time that a new one be purchased. Never hook up an old battery with a new one.

No volume? First of all, never over- (Concluded on page 27)



IN trouble-shooting (Fig. 3) in the Anderson Superdyne, be sure to connect A+ to B- and preferably have the grid return in the detector stage to the A+ to B- and preferably have the grid return in the detector stage to the direct to A-. The wiring diagram suggests an A+ grid return to the socket side of the rheostat, as other than 200 type tube was used, but it is better to have this lead go to the A+ battery side of the rheostat to avoid sending the grid return through this resistance.

# Great DX on 1 Tube and 1 Dial

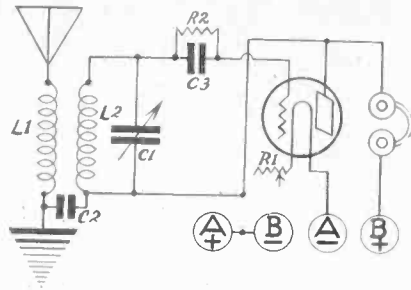


FIG. 1, wiring diagram of Lieut. O'Rourke's 1-tube, single-dial DX set that got 800 miles from New York City, tuning in Chicago stations through the powerful locals. L1 is the primary, L2 the secondary of a home-made coil. A variable grid leak should be used. A vernier type rheostat is absolutely necessary, for the regeneration is controlled through the rheostat, and unless properly controlled will not produce the remarkable results outlined.

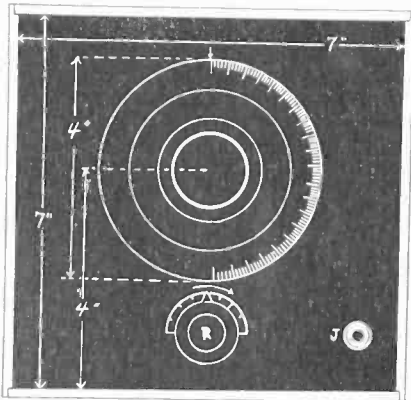


FIG. 2, panel layout for Lieut. O'Rourke's 1-tube DX set.

By Lt. Peter V. O'Rourke

SO many radio fans are just wild with ecstasy over the reception of signals from great distances that circuits permitting such reception are increasingly popular. There is indeed a thrill attached to hearing distant programs. Although it may be true that this thrill somewhat wears off in time, it is also true that it recurs after long or short lapses.

It is impossible to get DX on one tube without the use of regeneration, no matter how many controls are used. Therefore if a person has the DX fever and does not feel he can afford a Super-Heterodyne or a Neutrodyne, which require from five to eight tubes, he can satisfy his appetite only by using regeneration in its most effective form. This may be accomplished in a 1-dial set (Fig. 1) and distances up to 1,500 miles may be covered. Normally 500 miles may be depended on, but this set, even with powerful local stations going at full blast in New York City, has cut right through them and brought in Chicago, some 800 miles away, night after night.

This set is very inexpensive. The parts and equipment I used cost \$16.15. The tube was the 12 type, fed by a 1½-volt Columbia dry cell. The plate voltage was 22½.

The circuit may be constructed as shown in Fig. 1 and all the regeneration needed should be obtainable in that way. But if there is a deficiency in regeneration the fixed condenser shown as connecting the end of L1 with the end of L2 may be placed instead so that it connects with one side to the ground, as shown, but the other side to the F+.

## Making the Coil

The coil may be made at home on a 3½"

For \$16.15 Lieut. O'Rourke Constructed a Set That Consistently Got Chicago from New York While Locals Went Full Blast

diameter cardboard tubing, 4" high. Use No. 22 double cotton covered wire for both windings. L1 is begun ¼" from the top of the form and consists of 18 turns. Terminate, then leave ¼" space and wind the secondary, L2, which consists of 47 turns. Terminate. The beginnings and ends of the coils are secured by punching two small parallel holes for each terminal and threading a 5" excess length of the winding through each pair of holes. The total number of pairs will be four, that is, eight holes all told, for there are four terminals. Do not affix any devices to the cylindrical form, such as binding posts or lugs for terminals, but carry the wire straight to its proper connecting point, where it is secured by a Fahnestock clip. Thus no terminal strip is needed and the danger of encountering high resistances which sap the feeble radio impulses and cut down distance and selectivity is avoided. The coil wound thus will be found very efficient, being inferior to bakelite only on the low waves, because bakelite has a lower resistance at high frequencies. But the difference is slight and you will be perfectly safe using the coil as described. Also, the expense is kept down.

The variable condenser should be vernier and low-loss, that is, one made without the hard rubber or bakelite insulation on the back. The end plate should be metal. Some persons prefer also that the contact between rotor and a condenser binding post be of the pig-tail variety, that is, a piece of flexible wire that looks like braided hair is soldered at the two points mentioned. This insures an even contact that is mechanically and electrically safe, although the other form of contact, known as the wiping variety, is serviceable. So long as the wiping contact is firm it is all right.

It is very essential for best distance reception that a low-loss condenser be used. Also be sure to keep the coil at least 1½" away from any part of the variable condenser. This is to avoid interaction of electromagnetic fields of the coils with the electrostatic field of the condenser. Such interaction reduces the efficiency of a set about 40 per cent., sometimes as high as 60 per cent. Roughly interpreted in terms of miles the poor method of placing parts renders a 1,500-mile set capable of only 900 miles or possibly only 600 miles.

A good socket is essential. A low-loss type, like the Premier that I used, is advisable. All the radio-frequency impulses focus on the socket, hence if high resistance, seepage and dielectric losses are sustained here, much of the theoretical gain is actually sacrificed.

The grid leak may be mounted in the conventional fashion, as shown, or may be placed with one end on the grid post of the socket and the other end at the F minus or F plus. If the set does not do all that is claimed for it at first, try moving the grid leak to the different positions. The grid condenser always remains in the same position, no matter if the leak position is changed. That position is in series with the beginning of L2.

## Wiring Directions

Connect the aerial to the beginning of L1, the top terminal of the upper coil on the

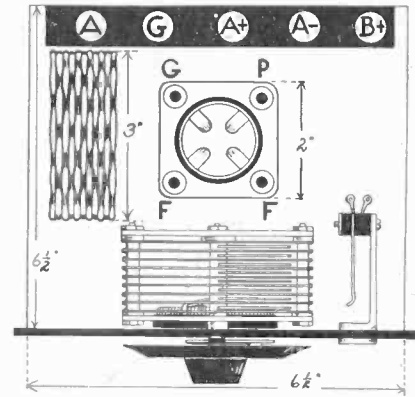


FIG. 3, assembly plan for the O'Rourke DX 1-dial set.

cylinder. Connect the end of L1, the bottom terminal of the upper coil, to the ground. The beginning of L2, or the top terminal of the lower coil, goes to the stator plates of C1, the variable condenser, and on to one side of the grid condenser. The other side of the grid condenser goes to the grid post on the socket. Be sure to keep the grid leads as short as possible. Use the bee-line system of wiring throughout. The shortest distance between two points is a straight line, and do not be afraid to use the straight-line method although it does not look as pretty as the angle method. The end of L2, or the bottom terminal of the lower coil, goes to the rotor plates of C1 and to the plate post of the socket. One of the phone tips will be connected to this same plate post. The filament is wired with one terminal of the A battery going direct to one of the F posts on the socket and the other A battery lead going to one side of the rheostat, the other side of the rheostat going to the remaining F post on the socket. It does not matter in which lead, A+ or A-, the rheostat is inserted. But if the rheostat is placed in the F+ lead be sure, in case you connect the fixed condenser from the end of L1 to the F+, that the connection is made to the A+ battery side, not to the F+ socket side. Now connect the B- and the A+ (direct from battery to battery) and place one of the phone tips in the 22½ volt post of the B battery. The other phone tip, as explained, goes to the plate of the tube. If a jack is used, the leads that would go to the phone tips go to the jack.

## Using Basket Wound Coil

Equal results were obtained in this circuit by the use of the coil as described and by the use of a basket-weave coil. For those desiring to use the basket-weave type directions are given for making such.

Get a block of wood 4" square and at least 1" thick. Describe a 3" circle on it. Divide the circle into fifteen equal parts. If a compass is set at 5/8" this division can be most easily accomplished. Drill 3/8" holes at each of the fifteen points. Insert 3/8" dowel rods, 4" high, in these holes. If the rods do not stand exactly upright, glue them into the holes, straightening the rods after the glue has stiffened a little, when the rods will remain in place. The number of turns is the same for this coil as for the other. The primary, however, is wound together with the secondary, side by side, until the primary windings are completed, when the winding of the secondary is continued alone until termination. The end of the secondary which is nearest the primary is the one that connects to the plate.

After the coil is wound it is moved up about 1" on the rods and the windings tied together with linen thread or twine.

(Concluded on page 31)

# How to Make a \$1 Coil Winder

By Herbert E. Hayden

Illustrations by the Author

A WINDER that will handle eight different diameters of tubing with a length up to 9" is easy to make and extremely useful. The tubing is automatically "centered" by the arrangement of the cardboard discs.

Cut circles (Fig. 1) of heavy cardboard  $1\frac{1}{4}$ ,  $1\frac{3}{4}$ ,  $2\frac{1}{4}$ ,  $2\frac{3}{4}$ ,  $3\frac{1}{4}$ ,  $3\frac{3}{4}$ ,  $4\frac{1}{4}$  and  $4\frac{3}{4}$ " in diameter and stack them up after coating their surfaces with glue. After they have dried drill through the center of the completed stack with a  $\frac{1}{4}$ " drill. A piece of  $\frac{1}{4}$ " threaded brass rod is used for the shaft. It is 14" long. The hardware store sells this. Shellac the completed cardboard discs several times. They will become hard as fiber.

The arrangement of the graduated end plates or discs of the winder with the handle attached is shown in Fig. 2. The small wheel to the right is a ratchet wheel. Notice the small piece of brass tubing on the shaft at the left which acts as a bearing.

Fig. 3 shows how the uprights holding the winder are made of 10-cent shelf brackets mounted on heavy pieces of soap box wood. The bases are arranged so that one side can be pulled away from the other, allowing variation in tubing length. A small tubing is shown in the photograph and the bases are brought together to center the coil while it is being wound.

Fig. 4 shows the arrangement of simple brass hooks which permit the coil and winding to be removed from the machine quickly, if necessary, without disturbing the winding.

Fig. 5 shows how a big, long tube is handled. Just pull the bases apart, tighten up the wing nuts and your bearings are in the right position. Notice the notches in the brass angle which holds the bases together.

Fig. 6 shows a close-up of the piece of metal or "pawl" which engages in the ratchet wheel. This prevents the coil from unwinding should the hand be removed from the handle for a moment during the course of winding a radio coil.

Fig. 7 shows a close-up of the wooden bases and the arrangement of the wing nuts.

Fig. 8 gives a view of the handle and ratchet wheel. The handle was taken from an old hand drill. You can buy a new one

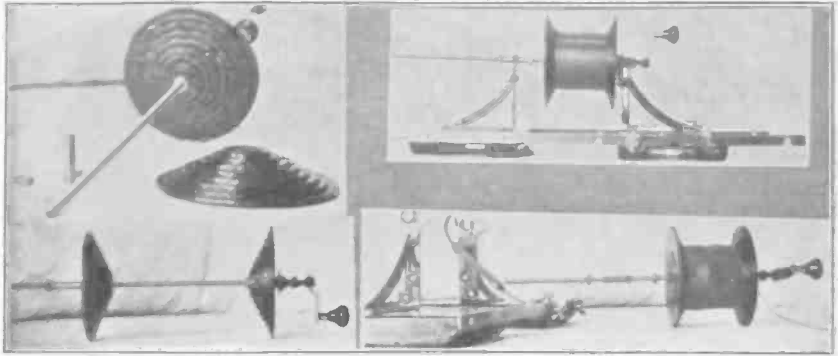


FIG. 1, left, top, shows the graduated discs cut from heavy cardboard, glued one upon the other. Fig. 2, lower left, shows winder and discs. The upper right photo, Fig. 3, indicates the arrangement of the graduated discs of the winder with the handle attached, placed on the frame. At the lower right, Fig. 4 is the stand made from 10c shelf brackets, mounted on heavy pieces of wood.

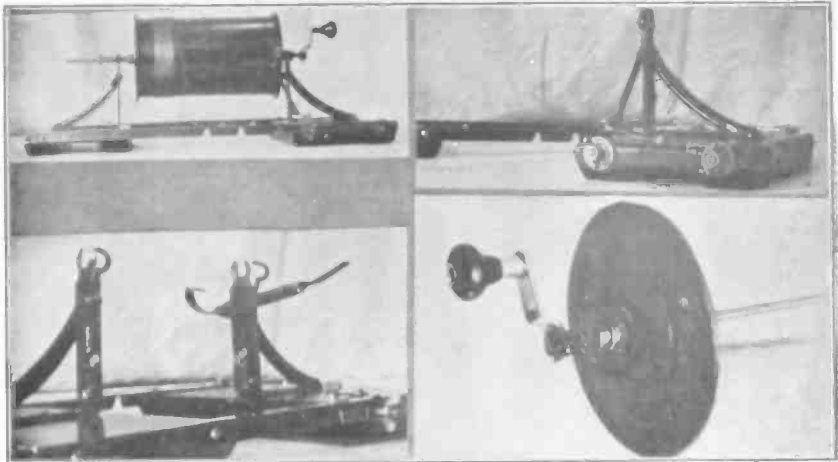
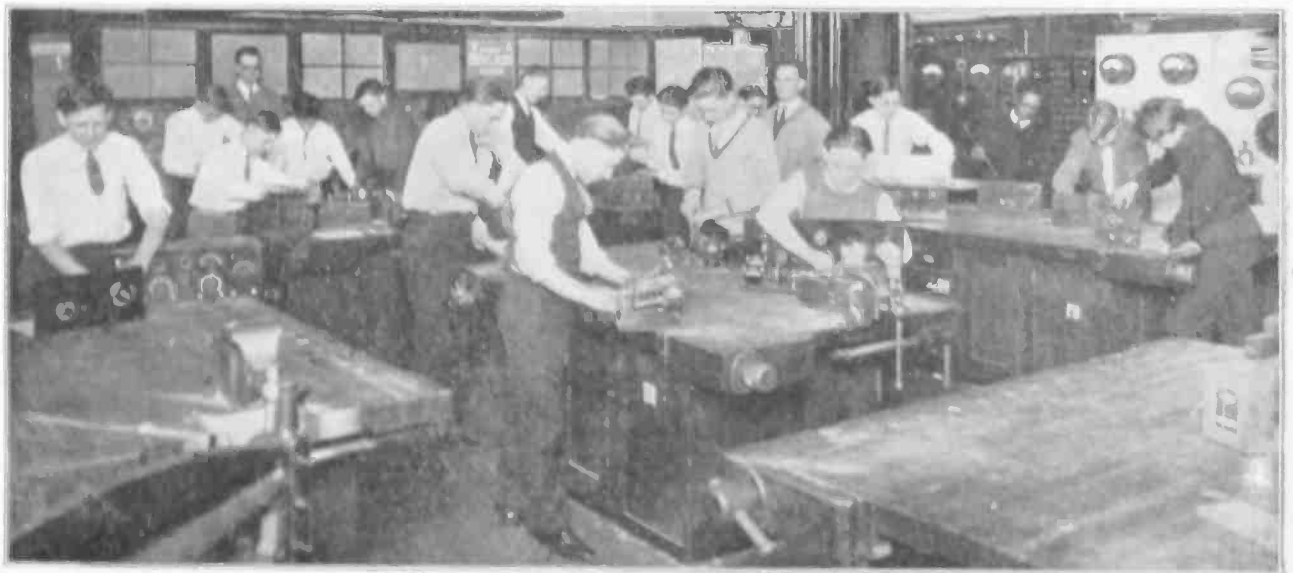


FIG. 5, upper left, shows the tubing is operated. Fig. 6, lower left, shows close-up of metal and pawl. Merely slide back the wing-nuts, place the tube upon the frame and tighten. Fig. 7, upper right, gives a close-up of the wooden bases and wing-nut arrangement. Fig. 8 gives a view of the handle and ratchet wheel.

for fifteen cents in a hardware store. It gives you a close-up of the "ratchet and pawl" arrangement, with the end plates removed for clarifying the illustration. The ratchet allows the coil to be turned in one

direction only. If it is desired to turn in the opposite direction the pawl is lifted with the finger.

The entire winder should not cost more than \$1 to build.



STUDENTS at the Lane Technical School, Chicago, build sets under the expert guidance of instructors. This was done for the edification of fans visiting the Chicago Radio Show. The students range from 13 to 19 years. (Nadel & Herbert.)



# BROADCAST PROGRAMS

THURSDAY, DECEMBER 4

**KHJ, Los Angeles, 395 (P. S. T.)**—12:30 P. M., Coy Barkley and his Palace Ballroom Orch. 2:30, Edward Murphey, reader. 6, Art Hickman's Concert Orch. 7:30, "Art" talk by Harold Swartz of the faculty of the Otis Art Institute. 8, Beacon Light Company, arranged by J. Howard Johnson. 10, Earl Burnett's Biltmore Orch. broadcast from the Biltmore Hotel.

**WDAF, Kansas City, Mo., 441 (C. S. T.)**—3:30 P. M., The Star's radio trio. 5:50, marketgram; weather; time and road report. 6, (School of the Air); address—Edgar Allan Linton, series of talks on world travels; reading—Miss Cecile Burton; The Tell-Me-a-Story Lady; The Hanlein-Knutson Trianon Ensemble. 11:45, Nighthawk Frolic.

**WJY, New York City, 405 (E. S. T.)**—7:30 P. M., Berlitz weekly French lesson. 8, "A Woman's Way," a comedy presented by WGY players. 9:45, Wanamaker Organ recital. 10:45, Al Reiser's Corinthians.

**WJZ, New York City, 455 (E. S. T.)**—10 A. M., Menu, Mrs. Julian Heath. 10:20, "The Progress of the World," a Review of Reviews talk. 10:30, Household Equipment, Ethel R. Peyer. 10:40, "How to Make Silk Lampshades," by Editor of Needle Art. 10:50, Eleanor Gunn's fashion talk. 1 P. M., Nathan Abas' Hotel Pennsylvania Orch. 4, Myrtle Holmes Curdy, contralto. 4:15, Osman Perez Freire, baritone. 4:30, Bernhard Levitow's Hotel Commodore Tea Music. 5:30, State and Federal agricultural reports; farm and home reports; closing quotations of the New York Stock Exchange; foreign exchange quotations. 7, Bernhard Levitow's Hotel Commodore Orch. 8, Wall Street Journal review. 8:10, N. Y. U. Air College; "Evolution," Prof. Chas. E. Bristol. 8:30, U. S. Army Night program. 10:30, Waldorf-Astoria Dance Orch.

**WIP, Philadelphia, 509 (E. S. T.)**—6 P. M., weather. 6:05, Art Coogan and his Orch. 7, Uncle Wip's Roll Call. 8, The WIP Magazine of the Air. 10:05, Second Annual Minstrel Show by the Fairmount Rowing Ass'n. 10:30, dance music by Harvey Marburger and his Vaudeville Orch.

**WOO, Philadelphia, 509 (E. S. T.)**—11 A. M., grand organ. 11:30, weather. 11:55, time. 12, Tea Room Orch. 5:10 P. M., sports results and police reports. 5:15, organ and trumpets. 9:55, time. 10:02, weather.

**WGBS, New York City, 316 (E. S. T.)**—10 A. M., talks with Terese. 10:10, Nelson Van Horn, pianist. 10:20, Pictorial Review Period. 10:30, Nelson Van Horn, pianist. 10:40, Pictorial Review. 10:50, Nelson Van Horn, pianist. 1:30 P. M., Talalaeff, Russian Dance Orch. 3, interview, with Mrs. Geo. E. Owens, by Terese Rose Nagel. 3:10, Jessica Dragonette, soprano. 3:20, Mrs. Maybelle A. Burbridge, beauty talk. 3:30, Jessica Dragonette, soprano. 3:40, book reviews, by Gertrude B. Tucker. 3:50, Jessica Dragonette, soprano. 6, Uncle Geebee. 6:20, Loretta Ellen Brady, Stories for Children. 6:30, Clifford Lodge, orch. 8:30, special cable dispatch of review of latest European plays. 9, The Guaranty Trust Choral Society under the direction of Albert Janpoulaki. 9:45, Will Hollander's Hotel Ambassador Dance Orch. 10:45, Joe Shuster and Sid Frank, popular songs. 11, musical features broadcast direct from the studio of the Piccadilly Theatre.

**KSD, St. Louis, Mo., 546 (C. S. T.)**—4 P. M., The Home Hour.

**WDAR, Philadelphia, 395 (E. S. T.)**—11:45 A. M., Almanac. 12:02 P. M., organ recital; features from the Studio; Arcadia Concert Orch. 2, Arcadia Concert Orch.; artist recital. 4:30, artist recital. 5, question period in Educational talks. 7:30, Dream Daddy.

**WCCO, Minneapolis, Minn., 417 (E. S. T.)**—10:45 A. M., Betty Crocker, "A Waffle Breakfast Party." 2 P. M., "The Popular Concert," Agnes Fryberger. 4, "Button, Button," by Irvin S. Cobb. 5:30, Gold Medal Lady. 6:30, Biley's Grand Cafe Orch. 7:30, "The Future of the Dairy Industry," Edward Barr. 8, Captive Male Quartet. 10, concert.

**WOC, Davenport, Ia., 484 (C. S. T.)**—10 A. M., opening market. 10:05, household hints. 10:55, time. 11, weather and river forecast. 11:05, market. 11:10, agricultural bulletins. 12, chimes. 12:15 P. M., weather forecast. 2, stocks and markets. 6:45, sport news and weather. 7, Sandman's Visit. 9, Blackhawk Hotel Orch. 11, Louis Connor and Orch.

**WJAX, Cleveland, O., 396 (E. S. T.)**—7 P. M., Wylie and his Vocalion Orch. 8, Musical numbers. 10, Wylie.

**KYW, Chicago, 536 (E. S. T.)**—6:30 A. M., morning exercises. 9:30, news and comment of the financial and commercial markets. 10:30, Farm and Home service. 11:35, table talk by Mrs. Anna J. Peterson. 2:35 P. M., "Afternoon Frolic." 6:02, news, financial and final markets. 6:35, children's bedtime story. 7, Joska DeBabary's Orch. 7:10, Coon-Sanders Original Nighthawks. 7:20, DeBabary's Orch. 8, "Twenty Minutes of Good Reading," by Rev. C. J. Perrin. 8:20, artists will be announced. 9:15, "Safety First" talk by Z. C. Elkin. 10, "At Home" program.

**WEAF, New York City, 492 (E. S. T.)**—11 A. M., musical program; beauty talk; talk by Lillian Eichler; market reports. 4 P. M., Helen Bard Nixon, contralto; Lulu Phillips, soprano; talk by Josephine Webbing Watts; Professor M. Da La Fontaine, ukelele. 6, music Hotel Waldorf-

Astoria; Mid-Week Services; the Hambone Quartet; "Touring in a Packard Eight"; Hohner Harmony Hour; Vincent Lopez and His Orch.

**KDKA, E. Pittsburgh, Pa., 326 (E. S. T.)**—9:45 A. M., stockman reports; general market review and agricultural items. 11:55, time. 12, weather; stockman reports. 12:15 P. M., Scalzo's Orch. 3:30, closing farm quotations. 6:30, KDKA Little Symphony Orch. 7:15, Santa Claus. 7:30, "Short Auto Trips." 7:40, stockman reports. 8, program by the National Stockman and Farmer. 8:30, the KDKA Little Symphony Orch., Victor Saudek, conductor; Well-known Welsh. 9:55, time; weather. 11, concert from Post Studio.

**WEEI, Boston, 303 (E. S. T.)**—6 P. M., Jack Renard and his Mansion Inn Orch. 7, Big Brother Club. 8:12, musicale.

**CKAC, Montreal, 425 (E. S. T.)**—4 P. M., weather and stock reports. 8:30, Canadian National Railways.

**WQJ, Chicago, 448 (E. S. T.)**—11 A. M., Miss Erna Bertrams, "Come to Tea Informally"; Miss Eleanor Chalmers, "The Foundation for the Smartly Dressed Woman"; Walter Murray, "Interior Decorating." 3 P. M., Cora Beeman, "Eat for Heat and Energy"; Charles T. Wolf, "Shoes"; W. B. Peterson, "The Care and Use of Aluminum Cooking Utensils." 7, Williams and his Rainbo Garden Orch.; Manuel Rodriguez, tenor; Mrs. Lydia Lochner, contralto; Marion Henry, accompanist; Kathryn Snyder, reader. 10, Williams and his Rainbo Skylarks; Axel Christensen, pianologues; Grace Wilson, contralto; Hill Hirsch and Gorny, harmony singers; Edna Solomon, contralto; Rosemary Hughes, soprano; Will Rossiter.

**WFAA, Dallas, Tex., 475 (C. S. T.)**—12:30 P. M., address, De Witt McMurray, editor, The Semi-Weekly Farm News. 8:30, Midnight Melody Men Orch. 11, Adolphus Hotel Orch.

**KGW, Portland, Ore., 492 (E. S. T.)**—11:30 A. M., weather. 12:30 P. M., Civic Music Club. 5, children's program. 7:15, markets, weather, news and police reports.

**WWJ, Detroit, 517 (C. S. T.)**—8 A. M., calisthenics. 9:30, "Tonight's Dinner," and a special talk. 9:45, health bulletins and talks of general interest. 10:25, weather. 11:55, time. 3 P. M., News Orch. 3:50, weather. 3:55, market reports. 8:30, News Orch.; Graeme Gillies, bass; Mrs. Claudine Secor, soprano. 10, Jean Goldket's Victor Recording Orch. 11, News Orch.

**WBZ, Springfield, Mass., 337 (E. S. T.)**—11:55 A. M., time, weather, market report. 6 P. M., Schrafft ensemble. 6:30, Leo Reisman ensemble. 7, market report. 7:05, bedtime story. 7:15, letter from the Homestead; "At the Theatres" with A. L. S. Wood. 7:45, Charles R. Hector with his orch. 8:15, concert by DeLancey Cleveland. 9:15, concert by the Senior Choir. 9:55, time; weather. 10:01, program continued.

**WMAQ, Chicago, 445 1/2 (C. S. T.)**—4 P. M., household hour, direction of Mrs. Elizabeth Hiller. 4:30, Federation of Women's Clubs. 6, organ recital. 6:30, Hotel La Salle orch. 8, Western railway convention. 8:15, Clara E. Laughlin. 8:30, Rockwell Stephens, auto editor. 9, lecture from University of Chicago. 9:15, program under Chicago Association of Credit Men.

FRIDAY, DECEMBER 5

**WEEI, Boston, 303 (E. S. T.)**—6:30 P. M., Dok-Eisenbourg and his Sinfonians. 7, Big Brother Club. 7:30, musicale. 8, Priscilla Quartet. 9, program from New York. 10, musicale.

**WHO, Des Moines, Ia., 528 (C. S. T.)**—7:30 P. M., "The Novelty Entertainers"; Mrs. F. B. Simpson, soprano; Master Fox and Margaret Simpson, four-hand piano selections.

**CKAC, Montreal, 425 (E. S. T.)**—1:45 P. M., classical concert. 4, weather and stock reports. 4:30, 10 lessons.

**WQJ, Chicago, 448 (E. S. T.)**—11 A. M., Fred Mann and his Sunday Dinner Menu. 3 P. M., Dorothy McLain Dicken, "Home for the Holidays"; Mrs. Harry T. Sanger, "Travelogue"; Miss Sarah Place, Infant Welfare Society. 7, Williams and his Rainbo Garden Orch.; Dorothea Schulbert, soprano; Ingram Cleveland, violinist; George Chovance, tenor; Carl G. Linner, pianist. 10, Williams and his Rainbo Skylarks; Verdi Trio, mandolin, guitar and accordion; Nubs Allen, contralto; Monogram Trio; Rogers Boys, Larry and Billy.

**KGW, Portland, Ore., 492 (C. S. T.)**—11:30 A. M., weather. 12:30 P. M., Original Serenaders. 5, children's program. 7:15, markets, weather, news and police reports. 8, lecture by University of Oregon. 10:30, Hoot Owls.

**WFAA, Dallas, Tex., 476 (C. S. T.)**—12:30 P. M., address, Dr. Robert Stewart Hyer. 8:30, musical recital; Mrs. J. Roscoe Golden, contralto.

**WWJ, Detroit, 517 (C. S. T.)**—8 A. M., calisthenics. 9:30, "Tonight's Dinner," and a special talk. 9:45, health bulletin and talks of general interest. 10:25, weather. 11:55, time. 3 P. M., News Orch. 3:30, weather. 3:55, market reports. 8:30, News Orch.; Anne Campbell, News poet; Albion College program.

**WMAQ, Chicago, 445 1/2 (C. S. T.)**—2 P. M., broadcasting football game from Stags field. 6, St. John's military academy. 8, Hotel La Salle Orch. 8:40, "Guam," by James Abbott. 9, theatre revue.

**WBZ, Springfield, Mass., 337 (E. S. T.)**—11:55 A. M., time, weather, Springfield market. 6 P. M., Westinghouse Philharmonic trio. 7, market report. 7:05, bedtime story. 7:15, current book review. 7:30, lesson of a course in "Musical Appreciation." 9:55, time, weather. 10, to be announced. 11, Westinghouse Philharmonic trio. 11:30, McEnelly's singing orch.

**KHJ, Los Angeles, 395 (P. S. T.)**—12:30 P. M., program presenting Karl Brandenburg, "The Times Newsboy Tenor." 2:30, matinee musicale. 6, Art Hickman's Concert Orch. 6:30, children's program. 8, program presenting the University

of California. 9:30, program through the Los Angeles Braille Association. 10:30, Earl Burnett's Biltmore Orch.

**WOS, Jefferson City, Mo., 441 (C. S. T.)**—8 P. M., address: "Missouri" by George A. Pickens. 8:15, address: "The Missouri Mule in Peace and War," by John Ashton. 8:30, varied musical concert by the Jameson Conservatory of Music.

**WDAF, Kansas City, Mo., 441 (C. S. T.)**—3:30 P. M., The Star's radio trio. 5:50, Marketgram, weather, time and road report. 6, (School of the Air); address—the Kansas City Children's Bureau. The Tell-Me-a-Story Lady; The Hanlein-Knutson Trianon Ensemble. 8, popular program by The Star's radio orchestra and the WDAF minstrels. 11:45 (Nighthawk Frolic).

**WJY, New York City, 405 (E. S. T.)**—7:30 P. M., Billy Wynne's Greenwich Village Inn Orch. 8:15, Current Topics, William H. Allen. 9, The Radio Franks—Wright and Bessinger. 9:15, "Taxes," by Frank Shevit. 9:30, program arranged by the Orch. of the S. S. Leviathan.

**WJZ, New York City, 455 (E. S. T.)**—10 A. M., Housewives League Menu, Mrs. Julian Heath. 10:20, Book Review by Grace Isabel Colbron. 10:30, "Women's Wear," by Mrs. Chas. C. Mickle. 10:40, Arts and Decorations, Mrs. Mary Roberts. 10:50, Eleanor Gunn's fashion talk. 1 P. M., Hotel Ambassador Trio; Henry Vander Zanden, director. 4, Henry Tobias and Follies Inn Versatile Orch. 4:30, Fred Hall's Royal Terrace Orch. 5:30, State and Federal agricultural reports; farm and home reports; closing quotations of the New York Stock Exchange; foreign exchange quotations; news. 7, Savarin Ensemble. 8, Wall Street Journal review. 8:10, N. Y. U. Air College; "Evolution," Prof. Chas. E. Bristol. 8:30, Gilbert and Sullivan Night. 10:30, Meyer Davis Society Orch.

**WIP, Philadelphia, 509 (E. S. T.)**—1 P. M., Gimbel Tea Room Orch. 1:30, weather. 3, recital by artists from the Morely Vocal Studio; Constance Acheson, soprano; Edna Zanzinger, soprano; Alma Manering, mezzo soprano; Daisy MacCorkle, mezzo soprano; Fred Shivers, tenor, and George Paskill, baritone. 6, weather. 6:15, Harvey Marburger and his Vaudeville Orch. 6:45, livestock and produce market reports. 7, Uncle Wip's Bedtime Story.

**WOO, Philadelphia, 509 (E. S. T.)**—11 A. M., organ. 11:30, weather. 11:55, time. 12, Tea Room Orch. 5:10 P. M., sports results and police reports. 5:15, grand organ and trumpets. 7:30, sports results and police reports; A. Candelori and his Hotel Adelphi French Room Orch. 8:30, special program from the Fox Theater Studio. 9:25, Romany Mixed Quartet, Wm. H. DeVore, director; Ida M. Muehlief, soprano; Hilda Dalbey, contralto; Wilmer G. Williams, tenor. Wm. H. DeVore, baritone; Alma W. Wilson, accompanist. 9:55, time. 10:02, weather. 10:03, organ recital, Harriette G. Ridley. 10:30, Vincent Zizzo and his Orch.

**WGBS, New York City, 316 (E. S. T.)**—10 A. M., timely talks by Terese. 10:10, Irma Hopper, singer and composer. 10:20, Alice Van Lee Carrick, on "Furniture," 10:30, singer and composer. 10:40, Dr. Lena Stillpass, on "Dental Hygiene." 10:50, singer and composer. 1:30 P. M., Armand Vecsey and his Ritz-Carlton Orch. 3, interview, with Eddie Mayo, by Terese Rose Nagel. 3:10, Valeria Seitz, mezzo soprano. 3:20, Gertrude B. Tucker, in "The Real Romance of America." 3:30, Valeria Seitz, mezzo soprano. 3:40, Alfred G. Robyn, Lessons in Harmony and Composition. 3:50, Valeria Seitz, mezzo soprano. 6, Uncle Geebee. 6:30, Nat Martin's "I'll Say She Is" Orch.

**KSD, St. Louis, Mo., 546 (E. S. T.)**—8 P. M., Sixth U. S. Infantry Band.

**WDAR, Philadelphia, 395 (E. S. T.)**—11:45 A. M., Almanac. 12:02 P. M., organ recital; features from the Studio; Arcadia Concert Orch. 2, Arcadia Concert Orch.; playlet. 4:30, dance program. 7:30, Dream Daddy. 8, a book review by Arnold Abbott. 10, meeting of the Morning Glory Club. 1 A. M., Arcadia Dance; features from the Studio.

**WCCO, Minneapolis, Minn., 417 (E. S. T.)**—10:45 A. M., Betty Crocker, "The Cake's Crowning Glory." 2 P. M., Woman's Hour. 2:30, musical. 4, "A Pigskin He Loved to Touch," by H. C. Witwer. 5:30, Children's Hour—Ellen Nye. 6, Sport Hour. 7:30, "The Coal Situation in the Northwest," F. O. Brandt. 7:45, "Better Xmas Mail Service," Arch Coleman. 8:30, dedication of organ, First Baptist Church, Minneapolis. 10, silent for remainder of evening.

**WOC, Davenport, Ia., 484 (C. S. T.)**—10 A. M., opening market. 10:05, household hints. 10:55, time. 11, weather and river forecast. 11:05, market. 12, chimes. 12:15 P. M., weather. 2, closing stocks and markets. 6:45, sport news and weather. 7, Sandman's Visit. 7:20, Educational Lecture—"Color in the Home," by Mrs. T. J. Buhman. 8, musical program.

**KYW, Chicago, 536 (E. S. T.)**—6:30 A. M., calisthenics. 9:30, news of the financial and commercial markets. 11:35, table talk, Mrs. Anna J. Peterson. 6 P. M., news, financial and final markets; review of Chicago Trade. 6:35, children's bedtime story. 7, Joska DeBabary's Orch. 7:10, Coon-Sanders Original Nighthawks. 7:20, DeBabary's orch. 7:30, program broadcast from KYW's studio. 8:20, American Farm Bureau; speakers announced. 9, midnight revue. 11, midnight revue continued.

**WEAF, New York City, 492 (E. S. T.)**—11 A. M., musical program; Roger Whitman on "Building a Home"; market and weather. 4 P. M., children's stories; Ricardo de Silva, violinist; Bob Schafer, tenor. 6, dinner music from Hotel Waldorf-Astoria; stories for children; Helen Morris, soprano; The Tappiness Boys; U. S. Navy Band Orch., Charles Benter, director.

**KDKA, E. Pittsburgh, Pa., 326 (E. S. T.)**—7 A.

**FRIDAY, DECEMBER 5 (Cont.)**

M., calisthenics; also at 7:45. 9:45, stockman reports. 11:55, time. 12, weather. Stockman reports. 12:30 P. M., Sunday School lesson. 3:30, closing farm quotations. 6:30, Meyer Davis Orch. 7:15, Daddy Winkum. 7:30, Monthly Business Review. 7:40, Stockman reports. 8:15, music by the Pitt Four. 8:30, Ohio State Day dinner. 9:55, time; weather.

**SATURDAY, DECEMBER 6**

**CKAC, Montreal, 425 (E. S. T.)**—7 P. M., kiddies' stories. 7:30, Rex Battle and his Mount Royal Hotel ensemble. 8:30, "Black Cat Night." 10:30, Joseph C. Smith and his dance orch.

**WFAA, Dallas, Tex., 476 (C. S. T.)**—12:30 P. M., Address, Dr. Ellis W. Shuler, geologist. 8:30, Dr. Richard Mandell, tenor. 11, Adolphus Hotel Orch.

**KGW, Portland, Ore., 492 (E. S. T.)**—11:30 A. M., weather. 10 P. M., George Olsen's Orch.; weather and news bulletins.

**WWJ, Detroit, 517 (C. S. T.)**—8 A. M., calisthenics. 9:30, "Tonight's Dinner" and a special talk. 9:45, health bulletins and talks of general interest. 10:25, weather. 11:55, time. 3 P. M., News Orch. 3:50, weather. 3:55, markets.

**WMAQ, Chicago, 447.5 (C. S. T.)**—12 M., Y. M. C. A. forum. 4 P. M., one of a series of talks on English. 4:30, pupils of Bush conservatory. 6, organ recital. 6:30, Hotel LaSalle orch. 8, weekly Wide-Awake Club, Mrs. Frances Ford. 8:30, musical geography, Mr. and Mrs. Marx E. Oberndorfer. 9, musical program.

**WBZ, Springfield, Mass., 337 (E. S. T.)**—11:55 A. M., time, weather. 6 P. M., Leo Reisman ensemble. 6:30, Copley-Plaza orch. 7, market report. 7:05, bedtime story. 7:30, Hotel Kimball trio. 8, program by Mme. Dueheana, Helen Norwood, soprano; and Charles Kallmann, baritone. 9, members of the Durant, Inc., Women's Health and Recreation Organization. 9:55, time, weather. 10, concert by Mme. Eugenie Tessier Sirois (the blind prima donna), Irene Bourke, Mrs. Josephine Proulx Sizer, Mrs. Albertine Gagnon Dean, soprano; Ernestine Alexandre, pianist; Bernadette Bourbonnais, accompanist. 11:30, Leo Reisman and his orch.

**KHJ, Los Angeles, 395 (P. S. T.)**—12:30 P. M., Virgil Springer, bass. 2, Charlie Wellman's Saturday Afternoon Frolic. 6, Art Hickman's Concert Orch. 6:30, children's program. 7:30, "Care of the Body," Dr. Philip M. Lovell. 8, program by Dr. A. Zimmerman, X-ray dentist. 10, Earl Burnett's Biltmore Orch.

**WDAF, Kansas City, Mo., 441 (C. S. T.)**—3:30 P. M., The Star's Radio Orch. 5:50, Marketgram, weather, time and road report. 6, (School of the Air); address—speaker to be announced. The Tell-Me-a-Story Lady. The Hanlein-Knutson Trianon Ensemble. 11:45, (Nighthawk Frolic).

**WJZ, New York City, 455 (E. S. T.)**—11 A. M., New York Mozart Society, direct from Hotel Astor; soloist, Parrish Williams, high baritone. 1, music. 5:30, State and Federal agricultural reports; 7, Waldorf-Astoria Dance Orch. 8, "Secret Service," Valentine Williams. 8:30, Liederkranz Society Concert. 11, Hotel Astor Dance Orch.

**WIP, Philadelphia, 509 (E. S. T.)**—1 P. M., organ recital by Karl Bonowitz. 1:30, weather. 3, popular orch. program by the "Arcadians." 6, weather. 6:05, Hotel St. James Orch. 7, Uncle Wip's Bedtime Stories. 8, "The Sun Cure for Tuberculous Children," a talk by Dr. Harvey Dee Brown. 8:15, "The Outsider," the drama written by Dorothy Branden. 9:15, "The Chalemey Quartet, Charlton Lewis Murphy, 1st. violin; Alex Morsello, 2nd violin; Irvin Safren, viola; Robert Attwood, cello, assisted by Margaret Irwin, pianist and Sylvia Stanni, soprano. 11:05, organ recital by Karl Bonowitz.

**WOO, Philadelphia, 509 (E. S. T.)**—11 A. M., organ. 11:30, weather. 11:55, time. 12, Tea Room orch. 5:10 P. M., sports results and police reports. 5:15, grand organ, trumpets, J. W. C. I. Band; Arthur A. Rosander, director. 9:55, time. 10:02, weather.

**WGBS, New York City, 316 (E. S. T.)**—10 A. M., talks by Terese. 10:10, Eleanor Schorer and her Kiddie Klub. 10:40, Lillian Robbins, soprano. 1:30, Russian Gypsy Orch. 3, interview, with Joseph Mullen, by Terese Rose Nagel. 3:10, Mrs. Frank Leslie, soprano, and James Gardner MacDermid, composer. 3:20, talk by James Gardner MacDermid. 3:30, Mrs. Frank Leslie, soprano. 3:40, Edith Menzer, Woman's Training Period. 3:50, Mrs. Frank Leslie, soprano. 6, Uncle Geebie. 6:30, Cameo Colleagues; Dick Shipley, leader. 7:30, Armand Vesey and his Ritz Carlton Orch. 8:30, The First Weekly Hour of the New York Herald-Tribune. 9:30, Sam Comly's Movie Chats. 9:45, musical program. 10:15, Josiah B. Free, baritone. 11, Russian Eagle Orch.

**KSD, St. Louis, Mo., 546 (E. S. T.)**—4 P. M., an hour for the housewife. 8, St. Louis Symphony Orch.

**WDAR, Philadelphia, 395 (E. S. T.)**—11:45 A. M., Almanac. 12:02 P. M., organ recital; features from the Studio; Arcadia Concert Orch. 2, Arcadia Concert Orch.; artist recital. 4:30, dance program by the Cotton Pickers. 5:30, Arcadia Dance Orch.

**WCCO, Minneapolis, Minn., 417 (E. S. T.)**—10:45 A. M., Betty Crocker, "A Talk to Girls." 8 P. M., "Fireside Philosophies." Rev. Roy L. Smith. 8:30, Indian program. 10, Minneapolis Athletic Club Orch.

**WOC, Davenport, Ia., 484 (C. S. T.)**—10 A. M., market quotations. 10:05, household hints. 10:55, time. 11, weather and river forecast. 11:05, market. 11:10, agricultural bulletins. 12, chimes. 12:15 P. M., weather. 12:17, markets. 6:45, sport news and weather. 7, Sandman's Visit. 7:30, discussion of the International Sunday School Lesson. 9, Louis Connor and his LeClaire Orch.

**KYW, Chicago, 536 (E. S. T.)**—6:30 A. M., calisthenics. 9:30, late news of the financial and com-

mercial markets. 10:30, Farm and Home service. 11:35, table talk by Mrs. Anna J. Peterson. 6:02 P. M., news financial and final markets. 6:35, children's bedtime story. 7, Joska DeBabary's orch. 7:10, Coon-Sanders Original Nighthawks. 7:20, DeBabary's orch. 8, Ballentine ladies' quartet; Marion Crawford, pianist; Indiana male quartet. 9:05, short stories, articles and humorous sketches. 9:30, late show. 12, show from the Congress Hotel studio.

**WJAX, Cleveland, O., 390 (E. S. T.)**—12 Midnight: Nite-Caps on Lake Erie.

**WEAF, New York City, 492 (E. S. T.)**—4 P. M., Clifford Lodge orch. 6, music, Waldorf-Astoria; stories by Fred J. Turner; May Singhi Breen and her Syncopators; Madelyn Maier, lyric soprano; Waldorf-Astoria orch.; Artists Trio of Hotel Edgemere; Vincent Lopez and his orch.

**KDKA, East Pittsburgh, Pa., 326 (E. S. T.)**—9:45 A. M., Stockman reports. 11:55, time. 12, weather, Stockman reports. 1:30 P. M., Daugherty's orch. 6:30, Westinghouse band. 7:15, Wimble, the Wanderer. 7:30, sport review by James Long. 7:45, feature. 8:30, Westinghouse band. T. J. Vastine, conductor. 9:55, time, weather.

**SUNDAY, DECEMBER 7**

**WLW, Cincinnati, O., 423 (C. S. T.)**—9:30 A. M., school by the editorial staff of Sunday School Publications. 11, Church of the Covenant, Dr. Frank Stevenson, minister. 7:45 P. M., services of the Emmaus Evangelical Lutheran Church, P. L. Dannenfeldt, pastor. 8:45, concert by the Western and Southern Orch.

**WOO, Philadelphia, 509 (E. S. T.)**—10:30 A. M., morning services, Rev. A. Gordon MacLennan, pastor. 2:30 P. M., musical exercises. 6, old time hymns and melodies.

**WEEI, Boston, 303 (E. S. T.)**—3:45 P. M., Men's conference in Bedford Branch, Y. M. C. A. 7:20, program from New York

**CKAC, Montreal, 425 (E. S. T.)**—4:30 P. M., Christie and his Italian Band.

**WFAA, Dallas, Tex., 476 (C. S. T.)**—6 P. M., Radio Bible Class, Dr. William M. Anderson, pastor. 7:30, service at First Baptist Church, Dr. George W. Truett, pastor. 9, Choristers from East Dallas Christian Church. 9:30, Ray Jones and his Heavenly Seven Orch.

**WWJ, Detroit, 517 (C. S. T.)**—11 A. M., services at St. Paul's Episcopal Cathedral. 2 P. M., News Orch.

**WOS, Jefferson City, Mo., 441 (C. S. T.)**—7:30 P. M., evening worship of the First Methodist Church, Rev. James E. McDonald, pastor.

**WIP, Philadelphia, 509 (E. S. T.)**—4 P. M., "Sunday Talk" meeting. 7:15, evening service. 9:30, Ben Stad and his WIP symphony orch.

**MONDAY, DECEMBER 8**

**WOS, Jefferson City, Mo., 441 (C. S. T.)**—8 P. M., Missouri State Prison Orch., supplementary program of piano solos by Harry M. Snodgrass.

**WLW, Cincinnati, O., 423 (C. S. T.)**—10:45 A. M., weather and business report. 1:30 P. M., business reports. 3, market reports. 4, Babson reports; musical program. 6, Santa Claus Hour. 8, the Methodist Book Concern Chorus. 8:10, special dance program by the S. A. E. Orch. Theatrical review. 8:55 Cooper Orch. and Quartet.

**WFAA, Dallas, Tex., 476 (C. S. T.)**—12:30 P. M., address, Judge Charles F. Greenwood. 8:30, recital by members of the Mozart Choral Club.

**CKAC, Montreal, 425 (E. S. T.)**—1:45 P. M., concert orch. 4, weather and stock reports. 4:30, 110 lessons.

**WHAZ, Troy, N. Y., 380 (E. S. T.)**—9 P. M., Elks Night. 12, Camus Serenaders, Rensselaer Polytechnic Institute orch.

**WCBD, Zion, Ill., 345 (C. S. T.)**—Messrs. Newcomer, Stewart, Schultz and Dunn, brass quartet; Fred Faassen, organist; Misses Sweeney, Neffziger and Crowe, vocal trio; Misses Dewep and Donovan, vocal duet; Mrs. Ruth Pihl, soprano; Arthur Rendall, clarinet; Lois Wiedman, reader; Mrs. David McElroy, pianist.

**WOO, Philadelphia, 509 (E. S. T.)**—11 A. M., organ. 11:30, weather. 11:55, time. 12, Tea Room orch. 5:10 P. M., sports results and police reports. 5:15, organ and trumpets. 7:30, sports results and police reports; A. Candelori and his Hotel Adelphia orch. 8:30, American male quartet; Frederick J. Brown, tenor director; Paul A. Lawless, tenor; Robert E. Kerwin, baritone; Felix J. Addis, bass; Thomas V. Lewis, accompanist; Casaccio trio; Michael Casaccio, flute; Maria Casaccio, piano; Caroline Casaccio, mezzo-soprano. 9:55, time. 0:02, weather. 10:03, grand organ recital, Mary E. Vogt. 10:30, Vincent Rizzo and his Hotel Sylvania orch.

**TUESDAY, DECEMBER 9**

**WLW, Cincinnati, O., 423 (C. S. T.)**—10:45 A. M., weather and business reports. 1:30 P. M., business reports. 3, market reports. 4, piano recital by pupils of William Kyle; Mah Jongg talk by Lucy Blackburn. 6, Santa Claus Hour. 11, entertainment from Goodwins' Gordon Kibler and Black and White Goodwilians.

**WFAA, Dallas, Tex., 476 (C. S. T.)**—12:30 P. M., recital presenting the Red-Head Girl. 8:30, W. Paul Romberg, violinist, and the Schubert String Choir. 11, organ recital at the Palace Theatre, Dwight Brown playing.

**WOO, Philadelphia, 509 (E. S. T.)**—11 A. M., organ. 11:30, weather. 11:55, time. 12, Tea Room orch. 5:10 P. M., sports results and police reports. 5:15, organ and trumpets. 9:55, time. 10:02, weather.

**WEDNESDAY, DECEMBER 10**

**WOS, Jefferson City, Mo., 441 (C. S. T.)**—8 P. M., "Feeding for Winter Eggs," by H. L. Kempster. 8:15, "The Rural Schools and Country

Life" by Dr. Henry S. Curtis. 8:30, Old time "fiddlin'."

**WFAA, Dallas, Tex., 476 (C. S. T.)**—12:30:1 P. M., address, Charles E. Osborne, physical fitness. **WLW, Cincinnati, O., 423 (C. S. T.)**—10:45 A. M., weather and business reports. 1:30 P. M., business reports. 3, market reports. 4, program for the "Shut Ins." 6, Santa Claus Hour. 8, the Chubb Steinberg Orchestra. 8:40, first part of Merman Sundermann's drama, "The Joy of Living," Eta Chafes Sinfonian Frat. 8:55, Formica Band and Orchestra.

**WEEI, Boston, 303 (E. S. T.)**—6:30 P. M., Dok-Eisenbourg and his Sinfonians. 7, cooking class. 7:10, Big Brother club. 7:40, "A Few Minutes with Santa Claus." 8, musicale. 11, Dok-Eisenbourg. 11:30, Fenway Theatre midnight organ recital.

**WOO, Philadelphia, 509 (E. S. T.)**—11 A. M., organ. 11:30, weather. 11:55, time. 12, Tea Room orch. 5:10 P. M., sports results and police reports. 5:15, organ and trumpets. 7:30, sports results and police reports; A. Candelori and his Adelphia orch. 8:15, State Ice Creams Post 142 band. 8:45, address by Samuel R. Boggs. 9, W. O. orch.; Clara A. Nagel, soprano; Harriette G. Ridley, accompanist. 9:55, time. 10:02, weather. 10:03, organ recital, Mary E. Vogt.

**THURSDAY, DECEMBER 11**

**WCBD, Zion, Ill., 345 (C. S. T.)**—11 Orch.; Mrs. Inman, Mrs. Crowe and Messrs. Mehaffey and Bagg, mixed quartet; Mrs. Thomas and Mr. Barton, vocal duets; Mrs. Beem and Mrs. Crowe, vocal duets; Beulah Mitchell, soprano; Chester S. Bagg, baritone; Mrs. P. M. LaRose, contralto; Daniel Mason, trombone.

**KFDY, Brookings, S. D., 273 (C. S. T.)**—8 P. M., Mr. and Mrs. R. M. Endresen and Lucille Wendt, Special cornet solo by Mrs. R. M. Endresen. 8:15, "Analyzing South Dakota Soil." 8:25, music by trio. Special saxophone solo by P. M. Endresen. 8:40, "Medinal Plants of South Dakota," talk by Anton Hogstad. 8:50, piano solo by Lucille Wendt.

**WLW, Cincinnati, O., 423 (C. S. T.)**—10:45 A. M., weather and business reports. 1:30 P. M., business report. 3, market reports. 4, French lesson by Madame Ida Teimpidis; piano recital by Adelaide Apfel. 6, Santa Claus Hour. 10, message from the U. S. Civil Service. 10:03, Doherty Meldoy Boys. 10:30, Milnor Instrumental Trio. 11, tenor solos by Carl R. Cornuelle. 11:15, Doherty Melody Boys and Milnor Instrumental Trio.

**WFAA, Dallas, Tex., 476 (C. S. T.)**—12:30 P. M., address, DeWitt McMurray, in a medley of humor, pathos and wisdom. 8:30, Pythian Band and Orch. 11-12, Adolphus Hotel Orch., playing in the Junior ballroom.

**WEEI, Boston, 303 (E. S. T.)**—6 P. M., Jack Renard and his Mansion Inn orch. 7, Big Brother club. 7:30, musicale.

**WOO, Philadelphia, 509 (E. S. T.)**—11 A. M., organ. 11:30, weather. 11:55, time. 12, Tea Room orch. 5:10 P. M., sports results and police reports. 5:15, organ and trumpets. 9:55, time. 10:02, weather.

**FRIDAY, DECEMBER 12**

**WOS, Jefferson City, Mo., 441 (C. S. T.)**—8 P. M., address, "Proven Facts About Hog Cholera and Its Control," by Homer A. Wilson. 8:15, students of George R. Smith College, Sedalia, Mo.

**WFAA, Dallas, Tex., 476 (C. S. T.)**—12:30 P. M., address, Dr. Robert Stewart Hyer. 8:30, J. Abner Sage, head of vocal department; Gay Jones, pianist.

**WEEI, Boston, 303 (E. S. T.)**—6:30 P. M., Dok-Eisenbourg and his Sinfonians. 7, Big Brother club. 7:30, "A Few Minutes with Santa Claus." 8, musicale. 9, Astor Coffee orch.

**WOO, Philadelphia, 509 (E. S. T.)**—11 A. M., organ. 11:30, weather. 11:55, time. 12, Tea Room orch. 5:10 P. M., sports results and police reports. 5:15, organ and trumpets. 7:30, sports results and police reports; A. Candelori and his Adelphia orch. 8:30, special program. 9:25, Hifrael trio; Frances Cordling Campbell, violinist; Elsie Fisher Craig, cellist; Hilda Radey, pianist; Jessie Lovejoy MacGregor, soprano. 9:55, time. 10:02, weather. 10:03, organ recital, Harriette G. Ridley. 10:30, Vincent Rizzo and his Sylvania orch.

**WLW, Cincinnati, O., 423 (C. S. T.)**—10:45 A. M., weather and business reports. 1:30 P. M., market reports. 3, stock quotations. 4, French lesson by Madame Ida Teimpidis; musical features.

**SATURDAY, DECEMBER 13**

**WLW, Cincinnati, O., 423 (C. S. T.)**—10:45 A. M., weather and business reports. 1:30 P. M., market reports. 3, Herbert Buschle and his orch. **WFAA, Dallas, Tex., 476 (C. S. T.)**—12:30 P. M., address, Hugo Swan. 8:30, Kidd-Key College faculty recital. 11, Adolphus Hotel orch.

**SUNDAY, DECEMBER 14**

**WEEI, Boston, 303 (E. S. T.)**—3:45 P. M., regular Sunday Men's conference. 7:20, musical program.

**WFAA, Dallas, Tex., 476 (C. S. T.)**—6 P. M., radio Bible class, Dr. William M. Anderson, pastor. 7:15-9, evening service, Dr. L. D. Young, pastor. 9:30, Jimmy Allen's orch.

**WOS, Jefferson City, Mo., 441 (C. S. T.)**—7:30 P. M., religious services of the First Presbyterian Church, Rev. W. Hooper Adams, pastor.

**INDEX TO VOL. 5, RADIO WORLD**

A complete index covering all the articles that appeared in Radio World from Jan. 5 to Sept. 20, appeared in Radio World dated Oct. 18, mailed on receipt of 15c., or start subscription with that number. **RADIO WORLD**, 1493 Broadway, New York City.

# Caldwell's Favorite Receiver That He Calls an

By Byrt C. Caldwell

**T**HE 5-tube reflex receiver is my favorite. After having built every kind of a receiver, from a crystal set to the 8-tube Super-Heterodyne, I decided that some type of reflex receiver is likely to be the most satisfactory for home use and all-around good work.

The receiver described, though not as selective as a good Super-Heterodyne, is selective enough for present-day use for both local and distance reception, gives tremendous volume, and almost perfect tone, and in sensitiveness surpasses the 8-tube Ultradyn. On the first test, immediately on setting the machine up, 11 stations, from 300 to 1,000 miles away, were received with enough volume to be heard clearly in any part of a 10-room house, with the set on the top floor. And the test only lasted for 1½ hours.

Fig. 1 shows the panel design, 7x24-in., drilled after marking by means of a template made from the diagram. Fig. 2 shows the arrangement of the parts on the baseboard. This arrangement should be followed closely, as it has much to do with the results obtained.

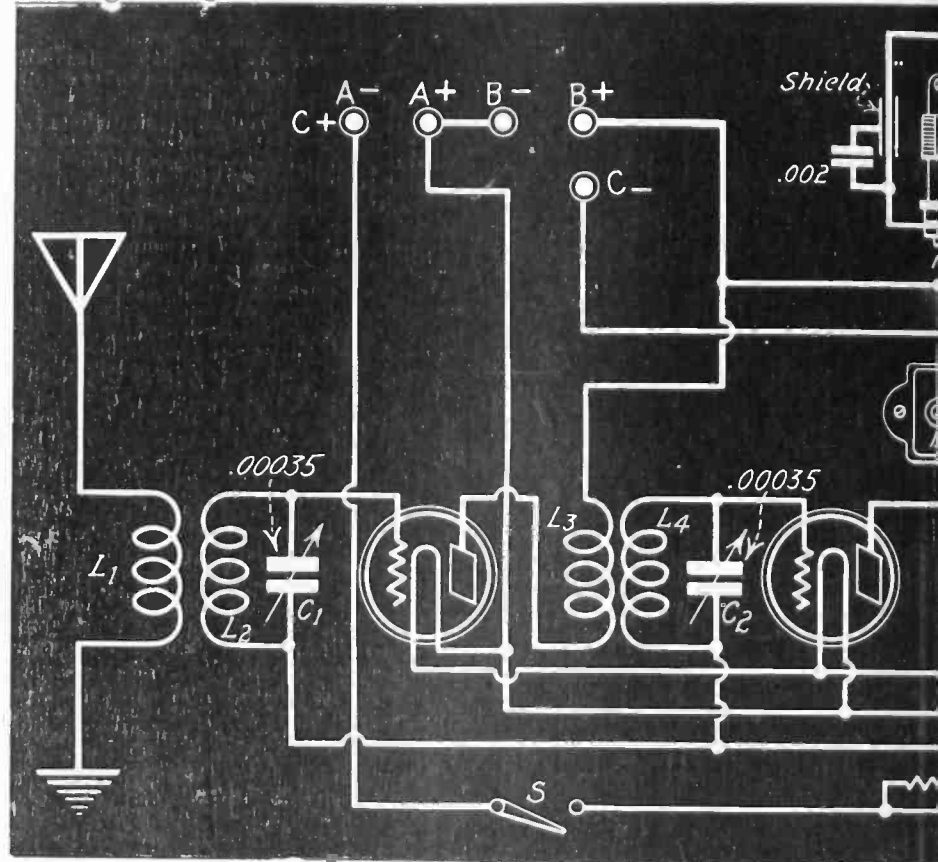
In Fig. 3 is shown the hook-up. The exact wiring of the audio and the fixed radio transformers is shown, and this should be followed closely. Take the utmost care in wiring and be sure that the soldering is perfect. If the wiring is done carelessly you will have no end of trouble, but if a good piece of work is done perfect results are assured.

Although there are four stages of RF amplification I have never been troubled with oscillation, though I kept the potentiometer always at the negative end!

The form for winding the coils is made out of a 4" square block of wood, marked with a 3" circle. This circle is divided into 15 equal divisions, and 3/16" holes are drilled on these divisions. If dividers are used to get the 15 points, place the divider points 3/8" apart. Metal or hard rubber rods are placed upright in these holes, and the coils are then wound on the form thus constructed. Wind around every two pegs, instead of in and out of each succeeding page.

No. 20 double cotton covered wire should be used for these coils. Wind 60 turns. Then put a little collodion on the wires where they cross both inside and out, and when this is dry, remove the pegs. Wind a single layer of paper, 1/2" wide over this coil, and on top of this wind 5 to 7 turns of the same kinds of wire. This is the primary. Fasten this winding with collodion also. Do not use much.

When mounting these coils, place them as far as possible from any solid, especially



**A BLACKPRINT (Fig. 3) of Caldwell's Favorite Receiver.** Note the placement of the audio lead which is shielded to prevent interaction of currents. L1 and L3 are audio transformers. All coils are basket-weave. This circuit, having but two controls and capable of being tuned to any station, is a very simple one. There are two untuned RFT stages, with an untuned RFT used for the detector and a 200-ohm potentiometer. A C battery biases the audio stages only. Try from usually

a metal. If they must be placed close to the condensers, place them so that the plane of the coil is at right angles to the plates of the condenser.

The long wire from the first AF transformer to the crystal should be covered with a piece of spaghetti. A piece of Belden braid or copper tubing is slipped over this. It must not touch the wire. This shield is connected to the wire which ends at the mark C-. One side of a .002 mica fixed condenser is soldered to this shield and the other side is soldered to the wire which passes through the shield.

A .001 mica condenser is soldered across the secondaries of each of the first two audio transformers.

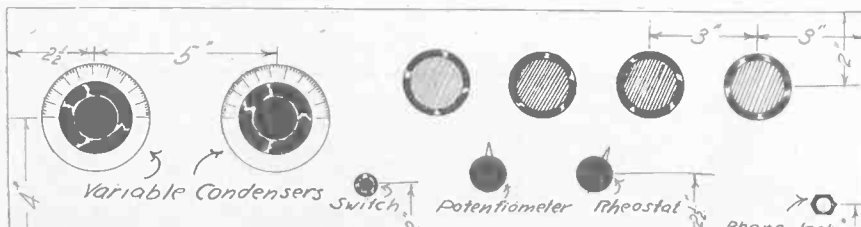
If the receiver oscillates the potentiometer may be used to stop the howling, but if this does not stop the howl it is due to feedback in the three audio transformers, poor batteries, high resistance connections, etc. It may be stopped by connecting a 50,000-ohm resistance across the secondary of the first AF transformer.

If you want a real satisfactory home receiver, one which is not prohibitive in price, one which gives wonderful distance on an indoor antenna—use an indoor antenna—one which is easy to operate, gives great volume if desired, good selectivity, and perfect tone, this is the one to build. The writer has tried this machine out against practically every type of receiver and unhesitatingly recommends it as the most all-around satisfactory set which one could hope to construct.

**A. Wire panel first.** Do not fasten panel to base yet.

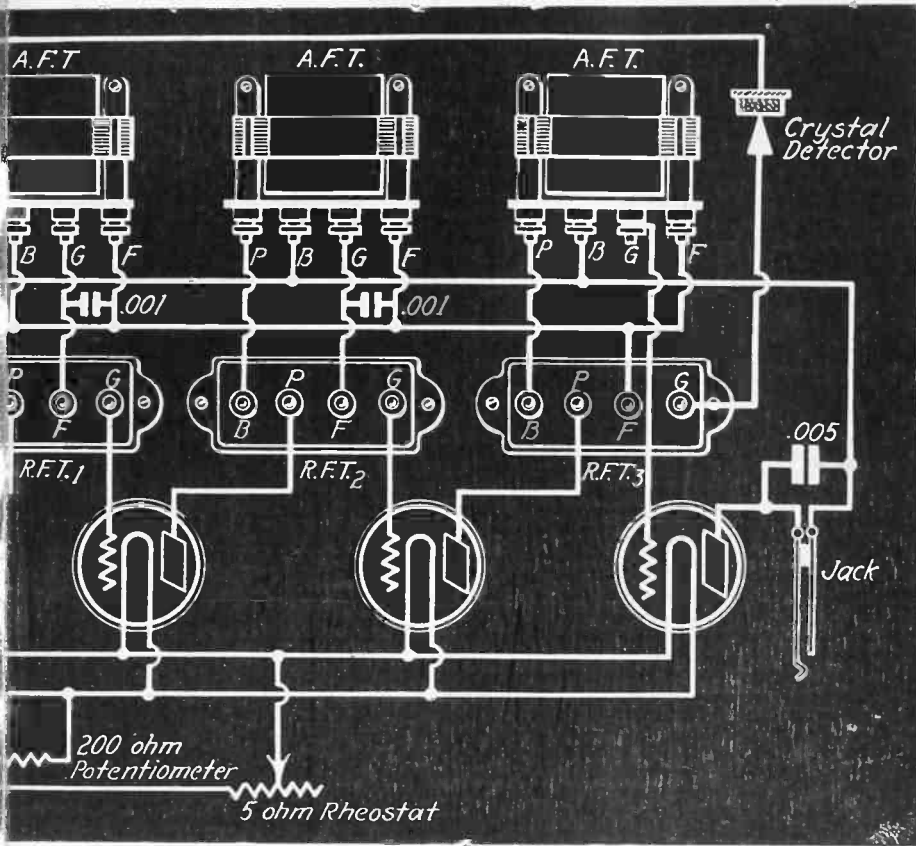
1. Connect switch to left side of rheostat (looking at panel from front).

2. Connect left binding post of potentiometer to this wire.



**FIG. 1—Panel design for Caldwell's favorite receiver.** The panel is 7x24". Make a template on paper, using the measurements given, and paste the template on the panel. Then dull.

# Receiver, a 5-Tube Reflex Ideal Holiday Gift



of the instruments for shortleads and the careful arrangement of the wiring. The primary of the first two A.F.T.s, L1 and L2, are the standard primaries of 6 turns; L2 and L4 are the standard secondaries of 60 turns. The receiver, being logged, is extremely easy to tune. The two tuned radio stages are at left. The coupling is reflex. The grid return of the two tuned radio stages is to the midpoint of the potentiometer. The crystal may be of the fixed type, but the adjustable crystals are much better.

3. Connect middle of potentiometer to movable plates of both condensers.

B. Wire base next.

1. Connect left-hand binding posts of all sockets together.

2. Connect right-hand binding posts of all sockets together, and to A plus binding post. Connect A plus and B minus binding posts.

3. Connect the plates of the 2nd, 3rd, and 4th tube sockets to the P binding posts of their respective RF transformers.

4. Connect G of RFT1 to G of 3rd socket, G of RFT2 to G of 4th socket, and G of RFT3 to crystal.

5. Connect other side of crystal to P of first AFT. (Over this wire, slide a piece of spaghetti, and over this a piece of Belden braid or copper tube, so that the braid or tube does not touch the wire).

6. Connect a long wire to B plus binding post, and have this long enough and so bent that the other end will reach one side of the jack when the panel is put in place.

7. Connect B of RFT1, and B of the 2nd and 3rd AFT to this wire.

8. Connect a long wire to F of the last AFT and have this long enough to reach over to the C— binding post.

9. Connect B and F of the 1st AFT, F

of the 2nd AFT, and F of RFT3 to this wire.

10. Shunt a .001 micadon across the secondary of each of the first two AFTs.

11. Connect one side of a .002 micadon to the copper tube shield over the long wire to the crystal, and the other side to the wire which is shielded. Connect the shield to the wire connected to the C— binding post.

C. Fasten base and panel together.

1. Connect the other side of rheostat to

the wire which connects the left hand binding posts of the sockets together.

2. Connect the other binding post of the potentiometer to the wire which connects the right hand binding posts of the sockets together.

3. Connect the other side of the switch to the A— binding post.

D. Put low-loss coils in place.

1. Connect antenna binding post to beginning, and ground post to end of primary of first coil. (L1).

2. Connect beginning of second coil (L2) to fixed plates of first condenser, and to grid of first tube, the end going to the potentiometer midpoint.

3. Connect plate of first tube to beginning of primary of 2d coil (L3), and end of primary to B plus binding post.

4. Connect beginning of secondary of 2nd coil (L4) to fixed plates of 2nd condenser, and to grid of 2nd tube, end going to the potentiometer midpoint.

5. Connect the other end of the long wire from the B plus binding post to one side of the jack.

6. Connect P of last tube to other side of jack.

7. Shunt a .005 micadon across the jack.

This set will make an ideal holiday gift. It is easily tuned, produces a wonderful tone, and is absolutely foolproof.

### LIST OF PARTS

- One 4" block of wood.
- Fifteen pegs.
- ½ lb. No. 20 DCC wire.
- Three AF transformers, one 6-to-1 and two 3½-to-1.
- Three fixed (untuned) RF transformers.
- One crystal detector.
- Two dials.
- One single circuit jack.
- One 200-ohm potentiometer.
- One 5-ohm rheostat.
- Four sockets.
- Two 17-plate variable condensers (.00035 mfd.) vernier not necessary.
- One push-pull filament switch.
- Fixed condensers: two .001, one .005, one .002, one .005.
- Five 201A tubes.
- Two 45-volt B batteries.
- One 6-volt A battery.
- Two 4½-volt C batteries.
- One 7x24" panel.
- One 6½x23" baseboard.
- One length of Belden braid (1 ft.)
- 100 ft. 7-strand aerial wire, 50 ft. No. 14 insulated lead-in wire, binding posts, bus bar, spaghetti, screws, bolts, solder, hardware.

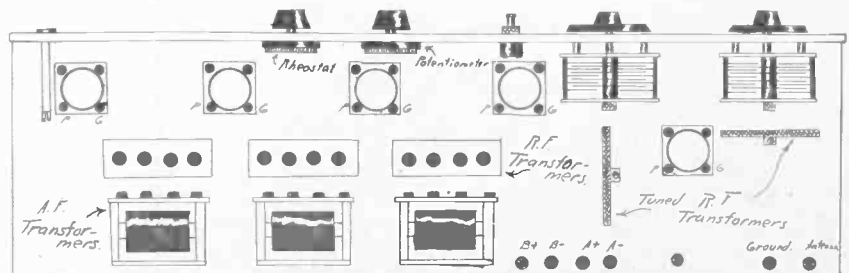


Fig. 2—The assembly plan. "This arrangement should be followed closely," advises Mr. Caldwell, "as it has much to do with the results obtained." The diagram shows top view, with the panel in back.



# Adding Two Stages of Audio

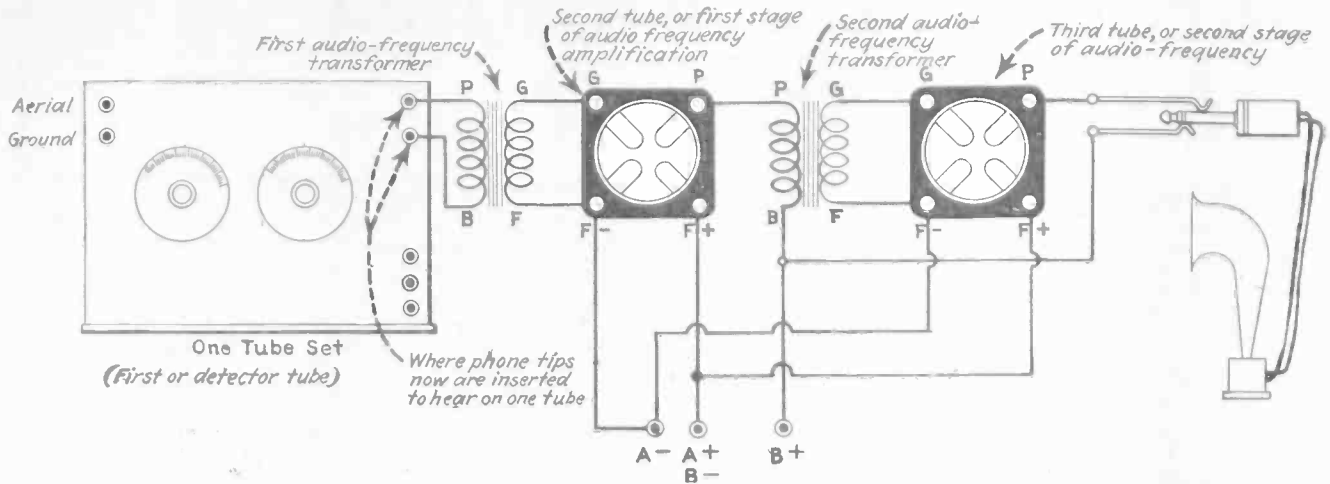


FIG. 1—A non-technical diagram for hooking up two stages of audio-frequency amplification. A separate B battery voltage must be used for the primary of the first stage of audio, as it is this voltage that supplies the plate current for the detector tube. For the sake of simplicity no rheostats are shown. If 199 tubes are used, no rheostats will be required if but two dry cells are placed in circuit. If type 11 or 12 tubes are used, two 1½-volt dry cells in parallel, with no rheostat, will work well. A switch should be used to turn the tubes on and off.

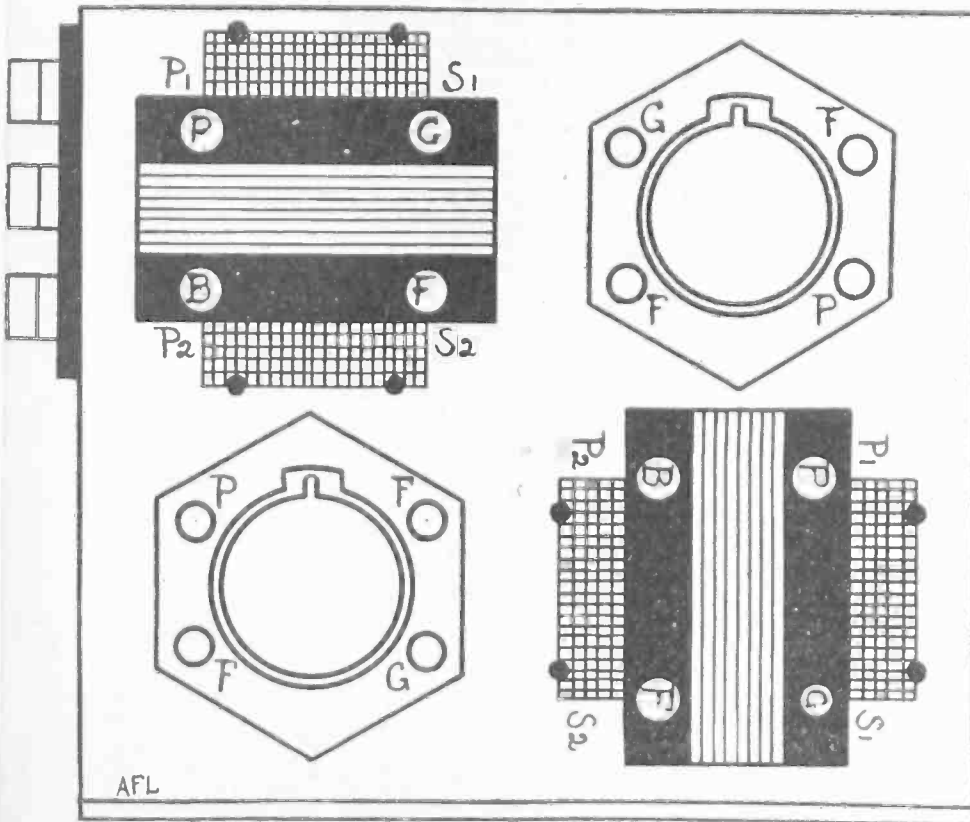


FIG. 2—The baseboard layout for the 2-stage amplifier: The sockets shown are for 199 tubes, but any standard amplifying tube may be used. Note that the cores of the audio transformers are at right angles to each other. This tends to prevent the interaction of currents, thus no howling. Keep leads short and to the point.

## By Dennis J. O'Flaherty

THERE are two distinct types of frequencies in radio operation—radio and audio.

Radio frequency is the frequency above approximately 15,000 cycles per second; audio frequency is the frequency below 15,000 cycles per second. Now, the question arises, "Why just 15,000 cycles?" The ear is the basis of distinction between frequencies. The average ear cannot hear anything that vibrates faster than 15,000 times per second. Some can hear pitches still higher—some cannot hear quite so high.

Therefore, when we amplify at radio

frequencies, the incoming signal is yet too high a pitch for the ear to hear or the phones to operate—around a million cycles per second. Therefore, it isn't until the signal reaches the tube and the phones that it is reproduced at the original frequency.

When we amplify at audio frequencies, the current that comes out of the plate circuit is stepped up so that the original frequency coming through the primary of the audio transformer is not changed—it is the voltage only, of the incoming signal, that is being boosted.

Remember—Radio for Range; Audio for Audibility.

However, despite theory, audio fre-

quency amplification does increase the practical receiving range of the set. Signals that are too weak to ordinarily actuate the phones, may yet be powerful enough to actuate the transformer of the first stage so that by the time they emerge from the second stage they have enough power to operate a loudspeaker or at least earphones for far-off stations.

It is always best to add audio frequency before adding radio frequency.

Never add more than two stages of transformer-coupled audio frequency to a set. If you must have a third stage of audio amplification make it resistance coupled.

Fig. 1 shows the detector tube and tuning unit of the set. The primary of the first audio transformer is connected to the output of the detector. Merely take off the phones and connect the two posts of the primary of the audio transformer to the former telephone binding posts.

Fig. 2 is the baseboard layout of the two-stage audio-frequency amplifier if 199 or equal tubes are used. Note that the cores of the audio-frequency transformers are at right angles to each other. Any standard amplifying tube may be used, but the sockets would have to be turned.

For the sake of simplicity in the diagram, no rheostats are shown. However, referring to Fig. 1, one rheostat may control both amplifying tubes. Merely insert the rheostat in series with the filament plus lead. Break the connection between the A+ posts on battery and F+ socket posts. Connect one side of the rheostat to each F+ socket binding post and the other side to the A+ battery. Fig. 3 shows how, schematically.

At least 45 volts B battery should be used for the amplifier. The signals will grow stronger as the voltage is increased to 90 volts, after which volume decreases. It is not advisable to apply more than 90 volts to the plate. There is always too great a possibility of the element support melting or of blowing out the primary of the transformer by a sudden turning on and off of the tube.

For the best results use transformer of different turn ratios. For the average tube a 6-to-1 ratio for the first stage and a 3½-to-1 ratio for the second stage are about correct.

If the instruments are not properly placed the amplifier will howl, due to an interaction of currents between the transformers. Keep the transformers at right angles. Keep the grid leads short and straight, and the plate leads at right angles to the grid leads.

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## A THOUGHT FOR THE WEEK

**C**RYSTAL may be a lowly start in radio—but don't forget that Columbus used an egg to demonstrate the fact that the world is round.

# RADIO WORLD

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DECEMBER 6, 1924

## The Pointed Program

8:30 P. M.—A man is no better than the best set he can make. 8:45—Reasonableness in expectations from receivers is too much to expect of human beings. 9—The best way to lose a stack of tubes is to let a kindly neighbor try to fix your set. 9:10—Better a bad set than no set at all. But sets are only as bad as you make 'em. 9:45—A grid that won't grid is worse than an oscillator that won't osc. 10—Most fans whose chief delight is to get quality reception wear the most disappointed faces when they can't "get" 3,000 miles every night. 10:12—Radio, without Coueism, every day in every way gets better and better. 10:20—Fans who make sets and rip 'em apart should always have a working set on hand, for even near and dear relatives are worthy of some consideration around the holiday season. 10:30—A Merry Radio Christmas is the slogan this year.

# The Holiday Gift for Better Manhood



**N**EAR the ash dumps in a Long Island community, lived six boys. One of them somehow got enough money to buy a rifle by mail. The boys went to the swampy dump to test it out on a hunting exhibition, and something happened. The explanation is that the rifle went off accidentally. One of the boys was killed. His companions hid his body behind bushes and placed an old derby hat over the face. For ten days the boys led the police to points other than the important one. Finally one lad, under sharp, secluded police questioning, broke down.

These were young lads, all of them, the eldest thirteen, others nine and ten. They used to shoot dice, sometimes at night, near the dump, for the refuse of the world was their playground. When they would grow up, say to be old enough to wear long trousers, they would still be shooting dice. The fascination of doing the forbidden thing, an obsession easily bred by evil companionship, would still thrill them as no honest endeavor could. They would not be bad boys, individually. Each one, taken by himself, would be good; but the product of competitive daring is a figure that resists even a mother's kindly authority, and easily descends into thuggery.

\* \* \*

**I**N Brooklyn, N. Y., a blond-haired, red-checked boy sang in a choir. He was so good-looking that he suffered perhaps the superficial disadvantage of seeming to the eye effeminate. Soon he left the choir and trod other fields. His parents at this stage seemed to have lost interest in him. Watch the boy or girl in whom the parents have done that.

The angel-faced boy emerged from the mists of the forgotten one day in a police court in Brooklyn. He was accused of burglary! With such a winning face, which in itself seemed to contradict every suggestion of violence or thievery? Yes, and soon the face was looking from behind cold bars of steel, and thus they looked for three years. Then a short period elapsed—perhaps a few months—and then another period—but each time through the years there was always the interruption of a prison term. And now this man, still under thirty, is under a life sentence for his tenth proven burglary.

\* \* \*

**N**OT all lads who lurk on city street corners or in gang headquarters in covens, lots and "bunks" by the hillside turn out to be criminals. Some just grow up to be do-nothings or good-for-nothings. A few make good. But it is risky for the boy—any boy, be he your son, brother, nephew—to be thrown upon his wits for a playground, natural yearning of the adolescent heart. That playground should be principally the home itself, the greatest institution for moral education. New playmates that the son is making are under parental vigilance. A parent, particularly a mother, has an uncanny knack of instantaneous discovery of unfitness of another lad to be the son's playmate.

\* \* \*

**N**OT one of the homes of the six boys of the ash dump homicide, nor the home of the angel-faced boy, possessed that magnetic attraction which makes the home at once the study and the playground, that attraction which is the greatest entertaining and educational medium contrived by the partnership of Man and Nature.

# YOU CAN BUILD

ANY ONE OF THESE  
RADIO RECEIVERS

WITHIN 30 MINUTES  
AFTER THE POSTMAN ARRIVES



## IT'S EASY. NO SOLDERING

BECAUSE  
WE HAVE DONE IT  
FOR YOU

Even the few remaining bus bar connections are already shaped to the exact angles for you.

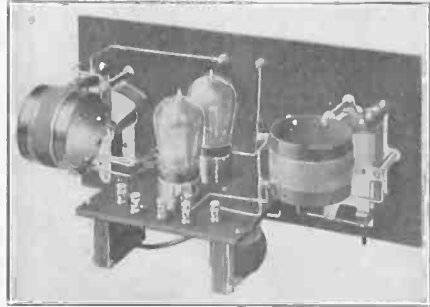
Just the turn of a few screws, the adjustment of a few small nuts and you will have completed the construction of a two, three or five tube radio receiver that, in workmanship and efficiency, will be the equal of sets costing several times the prices we ask.

The A. I. R. SERVICE COMBI-UNIT KITS include everything to make it easy for you. And the instructions are so simple that you cannot make a mistake.



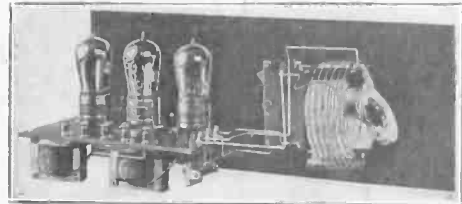
## A WONDERFUL GIFT

### Two Tube Loud Speaker Reflex



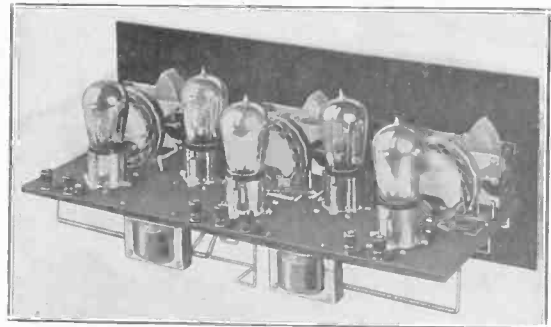
Operates a loud speaker with tremendous volume. **GENUINE MAHOGANY CABINET INCLUDED.** (Not an imitation.) ..... **\$31.50**

### Three Tube Low Loss



Includes the new silvered primary **GEN WIN LOW LOSS TUNER.** **GENUINE MAHOGANY CABINET INCLUDED.** (Not an imitation.) - Brings in stations even a thousand miles away. Frequently on the loud speaker ..... **\$34.50**

### Five Tube Radio Frequency Type 5A



This receiver has brought in the broadcasting from coast to coast. The most efficient type of receiver ever designed. **GENUINE MAHOGANY CABINET INCLUDED.** (Not an imitation) ..... **\$37.50**

No matter how experienced in radio you might be, we ask you to measure the A. I. R. SERVICE RECEIVERS against your most exacting ideas. Notice the quality of reception and that even distant stations come in on the loud speaker. Notice the neatness of the wiring and assembling, the most of which we have already done for you. Examine the apparatus closely and notice the unusual high quality. Notice that we have adhered strictly to the low loss principle—low loss condensers, low loss coils, and even low loss tube sockets (something new). Notice the sub-bases and the neat arrangement of the parts. Also that most of the wiring is out of sight (no more ugly wooden baseboards). Notice our new shadow panel and that silky effect. Notice that the A. I. R. SERVICE COMBI-UNIT KITS include a beautiful mahogany (not an imitation) cabinet. **THEN NOTICE OUR LOW PRICE.**

### MAKE US PROVE OUR CLAIMS

Choose the receiver here described which is best suited to your requirements. (We will entirely assemble it for a small additional charge, if you wish.) Then send your order by letter, post card or any way you wish.

**SEND NO MONEY. WHEN YOUR SHIPMENT ARRIVES PAY THE POSTMAN.**

If, after **THREE DAYS**, you decide that the receiver is not everything we claim, ship it right back to us. **WE WILL REFUND YOUR MONEY BY RETURN MAIL.**

**Dealers and Representatives Send Us Your Names and Addresses**

Send us your name and those of your friends. We will place you on our mailing list and send you the **PERRY WEEKLY RADIO TALKS.** They are free and will be a liberal education in radio in the course of a few weeks.

# American Interstate Radio Service

183-185 GREENWICH STREET

NEW YORK



# The Radio Trade

## NAVAL OFFICERS APPEAL RULING ON UNDERSEA TRANSMISSION

BALTIMORE.

**JOHN A. WILLOUGHBY** and Percival D. Lowell, naval officers, have filed suit against James Harris Rogers, of Hyatts, Md., claiming to be the original inventors of a patent making possible radio transmission on undersea craft, upon which Mr. Rogers holds a patent. Rogers applied for the patent January 10, 1919, and it was granted in May of the same year. The two officers were then working on the invention, but were not then ready to file their claim.

Upon applying for the patent they had found that Rogers had already obtained one. Rogers, against whom the Commissioner of Patents ruled, took the case to the Columbia district court of appeals. The court reversed the decision of the Commissioner and held that Rogers was the rightful owner of the patent.

The plaintiffs state that this decision was "erroneous and contrary to law." They ask the district court to adjudge them the lawful owners of the patent.

## New Corporations

Bond Electric Mfg. Co., mfr. radio apparatus, New York City, \$10,000; B. Miller, A. A. Badian, H. Reifel. (Atty., K. M. Marcus, 144 Rivington St.)

People's Radio Stores, Albany, N. Y., \$10,000; D. and S. Markowitz, J. P. Lieberman. (Attys., Yaguda & Cohen, Albany.)

Diamond Radio Products Corp., New York City, \$10,000; M. Kaplan, C. Rothblatt, B. Maxwell. (Atty., M. E. Baron, 1475 B'way.)

Monarch Radio Corp., New York City, \$48,000; L. Modell, I. and D. Malzman. (Atty., H. Bergman, 210 B'way.)

Sherman Wireless Corp., New York City, \$10,000; G. N. Sherman, M. Brooks, M. M. Gelman. (Atty., A. Dreyer, 1482 B'way.)

## Coming Events

DEC. 1-7—Newark Radio Fair.

DEC. 1 TO 8, INCLUSIVE—Boston Radio Exposition, Mechanics Building, Boston.

## Business Opportunities Radio and Electrical

Rates: 40c a line; Minimum, \$1.00

**GROWING BATTERY** manufacturing business for sale; now in operation; dies, necessary equipment; established trade; product advertised; will consider any reasonable offer, Box 01, Radio World.

**FEW THOUSAND** for manufacture radio loud speaker, cabinet form. Box 02, Radio World.

**RADIO AND PHONOGRAPH** store, fine location, lease; will pay to investigate. Box 03, Radio World.

**ENGINEER** wishes sell mechanical or electrical specialty to manufacturer in New York or Philadelphia districts. Box 04, Radio World.

## Literature Wanted

THE names of readers of RADIO WORLD who desire literature from radio jobbers and dealers, are published in RADIO WORLD, on request of the reader. The blank below may be used, or a post card or letter will do instead.

Service Editor,  
Radio World,  
1493 Broadway, New York City.

I desire to receive radio literature.

Name .....

City or town .....

State .....

Are you a dealer?.....

If not, who is your dealer?.....

His Name .....

His Address .....

S. R. Young, 500 Magnolia Ave., Elizabeth, N. J.

F. W. Ross, Attleboro, Mass.

L. L. Williamson, 803 E. Grace St., Richmond, Va.

Roy R. Toth, 352 Woodlawn Ave., Jersey City, N. J.

A. B. Ogdenshi, Pine Island, N. Y.

Jos. Lombardo, 2264 E. 705th St., Cleveland, O.

Geo. Nichols, 57 St. James Ct., Lowell, Mass.

I. Mayers, 47 Park View Terrace, Newark, N. J.

Malta Shop, Chartley, Mass.

Floyd S. Lehmann, 1 W. 33rd St., Minneapolis, Minn.

I. Cleدامs, Calistoga, Cal.

G. Dowling, 840 Baker St., San Francisco, Cal.

Triangle Radio Service, 159 11th Ave., Mt. Vernon, N. Y.

H. E. Nelson, Keokuk, Ia.

M. H. Cleveland, 205 S. Titus Ave., Ithaca, N. Y.

A. E. Geldhof, 5310 N. Pauline St., Chicago, Ill.

Geo. Hansen, 1712 E. 28th St., Des Moines, Ia.

Floyd S. Jones, 830 Ohio Ave., Canon City, Colo. (Dealer).

Roy Copp, 307 Macon Ave., Canon City, Colo. (Dealer).

W. Scott Ireland, 111½ Woodland Ave., Pleasantville, N. J.

F. K. Newkirk, Aberdeen, S. D.

Paul Stanton, Vermillion, Kan. (Dealer).

W. J. Hastings, 449 E. 106th St., Cleveland, O.

Guy W. Fredericks, Box 705, Miami, Ariz.

Fred Lund, 964 Savannah St., Mobile, Ala.

Geo. Lassen, Buffalo, So. Dakota.

Andy Ketchel, 23 Foundry St., Newark, N. J. (Jobber).

J. L. Lawson, LaFollette, Tenn.

Wm. A. Breniman, Box 54, Los Angeles, Cal.

J. W. Williams, 3216 Calif. St., S. Berkeley, Cal.

R. L. DesLoges, 706 W. 180th St., New York City.

E. A. Day, Kane, Pa.

Edw. McBride, Avonmore, Ontario, Can.

R. W. Laru, Hudson, Ohio.

Nick Manfredi, 30 Van Houten St., Paterson, N. J.

H. B. Thomasson, 1015 7th Ave., Hickory, N. C.

Peter Menos, 256 Wisconsin St., Milwaukee, Wis.

Hans G. Hirsch, Box 993, Havana, Cuba.

B. E. Gilman, 9 Noth St., Waterville, Me.

Alfred Donovan, Mt. Morris, N. Y.

F. J. Ensel, 2000 32nd Ave. South, Seattle, Wash.

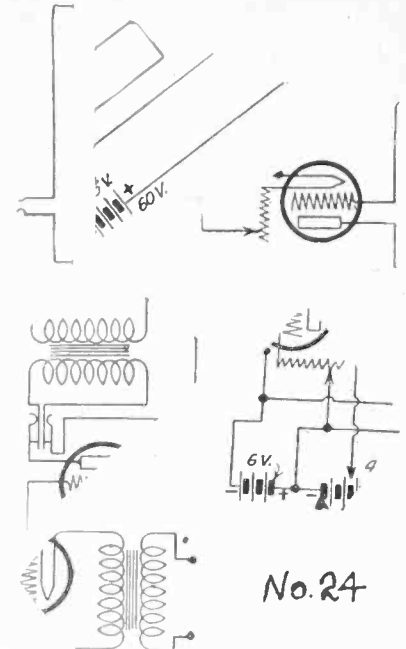
O. N. Anderson, Verden, S. D.

F. Stille, 108 N. Portland Ave., Youngstown, O.

T. J. Overby, Wilmington, N. C.

SEND FOR FREE CATALOG of Radio, Electrical and other technical books. The Columbia Print, 1493 Broadway, N. Y.

## Scrambled Diagram

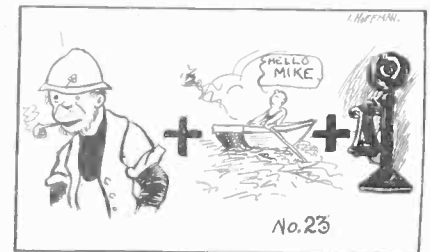


No. 24

TRY to piece this Scrambled Diagram together. Send your solution to Scrambled Diagram Editor, RADIO WORLD, 1493 Broadway, New York City.

## The Weekly Rebus

WHAT does this rebus represent? Send answer to Rebus Editor, RADIO WORLD, 1493 Broadway, New York City.



The names of those sending the solution will be published.

### SOLVERS OF THE REBUS

- Evelyn Reynolds, Crook, Colo.
- Chris. P. Stephens, 245 E. Pine St., Atlanta, Ga.
- Joseph Murphy, 62 Lexington Ave., Jersey City, N. J.
- Leo Witters, Jr., 1208 Race St., Kalamazoo, Mich.

## Station YAP!

(The Japanese Government has decided to build a radio station on the Island of Yap next year.)

OH gather 'round and you shall hear of the wonderful Island of Yap.

A station there they'll build next year for the use of the innocent Jap.

'Twill cost about a million yen—

Which is not quite so much as it sounds; It's something like a dollar-ten, Plus a couple of shillings and pounds.

Then it's Yap, Yap, Yap!

For the sap, sap, sap!

And also for the wiser ones as well.

For the Jappy will be happy

With his programs bright and snappy.

And perhaps our fans will like 'em—who can tell?

—H.

# LEWIS Specials

### Meyers Tubes

Unbreakable, noise free, non-hissing Detectors and Amplifiers. Can be used with any make of tubes. Adapter or mounting free. **\$4.00**

### Genuine Factory Sealed

#### Acme Kitset

Best 4-Tube Reflex Loop Set  
Reg. \$65.00—\$47.00

### Tel-aer

Only Insulated Aerial Wire approved by Board of Fire Underwriters. 100 ft. coils, with connecting lugs. **\$1.25**

### Cage Antenna

**\$2.00**

The best indoor aerial.

### New Transcontinental

#### Low Loss Tuner

Adjustable primary and tickler  
Special Feature—\$7.00

### 72" Battery Harness

Complete with lugs and Lead Battery Clips

Special—\$1.10

J. L. LEWIS, INC., 132 WEST 32ND ST., NEW YORK

## Trouble Shooting in Superdyne

(Concluded from page 15)

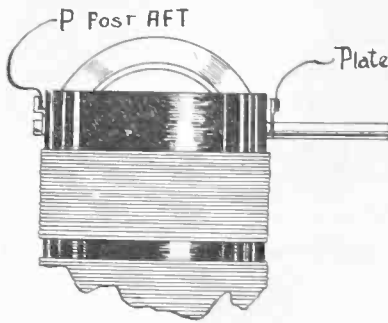


FIG. 1, right way to connect the tickler L4 if a standard 3-circuit coupler is used, with all windings in the same direction. If a special Superdyne coupler is used the connections are just the opposite, for the Superdyne coils usually have a reverse wound tickler. If the rotor is of the 180° type, however, the connections may be made in either way, the reverse feedback being obtained by rotating the tickler to negative inductive relationship.

rate a set. The 4-tube Superdyne will not usually give volume enough to fill an auditorium receiving a station 500 miles distant. However, it will give more than enough volume to comfortably hear in a large room. On 500-watt stations within a radius of 300 to 500 miles it is not too much to expect loudspeaker operation under good atmospheric conditions and with a good aerial. With the Superdyne, it is advisable that a type 200 tube be used as detector. The hard tube will not function quite as well as detector. Type 201A is suggested for the amplifying tubes. If you are located not nearer than 50 to 75 miles from the nearest broadcasting station, volume may be increased considerably by adding turns to the semi-aperiodic primary.

### Making Selectivity Better

No selectivity? Selectivity rests on two things mainly, viz., correct tuning and the proper number of turns on the coils. The Superdyne is a regenerative set. It is necessary that proper control be had of the regenerated currents or naturally neither best selectivity or sensitivity will be obtained. In tuning, set the rotor (stabilizer) as high as possible without having the set break into oscillation. The wavelength condenser (secondary) is then turned slowly, compensating on the regeneration by turning the rotor coil in the opposite direction. Remember, always set the rotor coil as high as possible without allowing the set to break into oscillation. If you are tuning your set correctly, turn to the coils. Take off, one turn at a time, the winding from the aperiodic primary. Each turn that is taken off will increase selectivity. It is even possible to go as low as having only two turns left, getting approximately the same volume, but improving in selectivity.

Too much oscillation? No control of regeneration? See Fig. 1. It is necessary that the ends of the windings of L4 be reversed, i. e., the beginning of L4 goes to the plate and the end of L2. If a standard 180° variocoupler is used, it is not necessary to worry about the reversal of the connections, as this automatically occurs after a 90° rotation is reached. The proper use of the detector rheostat helps to solve much of the problem of controlling the regeneration.

Distortion? See Fig. 2. Not only does the C battery conserve the life of the B battery, but it gives maximum amplification with minimum distortion. In order to get the proper negative grid bias, it is well to experiment until the correct voltage is obtained. Always experiment on a weak signal, because there will be no noticeable difference when changing the voltage of the C battery on locals.

# S-U-P-E-R-D-Y-N-E Specialists

WE ARE HELPING HUNDREDS OF FANS IN THE SATISFACTORY CONSTRUCTION AND OPERATION OF THE SUPERDYNE, so successfully featured by RADIO WORLD

## WE CAN HELP YOU!

OUR OWN COILS FOR SUPERDYNE  
Our engineers have developed the coils for this circuit to its highest perfection. Coils for superdyne (complete with diagram)..... **\$6.50**  
(Note: These Coils have been developed by and are distributed solely through us and should not be confused with inferior coils.)  
SUPERDYNE KITS  
Kits consisting of two Flewelling Condensers and complete set of coils (with diagram). SPECIAL PRICE FOR THE MONTH OF NOVEMBER..... **\$16.50**  
COMPLETE PARTS FOR SUPERDYNE  
Easily recognized as the products of leading manufacturers, assembled on engraved Radion front panel, and base panel with necessary bus bar ready to wire (technical and schematic diagram furnished). Schematic diagram drawn to actual size in minutest detail showing wiring above and below base panel. Using this diagram you can build a set equal to the best expert, particularly as to appearance and results..... **\$51.00**  
Contrary to usual practice, all parts included in this kit are the very best quality on the market, and workmanship first class.

READ OUR GUARANTEE

### GUARANTEE

We guarantee everything you buy from us to be satisfactory to you in every detail.  
You take no risk whatever in sending us your order, for unless you are completely satisfied with the article you may return anything you buy from us within 10 days and we will promptly refund your money.  
We want you to know the kind of a house you are trading with. We want you to know our principles of honest dealing and honest merchandise.

Wallace Radio Company for Good Standard Radio Equipment at reasonable prices with service—that means something.  
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Complete Parts for all of WORLD'S SUPERDYNE HOOKUPS.

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RADIOLA SUPER VIII  
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**De FOREST**  
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Set .....

De Forest Tubes—the tube which made Radio what it is.

**AMRAD**  
Amrad "S" Tubes  
Mershon Condensers  
Amrad Low Loss Basket  
Ball, Variometer and  
Variocoupler Covers  
Entire Broadcast  
Range

## WALLACE RADIO COMPANY, Inc.

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SUPERDYNE ADVICE FREE!

NEW YORK  
WE CAN SUPPLY ANYTHING IN RADIO

RESULTS GUARANTEED MAIL ORDERS FILLED

Write today for your free copy of

# Ward's New Radio Catalogue



Tested and guaranteed Radio Equipment sold without the usual Radio Profits

WARD'S Radio Department is headed by experts who know and test everything new. Who know by experience what is best—what gives the best service.

Our catalogue is prepared under their supervision. It shows all the best hook-ups, everything in parts and complete sets—so simple that you yourself can install them in a short time.

### Headquarters for Radio

Today Ward's is serving thousands upon thousands of Radio fans who have written for our catalogue, who have been surprised to see how low in price the standard Radio equipment can be sold without the usual "Radio Profits."

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### Our 52-Year Old Policy

For 52 years we have sold quality merchandise. We never sacrifice quality to make a low price. In buying Radio Equipment at Ward's, you are buying from a house of proven dependability. Address our house nearest you: Dept. 42-R

## ESTABLISHED 1872 Montgomery Ward & Co.

The Oldest Mail Order House is Today the Most Progressive

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# Television a Fact, Says Inventor

**BERLIN.**  
ANNOUNCEMENT is made in German newspapers that the problem of long-distance sight—seeing events and scenes while miles away from them—has been

definitely solved by a Leipsic scientist, and that machines are now being built by a big German company producing technical apparatus to put this new invention on a practical business basis.

be safe from unpleasant surprises. The problem of the "telegraphic film" is so complicated that it requires elaborate machinery

**RADIO** MONEY SAVING CATALOG SENT FREE  
**TIMES SQUARE AUTO SUPPLY CO. INC.**  
BROADWAY at 58th St New York

## If Your Neut Won't "Neut"

Here's the missing link. Uses same panel, same layout, same (but fewer) parts. Selective, deep, resonant volume from "Coast to Coast." Hundreds have bought this kit—carry a kick, but scores of enthusiastic testimonials. For \$5.00 we will send prepaid the only extra part, 25 feet gold sheathed bus wire, lithographed circuit and complete, simple instructions, with unlimited privilege of mail consultation. Nothing else to buy. Satisfaction guaranteed. Data about circuit—10c. 48 page radio catalog—5c. Stamps taken same as cash.

**Kladag Radio Laboratories**  
KENT, OHIO

## Greater Distance Clearer Reception

Reduced losses, less noise are the results of a good outside aerial. Efficient long distance sets, including ships at sea, use best possible aerial to get results.

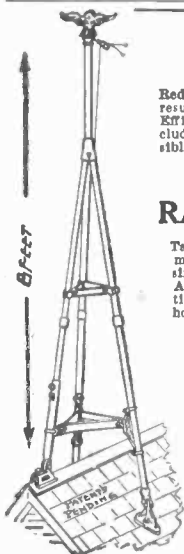
## EAGLE RADIO TOWERS

Take the place of unsightly home-made masts. Adjustable to fit single or double slope or flat roof. Additional height added by fitting standard pipe to top. Strong, hollow-tube construction.

### One Tower FREE

Towers shipped knocked down complete with instructions. Weight 50 lbs. Boy can assemble in an hour. Write for literature, prices and plan whereby you can get one tower free. Money-Back Guarantee.

**J. R. Burrell Co.**  
356 Folsom Place  
Dept. 15  
Milwaukee, Wis.



**Free Mailing Lists**  
Will help you increase sales. Send for FREE catalog giving complete and classified names of your best prospective customers—National, State, Local—Individuals, Professors, Business Firms.  
**99% Guaranteed by refund of 5¢ each**  
**ROSS-Gould Co.** 315 N. St. Louis

Inventions of long-distance sight machines have been claimed repeatedly by both English and German inventors, but heretofore there was always one link missing to make this machine a success in practice. The Leipsic scientist now claims to have found this connecting link which makes long-distance sight a reality.

### Names Kept Secret

To further this work as rapidly as possible, and to avoid being hampered by curious inquiries, the inventor as well as the producing company are keeping their names a secret.

The principle of this invention, it is explained, is the same as in the telegraphing of pictures, except that here the problem is not to telegraph a single picture, but a whole moving picture film which will unroll before the eyes of the audience as rapidly as it is "shot" by the camera miles away.

### Great Speed Needed

A single picture can be telegraphed in five or ten minutes. To produce a moving picture, at least ten pictures must be flashed on the screen each second. The Leipsic scientist claims to have found a way to send pictures at the rate of one-tenth of a second and also to reproduce and synchronize them at the receiving end at the same rate, so that a complete film is reproduced.

The transmission is by radio. A connection between the new invention, transmitting the picture, and the radio as already used, can be easily accomplished on the principle of the "speaking film."

If true, therefore, the "world stage" will indeed have become a reality, and the events of distant climes and countries will be seen and heard by people lolling comfortably in their seats at home.

### Complicated Apparatus

For the present, however, the husband whose wife is in the country and the messenger boy with the urgent telegram who is loitering before the show windows will

Famous for Quality and Service  
**Amplitron Tubes**  
Banded to Give Service—List \$4.  
Price .....

Send in your old and burnt out Tubes—We will send you new AMPLITRON—any model—at ..... \$2.50  
Dealers and Jobbers—Write for Discounts.

**Pennant Radio Laboratories**  
Dept. RW, 23 Central Ave., Newark, N.J.

**LOUD SPEAKING CRYSTAL SET**

Stations brought in from over 1000 miles and music heard all over the room right from crystal set with the STEINMETZ AMPLIFIER. Get our complete catalog.

**STEINMETZ WIRELESS MFG. CO.**  
5057 Baum Blvd., Pittsburgh, Pa.

"Can't Lose 'Em"

Bakelite, Engraved, Nickel-plated with legs  
**Panel Cut, Drilled, Engraved**  
Dealers. Write for Terms!  
**CORTLANDT PANEL ENGRAVING CO.**  
81 Cortlandt Street New York City

The "Goode" Two - o - One  
**A**  
Le Ton d'argent

**Guaranteed**

BY MAIL ONLY  
**\$2.39**  
Postpaid

**QUARTER AMPERE AMPLIFIER-DETECTOR RADIO TUBE**

**GUARANTEED SATISFACTORY**

All "GOODE" Tubes Sold Direct to the Consumer—No Dealer Profits

ONE—"Goode" Detector-Amplifier ..... \$2.39  
THREE—"Goode" Detector-Amplifiers ..... \$6.42  
(All Postage Prepaid)

The "Goode" Two-o-One A Tube amplifies or detects. It is a quarter ampere, five volts, standard base, silvered tube.  
Send express or postal money order or New York draft to—

**The Goode Tube Corporation**  
Incorporated Dept. B.  
**OWENSBORO KENTUCKY**

**LITTLE WONDER! SOLDERLESS LUG**

Holds Bus Wire Like Clip! Connect or Disconnect Wires Without Disturbing Terminal!  
Price 10 for 5c. Ask your dealer.  
Distributors Wanted.  
Mfd. by **PAUL GLAMZO**  
203 Lafayette St. New York

## Make Radio World Your Christmas Gift

Why not give him or her a subscription for RADIO WORLD for the coming year (52 numbers) for \$6.00? This will be a weekly reminder of your thoughtfulness throughout the coming twelve months.

We have made arrangements to send cards of acknowledgment direct to each subscriber, specifying the name of the giver.

Use the accompanying subscription blank.

Tear Off, Fill Out and Mail Today

**SPECIAL CHRISTMAS CARD SUBSCRIPTION BLANK**

Date .....

**RADIO WORLD, 1493 Broadway, New York City.**

Herewith find enclosed \$6.00, for which send RADIO WORLD for the coming year (52 numbers), and also send the acknowledgment card mentioned in your announcement, so that it will reach the name and address below around Christmas Day.

Ordered by: ..... Send Subscription to.....  
Name ..... Street Address .....

Address ..... City and State.....

# Broadcast Movies Claimed

which few private persons will be able to afford. The present method also still requires an actual cameraman to "shoot" the picture first.

If, however, this invention can be connected with another invention reported from England, which is said to eliminate not only time and distance but also night and sheltering walls for the scrutinizing eye—well, picture the consequences for yourself. But for seeing distant sport, political, festive or other events, the invention opens up enticing vistas.

### Details of Operation

In order to be transmitted by radio, a picture must be "screened," that is, it must be cut up into dots or lines. But, even the smallest pictures and the coarsest screen require at least 10,000 individual dots or lines for reproduction. At the rate of ten pictures per second, this means that 100,000 dots or lines must be sent each second, and rearranged or synchronized at the receiving end before the picture can be flashed on the screen.

The necessary apparatus for a "tele-graphic film" consists of the following machines:

A combination camera and screening apparatus, which divides each picture taken within one-tenth of one second into dots or lines and sends each dot or line consecutively, beginning at the top left and ending at the bottom right.

A photo-electric cell, which transforms

the 100,000 dots or lines of varying size or thickness it receives each second as light waves into electric waves of corresponding strength or weakness.

A standard radio sending apparatus which transmits these electric waves in the same fashion that the common radio transmits the waves it receives from a microphone.

A standard radio receiving apparatus with an amplifier.

An electro-photographic apparatus which retransforms the electric waves into light waves of a projection lamp.

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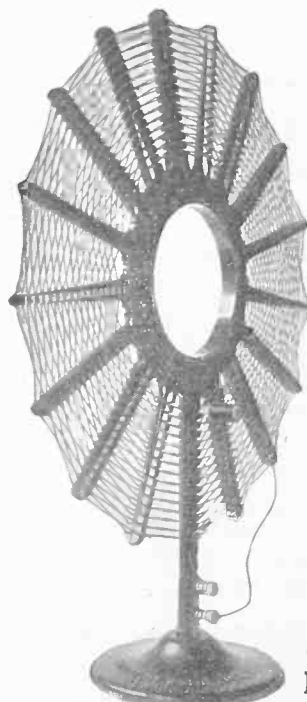
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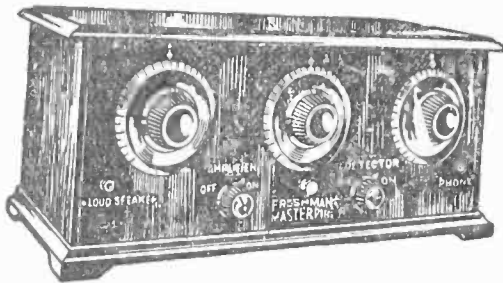


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CHAS. FRESHMAN CO., INC., 106 Seventh Ave., New York

## THE RADIO PRIMER

SUPERDYNE or NEUTRODYNE?

By Feodor Rofpatkin

To compare two circuits technically which are so radically different in principle and operation as the Neutrodyne and Superdyne is difficult, so the basis of comparison must necessarily be upon results—selectivity, sensitivity, volume, ease of tuning, number of tubes used, cost of outfit, etc.

In the first place, the Superdyne utilizes only four tubes, while the Neutrodyne uses five. Does everything depend upon the number of tubes? Let's see.

The Neutrodyne has two tuned radio, detector and two audio. The Superdyne has four tubes—one tuned radio, detector and two audio plus regeneration. Regeneration is equal to approximately one and one-half stages of radio-frequency. Of course, we must consider that the presence of regeneration complicates tuning to a certain extent, and in the hands of a novice approximately half of the regeneration is not properly utilized.

There is absolutely no regeneration or oscillation in a properly constructed Neutrodyne, thus the Neutrodyne is superior as to ease of tuning. However, after a little practice with the Superdyne, tuning becomes a sort of second-nature. One never actually figures out, mathematically, how the set is tuned no more than one thinks about the action of the hands and feet when driving an automobile.

Regeneration certainly sharpens tuning. When the peak of regeneration is reached, stations three meters apart may be separated without any interference.

But again, regeneration has a drawback. When at the peak of regeneration, tone is not as fine as if regeneration was absent. Nevertheless, the Superdyne is comparatively free from regenerative distortion because the regeneration is confined to the radio-frequency tube.

Both the Neutrodyne and Superdyne are extremely sensitive. In fact, as to DX possibilities, it would be extremely difficult to say which is the better. However, considering that the Superdyne uses only four tubes and the Neutrodyne five, I would pick the Superdyne.

For volume, the Neutrodyne is slightly better. But, if the extra tube that is in the Neutrodyne were placed in the Superdyne, the volume would be much greater than in the Neutrodyne. As is, the 4-tube Superdyne can consistently operate a loudspeaker on stations at a distance of 500 miles under average conditions, often stations 1,000 miles to 2,000 miles away.

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 two yearly subscriptions.

Indicate if renewal. Name .....

Offer Good Until Street Address .....

Dec. 20, 1924 City and State .....

# O'Rourke's 1-tube DX Circuit

(Concluded from page 16)

The coil is then worked off the form and is self-supporting.

### LIST OF PARTS

- ¾ lb. of No. 22 double cotton covered wire.
- One cylindrical cardboard form, 3" diameter, 4" high.
- One 23-plate low-loss variable condenser with vernier (General Radio).
- One 11 or 12 type tube.
- One socket to match tube (Premier).
- One 7x7" panel (N. Y. Hard Rubber).
- One cabinet to match.
- One 6½x6½" baseboard.
- One Filkostat with switch (for rheostat).
- One pair of earphones (Towers).
- One 22½-volt B battery (Eveready).
- One .00025 mfd. grid condenser (Halcyon).
- One variable grid leak (Turnit).
- One single-circuit jack.
- One-jack plug.
- 100 feet 7-strand aerial wire, 50 feet No. 14 insulated lead-in wire, one dozen Fahnestock clips. No soldering will be necessary.

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Bracket mounting type, complete, \$4.50.

**One Plug** on the Jones MULTI-PLUG instantly disconnects antenna, ground, A and B batteries from your set. One push reconnects. And it can't be plugged in wrong! Eight feet cable permits placing batteries out of way—in basement, closet or elsewhere. Makes your set portable. All leads plainly coded.

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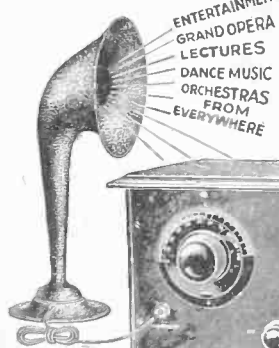
No money in advance. Tell us to ship by express. Examine at your express office without having to accept unless you wish. If you accept and are not fully satisfied after reasonable trial—say a week or so—we will refund your money.

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All prices include transportation

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5	14Q106	65.00	61.50	103.84
3	14Q107	30.00	61.50	72.04
2	14Q108	18.50	37.00	46.05
1	14Q109	14.50	14.40	23.01
4	14Q110	160.50	24.75	186.50*
5	14Q111	235.00	46.00	251.14
5	14Q112	185.00	46.00	199.14
5	14Q113	275.00	81.50	327.64
5	14Q114	160.00	71.00	184.79
4	14Q 80	120.00	67.00	142.50
5	14Q116	150.00	71.50	186.24
4	14Q116	100.00	67.50	141.24
5	14Q 61	60.00	79.00	112.50
6	14Q117	185.00	59.90	185.00
6	14Q118	82.60	64.80	138.11
5	14Q119	165.00	71.00	193.50
5	14Q120	110.00	71.00	153.59
6	14Q121	425.00	34.25*	429.95*
6	14Q122	269.00	36.00*	275.95*
4	14Q123	245.00	38.35*	251.48*
4	14Q124	206.00	40.10*	204.38*
2	14Q57	.....	.....	63.78
6	14Q125	65.00	48.90	97.00
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4	14Q127	95.00	67.50	140.00

\*This amount includes extra equipment, such as tubes, phones, voltmeter, etc.

Don't Delay! Act Today! TELEGRAPH YOUR ORDER—we will pay for message, also transportation. Everybody is getting a Set—Time you had yours!

**LIBERTY MAIL ORDER HOUSE, Dept. W681, 106 Liberty Street, NEW YORK**

# Non-Radiating Regeneration

(Continued from page 11)  
 in Fig. 4. The aerial lead goes also to the stator plates of the C' and to the grid of the tube. The ground lead goes to the rotor plates of C', to the G post of the

audio transformer and to one side of the fixed condenser C'. This condenser may be mounted directly across the secondary of the AFT. The F post of the AFT goes to the F post of the socket and to the A— on the battery. The A+ on the bat-

tery is connected to one side of the fixed resistance, which may be a balanced self-adjusting rheostat or a wire-wound resistance strip. The other side of this resistance goes to the F+ post on the socket.

The plate of the tube goes to one side of C' and to the spring of the jack, J. The other side of the jack goes to the other side of C', to the stator plates of C' and the beginning of L'. The beginning of L' emerges from under the winding. The end, which is on top, goes to the remaining unconnected side of C' and to the lower end of L' (marked "plate" in Fig. 4). The upper end of L' (marked B+ in Fig. 4) goes to the beginning of L', whose end connects with B+. Try from 45 to 90 volts here. The beginning of L' goes to the stator plates of C' and to one side of the adjustable crystal detector. The other side of L' goes to the remaining unconnected side of C' and on to the P post of the AFT. The B post of the AFT is connected to the remaining open side of the crystal. This completes all the wiring.

Some doubt may arise as to which is the beginning of L'. Take the end of L', duolateral coil, as your guide. See in which direction this points. Look inside, where L' is, and select the terminal thereof that points in the same direction. These two are the ends of the respective coils, the other terminals being the beginnings. (Terminals that mark the beginning of things are one of the many phenomena of radio!)

If the set tunes in by the whistle, widen the distance between L' and L'. If this does not cure the trouble, remove a few turns, one at a time, from L', and test after each turn is removed. Another resort is to remove the connection made from the coil L' to the jack and test for possibly better results with this connection made instead to the end of L'. If this does not improve things, carry the

New Improved **KRACO** ALL STEEL  
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 Get Yours Today—NOW—Send No Money  
 The batteries are fully guaranteed in writing and shipped subject to examination on the day your order is received. You pay on delivery or deduct 5 per cent. if full cash accompanies order. You may deduct 10 per cent. if two or more are ordered at one time.  
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# A Simplified Reflex

(Concluded from preceding page)  
 connection instead direct to B+. As may be seen from Fig. 1 this connection is made in any instance to B+, the only difference being how much, if any, of the coils L<sup>1</sup>, L<sup>2</sup> and L<sup>3</sup> are to be included in one of the phone leads. C<sup>2</sup> may be moved correspondingly, so that it will be at the end of L<sup>1</sup> or the end of L<sup>2</sup> or of L<sup>3</sup>, but never moved so that it does not bridge the phones.

Some persons not familiar with reflexes run into trouble over the grid return. It is made to the F minus. Follow the line from the grid through L<sup>1</sup> to the G post

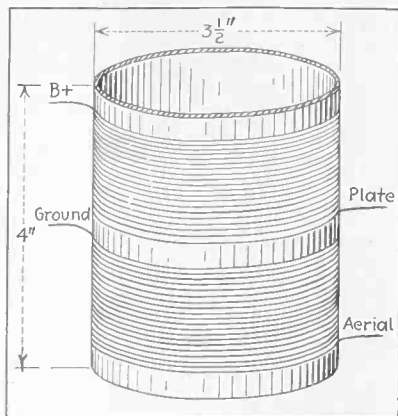


FIG. 4, showing how connections are made to L<sup>1</sup>L<sup>2</sup>. The top winding on the form is L<sup>2</sup> and the bottom one is L<sup>1</sup>. The beginning of L<sup>2</sup> (top coil) goes to the beginning of L<sup>1</sup>, which is the lead to B+. The end of L<sup>2</sup> goes to the end of L<sup>1</sup>, which is the lead to the plate.

of the AFT. Thus the grid goes to G as in a straight audio stage. The radio-frequency grid return is by-passed by C<sup>2</sup> to the F-, whereas the audio grid return is made conductively, instead of capacitatively, i.e., it goes from the end of L<sup>1</sup> through the secondary of the AFT direct to F-. Audio currents do not pass across condensers. The P and B posts accommodate the crystal output, i.e., the leads that otherwise would go to the phones.

### LIST OF PARTS

- One 7x14" panel (radion).
- One 6 1/2 x 13" baseboard.
- One tubing, 3 1/2" diameter, 4" high.
- 3/8-lb. No. 22 double cotton covered wire.
- One audio-frequency transformer, 5-to-1 ratio. (Emco)
- Three .0005 mfd. low-loss variable condensers, normally 23 plates. Vernier not necessary. (U. S. Laboratories).
- Three 4" dials.
- One fixed resistance.
- One A battery switch, toggle or push-pull. (Carter)
- Two .001 mfd. fixed condensers. (Freshman.)
- One single-circuit jack (Tri-Jack).
- One tube. (12 type).
- One socket to match.
- One A battery, 1 1/2 volts. (Columbia).
- Two 45-volt B batteries. (Eveready).
- One adjustable crystal detector. (Ambrose Vernier)

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Tuning and Amplifying off the same master phone in the base of the horn.

### SUPERSENSITIVE STETHOSCOPE

Eliminates Head Phones and increases the pleasure and satisfaction from your Radio Set.

### NO PLUGGING IN AND OUT OF RADIO SET

Tuning is done with Stethoscope in ears, then one turn on lever in base of horn cuts out Stethoscope and operates the horn. No chance of losing volume when changing from head set to horn; or disturbing dial adjustments and losing station. Same lever also controls volume in Stethoscope and horn. Any number of Stethoscopes may be used for listening without additional drain on the batteries or loss of volume.

### BEAUTIFUL, SPARKLING ONE-PIECE HORN

with silver plated metal parts. Best workmanship in every detail; dark gray crystalline finish. Made in two models; see illustration above. Extra Stethoscopes, complete with all fittings, each, \$1.50.

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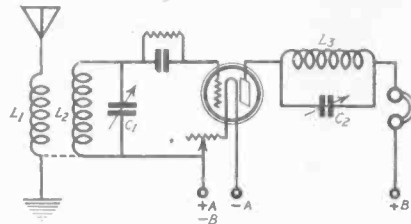




# Making Tuned Plate Oscilliate

By Neal Fitzalan

**T**UNING the plate circuit either by introducing a variometer or a coil shunted by a variable condenser is an excellent method of obtaining regeneration, although it does not actually produce regeneration in every instance. Indeed, judging by questions and complaints based on plate-tuned hook-ups, I should say that in one case out of every ten there must be a failure of this method to produce any effect. That is, regeneration does not take place. Why? In the first place this is sometimes caused by improper combination of coil and con-



**VARIOMETER** in the plate circuit produces regeneration through the capacities of the tube elements. The resonant plate circuit current is returned to the grid within the tube. A condenser-tuned coil (above) does the same.

denser, if this type is used. The inductance is of too low a value or too high. A change in the inductance value, taking off turns if that value is too high, or putting more on if it is too low, will cure the ill in such a case. Otherwise the substitution of a larger trick, or a small fixed condenser may be placed in series with the coil condenser to cut down variable condenser's capacity. In that event one side of the fixed condenser would go to the end of the plate coil and the remaining side of the fixed condenser to where the coil terminal formerly went on the variable condenser. To add to the capacity of the variable condenser, place the fixed condenser instead across the variable, i.e., one side of the variable, the remaining sides of both being connected, too. In this way the coil connections are not disturbed.

A tube is losing its pep when it does not oscillate as freely as it used to when it was young and fresh. Indeed, even newly bought tubes may be short of this oscillating quality. Unless a tube oscillates it will not regenerate. Detection without oscillation is possible, of course, but regeneration—never. Hence if you get a tube that oscillates and then introduce your tuned inductance or LC combination in the plate, you will get what you seek.

Sometimes a tube that will not oscillate may be made to do so, evidently through compulsion. If you have made up your mind that a tube that has oscillated on previous

occasions, but which is out of that cherished class and as good as useless unless remedied, then you may try tapping the tube base on a table. You strike the contact points against the table, not too forcibly, yet not quite gently. You are running the risk of losing a tube, but as it is not a good tube you may be willing to run the risk on the chance of transforming the tube into a really serviceable one. The tapping has the effect of dislodging the elements from their accustomed position, and this change of position may so alter the capacity relationship of these elements that an oscillating tube will emerge from a "dead soldier." Another method is to connect one side of the filament to B+ 16½ volts and then for just a fraction of a second touch the B— with a wire connected to the other side of the filament. The tube may be shocked into usefulness. This operation involves a risk of about 10 to 1 in favor of a tube not being blown out and the chance is about 25 to 1 that, if not blown out, it will oscillate where it didn't before. As to the tapping method, the chance of ruining the tube com-

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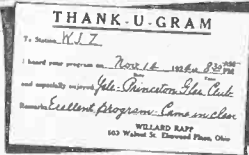
# Bringing a Dying Tube to Life

pletely is about 15 to 1 in favor of survival, with a possible 5-to-1 chance that, if it outlives the operation, it will oscillate at least some more than it did before.

If a coil and condenser combination is used in the plate circuit it may be a 47-turn coil of No. 22 double cotton covered wire,

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To the Artists and speakers who are broadcasting for your entertainment. **YOUR NAME AND ADDRESS PRINTED ON CARDS FREE.** Fine for writing for station stamps.



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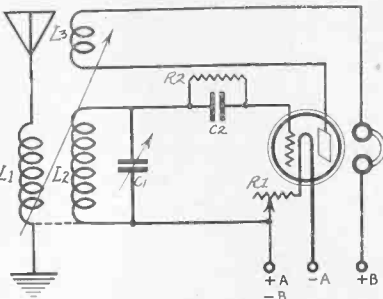
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TICKLER method of feedback. L3 is the tickler, a coil on a rotatable form.

bridged by a 23-plate variable condenser. If a variometer is used be sure that it is a large one, in the sense that it will cover from about 200 to 600 meters. Get as near to 600 as possible, as the chance is that the variometer will reach low enough and the danger is that it will not reach high enough.

The failure to obtain regeneration from a non-oscillating tube is very often blamed by those directions he is following.

Another good thing to try is a .001 fixed condenser from the beginning or end of the plate coil to B+.

## International Tests Prove Difficult

IN accordance with prearrangements large broadcasting stations kept off the air during the trans-Atlantic and trans-Pacific tests held as a feature of International Radio Week.

The first night brought no response from either side, although WEAJ used 1,500 watts and WJZ 750, British broadcasting stations using about 500 watts.

LCM, Stavenger, Norway, was the only station reporting any trans-Atlantic reception, having heard KDKA "loud and clear on 326 meters."

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# The Official List of Stations

in the United States and Canada was published complete in the November 29 issue of RADIO WORLD. Herewith is published the list of Cuban and Mexican broadcasting stations:

Call	Owner and Location	Meters
PWX	Cuban Telephone Co., Habana	400
2AB	Alberte S. Bustamante, Habana	240
2CX	Pedro Zayas, Borton, Habana	320
2DY	Frederick W. Borton, Habana	300
2EV	Frederick W. Borton, Habana	260
2EV	Westinghouse Electric Co., Habana	220
2HC	Heraldo de Cuba, Habana	275
2HS	Julio Power, Habana	180
2JQ	Raul Perez Falcon, Habana	150
2KD	E. Sanchez Fuentes, Habana	350
2KP	Alvaro Daza, Habana	200
2LC	Luis Casas, Habana	250
2MG	Manuel G. Salas, Habana	280
2MN	Fausto Simon, Habana	270
2OK	Maria Garcia Velez, Habana	360
2OL	Oscar Collado, Habana	290
2TW	Robert E. Ramirez, Habana	230
2WV	Amadeo Saenz, Habana	210
3EV	Leopoldo V. Figuerra, Colon	360
6BY	Valentin Ullivarri, Cienfuegos	200
6CX	Jose Ganduxa, Cienfuegos	300
6DW	Antonio T. Figuerra, Cienfuegos	170
6EV	Eduardo Terry, Cienfuegos	225
6KJ	Josela Alvarez, Cienfuegos	225
6KJ	Frank H. Jones, Cienfuegos	275
6KW	Frank H. Jones, Tunucu	340
7AZ	Pedro Noguero, Camaguey	225
7BY	Salvador Rionda, Camaguey	350
8AZ	Alfredo Broccks, Santiago	240
8BY	Alberto Ravelo, Santiago	250
8DW	Pedro C. Andus, Santiago	275
8EV	Eduardo Mateo, Santiago	180
8FU	Andres Vinnat, Santiago	225
8GT	Juan F. Chilbas, Santiago	260

**MEXICAN STATIONS**

CYB	El Buen Tono, Mexico City	360
CYL	El Universal, Mexico City	360
	Colegio Ateneo Fuente, Saitlilo	450
	Rositer & Co., Mazatlan	..

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- 1 Genuine Brunswick Low Loss Condenser.
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- 2 Brunswick Cast Foundation Brackets.
- 2 Brunswick Jacks with Gold-Plated Fronts; 1 for phones, 1 for Loud Speaker.
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- 1 Standard Glass-Enclosed Grid Leak.
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**G**EORGE BERNARD SHAW made his first appearance as a broadcaster. He went down to a London radio station and, shutting himself up in a room with an operator, read his play "Flaherty, V. C.," to an audience that probably numbered 4,000,000.

His reading was broadcast all over

England, Scotland and Wales and to the Continent. It went also to southern Ireland, but the British broadcasting company made no arrangements to send it to Ulster.

Mr. Shaw thoroughly enjoyed himself. He sat before a little table with a transmitter upon it. His book was in his hands and this alone prevented him from breaking out into gestures.

His face worked as he passed from the English Colonel to the Irish soldier and from the old peasant woman back again, and he let himself go as he crooned a few words of an Irish ballad or imitated Flaherty's mother's weeping. Yet in spite of quick changes of pronunciation and tone his voice carried extraordinarily well, and what seemed strangest to those listening in was the absence of applause or pause in reading as they saw their companions break into broad smiles at Mr. Shaw's shrewd hits.

Mr. Shaw began by explaining that he was about to show exactly what happened when he read a new play to actors and then he uttered a warning as to the proper pronunciation of the title of his play. It was not O'Flaherty, he said, but Flaherty, and as he shouted his version of it he remarked genially: "Got it? That's all right!"

Then he gave a brief explanation of the scene where the action of the play takes place and described how the last bars of "God Save the King" and three cheers are heard as the curtain goes up.

He sang a snatch of "Tipperary" with great gusto and settled down to the opening dialogue between the General and Flaherty. The contrast between the English accent and the Irish brogue was carefully marked, and then when Mrs. Flaherty was introduced—the old woman who thought her V. C. son was fighting against the English—the way in which Mr. Shaw made her blarney the General and then turn and rend her son made the difficulty of applauding the hidden reader absolutely exasperating.

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Patent Applied For  
The Globe Low-Loss Tuner is designed to give maximum efficiency. All metal parts entirely eliminated. Less than 1 1/2 oz. of insulating material. Anti-capacity windings. Suitable for use in all standard hook-ups. Special unit for the SUPERDYNE circuit.  
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**Globe Radio Equipment Co.**  
217 WEST 125th STREET  
NEW YORK CITY







# The Nation's Largest RADIO Mail order House.

## SPECIAL HOLIDAY GIFTS

**AMBASSADOR SET  
WITH ALL STANDARD PARTS IN GENUINE  
MAHOGANY CABINET**

You Have Never Seen a Set as  
Good for Selectivity or Dis-  
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- 1—Phone Plug
- Aerial Equipment
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 Pathe ..... \$12.98  
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 Fada ..... \$0.60  
 Amco (all styles) ..... .95  
 C. Hammer, 6 Ohm ..... .74  
 Patent ..... .89  
 Federal No. 18 ..... .79  
 Arrow Knob ..... .69
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 Fada ..... \$0.79  
 DeForest ..... .50  
 Hoosick Falls ..... .75  
 Patent 199 ..... .40  
 Federal ..... .79  
 General Radio ..... .89  
 Workrite, 199 ..... .60
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 Come Duplex ..... \$9.90  
 All American ..... 9.50  
 Modern ..... 9.00
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 Modern ..... 2.25  
 Acme ..... 3.50  
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 Federal No. 65 ..... 4.90  
 Thordarson ..... 3.98  
 AmerTran ..... 4.55  
 Erla ..... 3.95  
 Federal No. 226 ..... 3.98  
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 Acme 30K Super ..... 4.20  
 Heterodyne ..... 1.90  
 Tri Coil ..... 3.95  
 Erla Reflex ..... 3.00  
 Basia ..... 3.60  
 RR 1716 (Super-Hot) ..... 6.75

- DIALS**  
 Amco, 2 in ..... \$0.30  
 Amco, 3 in ..... .50  
 Amco, 4 in ..... .79  
 DeForest, 3 in ..... .55  
 DeForest, 4 in ..... .40  
 Pathe, 2 in ..... .30  
 Pathe, 3 in ..... .40  
 Pathe, 4 in ..... .55

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 General Instrument Lo-Loss, All sizes ..... \$4.50  
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 Jewel, 0-50 Volts ..... \$2.25  
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 We carry a complete line of new Freshman Products. Let us quote you on your wants.

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 Radiola Super-Heterodyne, complete with tube and speaker, \$249.00  
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GUARANTEED  
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MONEY  
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### Radio Locates Ships in U. S. Experiments WASHINGTON.

A METHOD for the location of ships by sound and radio waves has been reported by the Bureau of Standards as having been discovered. "In co-operation with the Coast and Geodetic Survey," says the

bureau, "a method has been developed for locating accurately the position of a surveying ship when the visibility is so poor that the coast cannot be seen. The method employed involves the combined use of acoustic and radio signals. A small bomb is exploded near the ship, the instant of the explosion being recorded by a chronograph on board. The sound wave produced by the bomb is picked up by under-water micro-

phones located at two or more known positions along the shore.

"When the sound signal reaches the microphone it is automatically sent back to the ship by radio, where the instant of its arrival is recorded on the chronograph. The time required for the signal to travel from the ship to each shore station can then be found by multiplying the time by the speed of sound in sea water. With this information the position of the ship can be quickly determined.



## Send For This Sensational Radio Bargain Book—FREE

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Our highest grade nationally known GUARANTEED parts. OUR GUARANTEE PROTECTS YOU. Money cheerfully refunded if you are not satisfied. Be sure to write your order and state prices plainly. Send post office or express money order or bank draft for total amount to insure prompt shipment. ALL PRICES ON THIS PAGE INCLUDE SHIPPING CHARGES RIGHT TO YOUR DOOR. Refer to any bank or commercial agency regarding our reliability.

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| 23-plate plain Con. .... \$1.29                  | Moulded Variometer ... \$2.39                |
| 23-plate Vernier Con. .... 2.59                  | Bakelite moulded ..... 3.45                  |
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| Bakelite Rheo. 6-ohm ..... .38                   | Randolph Special, 2200-ohm ..... 2.45        |
| Bakelite Rheo. 30-ohm ..... .59                  | Blue Bird Special ..... 3.95                 |
| Bakelite Vernier Rheo. 1.15                      | <b>LOUD SPEAKERS</b>                         |
| Bakelite Potentiometer, 200-ohm ..... .59        | American Bell ..... 3.95                     |
| <b>TRANSFORMERS</b>                              | With adjustable loud speaker unit ..... 6.95 |
| Randolph Special, 6 to 1, 2.16; 3 1/2 to 1, 1.89 | <b>COUPLERS and COILS</b>                    |
| Sinclair Special, 6 to 1, 2.55; 3 1/2 to 1, 2.24 | 180° Variocouplers ..... .95                 |
| <b>TUBE SOCKETS and DIALS</b>                    | Reinartz Coils ..... 1.25                    |
| 4" Hygrade Dial ..... .29                        | Electric Soldering Iron ..... .98            |
| Bakelite Socket ..... .28                        | Cockaday Coil ..... 1.65                     |
| Weston Plug ..... .75                            | Three Circuit Tuner ..... 2.95               |

**American Bell Loud Speaker**  
 with American Adjustable Unit. Wonderful volume, clear reception. Speaks for itself without coaxing. 10-inch bell—made of non-vibrating material.



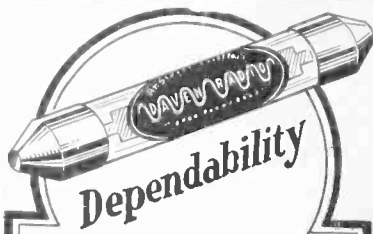
**\$3.95** Without unit  
**\$6.95** With unit



**HEADPHONES**  
 "Randolph Special"  
 2200 Ohm moulded head-set, properly designed to give strong and clear reception. Biggest headphone value ever offered.

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 containing a thousand bargains of everything on radio—parts, supplies, complete parts for sets, complete sets, etc., also a mine of very latest information on all different circuits, complete list of broadcasting stations, and other valuable, up-to-the-minute radio data. Send your name and address on a card or letter. We will send catalog free.

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General Radio  
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Jewell Elect.  
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Malone-Lemmon  
Music Master  
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Mu-Rad  
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Premier Elect.  
Pacnet  
Radio Corp.  
Rola  
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Radio Receptor  
Stromberg-Carlson  
Spilldorf  
Silver Voice  
Super-Speaker

Thompson  
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Thordarson  
Tower  
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ADJUSTABLE PHONES**  
*The finest in the world. Absolutely guaranteed*  
Leather Head Band (Beautiful Leather and Velvet Case  
Container). List, \$18.00.  
**A Real Xmas Gift.....\$6.95**

**SAVE ON TUBES**  
The A. A. A. New Model Bakelite Base Vacuum Tube (Low Loss)—All Reduced to..... **\$2.79**  
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A. A. A.—201A ..... **A. A. A.—199S**  
A. A. A.—199 ..... **(with Standard Bakelite Base)**  
A. A. A.—11

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25% Deposit on  
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## Radio Movies in 1928 Campaign Forecast

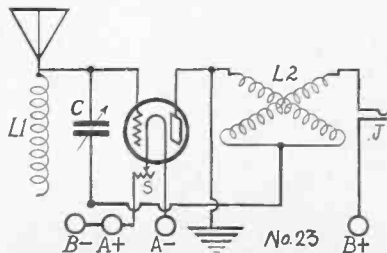
WASHINGTON.

RADIO, which played such a tremendous part in the Presidential campaign which just ended, will be so developed that voters in 1928 will not only be able to hear the Presidential candidates, but see them as well, by broadcasting movies. This prediction was made by Judge S. B. Davis, Acting Solicitor of the Department of Commerce.

Judge Davis says that among the minor influences of radio on the campaign was promptness in opening political meetings and brevity of political addresses.

### WHAT'S WRONG HERE?

THE wiring in the accompanying diagram is wrong. If you find what you think is the error, write to Wrong Diagram



Editor, RADIO WORLD, 1493 Broadway, New York City. Mention Wrong Diagram No. 23.

The names of those sending in the correct answers will be published.



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Every season of the year is enjoyable at Chalfonte-Haddon Hall. Winter recreations outdoors include Golf, Riding on the Beach, Aviation, Boardwalk Activities. Mild weather. Invigorating sea air.

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COMPLETE INDEX OF RADIO WORLD, January 3 issue to September 20, inclusive, published in the October 18 issue. Send 15 cents to RADIO WORLD, 1493 Broadway, New York City.

**FREE**

To Each Purchaser of a World Battery

A 24-Volt "B" Storage Battery positively given FREE with each purchase of a WORLD "A" Storage Battery. The WORLD Battery is famous for its guaranteed quality and service. Backed by years of Successful Manufacture and Thousands of Satisfied Users. You save 50%.

**Prices That Save and Satisfy**

Auto Batteries	Radio Batteries
6-Volt, 11 Plate \$12.25	6-Volt, 100 Amps. 12.50
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Shipment Express C. O. D. subject to examination. 5 per cent discount for cash in full cash order.

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proves satisfactory World performance. Mail this ad with your name and address—we will ship battery day order is received; and give you your choice of "B" Free Storage Battery or a handsome nickel finish Auto Spotlite, FREE. Write TODAY.

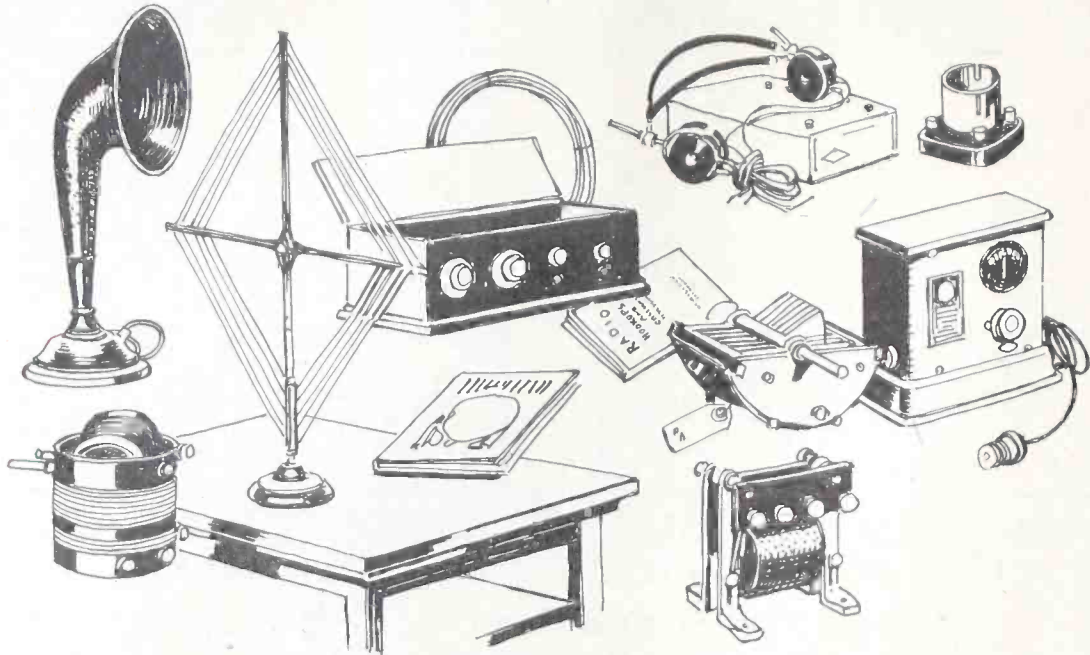
**WORLD BATTERY COMPANY**  
1219 So. Wabash Ave. Dept. 17 CHICAGO, ILL.

This FREE "B" Storage Battery takes the place of dry cell "B" batteries. Can be recharged and will last indefinitely. To be sold retail for \$6.00. It is the only battery of its kind equipped with solid rubber case—and in-urance against acid and leakage. Take advantage of this remarkable introductory offer NOW. To those who prefer it, we will send FREE a handsome nickel finish Auto Spotlite, instead of the "B" Battery. Be sure to specify which is wanted.)

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To introduce this new and superior World "B" Storage Battery to the Public

# Let Radio Safety Fuses Give You These Radio Parts Free!



Think of the Radio apparatus you can buy with that you now spend on blown-out tubes.

The use of RADECO SAFETY FUSES is saving Radio fans thousands of dollars annually. Why not get your share of this saving?

RADECO SAFETY FUSES are the only fuses which fit on the filament terminal of the tube, thereby protecting it against all causes of blow-outs. RADECO SAFETY FUSES are now priced at 25 cents each; one fuse to a tube is sufficient. The best Radio dealers now have RADECO SAFETY FUSES.

*If your dealer has not yet secured his supply, send the attached coupon.*

**“RADECO FOR SECURITY”**

-----COUPON-----

RADIO EQUIPMENT COMPANY,  
20 Stuart Street, Boston, Mass.

Gentlemen:

Please find enclosed ..... for which send me prepaid ..... fuses for ..... tubes.  
(State type of tube used.)

My dealer's name is .....

NAME .....

ADDRESS .....

## RADIO EQUIPMENT COMPANY

*New England's Oldest Exclusive Radio House*

**20 Stuart St., Boston, Mass.**