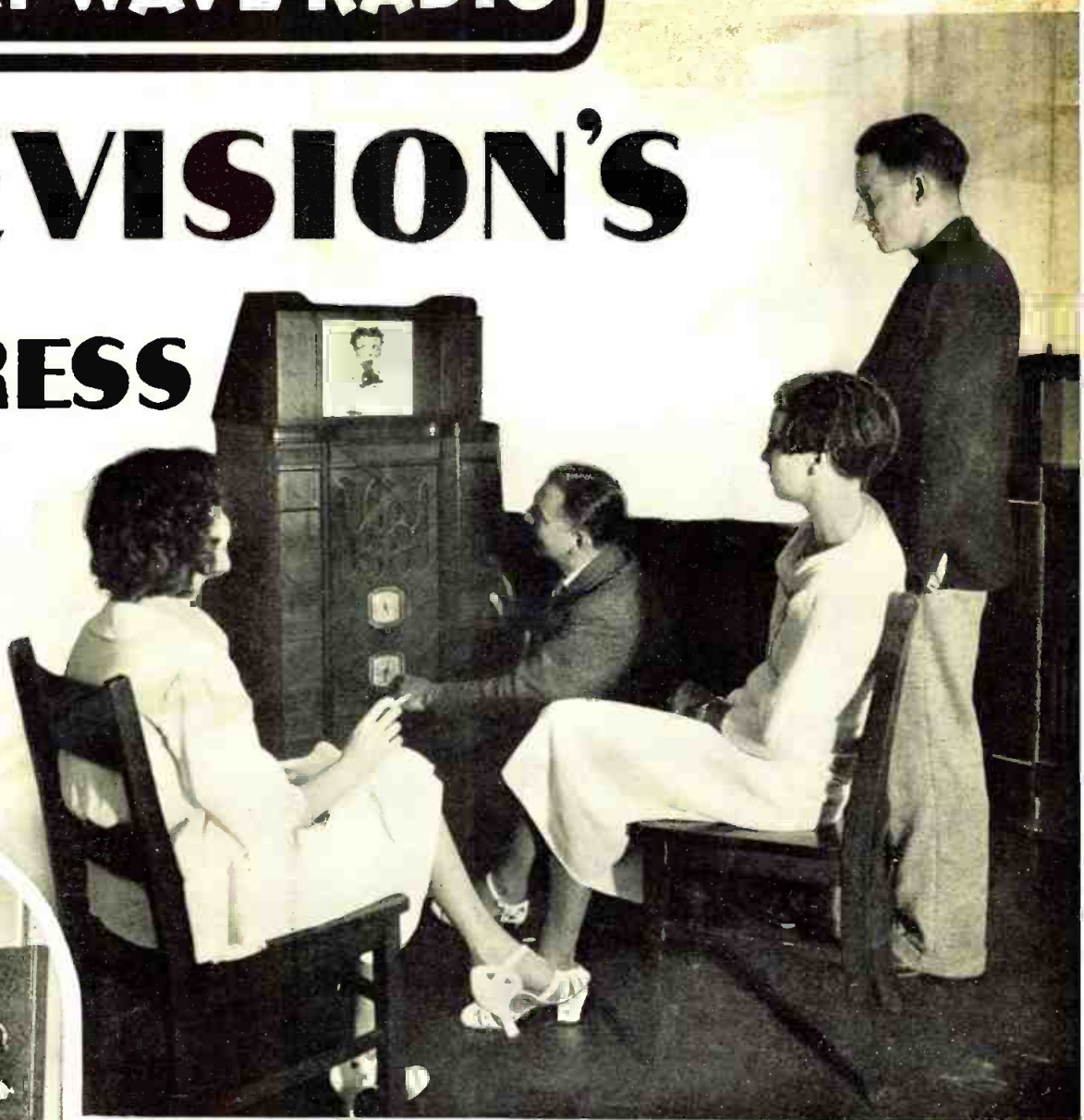
KEEPS YOU UP-TO-DATE ON RADIO

RADIO NEWS AND SHORT WAVE RADIO

OCTOBER, 25¢

IN CANADA 30¢

TELEVISION'S PROGRESS *in* AMERICA



NEW METAL TUBE SETS

A Publication Devoted to Progress in Radio

Television	Service Work	Amateur Activity
Broadcasting	Experiments	Short Waves
Electronics	Measurements	DX Reception
Applications	Engineering	Set Building

Really stable

Short-Wave Reception

. . . with General Electric Receivers

For 1936, General Electric offers these notably new features that keep the set always at "concert pitch".

- All-metal tubes make possible higher R. F. gain with consequent great improvement in signal to noise ratio. (Important for short-wave reception.)
- Permaliners — The first production receiver equipped with air dielectric trimmer condensers that are individually enclosed and protected against moisture and dust.
- Short leads from tube elements to tuned circuit made possible by: —
  - New Metal Tubes
  - Coils Mounted Directly on Switch Points
- Good mechanical design — efficient placement of parts — self-shielding metal tubes and sentry box.

MODEL A-82 The chassis is specially designed to include every advantage that results from the use of metal tubes and short leads. It meets the exacting requirements of short-wave listeners and amateur operators. An extremely sensitive and selective four-band receiver, tuning 49, 31, 25, 19 and 16 meter bands. Eight metal tubes. Sentry Box. Permaliners. Sliding-rule Tuning Scale. Stabilized Dynamic Speaker. Noise Control. Automatic Lo-note Compensation. Power Output — 4 watts undistorted. Maximum Volume Output — 6 watts. CW Oscillator may be added.

$94.50

(Eastern List Price)

GENERAL ELECTRIC RADIO

MERCHANDISE DEPARTMENT, GENERAL ELECTRIC CO., BRIDGEPORT, CONN.

MAIL THIS COUPON FOR OSCILLATOR DATA

General Electric Company, Bridgeport, Conn.
Attention: Sales Promotion Section R-1610,

Please send me Data Sheet FS-58 "Best Frequency Oscillator", and complete details of G-E Radios with the metal tubes.

Name.....

Street Address.....

City.....State.....

J. E. Smith, President National Radio Institute

I WILL HELP YOU START A SPARE TIME OR FULL TIME RADIO SERVICE BUSINESS WITHOUT CAPITAL

HERE ARE A FEW EXAMPLES OF THE KIND OF MONEY I TRAIN MY MEN TO MAKE

Now Has Fine Business

"I have a fine business servicing sets. I am making a good living—seldom have a week under $40. If it wasn't for N. R. I. I would probably be tramping the streets."

Glenn C. King,
46 Division Ave., S.,
Grand Rapids, Mich.

$15 A Week in Spare Time

"My spare time earnings average $15 a week. Since studying with you I have earned about $7,000 to $8,000 in Radio. I owe my success to the good method of the N. R. I."

C. N. Heffelinger,
R. F. D. No. 1,
Temple, Penna.

Best Equipped Shop in Town

"In the last year, we have moved our Radio shop and we now have the best equipped Radio Repair Shop in East Toledo. We also have a shop at 624 Milton Street. We have three fellows working for us."

W. R. Brown,
309 Main St.,
Toledo, Ohio.

You Get PRACTICAL EXPERIENCE with Radio Equipment I Give You

I'll show you how to use my special Radio equipment for conducting experiments and building circuits which illustrate important principles used in such well-known sets as Westinghouse, General Electric, Philco, R.C.A., Victor, Atwater-Kent, and others. You work out with your own hands many of the things you read in our lesson books. This 50-50 method of training makes learning at home easy, interesting, fascinating, intensely practical. You learn how sets work, why they work, how to make them work.

Free Book Tells How Mail Coupon!

The world-wide use of Radio sets for home entertainment has made many opportunities for you to have a spare time or full time Radio service business of your own. The day you enroll I start sending you Extra Money Job Sheets which quickly show you how to do Radio repair jobs common in most every neighborhood. Many N. R. I. men make $5, $10, $15 a week extra in spare time while learning. I show you how to install and service all types of receiving sets. I give you Radio equipment and instructions for conducting experiments, for building circuits and testing equipment, and for making tests that will give you broad, practical Radio experience. Clip the coupon below and get my free 64-page book, "Rich Rewards in Radio"—it gives you a full story of the success of N. R. I. students and graduates, and tells how to start a spare time or full time Radio service business on money made in spare time while learning.

Many N. R. I. Men Make $5, $10, $15 a Week Extra in Spare Time While Learning

Many of the twenty million sets now in use are less than 50% efficient. I will show you how to cash in on this condition. I will show you the plans and ideas that have enabled many others to make $5, $10, $15 a week in spare time while learning. George W. Honert, 248 Water St., Ligonier, Ind., made over $500 from the start of the Course to its completion.

Get Ready Now for a Radio Business of Your Own and for Jobs Like These

Broadcasting stations use engineers, operators, station managers, and pay up to $5,000 a year. Radio manufacturers use testers, inspectors, foremen, engineers, servicemen and buyers, and pay up to $6,000 a year. Radio dealers and jobbers employ hundreds of servicemen, salesmen, managers, and pay up to $75 a week. Television promises many good jobs soon. Television is leaving the laboratory in an impressive way. One million dollars is being spent on two stations. Receiving sets are being designed and built. New opportunities—many of them—are right ahead. My book tells you of the opportunities in these fields, also in Aviation Radio, Police Radio, Short Wave Radio, Automobile Radio and other new branches of this fast growing industry. Get it.

I Train You at Home in Your Spare Time

Hold your job until you're ready for another. Give me only part of your spare time. You do not need a high school or college education. Hundreds with only a common school education have won bigger pay through N. R. I. Graduate J. A. Vaughn jumped from $35 to $100 a week. Fred Dubuque doubled his earnings in one year. The National Radio Institute is the Pioneer and World's Largest organization devoted exclusively to training men by Home Study for good jobs in the Radio industry.

You Must Be Satisfied

I will give you an agreement to refund every penny of your money if you are not satisfied with my Lesson and Instruction Service when you complete my Training. And I'll not only give you thorough training in Radio principles, practical experience in building and servicing sets, but also Advanced Specialized Training in the type of Radio work you choose.

Get My Free Book of Facts

Mail the coupon for "Rich Rewards in Radio." It's free to any ambitious fellow over 15 years old. It tells you about Radio's spare time and full time opportunities; about my training; what others who have taken it are doing and making. Mail coupon now in an envelope, or paste it on a 1c post card.

J. E. SMITH, Pres.
Dept. 5KR
National Radio Institute
Washington, D. C.

Get my *FREE LESSON* on Radio Servicing Tips

I'll prove that my Training gives practical, money-making information, that it is easy to understand—that it is just *what you need* to master Radio. My sample lesson text, "Radio Receiving Troubles—the Cause and Remedy" covers a long list of Radio receiver troubles in A.C., D.C., battery, universal, auto, T. R. F., super-heterodyne, all-wave, and other types of sets. And a cross reference system gives you the probable cause and a quick way to locate and remedy these set troubles. A special section is devoted to receiver check-up, alignment, balancing, neutralizing and testing. Get this lesson *Free*. No obligation. *Just mail coupon.*

MAIL COUPON NOW

This Coupon is Good for One
FREE COPY OF MY NEW BOOK

J. E. SMITH, *President*,
National Radio Institute,
Dept. 5KR,
Washington, D. C.

Dear Mr. Smith: Without obligation, send me the Sample Lesson and your free book about spare time and full time Radio opportunities, and how I can train for them at home in spare time. (Please print plainly.)

Name.....*Age*.....

Address.....

City.....*State*.....14x1

Find out about the **World Famous Course that Pays for Itself**

RADIO NEWS

Edited by LAURENCE MARSHAM COCKADAY

S. GORDON TAYLOR, *Managing Editor* — WILLIAM C. DORF, *Associate Editor*

JOHN M. BORST, *Technical Editor* — JOHN H. POTTS, *Assoc. Tech. Editor*

JOSEPH F. ODENBACH, *Art Editor*

Vol. XVII October, 1935 No. 4

Reading Guide to this Issue—

As a matter of convenience for those having specialized interests in the radio field, the following lists the articles and features in this issue, classified under 14 heads. The numbers correspond with the article numbers in the Table of Contents on this page:

AMATEURS—1, 2, 3, 4, 6, 8, 9, 10, 11, 12, 13, 14, 17, 22, 30, 31
BROADCAST FANS—2, 3, 4, 5, 6, 7, 8, 12, 13, 14, 16, 21, 23, 27.
DEALERS—2, 4, 5, 6, 7, 11, 14, 18, 19, 21, 22, 24, 26, 28, 29, 31
DESIGNERS—2, 4, 5, 6, 7, 8, 11, 14, 16, 17, 19, 20, 31
DX FANS—4, 5, 6, 7, 8, 13, 16, 18, 21, 23, 24, 31
ENGINEERS—2, 4, 5, 6, 7, 8, 12, 14, 15, 16, 17, 19, 20, 31
EXPERIMENTERS—2, 4, 10, 14, 15, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 28, 29, 30, 31
MANUFACTURERS—2, 4, 14
OPERATORS—3, 6, 8, 10, 11, 31, 32
SERVICEMEN—2, 4, 5, 6, 7, 8, 12, 13, 14, 16, 17, 18, 19, 20, 21, 22, 24, 28, 29, 30, 31
SET BUILDERS—2, 4, 13, 14, 17, 18, 19, 20, 21, 22, 24, 26, 28, 31
S.W. FANS—1, 2, 4, 5, 6, 7, 8, 10, 11, 13, 14, 16, 18, 22, 25, 26, 31, 33
STUDENTS—2, 3, 4, 5, 6, 7, 8, 10, 12, 14, 15, 16, 17, 18, 19, 20, 21, 22, 24, 28, 29, 30, 31
TECHNICIANS—2, 4, 5, 6, 7, 8, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 24, 28, 29, 31

Coming Soon

With the introduction of metal tubes there is an increasing demand for "How to Build" articles in which they are incorporated. The RADIO NEWS Lab is now working on two designs—one an inexpensive 8-tube short-wave superheterodyne, the other a 7-tube tuned r.f. high-fidelity receiver. Complete constructional data will be presented as early as possible. A comprehensive article on the subject of output meters is also in the making for servicemen. Amateurs will find short-wave articles of unusual interest in coming issues, particularly one on a new a.c. pre-amplifier employing metal tubes.

Published Monthly by Teck Publications, Inc., *Washington and South Avenues, Dunellen, N. J.*

Lee Ellmaker, *President and Treas.*
B. Holcepl, *Secretary*
H. D. Crippen W. P. Jeffery, *Advertising Management*
Virgil Malcher, 205 W. Wacker Dr., Chicago, *Western Representative*

EDITORIAL AND EXECUTIVE OFFICES
461 EIGHTH AVENUE, NEW YORK CITY, N. Y.

Entered as second class matter at the Post Office at Dunellen, N. J., under the act of March 3, 1879.

25c a copy. Subscriptions: $2.50 a year, $4.00 for two years. In Canada and Foreign Countries $3.00 a year, $5.00 for two years. Subscribers are notified that change of address must reach us five weeks in advance of the next date of issue.

ALL OVER THE CONTINENT, THEY'RE SAYING

...What a Radio Set!

CLASS OF SERVICE

This is a full-rate Telegram or Cable-gram unless its deferred character is indicated by a suitable sign above or preceding the address.

WESTERN UNION

SIGNS
DL = Day Letter
NM = Night Message
NL = Night Letter
LC = Deferred Cable
NLT = Cable Night Letter
Ship Radiogram

W. P. WHITE, PRESIDENT — NEWCOMB CARLTON, CHAIRMAN OF THE BOARD — J. C. WILLEVER, FIRST VICE PRESIDENT

The time time as shown in the date line on full rate telegrams and day letters, and the time of receipt at destination as shown on all messages, is STANDARD TIME.

Received at 1935 JUL 27 PM 11 56

MINUTES IN TRANSIT — FULL RATE — DAY LETTER

MB1421 102 NL=MINNEAPOLIS MINN 27

MCMURDO SILVER CORPORATION=

3354 NORTH PAULINA ST CHGO=

MASTERPIECE FOUR JUST RECEIVED PROVIDED MORE THRILLS IN FEW HOURS THAN ALL OTHER RECEIVERS OWNED DURING FIFTEEN YEARS I HAVE STRIVEN TO OWN THE BEST OBTAINABLE STOP ALWAYS BEFORE HAD TO BE SATISFIED WITH BEST BY COMPARISON STOP NOW FOR FIRST TIME HAVE RECEIVER THAT IS ALL I HAD HOPED FOR IN THE DISTANT FUTURE AND EXCEEDED FONDEST HOPES FOR THIS YEAR OR NEXT STOP ALL I DO IS DECIDE WHAT CHARACTERISTICS ARE REQUIRED FOR BEST RECEPTION UNDER ANY SET OF CONDITIONS AND ADJUST THE CONTROLS TO PROVIDE IT STOP I CAN ASK FOR NO MORE STOP CONGRATULATIONS ON A FINE ACHIEVEMENT=

HARVEY MERCHANT.

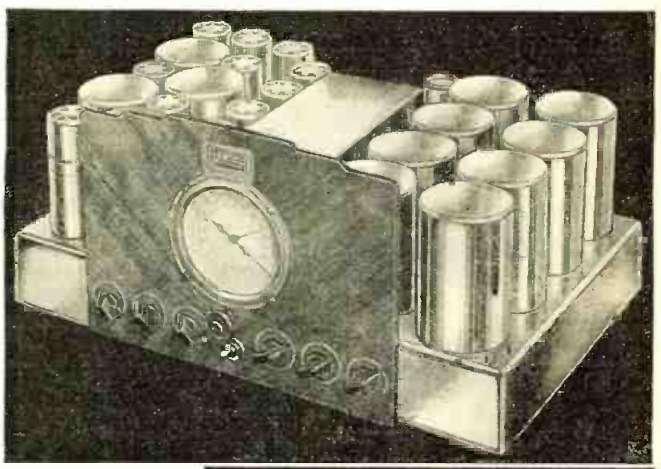
ALL over the continent, Silver MASTERPIECE IVs are stacking up performance records which critical owners say are unequalled by any other receivers they have ever operated.

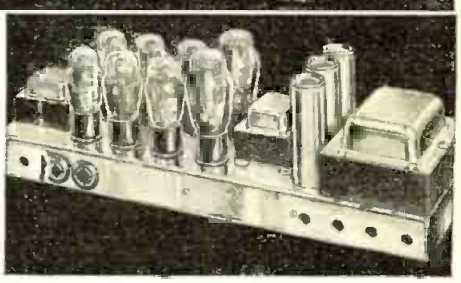
Read Harvey Merchant's interesting telegram which is reproduced on this page. It is typical of scores of letters and telegrams received at the laboratory, praising the amazing performance of the new MASTERPIECE IV.

Proud and enthusiastic MASTERPIECE IV owners already include the U. S. Government, engineers, musicians, experienced listeners, broadcast station executives, radio editors —men with the knowledge and experience to judge and compare on the basis of merit alone.

In Government Service

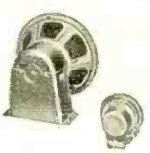
Officers of the U. S. S. Pennsylvania, Flagship of the entire United States Navy, have purchased a MASTERPIECE IV, as they purchased a MASTERPIECE III to give them worldwide entertainment directly under the most powerful navy transmitters afloat. The Federal Communications Commission was among the first purchasers of the new Silver MASTERPIECE IV, *on Government order*. Dr. Antonio Joyce, Director of Broadcasting for the Portuguese Government, uses a MASTERPIECE IV, just as he chose its predecessor the MASTERPIECE III from all available European and American radios. These sets were bought and paid for—not tendered as gifts for advertising purposes.





SILVER MASTERPIECE IV

The Finest Radio of All Time



● Designed today to meet tomorrow's needs, the laboratory-built MASTERPIECE IV has everything you could ask for in an all-wave receiver. True and full high fidelity reproduction, unlimited distance range, unequalled freedom from noise, extreme and variable selectivity, great power without distortion, amazing flexibility of operation—these are just a few of the results achieved through no less than 25 entirely new engineering advancements and refinements which the MASTERPIECE IV introduces and alone provides.

All of these features are completely described in the 32-page "Blue Book" which will be sent on request, without cost or obligation. Mail the coupon today and learn what entirely unhampered engineering has done to bring you truly world-wide all-wave reception at its very best.

●

McMURDO SILVER CORPORATION DIVISION OF G. P. H., INC.

3352 N. Paulina Street Chicago, U. S. A.

TRY IT FOR 10 DAYS

● Because we know the new MASTERPIECE IV can out-perform any other radio receiver in existence today, *at any price*, we freely invite you to make us prove it. Try it out in your own home or laboratory, under your own reception conditions. Put it to every test. If you are not entirely satisfied, you can have your money back. The coupon will bring you details of this remarkable 10-Day Trial Offer.

MAIL COUPON FOR FREE "BLUE BOOK"

McMURDO SILVER CORPORATION
3352 N. Paulina Street, Chicago, U. S. A.
Send Free "Blue Book" with complete specifications of Silver MASTERPIECE IV, details of 10-Day Trial Offer and 5-Year Guarantee.

Name.....

Address.....

City..... *State*.....

10—RN

S. W. STATION IDENTIFICATION CHART

(See April and May, 1935, issues for previous information on other short-wave stations)

Call Letters	Address	Name	Announcement	Identifying Signals
CO9GC	P.O. Box 137, Santiago, Cuba	La Voz de Santiago de Cuba		
CO9WR	P.O. Box 85, Sancti Spiritus, Cuba		Announces in English and Spanish	Chimes somewhat like N. B. C.
CT2AJ	Ponta Delgada, Sao Miguel, Azores		"Aki say-tay-doix-ah-jhota, estacao emisora da Ponta Delgada, Sao Miguel, Azores." Also English announcements	Ends with Portuguese National Hymn
HB9AQ	Lausanne, Switzerland			
HB9B	Radio Club Basel, Postfach Basel 1, Switzerland	Radio Club Basel		Intermission: signal "z'Basel a mym Rhy."
HH2S	Mr. Armand Mallebranche, P.O. Box A-103, Port au Prince, Haiti			
HIH	La Voz del Higuamo, San Pedro de Macoris, Dominican Republic	La Voz del Higuamo	Spanish and English every half hour: "HIH Santo Domingo, operating on a frequency of 6818 kc."	
HI1J	P.O. Box 204, San Pedro de Macoris, Dominican Republic			
HI3C	La Voz del Rio Dulce, La Romana, Dominican Republic	La Voz del Rio Dulce		Chimes
HJ1ABD	Sr. Ignacio de Villareal, Radio Station HJ1ABD, Cartagena, Colombia	Ondas de la Heroica	English and Spanish	Three-note chimes
HJ1ABE	Sr. Jose M. Fuentes L, Apartado Postal 31, Cartagena, Colombia	La Voz de los Laboratorios "Fuentes".		Ends transmissions with "Aloha Oe".
HJ1ABG	La Voz del Atlantico, Apartado 816, Barranquilla, Colombia	La Voz del Atlantico		
HJ1ABH	Sr. Sergio Martinez Aparicio, Cienaga, Colombia			
HJ3ABH	La Voz de la Victor, Apartado 565, Bogota, Colombia	La Voz de la Victor		
HJ4ABA	Medellin, Colombia	Ecos de la Montana		
HJ4ABL HJ4ABB	Ecos del Occidente P.O. Box 79, Manizales, Colombia	Ecos del Occidente	"HJ4ABL" L as in Lady"	Four strokes on gong
HJ4ABC	Pereira, Colombia	La Voz de Pereira	"Estacion acha-hotah-quatro-ah-bay-say, La Voz de Pereira, Pereira, Colombia"	Chimes before Announcements
HJ4ABE	Cia. Radiodifusora de Medellin, Medellin, Colombia	La Voz de Antioquia	"Aqui la acha-hotah-quatro-ah-bay-ay en Medellin, Colombia". Also English announcements	
HP5J	Sr. Manuel Diaz Doce, La Voz de Panama, HP5J, Apartado 867. Panama City, Panama			
HRP1	Sr. Manuel Escoto, Radio Station HRP1, San Pedro Sula, Honduras	El Eco de Honduras en San Pedro Sula	Spanish and English	Music box will play the first notes of National Hymn between selections. (in the near future)
JVH, JVM, etc.	Kokusai-Denwa Kaisha Ltd. Osaka Bldg., Kojimachiku, Tokyo, Japan		English and Japanese	Ends with National Anthem
LKJ1	Dept. of Commerce, Division of Radiotelegraphy, Oslo, Norway		"Broadcasting Oslo"	Interval signal: short series of musical notes
OAX4B	Messrs. Grellaud & Co. Apartado 1242, Lima, Peru		"Transmite la casa del auto" or, "Transmite la casa Grellaud de Lima" or, "Transmite la estacion oh-ah-ekis-quatro-bay de Lima, etc."	
PI1J	Middelbare Technische School, Oranjelaan 12. Dordrecht, Netherlands		Announcements in English, German and Dutch.	Begins with: cq "de PI1J" in code.; ends with National Anthem and again the call in code
PRA8	Radio Club de Pernambuco Avenida Cruz Cabuga 394 Recife, Brazil	"A Voz do Norte"		Chimes at 12:00, 7:00 and 8:00 p.m.
TFK, TFJ, TFL	Riksutvarp Islands, Box 547, Reykjavik, Iceland			
TIGPH	"Alma Tica" San Jose, Costa Rica	"Alma Tica"		
TGWA	Radiodifusora Nacional "TGW", Guatemala City, Guatemala			
TIPG YI2PG	Sr. Perry Girton, Costa Rica Radio and Broadcasting Station, Apartado 225, San Jose, Costa Rica		"This is Radio Station TIPG, Costa Rica, Costa Rica Broadcasting Station"	
TIRCC	Sr. Cespedes Marin, P.O. Box 1064, San Jose, Costa Rica	Radio emisora Catolica Costarricense, TIRCC		
VK3ZX	Mr. G. C. Bryse, 501 Royal Parade, Rockville, N-2, Melbourne, Australia			
VP1A	Amalgamated Wireless Ltd., Suva, Fiji Islands		"Suva Radio calling"	Transmissions begin with "Song of the Islands" and end with "God save the King"
WVD	c/o Alaska Telegraph System, Seattle, Washington			
XECR	Ministery of Foreign Affairs, Mexico City, Mexico.		"La estacion de onda corta, ekis-ay-say-erray"	
XECW	El Caballero Xantocam, Calle del Bajia 120, Mexico, D. F., Mexico			
X2AH	"Foreign Club" Tijuana, B. C., Mexico			
YN1GG	Managua, Nicaragua.	La Voz de los Lagos		
ZCK	P.O. Box 200, Hong Kong, China		"This is the Hong Kong Broadcasting Station Calling"	
ZFD	Town Clerk, St. George, Bermuda			
ZGE	The Malayan Amateur Society, Mercantile Bank Building, Kuala Lumpur, Federated Malay States		Announcements in English only	
ZHI	Radio Service Co. of Malaya, 2 Orchard Road, Singapore, Straits Settlements			Ends with "God Save the King"
ZHJ	Penang Wireless Society, 40 Park Road, Georgetown, Penang, Straits Settlements			Opens with: "God bless the Prince of Wales"
ZP10, ZP3AC	Avenida de Colombia 885 Asuncion, Paraguay	Rueda del Oeste	Announcements in Spanish	Begins with bugle call, ends with National Hymn

Complete... Inexpensive

WESTON-built

nstruments for profitable servicing

● To servicemen who feel that Weston quality is beyond their means, we present the above group comprising a complete set of Weston instruments for profitable servicing. It consists of Model 698 Selective Set Servicer, which employs the Weston Method of Selective Analysis and is equipped for the new metal tubes . . . the Model 692 Oscillator . . . the Model 687 Output Meter and the Model 780 Capacity Meter. As a servicing group, considering the quality and wide range of usefulness of these instruments, the price is relatively low . . . affording the average serviceman full opportunity to secure the dependability and long life for which Weston instruments are famous. Send the coupon for complete data... Weston Electrical Instrument Corporation, 615 Frelinghuysen Avenue, Newark, New Jersey.

WESTON

Radio Instruments

COUPON

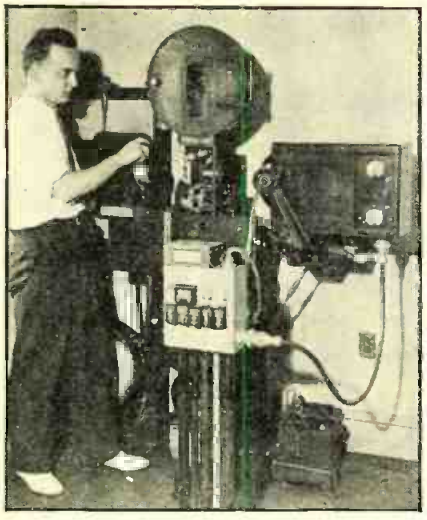
WESTON ELECTRICAL INSTRUMENT CORPORATION
615 Frelinghuysen Ave.,
Newark, New Jersey
Send me complete data on Weston Radio Instruments.

Name.....

Address.....

.....

Television RUMORS from Here and Abroad



TELEVISION DEMONSTRATED

Here is the new Farnsworth transmitter for moving-picture film, demonstrated recently in Philadelphia.

Television Rumors Rife

NEW YORK, N. Y.—In recent weeks countless "television" announcements, reports and rumors have come to the editorial offices of RADIO NEWS. Some of them are presented herewith: Richard C. Patterson, executive vice-president of NBC, in announcing plans for elaborate new Hollywood broadcasting studios, set the report buzzing that his chain has television in mind and will weld closer links between the talkie stars and the microphone. . . . The television-minded British Post Office has announced that Baird has adopted a transmission standard of 240 lines and 25 pictures per second. . . . But Baird is also said to be able to transmit on 405 lines . . . . Also from England comes word that the Marconi-E. M. I. Television Co. has adopted a 405-line interlaced scanning system. . . . Philo T. Farnsworth sailed for Europe in August, possibly for conferences on his firm's tie-in with Baird, of England, and Fernseh, of Germany. . . . In a syndicated newspaper article, David Sarnoff, R.C.A. president, pointed out his firm has produced "on a laboratory basis" a 343-line picture as against the crude 30-line image of a few years back. . . . R.C.A. is contemplating commercial service facsimile tests between New York and Philadelphia at an early date. . . . A Philco executive, speaking in San Francisco, asserted that his firm produced a $275 set that could be placed on the market in 30 days, but no station was provided to supply programs for the receivers. . . . Andrew W. Cruse, chief of the U. S. Department of Commerce electrical equipment division, advised American broadcasters to name a committee to keep stations informed on television progress and suggested employment of an European observer to assist the committee. . . . National Television Co. is reported to be working on the development of an inexpensive vision receiver. . . . In a new pamphlet issued to trade and public, the British R.M.A. sets forth: "It is estimated that at least 10 stations will be required to cover roughly half the population in this country. Many years must elapse before television service is available for the country as a whole."

NEW YORK, N. Y.—Since the Radio Corporation of America announcement that $1,000,000 would be spent in research and development of television, the radio industry has watched this firm's moves with great interest. It is understood that a portion of the television budget will be used for a new transmitter atop the Empire State Building, New York, where many tests have been conducted at earlier dates. Also, reports indicate that 500 experimental receivers of different designs are being constructed, the sets ranging from de luxe models to adapters for present receivers. The de luxe models are expected to employ 52 tubes, including the cathode ray, and will yield pictures about 8 inches square. Others will give 3-inch images.

This special group of receivers will not be sold, it is said. Instead, the sets may be installed in the homes of officials, engineers and other groups (probably including newspaper and magazine editors). Tests will be ready with this equipment within 18 months, but it will be much longer before the sets are offered to the public.

Further reports indicate that the most complicated of these sets will consume about 700 watts of current and that the models will be equipped with a folding mirror top to reflect the image on the cathode-ray tube which will be mounted vertically. It is expected that 360 lines at 24 frames-per-second will be employed and that the receiving light source and picture color will be fluorescent-green.

Dr. Vladimir Zworykin's iconoscope will probably be used in transmitting studio, film and outdoor programs. The inventor is said to be working on a problem of color with the aim of obtaining black-and-white pictures and already has had some experimental triumphs along this line, but seeks a method that is more permanent.

A duplicate transmitter may be arranged for Philadelphia. Whether this comes through or not, it is believed asured that studios will be erected in the Quaker City, and that programs will be sent to New York by both ultra-short-waves and the new coaxial cable to be installed between the two cities by the American Telephone and Telegraph Company. The Empire State Building transmitter will probably use frequencies between 50 and 100 megacycles and the service area is computed to be 17 miles.

PHILADELPHIA, PA.—A special press demonstration of the television equipment developed by Philo T. Farnsworth was recently given at the Chestnut Hill, Pa., laboratories of Farnsworth Television, Inc. Newspaper reports were most enthusiastic

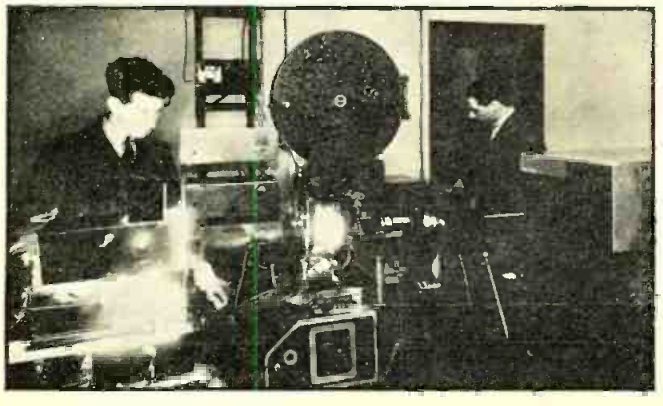
(*Turn to page 252*)

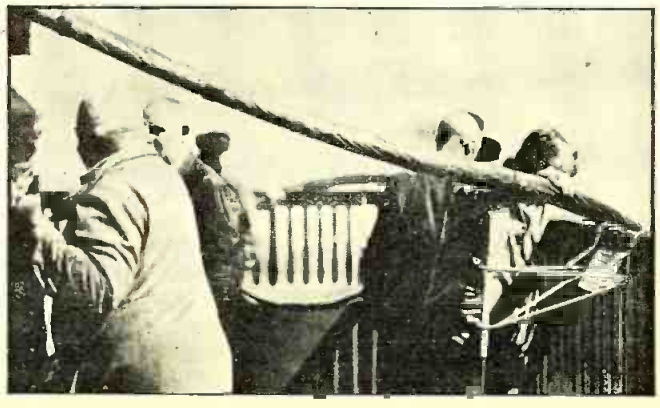
—IN AMERICA

The new home-television receiver developed by Farnsworth as seen from the rear, showing (on top shelf) the vision apparatus; (second shelf) the sound apparatus; (lower shelf) the power supply for both.

TELEVISION, IN EUROPE

The new Baird apparatus, for the transmission of television of regular talking films, exactly the same as used in the movies, is shown in the lower left. At right; the special television cable, running from the Berlin television transmitter to the antenna atop the radio tower, being installed.





Radio News
October, 1935

S O S
and the
RADIO OPERATOR

A dramatic account of the important part Radio and the Radio Officer have played in unforeseen marine disasters since the first days when "wireless" was installed on ships that put to sea

Jerome M. Goldby

SOS SOS SOS, fire in hold, out of control, SS.... long .... lat .... please hurry QRT QRT QRT QRT QRT CQ CQ CQ CQ SOS SOS SOS fire in hold out of control SS .... long .... lat .... please hurry! With ears straining for the first faint report that his call has been heard, the radio operator sits tensely in a smoke-filled shack, with slowly dimming lights adding to the eerie picture. "Oh, God, won't some one hear me?" With fingers tensed on the key and barely breathing, he waits. Suddenly from out of nowhere there comes a faint note swelling in volume as the operator tests his power and with renewed energy as though the note were but a short distance away, *there comes the answer!* Stand by SS .... test QRT .... want to get bearing on your QRT QRT QRT CQ CQ CQ. Nervously, the operator on the doomed vessel immediately sends VVV. "Hurry," he moans, "I can't stand this damn smoke much longer." Wonder what happened to that second man of mine . . . sent him out to the bridge almost twenty minutes ago . . . did he get that bearing yet. . . . The tense silence of the shack is broken by a whistle from the bridge, and a voice shouts down the communication tube "Did you get anyone yet? Hurry, hurry."

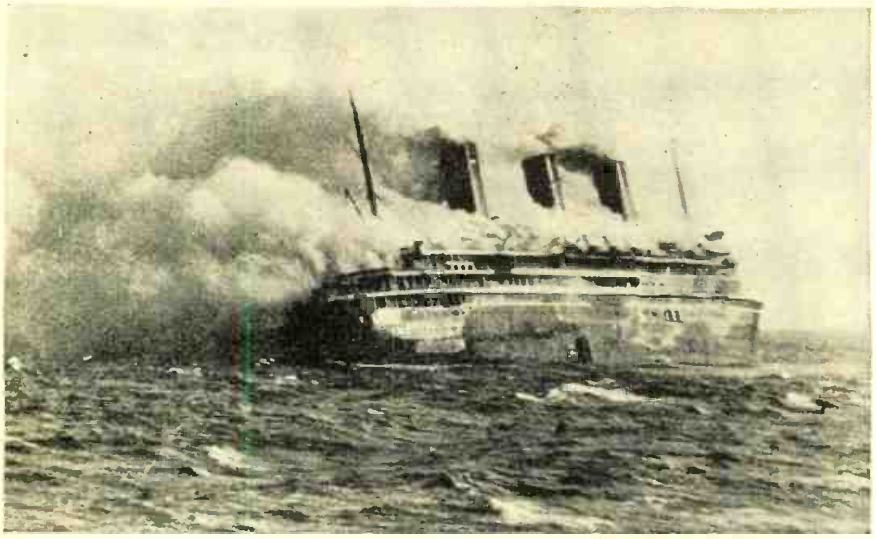
Outside on deck everything is being done to aid the passengers, but they mill in circles, running first here and then there. Lifeboats already overcrowded are being rushed by a group who seem to think the most important thing left is to stick together by all means. Sailors try to ward them off, but their impetus is too strong. They clamber aboard, jumping upon those already in the boat. Trampling, moaning, squealing, they keep coming. Others do not wait. They take the nearest exit towards safety and away from that infernal inferno. The water around the vessel is literally covered with bobbing heads. Screams for help fill the inky night. The ship's boats pull past—they are already overcrowded. Just too bad.

And the radio operator sits tensely at his key . . . testing. . . . "Hasn't he taken that bearing yet? . . . God, this smoke . . . my eyes . . . huh, what's that? No power . . . the engineroom must be deserted . . . and no auxiliary aboard . . . we're done for now." . . . Just then the answering note comes in with a roar. . . . "OK bearing coming for you now, keep up courage . . . forty miles from you." . . .

Scenes like this have been enacted with slight variations for the past number of years, but during the last season no less than three ships flying the flag of one shipping corporation have tragically disappeared from Lloyd's Register with great loss of life. The last year has been a tragic one with the number of vessels going to

RADIO BRINGS RESCUE AT SEA

A lifeboat of the SS Havana, which perished on the rocks of Mantanilla Shoals in the Bahamas, nearing the SS Peten, one of the rescue ships summoned by radio.



182 MEN SAVED BY RADIO

Here is the burning SS Atlantique, photographed from the SS Highland Chieftain, which answered an SOS call and brought 182 men safely into Cherbourg.

their doom for various causes put down as negligence, espionage, the elements, or just carelessness.

Through all this the radio officer has shown his mettle by sticking to his post through "Hell and high water." Almost always, he is the last man to leave his post because of his continued efforts to keep raising ships for aid. In the case of the SS Lexington of the Colonial Line. Ted Lupien, radio officer in charge, suddenly found himself all alone on the boat just as she started to turn over. He jumped into the water, only miraculously pulling himself free of the antenna wires, and fighting the suction of the ship, came up to the surface and saved himself from drowning. He is one of the few who live to tell that kind of tale.

The Radio Officer

With all the efficient and modern methods aboard for the safety of life, there should seem very little chance for foundering, for any reason, by the present day ocean-going steamers. There are watertight doors which can be closed quickly in case any part of the ship should become flooded, thus keeping the ship afloat indefinitely. There are fire doors which can be automatically controlled from a central station so as to keep the fire concentrated in that one compartment or part of the vessel. With sprinkler systems which will open when the flame of a match is held near to them and with various other automatic devices, there seems, nevertheless, to be a fatalistic attitude towards sea-going ships. Of course, not all vessels are so equipped, but almost all of them have on board a Radio Officer *whose duty it is to stand a radio watch and maintain communication with other vessels or land stations; to take bearings on radio beacons which dot the coasts of the United States and other countries, and to receive bearings from land stations, so designated to give them, for the protection of ships at sea.* Through the aid of radio and the operator, it is possible for the captain of a ship to guide his vessel to and from ports without even once glancing at his charts. The radio operator must be expert at taking bearing and this, alone, is a great advantage in keeping vessels on their true course and in coming to the aid of ships in distress at sea by finding their true position. On some of the vessels which carry only one operator, there is installed an apparatus known as the Automatic Alarm.

A RADIO HERO

An early photograph of Jack Binns, famous radio operator of the ill-fated Steamship Republic, who tapped out the rescue bringing CQD, the forerunner of the modern SOS, and the present-day "Op" carries on his tradition.

DISASTER!

Scene (from an old photograph) outside of the New York Sun newspaper office, with posters in view telling of the terrible disaster to the SS Titanic.

An Automatic Alarm

It is an ordinary receiver tuned to the distress frequency, with relays attached, so that if the operator is not on watch this alarm, which is supposed to operate only for distress signals, will automatically ring a bell and call the operator to his apparatus.

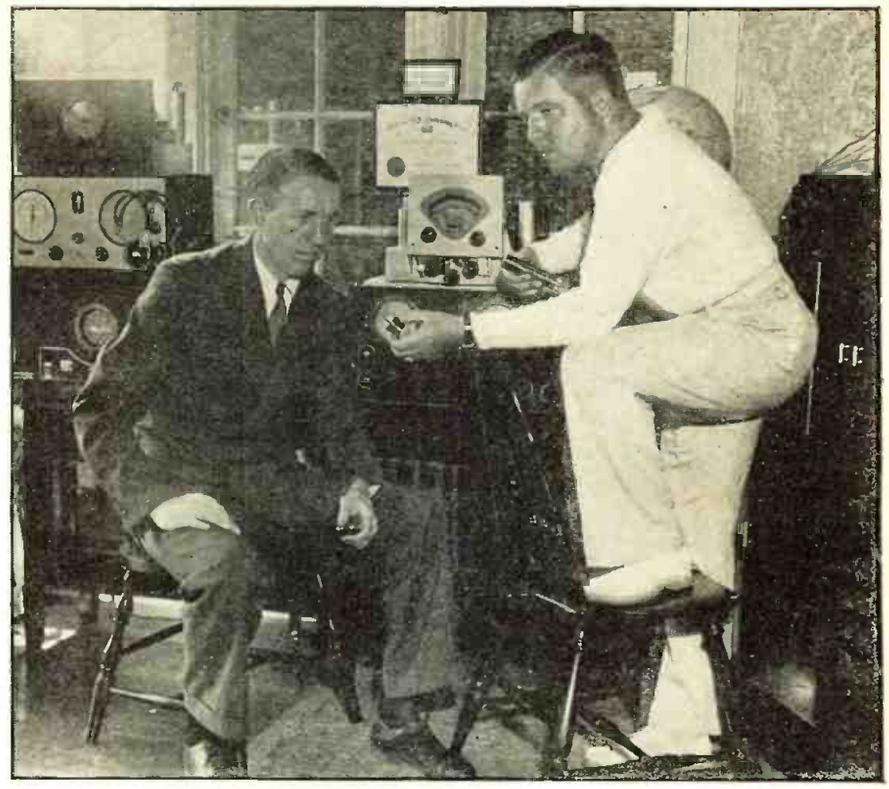
Disaster at Sea

During the fearsome holocaust and the terrible loss of life aboard the ill-fated SS Morro Castle off Sea Girt, New Jersey, the flames could be seen for miles around and the Captain of a passing vessel, the SS Jacob Luckenback, was perturbed over it. He sent for his radio operator, who had been broken out of his bunk to get a bearing from the Naval Land Station group and remarked that if the flames were coming from a burning vessel, the distress call must have been sent out. The operator went to his shack and called radio Tuckerton, WSC. requesting information if any ship had sent an SOS but the reply was "NIL." By the time the SOS was sent out, almost ten minutes afterwards, this vessel had proceeded further North and, although coming about, could only save part of the crew. If the distress call had been sent earlier, there is no doubt but that a greater number of passengers and crew would have been saved. This is but another case of the disastrous outcome of the hesitancy on the part of a skipper of a ship to give permission for the signal to be transmitted. There is, today, still some doubt as to whether Chief Operator Rogers did send out the signal on his own responsibility or had received the Captain's orders to do so. Regardless, it shows, as a case in point, that if this signal (*Turn to page 248*)

WHAT'S *NEW* *in* RADIO

Yes, there is something new in radio! On this and the following pages you will find important inside information in our descriptions of and tests on the metal tube sets, parts and accessories

***By* William C. Dorf**

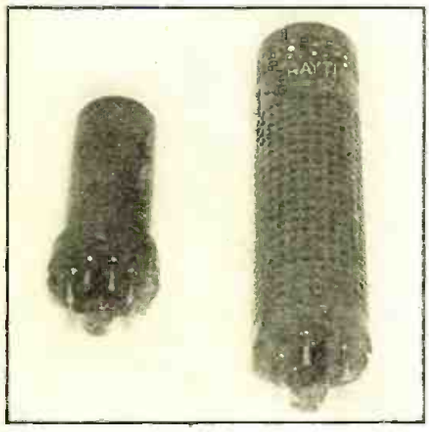


METAL TUBES—THE FOCUS POINT OF MANY EYES

There is no doubt but that the new metal tubes, metal tube sets and amplifiers, tube checkers, and other needed accessories will hold the first interest of radiomen during the coming season. Your editor and the author are shown examining the first metal tubes to become available.

Two of the Latest Metal Type Tubes

The photograph below shows two of the new Raytheon metal tubes, the smaller one is the 6F6, a power amplifier pentode. The electrical characteristics of this tube are similar to those of the type 42. The larger tube with the perforated metal shell is the type 5Z4, a full-wave, high-vacuum rectifier. Its heater voltage is 5 volts and the current 2 amperes, a.c. plate voltage, per



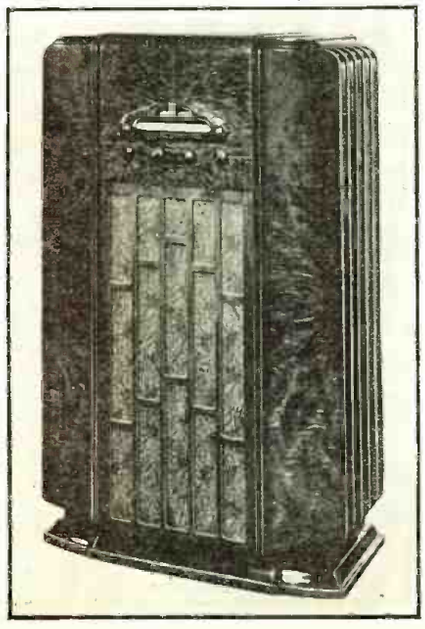
plate, 400 maximum and d.c. output current 125 mas. maximum.

Special Condenser Kit

To facilitate the assembly of the new Thordarson combined condenser capacity and leakage tester described in the September issue of RADIO NEWS, the Aerovox Corporation has just brought out a complete kit of condensers which have the exact capacities and voltage ratings called for in the construction of this instrument.

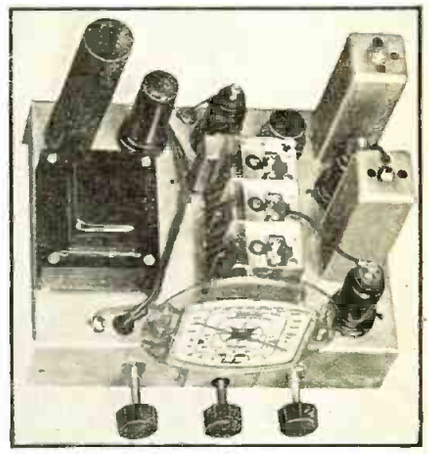
Announcing a New Line of Metal Tube Receivers

The new General Electric series of 8 metal tube sets, includes 4 consoles and 4 table models. The outstanding feature of the new line is the use of the new metal tubes. The new tubes are smaller, provide their own shielding, are more sturdily constructed than the glass tubes and as the manufacturer points out, with their improved electrical characteristics they are particularly advantageous in receivers operating on the very low wavelengths. A few of the new refinements incorporated in the receivers are the sliding-rule tuning scale, new stabilized dynamic type speaker and the "Permaliner" a new type of trimmer capacitor. The photograph shows the model A125 all-wave console which employs 12 metal type tubes.



1936 Line of Receivers

A good part of the new Allied receiver line, employ metal tubes. The receiver illustrated is a 6-tube all-wave super using the following metal tubes: one 6H6, one 6F5, one 6K7, one 6F6, one 6A8, and one 5Z4 rectifier. In addition to the metal tube models this company will continue to

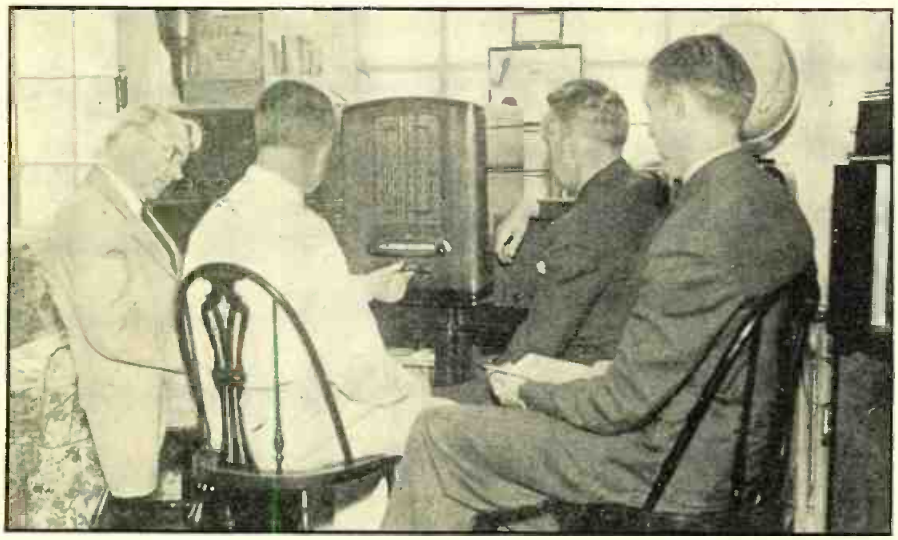


present the latest receivers using glass type tubes, auto sets, 32-volt receivers and new batteryless farm radios.

New Metal Tube Socket

The "Dilecto" 8-prong metal tube subpanel socket manufactured by the Continental-Diamond Fibre Company features sturdy construction. The base top, made of laminated bakelite, is extra thick so as to preclude any possibility of the keyway

(*Turn to page* 240)



TUNING IN JAPAN

This photograph was made at the Westchester Listening Post during an early morning test which netted short-wave station JVM with a Japanese program at full loudspeaker strength.

Hearing

ALL CONTINENTS

(With the G. E. Model A-82 Receiver)

By Laurence M. Cockaday

RECEPTION of short-wave broadcasts from every continent, including Australasia, was one of the highlights of recent RADIO NEWS tests on this new all-wave, 8-metal-tube receiver. This article will outline the results of tests made at the Westchester Listening Post and witnessed by observers rated high in art and music as well as by expert listeners on the short-wave bands. The type of circuit employed is shown in the diagram on this page and the metal tubes employed are also mentioned elsewhere.

The wave-bands covered by the set are as follows: Band A, 140 to 410 kc.; Band B, 540 to 1750 kc.; Band C, 1750 to 6000 kc.; Band D, 6000 to 19,500 kc. It will be noted that the only part of the range not covered is from 410 kc. to 540 kc. which includes the intermediate frequency used, so that the set is capable of reception from 19,500 kc. to 140 kc. except for this small band (which has no particular interest to the listener, anyway).

Logging the Wide World

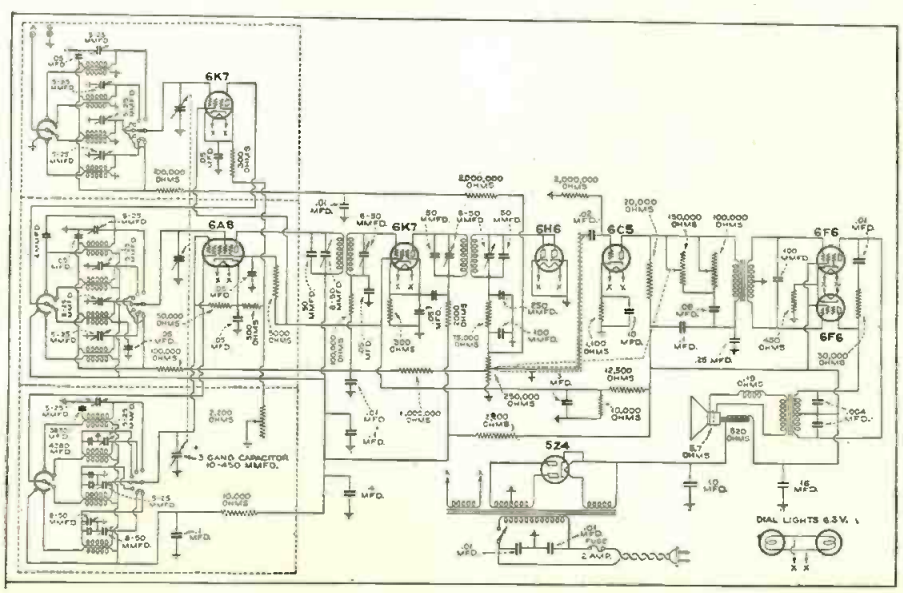
The log made at the Westchester Listening Post shows loudspeaker reception of all of the American broadcast stations from 16 meters to 49 meters. In the broadcast band no distance reception was tried for except in a test for selectivity. Stations as far west as Denver were picked up during these tests in the evening. The Canadian short-wave stations VE9GW, VE9HX, and CJRX, CJRO were easily tuned in. In Mexico we logged XECR and XEBT. Among the Central American and the West Indian stations were logged COH, COC, HRP1, HH1A, HH2S. South America's log included PRF5. OAX4D. HJ4ABB, YV3RC, HJ5ABD, HC2RL, HCJB, HJ5ABE, HJ4ABA, YV5RMO, YV2RC. In Europe were logged EAQ, CT1AA, all the German stations (including DJQ), all the British stations (including GSH, GSG, GSI), RW59, ORK, ORP, HBP, HBL, HBO, FYA (on all frequencies), CT1GO, PCJ, PHI, HVJ. In Asia we logged the following: VP1A (VPD), PLV, RW15, JVM, JVH, VUB, ZCK. In Africa we logged only OPM and ZTJ (JB). All three Australian stations (VK3ME, VK3LR, VK2ME) were picked up at almost full loudspeaker volume as a maximum signal. On only one day of the test was the noise level too high to understand these Australians. As an additional check on sensitivity, we sat down to log American and foreign amateurs on the 20-meter band with the following results: HP1A, TI3AV, PY2AK, G6XR, G5NI, G5ML, G2DL, G5CV, PY1CK. EA4AO, Cuban 8YB, CO2WZ, CO2SZ. CO2OZ, CO2LL, HB9AQ, X2AH, VO1I, XIQ, XIG, XIC, XIB, X2HH, K4SA, VP5PV, HI7G, F8DR, VK3JK, VK2EP, VE3TD, VE1CR, VE2EE, VE3GX, VE1DR. All American amateur districts were represented with the 1's, 3's and 8's rather scarce (due to the skip-distance), with the 4's, 5's and 9's very plentiful and with the following 6's and 7's: W6JY, W6DEP, W6CME, W6CIN, W6DDA, W6CAH, W6IUB, W6FQY, W6ZH, W6ENE, W6CQG, W7BCI, W7QC, W7AOF, W7DNP. All of this reception was done on the loudspeaker.

Uses 8 Metal Tubes

THIS new receiver employs the following metal tubes: Two 6K7 triple-grid super-control amplifier tubes, one 6A8 pentagrid converter tube, one 6H6 duo-diode detector tube, one 6C5 triode amplifier tube, two 6F6 power pentode tubes and one 5Z4 rectifier tube.

A Brief Description of the Receiver

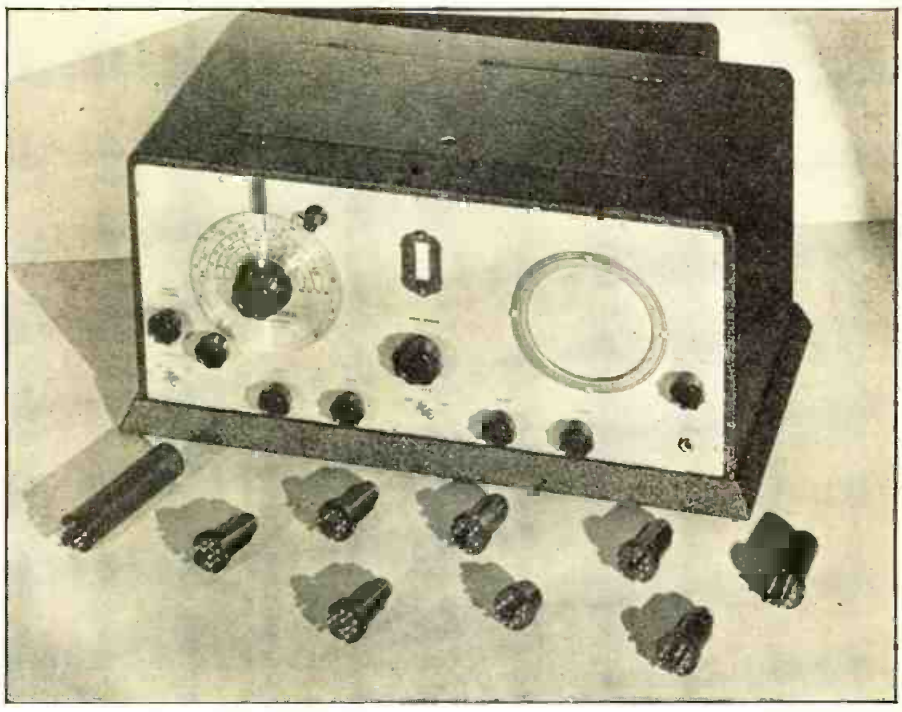
Looking at the front panel of the receiver, the loudspeaker grille is at the top, with the linear tuning scale horizontal across the middle portion of the set, with the wave-changing knob at the left and the tuning (*Turn to page 253*)



"With" METAL TUBE EFFICIENCY

(The Super Skyrider)

John Strong



EMPLOYS 9 METAL TUBES

The new communication type receiver is shown with its nine metal tubes and its new micro-vernier band-spread dial.

THE demand for greater gain, less noise, more selectivity and more accurate tuning is answered in this new receiver, not only through the use of nine metal tubes, but by the use of an especially designed iron-core intermediate frequency system and an ingenious tuning arrangement, which carries the imposing name of "Duo-micro-vernier" band-spread.

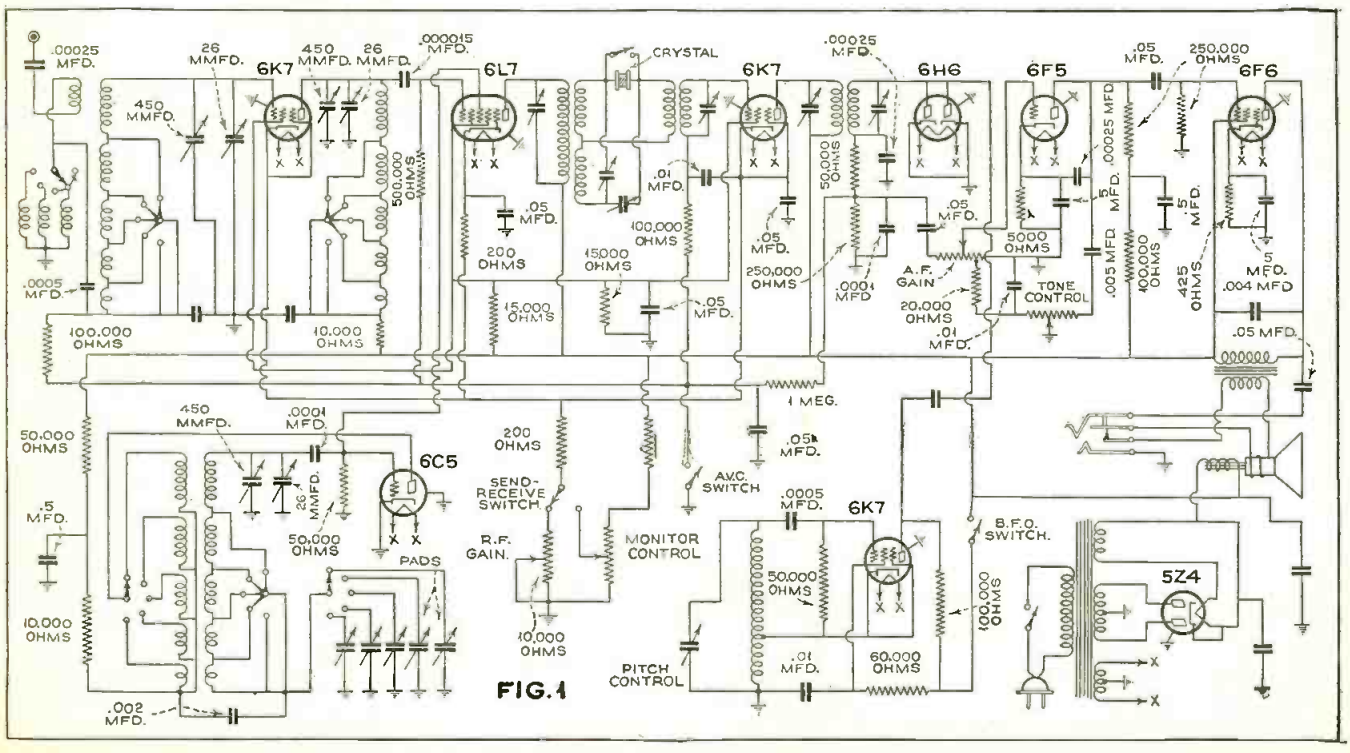
THAT metal tubes will definitely provide better short-wave reception is the conviction of the Hallicrafter engineers, as indicated by their announcement of the new Super Skyrider. The metal tubes in this set permit the elimination of tube shields, to which source engineers have long attributed a lot of the noise in short-wave receivers. The metal tubes also reduced inter-electrode capacities and gave the advantage of shorter leads, all of which afforded greater gain and fewer circuit complications.

The circuit diagram in Figure 1 shows that the new receiver uses metal tubes throughout as follows: a 6K7 in the r.f. pre-selector stage; 6L7 as first detector-mixer; a 6C5 as the oscillator; a 6K7 as the i.f. stage; a 6H6 as the second detector and avc tube; a 6K7 as the electron coupled beat oscillator; a 6F5 first audio, a 6F6 second audio and output tube and a 5Z4 rectifier. The 6L7 tube used here has no parallel in the glass tubes.

The crowded amateur bands demand a new order of selectivity. The special iron-core, intermediate-frequency system for this receiver answers this need adequately. This, incidentally, is the first commercial use of iron-core i.f.'s in an amateur receiver.

Some idea of its comparative efficiency might be gained when it is realized that the new set uses six tuned circuits in its i.f. system, either with or without the crystal filter, where most crystal receivers use only four tuned circuits. True single-signal reception is assured by this arrangement.

An efficient 5-band coverage from 7.5 to 550 meters (41,000 to 540 kc.) has been achieved. This high efficiency is also made possible through an antenna circuit that is (in each case) tuned to the low frequency (*Turn to page* 249)



Getting HIGH FIDELITY *on* DX *with* METAL TUBES

(The Atwater-Kent Model 649)

By The Editor

GETTING high-fidelity on DX from all over the world as well as on local signals is a worth-while feat on any set. To do this on a 9-tube set constructed in such a small space as this chassis takes up would be impossible without using the new metal tubes.

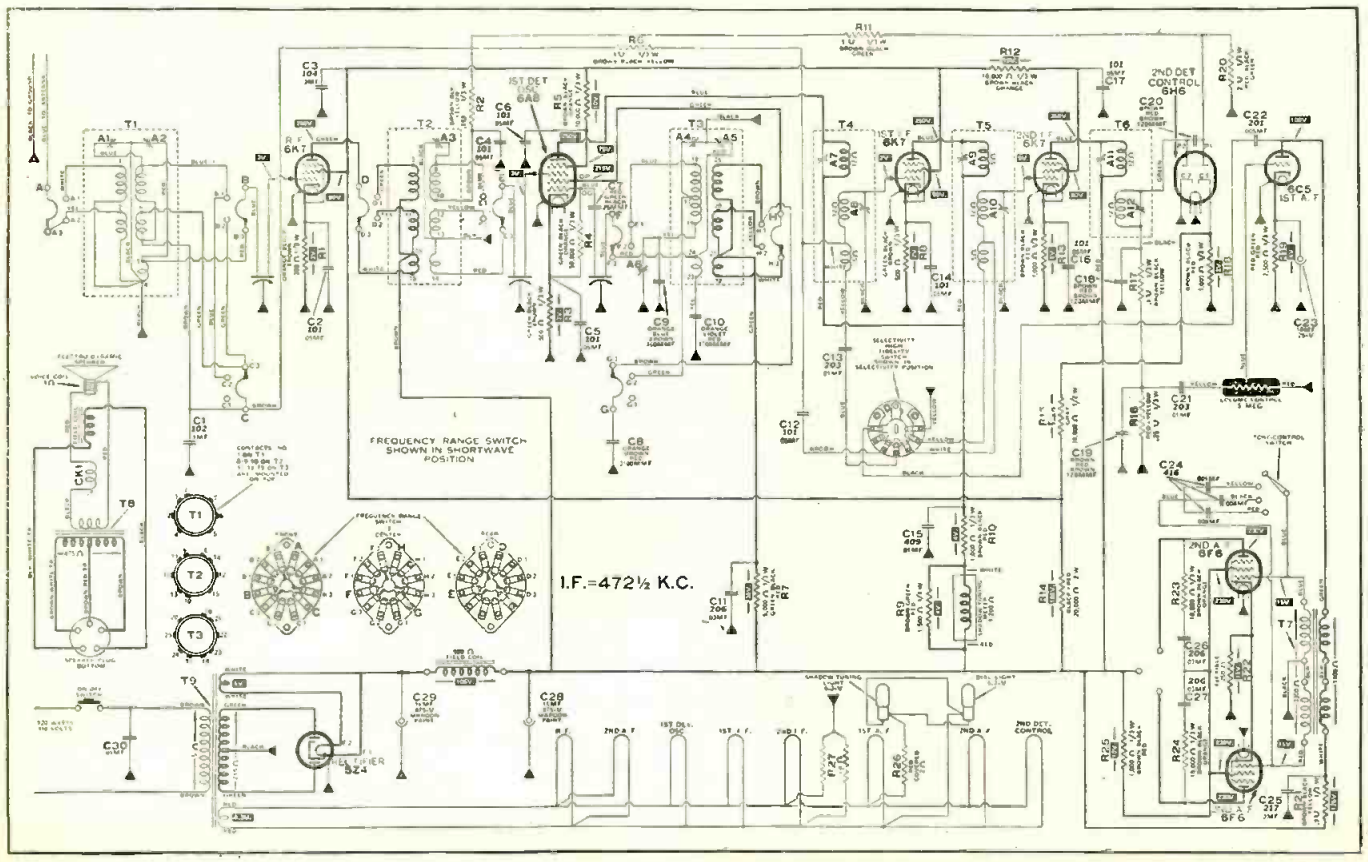
THIS receiver which, by the way, is the first all-metal-tube set to be sent to our laboratory and the first that our editors have had a chance to study and test is a 9-tube high-fidelity receiver including short-wave and standard broadcast reception. It is built very compactly, though with high efficiency. It has been tested out at the Westchester Listening Post and also at two of the leading amateur stations in the New York district. Exceptionally fine results have been obtained with it even as a "ham" receiver on the amateur bands, especially on the 20-meter band. No real DX tests were made on the Standard broadcast band except to judge selectivity, on account of bad static conditions.

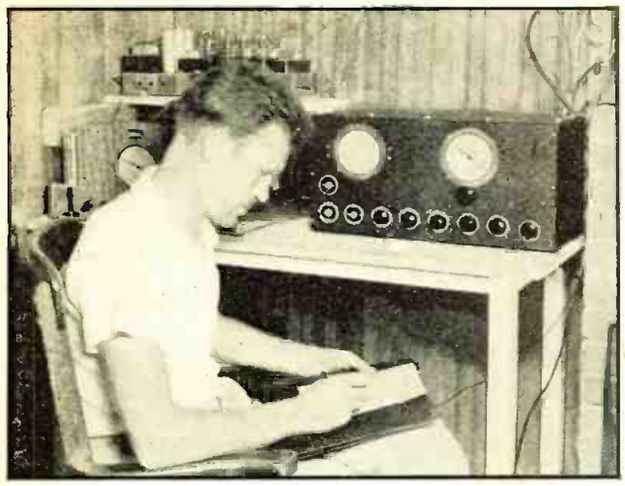
The circuit for this receiver is shown in the accompanying diagram. It employs a 6K7 metal tube in one stage of r.f. preselection, a 6A8 metal tube as a mixer-oscillator, two 6K7's in two i.f. stages, a 6H6 second detector tube followed by a 6C5 first-stage audio amplifier and two 6F6 push-pull pentode power tubes working directly into a loudspeaker through a coupling transformer.

TRYING FOR "BANDOENG"

In testing this receiver an opportunity presented itself, in the PLV special broadcasts for RADIO NEWS *and I.D.A. members and readers. This program was put on the air 20 minutes later than its scheduled time and gave your editors a bad quarter hour before it was finally tuned in. When heard it produced a healthy and perfectly understandable loudspeaker signal. Readers will recognize the scene as a corner of the Westchester Listening Post.*

Looking at the front panel of the receiver, the two upper controls near the dial are, left: combination "on-off" switch and sensitivity control, and right: the tuning (*Turn to page* 250)





Listening Post Tests on a 7 TUBE SUPER

(Montgomery-Ward "Airline" Professional Model 37)

By Gordon Fraser

24-HOUR VIGIL AT FAIRFIELD

Day and night tests of this new super were made at both the Westchester and Fairfield (Connecticut) Listening Posts, the set-up at the latter being shown here.

THIS receiver is designed for communication work particularly, but the very features which make it suitable for this type of service, make it especially suitable for all other types of reception including broadcasting, both on the short waves and the regular broadcast range. As shown in the photograph taken during reception tests at the Fairfield Listening Post, the receiver is a self contained unit, i.e., the receiver, power supply and loud speaker are all incorporated in the single metal cabinet of the table mounting type. It employs 7 tubes as follows: a 78 in the tuned r.f. pre-selector stage, 6A7 first detector and oscillator, 78 i.f. amplifier, 78 combination detector, a.v.c. and audio amplifier, 42 power output tube, 78 electron coupled beat oscillator and an 80 rectifier.

Among the numerous features of this "Airline" receiver are the following:

(1) Effective automatic volume control which can be cut out when using the receiver for the reception of c.w. signals.

(2) Tone control for use as an aid in reducing noise when using the receiver under unfavorable noise conditions.

(3) Sensitivity control for use in regulating gain and volume when the a.v.c. system is cut out.

(4) Audio volume control for regulating loud speaker output independent of the r.f. sensitivity.

(5) Stand-by switch which cuts off the plate current, but leaves the filaments lighted ready for instant use.

(6) A beat-frequency oscillator for locating very weak modulated signals and for the reception of c.w. signals.

(7) Two-ratio tuning dial providing a maximum ratio of 63:1 for critical tuning, but a much lower ratio for non-critical tuning as in the broadcast band.

(8) Floating chassis suspension to eliminate microphonic interaction between the loud speaker and the tuner chassis.

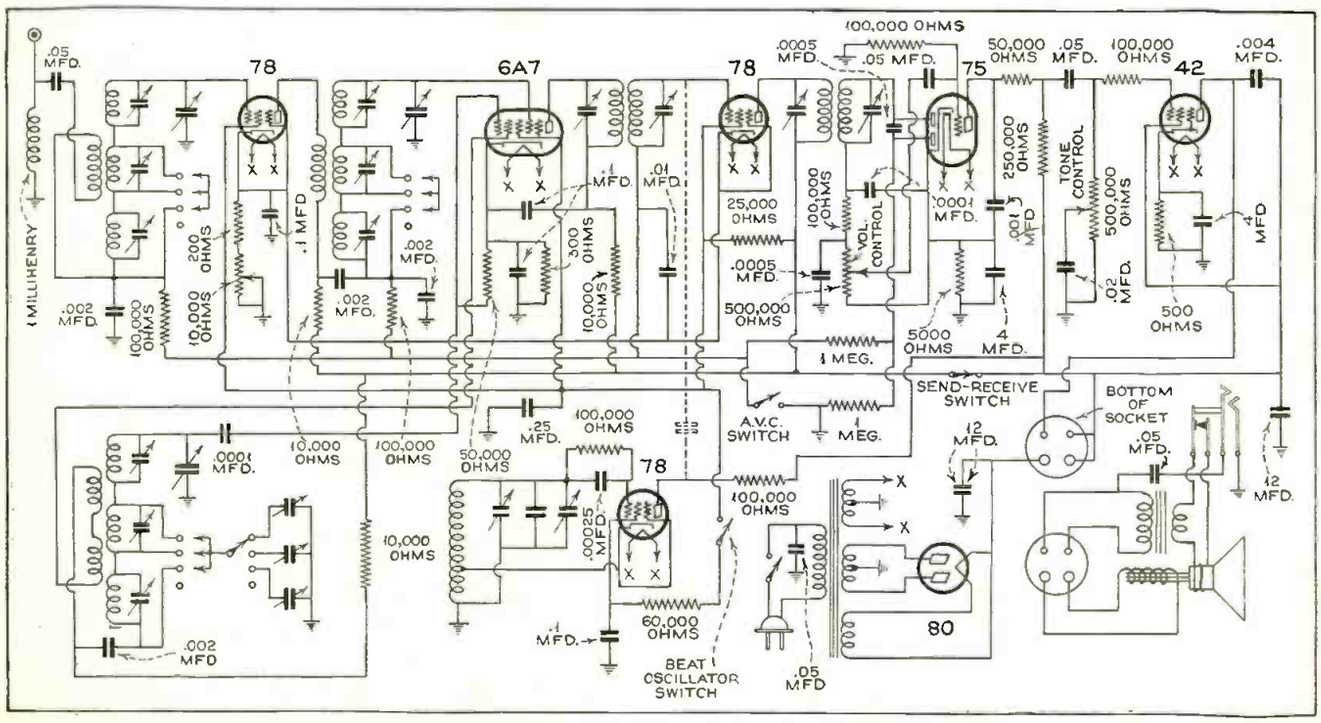
(9) A headphone jack which permits the use of headphones when desired, automatically cutting out the loudspeaker when the headphone plug is inserted.

(10) Complete coverage of the regular broadcast band, all shortwave broadcast bands down to and including 16 meters, amateur bands at 20, 40, 75 and 160 meters, plus numerous other services such as police, airplane, etc., is provided.

It is quite evident that a receiver incorporating such a variety of features effectively meets the requirements of every type of radio listener.

A band-switch provides three ranges: No. 3, from 540 to 1700 kc.; No. 2, from 1650 to 4300 kcs. and No. 1 from 5.5 to 18 megacycles.

Viewing the re- (*Turn to page* 249)



The "HAM" Shack

¶ A Department for the amateur operator to help him keep up-to-date

Conducted by
Everett M. Walker
Editor for Amateur Activities

YOUNGEST BRITISH AMATEUR

This is George Allan Bryan, G2AFV, of Derby, England, who in spite of his 14 years has been granted a short-wave license. His transmitter is of the bread board type layout.

THE last year has witnessed the development and introduction of a number of new tubes designed for the transmitting amateur. These new valves provide the "makings" of a more flexible transmitter with the use of fewer tubes to obtain greater power outputs, greater modulating flexibility and suppressor grid modulation. They are milestones in the progress of amateur radio.

PERHAPS the most outstanding and radical departure has been the introduction of the transmitting pentode. The tube is an overgrown receiving tube that first was suggested by the power pentode of the 59 type. Tubes in this category offer their greatest usefulness in telephone transmitters, crystal-oscillator circuits and as buffer stages requiring small amounts of excitation with large amounts of output.

These new tubes have made their appearance in such rapid succession that the newer amateur has failed to grasp the desirable features they afford in simplifying the transmitter. The array of new type numbers have tended only to befuddle the newcomer to the extent that he has passed up the newer valves despite the fact he started from "scratch." The array of additional grids or screens in the newer pentodes also has tended to cause the newcomer to pass up the advantages of this type of tube. It will be the purpose of this article to outline briefly the characteristics of the new tubes, discuss their merits and describe their adaptability.

Improvements on the RK20 Tube

First among the newer pentodes to be brought out was the RK20, developed by the Raytheon Production Corporation. The tube was introduced last year. Since then a number of improvements have been made in its construction so that now it is a rugged tube that compares more than favorably in performance with the older triodes. The RK20 may be used as a high-power crystal oscillator, affording the newcomer a means of obtaining a medium-powered crystal-controlled transmitter at a minimum cost; it may be used as a buffer-amplifier requiring only a small amount of excitation power and delivering sufficient output to drive a 1-kilowatt final Class C amplifier; and it may be used as a suppressor-grid modulated amplifier providing a good low-powered 'phone transmitter with a minimum amount of modulating power and equipment. The static characteristics of the RK20 are:

Filament: 7.5 volts at 3 amperes
Capacities: Grid to plate, .012 mmf.; input, 11 mmf.; output 10 mmf.

Ratings:		
D.C. plate voltage	1,250 volts max.
D.C. screen voltage	300 volts max.
D.C. suppressor voltage	45 volts max.
Screen dissipation	15 watts max
Plate dissipation	40 watts max
Control grid d.c. current	10 ma. max.
Control grid r.f. current	5 amps. max.

Specifications for use as a suppressor for use as a suppressor grid modulated r.f. power amplifier in Class C telephony with 100-percent modulation:

D.C. plate voltage		1,250 volts
D.C. screen voltage		300 volts
D.C. control grid bias	minus	100 volts
D.C. suppressor grid	minus	40 volts
Plate current		47 ma.
Screen current		36 ma.
Necessary r.f. driving power		.9 watt
Necessary audio power		.8 watt
Peak, output		84 watts
Carrier output		21 watts

Specifications for using the RK20 as an r.f. power-amplifier and oscillator in Class C telegraphy:

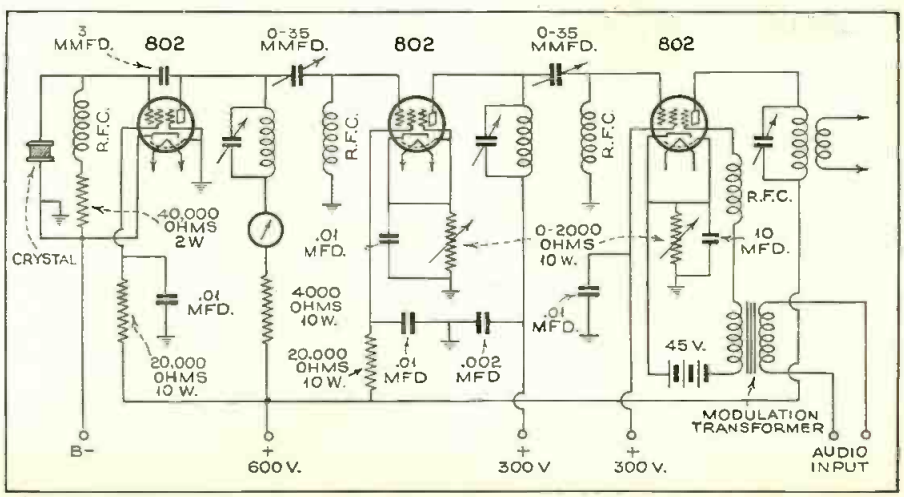
Plate, screen and control grid same as above.

Suppressor D.C. voltage	plus	45 volts
D.C. plate current		92 ma.
D.C. screen current		32 ma.
D.C. control grid current		5 ma.
R.F. input power		0.9 watts
Carrier output		80 watts

From the above characteristics it will be noted that this type tube affords many possibilities. It may be used as a crystal- or electron-coupled oscillator without difficulty. The low control grid-to-plate capacitance makes possible the use of a plate load circuit tuned to the fundamental in crystal- or electron-coupled oscillator circuits such as the "tri-tet." Using crystal control, 50 watts of radio-frequency power can be taken from the plate load circuit without overloading the crystal.

A few operating notes might be included here. The screen voltage may be obtained either from a separate source or through a dropping resistor. The dropping resistor aids modulation, but not much. When the tube is used as a frequency-doubler, the power ratings should be decreased. The adjustments are much more critical than for a straight amplifier or modulator. If care is taken in the adjustment, about 50 watts may be obtained with reasonable plate dissipation with at least 100 volts bias on the control grid. This, of course, applies to the use of the tube as a doubler. When used as a straight buffer, greater output may be obtained. Another point: shielding of the grid-input tuning system from the plate-tuning apparatus is desirable and will provide improved stability. Never allow a shield to touch the glass envelope, as a shield, which is naturally at ground potential, is likely to cause arcing at the point of contact and a severe arc may puncture the tube.

Much space has been devoted to the characteristics of the RK20, but the same general rules apply to the installation of all new tubes in the shielded pentode category. For instance, there are two smaller tubes of this same type manufactured by the Raytheon company, namely, the RK23 RK25, and the UV802 manufactured by the R.C.A. Manufacturing Company, Inc.



The RK23 and RK25 are identical in every respect excepting filament requirements, the former operating from a 2.5-volt source and requiring 2 amperes and the latter a 6.3-volt source at .8 ampere. The UV802 has a 6.2 filament. All three are of the heater cathode type. Other characteristics of these three tubes are:

	RK23-RK25	UV802
D.C. plate voltage	400 volts	500 volts
D.C. screen voltage	200 volts	250 volts
Suppressor voltage	40 volts	40 volts
D.C. plate current	60 ma.	50 ma.
D.C. screen current	35 ma.	28 ma.
Plate dissipation	10 watts	10 watts
Normal output	10 watts	10 watts

While each of these three tubes may be used in a suppressor-grid modulated transmitter, the power output obtained is comparatively small. A carrier of about 3.5 watts is obtained. On the other hand, in typical Class C operation, outputs of the order of 16 watts may be obtained, which is sufficient to drives tubes in the 203A category. Typical operating conditions for these tubes in such service, in addition to the above specifications, are about 100 volts minus control-grid bias, 40 volts positive on the suppressor grid and plate cur-

(*Turn to page* 246)

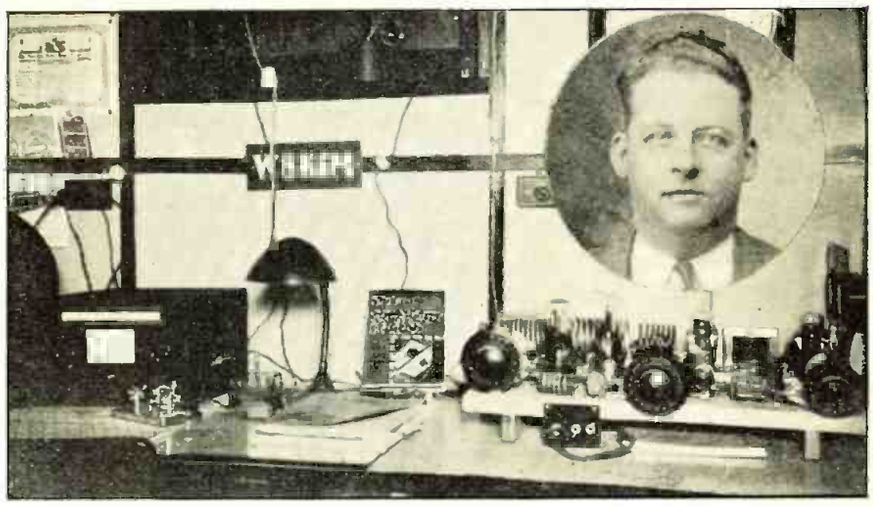
RADIO NEWS Sponsors New Opportunity for Code Practice at Home

RADIO NEWS takes pleasure in publishing the following schedule of code transmissions in the United States especially for those who wish to learn the code over the air. All one has to do is to tune in to the proper frequency as specified at the proper time and day and start copying the special code transmissions for practice. A daily schedule is given for the present month (beginning September 1st and ending October 1st). In the first column is the time (a.m. or p.m.); in the second column are the symbols, E, C, M and P (where E is used for E.S.T., C for C.S.T., M for M.S.T. and P for P.S.T.). In the third column are the call letters of the transmitters of amateur members of the Guild and the fourth column contains the frequencies of transmission in all cases, except where otherwise noted. Each CSCG transmitting station will begin his program at stated time by sending "CSG" 6 times, followed by his station call repeated 3 times, slowly. At intervals of 5 minutes, he will repeat "CSG" 6 times and his call letters 3 times. All who listen to CSCG programs are requested to write a card to the transmitting station telling him how his signals come in and, if possible, sending him copies of transmissions.

A GREAT THING FOR CODE STUDENTS

W2HZJ, Walter G. German says: "RADIO NEWS is doing a great thing for code students by showing them just how they can secure the right kind of practice. There is a real demand for trained radio operators in the Naval Communication Reserve. I will send interested students complete information and application blanks."

—Signed—W2HZJ.
RM3c V-3 USNR.



A VERY FINE SERVICE

W8KGM, Edward J. Goodison, a Guild Station transmitting code as per schedule says: "RADIO NEWS schedule service is very fine business. Beginners here in town now take RADIO NEWS for these code schedules and get real fun out of logging the stations listed and learning the code."

—Signed—W8KGM.

MONDAY

8:30 A.	E.	W1AMH	56,100-3536½
9:00 A.	ED.	W2HZJ	3577
9:00 A.	E.	W3AEJ	3785
4:00 P.	E.	N1FNM	3510
5:00 P.	P.	W7WE	3637-7274
6:00 P.	E.	N1DUZ	3638
6:00 P.	E.	W8MHE	3830
6:00 P.	E.	W8EEZ	3598
6:30 P.	C.	W9LKK	3757
7:00 P.	E.	W2HCP	3835.5
7:00 P.	C.	W9SFT	3585
8:00 P.	E.	W8MCP	3580

TUESDAY

8:15 A.	E.	VE3UU	3865
9:00 A.	ED.	W2HZJ	3577
3:30 P.	C.	W9TE	7012
4:00 P.	E.	N1FNM	3510
6:00 P.	E.	W8MHE	3830
6:00 P.	E.	W8EEZ	3598
6:30 P.	C.	W9LKK	3757
7:00 P.	M.	W9HHW	7276
7:00 P.	M.	W6IQY	14380
7:30 P.	C.	W8HKT	3750
8:00 P.	C.	W5CPV	7149
8:00 P.	E.	W8MCP	3580
8:00 P.	M.	W7DBP	3607

WEDNESDAY

6:00 A.	C.	W5DDC	7200
9:00 A.	E.	W2HZJ	3577
3:30 P.	C.	W9TE	7012
4:00 P.	E.	N1FNM	3510
5:00 P.	P.	W7WE	3637-7274
6:00 P.	E.	W6MHE	3830
6:00 P.	E.	W8EEZ	3598
6:30 P.	C.	W9LKK	3757
7:00 P.	E.	W2HCP	3753
7:00 P.	E.	W3AEJ	3785
7:00 P.	C.	W9SFT	3585
7:00 P.	M.	W9HHW	7276
8:00 P.	M.	W7DBP	3722

THURSDAY

8:15 A.	E.	VE3UU	3865
9:00 A.	E.	W2HZJ	3577
3:30 P.	C.	W9TE	7012
6:00 P.	E.	W8MHE	3830
6:00 P.	E.	W8EEZ	3598
6:30 P.	C.	W9LKK	3757
7:00 P.	M.	W6IQY	14380
8:00 P.	M.	W7DBP	3607

FRIDAY

9:00 A.	E.	W3AEJ	3785
9:00 A.	ED.	W2HZJ	3577
3:30 P.	C.	W9TE	7012
5:00 P.	P.	W7WE	3637-7274
6:00 P.	E.	W8MHE	3830
6:00 P.	E.	W8EEZ	3598
6:00 P.	E.	N1DUZ	3638
6:30 P.	C.	W9LKK	3757
7:00 P.	E.	W2HCP	3753
9:30 P.	E.	W4BHR	3867

SATURDAY

8:15 A.	E.	VE3UU	3865
8:30 A.	E.	W1AMH	56,100-3536½
9:00 A.	ED.	W2HZJ	3577
6:00 P.	E.	W8MHE	3830
11:50 P.	P.	W7WE	3637-7274

SUNDAY

8:15 A.	E.	VE3UU	3865
9:00 A.	ED.	W2HZJ	3577
10:30 A.	E.	W3EEY	3628
10:30 A.	C.	W5DDC	7200
11:00 A.	E.	W8KGM	3807
1:00 P.	P.	W7WE	3637-7274
6:00 P.	E.	W8MHE	3830
7:00 P.	C.	W9LUS	3631
8:00 P.	M.	W7DBP	3722

Active Members Candler System Code Guild

W1AMH—Harold J. Morse, 48 Hebron St., Hartford, Conn.

N1DUZ—J. E. Vermeiren, 137 Middlesex St., Springfield, Mass.

N1FNM—G. W. Wabrek, New Hartford, Conn.

W2HCP—A. P. Bloser, 82 Dove St., Albany, New York.

W2HZJ—Walter G. Germann, 905 E. 169th St., New York, N. Y.

W3EEY—Dr. H. A. D. Baer, BAER HOSPITAL, Allentown, Penna.

W3AEJ—Geo. W. Knowles, 82 Elgin Avenue, Westmont, N. J.

VE3UU—Gordon Murray, 53 Elm Grove Ave., Toronto, Ont., Canada.

W4BHR—James D. Randolph, Warren Plains, N. C.

W5DDC—Herbert Leo, 1420 Hawthorne St., Houston, Texas.

W5CPV—Grady L. Hardin, 132 Oak St., Hot Springs, Ark.

W6IQY—E. L. Troutman, Box 85, Flagstaff, Ariz.

W7WE—Loren C. Maybee, 3516 Hudson St., Seattle, Washington.

W7DBP—F. W. Stuart, R. F. D. 2—Boise, Idaho.

W8HKT—F. T. McAllister, 807 Michigan Ave., St. Joseph, Mich.

W8MCP—Chas. Hedrich, 30 DeKalb St., Tonawanda, N. Y.

W8MHE—Charles L. Gibson, 9 Sycamore St., Natrona, Pa.

W8EEZ—Tauno M. Alanen, 512 New Street, Fairport Harbor, Ohio.

W8KGM—E. J. Goodison, 300 E. Edward St., Endicott, N. Y.

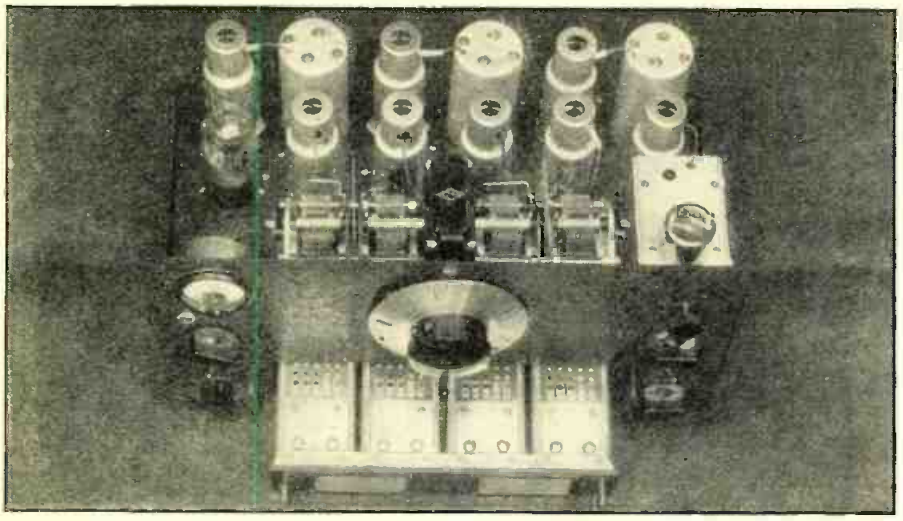
W9HHW—Denzel Begley, Box 46, Ft. Meade, S. Dak.

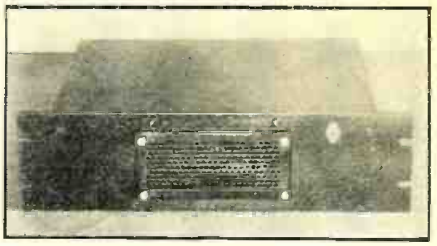
W9SFT—Gerald Broughton, CCC Co. 735, Scammon, Kansas.

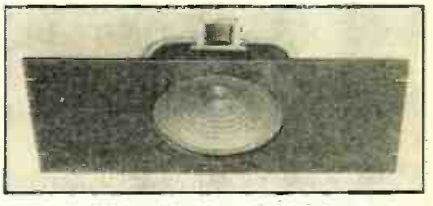
W9TE—A. L. Braun, 5211 Brookville Rd., Indianapolis, Indiana.

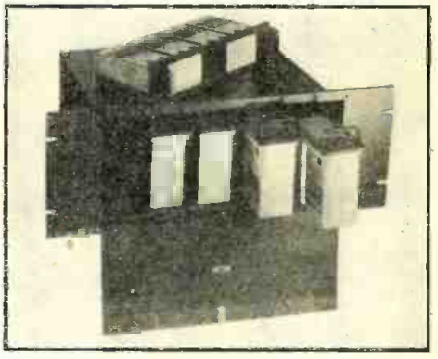
W9LKK—Sidney Schulz, 3132—4th St. S. E. Minneapolis, Minn.

W9LUS—Clarence Read, 3401 Parnell Ave., Chicago.









Some Technical Features of the

HRO AMATEUR RECEIVER

By The Staff

IN last month's article it was promised that more information regarding the technical features of this receiver would be given, and therefore we point to some of these in the following description.

THE HRO receiver is a 9-tube high frequency superheterodyne for dependable communication purposes. A circuit diagram of this receiver was given last month. It will be noted that the set can be used with either a single-wire type antenna or with a doublet. When the doublet is used the short flexible lead on the input should be disconnected from the ground terminal.

Signal-Strength Meter

One of the features of the receiver is the "S" meter for indicating signal strength. This meter is calibrated in arbitrary units from 1 to 5, corresponding, approximately, to the definitions of the points of the "S" scale of the R.S.T. system of amateur signal reporting. It is necessary to make certain adjustments on the receiver to use this meter. The set must first be set to a predetermined degree of amplification. With the a.v.c. switch "off," the c.w. oscillator "off," the crystal filter "off," and the selectivity control set at maximum sensitivity, press the meter's push-button and increase the r.f. sensitivity control until the meter needle is at zero. (The sensitivity control should then read somewhere around 9½.) Next, tune the receiver to the desired signal, without changing the controls and the strength of the signal may be measured by throwing "on" the a.v.c. switch and tuning the set (on the signal) for maximum meter deflection while pressing the button. This procedure holds true for either phone or c.w. signals as long as the beat oscillator is turned "off" for c.w.

The frequency ranges of the four high efficiency coil (*Turn to page 256*)

Columbia's New

STUDIO ACOUSTICS

By Samuel Kaufman

A NEW type of broadcasting studio embracing a pick-up technique entirely new to radio was recently opened by the Columbia Broadcasting System, at the studios of its key station, WABC, New York. The studio was planned and built under the supervision of Edwin K. Cohan, technical director of the network. Dr. E. E. Free, prominent engineer and acoustical expert, served as consultant in the studio's design.

The new studio is of the "live-end, dead-end" type but it is termed revolutionary in its use of a special echo plane instead of a mere reverberating surface on the rear wall of the live-end. The three wall surfaces of the live portion are covered with wood paneling designed according to acoustic principles. The studio's dead-end walls are covered with two grades of perforated metal (*Turn to page 236*)

Looking Over The HAM BANDS with a 9-Tube AMATEUR KIT RECEIVER

(Lafayette Professional 9)

—AND STANDING BY

The completed set being tested in the Listening Post on all the amateur bands as well as on the short-wave broadcast wavelengths.

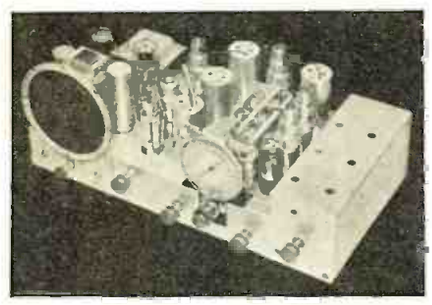
By the Associate Editor

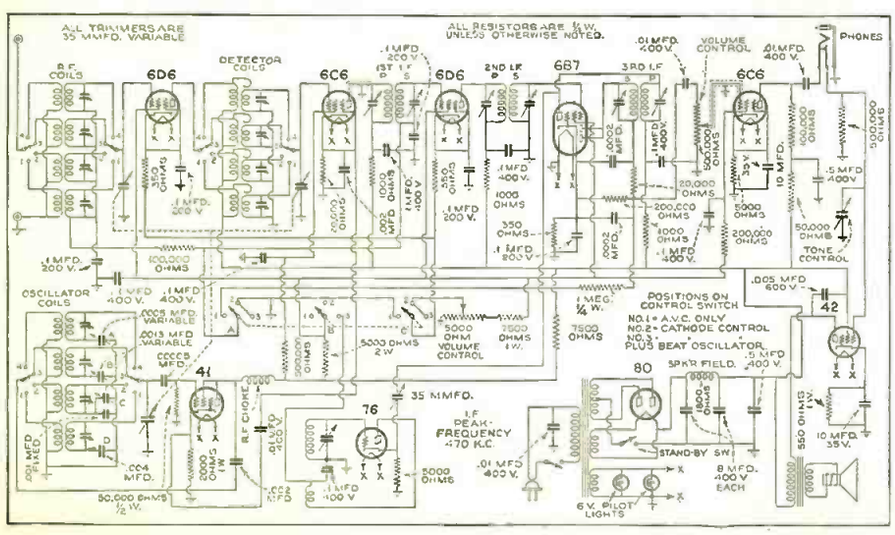
IT is the purpose of this article to describe a 9-tube all-wave superheterodyne receiver for home construction that should have special appeal to the many thousands of amateurs and short-wave listeners who like to "roll their own," not only because it incorporates many of the new 1935 refinements, or the fact that the set performed exceptionally well on all operating tests, but principally because the most difficult part of superheterodyne receiver construction has been eliminated by providing the kit with a pre-assembled tuning unit, that is wired and "tracked" at the factory.

Several amateurs had reported that this set had everything the discriminating ham demanded and the reader can well imagine that on completion of the receiver and after our alignment check of the tuning circuits, just how anxious the staff members were, to put the receiver through its paces and to determine for themselves just how well it measured up to the reported claims.

The preliminary tests were conducted at our laboratory which is located in the heart of New York City and the results on both the broadcast and short-wave channels indicated that interesting and surprising reception was in store for us, for the big tests at the Westchester Listening Post.

The preliminary tests spoken of above, were conducted late Monday afternoon. The next day, the set was put into a carton and transported by motor car to the Westchester Listening Post and immediately on arrival there Mr. L. M. Cockaday and the author quickly connected the receiver to its antenna and ground and went to work. The first day's testing ran through most of the entire day (Tuesday), until 10 P.M. that night. No tests were made on Wednesday, but Thursday's tests were quite exhaustive, from 9 A.M. till 12 midnight. Both operators noted the ease of tuning and the good selectivity and sensitivity of the receiver.



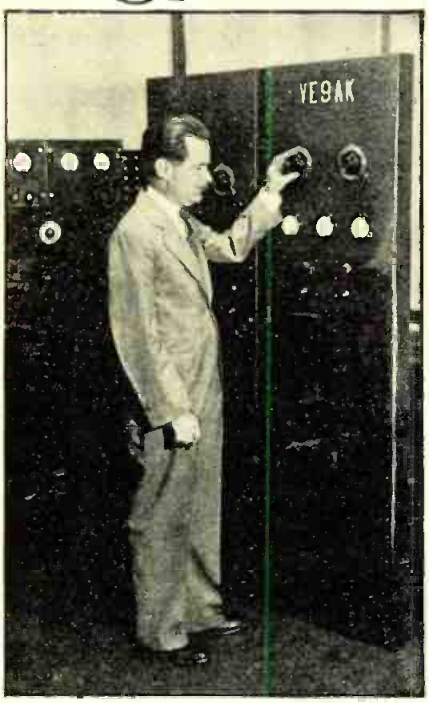


General Description

Before outlining the results of our tests, let us first describe briefly the features of the receiver and the functions of the various tubes. The receiver has a wavelength coverage from 9.7 to 560 meters (in four different wave bands). A stage of radio-frequency amplification is used on all bands, thereby minimizing image frequency and providing additional sensitivity and selectivity. The outstanding features of the receiver include a beat-frequency oscillator for c.w. code reception, an automatic or manual volume control, which can be selected at will, continuous mechanical band-spreading and a dual-speed airplane type tuning dial. The dynamic type speaker, power supply and the audio-output stage are built on a separate chassis unit and if desired, it can be unmounted from the main chassis and placed a short distance from the tuner. The crystalline finished cabinet is available with the kit and it is an unusually strong one, measuring 10 inches high by 11½ inches deep by 22½ inches long.

As mentioned previously, 9 tubes are employed and their functions are as follows: A type 6D6 is used for the r.f. stage, followed by a 6C6 as a first detector and the oscillator circuit employs a 41 power pentode type tube. In tests with this (*Turn to page* 256)

Reporting TELEVISION'S



MONITORING TELEVISION

J. L. Cassell at the Canadian television station VE9AK monitoring a program.

¶ What will be the method finally chosen for television in the United States? Should not any method that produces good results be given a chance on the air?

By Rupert Oakille

TELEVISION bids fair to bring an entirely new set of problems before the F.C.C., for at present a number of experimental stations are sending or propose to send their pictures on the 5- and 6-meter bands, the 10-meter band the 170-meter band, etc. Then there is the problem of how television programs are to be sent to different parts of the country; over wires, what kind of wires or cables, etc. Not only is this the case, but two radically different types of scanning are being used; i.e., the cathode-ray tube and the revolving disk. Each of these systems claims manifest advantages and proponents of each state that theirs will be the system adopted as the official standard when the standardization of television receivers takes place, as it is sure to do within a short space of time.

In this article the writer, who has been active in radio for fifteen years and in television since 1928, will attempt to analyze the claims of the various systems, with the aim of predicting future standards.

The cathode-ray types of scanners, in which Philco, RCA and the Farnsworth group are interested represent one side of the story. The mechanical (or revolving disk) scanner, is represented by some of the independents, one of which, the Peck Television Corp., has produced excellent images on a large screen, in black and white.

In order to simplify a discussion of the improvements in both of these systems let us divide this article into subheads.

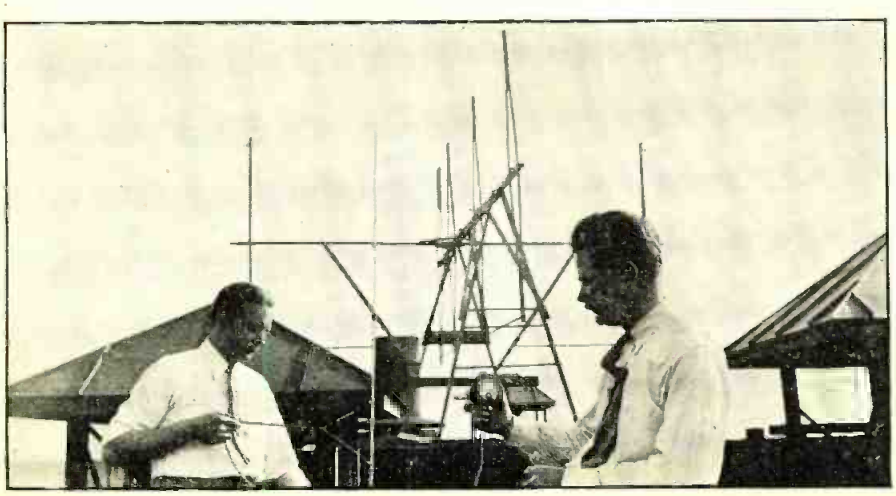
SIMPLICITY OF MECHANISM. Besides incorporating a more or less conventional radio receiver to produce the television signal, a television receiver must include a light source, a means of modulating the light in order to reproduce high-lights and shadows, a scanner to spread the light over the screen or otherwise break it up into a two-dimensional picture, and a power-pack capable of supplying the voltage and current used by these units.

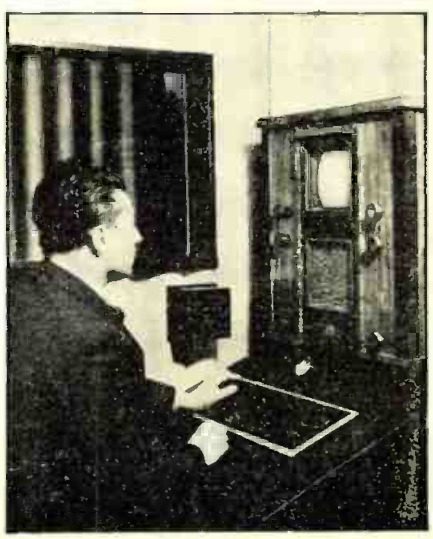
The cathode-ray system appears to be simpler, for in it we find a single tube performing the functions of light source, light modulator and scanner, while the disk system makes use of a three-inch disc driven by a small motor, a headlight bulb for light source, and a separate modulator cell. Carrying our inspection a step farther, we learn that the disc motor operates directly from the 110-volt light lines and that the light source used with the disc also draws its current from the ordinary power-pack of the set and that the light valve is modulated directly from the output of the standard push-pull amplifier which Peck's receiving circuit employs. On the other hand, as many as six additional tubes are used in the cathode-ray systems to afford scanning action with the cathode-ray tube and each of these six extra tubes employ its own oscillator coils, condensers, chokes, etc. A special power pack, including heavy-duty rectifiers, chokes, condensers and resistors is also required with the cathode-ray tube, which may use voltages up to 4000 or more.

Neither of these systems is quite as simple as the now obsolete system in which a tube of either the neon plate or neon crater type was used as combined light source and light modulator. This system has, however, been virtually abandoned because of deficiencies in the

MEASURING TELEVISION BEAM INTENSITIES

Making actual field-strength measurements near the short-wave antenna of VE9AK to determine the beam's directional ability.





PROGRESS *in America*

brilliance and size of the pictures it produced.

SIMPLICITY OF OPERATION. Tuning is unquestionably somewhat simpler in the cathode-ray system than in the Peck system. In the former, it is merely necessary to tune in the signal, which is automatically synchronized by the extra 6-tube circuit. One additional control is necessary to establish synchronization in the disc system. In both systems, synchronization, once obtained, remains established as long as the set is tuned to a given station.

FREEDOM FROM TROUBLE. The two systems are about equal in freedom from problems of servicing. In the cathode-ray system, the scanning-light-source tube may require the aid of a service man every 1000-2000 hours, when replacement becomes necessary. This will be the case if the manufacturers decide to install it in a sealed unit because of the high voltages which it may require. Its associated tubes should be easily replaceable by the set owner.

Both light source and modulator tubes, operated at normal set voltage in the disc system, will be replaceable by the owner. The motor will be similar to that used in an electric clock—and as completely free from servicing problems.

The cost of the cathode-ray tube, with an estimated life of 1000-2000 hours, may probably be brought as low as $25 when in production, and its associated tubes should last as long as, and cost no more than, the other ordinary receiving tubes which the set employs. The Peck light source and modulator tubes will have a combined retail cost below $2, and a life of approximately 5000 hours.

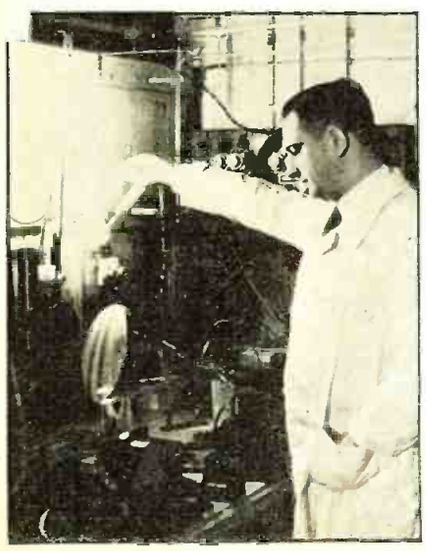
DETAIL AVAILABLE. Images reproduced by cathode-ray systems will be composed of about twice as many lines per frame as will those of the disc system, which (*Turn to page* 241)

TELEVISION PICTURES "A LA DISK"

Large-size screen television pictures of a motion-picture cartoon character, projected on a screen at the top of a television receiver.

CATHODE-RAY EQUIPMENT

Experimenting with a large cathode-ray tube for television, in the laboratory. Illustration on opposite page shows the same tube operating in a television receiver.



New COAXIAL CABLE *for Television*

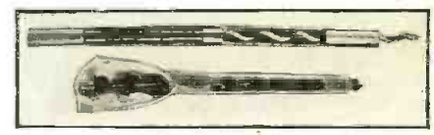
By Victor Hall

THE recent announcement by Bell Laboratories, of the so-called "coaxial" cables for transmission of wide frequency-range signals from one point to another, has been of more than passing interest to telephone men and television experimenters alike. An experimental circuit is soon to be set up between New York and Philadelphia, using a double coaxial cable for further research work.

Although the idea of coaxial circuits has been investi- (*Turn to page* 249)

SHOWS COMMISSIONERS TELEVISION CABLE

Dr. F. B. Jewett of the Bell Labs exhibits new type coaxial cable to be used for television between New York and Philadelphia, before members of the Federal Communications Commission. Photo below shows two examples of cable construction.



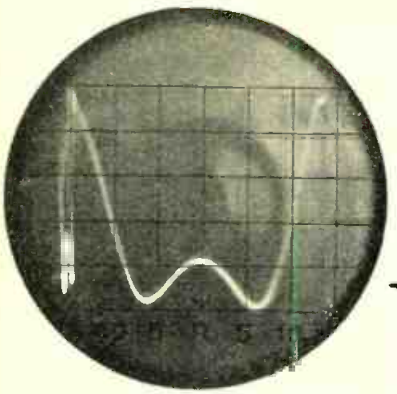


FIGURE 4

New 19 Tube RECEIVER

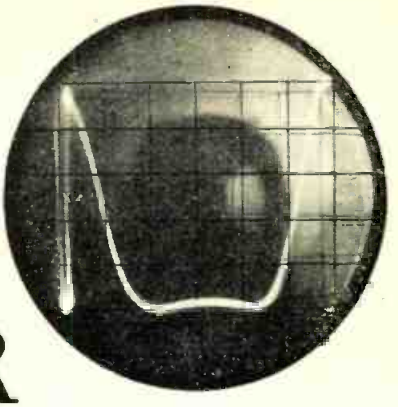


FIGURE 5

(The Masterpiece IV)

McMurdo Silver

Part Two

FOLLOWING the general description of the MASTERPIECE IV in the September issue, consideration will now be given to its r.f. and i.f. circuit design.

In line with the desirable but difficult aim of obtaining high r.f. amplification and low i.f. gain to prevent the usual vitiating of high sensitivity by excessive inherent noise, the two tuned r.f. stages are used on all bands. This is a radical departure, for no previous all-wave receivers have attempted to use more than one r.f. stage on all bands, so far as the writer knows.

On long waves, and even down to 10,000 kc. two stages of r.f. present no great difficulties, since in these ranges circuit wiring inductance presents little practical difficulty, and coils can easily be held to close tolerances. Above 10,000 kc. (below 30 meters) the situation is quite different, and the greatest care must be used if accurate tracking of four tuned circuits is to result. This, however, is only serious when an attempt is made to get the very most out of the r.f. amplifier, as is done in this receiver, through the use of the best possible coils and really low-loss shielding. If relatively poor coils in small shields were used, the individual circuits would become so broad as to require no really accurate tracking.

Gain Equalization

The net result is high r.f. gain even in the range of 10,000 to 30,000 kc., good sharp circuits which require perfect alignment and tracking to "do their stuff" (and it becomes necessary to track all circuits in terms of a few kilocycles), and an absence of inherent noise that is simply amazing.

Gain or amplification is always easier to obtain at low frequencies, as is selectivity. Hence some means of gain equalization between low- and high-frequency tuning ranges is vitally necessary. Gain equalization throughout each band is obtained by oversize low-impedance primaries with balancing capacity coupling in the r.f. transformers. This, however, is no help in equalizing the gain variation of as much as 20 to 1 that will exist between the lowest and highest frequency bands.

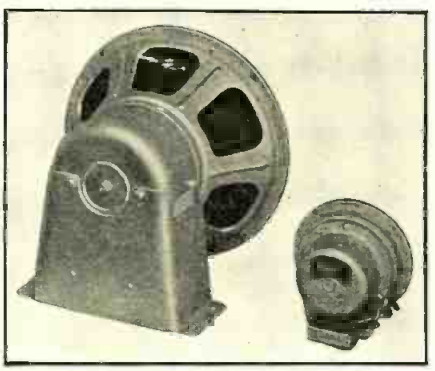
Obviously, the top limit is that obtainable on the lowest frequency band unless i.f. gain is changed to compensate. So to compensate gain, and selectivity of the r.f. amplifier, the long-wave band transformers (140 to 410 kc.) are universally wound of fine wire (like small r.f. chokes) to permit no more than desired gain and selectivity. In the broadcast band, 100,000 ohm resistors must be shunted across each r.f. grid circuit to similarly compensate gain and selectivity. No circuit "loading", or intentional impairment is needed in the range of 1600 to 12,000 kc., the best r.f. coils that can be built are just good enough. Over this range the i.f. sensitivity can be held down to 75 microvolts absolute, the two r.f. amplifier stages contributing easily the additional gain necessary to the ⅓ to ½ microvolt absolute overall sensitivity with almost no inherent noise even when "wide open".

10-25 Meter Band

From 12 to 30 megacycles, enough gain cannot be had from the two r.f. stages to give equal overall sensitivity, so a compromise must be resorted to, which is fully justified. As the amount of wire in the input r.f. transformer is so little as to give rise to substantially no electron agitation noise, it is permissible to increase i.f. gain somewhat—but only with a very (*Turn to page* 251)

THE DUAL SPEAKERS

The large bass speaker and the 5½ inch "tweeter" provide reproduction over the wide range of 30 to 9000 cycles, for real "high fidelity".



AMPLIFIER AND POWER SUPPLY

Below is the 8-tube, 35-watt amplifier and power supply which connects to the tuner by means of a 6-wire cable and plug.

FIGURE 1

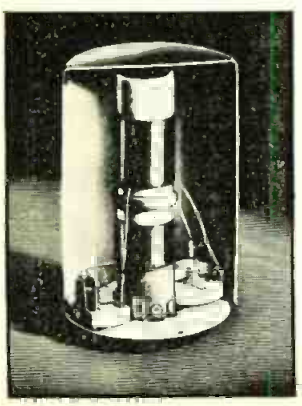


FIGURE 2

Theory and Practice for Correct IMPEDANCE MATCH

C. A. Johnson

Part Three

IN audio frequency practice the general problem is to transfer electrical energy from a source to a load, in the most efficient manner. The source may be any one of a number of common devices, such as a phonograph pickup, an oscillator, secondary of a transformer, etc. In any event, the source will have a characteristic impedance, depending upon its own structure and in the case of the transformer, upon the apparatus which precedes it in the electric circuit.

LET us take the simplest case and determine the conditions under which the maximum power can be obtained from a given source. Figure 1 is an illustration of such a case. We will assume that the impedance of the source is a pure resistance, R_S, and that the e.m.f. generated by it is e. This voltage must drive a current, i, through the source and through a load R_L. Our problem is to find the best value of R_L. We will assume that R_L is also a pure resistance, so that neither of the impedances will vary with frequency.

Now the current flowing in the circuit at any given instant is given by the formula

$$i = \frac{e}{R_S + R_L} \qquad (1)$$

If we designate the power developed across the load by P_L, we find that

$$P_L = \frac{e^2 R_L}{(R_S + R_L)^2} \qquad (2)$$

Now when is P_L a maximum? This answer can be found very easily by means of differential calculus, but we can also solve for it graphically by assigning numerical values to the terms of formula (2). We will let $R_S = 500$ ohms and the r.m.s. value $e = E = 1$ volt. Now we will vary R_L from 10 ohms to 500 ohms and see what happens to P_L. The result is shown by the graph in Figure 2. Note that P_L is a maximum when R_L has the same value as R_S, which is 500 ohms in this case.

The above analysis is perfectly general and applies to all electrical circuits for any frequency including d.c. A more useful form of the graph is shown in Figure 3. This shows the number of decibels loss at a junction, when the ratio of source impedance to load impedance is varied by definite amounts.

Reflection Loss

This loss is often called a "reflection loss," because any mismatch at a junction has the effect of reflecting the electric energy back into the source. The reflection loss between any two impedances can be calculated from the formula

$$N = 20 \log \frac{Z_S + Z_L}{\sqrt{4 Z_S Z_L}} \qquad (3)$$

where—

N = number of decibels loss.

Z_S = absolute value of impedance of source in ohms.

Z_L = absolute value of impedance of load in ohms.

Note that if $Z_S = Z_L$, the formula becomes

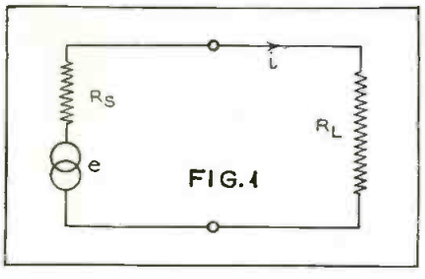
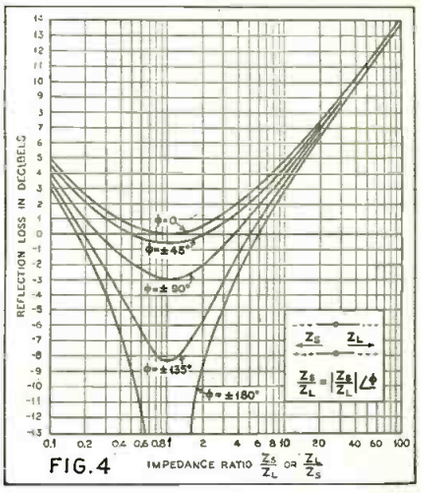


FIG. 1



REFLECTION LOSS FOR DIFFERENT PHASE ANGLES

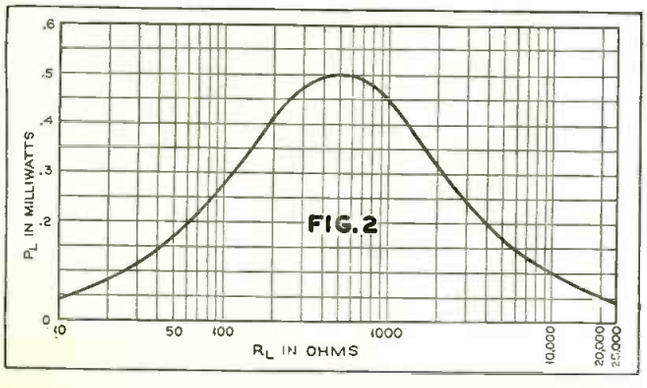
Figure 4. Reflection loss plotted against impedance ratio for various values of ϕ, Z_S and Z_L are complex quantities, while the vertical lines around a symbol (as $\left|\frac{Z_S}{Z_L}\right|$) denote the scalar quantity without regard to the phase angle.

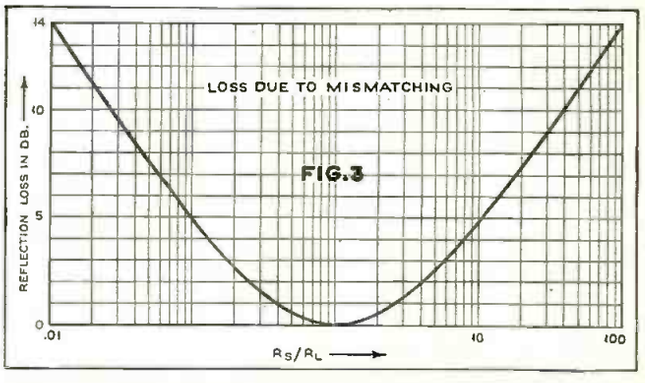
$$N = 20 \log \frac{2Z_S}{2Z_S} = 20 \log 1 = 0$$

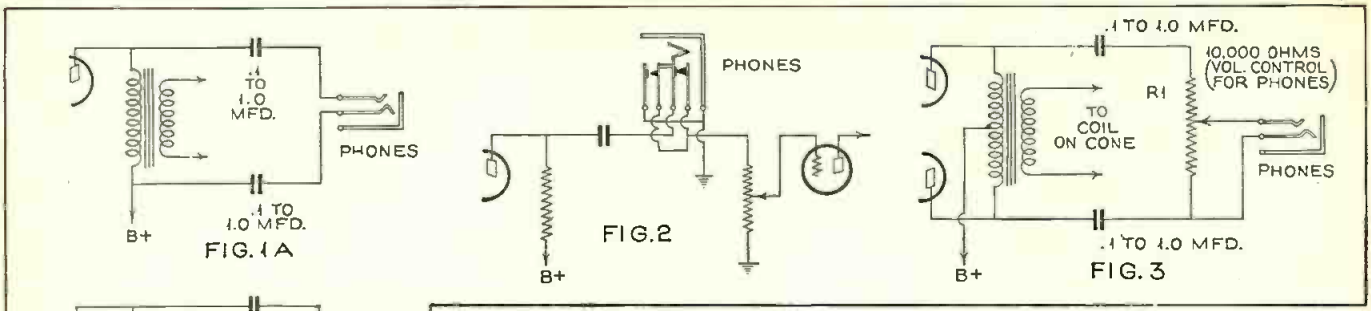
Formula 3 may be used to check any other point on the curve of Figure 3.

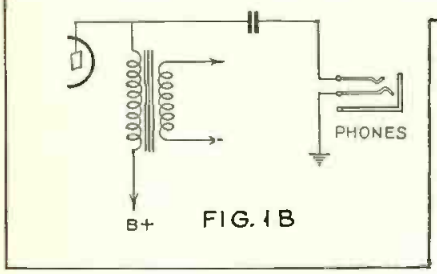
Thus we see that a mismatch of impedance in a transmission line produces a reflection loss. If we were always dealing with pure resistances, such a loss would not be serious; and we could tolerate any mismatch, provided we had sufficient gain elsewhere in the system to give the required amplification. Anyone who works with audio frequency transmission systems, knows that an appreciable mismatch of impedance produces frequency distortion in the signal. It is this distortion that destroys the "quality" of the speech or music, and thereby renders the system worthless. Let us see, therefore, what causes frequency distortion in a mismatched junction.

In practice both Z_S and Z_L are usually complex quantities. They are apt to have different phase angles and the phase angle may change with frequency. Any difference in phase angle between Z_S and Z_L produces what is called a "reflection phase (*Turn to page* 241)









An Opportunity

DOLLARS *in*

S. Gordon Taylor

SERVICE sidelines not only bring extra income for the enterprising serviceman but in their promotion new contacts are made, many of which represent prospects for regular service work or for other sidelines. One such sideline is the addition of headphone connections in standard radio receivers.

THERE are two general types of of home prospects for headphones: (1) the hard of hearing and (2) the DX fan. Together these groups represent a potential market for many installations of this type. There is practically no community, no matter how small, that does not offer a few such prospects.

Let us consider the hard-of-hearing prospect. His social contacts are more or less limited and radio might become an extremely important item in his life, but untold numbers have been denied the pleasure of radio because of the discomfort that the loudspeaker, operated at the required high level, causes others. It is among this group that a really tremendous market for headphone adapter equipment is to be found.

Where the affliction is so severe that the headphones have to be operated at a high volume level, a switch can be provided which permits the loudspeaker to be cut out when the headphones are in use—or a separate volume control in the loudspeaker circuit enables the family of the afflicted to regulate loudspeaker volume as desired but permits the headphones to operate at a high level. On the other hand, it may be that the headphone volume level required is less than that at which the loudspeaker is normally employed. In such a case, a separate volume control in the headphone circuit will satisfy the requirements.

Many who cannot hear with headphones find the recently developed "bone conductors" highly effective. These bone conductors are small but powerful devices placed against the bony structure of the head, usually the mastoid bone behind the ear, through which the sound is carried directly to the inner ear. These bone conductors are now available at retail. Two such devices are shown in the accompanying illustrations.

Need for Tone Control

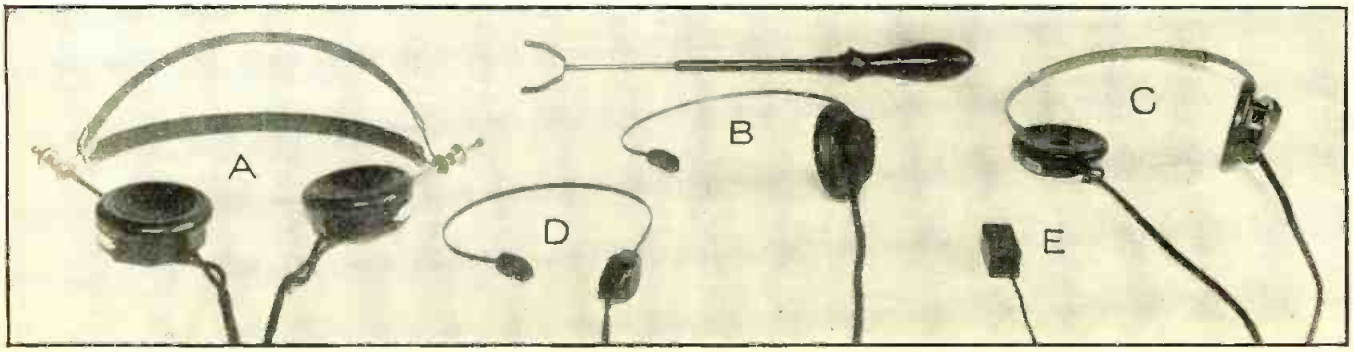
Usually hearing loss is greater at some frequencies than at others. The majority of people who are hard of hearing suffer the major losses in the higher frequency ranges. In any event, some degree of tone compensation is desirable in almost every case. This can be accomplished by including a means for tone control in the headphone circuit. Experiments to date seem to indicate that this is best accomplished through the use of a device such as the United Transformer Company's "Varitone" impedance unit, indicated in the circuit of Figure 7 and shown in one of the photographs, (also described in detail, with circuits, curves, etc., on page 621, RADIO NEWS for April, 1935). This Varitone and its attendant vari-

MODERN HEADPHONES

(A) The new Brush Crystal headset. (B) and (C), Trimm "Featherweight" headphones, single and double, with optional lorgnette handle above. (D) Trimm bone conductor. (E) Kurman bone conductor. All of these are extremely light in weight, less than 3 ounces per headphone. (Addresses of manufacturers will be supplied upon request.)

TONE CONTROL FILTER

The United "Varitone" unit may be incorporated in output circuits (as shown in Figure 7) to provide a wide variety in tone control.



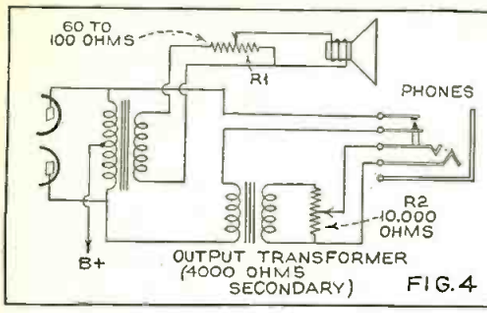


FIG. 4

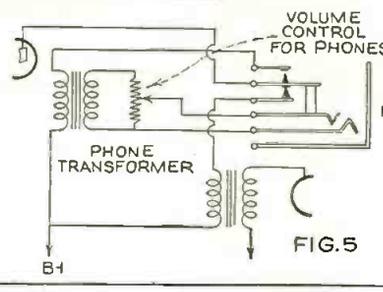


FIG. 5

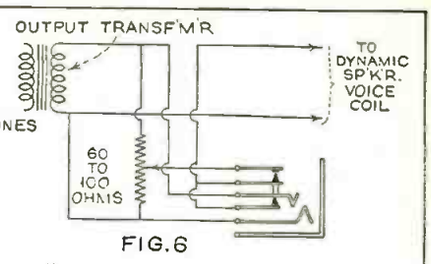


FIG. 6

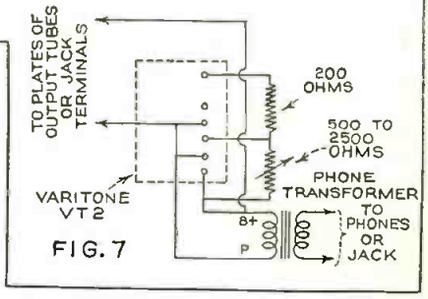


FIG. 7

for Servicemen!

HEADPHONES

and John H. Potts

able resistors make it possible to shape the response characteristics to meet any requirements.

The new crystal headphones illustrated offer a distinct advantage over ordinary headphones for the majority of hard of hearing because of their unusually good high-frequency response. In several tests conducted by the author with hard-of-hearing subjects, the use of these headphones made tone compensation unnecessary, and made music more enjoyable and speech more understandable than did ordinary headphones.

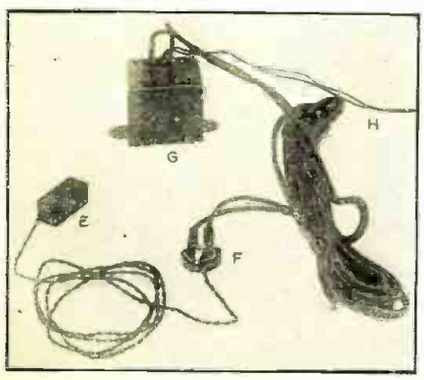
Headphones for DX'ers

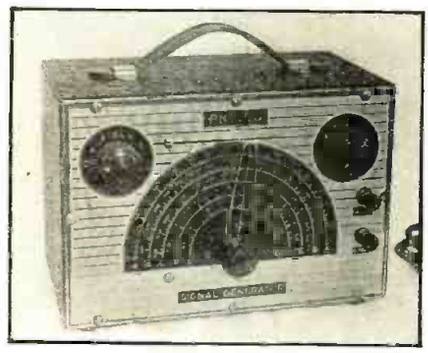
The DX listener has been mentioned as another logical prospect for headphone installations. In this case headphones are desirable because much of the best DX reception is accomplished between midnight and sunrise. To use a loudspeaker at these hours is sure to bring down upon his head the censure of the rest of the family. An installation for this type of service may include only provision of headphone connections and a switch or automatic jack to cut off the speaker when the headphones are in use. Or it may go further and include tone control where the receiver is one which does not have this feature built-in. This permits attenuation of the high frequencies and in this way static and noise may be materially reduced with only a relatively slight reduction of the volume of speech.

The question will logically arise in the minds of the servicemen as to just how prospects for such installations are to be unearthed. Hard-of-hearing prospects can be located in several ways. Your community may have a local League for the Hard of Hearing where you can arrange a demonstration and obtain the names of members. If there is no such local organization, prospect lists may often be obtained by consulting doctors, ministers, and school principals. The duties of these three groups bring them in contact with many who are hard of hearing (*Turn to page 237*)

BONE CONDUCTOR OUTFIT

The Kurman bone conductor equipment includes a transformer (G), extension cord (H), volume control rheostat (F) and bone conductor (E). It is only necessary to insert the wafer adapter (provided with the kit) under the output tube of any radio set to enable the hard of hearing to listen to radio programs.





All-Wave

SIGNAL GENERATOR

Frederick Siemens

THE new Philco Model 088 All-Wave Signal Generator well exemplifies the modern trend in test oscillator design, featuring sturdy construction with simple, rapid and convenient operation.

Five wave bands are used, covering, on fundamental frequencies, a continuously variable range from 100 to 20,000 kc. The desired band is instantly secured by operation of a dual-purpose wave-band switch, which also serves as an on-off switch.

The large dial is direct-reading on all ranges, calibration being clearly and permanently shown. Compensating condensers, conveniently accessible without removing the instrument from its housing, enable independent adjustment of range to track with the dial calibrations.

The instrument is operated from self-contained batteries. A single 1C6 performs the dual functions of oscillator and modulator in a special highly-stable, electron-coupled circuit, giving long service from a single set of batteries.

Particular attention has been devoted to the design of the parts used, that they may withstand the severe conditions of modern servicing. The compensating condensers are made both moisture-proof and temperature-proof. The tuning condenser is of rugged mechanical design to hold calibration and the entire instrument is enclosed in a specially treated, sheet-steel case.

The coils are of a solenoid type, especially treated for high-frequency operation and to maintain unusual stability in frequency calibration.

The attenuator is completely shielded, and provides a ratio of up to 20,000 to 1, so that a strong signal is available to "find the way" after replacing an i.f. transformer or in stage-by-stage hook-up analysis.

The tuning knob operates through a reduction gear, permitting smooth and accurate adjustment. The long, chromium-plated pointer is specially reinforced to withstand accidental knocks. The contrast between the bright pointer and the dark dial makes for high visibility and consequently ease of adjustment to the desired frequency.

A carrying strap, so often overlooked in other designs, is supplied. The metal case (*Turn to page 256*)

How to V.T.

MEASURING RECEIVER SENSITIVITY

The author is shown making a set-up for actual measurements of receiver sensitivity, a feat made possible by the unusual V.T. voltmeter described in this article. Below is a "block" diagram of the set-up.

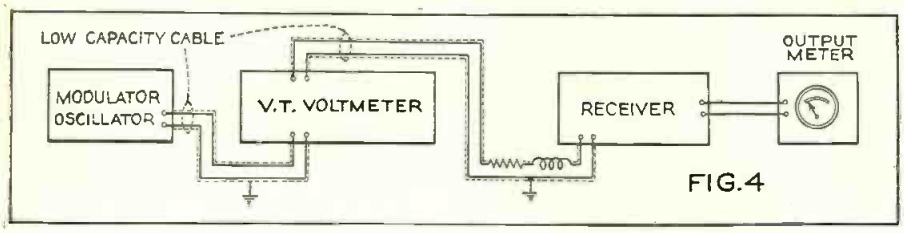


FIG. 4

THE basic design of this new, ultra-sensitive vacuum-tube voltmeter was discussed in the August issue. This month the author describes the completed instrument, with suggestions on construction and adjustment. Its applications as a service and laboratory instrument will be covered next month.

IN the preceding article we discussed the circuit design of this instrument. For sensitivity measurements, a very simple but highly effective attenuator has been designed. Ladder type resistance attenuators have been so generally employed in better grade test oscillators that there is a wide-spread impression that no other types merit consideration. The construction of a ladder attenuator to meet laboratory standards of tolerance in frequency independence over the wide band of frequencies required by present-day sensitivity tests is an extremely difficult task.

The Attenuator

Several years ago, mutual inductance and capacitive attenuators were in general use for production testing and some laboratory applications. More recently these forms of attenuation have received research investigation with a view to their adoption for laboratory use. "Piston" attenuators have been found to have many desirable features for laboratory signal generators.(1) The mutual inductance type is simply an arrangement for varying the coupling between two small coils enclosed in a long, copper tube. The capacitive type is similarly constructed but uses two disks, one in a fixed position and the other arranged to move along the same axis. The degree of attenuation is determined by the separation of coils or disks, as the case may be. Such designs present some mechanical difficulties if it is desired to use a rotating dial for operation of the attenuator.

The attenuator to be described is of the capacitive type, and is substantially independent of frequency. Figure 1A shows the construction, which is much simpler than the usual ladder type. The schematic circuit of the attenuation system is shown in Figure 1B. The input voltage, E1, is in series with C1 and C2. The output voltage, E2, is proportional to the ratio of C1 to C1 plus C2. Therefore, if C1 is very small compared with C2, the voltage E2 will be very small.

The range of attenuation with this design is limited by the ratio of maximum to minimum capacitance between the electrodes a and b of C1. With the usual design of variable condenser, this ratio is less than 30 to 1, which would be inadequate and also the use of this type would require insulating the rotor from the panel. By modifying the condenser design, it is possible to easily increase this ratio to over 500 to 1. A standard Cardwell condenser was used, the stator assembly and all except one rotor plate being removed. To facilitate soldering, two semi-circular copper plates were cut out and mounted on bakelite supports as shown in Figure 1A. The operation is quite different from that of the usual type of variable condenser. The grounded rotor intercepts the electric wave field between the two electrodes, a and b. When the rotor is completely *meshed*, the capacity between a and b is a *minimum*. The minimum capacitance is further reduced by the grounded shield around the base of the condenser frame, which must closely approach electrode a. If the ratio of maximum capacitance of C1 to C2 is 1 to 500, at maximum setting of C1, with 50 millivolts input, the output voltage E2 will be 500 microvolts and, at minimum capacitance, 1 microvolt. Values above or below this range may be obtained by changing the input voltage. The method of calibration will be described later.

Assembly Details

A schematic diagram of the complete instrument is shown in Figure 2. The attenuator is cut in and out of the circuit by S1. The calibration is checked by turning S2 to point a, as described in the previous article. Re-

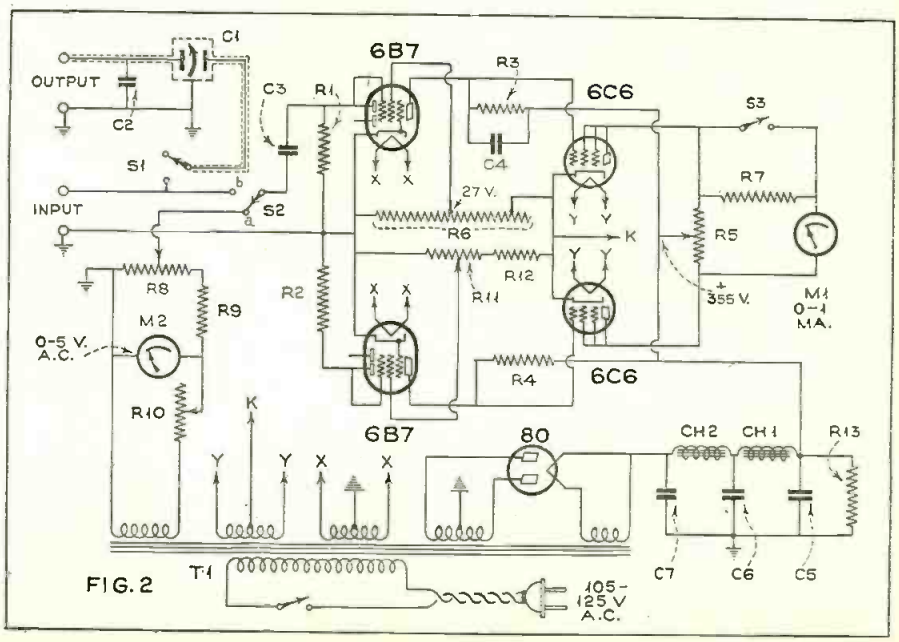


FIG. 2

Build The Newest VOLTMETER

John H. Potts

Part Two

sistor R7 serves to limit the current through the meter when the circuit is being balanced, therefore S3 should be open during preliminary adjustments.

The instrument is assembled in a General Radio rack-and-panel case. The holes for the meters, binding posts, etc., on the panel are ready-drilled at the factory, saving considerable work. It will be necessary, of course, to drill some holes in the sub-panel for the sockets, electrolytic condensers, etc., but these are much smaller and therefore easier to drill.

The apparatus should be laid out as shown in the photograph, the power transformer being kept as far as possible from the input circuit and the meters.

"Quality Parts"

Care should be taken to keep the wiring of the input circuit as short as possible and away from the panel and sub-panel. C3 should preferably be mounted with spacers above the sub-panel. This serves to keep down the input shunt capacitance, and extends the useful range of the instrument.

In this type of circuit, the quality of the parts used is very important. This applies particularly to the resistors. Some types which are quite suitable for usual radio applications manifest erratic operation when used in this apparatus, which magnifies slight imperfections to an enormous degree. The resistors in the 6B7 circuit are particularly important. In the plate circuits, only wire-wound types have been found satisfactory. In the diode circuits, it is advisable to try several. Resistor trouble will show up in rapid, erratic jumping of the milliammeter pointer. When the circuit is unbalanced, the pointer acts in somewhat similar fashion but the shifting around is more gradual. Loose connections or poorly soldered joints will give trouble indications similar to resistors.

When the wiring has been completed the input binding posts and output milliammeter should be temporarily shorted.

Final Adjustment

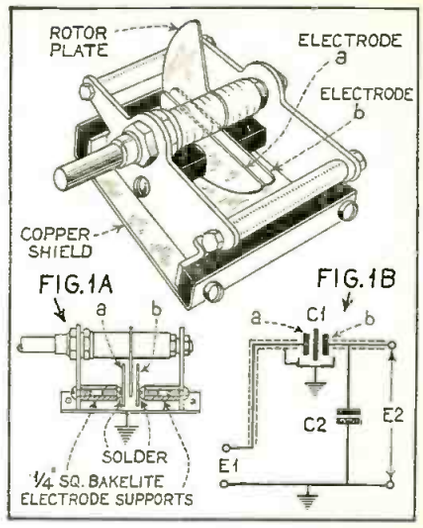
Another milliammeter is placed in the plate circuit of one of the 6B7's and its plate current adjusted, by regulating the screen voltage, until it reads 0.9 ma. The 6C6 tubes should be removed while making this adjustment. Then balance the 6B7 circuit by adjusting the screen voltage of the other 6B7 until it draws the same plate current. A voltmeter connected across their plates will then read zero.

Now replace the 6C6 tubes and insert a milliammeter in the common cathode lead at K (Figure 2). Move the slider along R6 until the cathode current for both 6C6's is 14 ma. Remove the short from the output milliammeter and adjust R5 until the reading is zero. The short across the input binding post may now be removed and the instrument calibrated as described in the preceding article.

If greater or less sensitivity is desired, the preceding operations may be repeated, varying the screen voltage on the 6B7's until a higher or lower plate current is obtained. The 6C6 cathode current will have to be readjusted to the prescribed value if this is done.

When the instrument has been completed and adjusted the attenuator must be calibrated. This may be accomplished with little equipment, if care is taken.

The first step is to determine the attenuation ratio when C3 is set for maximum capacitance (rotor plate all out). This may be done by temporarily disconnecting the attenuator from the tube voltmeter circuit and connecting its input terminals to a source of high frequency voltage (E1). A thermal voltmeter, or a less sensitive tube voltmeter is temporarily shunted across the input terminals. If this equipment is not at hand, a simple r.m.s. type of tube voltmeter as shown in Figure 3 may be assembled and (*Turn to page* 246)



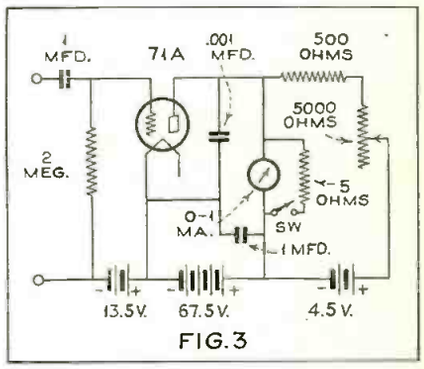
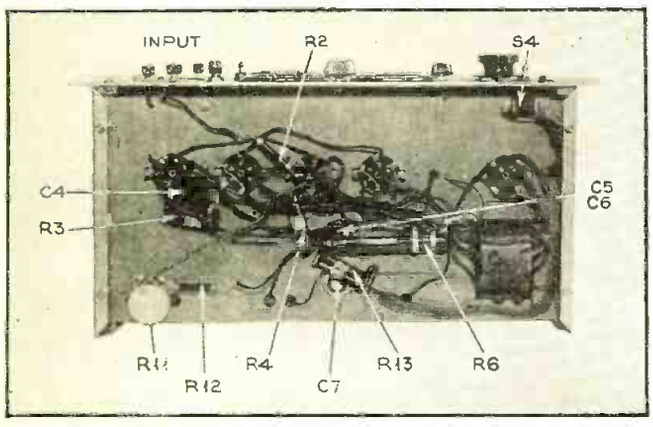
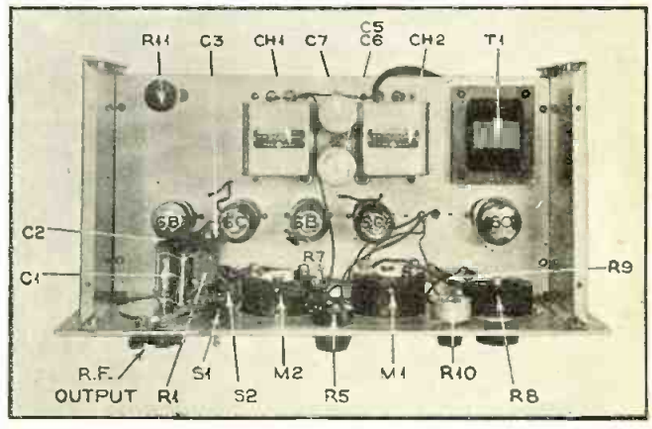


FIG.3

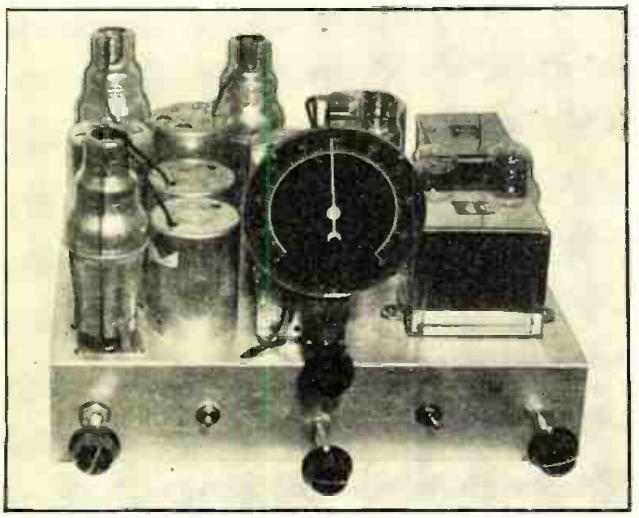




INTERNAL VIEWS

The two views below show the arrangement of all parts. The photo at the right and Figure 1 (a) show the construction of the novel capacity attenuator.

For Your Rural Home Camp or Cabin You'll DX Corner



READY FOR OPERATION

The controls, left to right, are: Manual gain control (cut out when using a.v.c), a.v.c. switch, tone control with tuning knob above it, headphone-speaker switch, combined audio volume control and off-on switch. At the left is the improved wide-scale signal strength (tuning) meter.

In the August issue, the introductory article on the "Radio News 2-Volt DX'ers Super" described the unusual sensitivity and selectivity demonstrated in Listening Post reception tests. This month the co-designer and builder provides the construction details on the set

Ed Glaser (W2BRB)

Part Two

THE circuit diagram, Figure 1, shows a type 34 r.f. stage; a type 1A6, combined oscillator-mixer; 2 type 34, 175 kc. i.f. stages; a type 1B5 duplex-diode triode, detector, a.v.c. and audio stage; a type 30 driver and a type 19 class B audio power stage. A toggle switch, SW2 provides for use of either manual or automatic gain (volume) control and another switch, SW3 allows a choice of speaker or headphones. The tuning meter is in the plate circuits of the first three tubes (which are a.v.c. controlled). For economy, the plate voltage was limited to 135 with 9 and 3 volt separate C batteries. The 3-volt C battery provides minimum bias for the first three tubes and cannot be grounded in the a.v.c. position. Hence the separate battery. The filaments may be supplied from a single 2-volt storage cell directly, from an Eveready Air Cell (through a 0.44 ohm resistor connected at "X" in Figure 1) or from a 3-volt series-parallel bank of dry cells (through a 6-ohm rheostat connected at "X"). The filament drain is 680 ma. which includes one 60 ma., 2-volt pilot lamp. The B drain with no signal will be 25 to 30 ma. The 19 will draw additional plate current momentarily on loud signal peaks.

Let us become more familiar with the problems of construction. It is assumed all parts are on hand and the chassis is drilled (see Figure 2) and ready for assembly. Although close inspection of the photographs will be helpful it is necessary to observe certain rules:

1. Turn sockets for shortest plate lead to r.f. and i.f. transformers.

2. Mount coils for shortest plate leads.

3. Push green grid cap leads out of the hole nearest the corresponding tube.

4. The class B input transformer should be mounted with the primary leads toward the 30, then the grid leads to the 19 will also be short.

5. The class B output transformer should have the primary toward the 19 plates.

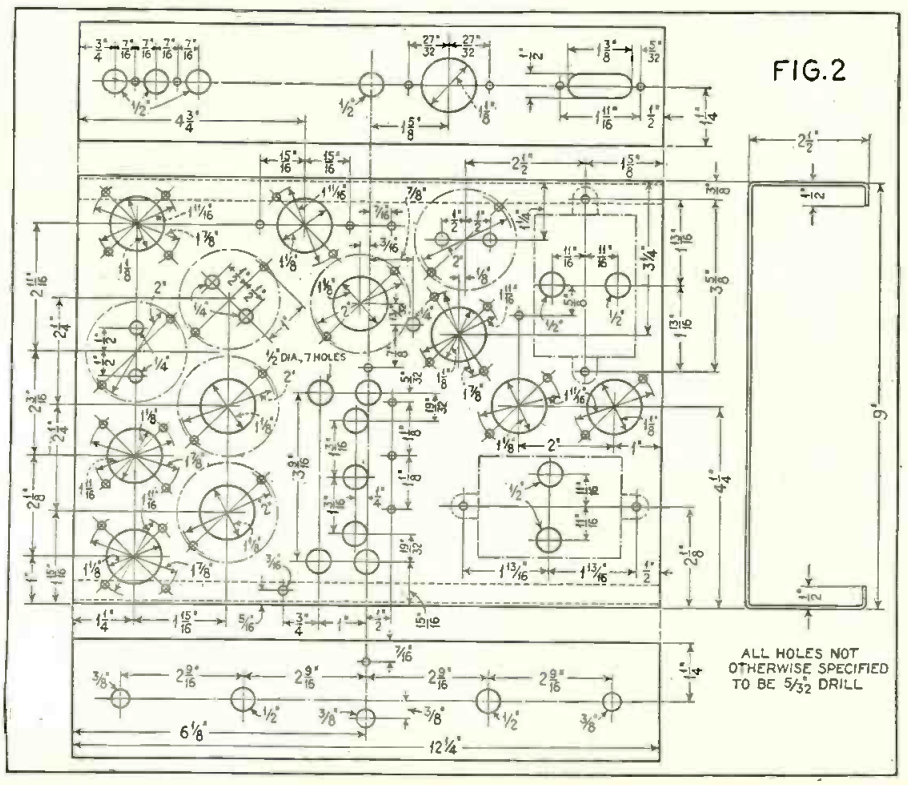
In wiring, there are also a few points to bear in mind:

1. The antenna leads from the posts to the input coil should be twisted.

2. Make grid cap leads as short as possible and keep them as far away from other grid leads as possible.

3. Make plate leads to coils as short as possible and see that they lie right against the chassis. This limits their external field and reduces stray coupling.

4. Make tubular condenser leads



BLUEPRINTS

A SET of "Blueprints" including a full size chassis drilling template, and a picture wiring diagram of the "Radio News 2-Volt DX'ers Super" may be obtained by sending 50c to RADIO NEWS Blueprints Dept., 461 8th Ave., New York City.

Want to Build this BATTERY "SUPER"

short and as nearly as possible, ground them at a common point, especially the r.f. by-passes.

5. Ground each section of the variable gang condenser with short, flexible leads.

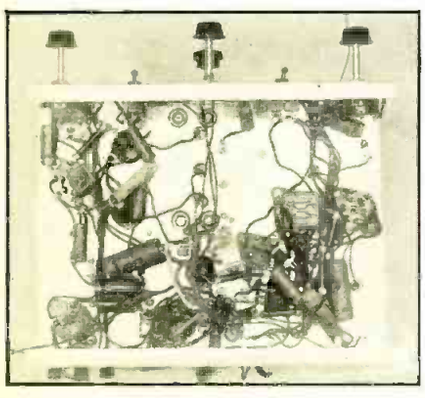
Start wiring the filaments, switch and lamp, then the r.f. and i.f. plate and grid cap leads. Then mount the insulated lug assemblies to rigidly support the tubular condensers, a.v.c. resistors, a.f. resistors, and the cable. A little planning before wiring at this point will result in a neater job. Wire the variable condenser before mounting. Then connect the stator leads to their respective coils. As the leads from the oscillator coil to grids 1 and 2 of the 1A6 are long, run them right against the chassis. The 30 and 19 audio stages, tone control, phones and speaker wiring may be left until last.

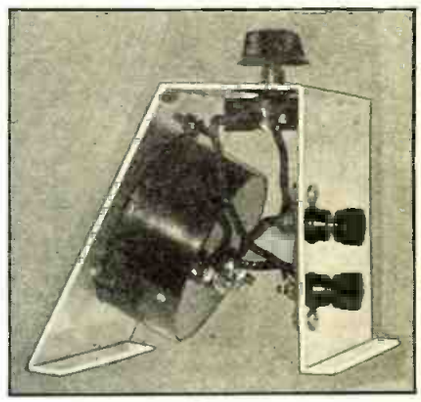
Connecting and Aligning

When the wiring has been completed and the set ready for test, connect the A battery only; and remember the filament series resistor if an Air Cell or 3-volt pack is used. The tubes should glow at a dull red which is hard to distinguish in bright light. Next, connect the C batteries. Before connecting the B batteries, put a 10,000 ohm resistor in series with the tuning meter and temporarily connect resistors of 1000 ohms or so in the plus 45 and 135 volt leads to save the batteries in the event of a short circuit. A 25 to 100 ma. meter in the negative B lead will also help get things running—but make sure those resistors are in. With speaker or phones connected, there should be a click when adding the 135 volts. If all is well, some station will probably be heard.

The set should now be carefully aligned, starting with the i.f. stages. If possible, secure an oscillator which is accurately calibrated at 175 kc. The oscillator signal is applied to the plate terminal of the 1A6 socket. The tuning meter forms an excellent alignment meter (when the a.v.c. switch is in the "on" position), and the test signal need not be modulated. In aligning the i.f. transformers, *the following precautions must be observed.* First, use a non-metallic screw-driver, preferably made from a bakelite rod. An accidental short circuit of the shield of the i.f. transformer to the adjusting screw will burn out the meter. It is also advisable during all adjusting operations to keep the 10,000 or 15,000 ohm resistor in series with the tuning meter. Adjust each trimmer until maximum retardation of the meter (*Turn to page* 253)

BELOW DECK





TUNING METER STAND

A strip of aluminum is bent as shown to accommodate the meter, its shunt rheostat and binding posts. Wood or bakelite may be used in place of aluminum if preferred.

PULLING IN PORTUGAL

Two operators at the Listening Post listening to CT1AA during recent tests on this receiver

Testing the "SUPER" DX-8

John M. Borst

A SUPER DX-8 receiver, constructed according to the description in the September issue, was received at the Radio News for test in the R. N. Laboratory and at the Westchester Listening Post. The set was unpacked and first checked in the laboratory to see that all was satisfactory. While making the first listening tests, the large number of controls seemed bewildering but they all serve a purpose and they all work. The use of each control was stated last month, but it may be well to add some more (*Turn to page* 254)

OFFICIAL L. P. O. TOMLINSON
(PORTCHESTER, N. Y.)

Here he is, at the "hopped up" 1929 Majestic with which he accomplishes most of his DX records.

THE DX CORNER

S. GORDON TAYLOR

(For Broadcast Waves)

ATTENTION of all broadcast band DX'ers is called to the articles elsewhere in this issue covering the RADIO NEWS DX Converter and the RADIO NEWS 2-Volt DX'ers Super. A preliminary article on the latter was included in the August issue, page 74.

Many of the new 1936 standard receivers have been tested in the Lab and the RADIO NEWS Listening Posts in Westchester and Fairfield and reports of these tests will be found in several articles in the present issue. These receivers are well worth the consideration of DX'ers who contemplate the purchase of new equipment. In the test reports relatively little mention is made of the reception results obtained on the broadcast band, for the reason that real DX tests have been impossible with the extremely high noise levels that have existed during this summer. So far as it has been possible to judge, however, the average DX ability of these receivers is considerably above equivalent models of last year.

ALL Official RADIO NEWS Listening Post Observers are cordially invited to contact broadcast stations with the object of arranging special DX programs to be dedicated to the RADIO NEWS DX Corner and its Listening Post Observers. In arranging such broadcasts it should be borne in mind that RADIO NEWS goes to press considerably ahead of the date when it appears on the newsstands. In order to permit published announcements it is therefore necessary that programs be arranged well in advance. If a program is scheduled to take place after the 10th of any given month, notice should be in the hands of the editor of this department not later than the first of the *preceding* month. If the program is scheduled for before the 10th, however, notice should be sent in a month earlier than this.

Reporting on Special RADIO NEWS Broadcasts

The special broadcast from WCAU and W3XAU took place on July 2 and information from that station indicates that an excellent response was received. Unfortunately, due to certain scheduled tests taking place at that time, the broadcast to RADIO NEWS listeners was delayed about an hour, with the result that many listeners gave up their quest for this station before the program actually got under way.

The management of this station offers sincere apologies for the unavoidable delay. Their courtesy in dedicating this program to RADIO NEWS is appreciated and it is hoped that another broadcast from WCAU and its short-wave station, W3XAU, can be arranged for one of the coming autumn or winter months.

The special broadcast from WPEN took place as scheduled on the morning of July 10th. Unfortunately, reception conditions were simply terrible, with an extremely high noise level. As a result the program was completely ruined for distant listeners. At the Fairfield (Conn.) Listening Post it was possible to receive it well enough for positive verification purposes. But due to heavy static, reception was far from good, even at that distance.

A letter from Mr. Charles W. Burtis of WPEN expresses the hope that they will be able to put on another program for us later in the fall—a hope in which we join Mr. Burtis.

RADIO NEWS DX Broadcasts

(Eastern Standard Time)

Sept. 4, 3:00-5:10 a.m., WIRE, Indianapolis, Ind., 1400 kc., 500 w.

This special 2-hour DX broadcast, which was arranged by Observer John Kalmbach, will be dedicated to the RADIO NEWS DX Corner and Official RADIO NEWS Observers throughout the world. All official observers and other DX listeners are urgently requested to listen in and report to WIRE (and the stations listed below). If you want a verification, inclose postage. If not, won't you drop these stations a report anyway to let them know that their cooperation and courtesy in dedicating their programs to us are appreciated? It is hoped that many special programs will be dedicated to us during the coming year and the best way to insure this is to report regularly on each such programs.

The following F.C.C. frequency-check broadcasts are also to be dedicated to the RADIO NEWS DX Corner:

Sept. 2, 5:00-5:20 a.m., WSYR, Syracuse, N. Y., 570 kc., 250 w. Arranged by Observer John C. Kalmbach.

Sept. 3, 2:00-2:20 a.m., WPAX, Thomasville, Ga., 1210 kc., 100 w. Arranged by Observer Ray Wood.

Sept. 4, 3:00-3:20 a.m., WDAS, Philadelphia, Pa., 1370 kc., 100 w. Arranged by Observer Bob Cleaver.

Official RADIO NEWS Broadcast Band Listening Post Observers

United States

Alabama: Ray Wood
California: Frank D. Andrews, Roy Covert, Bill Ellis, Randolph Hunt, Walter B. McMenamy, Radio Fellowship, Warren E. Winkley
Connecticut: Fred Burleigh, James A. Dunigan, Philip R. Nichols, R. L. Pelkey
Georgia: W. T. Roberts
Illinois: Herbert H. Diedrich, Ray E. Everly, H. E. Rebensdorf, D. Floyd Smith
Indiana: E. R. Roberts
Iowa: Lee F. Blodgett, Ernest Byers
Kansas: Vernon Rimer
Maine: Danford Adams, Steadman O. Fountain, Floyd L. Hammond
Maryland: Louis J. McVey, William L. Bauer, William Rank, Henry Wilkinson, Jr., Frank Zelinka
Massachusetts: William W. Beal, Jr., Walter C. Birch, Russell Foss, Simon Geller, Robert A. Hallett, Evan B. Roberts
Michigan: John DeMyer, Howard W. Eck
Minnesota: F. L. Biss, Walter F. Johnson
Missouri: Dudley Atkins, III.; C. H. Long
Montana: R. W. Schofield
New Jersey: Henry A. Dare, Jack B. Schneider, Alan B. Walker
New York: Jacob Altner, Murray Buitekant, Stephen Flynn, Ray Geller, Edward F. Goss, Robert Hough, Robert Humphrey, John C. Kalmbach, Jr., Harry E. Kentzel, Maynard J. Lonis, Harold Mendler, R. H. Tomlinson, William Wheatley.
North Carolina: Marvin D. Dixon
North Dakota: O. Ingmar Oleson
Ohio: Stan Elcheshen, Donald W. Shields, Richard J. Southward
Oregon: David Hunter, Walter Weber
Pennsylvania: Robert W. Botzum, Robert Hoffman Cleaver, Edward Kocsan, J. Warren Routzahn, Joseph Stokes
Rhode Island: Spencer E. Lawton
South Dakota: Mrs. A. C. Johnson
Tennessee: W. S. Jackson
Texas: E. L. Kimmons
Vermont: Harry T. Tyndall
Virginia: A. J. Parfitt, C. C. Wilson
Washington: John Marshall Junior High School Radio Club
West Virginia: Clifford Drain
Wyoming: J. H. Woodhead

Foreign

Alaska: S. A. Tucker
Australia: Albert E. Faull, Victoria; George F. Ingle, New South Wales; Aubrey R. Jurd, Queensland
Canada: William H. Ansell, Saskatchewan; C. R. Caraven, British Columbia; Claude A. Dulmage, Manitoba; C. Holmes, British Columbia; Philip H. Robinson, Nova Scotia; Art Ling, Ontario
Cuba: Rafael Valdes Jiminez, Camaguey
England: R. T. Coales, Hants; F. R. Crowder, Yorkshire; George Ellis, North Stockport; Charles E. Pellatt, London
Irish Free State: Ron. C. Bradley
Newfoundland: A. L. Hynes, Clarenville
New Zealand: P. T. Kite, Auckland; L. W. Mathie, Hawke's Bay; R. H. Shepherd, Chirstchurch; Eric W. Watson, Christchurch
Philippine Islands: George Illenberger
Puerto Rico: Ralph Justo Prats, Santurce
South Africa: A. C. Lyell, Johannesburg
Sweden: John S. Bohm, Malung
Switzerland: Dr. Max Hausdorff, Viganello

Periodic DX Broadcasts

Wednesdays (second and fourth of each month), 2:01 a.m., E.S.T., KIUL, Garden City, Kansas, 1210 kc. 100 watts.
Fridays, 11:00-11:30 p.m., E.S.T., KDKA, Pittsburgh, Pa., 980 kc., 50 kw. (DX tips.)
Sundays, 12:45-1:00 p.m., E.S.T., WTCN, Minneapolis, Minn., 1250 kc., 1 kw. (These DX broadcasts to start some time during September.) (DX tips.)
Sundays, 1:00 a.m., E.S.T., KFI, Los Angeles, Calif., 640 kc., 50 kw. (DX tips.)
Sundays, 1:00-5:00 a.m., E.S.T., CMBX, Havana, Cuba, 1380 kc., 170 watts.
Monthly, 13th, 2:00-5:00 a.m., E.S.T., CMOX, Havana, Cuba, 1320 kc., 250 w.

DX Club Register

Below is the listing of the active DX Clubs for the benefit of DX Listeners who may be interested in joining one or more of these organizations. For further information, address the clubs direct or the editor of this department.

Executives of clubs not listed are invited to forward information to this department.

Canadian DX Relay, Goderich, Ont., Canada; Fred H. Bisset, Pres. World-wide membership. Annual membership fee, $1.75, includes weekly bulletin containing tips, club news, etc. Five months trial membership $1.00; one month trial membership 25c.

Globe Circlers' DX Club, 254 Cleveland St., Brooklyn, New York; William H. Wheatley, Pres.; Observer Raphael Geller, Secretary-Treasurer; world-wide membership, dues $1.25 per year, issues a 6-page bulletin twice monthly.

International DX'ers Alliance, Bloomington, Ill.; Charles A. Morrison, Pres. World-wide membership. Applicants for regular membership must be able to meet certain definite qualifications. Membership dues of $1.00 per year ($1.25 in foreign countries) includes subscription to the 16-page monthly bulletin, "The Globe Circler." Sample copy on request.

KDKA DX Club, 310 Grant St., Pittsburgh, Pa.; Joseph Stokes, Pres. World-wide membership. No dues. No bulletin. Tips and DX information broadcast every Friday midnight, over KDKA.

National Radio Club, 602 W. Market St., York, Pa.; Robert H. Weaver, Pres.; dues $1.25 per year, bulletins weekly throughout the winter and monthly during the summer.

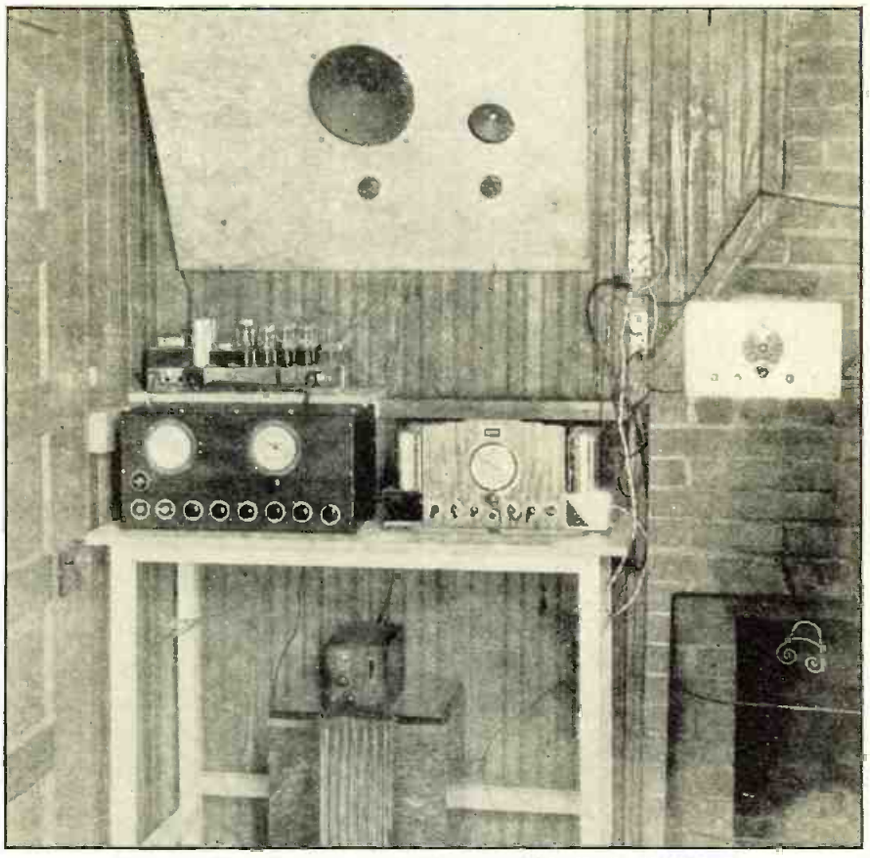
Newark News Radio Club, 215 Market St., Newark, N. J.; Irving R. Potts, Pres. Over 2000 members throughout the world. Annual dues $1.00; initiation fee $1.00 (making $2.00 total for first year), includes membership button or pin. Members receive each week DX program listings, news and letters from members. Local members meet monthly in the Newark News Auditorium.

New Zealand DX Club, Box 1680, Wellington, N. Z.; membership about 1600. Membership fee 60 cents; official organ is the N. Z. Radio Times, a monthly magazine which sells for about 24 cents in N. Z.; each member receives certificate of membership and a badge enamelled in the club colors.

New Zealand DX Radio Assoc., 88 McFaddens's Road, Christchurch, N. Z.; issues monthly bulletin of 28 printed pages. Membership information on request.

United States Radio DX Club, Shrewsbury, Mass.; George D. Deering, Jr., Pres. No membership dues. Issues monthly bulletin for which a charge of $1.00 per year is made. Sample copy upon request.

Universal Radio DX Club, San Francisco, Calif.; Charles Norton, Pres.



WHERE YE EDITOR LISTENS DURING THE SUMMER

The test table at the listening post at Fairfield Beach, Connecticut. The equipment shown on the table is the new Silver Masterpiece IV, with its power amplifier on the shelf above and its dual speakers overhead. The Montgomery Ward Professional receiver is shown at the left, and under the table a Motorola.

Our Readers Report—

Observer Botzum (Pennsylvania): "My log has now reached 585 verified with 680 heard. Included are 5 TP's, 13 TA's and 15 SA's. I use an umbrella type aerial and find it gives me less noise with better reception. Would like to hear from other DX fans who have tried umbrella aerials. Following is a list of the stations which constitute the new South American broadcast chain of which LS2 is the key station:

Call	Name	Location	Kc.	Kw.
LS2	Radio Prieto	(Buenos Aires)	1190	40
LR2	Radio Argentina	(Buenos Aires)	910	6
LU7	Radio Gral. San Martin	(Bahia Blanca)	1280	5
LT3	Radio Sociedad Rural de Cerealistas	(Rosario)	1080	3.5
LT9	Radio Roca Soler	(Santa Fe)	1060	.2
CX-26	Radio Uruguay	(Montevideo)	1050	2
LT5	Radio Chaco	(Resistencia)	1160	.5
ZP9	Radio Prieto (de Asuncion-Paraguay)		898	1.5

(*Turn to page* 250)

U. S. Station Changes

The following changes were announced by the Federal Communications Commission during the month of July. Abbreviations employed are: CP—construction permit; Unltd.—unlimited; Auth.—authority or authorization; Spec.—special; Mod.—modification; Temp.—temporary; L. S.—local sunset; Lic.—license.

1370	WPAY	Portsmouth, Ohio. Granted license to cover move of station from Mt. Orab to Portsmouth, Ohio. 100 watts, Unltd. time.
1420	KWBG	Hutchinson, Kansas. Granted license to cover CP authorizing erection of new station 100 w. unltd. time.
770	WBBM	Chicago, Ill. Granted license to cover increase in power from 25 to 50 KW.
1100	KWKH	Shreveport, La. Granted Extension of Auth. to operate Unltd. time, using directional antenna at night, to Feb. 1, 1935.
1130	WJJD	Mooseheart, Ill. Granted CP to move transmitter to Des Plaines, Ill.
1370	KLUF	Galveston, Tex. Granted Extension of Auth. to operate with 250 watts daytime for the period ending Jan. 1, 1936.
1140	WRMD	Rockeville, Md. Granted CP for new station to operate with 250 watts. Daytime.
1360	KCRC	Enid, Okla. Granted Mod. of Lic. to change freq. from 1370 to 1360 kc; increase power from 100 watts night, 250 day, to 250 Unltd. time.
1420	KABC	San Antonio, Tex. Granted CP to increase day power from 100 to 250 watts.
1310	WGH	Newport News, Va. Granted license to cover CP for new station; 100 w. night, 250 w. day; unltd. time.
1380	WNBC	New Britain, Conn. Granted license to cover CP for new station; 250 watts; daytime.
550	WSVA	Harrisonburg, Va. Granted license to cover CP 500 watts, daytime.
770	KFAB	Lincoln, Neb. Granted license to cover CP covering increase in power from 5 to 10 KW.
1370	KAST	Astoria, Ore. Granted license to cover CP for new station; 100 watts. Daytime.
1500	KNEL	Brady, Tex. Granted amended CP for new station 100 watts, Daytime.
1130	WJJD	Chicago, Ill. Granted extension of Auth. to begin operation at 5 AM, CST, for the period ending in no event later than Sept. 29, 1935.
1200	WMPC	Lapeer, Mich. Granted license to cover CP authorizing increase in day power to 250 watts; 100 w. night, specified hours.
1370	WMFO	Decatur, Alabama. Granted license for new station 100 watts; daytime only.
770	KFAB	Lincoln, Neb. Granted extension of Auth. to operate synchronously with WBBM after sunset for a period ending January 31, 1936.
770	WBBM	Chicago, Ill. Granted extension of Auth. to operate synchronously with KFAB after sunset for period ending Jan. 31, 1936.
1210	KWEA	Shreveport, La. Granted extension of Auth. to remain silent to Sept. 30, 1935.
1220	WCAE	Pittsburgh, Pa. Granted CP to install new eqpt. and operate on 1KC night; increase day power from 1 to 5 KW, Unltd. time.
760	WJZ	New York City. Granted license to increase power from 30 to 50 KW. Unltd. time.
600	WMT	Waterloo, Ia. Granted Mod. of Special Auth. to install directional antenna; 500 w. night, 1 KW day. Unltd. time.
600	WREC	Memphis, Tenn. Granted Mod. of CP to increase power from 500 w. night, 1 KW day to 1 KW night, 2½ KW day; extend completion date to Feb. 1.
1310	WMFF	Plattsburg, N. Y. Granted CP to move transmitter locally and increase power from 100 to 250 watts day.
1420	New	Hilo, T. H. Granted CP for new station, 100 watts, Unltd. time.
1420	WPAR	Parkersburg, W. Va. Granted license to cover CP 100 w. unltd. time.
1200	KGVO	Missoula, Mont. Granted temporary license to cover CP 100 watts, Unltd. time.
680	WPTF	Raleigh, N. C. Granted extension of Auth. to operate from L. S. at San Francisco to 11 PM, EST, with 1 kw.
850	WESG	Elmira, N. Y. Granted extension of Auth. to operate daytime to sunset at New Orleans with power of 1 KW for period ending Feb. 1, 1936.
1060	KTHS	Hot Springs Natl. Park, Ark. Granted extension of Auth. to operate from 6 AM to local sunset, remain silent from LS to 8 PM, CST, and operate from 8 PM to midnight on 10 KW for period of 6 months.
1060	WBAL	Baltimore, Md. Granted extension of Auth. to operate on 10 KW, from 6 AM to 9 PM, EST and to synchronize with WJZ daily except Sunday on 760 kc, 2½ KW after 9 PM, EST. Sunday, after 8:45 PM, EST.
1040	WTIC	Hartford, Conn. Granted extension of Auth. to operate, unltd. time, 50 kw, for period ending Nov. 1, 1935.
1060	WJAG	Norfolk, Neb. Granted Extension of Auth. to operate with 1 KW, LTD time, for the period ending Feb. 1, 1936.
1040	KWJJ	Portland, Ore. Granted extension of Auth. to operate ltd. time, and resume operation from 9 PM to 3 AM, PST, to Nov. 1, 1935.

A DX

If your DX receiver provides all the sensitivity *and* selectivity you want—don't read this article! Otherwise read it because this new unit will vastly improve these two features in your present receiver

THE Radio News DX Converter is a novel device which should be of outstanding interest to broadcast-band DX listeners. If you are using a superheterodyne receiver this converter connected ahead of it will result in a "double super" or "triple detection" circuit—a type of circuit which is finding increasing popularity among the trans-oceanic commercial telephone receiving stations in this country and abroad. It will increase both sensitivity and selectivity of your present superheterodyne without introducing complications of any kind. If, on the other hand, you are using a tuned r.f. receiver this new converter makes a superheterodyne out of the combination, with increased selectivity and an increase of approximately one hundred times in sensitivity.

WHEN used in connection with any type of receiver, the receiver is tuned to the low-frequency end of its range, 540 kc. or thereabouts, and thereafter all stations are tuned in on the single dial of the converter. The converter circuit consists of one r.f. stage, oscillator, and detector. Any signal tuned in is converted to the low frequency to which the regular receiver is tuned. The result is that the signal input to the receiver from the converter is vastly greater than the signal produced by the antenna. Furthermore, the addition of the three tuned signal circuits of the converter naturally provides a very decided increase in selectivity.

Those who have experimented with the "double super" idea are well aware of the difficulties in the form of "birdie" whistles encountered in such circuits due to the interaction of the two oscillators. Using this converter with a super avoids such complications, partly because the converter has its own independent power supply and also because it is on a separate chassis. If it is kept from one to two feet away from the receiver with which it is used, there will be no interaction or undesirable coupling of any kind. The result is complete freedom from this "birdie" bugaboo of "double super" circuits.

After the final model of the converter was completed it was tried out with approximately a dozen different receivers of both the standard and home-made varieties—receivers ranging all the way from a two-stage tuned r.f. job up to a 19-tube superheterodyne. In every case the converter worked with extreme satisfaction and without any objectionable characteristics. From this it would seem entirely safe to say that the converter can be used with any type of receiver, with assurance of excellent results.

Simple to Build

In working out the design of this new converter the thought was borne in mind constantly that its construction would be undertaken by many DX'ers of little experience in building radio equipment. As a result the unit is really easy to build. To further this end, RADIO NEWS has arranged with Wholesale Radio Service to make available a foundation kit which includes all of the essential parts—a completely drilled chassis, special coils, gang tuning condensers, trimmer condensers, etc. Retailing these parts in kit form has a double advantage of keeping the price low and of assuring the constructor that the parts he uses will actually work and work properly. The coils, for instance, and gang condenser are all special. This was made necessary by the fact that the intermediate frequency employed is in the neighborhood of 540 or 550 kc. and the tuning range covered extends down to approximately 1600 kc. in order to include the high-fidelity stations on 1530 and 1550 kc., which means a wider tuning range than is possible with ordinary r.f. coils and tuning condensers.

No attempt has been made to concentrate the unit to unduly small size, a fact which simplifies the wiring. By following the picture wiring diagram provided in the special set of blueprints even the novice can do the wiring without difficulty. It might be well to point out here that the chassis and some of the parts included in the new kit are identical with those employed in the RADIO NEWS Short-Wave Converter described in the April issue. It may be that some readers who constructed that converter will want to try this new one. The differences in parts will be indicated by comparing the list of parts at the end of this article with the one in the April issue.

Precise Tuning

As indicated in the circuit diagram, Figure 1, the tubes employed are 6D6 r.f. amplifier, a 76 oscillator, a 6A7

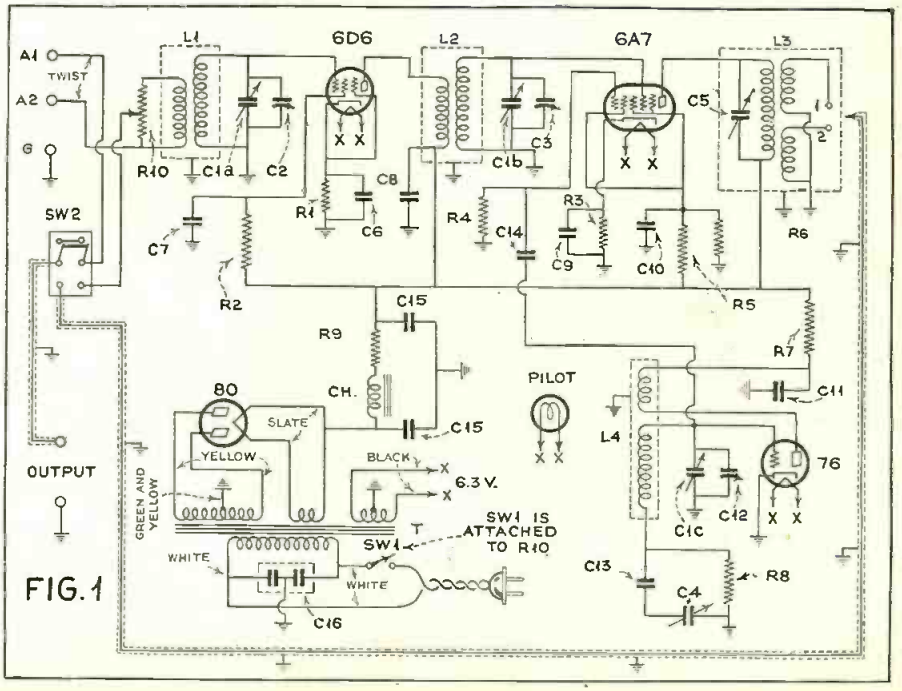


FIG. 1

"HOPPER UPPER"

(Radio News DX Converter)

S. Gordon Taylor

oscillator coupling tube and detector, and a type 80 rectifier. The r.f. stage, detector and oscillator are tuned by a 3-gang condenser. To insure absolutely accurate alignment at all frequencies within the broadcast band, the trimmer condensers in the r.f. and detector circuits are brought out to the front panel. This is an advantage because in receiving far-distant stations these controls can be adjusted as necessary for *exact* resonance. Small midget condensers are used for this purpose. If mica trimmer condensers are found on the front and middle sections of the gang condenser they should be removed by taking out the adjustment screws and breaking off the flexible plates. The trimmer condenser on the rear section of the main condenser should be left intact, as this is employed as the oscillator trimmer.

Matches Set Impedance

The output transformer is a special one designed for this converter. Its primary or plate coil is tuned. Two untuned secondaries are provided, one low-impedance and one high-impedance. When connecting the converter to a receiver, each of these secondaries should be tried and permanent connections made to the one which produces the loudest signal. In making this test it will be necessary to retune the primary of this transformer, as the shift is made from one secondary to the other.

So great is the signal voltage gain provided by the converter that it was necessary to include a control to prevent the converter output from overloading the input of the receiver. After considerable experimentation a potentiometer in the antenna circuit was found to provide the most satisfactory means for accomplishing this purpose. Normally, a potentiometer in the input circuit tends to increase noise by reducing the signal applied to the first detector. In this instance, however, no difficulty was found from this source because the potentiometer was retarded only in the reception of strong signals and such signals are so loud as to readily override the noise. On weak signals where noise is really important, the potentiometer is advanced all the way, and of course in this position, does not increase the noise level.

The switch SW2 is the antenna switch. When thrown to one side it connects the antenna to the converter input and connects the converter output to the receiver. Thrown to the other side, it connects the antenna direct to the receiver for normal operation.

Connecting to Set

The converter is connected to the receiver by means of either a twisted pair or a single-conductor shielded lead with the shield serving as the second lead (ground). The use of a twisted pair is recommended because of its lower capacity. However, if the receiver or converter show any signs of instability it will be necessary to substitute a shielded lead for the twisted pair.

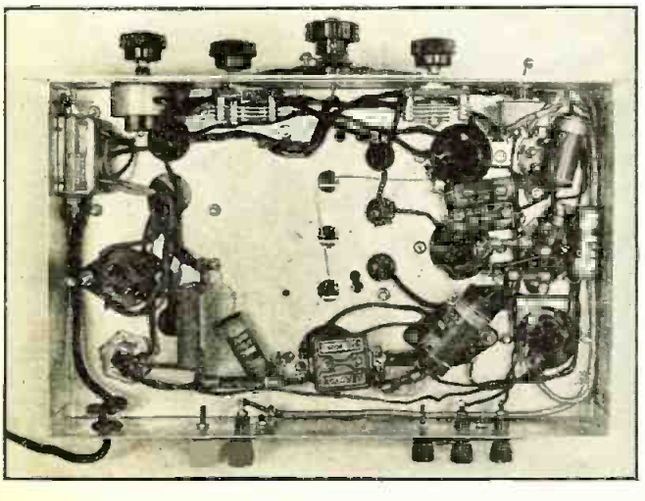
It is not deemed necessary to go into details concerning the assembly of parts or the wiring. However, the reader may be interested in reading the article on the short-wave converter in the April issue, as the wiring in that unit is practically identical with that in the present one.

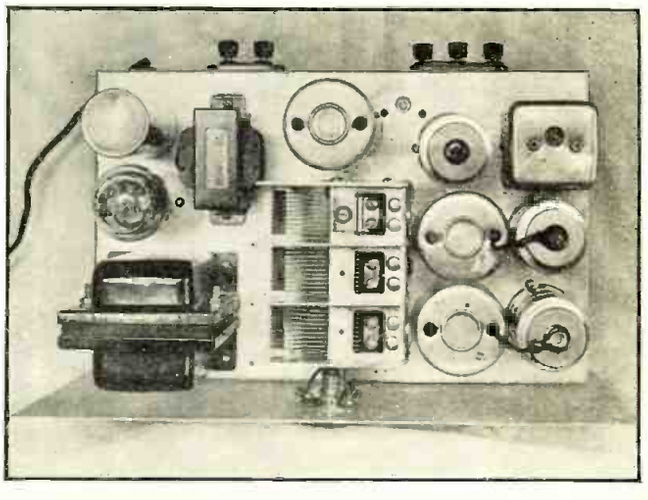
When the converter is completed it should be connected to the receiver and the receiver tuned to its lowest frequency. If an ordinary antenna is employed, connect it to one of the antenna posts and connect the other to the ground post. The "ground" may be connected to the ground post on the converter or on the receiver. If any type of 2-wire antenna lead-in is used, connect the leads to the 2 antenna posts of the converter.

Tune the output transformer of the converter to the point which produces maximum noise in the loudspeaker output. The alignment of the oscillator and r.f. circuits can then be (*Turn to page 237*)

The Special "Blueprints"

IF you are interested in this DX Converter but don't care to tackle the construction job yourself, your local radio serviceman will be glad to build it for you. However, even though your construction experience is limited, you can easily build it yourself. The drilled chassis and the essential parts are available in kit form, making the assembly job a simple one. To simplify the wiring you can obtain the Radio News "Blueprints" which include a full-size picture wiring diagram, an enlarged photo of the under-chassis wiring, a full-size chassis layout, and a chassis drilling template for those who prefer to make the chassis themselves. The blueprints may be obtained by sending 50c to Radio News Blueprint Department, 461—8th Avenue, New York City.





The DX for the

DX CORNER

Here is the listening post of A. J. Webb of Bishopston, Bristol, England, Official Observer for that country.

THE thirty-first installment of the DX Corner for Short Waves contains the World Short-Wave Time-Table for 24-hour use all over the world. The list starts at 01 G.M.T. and runs 24 hours through 00 G.M.T., right around the clock! This Time-Table contains a List of Short-Wave Stations, logged during the last month in the RADIO NEWS Westchester Listening Post (in our Editor's home), as well as at our official RADIO NEWS Short-Wave Listening Posts throughout the world. It provides an hour-to-hour guide to short-wave fans, whether experienced or inexperienced. The Time-Table shows the Call Letters, Station Locations, Wavelength and Frequency in the middle column. The column at the left gives the Times of Transmission in G.M.T. a.m., and the column at the right gives the Times of Transmission in G.M.T. p.m. The corresponding time in E.S.T. is also given and space has been left for filling in your own Local Time. The time, E.S.T., in the U. S. would be 8 p.m., E.S.T., for 01 G.M.T., as there is a five-hour difference. The time, E.S.T., for 13 G.M.T. would therefore, be 8 a.m., E.S.T. These two features can be seen at the beginning of each outside column in the Time-Table. The times, C.S.T., for these two corresponding hours would be 7 p.m., C.S.T., and 7 a.m., C.S.T. The times, M.S.T., for the corresponding hours would be 6 p.m., M.S.T., and 6 a.m., M.S.T. The times, P.S.T., for corresponding hours would be 5 p.m. and 5 a.m., P.S.T. In this way American listeners can easily fill in their own Local Times at the top of the columns. Foreign listeners would probably prefer to use G.M.T., anyway, or, if not, can compute the time difference from G.M.T. and fill in their Local Time in each column head. At the end of the Time-Table is given a List of Symbols covering the various irregularities of transmission, etc.

Affiliated DX Clubs

We are hereby placing a standing invitation to reliable DX Clubs to become affiliated with the DX Corner as Associate Members, acting as advisers on short-wave activities, in promoting short-wave popularity and reception efficiency. A list of associate organizations follows: International DX'ers Alliance, President, Charles A. Morrison; Newark News Radio Club, Irving R. Potts, President, A. W. Oppel, Executive Secretary; Society of Wireless Pioneers, M. Mickelson, Vice-President; U. S. Radio DX Club, Geo. E. Deering, Jr., President; the Radio Club Venezolano of Caracas, Venezuela, President, Alberto Lopez; The World-wide Dial Club of Chicago, Illinois, President; Howard A. Olson; International 6000- to 12,500-Mile Short-Wave Club, Oliver Amlie, President, Joseph H. Miller, Vice-President.

Any DX fan wishing to join any one of these Clubs or Associations may write for information to the Short-Wave DX Editor, and his letter will be sent to the organization in question. Other Clubs who wish to become affiliated should make their application to the Short-Wave DX Editor. Clubs associated with the DX Corner have the privilege of sending in Club Notes for publication in RADIO NEWS.

Your DX Logs Welcome

Please keep on sending in your information on any s.w. stations that you hear during the coming month, getting them in to the short-wave DX Editor by the 20th of the month. In this way you share your "Best Catches" with other readers and they, in turn, share with you, making for improved knowledge on short-wave reception. Also send in any corrections or additions that you can make to the short-wave identification charts, including station addresses, station slogans, station an-

THE WORLD'S ORIGINAL ORGANIZATION OF

S.W. PIONEERS

Official RADIO NEWS Listening Post Observers

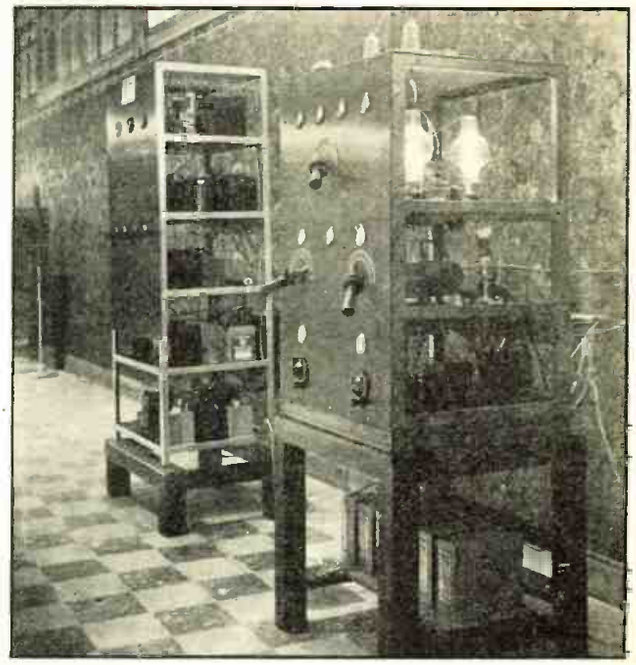
LISTED below by states are the Official RADIO NEWS Short-Wave Listening Post Observers who are serving conscientiously in logging stations for the DX Corner.

United States of America

Alabama, J. E. Brooks, L. T. Lee, Jr., William D. Owens; Alaska, Thomas A. Pugh; Arizona, Geo. Pasquale; Arkansas, James G. Moore, Don Pryor, Caleb A. Wilkinson; California, Eugene S. Allen, A. E. Berger, C. H. Canning, Earl G. DeHaven, G. C. Gallagher, Werner Howald, Wesley W. Loudon, Robert J. McMahon, Oriente I. Noda, Jr., Geo. C. Sholin, James E. Moore, Jr., Phil E. Lockwood, Hank G. Wedel, H. H. Parker, Fred A. Pilgrim, Douglas S. Catchim; Colorado, Wm. J. Vette; Connecticut, H. Kemp, Geo. A. Smith, Philip Swanson, J. Herbert Hyde; District of Columbia, Phillip R. Belt; Florida, James F. Dechart, George H. Fletcher, E. M. Law; Georgia, C. H. Armstrong, Guy R. Bigbee, James L. Davis, John McCarley, R. W. Winfree; Idaho, Bernard Starr, Lawrence Swenson; Illinois, E. Bergeman, Larry Eisler, Robert Irving, Charles A. Morrison, Phillip Simmons, Samuel Tolpin, Ray A. Walters, Floyd Waters, Robert L. Weber, J. Ira Young, Evert Anderson, Eddie C. Zarn, Louis Horwath, Jr.; Indiana, Freeman C. Balph, Arthur B. Coover, J. R. Flannigan, Henry Spearing, B. L. Cummins; Iowa, J. Harold Lindblom; Kansas, C. W. Bourne, Wm. Schumacher; Kentucky, Geo. Krebs, Charles Miller, Wm. A. McAlister, James T. Spalding, W. W. Gaunt, Jr.; Louisiana, Roy W. Peyton; Maine, Danford L. Adams, M. Keith Libby, Vincent M. Wood, R. C. Messer; Maryland, Howard Adams, Jr., J. F. Fritsch, James W. Smith, August J. Walker, Forrest W. Dodge; Massachusetts, Armand A. Boussey, J. Walter Bunnell, Walter L. Chambers, Arthur Hamilton, Sydney G. Millen, Harold K. Miller, Elmer F. Orne, Roy Sanders, Donald Smith, Robert Loring Young; Michigan, Ralph B. Baldwin, Stewart R. Ruple, Jerry M. Hynek; Minnesota, M. Mickelson, E. M. Norris, Dr. G. W. Twomey; Mississippi, Mrs. L. R. Ledbetter, Dr. J. P. Watson; Missouri, C. H. Long; Montana, Henry Dobravalny; Nebraska, Hans Andersen, P. H. Clute, Harold Hansen, G. W. Renish, Jr.; Nevada, Don H. Townsend, Jr.; New Hampshire, Paul C. Atwood, Alfred J. Mannix; New Jersey, Wm. F. Buhl, Wm. Dixon, Morgan Foshay, George Munz, R. H. Schiller, Paul B. Silver, Earl R. Wickham; New Mexico, G. K. Harrison; New York, Donald E. Bame, John M. Borst, H. S. Bradley, Wm. C. Dorf, Capt. Horace L. Hall, Robert F. Kaiser, John C. Kalmbach, Jr.; L. H. Kattell, W. B. Kinzel, Wm. Koehnlein, T. J. Knapp, A. J. Leonhardt, Joseph M. Malast, S. Gordon Taylor, Edmore Melanson, Joseph H. Miller, R. Wright, Harry E. Kentzel, Howard T. Neupert, A. C. Doty, Jr., Thaddeus Grabek, Ken L. Sargent; North Carolina, W. C. Couch, E. Payson Mallard, H. O. Murdoch, Jr.; North Dakota, Bill Bundlie; Ohio, Paul Byrns, Charles Dooley, Stan Elcheshen, Albert E. Emerson, Samuel J. Emerson, R. W. Evans, Clarence D. Hall, William Oker, Donald W. Shields, C. H. Skatzes, Carl P. Peters, Orval Dickes, Edw. DeLaet, M. L. Gavin, Charles W. Krier; Oklahoma, H. L. Pribble, Robert Woods, W. H. Boatman; Oregon, Harold H. Flick, Geo. R. Johnson, James Haley, Ernest R. Remster, Ned Smith, Virgil C. Tramp; Pennsylvania, Oliver Amlie, Harold W. Bower, Roy L. Christoph, R. O. Lamb, John Leininger, Geo. Lilley, Edward C. Lips, Chas. Nick, Hen. F. Polm, C. T. Sheaks, K. A. Staats, F. L. Stitzinger, Walter W. Winand, J. B. Canfield, Charles B. Marshall, Jr.; Puerto Rico, Manuel F. Betances, A. N. Lightbourn; Rhode Island, Carl Schradieck, Joseph V. Trzuskowski; South Carolina, Edward Bahan, Ben F. Goodlett; South Dakota, Paul J. Mraz; Tennessee, Chas. D. Moss, Eugene T. Musser; Territory of

Corner

SHORT WAVES



"TIRCC"

View of the transmitter of the new radio station TIRCC, at San Jose de Costa Rica, operated by Cespedes Marin.

nouncements, and any identifying signals the stations may have. Our Editors are doing the same thing, working with you day and night to bring you the best and most reliable short-wave information. Your logs are welcome and are sincerely invited.

To save a lot of wasted effort for our editors it would be best if our Observers use a standard form for their reports of new stations or station changes. We have found a system of paragraphs, in exactly the following procedure, most convenient:

"JVH, Nazaki, Japan, 20.5 meters, 14,600 kc., daily 12 m. to 1 a.m., EST, irregularly testing 3 p.m. EST."

In other words, use one paragraph to an item and also indicate whether data was from a veri, an announcement or other source.

Let's See Your DX Corner!

Readers are also invited to send in photographs or snapshots of themselves in their Listening Posts, for publication in the DX Corner. Let other readers see what you and your equipment look like! Write 50 words naming and describing your receiving equipment. RADIO NEWS will pay $1.00 for each photo used, to help defray expenses. If a copy of RADIO NEWS appears in the photo, this payment will be doubled.

Listening Post Observers and Other Fans Please Notice

Listed on next column is this month's partial information regarding short-wave stations heard and reported by our World Wide Listening Posts. Each item in the listing is credited with the Observer's surname. This will allow our readers to note who obtained the information given. If any of our readers can supply actual Time Schedules, actual Wavelengths, correct Frequencies, or any other Important Information regarding these items, the DX Corner Editor and its readers will be glad to get the information. There are some hard stations to pull in in these listings, but we urge our Listening Posts and other readers to try their skill in logging the stations and getting correct information about them. When you are satisfied that you have this information correct, send it in to the editor; or if you have received a "veri" from any of the hard-to-get stations, send in a copy of the "veri" so that the whole short-wave fraternity may benefit. The list containing this information follows:

CT1AA, Lisbon, Portugal reported testing on about 11850 kc., 25.3+ meters, 3 to 6 p.m. E.S.T. (Dickes, Reilly, Alan Smith, M. C. Smith, Millen, Libby, Chambers).

GSJ, Daventry, England, reported heard on 13.93 meters, 6 to 9 a.m. E.S.T. (Scherz).

GSI, Daventry, England on 15260 kc., 19.66 meters reported heard 11:36 a.m. to 1 p.m., E.S.T., noon to 2:15 p.m., and 3:20 to 4:45 p.m. E.S.T. (Geiser, Reilly, Frost, Gallagher, Libby, Forbes, DeLaet, Thomas, McMenamy, Sterneman, Alan Smith).

GAS, Rugby, England, heard relaying programs to America for C. B. S., 12:30 p.m. E.S.T. (Alan Smith).

DJR, Zeesen, Germany, 15340 kc., reported heard 3 to 5 p.m., E.S.T. (Peters).

HBL, Prangins, Switzerland, 9580 kc., heard relaying special programs to Australia regularly Sundays, 12 p.m. to 1 a.m. (Pilgrim).

HBO, Prangins, Switzerland, 11.4 megacycles heard with special program to a foreign country (Alan Smith).

FTK, St. Assise, France, 18.9

(*Turn to page 228*)

SHORT-WAVE LISTENING POST OBSERVERS

Hawaii, O. F. Sterneman, A. Fabius; Texas, James Brown, Heinie Johnson, Carl Scherz, Bryan Scott, James W. Sheppard, John Steward, Overton Wilson; Utah, Earl Larson, Harold D. Nordeen, A. D. Ross; Vermont, Eddie H. Davenport, Jos. M. Kelley, Dr. Alan E. Smith; Virginia, G. Hampton Allison, L. P. Morgan, D. W. Parsons, Gordon L. Rich, Gaines Hughes, Jr., E. L. Myers; Washington, Glenn E. Dubbe, A. D. Golden, Charles G. Payne; West Virginia, Kenneth R. Boord, R. E. Sumner, Fred C. Lowe, Jr.; Wisconsin, Willard Hardell, Walter A. Jasiorkowski; Wyoming, L. M. Jensen, Dr. F. C. Naegeli, Eric Butcher.

S.W. PIONEERS

Official RADIO NEWS Listening Post Observers

LISTED below by countries are the Official RADIO NEWS Short-Wave Listening Post Observers who are serving conscientiously in logging stations for the DX Corner.

Argentina, J. F. Edbrooke, Santiago E. Roulier.

Australia, Albert E. Faull, A. H. Garth, H. Arthur Matthews, C. N. H. Richardson, R. H. Tucker, Harold F. Lower.

Belgium, Rene Arickx.

Bermuda, Thursten Clarke.

Brazil, W. W. Enete, Louis Rogers Gray.

British Guiana, E. S. Christiani, Jr.

British West Indies, E. G. Derrick, Edela Rosa, N. Hood-Daniel, Aubrey H. Forbes.

Canada, J. T. Atkinson, A. B. Baadsgaard, Jack Bews, Robert Edkins, W. H. Fraser, Fred C. Hickson, C. Holmes, John E. Moore, Charles E. Roy, Douglas Wood, Claude A. Dulmage, A. Belanger, Robert B. Hammersley.

Canal Zone, Bertram Baker.

Canary Islands, Manuel Davin.

Central America, R. Wilder Tatum.

Chile, Jorge Izquerdo.

China, Baron Von Huene.

Colombia, J. D. Lowe, Italo Amore.

Cuba, Frank H. Kydd, Dr. Evelio Villar.

Czechoslovakia, Ferry Friedl.

Denmark, Hans W. Priwin, Hilbert Jensen.

Dominican Republic, Jose Perez.

Dutch East Indies, E. M. O. Godee, A. den Breems, J. H. A. Hardeman.

Dutch West Indies, R. J. van Ommeren.

England, N. C. Smith, H. O. Graham, Alan Barber, Donald Burns, Leslie H. Colburn, Frederick W. Cable, C. L. Davies, Frederick W. Ginn, R. S. Houghton, W. P. Kempster, R. Lawton, John J. Maling, Norman Nattall, L. H. Plunkett-Checkemian, Harold J. Self, R. Stevens, L. C. Styles, C. L. Wright, John Gordon Hampshire, J. Douglas Buckley, C. K. McConnon, Douglas Thwaites, J. Rowson, A. J. Webb.

France, J. C. Meillon, Jr., Alfred Quaglino.

Germany, Herbert Lennartz, Theodor B. Stark.

India, D. R. D. Wadia, A. H. Dalal, Terry A. Adams, Harry J. Dent.

Irish Free State, Ron. C. Bradley.

Iraq, Hagop Kouyoumdjian.

Italy, A. Passini, Dr. Guglielmo Tixy.

Japan, Massall Satow, Tomonobu Masuda.

Malta, Edgar J. Vassallo.

Mexico, Felipe L. Saldana, Manuel Ortiz Gomez.

New Zealand, Dr. G. Campbell Macdiarmid, Kenneth H. Moffatt.

Newfoundland, Frank Nosworthy.

Norway, Per Torp.

Palestine, W. E. Frost.

Panama, Albert Palacio.

Peru, Ramon Masias.

Philippine Islands, Victorino Leonen.

Portugal, Jose Fernandes Patrae, Jr.

Scotland, Duncan T. Donaldson.

South Africa, Mike Kruger, A. C. Lyell, H. Mallet-Veale, C. McCormick.

Spain, Jose Ma. Maranges.

Sweden, B. Scheierman.

Switzerland, Dr. Max Hausdorff, Ed. J. DeLopez.

Turkey, Herman Freiss, M. Seyfeddin.

Venezuela, Francisco Fossa Anderson.

Applications for Official Observers in the remaining countries should be sent in immediately to the DX Corner.

WORLD SHORT WAVE TIME-TABLE

Compiled by LAURENCE M. COCKADAY

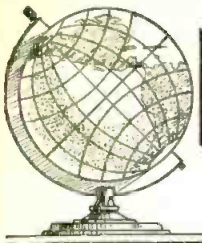
Hours of transmission for the World's Short Wave Broadcast Stations

FILL IN LOCAL TIME											
8	9	10	11	M	1	2	3	4	5	6	7
EASTERN STANDARD TIME											
01	02	03	04	05	06	07	08	09	10	11	12
GREENWICH MEAN TIME											
13	14	15	16	17	18	19	20	21	22	23	00

HOURS OF TRANSMISSION

Wave-length Meters	Call Letters	Frequency Kc.	City Country
13.9+	W8XK	21540	Pittsburgh, Pa.
13.9+	GSH	21470	Daventry, England
16.8+	GSG	17790	Daventry, England
16.8+	W3XAL	17780	Bound Brook, N. J.
16.8+	PHI	17775	Huizen, Holland
16.8+	DJE	17760	Zeesen, Germany
19.4	PRADO	15440	Riobamba, Ecuador
19.5	HAS3 (HAS)	15370	Budapest, Hungary
19.5	W2XAD	15330	Schenectady, N. Y.
19.6+	DJQ	15280	Zeesen, Germany
19.6+	W2XE	15270	New York, N. Y.
19.6+	GSI	15260	Daventry, England
19.6+	W1XAL	15250	Boston, Mass.
19.6+	FYA	15245	Pontoise, France
19.7	PCJ	15220	Huizen, Holland
19.7	W8XK	15210	Pittsburgh, Pa.
19.7	DJB	15200	Zeesen, Germany
19.8	GSF	15140	Daventry, England
19.8	HVJ	15123	Vatican City
19.9+	RKI	15040	Moscow, U.S.S.R.
20.5+	JVH	14600	Nazaki, Japan
21.4+	HJ5ABE	14000	Cali, Colombia
22.7+	ORP	13200	Ruysselede, Belg.
22.9+	VP1A (VPD)	13075	Suva, Fiji Islands
24.8+	CT1CT	12082	Lisbon, Portugal
24.9+	RW59	12000	Moscow, U.S.S.R.
25.2	CT1GO	11900	Parede, Portugal
25.2	FYA	11890	Pontoise, France
25.2+	W8XK	11870	Pittsburgh, Pa.
25.2+	GSE	11860	Daventry, England
25.3+	W2XE	11830	New York, N. Y.
25.4	12RO	11810	Rome, Italy
25.4+	W1XAL	11790	Boston, Mass.
25.4+	DJD	11770	Zeesen, Germany
25.5+	GSD	11750	Daventry, England
25.5+	FYA	11720	Pontoise, France
25.5+	CJRX	11720	Winnipeg, Canada
25.6+	HJ4ABA	11710	Medellin, Col.
27.9+	JVM	10740	Nazaki, Japan
28.1+	JVN	10660	Nazaki, Japan
28.9+	LSX	10350	Buenos Aires, Argen.
29.0+	ORK	10330	Ruysselede, Belgium
29.3+	CO9WR	10200	Sanctus Spiritus, Cuba
29.5+	OPM	10135	Leopoldville, Belgian Congo, Africa
30.4+	EAQ	9860	Madrid, Spain
31.1+	12RO	9635	Rome, Italy
31.2+	CT1AA	9600	Lisbon, Portugal
31.2+	W3XAU	9590	Philadelphia, Pa.
31.2+	VK2ME	9590	Sydney, Australia
31.2+	HP5J	9590	Panama City, Pana.
31.3	HBL	9580	Geneva, Switzerland
31.3	VK3LR	9580	Lyndhurst, Victoria, Australia
31.3	GSC	9580	Daventry, England
31.3+	W1XK	9570	Springfield, Mass.
31.3+	VUY (VUB)	9565	Bombay, India
31.3+	DJA	9560	Zeesen, Germany
31.4+	DJN	9540	Zeesen, Germany
31.4+	LKJI	9530	Jeloy, Norway
31.4+	W2XAF	9530	Schenectady, N. Y.
31.5+	VK3ME	9510	Melbourne, Australia
31.5+	GSB	9510	Daventry, England
31.5+	PRF5	9501	Rio de Janeiro, Braz.
31.8	COH	9428	Havana, Cuba
31.8+	PLV	9415	Bandoeng, Java
32.8+	HAT4	9125	Budapest, Hungary
32.8+	CP6	9120	La Paz, Bolivia
33.0+	TFK	9060	Reykjavik, Iceland
34.0+	HKV	8795	Bogota, Col.
34.2+	ZCK (ZBW)	8750	Hong Kong, China
35.6+	HC2AT	8400	Guayaquil, Ecuador
36.4+	ZP10	8220	Asuncion, Paraguay
36.5	HCJB	8214	Quito, Ecuador
38.1+	HC2JSB	7854	Guayaquil, Ecuador
38.4+	HBP	7790	Geneva, Switzerland
40.4+	HJ3ABD	7406	Bogota, Colombia
40.6+	XECR	7380	Mexico City, Mex.
41.1+	HJ1ABD	7281	Cartagena, Col.
41.7+	CR6AA	7177	Lobito, Angola, Port. West Africa
42.0	HJ4ABB	7138	Manizales, Col.
42.1+	HB9B	7118	Basle, Switzerland
42.2+	HJ1ABE	7100	Sincelejo, Col.
42.3+	PI1J	7082	Dordrecht, Holland
43.4+	HI3C	6900	La Romana, D. R.
44.0	HIH	6818	San Pedro, D. R.
44.4+	JVT	6750	Nazaki, Japan
44.6+	TIEP	6710	San Jose, Costa Rica
45.0+	HC2RL	6668	Guayaquil, Ecuador
45.3	PRADO	6616	Riobamba, Ecuador

HOURS OF TRANSMISSION



WORLD SHORT WAVE TIME-TABLE

(*Continued from the Previous Page*)

Hours of transmission for the World's Short Wave Broadcast Stations

												FILL IN LOCAL TIME												
8	9	10	11	M	1	2	3	4	5	6	7	EASTERN STANDARD TIME	8	9	10	11	N	1	2	3	4	5	6	7
01	02	03	04	05	06	07	08	09	10	11	12	GREENWICH MEAN TIME	13	14	15	16	17	18	19	20	21	22	23	00

HOURS OF TRANSMISSION												*Wave-length Meters*	*Call Letters*	*Frequency Kc.*	*City Country*	HOURS OF TRANSMISSION											
D	D											45.3+	RW72	6611	Moscow, U.S.S.R.					I							
D	D											45.7+	TIRCC	6550	San Jose, Costa Rica				S	D	D						D
D	D											45.9+	YV6RV	6520	Valencia, Ven.					D						D	D
O	O	O										46.2	HJ5ABD	6490	Cali, Colombia												N
D												46.2+	HI4D	6482	San Domingo, D. R.				XS	XS	XS			XS	XS	XS	XS
D	D	L										46.4+	YN1GG	6450	Managua, Nicaragua					D	D					D	D
D	D	D										46.5+	HJ1ABB	6447	Barranquilla, Col.			D	D	D				S	S	D	D
	Sa	Sa	Sa									47.0	YV4RC	6375	Caracas, Venez.										D	D	D
L	L	L										47.4+	HIZ	6315	San Domingo, D. R.					S	S	S		S	D		T
AM												48.1+	OAX4B	6230	Lima, Peru												L
D	D	I	I	I								48.1+	HJ1ABH	6225	Cienaga, Colombia												AM
XS	XS	D										48.4+	HI1A	6188	Santiago de Los Caballeros, D. R.				Z	Z	D	D					D
D	D	D	D									48.5+	HJ3ABF	6180	Bogota, Colombia				D								XS
D	D											48.7+	CJRO	6160	Winnipeg, Manitoba							I	I	D	D	D
D	D											48.7+	HJ2ABA	6150	Tunja, Colombia						D						D
			Sa	Sa								48.7+	YV3RC	6150	Caracas, Venezuela				D	D	D			D	D	D	D
XR	XR											48.7+	VE9CL	6150	Winnipeg, Man.												
D	D	D			M	M						48.7+	HJ5ABC	6150	Cali, Colombia				D	S	S						XR
	D	D	D	D								48.7+	CO9GC	6150	Santiago, Cuba					D			D	D			
										AE	AE	48.8+	W8XK	6140	Pittsburgh, Pa.												
												48.9	ZGE	6132	Kuala Lumpur, F. M. S.	AE											
D	D	D	D									48.9+	COCD	6130	Havana, Cuba											D	D
XY												48.9+	CT1GO	6130	Parede, Portugal				S	S	S						XY
												48.9	VQ7LO	6120	Nairobi Kenya, Afr.	E	E		AF	AF	AF	S	S				
D	D											49.0+	W2XE	6120	New York, N. Y.												D
		D	D	D	D				D	D	D	49.0+	VDA5	6120	Bandoeng, Java	D	D	D						D	D		
D	D	D									D	49.0+	HRP1	6115	San Pedro Sula, Honduras					D	D						
												49.0+	HJ1ABE	6115	Cartagena, Col.												
D	D	D										49.0+	YV2RC	6112	Caracas, Ven.	D	D	D	S			S	S	S	D	D	D
D	D	D	D	D								49.0+	VE9HX	6110	Halifax, N. S.		D	XA	XA	XA	XA	XA	XA	D	Sa	D	D
												49.0+	GSL	6110	Daventry, England					D	D	D	D	D	D		
AH	AH	AH	Sa									49.0+	VUC	6109	Calcutta, India	D	D	D	D	Sa							
	XSa				D	S						49.1+	W3XAL	6100	Bround Brook, N. J.									AH	AH	AH	AH
D	Z	I	S									49.1+	W9XF	6100	Chicago, Ill.												
			AL	AL			AL	AL	XS	XS		49.1+	HJ4ABB	6100	Manizales, Col.					XA							
												49.1+	ZTJ (JB)	6098	Johannesburg, Africa	S	D	D	AL	D	D	D	XS	SA			
												49.1+	VE9GW	6090	Bowmanville, Can.		D	D	D	D	D	D	D	D	S	S	S
												49.3+	CP5	6080	La Paz, Bolivia										I	I	I
S												49.3+	W9XAA	6080	Chicago, Ill.		XS	XS	D	D	D	D	D	D	D	S	S
										XS	XS	49.3+	ZHJ	6080	Penang, Straits Settlements	XS											
							K	K				49.3+	CQN	6073	Macao, Asia												
							D	I	I	I	I	49.3+	OER2	6072	Vienna, Austria	I	D	D	D	D	D	D	D	D	D	I	
XS												49.3+	HH2S	6070	Port au Prince, Haiti												
S	S	S	AG	AG	T							49.3+	VE9CS	6070	Vancouver, B. C.						S	S	S	S	S	D	D
												49.3+	HJ1ABF	6070	Barranquilla, Col.												
D	D	Sa	Sa	Sa								49.4+	HJ4ABL	6065	Manizala, Col.				D						D	D	D
		D	D	D	D					XS	D	49.4+	W8XAL	6060	Cincinnati, Ohio	D	D	D	D	D	D	D	D	D	D	D	
D	D											49.4+	W3XAU	6060	Philadelphia, Pa.												D
												49.4+	OXY	6060	Skamlebaek, Den.				S	S	D	D	D	D	D	D	
												49.5+	GSA	6050	Daventry, England											D	D
	D											49.6	HJ3ABI	6045	Bogota, Colombia												
XS	XS	XS		Sa								49.6+	HJ1ABG	6042	Barranquilla, Col.					XS	S	S	S	S	S		XS
D											D	49.6+	PRA8	6040	Pernambuco, Brazil	D	D	D			D	D	XS	D	D	D	D
D	D	D										49.7+	HP5B	6030	Panama City, Pan.					D				I			
D	D	D	D	D	Th	Th						49.7+	VE9CA	6030	Calgary, Alberta, Can.		XS	XS	XS	D	D	D	XS		S	S	D
		D	D									49.8	DJC	6020	Zeesen, Germany						D	D	D	D	D		
				S	S					N	N	49.8+	ZHI	6018	Singapore, Malaya	N											
T	T	I	Sa	Sa								49.8+	COC	6010	Havana, Cuba	D	D	D	D	D				D	D	I	I
D	D	D										49.9+	HJ1ABJ	6006	Santa Marta, Col.					D							D
				Sa								49.9+	VE9DN	6005	Montreal, Canada						D						
D	D	D	D	D								49.9+	XEBT	6000	Mexico City, Mex.			D	D	D	D	D	D	D	D	D	D
												49.9+	RW59	6000	Moscow, U.S.S.R.												
Z	Z	Sa	Sa									50.1+	HIX	5980	San Domingo, D. R.					D							I
		D	D									50.1+	XECW	5975	Xantocam, Mexico												
D	XS	XS										50.2+	HJ3ABH	5970	Bogota, Col.				XS	D	D					D	D
									S			50.2+	HVJ	5969	Vatican City							D					
D	D	D										50.6+	HJ4ABE	5925	Medellin, Colombia				D							D	D
D	D											50.8+	HJ2ABC	5900	Cucuta, Colombia											D	D
XS												50.9+	YV8RV	5880	Barquisimeto, Ven.											XS	XS
D	D											51.1+	HI1J	5860	San Pedro de Macoris, D. R.											D	D
XS	XS	XS										51.4+	TIXGP3	5823	San Jose, Costa Rica												
I	I	I										51.6	YV1IRMO	5810	Maracay, Ven.												
	AH	AH	AH									51.8+	OAX4D	5780	Lima, Peru		AN	AN	AN								
XS	XS											53.0+	YV5RMO	5650	Maracaibo, Ven.				D	D					XS	XS	XS
	L	L										64.5+	HC2EP	4650	Guayaquil, Ecuador												
					I	D	D	D	D	D	D	70.2	RW15	4273	Khabarovsk, Siberia	D	D	D	D								
												74.9+	CT2AJ	4002	San Miguel, Azores										L	L	
												79.5+	HB9B	3770	Basle, Switzerland									Th			
												79.9+	CT1CT	3750	Lisbon, Portugal		S										
												84.6+	CR7AA	3543	Lourenzo Marques, Mozambique					AC	AC	AC					

C—Monday, Wednesday, Friday
D—Daily
E—Tuesday, Thursday
G—Tuesday, Thursday, Saturday
I—Irregularly
K—Monday, Friday
L—Wednesday, Saturday
X—Monday, Wednesday, Thursday

D—Monday, Tuesday, Wednesday, Friday
P—Except Tuesday, Wednesday
R—Thursday, Friday, Saturday
S—Sunday
T—Tuesday
Th—Thursday
Z—Tuesday, Friday
AB—Tuesday, Wednesday, Friday, Sat.

AC—Monday, Thursday, Saturday
AE—Tuesday, Friday, Sunday
AF—Saturday, Sunday
AG—Tuesday, Sunday
AH—Monday, Wednesday, Saturday
AL—Except Monday, Sunday
AM—Monday, Thursday

AN—Tuesday, Saturday
Sa—Saturday
XA—Except Saturday, Sunday
XM—Except Monday
XS—Except Sunday
XSa—Except Saturday
XX—Tuesday, Thursday, Friday
XY—Except Tuesday, Sunday

The DX Corner

(Short Waves)

(*Continued from page 225*)

meters reported heard (Ortiz).

FZR, reported heard on 24.9 meters (Garth).

CT1GO, Parede. Portugal, has changed wavelengths as follows: on 6130 kc., 4892 meters. It is heard on Mondays, Wednesdays, Thursdays, Fridays, and Saturdays, 00.20 a.m. to 01.30 a.m. G.M.T. and on Sundays 04.30 to 06.00 p.m. G.M.T. On 11900 kc. 2521 meters they will be on the air Tuesdays, Thursdays and Fridays 06.00 to 07.15 p.m. G.M.T. and on Sundays from 03.00 to 04.30 p.m. G.M.T. (Grabek and J. H. Miller).

RRR1, reported heard on 18.79 meters 4 to 5:30 a.m. E.S.T. Uses 3-note signal like other Russian or Siberian stations (J. H. Miller).

PLP, Java 27.2+ meters 11000 kc. reported heard 5 to 7 a.m. and 9 to 11:30 a.m. (Howald, Fabius, Baadsgaard, Lower, Godee, J. H. Miller).

PLE, Java, 18.83 megacycles, 15.9+ meters reported heard 9 to 11:30 a.m. also 5 to 6 p.m., also 9 p.m. E.S.T. (Howald, Baadsgaard, J. H. Miller, Gallagher).

PMA, reported heard on 19.35 megacycles, (Gallagher).

PLW, reported heard on 9.48 megacycles at 10 a.m. E.S.T. (Gallagher).

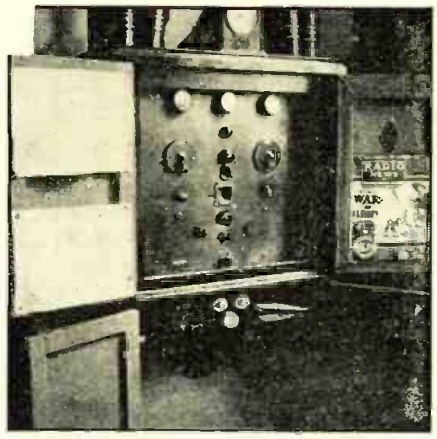
PMN, Bandoeng, Java, reported heard on 10260 kc. 29.2+ meters (Godee, Gallagher).

JVH, Nazaki, Japan, 14600 k.c., 20.5+ meters has changed their time of operation from 12 midnight to 1 a.m. E.S.T. daily. They have also started testing on the same frequency at 3 p.m. E.S.T. irregularly (Moriwake, Coney, Kemp, Jensen, Ross, Haws, Sholin, Kuramochi, Catchim, Gallagher, Akins, Sterneman, Pilgrim, Chambers, Bews, Howald, McMenamy, Lower, Geiser). L. P. O. Scherz says he hears them on Mondays and Thursdays 4 to 5 p.m. E.S.T.

JVM, Nazaki, Japan, 10740 kc., heard regularly in the morning hours till 8 a.m. E.S.T. or some times later (Westchester L.P.).

JVL, Nazaki, Japan, 11.66 megacycles relays JOAK irregularly (Gallagher).

ZCK, Hongkong, China, on 8750 kc., reported now by many listeners and observers. They have other licensed frequencies as follows: 5410 kc., 6090 kc., 11740 kc., 15190 kc. (Sholin). The long-wave call ZBW may be heard on this station at times as ZCK relays ZBW.



IN FAR-OFF CHINA

Meet Baron von Hoynigen-Huene, of Tientsin, China, Official Radio News Short Wave Listening Post Observer for that country. At right, is one of his special receivers for long distance work.

VUY (VUB) Kirkee, India, 31.36 meters, 9565 kc., are now on the air on Wednesdays and Saturdays 11 to 12:30 a.m., E.S.T. The transmissions are from station VUY which rebroadcasts the programs of station VUB at Bombay, India. Call letters announced are VUB. The station has also been reported heard on Wednesdays and Saturdays at 6 a.m. and irregularly at 7 a.m., (Amlie, Fabius, Mallet-Veale, Schierman).

VUC, Bombay, India, 6300 kc., 47.5 meters, now transmitting from 8 to 9 a.m. and from 3 to 9:30 p.m., E.S.T., (Dalal and Terrance Adams).

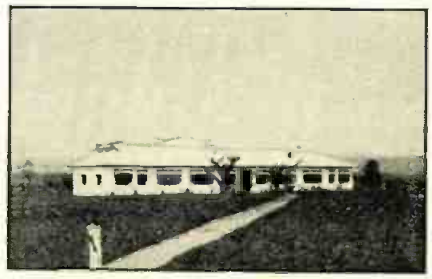
VP1A (VPD) Radio Suva, Fiji Islands, 13075 kc., reported heard 12:30 p.m. to 1:30 a.m. and except Sunday 6 to 7 p.m., E.S.T., (Sterne-

(*Turn to page 245*)

AT LEOPOLDVILLE, BELGIAN CONGO

This is the transmitter building of Station OPM, now being heard on the short waves.

Photo courtesy Tomlinson



Columbus Day Special!

WHAT will be the first short-wave "Exploration Party" will be held on October 12th, Columbus Day, in honor of the great explorer's birthday. Three short-wave transmissions will be made on that date by Station W2HFS, owned and operated by Henry B. Lockwood of Mount Vernon, New York, U. S. A. These transmissions will take place on a frequency of 14230 kc. in the 20-meter amateur band. They will occur at 12.00 G.M.T., at 23.00 G.M.T., and at 05.00 G.M.T. Far East and Australian listeners will hear the first transmissions best; listeners in North and South America should hear the second one and European and African listeners should hear the third, although all transmissions could be tried for.

These transmissions will be scheduled conversations between W2HFS and another amateur station on the same band whom you will have to identify yourself. Here is a chance to explore the ether and report all you hear of *both* conversations, signal strength, fading, etc. Reception will be verified. Send in reports to both stations c/o RADIO NEWS and they will be forwarded. We want all Official RADIO NEWS Short Wave L.P.O.'s to listen and report and we hope many other listeners will avail themselves of the opportunity to help in this amateur research. Tell your local DX Club about this Party and have their members listen in and report also. There is a "veri" awaiting all who identify the transmissions.

REPRESENTS LONG ISLAND

Here is the short-wave set-up of R. Cooney of St. Albans, Long Island. His receiver is an All-Star set and with it he picks up many foreign short-wave stations.

Only the SCOTT *Full Range Hi-Fidelity* RADIO

BRINGS YOU SUCH *True* TONE ON *World-Wide* RECEPTION

Sit back and listen to the magnificent new SCOTT Full Range Hi-Fidelity Receiver—the unequalled custombuilt achievement of one of the world's finest radio laboratories!

World-wide programs *recreated* for the first time! You feel the very singers, musicians, actors, living and breathing before your very eyes—so breath-taking is the richness, the reality of SCOTT tone!

TWO YEARS AHEAD OF ANY RECEIVER

The SCOTT alone accomplishes this because of its advanced design—fully two years ahead of any receiver sold today, and custombuilt with the precision of a fine watch. Selectivity is needle-sharp! You cut right through powerful adjacent stations—and from the land of Schubert—from oriental Asia—bizarre Africa—South America—from the continent of Australia—there comes to your home a thrilling mosaic of the music of peoples of all the earth—brought in with a precision possible *only* with SCOTT Continuously Variable Selectivity!

Sensitivity? —yes! Glorious world programs from dozens of exciting, new foreign stations you have never heard before—songs with the clarity of bells at twilight, music with the thrilling clarity possible *only* with the SCOTT'S high Useable Sensitivity.

GREATER RESERVE POWER

Only the SCOTT receiver has the Reserve Amplifier Power absolutely necessary to give you the "peak" fortissimos of a Wagnerian opera or of a popular dance orchestra without distortion. Yet in the same short breath every singing silver overtone is yours! For the untiring genius of SCOTT engineers has raised ordinary high fidelity reproduction to new pinnacles of perfection not even approached by any other receiver. Only part of the thrilling overtones of violin, oboe, bass clarinet and human voice come through the ordinary 7500 cycle high fidelity receiver. The rest is lost to you without a SCOTT—it alone captures all the tones broadcast up to 16,000 cycles—all the tones from the Hi-Fidelity stations. This is the unchallenged leader which DX enthusiasts acclaim the world over as the finest receiver human hands have ever built.

E. H. SCOTT RADIO LABORATORIES, INC.
4440 RAVENSWOOD AVE. DEPT. 5R5 CHICAGO, ILL.

MICROMATIC VARIABLE SELECTIVITY—piercing through the most powerful adjacent wave length stations to bring you foreign programs you have never heard before.

FULL RANGE HI-FIDELITY—doubling tonal range of other high fidelity radios, giving you overtones of violin, oboe, bass clarinet and voice never heard before on any radio, 25 to 16,000 cycles.

35 WATT PURE CLASS "A" OUTPUT—carrying to you strong "peak" passages with a lack of distortion and a crystal brilliance surpassing that of any other radio today.

These are but a few of the unparalleled advantages which are at your fingertips when you own a SCOTT receiver. They mean an enjoyment of foreign reception beyond your fondest dreams.

FIVE YEAR GUARANTEE

The SCOTT is sold direct from the laboratories on a thirty day home trial (in U. S. A. only) with an unqualified five year guarantee (tubes excepted). If you are interested in unmatched world-wide reception, send the coupon below, and we will immediately forward you complete details and "94 PROOFS OF SCOTT SUPERIORITY." No obligation whatever.

SEND THIS COUPON *TODAY*—DETAILS FREE

E. H. SCOTT RADIO LABORATORIES, INC.
4440 Ravenswood Ave., Dept. 5R5, Chicago, Ill.

Send me complete details of the new Scott Full Range Hi-Fidelity Receiver and particulars of your 30-day trial offer.

Name_____

Address_____

City_____ State_____

NINA TARASOVA

JACK SMART

VERNA HILLE

LIONEL BARRYMORE

Backstage in Broadcasting

Samuel Kaufman

LANNY ROSS, singing star of the Maxwell House Show Boat presented on NBC Thursday nights, was given novel recognition for his outstanding services on that feature. Beginning October 1, in his honor, the series will be renamed "Lanny Ross Presents the Maxwell House Show Boat." On that date the program will start its fourth consecutive year. It is understood that the change in billing will not bring about any alterations in the program's framework. During Jack Benny's vacation from the airwaves, Lanny was called to star on the Sunday NBC series presented by General Foods. The feature entitled "Lanny Ross and His State Fair Concert," featured Howard Barlow's orchestra in addition to the tenor.

VERNA HILLE, a comely Hollywood miss, is featured on the new CBS "America's Hour," presented Sundays. The program is one of the most important additions to the chain's dramatic series. Miss Hille has appeared in several talkies, the fact being obvious that any girl, who photographs as well as she, will not be overlooked by the cinema scouts.

ONE of the prominent new CBS features is "On the Air with Lud Gluskin." Co-featured with Gluskin's orchestra on the Tuesday program is Nina Tarasova, international songstress. Gluskin, who in recent seasons gained a high rating in the radio world, is a native of New York, a former Yale student and an erstwhile night-club pianist. He organized a band of American musicians in Europe and gained considerable fame abroad. When he returned to New York, CBS promptly presented him on the air.

WHEN Fred Allen took leave of the NBC Wednesday "Town Hall Tonight" series to go to Hollywood, the master-of-ceremonies role was turned over to Uncle Jim Harkins and the bulk of the hour was given over to amateurs. Uncle Jim, in the past, assisted Allen in the recruiting and handling of the amateurs and had a non-professional show of his own over WMCA, New York. Skits featuring Jack Smart, one of radio's most versatile actors, and Minerva Pious, noted actress, are included in the series.

WITH Joe Penner's adieu to the Sunday Standard Brands program of NBC, the spot has been filled by a series entitled "The Voice of the People" in which the microphone is brought out-of-doors to pick up opinions of passers-by selected at random. The program is conducted by Jerry Belcher and Parks Johnson who conducted a similar series over a Houston, Texas, station. The sponsors, the network, and all concerned with the program's production attest to the statement that there is absolutely no preparation for any of these broadcasts beyond the necessary technical setup for the microphone connection.

LIONEL BARRYMORE, the actor who bobs up on various network programs every now and then, has been signed to a unique radio contract by the makers of Campbell's soup. The contract calls for him to appear each Christmas Day for the next five years in the role of Scrooge in Dickens' "Christmas Carol" over CBS. Lionel is the eldest of the three famous Barrymores and has enjoyed a distinguished career of more than a score of years on the stage and screen. Discussing radio drama recently, Barrymore said: "It's a fascinating medium that deserves, and needs, the attention of every person seriously interested in the future of the theatre. This, I think, is entirely possible

LUD GLUSKIN

"VOICE OF THE PEOPLE"

LANNY ROSS AND CAPTAIN HENRY

STANLEY HIGH

when one considers future development in television and radio drama technique."

STANLEY HIGH, commentator, has been assigned the role of a roving microphone reporter by NBC. During the past few weeks he has been heard from various parts of the country giving network listeners an account of American political and economic conditions in the respective localities. His programs are presented Tuesdays from whatever city he happens to be in at the scheduled hour. Keeping the forthcoming Presidential election in mind, High's objective is to give a report of the nation's conditions while the various parties and groups are laying the groundwork for the 1936 campaign.

BROADCASTERS have always held that it is only a matter of time for all living celebrities to be signed to a radio contract. And the latest prominent personality of the literary world to sign on the dotted line for a radio sponsor is Christopher Morley. The series is presented over CBS Fridays under the heading of "The Socony Sketchbook," the sponsor being the Standard Oil Company of New York. The series contains informal anecdotes and breezy comment by Morley and the varied talents of Virginia Verrill, California songster, Johnny Green's Orchestra, and several supporting entertainers.

WITH the consistent growth in popularity of talkie stars in radio, and of radio stars in the talkies, plans were

(*Turn to page* 255)

VIRGINIA VERRILL

THE SERVICE BENCH

tells YOU something about

SERVICE GUARANTEES

● ● ●

SALES PROCEDURE

● ● ●

Conducted by
Zeh Bouck
Service Editor

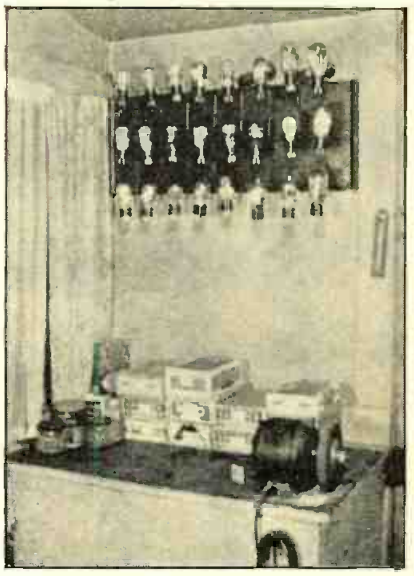


FIGURE 1

THE GUARANTEE PROBLEM

IT goes without saying that a serviceman should back up his work with a guarantee. However, there are logical limits to this warranty, imposed by various considerations. Even a "permanent" repair cannot be expected to last forever, and the serviceman should not be held responsible for future receiver failures which have nothing to do with his previous repairs or which are caused by tampering with his job. Roger H. Hertel, owner of Hertel's Radio Store in Clay Center, Nebraska, contributes the model guarantee given below—

GUARANTEE—*This is to certify that .....has had a..... radio, Model No. ..... repaired in our service department and we hereby guarantee all work done and new parts installed as shown by our service record, a copy of which is attached to this guarantee certificate, for a period of ninety days, provided that:—*

1. *We are notified promptly in case of trouble.*
2. *The radio is returned to our shop for service, or a mileage charge will be made of* 10c *per mile one way to have the radio returned to the shop.*
3. *No one has tampered with the radio in any way.*

SPECIAL NOTICE—*We will absolutely guarantee all work we do and repairs we make. These are clearly indicated on your copy of our service record. We will not and cannot be responsible for any other trouble you may have.*

Signed .....

This guarantee is attractively printed in green ink on a yellow background. Our only criticism of it is the time limit. We personally feel that a first-class repair made with high-grade parts could be safely guaranteed for a much longer period. We would suggest a one year guarantee as a minimum.

The reader will note that the "service record" is an integral part of the guarantee. This is an important point, and is a protection for the serviceman. Many servicemen provide room on the service record for the signature of the set owner, who signs a statement that the receiver has been satisfactorily repaired. This obviates a possible complaint later that "the set never did work, even when it was returned from the shop."

THIS MONTH'S SERVICE SHOP

Just to prove that initiative and ability are more essential to the promotion of a successful service business than an elaborate and expensively-equipped laboratory, we bring you our Service Shop selection this month in Figure 1, owned by Mr. K. W. Brown of St. Joseph, Mo. However, the essential equipment is there, mounted in an old Freshmann Masterpiece cabinet (not shown in the photo) and consists of a capacity bridge, condenser tester, condenser test block, resistance indicator, continuity meter, ohmmeter, milliammeter and a loudspeaker. A built-in power supply furnishes from 3 to 600 volts a.c. or d.c.

SERVICE SALES PROMOTION

A "business card" is rightfully only a business card when it brings in business. To do this effectively, it should carry a concise sales argument as well as identifying the bearer. An example of a live-wire card for radio servicemen is shown in Figure 2. It proclaims several facts: First,

R. C. A.-VICTOR SERVICE ENGINEER

MEMBER PHILCO RADIO MANUFACTURERS' SERVICE

Chuck's Radio Service
210 SOUTH CARBON AVENUE
PRICE, UTAH
(UNIVERSAL RADIO LAB.)
PUBLIC ADDRESS AND RADIO SPECIALISTS
RADIO REPAIRING BY EXPERTS
C. J. SCHAUERS, CHIEF TECHNICIAN

that radio service is available. Secondly, that R.C.A.-Victor sets receive specialized attention. Regardless of what kind of a receiver a person owns, everyone knows of and has respect for the R.C.A.-Victor

Cash Prizes for Servicemen

RADIO NEWS is offering five cash prizes of $10.00, $5.00, $4.00, $3.00 and $2.00 each month for the best ideas sent in by active servicemen for promoting the service business. In addition, a one-year subscription to RADIO NEWS will be given for such ideas, other than prize-winning, that are printed. Send in as many suggestions as you wish. The more the better! What has helped you ring up the cash register may do as much for a brother servicemen and bring you in some prize cash besides! Address contributions to the Service Contest Editor.

line. The implication is that anyone good enough to service these receivers can service all receivers. Thirdly, the same argument holds for the Philco mention, while additionally cashing in on the publicity given the Radio Manufacturers Service. Fourth, and by no means last, the recipient is reminded that Chuck's Radio Service also offer public address facilities expertly superintended.

The tag shown in Figure 3 is effective

for the purpose it is intended, and should be resorted to in cases of removal to new headquarters. Some servicemen prefer a small sticker—the idea, and results, are the same.

THE DAY'S WORK

From Harry Schmidt, Radio Service, Richmond Hill, N. Y. (whose letter-head carries the following sales message—"Radio Service — Public Address Installation — Special Installations—Electrical Hearing Aids"):

"Symptoms: Smoke, a burned odor and bad hum, with a Wanamaker Model J. W.-32. Investigation showed that the tone control condenser had shorted placing the entire output of the rectifier across the tone control resistor with the logical result. A new .05 mfd. condenser and a .5 megohm variable resistor cured this part of the trouble. The hum was caused by a leaky electrolytic filter condenser. These condensers are held in place by a riveted strap, and next to no space is available for a new condenser. Disconnect but do not remove the defective capacitor. Use an Acratest '600 Line' 6 mfd. condenser which is very compact and can be wedged into the place between the old condenser and the back of the chassis."

A Familiar Tube Complaint

"Had an unusual experience with a Majestic Model 25, I want to pass on. After being turned on for a few minutes, the set would go into oscillation with cessation of reception. By-passes and grounds were suspected, but examination disclosed nothing wrong here. Voltages and resistors all checked okay. After wasting a good deal of time, I tried letting the set play with one tube plugged into the analyzer. No luck until I got to the first detector

(*Turn to page* 235)

Servicemen's PRIZE CONTEST

Announcement of Awards

Zeh Bouck
Service Editor

FIRST PRIZE
Service Advertising

"The problem of effective newspaper advertising in a city of 100,000 has been solved by the Radio Servicemen's Association of South Bend, Indiana. In a 10-inch- 2-column advertisement in the local newspapers, servicemen have been able to carry to the radio owner the assurance that his radio instrument is safe in their hands, and that experience and technical knowledge are at his service. The advertisement carries the names and business addresses of 40 South Bend members, and five from the adjoining city of Mishawka, thus becoming a directory that many radio owners will keep. The fact that experienced servicemen are united to insure technical safety to the radio owner at reasonable rates is emphasized. The cost of the advertising to each man is small."—*William C. Harder.*

WINNING SERVICE AD

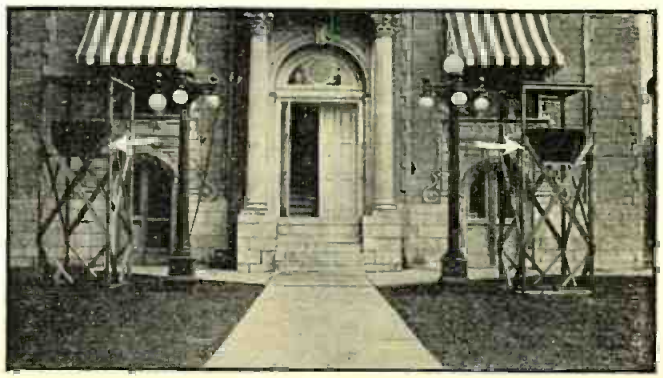
SECOND PRIZE
Kodak as You Go!

"On every sound rental job I do, I take pictures of the crowd and the set-up of my equipment. These pictures, together with a newspaper write-up of the event, or hand-bills advertising the occasion if it is out of town, together with a letter of recommendation from the organization renting the equipment saying that the set-up was entirely satisfactory, are bound in a loose-leaf book. This sound advertising presentation is left with a prospect, and speaks louder than anything I might say for my service."—*Merrill Lindley.*

THIRD PRIZE
Breaking Down Sales Resistance

"There are numerous occasions where a civic or fraternal organization will sponsor some type of meeting or entertainment at which sound equipment can be used to an advantage. Such occasions commemorate national events, holidays, dedications, etc., and rarely is money provided for the rental of sound equipment. I have been successful, however, in overcoming this obstacle. When I am informed that no funds are available to pay for my services, I make the organization the following proposition: Since the occasion is for the benefit of the entire community, I am willing to do my part in making the affair a success by donating part of the public-address cost if the organization or other local merchants will provide the balance. As a concrete example, if the job is worth $25.00, I suggest that the organization dig up four sponsors to donate $5.00 apiece, and I'll do the rest, and I usually get the assignment that otherwise I would have lost. The $25.00 price is in no way jacked up—it is at my regular rate—and the $5.00 is charged off to donations or advertising—as worthwhile publicity is invariably a by-product of the job. The newspapers are glad to give me credit and an announcement is usually made that the sound equipment has been made available through the courtesy of the various sponsors who are named."—*Harry Bangerter.*

PHOTO RECORDS
Keep a photographic scrap-book of every P.A. job you do. It actually makes money for a wide-awake serviceman in Indianapolis. A job well done is worth picturing.



FOURTH PRIZE
A New Side-Line for the Serviceman

"Up to now memories have been kept alive with the aid of photographs. Only recently has science made it possible to 'photograph' the living voice to bring back that vital part of every memory. Recording studios are inevitable in the near future, and the radio serviceman is the logical person to operate them in every community. Recording is the counterpart of P. A. work, which contributes so greatly to the serviceman's income. Practical-recording as a money-making idea for the service-man is not visionary and can be put into immediate operation by anyone who is willing to invest a relatively small sum in the obvious equipment. You can sell your recording services almost exactly as you do your P. A. work. To list a few recording potentialities: family reunions—picnics—important events—commencement exercises—business advertising (for use in conjunction with a sound truck)—advertising to accompany slides in local motion-picture theaters. Probably one of the greatest potential recording markets in the world is the 'mothers' market. They bring their children to your studio for a permanent record of everything from the first efforts of speech to more ambitious exhibitions of musical talent. These records will be just as precious as the family album. Your local newspaper will be glad to give you the necessary publicity to start the ball rolling."—*P. M. Olinger.*

FIFTH PRIZE
Digging Out of the Depression

"'The radio business is all played out. I can't even make a living at it.' This is the usual cry you hear today. Why should this be so? With about 20,000,000 families in the United States owning radio sets (which at times need installation and repair) there is no reason why a serviceman cannot make a go of it. Of course they do not always need service, but if you could get in touch with the owner of a radio set at the moment it needs installation or repair, then quite naturally you would be able to increase your present business. How is this to be done? Very easily. Every time a radio set owner moves, he needs installation, perhaps adjustment or repair. Now, if you could reach this owner right after he has moved into the new apartment and ask him a reasonable price for the installation, you will get the job even though he might have originally planned to do it himself. Of course, you must make the price attractive. You must not think of the single job and try to make as much as you can on it. Rather consider the future business this customer will give you if you satisfy him now. Chances are he may need some new tubes. A repair might even be necessary. Anything is liable to happen to a radio in moving. So, you see, it pays to go after prospective customers as soon as they move.

"It is very easy to get names and addresses of new tenants. Go to your local moving-van company. Make arrangements with them to provide you with the name and address of every family they move. See the manager. Tell him you will keep his radio in repair gratis in exchange for this favor. If he does not want to help you, try someone else in the company. You are bound to find someone willing to help you in exchange for keeping his set in good condition. And you can very well afford to do it.

"Another man for you to see and whose friendship you should try to cultivate is the superintendent (do not call him janitor) of every apartment house in your neighborhood. Be alive! Make friends with all the storekeepers on your block. Be willing to help them if necessary. They can switch a lot of trade your way. Make yourself known in your vicinity. Give everybody a square deal and your business will increase."—*Albert D'Antoni.*

THIS MONTH'S WINNERS

FIRST PRIZE—To W. C. Harder, 1083 Woodward Avenue, South Bend, Indiana—$10.00 for showing the individual serviceman how he can enjoy the benefits of big space advertising at small space cost—at the same time demonstrating what co-operation can do!

SECOND PRIZE—To Merrill Lindley, 2659 Napoleon Street, Indianapolis, Indiana—$5.00 for a practical and highly effective form of sales presentation!

THIRD PRIZE—To Harry Bangerter, 607 South Walter Avenue, Albuquerque, New Mexico—$4.00 for building up good will and business at the same time!

FOURTH PRIZE—To P. M. Ohlinger, Portsmouth, Iowa—$3.00 for novelty and a new service sideline!

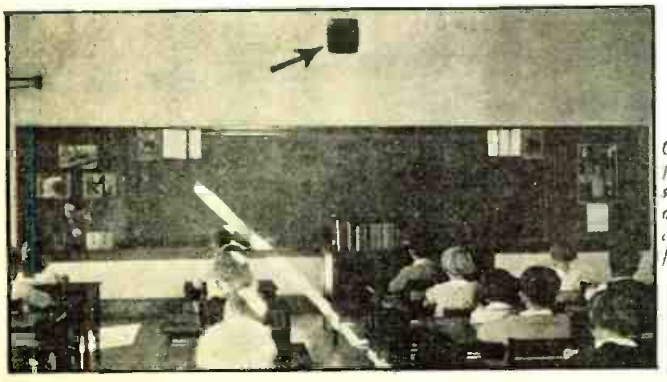
FIFTH PRIZE—To Albert D'Antoni, 2260 Washington Avenue, Bronx, N. Y.—$2.00 for a general plan for keeping the cash register tinkling!

The Service Bench

(*Continued from page 233*)

tube a 35. When the set went into oscillation, the plate current rose sharply. No negative bias, and a short-circuit from cathode to ground. With the set turned

(*Turn to page 251*)



SCHOOL P. A. WORK

Can you do a school public-address installation? A photo of a past job, well done, is the best affirmative answer to this question.

RADIO PHYSICS COURSE

ALFRED A. GHIRARDI

Lesson 45. Phase

WHEN a condenser is connected in an alternating current circuit as shown at the left of Figure 1, a periodic transfer of electrons takes place from one plate around through the circuit toward the other plate and back again many times every second. This gives rise to a flow of alternating current in the external circuit. We have already studied the actions of condensers in detail in Figures 83 and 84, but it is important to consider at this point, the phase relations between the variations in the applied e. m. f. and those in the current in a condenser circuit. This can be understood best by considering the action of the electrons.

Consider the condenser connected to a source of alternating e. m. f. as shown at the left of Figure 1. Let the sine-wave applied e. m. f. be represented as shown at the right. We will assume that the condenser has no ohmic resistance. At O the e. m. f. starts from zero and rises rapidly along OF, and drives electrons out of one set of plates (which become positively charged due to lack of electrons) around through the external circuit into the other set of plates (which become negatively charged due to excess of electrons). During this time a strong flow of electrons (current flow) takes place because there is nothing to oppose them. Now the e. m. f. approaches its maximum value at P. A large number of electrons have accumulated on the negative plate and have built up a negative charge which repels those that are now being forced in.

Although the e. m. f. is near its maximum value, electrons cannot flow into the plate so rapidly as before because the negative charge caused by the accumulation of the electrons already there, is now almost equal to the applied e. m. f. This means that the electron or current flow becomes less as the applied e. m. f. approaches its maximum value. During this time the current or electron flow is therefore represented by the part of the current curve between D-E-G. As the applied e. m. f. decreases from P to R, the electrons begin to flow around in the opposite direction from the negatively charged plate to the positively charged plate against the applied e. m. f. which is still in the same direction as before. This gives rise to a current flow in the opposite direction as represented by part G-H-I of the current curve. After the applied e. m. f. passes through zero at R and reverses in direction from R to S, it begins to charge the condenser in the opposite direction and so the electrons and current continue to flow in the same direction as before, as shown from I to J to K. When the e. m. f. decreases toward zero again at W, the plate which is now negative begins to discharge electrons around the circuit to the positive plate. Hence the current is flowing in the opposite direction along K-L-M. This action repeats itself over and over for each cycle of the applied alternating e. m. f.

It will be seen from this that in a purely condensive circuit (no resistance and no inductance), when once the action starts, the current or rate of flow of electrons is greatest when the applied e. m. f. is near the zero value, and dies down to zero as the e. m. f. approaches the maximum. In other words, the current variations lead the e. m. f. variations by 90 electrical degrees. This is shown in Figure 1, by the fact that whereas the current has already completed a quarter cycle at M, the e. m. f. is just beginning a cycle at the corresponding point W, i.e., the variations in the current occur one quarter of a cycle *ahead* of the corresponding variations in the applied e. m. f.

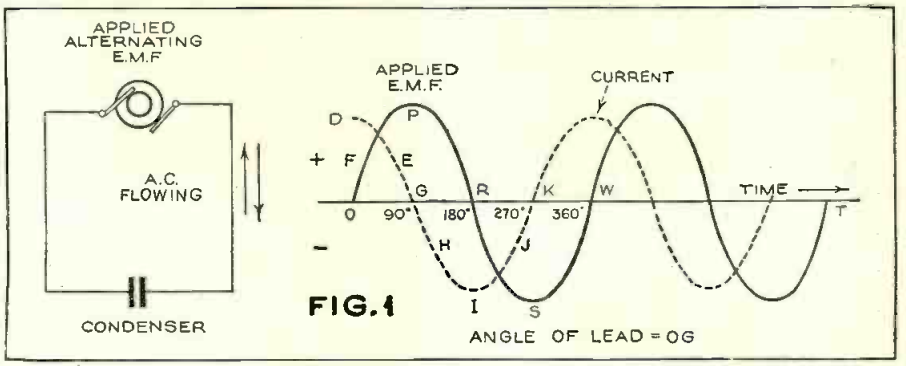


Figure 1—Effect of capacitance on the phase relations between current and applied voltage in an alternating current circuit.

Columbia's Studio Acoustics

(*Continued from page* 208)

designed to permit the sound waves to penetrate the four inches of rock wall beneath.

Glass windows of the control room and the client's chamber, situated in the dead-end are long and narrow in design to minimize any reflections that might be set up by hard, smooth surfaces.

One innovation is that the wooden panels of the echo plane, instead of being fastened solidly to the wall surfaces, are secured only at their edges, leaving their centers free to vibrate as the sound waves strike them.

Diaphragmatic action of the panels, in reflecting the sounds coming to them from the performers at the far end of the studio, echo the sound waves right back to the pick-up point. The time essential for this return is a small fraction of a second and, according to the engineers, adds brilliance to tone.

Additional reverberating surfaces are provided and built in undulating surfaces so that the sound waves will be diffused as they are reflected from side to side of the broadcasting chamber.

Dr. Free explained that use of wood for the live surfaces was suggested by the fact that musicians for many ages have claimed that their music sounds best to them when performing in wooden paneled rooms. He compared the paneling's application to the sounding boards of piano's. In effect, the room was treated as though it were a single gigantic musical instrument. Mr. Cohan told the writer that CBS was so pleased with the new type of studio that it was decided to alter all of the WABC chambers along the same lines. He also thought it probable that the idea would be applied to other CBS stations.

A DX "Hopper Upper"

(*Continued from page 223*)

tackled, following the usual routine in aligning superheterodyne input circuits. If an oscillator is available so much the better, but if not the job can be done readily using broadcast station carriers.

When the alignment has been completed it will be found that the tuning range of the converter covers from approximately 1600 k.c. to 540 k.c. However, it must be remembered that the low frequency end of the range will be limited to about 10 kilocycles higher than the frequency to which the receiver is tuned. Thus if your receiver will tune to 540 k.c. you will not find it possible to tune in a 540 meter broadcast station with the converter because of the interaction of the converter and receiver both operating on the same frequency. You should be able to tune in stations on 550 k.c., however. If your receiver is such that it will only tune to 550 or 560 k.c., then the low frequency end of the converter range will be correspondingly higher.

The last step is to try the other secondary of the output transformer, retuning the primary of this transformer. Then make the final connections to the coil which produces best results.

In closing it should be pointed out that the full benefit of the converter will not be noticeable with a receiver having automatic volume control unless the test is made on a very weak signal. Where such a receiver is used the extra gain provided by the converter is offset by the action of the a.v.c. on anything but very weak signals. If the receiver is equipped with a tuning meter the tremendous increase in signal voltage provided by the converter will be quite apparent on the meter. During tests of the converter here in New York many out-of-town stations kicked the tuning meter up full scale, whereas without the converter even the local stations would not register full scale on the meter.

One final suggestion is that receivers be operated at relatively low gain in cases where there is a manual sensitivity control and assuming that the receiver itself is capable of fairly high gain. This, in effect, will mean that the i.f. amplifier is working at low gain and will result in the best possible signal to noise ratio.

List of Parts

The Foundation Kit

L1, L2, L3, L4—Set of special "Radio News DX Converter" coils
C1—Tuning condenser, 3-gang, each section—405 mmfd.
C2, C3—Hammarlund midget condensers, 4-plate, 50 mmfd.
C4—Special compression type padding condenser variable 800-1600 mmfd.
C5—Supplied (built-in) with coil L3
C12—Trimmer included in C1
C13—Fixed mica condenser, .00065 mfd.
1 Cadmium-plated, drilled chassis with panel welded in position; 4 tube sockets, 3 tube shields. 2 binding-post strips. Chassis 12 inches long, 7½ inches deep. 2 inches high. Panel 13 inches long, 8 inches high.

Other Parts Required

C6, C7, C9, C10, C11—Sprague tubular bypass condensers, 1 mfd., 600 volts peak
C8—Sprague tubular by-pass condenser, .5 mfd., 600 volts peak
C14—Solar mica condenser, pigtail type, .0001 mfd.
C15—Mallory 2-section (8-8 mfd.) electrolytic condenser with grounded can, inverted type, 450 volts
C16—Sprague 2-section by-pass condenser in shield can, .1-.1 mfd., 400 volts
Ch—Thordarson type T-4402 filter choke
R1, R3—IRC pigtail resistors, 250 ohms, ½ watt
R2, R6—IRC pigtail resistors, 50,000 ohms, ½ watt
R4—IRC pigtail resistor, 5000 ohms, ½ watt
R5—IRC pigtail resistor, 30,000 ohms, ½ watt
R7—IRC pigtail resistor, 10,000 ohms, 1 watt
R8—IRC pigtail resistor, 10,000 ohms, ½ watt
R9—Electrad wire-wound resistor, 2000 ohms, 10 watts
R10—Electrad 15000 ohm potentiometer, type 201, with switch
SW1—See R10
SW2—Toggle switch, d.p.d.t.
T—Thordarson power transformer, type T-5472 with secondary windings of 575 volts (c.t.), 5 volts and 6.3 volts (c.t.)
1 National "Velvet Vernier" dial, type B, with variable ratio, 100-0-100 scale and pilot light bracket
2 grid caps
1 line cord and plug
Shielded wire (about 5 feet)
Tubes, one 6D6, one 6A7, one 76, one 80

Earning Dollars in Headphones

(*Continued from page 215*)

and in the great majority of cases such professional men are entirely willing to provide the names of the afflicted.

DX'ers are a little more difficult to locate. However, even a small community is likely to have several long-distance fans who have some reputation in their neighborhoods for their DX accomplishments. Casual inquiry is likely to disclose a few of these and each in turn will usually be able to provide the names of several others.

Once an installation has been made for a hard-of-hearing person, in a smaller community, it may be possible to have an item on it appear in a local newspaper. Such an item naturally provides excellent publicity. Small advertising space in this same newspaper is likely to bring substantial rewards.

Some Suggestions

Methods of installing headphones deserve considerably more attention than is usually given if really satisfactory results are to be obtained. It is hoped that the following suggestions will prove helpful to this end.

Figure 1a shows one of the methods widely employed with receivers having a single output tube. The condensers are used to isolate the headphones from the d.c. However, since these condensers are connected to points in the circuit at high voltage with respect to ground, the condenser discharge voltage to ground is high. In many types of phone plugs, and on some makes of phones, exposed terminals or metal parts connect to the jack. Touching any of these points will result in a disagreeable shock. Furthermore, with continued use, the phone cord insulation wears and allows shocks also. Figure 1b, by grounding one side of the headphones overcomes this fault providing phone and plug terminals are insulated.

Figure 2 shows a method used where high volume is not required, for connecting phones to a resistance-coupled amplifier. Since the coupling condenser is at a lower potential, and may discharge to ground through the shunt phone circuit, this is much safer and more desirable. In this circuit, provision is made for opening the balance of the amplifier circuit so that the speaker is inoperative when the phones are in use.

Figure 3 shows a common but undesirable way of connecting phones across a push-pull output circuit. Independent control of phone volume is obtained by varying R1. This circuit has all the faults of Figure 1a. Figure 4 shows a method of overcoming these faults. When the phone plug is inserted, the primary of the headphone transformer is shunted across the primary of the output transformer of the set. The speaker volume level may be independently controlled by adjusting R1 and that of the phones by adjusting R2. This is particularly desirable when phones are used by the hard-of-hearing as mentioned above.

Figure 5 indicates how this desirable method may be used for interstage work, with a transformer-coupled amplifier. Means are provided to cut out succeeding stages when using phones.

Figure 6 shows a circuit which is particularly advantageous since it eliminates the necessity for an extra transformer by connecting the headphones directly into the secondary circuit of the loudspeaker transformer. In this particular circuit a volume control is included to regulate the speaker output, but only when the headphones are plugged in. This potentiometer is in the circuit at all times but its resistance is sufficiently high to avoid any harmful effect. This circuit requires the use of low impedance headphones. This is another advantage because many hard-of-hearing persons have pocket-type hearing aids in which the headphone or bone conductor has an impedance of only a few ohms and therefore will serve in this radio output circuit. Also headphones and bone conductors wound to low impedance may be obtained direct from the manufacturers of the equipment shown in this photograph.

Figure 7 shows the method of securing "Varitone" compensation, or tone control. This is only one of the several practical "Varitone" circuits described in the April issue and is most suitable for short-wave and DX work, serving to give greater relative response around 1000 cycles, where phones are most sensitive and noise is low.

All the above diagrams show switching operations performed automatically when the phone plug is inserted. If desired, a separate switch or switches may of course be used in conjunction with jacks having fewer contact springs, or with tipjacks.

THE TECHNICAL REVIEW

CONDUCTED BY ROBERT HERTZBERG

The Fundamentals of Radio, second edition, by R. R. Ramsey; published by Ramsey Publishing Co., 1935. The second edition of a textbook which has been famous for its clear and simple explanations of complicated phenomena. At first glance it would seem that too much ground was covered, treating all of radio in 425 pages, but actually a good deal of detail is given. The text is full of explanations usually missing in much larger texts. The Helmholtz-Koenig controversy is an example.

This book is intended as a textbook for radio schools, colleges and for the individual who wishes to understand radio thoroughly. An effort has been made to make the text easily readable, without too much mathematics, although a few applications of calculus are present. Yet, it is not in any sense a "popular" book. Rigid accuracy has been maintained everywhere.

The opening chapters deal with the beginnings of electricity, the fundamental laws of electricity and magnetism. Next comes an introduction to radio, capacity, inductance, radio waves. Then there are several chapters on tubes, beginning with the rectifier and discussing the use of the triode as detector, amplifier and oscillator. Several of the newest tubes, including thyratrons, phototubes are described. The rest of the book deals with the operation of transmitters and receivers. The chapters are too many to quote them all here.

Mathematics of Radio Servicing, by M. N. Breitman. Supreme Publications, Chicago. This is a mimeographed booklet of 18 pages, intended to clarify some points of elementary "math" and to help the serviceman to connect them with everyday radio problems. It is a "refresher" course for the man who has studied mathematics in school but who has gotten a bit "rusty" on the subject.

Les Filtres Electriques (Electric filters), 2nd edition, by Pierre David; published by Gauthier Villars, Paris, 1935. A French book on the theory, design and applications of electric filters. This should be practical and useful to many an engineer who is sufficiently acquainted with the French language. The author has succeeded in explaining the complicated subject with greater clarity than one usually finds in books on filters. The first part of the book deals with the theory of electric circuits and filters. The second part is devoted to problems of design. There is a long appendix or "complement" which deals with special problems. There are several charts which should be very useful for designers of filters.

Review of Articles in the July, 1935, Issue of the Proceedings of the Institute of Radio Engineers

A Single Side-Band Short-Wave System for Transatlantic Telephony, by F. A. Polkinghorn and N. F. Schlaack. Describes a single-side band, reduced-carrier system, which gave an improvement of 8 db in equivalent radiated power over the conventional double side-band system.

Monitoring the Standard Frequency Emissions, by Evan G. Lapham. The method and equipment used at the National Bureau of Standards is reviewed. Results show that the emissions hold their accuracy within remarkably close limits.

Recent Studies of the Ionosphere, by S. S. Kirby and Elbert B. Judson. Results of ionosphere measurements utilizing transmissions of vertical incidence and made weekly over a period of eighteen months are discussed. The presence of a tentatively named G layer is indicated.

Analysis of the Operation of Vacuum Tubes as Class C Amplifiers, by I. E. Mouromtseff and H. N. Kozanowski. The operation of class C amplifiers under carrier and modulated conditions is analyzed with the aid of constant-current charts. With the latter, it is possible to precalculate all operating factors such as output, efficiency and grid driving power.

New Method for Eliminating Static Caused by Trolley and Electric Cars, by E. W. Schumacher. This method involves the use of sliding carbon "bows" to contact the overhead wire, this material having been found to produce no noticeable interference.

Anomalous Transmission in Filters, by J. G. Brainerd. Using a terminating impedance which approximates the negative of the usual iterative impedance is shown to result in transmission not specified by ordinary filter theory. The effect is shown to be one of resonance.

A 60-Cycle Bridge for the Study of Radio Frequency Power Amplifiers, by Atherton Noyes, Jr. This bridge consists of three resistive arms and a fourth arm comprising a sinusoidal 60-cycle voltage.

Measurement of Radio Frequency Impedance with Networks Simulating lines, by W. L. Barrow. Several new methods of carrying out this measurement have been developed and a study of the factors affecting the accuracy and technique of manipulation has been made. Optimum accuracy is obtained when the characteristic impedance of the network and the impedance to be measured are equal.

Review of Contemporary Literature

An Electronic Regulator for an Alternator, by

C. C. Whipple and W. E. Jacobsen; Electrical Engineering, June, 1935. A description of an electronic voltage regulator which, it is claimed, will reduce variations in voltage to .2 per cent. It is operated by means of a non-linear bridge circuit and a grid-controlled mercury vapor tube which governs the excitation of the alternator.

Photoelectric Control of Resistance Type Metal Heaters, by E. H. Vedder and M. S. Evans, Electrical Engineering, June, 1935. A device, operated by the radiant heat of the metal to be treated, which turns off the power when the proper temperature has been reached. This device is used on the type of metal heaters which heat metal by passing current directly through it.

Adjusting the Phone Transmitter for Best Modulation Performance, by W. C. Lent. QST, August, 1935. Every amateur or amateur-to-be who expects to go on the air with phone should read this article and learn how to obtain clear modulation.

Resistance-Coupled Amplifiers, by Leland Patterson, R/9, August, 1935. Every experimenter who has built resistance-coupled amplifiers knows how annoying "motor-boating" is. This article tells how to eliminate the trouble by means of decoupling filters.

The 7½-watt Family Album, R/9, August 1935. The six members of the popular 7½-watt family of transmitting tubes are described and their operating characteristics treated in a practical manner.

Oscillographic Response-Curve Examination, by R. F. Proctor and M. Horgan. The Wireless Engineer (London), July, 1935. This paper deals with the errors that occur in the construction of equipment for the visual demonstration of response curves of filters on a cathode-ray oscillograph.

Applications of Electronic Engine Indicators, by Ivan Bloch, Electronics, July, 1935. The pressure-volume diagrams, or indicator cards, of expansion engines are the most effective devices for analyzing engine performance. This article describes several ways of tracing these diagrams on the screen of a cathode ray tube, a system which possesses marked advantages of older mechanical methods now in use.

Wide-Range Transformers, by Arthur E. Thiessen. General Radio Experimenter, July, 1935. Detailed technical data of several new interstage amplifying transformers having substantially flat response curves in the remarkably wide range from 35 to 225,000 cycles.

Connecting Condensers in Series. Aerovox Research Worker, June, 1935. Excellent data for the experimenter on the subject of connecting condensers in series to serve equally as well as a single condenser of high-voltage rating.

A Linear, Multi-Range Electronic Voltmeter, by L. C. Paslay and M. W. Horrell. Radio Engineering, July, 1935. Complete description of a special instrument designed for measuring television signals, but also useful, of course, for many other laboratory purposes.

Class B and C Amplifiers Computations, by Dr. Victor A. Babits. Communication and Broadcast Engineering, July, 1935. This paper gives graphical methods for computing operating values of high-frequency Class B and C amplifiers.

Technical Booklets Available

Bulletins on the Latest Dials

Bulletins 58, 60 and 61 of the Crowe Name Plate and Mfg. Co. describe a wide variety of dials, knobs, dial plates and special remote controls for motors car sets. Copies of these bulletins are available to our readers, free of charge, simply by writing to RADIO NEWS, 461 Eighth Avenue, New York City.

Carbon Resistors Under 100 Ohms

A folder recently issued by the Ohio Carbon Co. tells about their newly developed carbon resistance material which permits production of carbon resistors in values between .04 and 100 ohms. The manufacturer states that low value carbon resistors have certain characteristics that make them especially desirable to many forms of industrial electronic applications. Readers can obtain a copy of this folder, free of charge, by writing to RADIO NEWS, 461 Eighth Avenue, New York City.

Latest 1935 Catalog

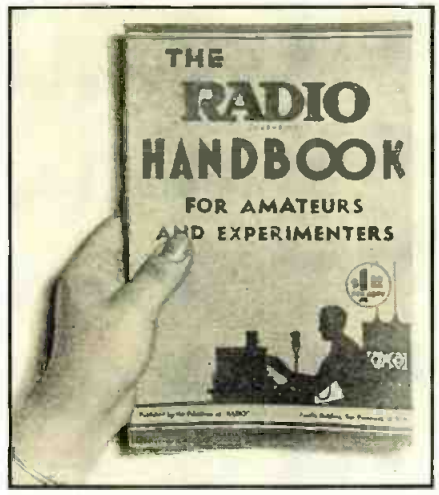
This new 8-page catalog features the complete Muter line of "Candohm" wire wound resistors for all the popular makes of receiving sets. It also includes descriptive information with illustrations on their new resistance bridge, all-wave tuning coupler, switches, and other products. Through a special arrangement, this catalog is made available to our readers, simply for the asking. Address requests to RADIO NEWS, 461 Eighth Avenue, New York City.

New Condenser Catalog

This is the new Allen D. Cardwell Manufacturing Corporation's catalog which is offered free to all RADIO NEWS readers. It lists their complete line of receiving and transmitting condensers, trimmer and special taper-plate condensers and other associate products. To obtain this book simply send in your request to RADIO NEWS, 461 Eighth Avenue, New York City.

Attention! Amateurs and Experimenters

The new "Radio Handbook" is probably one of the outstanding radio books of the year. Containing 296 pages, it is chock full of valuable, practical data on short-wave receivers, transceivers, transmitters and antennas of every imaginable type. Included with the text are diagrams, values of parts and coil data and there are innumerable illustrations. Fundamentals of radio are given and every phase of amateur activity from learning the code to operating a one kilowatt outfit is told very thoroughly and capably.



There is a chapter on power transformer design, a table on static characteristics of transmitting tubes and to show how up-to-date the book is, characteristics are given on the new metal receiving tubes. Every amateur, prospective amateur or experimenter should have a copy of this book for his radio library. The price of the book is one dollar ($1.00), and any reader desiring a copy can obtain same by forwarding his remittance to RADIO NEWS, 461 Eighth Avenue, New York City.

Radio News Booklet Offers Repeated

For the benefit of our new readers, we are repeating, below, a list of valuable technical booklets and manufacturers' catalog offers, which were described in detail in the June, July, August and September, 1935, issues. These booklets (J1 to J9, Jy2 to Jy5, A1 to A5 and S1 to S4) are still available to our readers free of cost. Simply ask for them by their code designations and send your requests to RADIO NEWS, 461 Eighth Avenue, New York, N. Y. The list follows:

J1—Information on the Cornish Wire Company "Noise-Master" Antenna Kit. Free.

J2—Booklet describing the technical features of the Hallicrafters' "Super-Skyrider" short-wave superheterodyne. Free.

J3—New 1935 catalog of the Hammarlund Manufacturing Co. Free.

J4—Resistor catalog of Electrad, Inc., Free.

J5—Booklet on tube testing prepared by Supreme Instruments Corp. Free.

J6—"Practical Mechanics of Radio Service," issued by F. L. Sprayberry. Free.

J7—New 1935 parts catalog of Alden Products Co. Free.

J8—Practical ham antenna design folder and leaflet on a new auto-radio under car antenna system, published by Arthur H. Lynch, Inc. Free.

(*Turn to page* 240)

WHAT'S NEW IN RADIO

WILLIAM C. DORF

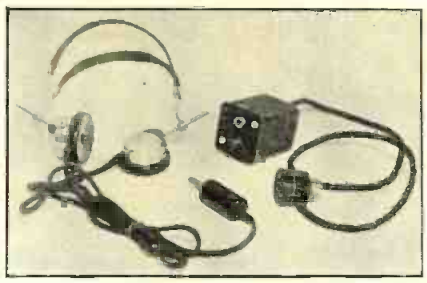
(*Continued from page* 201)

breaking. This base is reinforced by a second base made of fabric and an additional feature is the four-point wiping

spring-prong contacts. The mounting center spacing is 1½ inches.

Headphone Adaptor

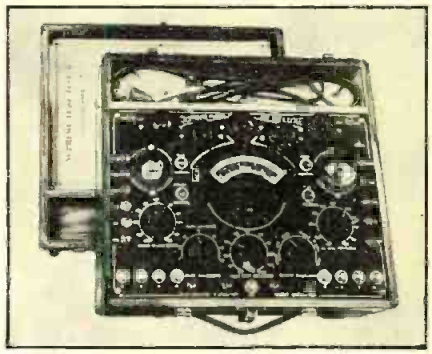
This Philco headphone adaptor kit meets a long felt want for the short-wave and broadcast fan who likes to listen-in during the late hours of the night, without disturbing other members of the family. The



headphones are light in weight and are designed to provide maximum sensitivity. In addition to the above application there should be a large market among the hard-of-hearing for a device of this type.

A Universal Instrument

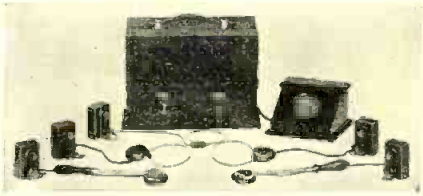
Among the features of the new Supreme model De Luxe 89-tube checker are: a 5-inch full-vision easy-to-read meter with English reading scale, facilities for testing all metal tubes without adaptors, a neon tube leakage testing arrangement and unusual for a tube checker it is also equipped with a 5-range voltmeter for



point-to-point testing, 5 ohmmeter ranges and a condenser tester.

The Latest in Group Hearing Equipment

The Trimm Radio Manufacturing Company announces a new group hearing aid for installation in churches, theatres and other places of public assemblage. The equipment, designed for simplicity of installation, comprises an amplifier, a crystal type microphone, Trimm featherweight earphones and bone conduction units and the necessary outlet boxes which contain individual vol-



ume controls. As the microphone requires no energizing current, installation and placement of this unit is greatly facilitated.

New Universal Receiver with Metal Tubes

The Emerson Model 107, a.c.-d.c. compact set incorporates 6 tubes, 3 of which are the new metal type. It has 3 wave bands covering the regular broadcast wavelength range, the police and amateur band and a foreign short-wave range. A feature

of the cabinet is that the back is designed and finished the same as the front, in contrast to the rough finish or open back of the usual compact set.

The Technical Review

(*Continued from page* 239)

J9—Information on new radio courses given by the Capitol Radio Engineering Institute. Free.

J10—"Radio Noises and Their Cure." A 75-page book. Price 50 cents.

Jy2—New parts catalog of Birnbach Radio Company. Free.

Jy3—Data on Vacuum Tube Voltmeter Measurements published by Cough-Brengle Company. Free.

Jy4—"Increasing the Serviceman's Income," folder issued by Philco Radio & Television Corp. Free.

Jy5—Transformer Bulletin of American Transformer Corp. Free.

A1—Information on new Browning "35" receiver, issued by Tobe Deutschmann Corp. Free.

A2—New parts catalog of Wholesale Radio Service Company, Inc. Free.

A3—Data on a multi-testing instrument, published by Supreme Instruments Corp. Free.

A4—Condenser catalog prepared by Cornell-Dubilier Corp. Free.

A5—Instructive and interesting information on condensers published by the Sprague Products Company. Free.

S1—Analyzer booklet, published by Supreme Instruments Corp. Free.

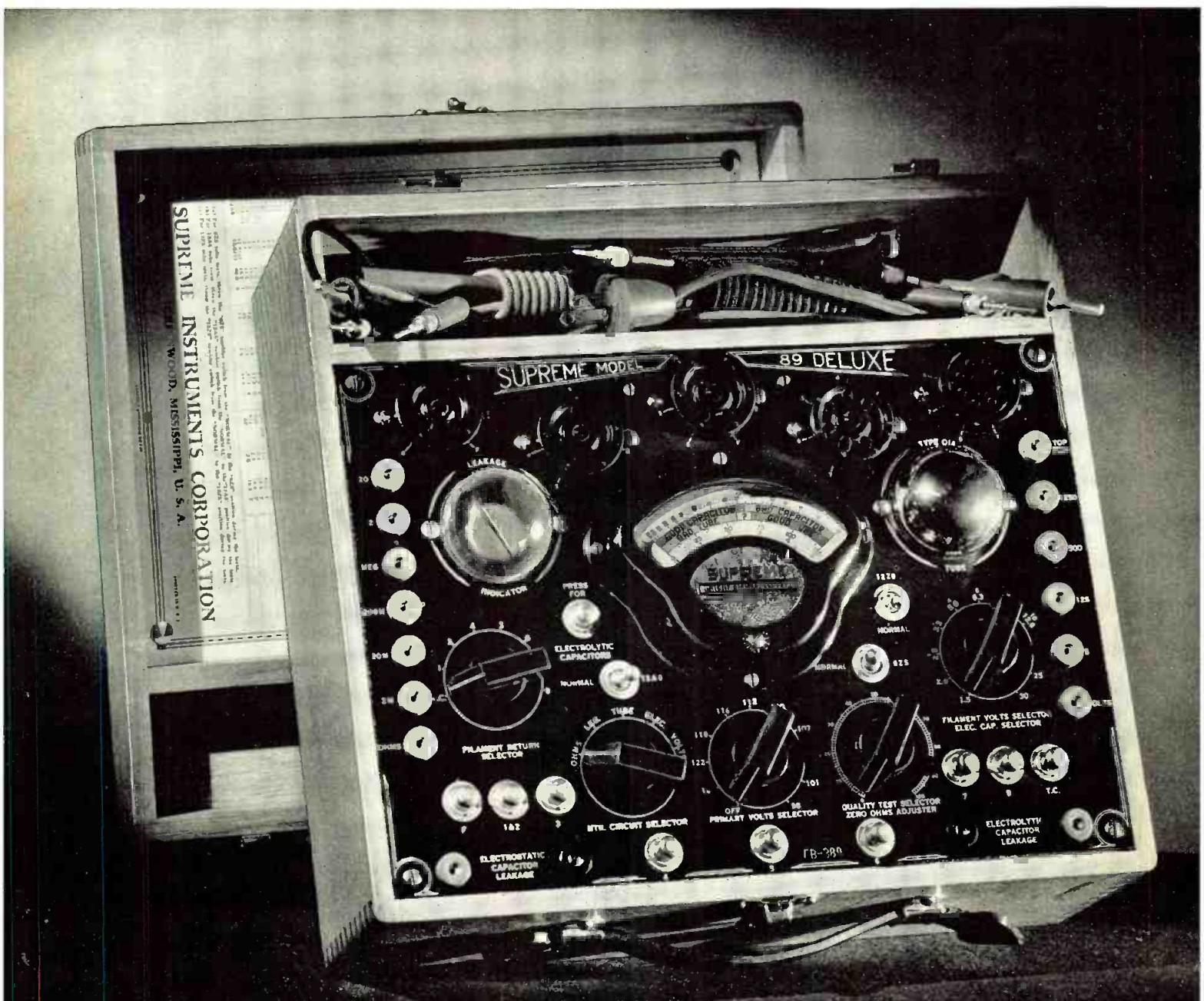
S2—Transformer bulletins, issued by Kenyon Transformer Co. Free.

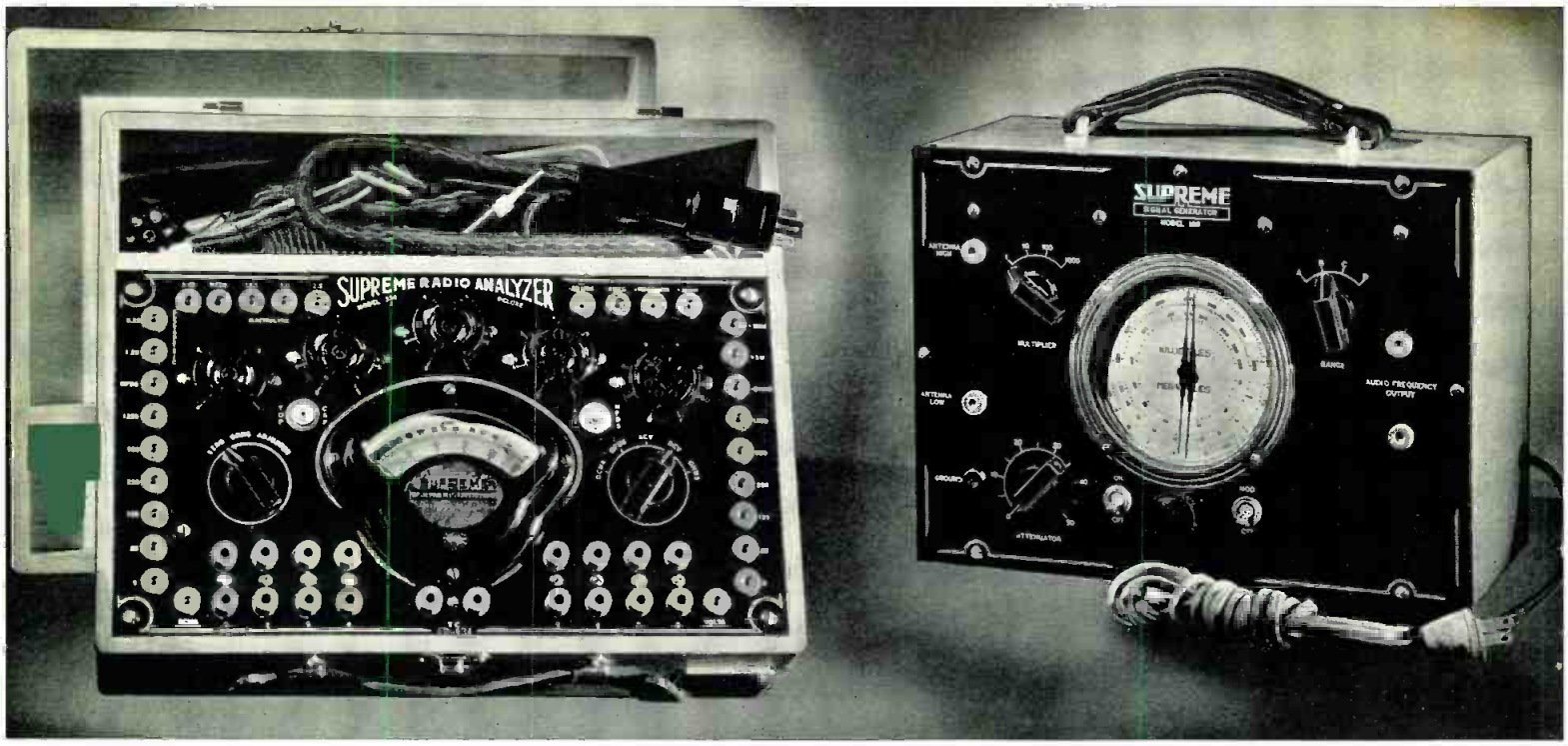
S3—Bulletin of sound equipment, issued by Sound Systems, Inc. Free.

S4—Amateur equipment catalog of Wholesale Radio Service Co., Inc. Free.

Let the Camera, not words, tell the story. It shows the versatility, rapidity, and finality of tests inherent in 1936 Supreme Instruments. Your jobber's demonstration converts it all into amazing reality. The free technical manuals, completely diagrammed, give the inside story of how minutely and accurately these instruments are engineered to the practical needs of everyday servicing. "The instruments we need to be modernly equipped," say the forward-looking servicemen. "The equipment the real radioman will want," agree leading jobbers as they decide on the lines to get behind in this season of better buying power. Truly "Supreme by Comparison." More reason why Supreme Instruments are FIRST choice by a heavy majority, throughout the radio service world.

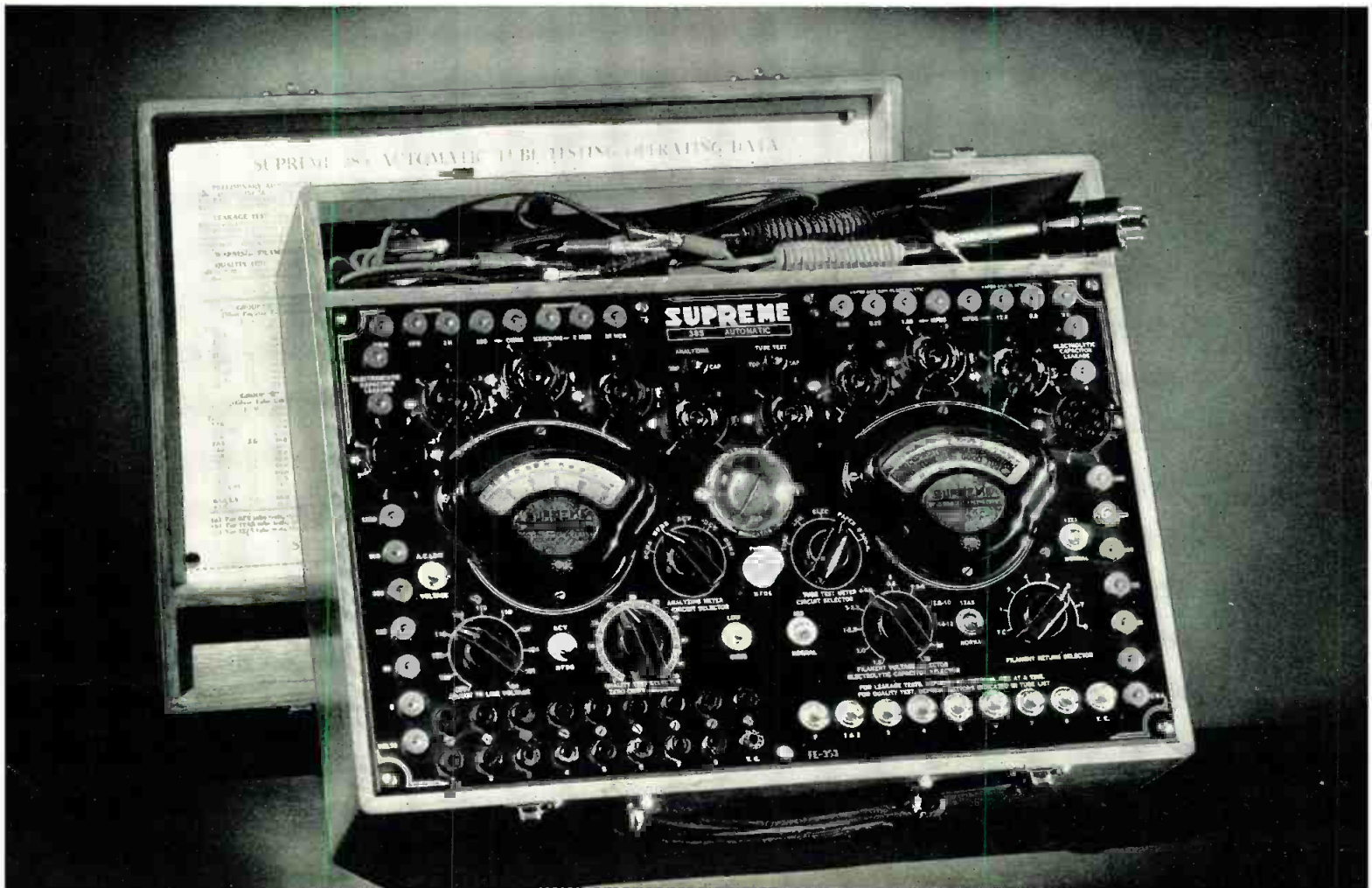
The panel of the Supreme 89-DeLuxe Tube Tester below gives you proof of the 7 in 1 instrument facilities of this master service tool. Single selector switch converts instrument to (1) English Reading tube tester, (2) Neon tube leakage tester, (3) Neon Electrostatic condenser tester, (4) English Reading Electrolytic condenser analyzer, (5) Multi-range voltmeter, (6) Multi-range ohmmeter, and (7) a double range megohmmeter. Resistance ranges to 20 megohms are with self-contained power supply. This is the instrument that will put a lot of extra profits in servicemen's pockets this season. Price, $45.95. The Supreme 89 Standard Tube Tester is priced, $34.95.





Directly above is the Supreme 339 DeLuxe Analyzer. DeLuxe in construction and recognized as the finest testing equipment in its class selling under $75.00. It is a super-analyzer with direct resistance ranges up to 20 megs and self-contained power supply. Virtually spreads entire circuit of set on the panel like a diagram. Its outstanding features can only be fully appreciated by a demonstration at your jobber's and the free technical manual, obtainable from Supreme Instruments Corp., Greenwood, Miss. Price, $39.95. The Supreme 339 Standard Analyzer is priced $29.95. Supreme 189 Signal Generator is distinctive in handsome finish and serviceability. 3 tubes . . . 4 controls. Electron coupled circuit. Excellent dynamic stability. Completely shielded and supply line adequately filtered. Jobber's demonstration and diagrammatic manual from Supreme, Greenwood, tells its whole outstanding story. Price $36.95.

In the Supreme 385 Automatic below the modern serviceman finds his ideal of combined features. Truly a portable laboratory. Features Supreme's exclusive "Uni-Construction." Combines features of 339 De Luxe Analyzer and 89 DeLuxe Tube Tester. A perfect setup. Amazing in its simplicity of operation. So quick, so positive—automatic results. Contains 3 ohmmeters, free reference point analyzer, English reading tube tester, English reading condenser tester, Neon tube leakage tester. Measures only $4\frac{7}{8}$"x$13\frac{3}{4}$"x$16\frac{3}{4}$". Like all Supreme instruments, in beautiful polished hardwood case. Unquestionably radio's finest and most complete servicing instrument. Only a jobber's demonstration can develop its many ingenuities. Free technical, illustrated manual obtainable from Supreme Instruments Corp., Greenwood, Miss. Price, $77.95.



Television Progress

(*Continued from page 211*)

uses 180-line images. As a result, perfect detail will be visible to an observer stationed about five feet from the cathode-ray set, or about ten feet from the Peck set. Incidentally it is claimed that approximately twice as many lines-per-picture are necessary with the cathode-ray system in order to give detail equal to the Peck picture. (This is because the scanning spot remains uniform in size, under the disk system, while it decreases in size when its brilliance is modulated downward in the cathode ray tube. The resulting black spots must be filled in by utilising additional lines.)

SIZE OF PICTURE. Cathode-ray receivers thus far demonstrated have produced pictures about three inches square, though pictures up to nine inches square are claimed. While the Peck television receiver normally shows a 14-inch picture on its self-contained screen, pictures up to 3 ft by 4 ft square have been demonstrated when the screen is removed. The 14-inch Peck picture and the cathode-ray picture are of approximately equal brilliance; bright enough to be shown in a lighted room. The 4-foot picture is somewhat duller.

NUMBER OF IMAGES PER SECOND. Both systems have shown 24 frames-per-second, the same as standard motion-picture film. It is said that one cathode-ray system is experimenting with 48 frames, but the advantage of this increased number is not clear to the writer.

ORIGINAL COST OF RECEIVER. As neither the disk nor the cathode-ray standard receivers are as yet on the market, it is impossible to give other than estimated prices. However, William Hoyt Peck, president of the Peck Television Corporation, definitely states that manufacturers building sets which use his system will be able to retail receivers at prices ranging from $150 to $250. Other authorities predict that cathode-ray receivers will list at prices ranging from $250 to $750. In quoting these figures, it has been assumed that both types of sets will include, in addition to television and its associated sound channel, a complete multi-wave broadcast receiver. The prices are estimated as of sets complete with tubes.

PROGRAM MATERIAL. No plans have as yet been made public by any television company relative to the actual material which will be broadcast. It is, however, logical to believe that motion-picture producers will enter into television agreements; that outstanding radio programs will be televised; and that portable transmitters will be used to broadcast public meetings, sports events and similar occurrences of public interest. Obviously, this material will be equally available for owners of either type apparatus.

ADAPTABILITY. Should both systems be in general use, the problem of building receivers to receive both standards of images is encountered. Neither the cathode-ray nor the disk system will receive signals intended for reception by the other system unless certain adjustments are made. In the cathode-ray system it will probably be necessary to have the scanning oscillator re-calibrated in order to receive disk-type pictures. With the disk system a quick-demountable scanning wheel will be provided, to be snapped onto the motor shaft in order to receive the pictures intended for cathode-ray reception.

"NETWORK" POSSIBILITIES. The problem of limited service area has been a major worry of all television concerns until very recently. According to proponents of the cathode-ray system, the maximum distance which can be traversed dependably, on the short wave which television will use, is about twenty miles. Yet the Peck television station, VE9AK, in Montreal, Canada, has for the past several months been sending strong signals over a distance of 80 miles, with only a 300-watt antenna input.

A special high-frequency "coaxial" cable, suited to carrying television signals, will soon be under construction to link New York and Philadelphia. Its cost may prove prohibitive as far as its extension to a nationwide system, similar to radio's telephone networks, is concerned.

COLOR OF PICTURE. Cathode-ray tubes normally provide a picture which is in tones of apple green, though it is said a black and white tube is in the process of development. In Peck's disk system, the picture is black and white, the same as the customary motion picture, which it closely resembles.

As far as program material is concerned, there will doubtless be a scramble for talent, with frantic bidding between the broadcasters in an effort to get a corner on the "big name" stars. However, as even now there are more than enough stars to go around, a fairly equitable division should result.

With two types of systems, each of which has certain advantages and each of which is capable of producing television images which should satisfy the most exacting critics, it would certainly seem that transmitters designed to serve cathode-ray receivers as well as those sending signals for the mechanical system should be given a place in the television spectrum. Even if there is some inconvenience or even chaos in using different systems with different details of transmission, they should be given a trial—and soon a definite "start" in television must be made.

In the earliest days of sound broadcasting, there was chaos too. (Two stations only a few miles apart might operate on the same wave and at the same hours, so that the reception of neither was possible. Then the United States Government stepped in with appropriate legislation. The Federal Radio Commission (now the Federal Communications Commission) was established, and measures were taken to insure that all stations be operated in the "public interest, convenience and necessity."

At first there may be a double standard of television, but it is confidently predicted that the Federal Communications Commission will allot the channels equitably without showing any groups undue favor. Eventually, perhaps, a standard number of pictures-per-second and of lines-per-picture will be mandatory; if so, this will probably be in the nature of a compromise between what the various systems are using at the present time.

Impedance Match

(*Continued from page 213*)

shift," and alters the value of the reflection loss. Figure 4 is a set of curves showing the reflection loss for various phase relations between Z_S and Z_L.

The phase difference between Z_S and Z_L is designated by ϕ. Note that the curve for $\phi = 0$ is the same as the curve in Figure 3. You will also note that the reflection loss has a negative sign for other values of ϕ in the region where $\frac{Z_S}{Z_L} = 1$.

This means that under certain conditions, a phase difference between Z_S and Z_L produces an actual reflection *gain*, instead of a loss. In all cases the reflection loss is minimum in the region where $Z_S = Z_L$.

Now what does this mean in terms of practical results? In the first place, if either Z_S or Z_L varies with frequency, the value of $\frac{Z_S}{Z_L}$ will change with frequency. This means that the junction will have a better match for some frequencies than others. This favors some tones and discriminates against others. The accentuation will come in the region where the match is the best or where Z_S most nearly equals Z_L. A practical example of such a case is an attempt to operate a 15 ohm voice coil from the secondary of an output transformer, designed to work into 500 ohms. The resultant signal is attenuated, of course, over the entire range; but the higher frequencies are attenuated less, because the impedance of the coil increases enough in that region to produce a somewhat better match.

Contrary to popular supposition, there is no universal rule as to which end of the frequency spectrum will suffer more, when $Z_S > Z_L$, or when $Z_S < Z_L$. This depends upon the phase relations between Z_S and Z_L as well as upon their absolute magnitudes. If, for example, Z_S is primarily resistive and Z_L is an inductive reactance, and $Z_S > Z_L$; the high frequencies will be favored, because the magnitude of Z_L increases with frequency. Conversely, if Z_L is a capacitative reactance, the reverse will be true.

The desirable condition is to have impedances which do not vary appreciably over the frequency range concerned. If they do vary, Z_S and Z_L should vary by similar amounts in the same direction. Impedance adjustment between a source and load of unequal impedance, can be most easily accomplished by means of properly designed transformers. In its simplest form a transformer provides a ratio between two lines of different impedances. The windings themselves do not possess an inherent impedance that is significant as far as application is concerned. The impedance looking into one coil of a transformer is determined by the load across the terminals of the other coil.

QRD? QRD? QRD?

CONDUCTED BY GY

THIS columnist forecast some time ago that the Wagner Labor Bill would pass and with it out of the Senate by such an overwhelming vote plus an assured Presidential approval would almost force all radio operators and technicians into the American Radio Telegraphists Association.

THE Wagner bill briefly provides that the union or organization holding a majority of members in an industry will dominate the rest, or those who have not already enrolled under the major organization's banner. Thus if the ARTA has 70 percent of the field, or even 51 percent, it will control the whole from a bargaining point of view. The NBC and CBS company unions will be outlawed in that provision prohibiting an employer from contributing to and/or controlling the union. From a radio op's viewpoint it is the finest thing that could have happened to him, from a lawyer's angle it probably would not be "constitutional." Until that is proven it will give a temporary big stick with which to work on the Broadcast and Airways people which is not possessed at present.

The photo reproduced in our heading this month shows a conference of division engineers of the N.B.C. in New York, recently. Left to right, seated, they are: A. H. Saxton of San Francisco, O. B. Hanson, NBC Chief Engineer, W. J. Purcell of Schenectady and H. C. Luttgens of Chicago. Standing are S. E. Leonard of Cleveland, George O. Milne of New York, George McElrath, NBC Operating Engineer of New York, R. H. Owen of Denver, and A. E. Johnson of Washington, D. C.

Business seems to be booming in the airlines. Seems to be sort of an overnight change. We wonder why . . . or does it matter? There has been great difficulty in getting good men and by *good* we mean *clear enunciation*, sending and copying about 40 WPM and a perfect coordination with a little knowledge of meteorology and aircraft thrown in for good measure. Note, me hearties, we sed good, not average! Twenty-five men were tested for one job and only one qualified. In another slightly below average land point-to-point job about one out of fifteen could stand the gaff. So what is the answer? *You gotta be good to get there as competition is keen today!*

Trend of the Times include Joe Dockendorf who received honor degree number two from ITK for commercial operating in the Porto Rican hurricane of 1928. . . . Bostrom, the ex jr Collegian, ex "Y" and W6HMW, is showing Uncle Sam's Navy how they do it in the Prune State. Stick to it, old sock, and some day you'll be a General or at least a Captain. . . . Earl E. Martin growls from Des Moines that whilst taking his exams. for Radiotelefone 1st, the chap sitting beside him worked on the same set of questions, yet when they both got their tickets the other chap's was good for three years and his'n for only one and a half, which is the same date of expiration as his Commercial diploma . . . now why, sez we, also? . . . Lotsa questions this time. . . .

ARTA take notice . . . "I am enclosing a carbon copy of a letter which came into my possession the other day. Although I am not a member of any Union, I do think that a man who has the foresight to get ahead in the world is entitled to a least something to live on. As you can see from the letter this Broadcast Station is offering a wage of $20. per week with 40 hours per week of work. Then they have the nerve to ask for qualifications on top of that! And they tell the men that they have a good chance for advancement. I happen to know that the so-called Chief Engineer, A.C. is drawing the huge sum of less than $30. per week. I am merely passing this info. on to you in the hopes that something might be done to better conditions somehow. Anything that I can do to help will be done with pleasure." '. . . We are contemplating increasing our period of broadcast, and it is necessary that we increase our operating force to take care of these extra hours. We will require that the next operator employed here be able to announce, operate the transmitter and copy press transmissions at the rate of 35 words per minute. . . .'

Well, the ARTA has issued, through its

bulletin, a notification to all its members that it is contemplating the unification of itself with the A. F. of L. This suggestion was made by Ye Ed yars ago and would have saved the organization and its members much of the grief which it has gone through getting to where it is today. Because of its strength and wisdom in organization and general management of associations and direction for wage bargaining this get-together will be of great benefit to the ARTA and its members. There will be those men who believe that the op's union will be smothered in the maw of the Mother and its individuality submerged by higher forces, but this writer believes that the association will not only keep its identity, but will be better able to cope with situations which arise and furthermore will be able to receive cooperation and coordinate more easily with affiliated unions under the banner of the A. F. of L. For this latter reason, if for no other, is it advisable to make this move and altho much has been said about the methods employed by the A. F. of L. regarding the consideration shown towards employers and employees. they know that labor is their bread and butter, that it made them and can likewise break them. Of primary importance we all know that it takes a big arm and plenty of heft behind it to push something over and the A. F. of L. has that. May the handshake be sincere and firm, sez us'n.

The French Liner Normandie seems to have stepped out and broken more than one record and the other one is the number of messages handled on a single trip. No exact figures could be obtained but the ops aboard all felt confident that they had surpassed all previous volume of communications. She carries a staff of six radio operators. Can any one answer the question as to how many ops the same size wagon would carry aboard under the U. S. flag?

ARTA sentiment seems to be growing out in them western states and all meetings are fairly well filled up. Two Los Angeles stations came around to the association's way of looking at hours and, brothers, in Southern Calif. that is something to write home to the folks about. . . . The Airways are all set for organization and ARTA could step right into the breach and do the job with ease. The removal of V. G. Mathison seems to have acted like a tonic and sentiment has improved one hundred percentum. There are still a few minor would-be leaders in the organization's California section and when they are removed it is believed that the broadcast field will boom thereabouts. Something for the boys in the main office to check up on. . . .

Well, DA is still with Dept. Water and Power and the only good opr on the circuit with JD and AX gone to bigger and better posts of duty. As long as Las Vegas is only 20 miles away he can avoid the inevitable result (cutting out paper dolls). Our sympathies are with you DA. AX is still looking forward to that valet he is gonna hire someday. . . . Your editor has seen the time when the President of a SS company begged an op to go to work, sent him a box of cigars, took him to the ship in his private car and would do anything except change the engines in the old tub, but we ain't never seen an op with a valet. We wonder what section of NRA that comes under? . . . The Board of Education out in the hills tells us that there are quite a few operators who would like to teach night school, etc. but they fail to last very long and the reason is insufficient preparation . . . or is that a

(*Turn to page* 247)

SHORT-WAVE PAGE

DURING the summer months, the average short wave listener's attention was concentrated on the stations operating on wavelengths below 49 meters. There was almost "panicky" rivalry among the fans to see how many foreign amateurs could be logged.

THE 20-meter band, this summer, became the most interesting of all the allotted amateur wavelengths. Staying "open" until almost dawn, it was possible to tune in many foreign countries that might otherwise have been lost to us. Not being a soothsayer we cannot foretell what reception will be during the fall and winter, but as the world of short-wave signals seems to have turned upside down, we expect this year to be the finest of all the DX years.

Stations that we never dreamed of hearing will undoubtedly be logged and verified. Of course, many of the distant catches have increased their power and have adjusted operating schedules in order that listeners living in other lands will have opportunity to tune in their programs, but just from the favorable conditions that we have experienced in the last few months, we say the fall of 1935 and the winter of 1936 should be the finest in regards to DX reception that we have ever experienced.

Not a small amount of success will be due to the fact that the short-wave enthusiast has "grown up" to the fact that the oft-mentioned "squeak box" or receiver made of left-over parts will not bring him the world. The American listeners who are having any real success with the short waves and using one-tube receivers are few and far between. Our British cousins *do* go in for "one valve" converters and receivers and have extraordinary success with them.

Here is our reception report covering a period of several weeks. VPD, 13.07 meg., Suva, Fiji, Islands, has had a signal varying in degrees of strength when tuned for. This station is heard here in the Eastern part of the United States, from about 12:35 a.m. to 1:37 a.m. They have a supposedly regular schedule of 12:30 to 1:30 a.m., E.S.T., but are not adhering to it.

Have you joined the PCJ Club? According to the announcer, all a listener has to do in order to be classed as an active member of this organization is to send in at least one report a month on the Netherlands stations transmission. PCJ, (15.22 meg.) has been logged repeatedly at 3:00 a.m., E. S. T., signing off at 5:00 a.m.

OAX4D (5.78 meg.) Lima, Peru, was one of the strongest and clearest of the South American stations when heard on Wednesday evenings, signing off at approximately 11:30 p.m. They request all reports be sent to "All American Cables, Inc., Casilla 2226, Lima Peru."

CT1AA, Lisbon, Portugal, was heard testing on 11.84 meg., signing off at 6 p.m. E.S.T.

We suggest that all fans be on the lookout for the transmissions from the Schooner "Effie Morrissey," W1OXFP, 14.2 meg., seems to be the favored call.

JVH., 14.6 meg., Tokyo, Japan, has been endeavoring to "put across" a special broadcast to the United States between 4 and 5 p.m. These have been hopeless failures but this high Japanese frequency has reached us with fine volume whenever they were contacting Berlin or Rugby during the early morning hours.

I2RO, 9.64 meg., Rome, Italy, has been coming across with superfine volume and clarity. This station has stepped up into the ranks of the "foreign locals."

EAQ, 9.84 meg., Madrid, Spain, was very poor for several months, but of late has regained the lost ground and has been transmitting excellent programs for the benefit of short wave listeners.

All of the Daventry transmissions have been very good. GSG, 17.79 meg., in the early mornings, with GSF, 15.14 meg., heard during the early evening until 5:45 p.m. The latter transmissions rate an R9.

DJB, 15.2 meg., Germany, with a program radiated to South Africa, has been logged at 3:00 a.m.

France on 11.9 meg., transmitting an hour program from 3 to 4 a.m., E.S.T., has had a strong signal every morning.

The Aussies have been good at times but reception of the VK's has been rather erratic. VK2ME, coming on the air with the laughing notes of the kook-a-burra bird, gradually builds up in signal strength so that it rates an R7-8 within an hour.

Twirling the dials of a morning should bring the East Coast listener the following: The "Holland Twins," PHI (17.78 meg.) and PCJ (15.22 meg.) come on the air at 7:30 a.m. with Mr. Edward Startz as master of ceremonies. PHI is generally far superior in every way to PCJ; France, (15.24 meg.); GSH, (21.47 meg.); LSL, (21.17 meg.); Buenos Aires; W8XK, (15.21 meg.), Pittsburgh; W1XK, (9.57 meg.), Boston; WOO, (12.84 meg.), Lawrenceville, N. J., calling ships.

(*Turn to next page*)

The DX Corner (Short Waves)

(*Continued from page 228*)

man, McMenamy, Schumacher, Lower, Alan Smith, Sholin, J. H. Miller, Gallagher, Fabius, J. E. Moore).

OPM, Leopoldsville, Belgian Congo, Africa, 29.5 meters, 10135 kc., broadcasts regularly from 2 p.m. to 4:30 p.m., E.S.T. This station either broadcasts or works ORK or ORP on c.w. at this time, with announcements in Dutch and French. The music is usually from a symphony orchestra (J. H. Miller, Schradieck).

VQ7LO, Nairobi, Kenya, Africa, has changed wavelength to 49.02 meters, 6120 kc. They are on the air on Sundays 11 a.m. to 2 p.m., E.S.T. and on Mondays to Fridays from 5:45 to 6:15 a.m. and from 8:30 am. to 2:30 p.m., E.S.T. On Tuesdays and Thursdays they are on the air from 8:30 to 9:30 a.m. and on Saturdays from 10:30 a.m. to 3:30 p.m., E.S.T. (Styles).

Southern Rhodesia broadcasts—on short-waves. The Post Office broadcasts here take place on the short-waves from Bulawayo and from Salisbury, simultaneously, on Tuesdays from 8:50 to 10:15 p.m. and Fridays from 5:15 to 7 p.m. (Presumably this is South African time). The Bulawayo wavelength is 48.8 meters, 6147 kc., and the Salisbury wavelength is 50 meters. 6000 kc. No station calls are mentioned. (Kruger).

A station on 6000 kc., woman and man announcers, French language spoken, closes down at 11 a.m., E.S.T., with the Marseillaise and "Bon Soir". I wonder if it could be FIQA? Who has heard it and who can identify it accurately? (Terrance Adams)

VK2ME, Sydney, Australia, now on the air 12:01 to 3 a.m., E.S.T., (Amlie, Cummins, Lawton, J. E. Moore, Schierman). Incidentally L. P. O. Amlie has just completed 185 reports to the Australian Broadcasting Commission re. the 3 Australian station FB OM Editor.

VIZ3, Australia, 11500 kc., reported heard nearly every night (Ross).

W1OXFP, the "Effie M. Morrisey," contacts amateurs, irregularly, afternoons on 14,203 kc. (S. J. Emerson)

KKQ, Bolinas, California, 11970 or 11950 kc., relays NBC to Honolulu 8 to 10:30 p.m., E.S.T. (Bews, Peters, Sterneman, Schumacher).

KWE, reported heard on 15,430 kc., relaying NBC programs to Japan. (Bews).

KFI, Los Angeles, California, has a program with DX Tips Saturdays from 1 to 1:15 a.m., E.S.T. (Sholin).

W4XB, Miami, Florida, reported heard back on the air on 6040 kc., daily from 5:30 to 12 Midnight, E.S.T.

WIXAL, Boston, Mass., 15,250 kc., reported heard Sundays, irregularly, from 10 to 11 a.m., E.S.T. (Nemeth and Chambers).

WIXAL, Boston, Mass., 11790 kc., reported heard Sundays, 3 to 6 pm., E.S.T. (Chambers).

KGGC, San Francisco, Calif., 1420 kc., 100 watts, has a special short-wave DX Tip program, sponsored by Philco, every Saturday night, from 10 to 10:15 p.m., P.S.T. (Sholin).

KJBS, San Francisco, Calif., 1070 kc., 500 watts, has a program of DX Tips on Mondays, Wednesdays and Fridays from 9:15 to 9:25 p.m., P.S.T. (Sholin).

W3XL, Bound Brook, New Jersey, heard 64 25 kc., from 6 to 12 p.m., E.S.T., relaying NBC programs. (Forbes).

VE3JZ, Oshawa, (Ottawa,) Ontario, Canada, reported heard on about 14.2 megacycles. (Alan Smith).

XDA, Mexico City, Mexico, 3040 kc., 5 to 8 a.m., E.S.T. (Pilgrim).

HIJ, Santo Domingo, D. R., reported heard on 29 meters. (Ross).

HIZ, now reported, with a new transmitter, on 49.5 meters daily except Sunday 5 to 6 p.m., E.S.T. and with a DX program on Saturday 12 midnight to 2 a.m., E.S.T. (Horwath). (Can anyone check this report as to frequency, change, etc.? There seems to be some doubt about this in checking other observer's reports on this station—Editor).

VP5MK, Kingston, Jamaica, 7200 kc., 30 watts, reported heard 5 pm., E.S.T., with a musical program irregularly. (Forbes).

VP3MR, 42.5 meters, reported heard, Wednesdays, 9 to 10 p.m., E.S.T. (Kalmbach).

TIRCC, San Jose, de Costa Rica. This station's true frequency is 6550 kc., calibrated to be 47.5+ meters. It is operated by our old friend Cespedes Marin, owner and operator of the famous little NRH. He is reported heard, however, on a frequency of 13100 kc., which is an harmonic. Time on the air is Sunday 12:45 p.m. to 2:30 p.m., 6 p.m. to 7:06 p.m. and 8 to 9 p.m., E.S.T. Also heard on Thursdays from 8 to 10 p.m. (A. E. Emerson, Libbey, Kalmbach, Kentzel, Lightbourne, Forbes).

COCD, Havana, Cuba, 48.92 meters; 6130 kc., reported on the air 10 a.m. to 1 p.m. and 6 p.m. to midnight.

(*Turn to page 246*)

Capt. Hall's Page

(*Continued from page 244*)

We have discussed the stations that ARE heard—now we are going into detail about the stations that ARE NOT being heard. The fact that many short wave listeners desire to log an "African" in order to say they have heard all the continents immediately brings to mind the fact that the Rabat short wave broadcasting station in Morocco was formerly a Sunday "special." But where they have disappeared to—no one knows. Listeners living in the vicinity of New York have not heard this station's transmissions in many a day.

YDA, 6.12 meg., Bandoeng, Java, was as regular as "clock-work" all last fall and winter but with the coming of the warm weather—YDA left us. The writer has not heard them with any degree of volume since spring.

HAT-4, Budapest, came on the air with much fan-fare, plus a regular schedule. What happened? They disappeared for several weeks and then one Sunday we tuned in with a fine program and a strong signal. Tuning for them the very next Sunday—brought—000 to the log. Their 9.12 meg. frequency was always superior to their long since abandoned 15.37 meg. one.

The Vatican—here to-day and gone tomorrow. Every day for months HVJ, 15.11 meg., aired their views on religion. We all settled down to the fact that at last HVJ was on a regular schedule. It, too, has almost disappeared from the short-wave fans' horizon.

(Alan Smith, A. E. Emerson, Hammersley, Gallagher, Hughes, Morse, Gavin, Marshall, V. D. S. Sholin, Young).

TGX, Guatemala City, Guatemala, reported heard on 50.5 meters, 8 to 10 a.m. except Sunday 8 to 12 pm., E.S.T. (Ortiz). (Is this the broadcast band call? Editor).

HP5H, Colon, Panama, reported heard on 6070 kc., with 300 watts power. (Young).

HC2JSB, Guayaquil, Equador, 38.19 meters, and 7854 kc., new wavelength, reported on the air 9 a.m. to 2 p.m., E.S.T. and 7 p.m. to 11 p.m. E.S.T. (Chambers).

ZP1O, Asuncion, Paraguay, 13.4 meters, 8220 kc., reported heard at 12:30 p.m., E.S.T. (Young).

CEC, Santiago, Chile, 28.12 meters, 10,670 kc., 2 kw., reported irregularly

(*Turn to page* 250)

V. T. Voltmeter

(*Continued from page* 217)

calibrated on 60 cycles. C1 is set for maximum capacitance, the shielded leads from C2 are connected to a set input, with a dummy antenna minus the capacitor in series, and sufficient voltage applied to give a readable deflection on the sensitive tube voltmeter, which is connected across C2. This reading is compared with the reading secured of E1 and the ratio calculated, which will probably be 100 to 1 or more, depending on the construction of C1.

Now let us set up the apparatus as shown in Figure 4, re-connecting the attenuator as shown in Figure 2. The receiver used should be as sensitive as possible and the a.v.c. system, if any, rendered inoperative. Remove the volume control knob and anchor in place a blank cardboard dial. Substitute a pointed type knob.

Now apply sufficient test signal to give say 25 millivolts reading on the tube voltmeter. With the attenuator set for minimum attenuation, the previously determined ratio will indicate the voltage applied to the receiver input. If this ratio is 100 to 1, the applied voltage is 250 microvolts. Adjust the volume control until the output meter shows any convenient voltage—say, 1 volt. Mark the pointer position on the blank dial.

Next, increase the test signal to 50 millivolts. Under the conditions stated above, the input signal to the set is now 500 millivolts. Leaving the volume control set as before, adjust the attenuator condenser C3 until 1 volt output is again shown on the output meter, retuning the receiver if necessary. The input voltage is therefore again 250 microvolts but the attenuation ratio is now 200 to 1. The dial indication giving this value of attenuation is noted and the test signal again reduced to 25 millivolts. With the 200 to 1 attenuation ratio established, the input voltage to the set is now 125 microvolts. The volume control on the set is now adjusted to give 1 volt output with 125 microvolts input and the cardboard dial again marked. Now increase the test voltage to 50 millivolts as was done before and readjust the attenuator dial until 1 volt output is again secured. The attenuation ratio now established is 400 to 1. These operations are repeated step by step until the limit of attenuation or set sensitivity is reached. A curve is then constructed giving the attenuation ratio at each point on the dial. From this data, the dial may be directly calibrated in microvolts for a given input.

The test oscillator attenuator may likewise be directly calibrated by connecting directly to the set input and noting the setting of the attenuator required to give the input voltages indicated by the radio volume control calibration.

While the attenuation ratio is independent of frequency, extreme care is necessary in higher frequency measurements if proper action is to be secured. This subject will be covered in detail in the next article. All calibrations should be repeatedly checked to reduce observational error to a minimum.

Some test oscillators will not deliver sufficient output for use with this system. In such cases, the coupling of the test oscillator attenuator to the oscillator output should be increased if the design permits.

Parts List

C1—Special reconstructed Cardwell 150 mmfd. variable condenser (see text)
C2—Aerovox pigtail type mica condenser, .00015 mfd.
C3—Aerovox bakelite case by-pass condenser, .5 mfd., 200 v.
C4—Aerovox pigtail type mica condenser, .001 mfd.
C5, C6—Aerovox dual electrolytic condenser 8-8 mfd., type GG5, 500 v.
C7—Aerovox electrolytic condenser, 8 mfd., type GM, 500 v.
R1, R2—Lynch fixed resistors, 1 megohm, 1-watt
R3, R4—Ward Leonard wire-wound resistors, 250,000 ohms, 1 watt
R5—Electrad potentiometer, type 278, 5000 ohms
R6—Ward Leonard voltage divider, 10,000 ohms, 50 watts
R7—Lynch fixed resistor, 10,000 ohms, 1 watt
R8—General Radio potentiometer, 400 ohms, type 214A
R9—Lynch fixed resistor, 19,600 ohms (low 20,000 ohm resistor will serve), 1 watt
R10—Electrad wire-wound volume control, 100 ohms, type 272 W
R11—Electrad volume control, 50,000 ohms, type 205
R12—Lynch fixed resistor, 150,000 ohms, 1 watt
R13—Aerovox wire-wound resistor, 15,000 ohms, 20 watt
S1, S3, S4—Toggle switches, single-pole-single-throw
S2—Yaxley d.p.s.t. jack switch
M1—Weston model 301, 0-1 ma. milliammeter, bakelite case
M2—Weston model 476, 0-5 volts, a.c. voltmeter, bakelite case
T1—Kenyon power transformer, special type, with extra 5-volt winding
Ch1, Ch2—Kenyon, 30 henry choke, type BC 350
1 General Radio, type 661-B, unit panel with accessories
1 General Radio, type 661-L, end- and base-plate assembly
1 General Radio plain dial, type 710-A
1 General Radio knob, type 637-J
1 General Radio dial plate, type 318-A
2 Binding post strips, 2-gang
2 7-prong wafer sockets
2 6-prong wafer sockets
1 4-prong wafer socket
2 6B7 tubes
2 6C6 tubes
1 80 tube

* Harnett and Case, Proceedings Inst. of Radio Eng., June, 1935.

The "Ham" Shack

(*Continued from page* 207)

rents between 50 and 60 milliamperes. These tubes also make excellent oscillators. Another advantage is that no neutralization is required. A typical circuit which shows all of the possible uses of these tubes is shown.

Another new tube in the pentode category which has just made an appearance at this writing is the RK28. It is an overgrown RK20 and offers the amateur a means of high output with suppressor-grid modulation. The tube in this type service is capable of delivering a 60-watt carrier. For c.w. work it will deliver an output of about 200 watts under normal operating conditions, and higher outputs are not beyond the realm of possibility. Its ratings are as follows:

Filament voltage		10 volts
Filament current		5 amperes
D.C. plate voltage		2,000 volts max.
D.C. screen voltage		400 volts max.
D.C. suppressor voltage	plus	45 volts max.
Plate dissipation		100 watts
Control grid voltage		100 volts max.
Plate current for c.w.		140 ma.
Plate current for suppressor mod.		80 ma.
Suppressor voltage for sup. mod.	minus	50 volts
Screen current for c.w.		60 ma.
Screen current for sup. mod.		85 ma.
Normal control grid current		10 to 11 ma.
Necessary R.F. driving power		1.8 to 2 watts
Audio power necessary for modulate		.4 watt

In tubes of the pentode type it is possible to obtain slightly higher outputs under modulation if both the suppressor and screen are modulated. For instance, with the RK28, 5 watts or so more carrier power is obtainable. However, modulating both elements requires an additional amount of audio power. In this case from 7 to 8 watts are necessary to modulate both elements. In the case of the RK20 the difference is slight. Three-tenths of a watt will modulate the suppressor 100 percent, and 1 watt will modulate both elements.

R.C.A. has just announced a new pentode which is an overgrown version of the 802 and in many respects similar to the RK29. It is known as the 803. It offers excellent possibilities as a 125-watt r.f. pentode capable of giving outputs of

about 200 watts in c.w. service and more than 50 watts carrier when used in a suppressor-grid modulated 'phone. Few details on the tube are available at this writing, but it is known to have a plate voltage rating of 2000 volts at 80 milliamperes, a 10-volt filament at 3.25 amperes, a screen rating of 600 volts, and a 40-volt suppressor voltage. For Class C use or an oscillator, plate currents of 160 milliamperes (at maximum voltage) may be used.

Next we come to new tubes designed specifically for Class B r.f. and a.f. amplifiers. In this group there is the RK31, made by Raytheon, and the 838, made by R.C.A. These tubes are especially interesting for use in Class B modulating circuits because of their zero-bias characteristic. They are high-mu triodes, the former in the 50-watt plate-dissipation class and capable of delivering 140 watts of audio power (when two tubes are used in push-pull, which is necessary for Class B audio) and the latter in the 100-watt (203A) class, capable of delivering 260 watts per pair. Typical Class B operating characteristics of the RK31 and 838 follow:

	RK31	838
Filament voltage	7.5 volts	10 volts
Filament current	3 amperes	3.25 amperes
Plate dissipation	40 watts	100 watts
D.C. plate voltage	1,250 volts	1,250 volts
Grid voltage	0	0
Static plate current (per tube)	15 ma.	74 ma.
Peak plate current (per tube)	270 ma.	175 ma.
Average plate current (per tube)	80 ma.	160 ma.
Normal power output (two tubes)	140 watts	260 watts

The 838, in addition to be an ideal Class B audio tube, also has many desirable features for Class C use on all frequencies. Its grid-plate capacity is only 8 mmfd., its grid-filament capacity 6.5 mmfd. and plate-filament 5 mmfd. This makes it a good tube for ultra-high frequencies. Its manufacturers have found that it may be used at full rating on 28,000 kilocycles and will operate on frequencies as high as 90 megacycles with reduced input. For Class C service 90 volts of minus bias is required on the grid. With a driving power of about 6 watts, approximately 130 watts output may be obtained with normal input.

Among other transmitting tubes which have been introduced in the last year are makes of high-power, low-capacity triodes that are capable of high inputs at high frequencies. These are the HK354 Gemmerton, made by Heintz and Haufman, Ltd., of San Francisco, Calif., and the 50T and 150T Eimac tubes manufactured by Eitel, McCullough, Inc., of San Bruno, Calif. The Eimac 150T and HK354 are very much similar in static and operating ratings. With either of these tubes as much as one-half kilowatt input may be used. A pair of them will handle a kilowatt, the maximum allowed under amateur regulations. The ratings on these three tubes are as follows:

	H354	150T	50T
D.C. plate voltage	1,000-3,000	1,000-3,000	1,000-3,000
Maximum D.C. plate current	175	200	100
Filament voltage	5	5	5
Filament current (amperes)	7.5	10	6
Maximum plate dissipation	150 W.	150 W.	50 W.

By correlating this data, ideas for many new transmitter layouts will occur. They offer a countless number of combinations that afford a minimum number of tubes and consequently minimum number of tuning circuits and power supplies. For instance, by using a UV802 as a crystal oscillator with a 40-meter crystal, an RK20 as a muffer-doubler and a pair of 150T's or HK354's in a final amplifier, a 3-stage, 1-kilowatt, 20-meter 'phone transmitter may be had. It is admittedly more difficult to obtain 1-kilowatt on 20 meters than on the lower frequencies, yet this arrangement will provide sufficient excitation for modulation. This is only one of the many layouts that may occur.

Calls Heard

By Edwin Hoover, Delrey Hotel, 1819 East Fifty-fifth Street, Cleveland, Ohio, on 20 meter 'phone: W4ALG, W4AUP, VE4LA, W6CLL, W6DCQ, W5BDB, W5CEO, VP6YB, VE5HN, W6AM, W6AVU, W6BAY, W6BFP, W6BWE, W6CIN, W6CQG, W6DA, W6DEP, W6DJJ, W6DLI, W6DMN, W6DTX, W6EAN, W6EIP, W6EQJ, W6ERT, W6FCL, W6FFN, W6GOY, W6HLY, W6HOE, W6ISH, W6JYH, W6JZH, W6KM, W6LR, W6WP, W6ZH, W9CJJ, W9GHY, W9HQT, W9KGR, W9LNB, W9OMM, W9PIY, W9RTQ, W9SBJ, W9YL, W1CJV, CO2HY, CO2KC, CO2LL, CO2WZ, CO7HF, W3CZE, HI7G, G5ML, W3BIH, W4ABG, W4AGP, W4AGR, W4BDV, W4CJ, W4MM, W4PI, W8FJP, W4BYY, W4QZ, HH5PA, W7BCU, W7CFX, W7CHT, W9AIO, W9AR, W9BHM, W9CUH, W9DKU, W9DXP, W9FWJ, W9GET, W9LAI, W9LGT, W9LJP, W9LLX, W9PVH, W9DEG, W9HLG, W9JRY, W9KFA, W9MCD, W9PDI, W9BEZ, W9CET, W9CVN, W9DEF, W9DMF, W9FDO, W9GHI, W9OZK, W9PEP, W9PV, W5AMZ, W5AOO, W5AXU, W5BMM, W5BYJ, W5CYI, W5LA, W5ZS, VE4NI, W3AYU, W3DF, W3FEU, W1AF, W1AXA, W1CAV, W1CCZ, W1CRW, W1HX, W1MG, W1KK, W1UH, X1G, X1W, X2AH, W8EPC, W9GXE, W9AGO, W9ATP, W9BPK, W9DGM, W5DNV, W9AAN, W9AEQ, W9BJ, W9EL, W9FSO, W9GUB, W9HVJ, W9MZ, W9TEH, W9JNG, W9JSZ, W9LD, W9OLG, W9PJQ, W9RAS, W7CAL, W9AGS, W9ANZ, W9ATB, W9BBS, W9BCX, W9CPM, W9EYP, W1AVG, W2AER, W2AIE, W2BYM, W2CLS, W2CZO, W2CZP, W2DNG, W2DVU, W2DYR, W2EUI, W2FLO, W2GAM, W2GVN, W2MO, W3ACX, W3BBO, W3BPH, W3DCX, W3MD, W5ZA, W2ADJ, W2BCP, W2BYP, W2CCP, W2CLA, W2CRB, W2GYL, W2HFS, W2HHU, W2HS, W8CPC, W8GWZ, W4AH, W4AHH, W4BFB, W4BQZ, W4DCQ, W4HX, W4ZF, W9BPM, VE1DR, W8BGF, W8BNC, W8BRB, W8BUD, W8DI, W8DLD, W8EFW, W8FHE, W8FSS, W8HFE, W8HH, W8IMU, W8JAI, W8KC, W8KJE, W8LIR, W5AAQ, W5AEE, W5AFX, W5AHD, W5ALI, W5AMS, W5AXA, W5AYF, W5BAT, W5BDG, W5BEE, W5BDB, W5BOP, W5BVK, W5CCB, W5DQ, W5DUF, W5EFV, W5EPR, W5EVV, W5FJ, W5HJ, W5NF, W5PP, W5UN, VE3EZ, W7AO, HP1A, W3AIF, W3AXR, W3CTB, W3DLY, W3DMR, W3EOZ, K4SA, VE2BE, VE2BG, VE2CA, VE2EE, VE2FG, W1BBN, W1GPE, W4ABY, W4AZI, W4BFH, W4CRE, W4DCK, W4FK, W4KH, W4WT, W5AEB, W5AID, W5AOT, W5AVM, W5BEB, W5BEQ, W5BFS, W5BGT, W5BIN, W5BVH, W5CAE, W5CEL, W5CFP, W5CTC, W5CUA, W5CV, W5DCO, W5DCP, W5DDP, W5EBP, W5EBU, W5ECL, W5EUB, W5IT, W5OX, W5SF, W5SH, W5VU, W3CIJ, W7AIT, W7ALZ, W7BCI, W9EEL, W9FDI, W9RNX, W7ARK and W7CEO.

By Lewis F. Miller, 6430 North Beacon Street, Chicago, Ill., on 20 meter 'phone: HC1FG, VP3BG, VP5IS, VP5PA, VP6NW, VP6YB, VP6MO, LU6AP, HH5PA, HI7G, K4SA, CT1BY, TI2FG, TI3AV, HP1A, CE1BC, VO1I, K6BAZ, K6CMC, K6DBN, VK2EP, G5BJ, G5ML, G5BY, G6XR, G6PY, X1AI, X1AX, X1G, X1W, X2AH, X2N, CO2AN, CO2FG, CO2HY, CO2IM, CO2KC, CO2LL, CO2RA, CO2WW, CO2WZ, CO6OM, VE1BR, VE1BV, VE1CA, VE1CI, VE1CO, VE1DC, VE1EA, VE2BE, VE2BG, VE2CA, VE2EE, VE4BF, VE4AU, VE4CY, VE4EA, VE4FL, VE4FU, VE4HQ, VE4HR, VE4HV, VE4HW, VE4IG, VE4LA, VE4LM, VE4NI, VE5HA and VE5HN.

By Darrell Barnes, East Main Street, McMinnville, Tenn., on 20 meters: C1BY, HI7G, HP1A, EA4AO, K4SA, K6KKP, LU6AP, VO1I, TI2FG, VP5IS, VP5PA, VP6YB, VP9R, X1W, X1F, X1T, X1K, X1G and X2C.

By Samuel J. Emerson, 1097 Galewood Drive, N.E., Cleveland, Ohio, on 20 meter 'phone: CO6OM, TI2RC, CO5RY, TI2FG, CO2WW, VE1CR, CO2WZ, VE1CF, CO5FG, G5ML, HH5PA, CO2AN, G6XR, HP1A, VO8A, CO2HY, VP9R, H161I, G5NI, PY1CK, TI3AV, VP6NW, PY2EJ, HC1FG, VP6CS, VE5HH, VE3LL, VE4LA, VE2BG and VE4BF.

Q.R.D.

(*Continued from page 243*)

new gag . . . but gags or no we must turn down the midnight oil, having gotten over those pre ham days when four AM was still early to log another one of those elusive Chinese stations, so ge . . . 73 . . . GY.

S O S and the Operator

(*Continued from page 200*)

had been sent out sooner, the fearful loss of life might have been lessened by the quick arrival of succor from passing ships.

An outstanding strange disaster of the sea was the recent foundering of the *SS Mohawk* which also went down off sight-of-shore, through a strange quirk of fate. Heading south with a full quota of cruising pleasure goers, nothing seemed more remote from the Master's mind than an untowards happening which might occur to his ship on this beautiful, clear night. Slowly the majestic vessel plowed gracefully through the swell, rising and falling with the gentle heaving of the ocean. The skipper paced the Bridge deck and noted a ship on his port side a few points off his port stern, but thought nothing more of it until about an hour later when he noticed that this ship was coming up rather rapidly. However, as it was running a parallel course to his vessel, he was not concerned with it, excepting to wonder who it might be, as all skippers often wonder when ships pass each other in the night. The helmsman was watching his compass, now and then giving a slight tug to the wheel to keep the rudder straight. Suddenly he turned to the Captain with the cry, "The rudder is stuck. Sir, I can't do anything with it." To emphasize his remark, he tugged at the wheel, but it would not budge. The Captain tried the wheel to make sure for himself that this was the case, and immediately transferred the control to the auxiliary rudder in the engine room where it was manned by the men below.

Either the Captain's orders were misinterpreted, or else the order "starboard" turned the ship to the left instead of to the right, because very shortly thereafter there was a tremendous crash between the *SS Mohawk* and the *SS Talisman*, the ship which had been running parallel to it until the former had run off its course. Immediately the *Talisman* backed off the doomed ship and the *Mohawk* began to settle rapidly because of the tons of water which rushed into it. By this time Radio Officer in charge, Russell McDonald, had sent out his SOS signals, and had made contact with passing vessels which rushed to the ship's aid. If this had not been done greater loss of life would have been rolled up than actually did go down with the ship. *He went down with his ship, sticking to his post as is the tradition of radio operators.*

It is the Radio Officer who must keep his apparatus always in working condition, checking, testing constantly, for fear that in the next few minutes it may be called upon to perform the very functions for which it was originally intended . . . the saving of life at sea. But the Radio Officer is not an entity unto himself. He has one man to answer to and from whom he receives his orders, and that person is the Captain of his Ship. In refutation of a recent article disseminated for the purpose of disqualifying the radio operator from being the sole Communications Officer of a vessel, arguments were brought forward that during recent disasters and those tragedies which have occurred in the past few years, the radio operator has not been at fault. In a paragraph relating to the loss of the *SS Vestris*, there appears the serious charge that irresponsible radio operators congested the air with superfluous signals to such an extent that rescue work was greatly hampered. That rescue work might have been hindered by a mysterious reluctance on the part of the master of the *Vestris* to issue orders for the transmission of the distress signals, it does not mention. That the commercial land station WSC at Tuckerton, N. J., and not the battleship *U.S.S. Wyoming*, assumed and maintained complete control of radio communications during the time when the whole world was listening to the details. . . . It does not mention that an inspection of the radio log and records of WSC will show that the efficiency and intelligence of radio operators were instrumental in saving many lives that might otherwise have been lost as a result of the delayed SOS.

In the case of the rescue of the crew of the *S.S. Florida* by the *S.S. President Roosevelt*, the Radio Officer played an important part to such an extent that the Master of the latter vessel could not have found the whereabouts of the *Florida* without the aid of the Direction Finder which was manned by Chief Radio Officer Kenneth Upton. The faith which Captain Fried of the *Roosevelt* placed not only in this instrument, but in the ability of his radioman, led to this rescue because of an apparent error of 150 miles difference in the reported position of the doomed vessel.

Radio operators have always been known for their ingenuity and resource during times of stress in repairing apparatus which has gone haywire because of a vessel's terrific buffeting going through storms and hurricanes. Stranger than fiction stories can be told of their practical ability when put to the test. One such case is the story of the *S.S. Taboga* of the Taboga Steamship Company plying between Caribbean ports. During a terrific West Indian hurricane, this vessel was taking water into all parts of the ship and the holds were almost full of water when the captain issued orders to the Radio Officer to ask vessels to stand by, just in case. The Radio Officer was Willard W. Bliss, who was in charge of a Telefunken Spark set which, at its best, could not be pushed too far without serious results, and which, due to the staggering and lurching of the ship, was at that moment practically held together by a bale of wire strung between its uprights. The huge coil, which was pushed on rollers with which to get frequency, was jammed and the spark gap gaskets were all water-logged and burnt, so that it was impossible to send out anything. Operator Bliss immediately went into action and collected candles which he boiled in a pot in the galley. Then he put the spark gaskets into the paraffin and after allowing to cool, put them in the transmitter. The gaskets continually kept blowing out, but he stuck to his task until he had raised some passing vessels who came to the rescue of the doomed ship.

Another case is that of the *S.S. Genessee* while going through a number seven typhoon off the Philippine Island coast near Manila. On board was a conventional two kw spark transmitter which had seen better days a few years back, but to add to the deplorable state of the apparatus, it was housed on the main deck in a shack which had formerly been used as the ship's ice box. This was situated right under the wheelhouse and during rough weather, when the water came onto the bridgedeck, it would seep through the deck to the radio shack and raise the very devil with the spark gaps. During this typhoon incident there were four Filipinos in the wheelhouse swabbing up the deck continually to keep the water out of the radio shack, below, because of the emergency situation, but all to no avail, as the sparks would fly between gaps just as soon as the key was touched. At about this time, the second operator was testing the apparatus when, without warning, there was a terrific boom accompanied by flame and dense smoke. He ran out of the shack and called the Chief Operator in charge who, upon investigation, found that the secondary of the coil had blown out. Not having wire of the proper size aboard and due to the immediate danger of the vessel's foundering, there was no time to dismantle the apparatus and rewind a complete new secondary coil, so the operators went into action and took ordinary bell wire, cleaned off the cotton insulation and cut the wire into lengths the size of the blowout. In the meantime they made up a pot of lead, threw the wire into the gap and poured the molten solder into it. The transmitter worked and the ship was brought into port.

Since the days of the first wireless call for help, which the Department of Commerce gives as the *S.S. Mathews* who, on March third, 1889, ran into the East Goodwin Lightship and the accident was reported by radio and lifeboats were sent to the relief of the lightship, radio and the radio operators have done ycoman work in the saving of life and property at sea. Credit for many of the lives which were saved on the illfated *Titanic* has been given to the quick thinking of its operator in charge, Jack Phillips, who went down with his ship. In January of 1909 Jack Binns, radio operator of the *S.S. Republic*, which collided with the *S.S. Florida*, saved 1500 lives by means of his transmission of the distress signal which at that time was CQD meaning "come quick danger."

Thousands of lives and billions of dollars in property have been saved by radio and the Radio Officer, but today we still have those shipping companies who, protected by laws which do not make it compulsory for them to equip their ships with suitable apparatus for the saving of life, and to save a few dollars, have no radio aboard their vessels. Recently the *S.S. Henry Cort*, a lake freighter plying between ports on the Great Lakes, could have been saved if she had had radio apparatus aboard. Terrific gales which come up very frequently on the Lakes make it unsafe for vessels to be out in the center of it. They try to make some port or the lee of an island to protect themselves from the force of the gale. During one of these the *Henry Cort*, while trying to make a lee, ran onto a breakwater and smashed up. If this vessel had radioed for assistance, the Coast Guard cutters built for this purpose, could have thrown a line to her and towed her safely into port.

Another case is the good fortune of the *S.S. Helen* of the Atlantic Fruit Company which went ashore off Poplar Island, Chesapeake Bay, while heavily laden with a perishable cargo of bananas. The *Helen* was not equipped with radio, but was sighted by the tug *Savage*, which immediately sent a distress call, bringing out the necessary aid.

Radio and the radio operator have also played an important part in the humdrum task of saving the life of a shipmate on vessels which do not carry a medical officer on its roster. Contact is made with a vessel which has one such aboard and instructions and prescriptions are sent to the vessel requesting such information. An actual operation was recently successfully performed by this method of instruction and the patient recovered.

Because of the important roles that radio has played in the guarding and saving of life and

property at sea. it is indeed surprising that only about 15 percent of our merchant-marine are required to carry radio apparatus aboard as a safeguard. This is due to an antiquated law of 1912 which makes it mandatory for installations to be made on those ships which travel more than 200 miles away from land and on ships having more than 50 persons aboard. Lloyd's register of shipping statistics shows marked and steady decline in the annual tonnage losses of all power-driven vessels since 1900 when radio first began to be installed on ships. No person today would care to venture very far on any vessel that was not radio equipped. Nevertheless, despite the long and brilliant career that radio has played in disasters at sea and the innumerable lives it has saved, to say nothing of the countless millions in property it has saved from destruction. there are still shipowners and occasionally ship masters who attempt to belittle the value of radio as a protection to life at sea. Perhaps two quotations may be appropriate here, one from a prominent shipping director and the second from one of the world's best known and most important ship masters. These quotations have reference to disasters that are two score years old, and are today little known of by many persons:

Said P. A. S. Franklin of the I.M.M., after the famous CQD of Jack Binn's during the sinking of the *Republic*, "Wireless? Why, it is the greatest safeguard against accident at sea that the World could have. It might have been as bad as the *Bourgoyne*, had it not been for the wireless. Not only has it enabled the *Republic* to call aid to her within five minutes after she was in jeopardy, but thousands of people on shore who had friends on board knew what was going on and how the passengers were rescued. This is the most perfect test of the value of wireless since the invention was made."

Those who have read Sir Arthur Rostron's fine "Home from the Sea" will perhaps recall his dedication in which he says. "I would mention that it was the wireless operator in the *Carpathia* who, through his attention to duty and his interest in his work, gave me the opportunity to do something really useful which planted my feet on the ladder of success." Sir Arthur Rostron, KBE., RDRNR., and late Commodore of the Cunard Line, was the Captain of the obscure *Carpathia* when the *Titanic's* SOS startled the world and sent influential people to Congress demanding legislation for the protection of lives at sea by radio.

The fight for legislation has since been going on and with the recent disasters which will have to stand as martyrs to a cause, it is to be assumed that the matters before the present Congress. which include the ratification of the 1927 Safety of Life At Sea Conference. will be passed not only for the edification of those involved, but also for the safety of the traveling public.

7-Tube Super

(*Continued from page 205*)

ceiver from the front. the controls are as follows: Upper left—a.v.c. switch and immediately below it, the headphone jack. Following in order to the right are the beat-frequency oscillator switch, the beat-frequency pitch adjustment, sensitivity control, audio volume control. band switch, tone control and power switch combined, and at the extreme right, the stand-by switch. Immediately above the band switch is the dual tuning control. This consists of a large knob for the low ratio tuning and a small knob on the front of the large one to provide the high ratio tuning. The tuning dial is equipped with two pointers, the larger one of which operates over the three scales which are calibrated in frequencies. The small pointer operates over a scale marked off into one-hundred divisions to permit accurate logging of stations in the short wave ranges. The effectiveness of the high-ratio tuning control is readily evident and is perhaps best illustrated by the fact that in the broadcast band a complete revolution of this knob varies the tuning only a little more than a single 10 kilocycle broadcast channel.

During the operating test of this receiver all of its features were carefully checked and found to function in a highly satisfactory manner. It would probably be of interest to the reader to know something about what the receiver accomplished on the air during the tests. Transpacific stations VK3LR, VK3LME and the Japanese station JVM were readily brought in. Among the European stations were GSF, FYA, CT1AA, DJD, EAQ and GSC. United States and Canadian Stations: W3XAL, W2XE, W8XK, VE9GW, W8XAL, W1XK, W2XAF, CJRO and CJRX. Stations in Cuba, South America, etc.: COH, PRF5, YV6RV, YV3RC, YV5RMO, YV2RC, HI1A and HJ4ABA.

In between times, some time was spent in jotting down the call letters of amateur stations heard. Those operating on phone on 20 meters were: W2EUG, W2BJT, W2HFS, W2CMT, W2FZK, W2MW, W2AKK, W3DQ, W4ALG, W40C, W4AH, W4WP, W5LA, W5AEB, W5CCB, W5BDB, W5CYB, W5BEE, W5FJ, W5DEP, W5AEB, W5ZS, W5DQ, W5CYK, W5ECI, W5SF, W6DEC, W6DDA, W6CQG, W7BCI, W9DUM, W9ESO, CO2WZ, CO2RA, HP1A, T12RC, VE4BF, VE2CA, XIG, (Cuban) 8YB.

It was not until this article was being prepared that it was realized that no record had been made of the amateurs tuned in on 40 and 75 meters. However, operation of the set on both of these bands was on a par with its operation on the 20 meter band. Only a few minutes were devoted to logging stations in the 160 meter band. Those logged were as follows: W1HOK, W1GYA, W2GAR, W2GOP, W2FAB, W2ELA, W2GYH, W2HVR.

The above record is not given to represent anything like a complete log of all stations tuned in during the test period, but more to give a representative idea of the true variety and International flavor of reception possible with this new receiver.

Coaxial Cable

(*Continued from page 211*)

gated mathematically and by physicists theoretically for almost a century. this is the first time that the idea will be given a practical long-distance trial. The cable itself is really a solid conducting rod. supported at intervals at the center of a conducting tube, that acts as the return path. The first experimental line (two miles long) was installed by A. L. Richey at a test station near Phoenixville, Pennsylvania. The outside tube in this case was 2½ inches in diameter with a smaller tube inside and a copper wire inside that. This was a "double" coaxial cable. The new New York-Philadelphia cable will contain, inside its outer lead sheath. two separate tubes each containing a conductor. Each one of these lines is capable of carrying frequencies of a band width of the order of a million cycles. Such a coaxial line requires successive amplifiers to take care of attenuation spaced at distances of about each ten miles. The amplifiers themselves are fully automatic and amplify all frequencies at the same time. The amount of gain necessary (which varies with the temperature) is automatic and a "feedback" principle in the tubes controls the gain and permits high stability and freedom from noise and distortion. This feedback principle is the reverse of that used in radio receivers some years ago.

A 1,000,000-cycle line such as this will carry over 200 voice conversations at the same time, without interference. All of these signals pass through the amplifier (power for which is sent at 60 cycles over the same line). The separate voice signals are modulated on to different frequency channels (up to 1020 kc.) by multiple oscillators and the separate channels are selected at the receiving end by quartz crystal filters.

The coaxial line is also well adapted for transmitting the extremely-broad frequency bands required for television. The new cable may become a means of transmitting television programs from one part of the country to another if the actual maintenance costs, as indicated by future operation on the experimental Philadelphia line. do not run too high. The illustration, herewith, shows two types of coaxial cables that have proved very satisfactory under tests.

Metal Tube Set

(*Continued from page 203*)

end of each band. It is capacitively *and* inductively coupled to the grid and through this means uniform gain on all parts of all the bands is obtained.

Of equal delight to the c.w. operator is the convenient beat-frequency oscillator (electron coupled) in conjunction with which the front-panel-mounted pitch control is employed. The crystal filter is controlled on the front panel by a switch and a phasing condenser. In addition there are r.f. gain and audio gain controls, the send-receive switch and the phone jack. The knobs. too. are distinctive and highly practical.

The phone man, too, has a new "gadget" in the exclusive "low-boost" control that injects the desired amount of bass into phone reception, eliminating the "thinness" so characteristic in phone reception on communication receivers, generally.

Another feature of the new set is the duo-micro-vernier band-spread system. Unequalled accuracy of logging is afforded by this system which combines electrical band spreading and micro-vernier tuning in an exclusive and distinctive dial. The vernier and the main tuning dial are illuminated.

Full provision is made for the use of either the doublet or the conventional types of antennas. (*Next month we intend to publish an article recounting the results of tests on this receiver being made at the Westchester Listening Post.*—EDITOR.)

High Fidelity on DX

(*Continued from page 204*)

knob. By pushing "down" on this later control, a very high ratio non-backlash tuning is obtained. By pulling "up" on the control, a low ratio is obtained for fast tuning. Located between these two knobs is the shadow-tuning meter (which was found a great help in obtaining exact resonance even on the most distant stations as far away as Asia). The three bottom controls are, left to right: the 4-position tone control, the high-fidelity-sensitivity switch and the wave-change switch (which changes coils and moves up and down the proper dials). The chassis and the loudspeaker of this set are mounted in a really beautiful chest-high console of fine workmanship.

In the tests at the Listening Post on both a single wire and a doublet antenna, the set showed its ability to bring in, with great volume on the loudspeaker, both local and extremely distant broadcast stations on all the short-wave bands. A few of the short-wave stations tuned in and logged, are given as examples: DJB, DJA, DJN, DJC. DJE, GSB, GSC, GSD, GSE, GSF, GSG, FYA (on 19 meters, 25.2 meters, and on 25.6 meters), LKJ1, I2RO (on 25.4 meters and on 31.3 meters), PCJ, CT1AA, EAQ, ORK, JVH, JVM, ZCK, YDA5, RKI, VK3ME, VK3LR, COH, PRF5, VE9GW, HJ3ABH, HJ1ABB, HJ4ABA. These and many other stations in South America, Central America, and Cuba were picked up on the short-wave broadcast bands from 16 meters up to and including the 49-meter band. Tests on the 20-meter amateur band brought in all the nine districts in the United States and the two amateurs who tested this set on the 20, 40, 75, and 160 meter bands were loud in their praise of the set's extreme sensitivity and selectivity, having brought in South American, English, French, Belgian and Australian amateur transmitters (admittedly) better than their own special communication receivers used in their stations. A few of the foreign amateurs heard are mentioned now: CO2WW, TI2RC, G2GV, G5QJ, G5NI (Old Barnacle Bill's voice could be heard roaring in from this station on some occasions so loud it could be heard a block away from the receiver), ON4AC, F8DR, VP3BG, X2HH, HB9AQ, EA4AO, VK2EP, also one South American HJ5ABE, in the midst of the 20-meter band on about 1400 k.c. JVH was also picked up at midnight on a little higher frequency than this —14600 k.c.—although code interference was heard with it, somewhat.

After three weeks of testing this receiver, on and off when conditions were good and when conditions were bad, we do not hesitate to recommend the set for special Observer work where reliable all-wave reception is an absolute necessity. In actual comparison with an earlier 12-tube set, which was used at the Listening Post as a standard, this 9-metal-tube job outperformed it in every way including tone quality, sensitivity, and selectivity.

The Pantograph

Sylvester Bruzas, author of the article describing the construction of a pantograph panel engraving tool on page 10 of the July issue, calls attention to the fact that the last sentence of paragraph 4 should read, "The arms, however, must be arranged so that AD is always equal to DE and EH is equal to HC".

The DX Corner (Broadcast Waves)

(*Continued from page 221*)

Observer Everly (Illinois): "WMFJ, 1370 kc., Daytona Beach, Florida, sends out a nice verification—a picture of the world's record racing car, the 'Bluebird'."

Observer Parfitt (Virginia): "So far as DX is concerned this summer I have been having a swell (tering) time. Old Man Static has predominated, but have made a little progress in my DXing with the result that my log of verified stations now stands at 453."

Observer Kalmbach (New York): "DX'ers having trouble securing verifications from KHJ are advised to send their reports to C. Ellsworth Wylie, manager of this station."

Unfortunately the fact that the F.C.C. Monitor Schedule was included in this department this month makes it necessary to curtail notes and reports received from many observers. This is to be regretted but it is hoped that the help obtained from this up-to-date frequency-check schedule will compensate those whose notes are not published and the readers to whom these notes would have been of interest.

The DX Corner (Short Waves)

(*Continued from page 246*)

from 8:30 to 9 p.m., E.S.T. and also, irregularly, from 3 to 4 a.m., E.S.T., (V. D. S. Gallagher and Vassallo).

CP6, La Paz, Bolivia, 32.8 meters, 9120 kc., reported heard 8 to 10 p.m., E.S.T. (Videly).

CP7, La Paz, Bolivia, 19.6 meters, 15,300 kc., reported soon to start broadcasting 11 to 12 pm. (Videly).

YV5RMO, Maracaibo, Venezuela, 5650 kc., reported on the air, daily from 11:30 a.m. to 1 p.m. and from 5:30 p.m. to 10 p.m., E.S.T. (Coover).

YV11RMO, 51.6 meters, 5810 kc., now back on the air with 150 watts. (Young, Bower). (L. P. O.'s please get schedule. Editor).

YV8RV, a new station in Barquisimeto, Venezuela is reported soon to come on the air on 5880 kc., 51.02 meters. (Heard testing on 5550 kc., 6:30 p.m., E.S.T. (Young and Betances).

YVQ, reported heard on 6672 kc., Saturdays only, from 8 to 9 p.m., and from 9 to 10 p.m., E.S.T. (Marshall).

PSK, Rio de Janeiro, Brazil, reported back on the air, irregularly, 6 to 8 p.m., E.S.T. (Zarn). Was heard up to 1015 p.m. at Newfoundland. (Nosworthy).

HJ1ABD, puts on a DX program the last Thursday of each month. (Bower).

HJ1ABE, 42.2 meters, 7100 kc., transmits from 6:30 to 9 p.m., E.S.T. (Acosta).

HJ3ABF, Bogota, Colombia, reported on 6180 kc., also 6170 kc., reported heard except Sundays 7 to 10 p.m., E.S.T. (Alan Smith, Chambers).

Club News Like Hen's Teeth This Month

What with holidays and vacations breaking up the regular routine of the officers of Short-Wave DX Clubs we find that we have received no news from these organizations and therefore, of course, cannot print it. Vice-president Mickelson of the Society of Wireless Pioneers has been ill and so has Alice R. Bourke, W9BXS, who have taken editorial care of the Society's news in the past. We hope they will recover quickly. Oliver Amlie, president of the 6,000 to 12,500 Mile Short-Wave Club is vacationing in East Lynn, Massachusetts. The other clubs and associations we have heard nothing from, so will just put it down to "holiday vacations in general" and call it a day.

YV2RC Club Broadcasts

During the month of September, Station YV2RC, Caracas, Venezuela, will transmit the following special programs dedicated to Radio Clubs and Radio Publications. These will be transmitted on the YV2RC 1 kw. short-wave transmitter from 1:30 to 2 a.m. from 8:30 to 9 p.m. E.S.T. or from 01.30 to 02.00 G.M.T. the following day.

1. September 3, Short Wave Club of New York City.
2. September 10, Newark News Radio Club, Newark, New Jersey.
3. September 17, The Quixote Radio Club, Hendersonville, N. C.
4. September 24, Evening Public Ledger, Philadelphia, Pa.

The Service Bench

(*Continued from page 235*)

off, K to ground showed 2,500 ohms, which was normal. Conclusion: The tube had a heater-to-cathode short-circuit which only showed up when the tube was hot. A new tube, of course, did the trick. No hum was apparent at any time."—F. O. Eckhardt, Flint, Mich.

A Close Fit

Louis Warren, a familiar contributor to this department, tells how to remove a Majestic 32-volt set from the cabinet: "To the guys who swear that this new table model was poured into the cabinet, here's a tip on taking it out. After removing the bolts from the base (not likely that you'll have a socket to fit those odd size heads—I didn't), lift the vibrator end up about one inch. When tilted in this manner, the chassis can be gently but firmly withdrawn from the cabinet."

Loss of Pep in RCA 60

Mr. Warren also writes of low sensitivity in this model. "Watch for the 2-watt resistor located about the middle one on the underside of the power pack. This resistor is supposed to check 20,000 ohms, but in use they have the habit of dropping to as low a value as 2,600 ohms. The receiver will still pick up locals—but that's about all."

Atwater Kent 246

"I was called upon to service a 246 Atwater Kent. The complaint was that every time the volume control was advanced or retarded, with the tone control in the bass adjustment, the loudspeaker gave a peculiar 'zurp' and went off into an audio howl. The exact nature of the trouble is still somewhat of a mystery, but a new volume control eliminated it."—R. H. Hertel, Clay Center, Nebr.

Temporary Speaker Field Repair

Carl W. Spiser, of Fillmore, Mo., advises that when one section of a split field winding is burned out, a temporary repair can be effected by substituting a low value (about 200 ohms) resistor across that section. On a 5-tube Gloritone no difference in operation could be noticed.

Brunswick Output Transformer

"Replacement is a problem in many models due to the limited space and the difficulty in securing a duplicate part. I recommend the use of a G. E. output transformer. While this is too large, it can be melted out of its can and placed in the original Brunswick can after that has been similarly cleaned out. It works perfectly."—M. T. Trippe, Edmondson Radio Service, Baltimore, Md. Mr. Trippe's letterhead offers "Expert Repairs on Radios and Electrical Appliances," and states that the Edmondson Radio Service are agents for Westinghouse lamps and General Electric refrigerators and electrical supplies.

19-Tube Set

(*Continued from page 212*)

quiet first-detector-oscillator such as that employed. So this is done by changing the screen voltage on the first two i.f. stages automatically by one section of the wave change switch, which increases the total i.f. gain to 30 microvolts.

Figure 1 shows a typical r.f. coil assembly (530 to 1600 and 1600 to 4500 kc. r.f. coils with air trimmers). In this typical two range r.f. assembly, only one low impedance primary

(universal wound, in the middle) is used, since for both ranges it must resonate below 530 kc. to prevent broadcast-band stations pushing through if it resonated in the broadcast band—a fine, but very important point of design.

Figure 2 illustrates an i.f. transformer assembly. The four transformers vary in coil spacing, and the fourth has the beat oscillator inductance loosely coupled to its secondary.

Figure 3 shows the "engine room" of the tuner. At the right of the central partition all i.f. and a.f. wiring is located. At the left are the r.f., first detector and oscillator circuits. The sectional shielding is especially noteworthy as it provides effective interstage r.f. isolation, with each gang of the wave-band switch being located within the shield for the corresponding circuit. All r.f wiring is uniform and direct. Isolation filters are used generously, as will be noted from the large number of shielded filter condensers mounted on the shield partitions and chassis walls.

Figure 4 is an oscillograph showing the overall i.f. selectivity curve necessary to effect the perfect band-pass alignment of the last two i.f. transformers. The "sway back" and sharp cut-off sides of this curve indicate the true band pass filter. The "sway back" is necessary to compensate for the r.f. amplifier selectivity. Just how the two aid each other is seen in the ideally flat-topped oscillograph photo measurement from antenna to audio system in Figure 5.

Space does not permit showing the sharp selectivity curve, but it closely resembles Figure 5 except that it is only 7,000 cycles broad at its flat peak, while Figure 5, the high fidelity curve, is 15,000 cycles broad at its peak. Further high audio-frequency compensation occurs in the audio amplifier—but read the next installment for that.

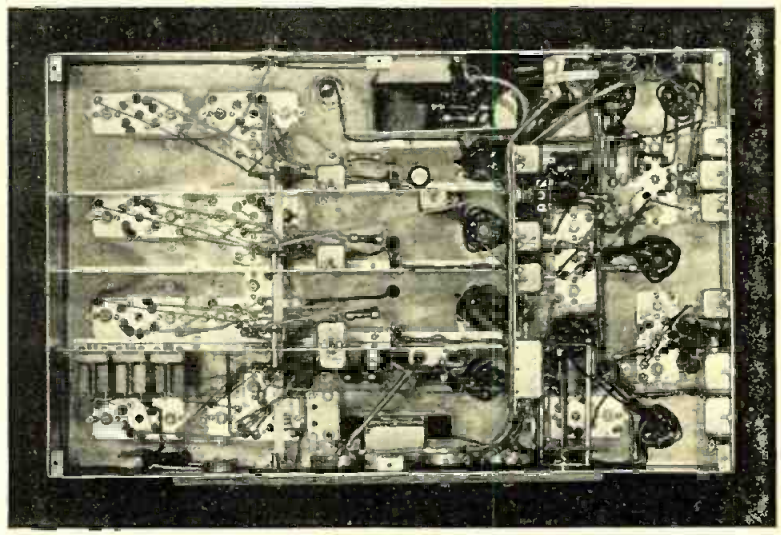


FIGURE 3

How well the design of the Masterpiece IV has been executed throughout is indicated by one user's report of 51 broadcast stations received in one evening between 4500 and 13,000 kc., all in the congested d.c. district in the "great white way" section off Times Square, on 44th Street in New York City, in middle June. Another user in Chicago besides many foreigners too numerous to list, heard an Alaskan weather beacon station on long waves—equal to reception of long wave European broadcasters on the east coast, which is indeed a tribute to the receiver's quiet distance-getting ability.

Television Rumors

(*Continued from page* 198)

over the clarity of the images in tests conducted over both wires and the air. Films and live subjects were used.

The screen, about 5 by 7 inches, revealed remarkably clear images. The inventor revealed his purpose to receive images on a small tube and project them optically onto a screen of convenient size. He expressed the belief that commercial television in the U. S. A. will arrive in less than a year.

Screens of zinc orthosilicate and of a combination of calcium tungstate and other substances were used. The first received the images transmitted over the air while the latter was used in the wire television tests. A coil placed around the "oscillight"—a receiving tube—reduced the spot of light from the valve to a tiny speck which sped across the screen at the rate of 6,000 times a second.

WASHINGTON, D.C.—After considerable controversy, the Federal Communications Commission authorized the American Telephone and Telegraph Company to install a coaxial cable between New York and Philadelphia for experimental television and multiple telephone and telegraph service. But the F.C.C. ruled that all parties having an interest in the transmission of television images should have access to use of the cable during the experimental period. When the various parties are unable to agree on terms, the F.C.C. itself will aid in arbitration. The Commission refused to grant the A.T. & T. sole rights to the use of the cable for the development of its patents. Postal Telegraph and Western Union filed objections to the telephone company's application, but they were withdrawn. Other opposition was made by moving-picture interests.

WASHINGTON, D. C.—A group of Federal Communications Engineers recently visited the television laboratories of R.C.A., Farnsworth and Philco. The party was headed by Dr. C. G. Jolliffe, chief engineer of the commission, and included Andrew D. Ring, Lieutenant E. K. Jett, Gerald C. Gross and J. P. Buchanan, Jr. No comment was made on their observations of the three cathode-ray systems, though they were reported to be impressed.

HAMBURG, GERMANY—The S.S. *Caribia,* operating in the Hamburg-American Line's Central American service recently participated in oceanic television reception. The experiments were made jointly with the German Association of Electro-Technicians and the Reichspost. Synchronized sight and sound from the Reichspost shore station were received on a set installed in the ship's reception room. Observers were reported to be favorably impressed with the demonstration.

LONDON, ENGLAND.—According to *Industrial Britain,* official publication of the British Travel Association, an industrial application of television is being made by the Automatic Electric Company, of Liverpool, in the supervisory remote-control apparatus to be installed over the whole of the electrical grid scheme of South Scotland. The report follows: "The apparatus is an arrangement whereby engineers at a central spot are able, by means of television, to read the meters at any number of distant sub-stations, and

take whatever steps are necessary to deal with exceptional demands on one or more sub-stations by transferring power from others. When the new apparatus is installed, engineers in Glasgow will be able instantly to control the supply to places as far apart as Dundee, Kilmarnock, Edinburgh, and down to the English border."

LONDON, ENGLAND.—Alexandra Palace has been selected as the site for the London zone's television transmitter. The site is 306 feet above sea level and it is proposed to erect a 300-foot mast, thus providing an antenna height of 606 feet above sea level, which is believed high enough to supply the large London area with images of sharp definition. Details of new Baird home vision receivers were recently announced here. One model has a picture, 6 by 8 inches, while another yields a 9 by 12 inch image. Licenses will be granted by Baird to other British manufacturers.

All Continents

(*Continued from page* 202)

knob at the right. This tuning knob is pushed "in" for high ratio, 55-1, and "out" for low ratio, 5½-1, for fast tuning. The three lower knobs are, from left to right, the sensitivity control, the volume control and the combination "off-on" switch and volume control.

The receiver, taken as a whole is a remarkably efficient, beautifully toned receiver, with plenty of high frequencies so that long distance station announcements can be easily recognized. The receiver should appeal to those who wish to literally step out all over the world to hear the short-wave stations clearly, and yet at a moment's notice switch over to the broadcast band for high-quality reception of local stations. This is also one of the first American receivers to incorporate a high wave band above the standard broadcast band including 2000 meters reception. We heartily recommend this set to our Listening Post Observers and other s.w. listener-readers on the basis of the results of the tests we have conducted.

A Battery Super

(*Continued from page* 219)

is secured. Now proceed directly with the r.f. alignment.

First, tune the oscillator to 1400 kc. Then tune the receiver to the same and adjust each trimmer on the gang condenser until the meter reading is a minimum. Now, tune the oscillator and receiver to 600 kc. Don't touch the trimmers, but adjust the padding condenser until minimum meter reading is secured, rocking the gang condenser back and forth while making the adjustment. Now recheck at 1400 kc. If an oscillator is not available, align the r.f. circuits first by tuning in good steady station signals at around 1400 and 600 kc. Then when the r.f. end is lined up make the adjustments in the i.f. transformer tuning to bring them into exact alignment.

The protective resistors may now be removed and meter rheostat adjusted so that the meter shows full-scale deflection with the a.v.c. switch "on" but no signal tuned in. The receiver is then ready for use.

When working properly, the receiver should have some tube hiss and more or less background noise, depending on the location, when turned full-on. The tuning should be very sharp in the "manual" position. Though not broader, the tuning will *appear* so in the a.v.c. position.

Two antenna posts are provided for doublet and other types of ungrounded antennas. When an ordinary antenna is used the middle post should be connected to the ground post (chassis).

It should be noted that filament type tubes encourage feedback, or coupling, between stages. Therefore, a receiver with such tubes will be inherently somewhat less stable than a set using unipotential (heater) type tubes. This may not be noticeable, but, for the utmost gain possible, it will pay to experiment a bit with a by-pass condenser (0.1 to 1.0 mfd.) connected from the positive filament to chassis. In this particular set, the condenser had no effect. In another, it may be useful. Additional plate and screen-grid filters consisting of a 10,000 ohm resistor and 0.1 mfd. condenser may permit a bit more gain although in this set the writer found them of no help.

The permanent magnet dynamic type of speaker is very satisfactory for a set of this type, providing good quality and requiring no power sup-

ply for the field or any magnetic speaker may, of course, be used.

If a charging means is handy, it may be convenient to use a single storage cell (2 volt lead cell) for filament supply although the usual care is required in handling to prevent damage by the acid. For long periods of use, the Air Cell will probably be most convenient and economical. For intermittent use, a bank of No. 6 dry cells may be used but there will be more variation in voltage.

Parts List

C1—Trutest variable condenser, type TRF, 3-gang, .000365 mfd. (each section) with trimmers.
C2, C3, C6, C7, C10—Aerovox tubular condensers, type 284, .05 mfd., 200 volt.
C4, C5, C8, C12, C20, C21—Aerovox tubular condensers, type 284, .1 mfd., 200 volt.
C14—Aerovox tubular condenser, type 284, .03 mfd., 200 volt.
C17—Aerovox tubular condenser, type 284, .006 mfd., 200 volt.
C18, C19—Aerovox tubular condenser, type 284 .5 mfd., 200 volt.
C9—Aerovox mica condenser, type 1467, .00035 mfd.
C11—Aerovox mica condenser, type 1467, .0001 mfd.
C13—Aerovox mica condenser, type 1450, .01 mfd.
C15—Aerovox mica condenser, type 1467, .00025 mfd.
C22—Aerovox mica condenser, type 1467, .0005 mfd.
C16—Hammarlund oscillator padding condenser, type MICS-1000, .0006 to .001 mfd.
R1, R2, R3—Lynch fixed resistors—100,000 ohms, ½ watt.
R4, Electrad volume control, type 272W, 100 ohms.
R5—Lynch fixed resistor, 20,000 ohms. ½ watt.
R6, R7—Lynch fixed resistors, 250,000 ohms ½ watt.
R8, R14—Lynch fixed resistors, 50,000 ohms, ½ watt.
R12—Lynch fixed resistor, 1 megohm ½ watt.
R9—Electrad volume control, type 203, 500,000 ohms (with special d.p.s.t. snap-on-switch, SW1).
R10, R13—Electrad volume controls, type 205, 50,000 ohms.
R.F.C.—National, type 100, r.f. choke.
SW1—Electrad switch (see R9).
SW2—Toggle switch, d.p.d.t.
SW3—Toggle switch, s.p.d.t.
T1—Sickles antenna r.f. transformer, type 550.
T2—Sickles interstage r.f. transformer, type 551.
T3—Sickles oscillator coil, type 570.
T4, T5, T6—Hammarlund 175 kc. i.f. transformers, type T-175.
T7—United Transformer Company input Class B, 30 to 19, audio transformer, type NS-29.
T8—United Transformer Company output Class B audio transformer, plates of 19 to 2000 and 4000 ohms, type NS-33.
1—Metal chassis (see Figure 2).
1—Eby triple antenna post assembly.
2—Eby 2-gang phone-tip jack strips.
1—Trutest airplane type dial, 0-100 divisions.
3—Small bakelite knobs, for ¼-inch shaft.
1—2-volt, 60 ma. pilot lamp.
1—Electrad Tru-volt resistor 1 ohm, 10 watt (used only with air cell battery) adjust.
6—Triple lug mounts for supporting small parts.
1—9 wire cable, moisture-proof, length 4 feet or more.
4—4-prong wafer type sockets.
3—6-prong wafer type sockets.
2—Goat tube shields, type ST12.
3—Goat tube shields, type ST14.
4—Rubber grommets, for cushion mounting of variable condenser.
1—Type 1A6 tube.
3—Type 34 tubes.
1—Type 30 tube.
1—Type 1B5 tube.
1—Type 19 tube.

Accessories List

M—Triplett 0-1 ma. milliammeter, type 321, bakelite case (knife edge pointer optional).
1—Pair head-phones.
1—Permanent-magnet dynamic, or magnetic type speaker.
1—Eveready Air Cell, type SA600, or other A battery.
3—45-volt B batteries, medium or heavy duty.
3—4½-volt C batteries, tapped.
1—Stand for meter.
1—Electrad potentiometer, type 272W, 100 ohms (for variable meter shunt).
1—Eby double binding post strip (for meter stand).

Super DX-8

(*Continued from page* 219)

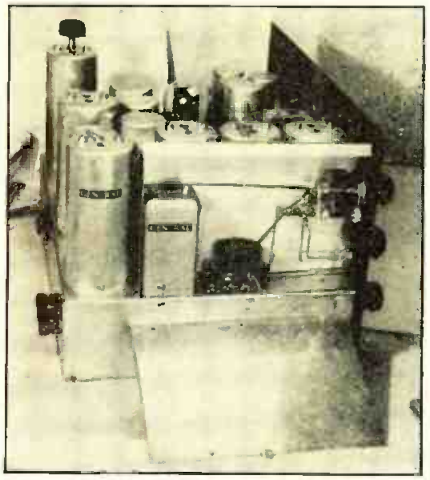
tuning hints, after the experience gained by the staff.

Normally, the set is run with the crystal "cut out" and the a.v.c. in use, the sensitivity control all the way up. Under these conditions volume is regulated by means of the audio-volume con-

INDEX OF ADVERTISERS

trol. It was found that the receiver is slightly more sensitive without the a.v.c. in use. If you listen to c.w., the beat oscillator has to be turned "on" and the a.v.c. "off". The crystal circuit is used for increasing selectivity. There is a series and a parallel connection with the usual variable condenser.

Receivers such as this with separate bandspread condensers sometimes confuse those who



are not used to them. But it is easy to tune this set if you know how. There are three systems possible: Find out which indicating needle belongs to the small condensers by looking at the back of the panel, while the knob is pushed or pulled, turning it in both positions. If the trimming condensers are set at minimum capacity, the main tuning condenser should be adjusted to the high-frequency end of the band one wishes to listen to. Then switch to the bandspread condenser and it will cover the desired region. Similarly, one can set the bandspread condenser at maximum capacity, then find the lowest frequency of the band of interest and switch to the bandspread condenser which will now again cover the desired band. Many listeners like to set their bandspread at 50, so that they can go an equal distance either way if the desired station or group of stations is found. Where the dial is not calibrated in frequencies, it is not important which of the three systems is used.

The ranges overlap considerably and the 31 meter band is covered twice; it will be found that stations in this band come in best on the lower frequency range, because the condenser capacity will then be small and the voltage across it high.

At the Westchester Listening Post, during the last half of July, nearly all Europeans came in well. All British and German stations were tuned in, except on 49 meters. The three French stations were very good, and so were EAQ, CT1AA (9600 k.c.) and VK2ME. OPM, at Leopoldville, Africa was very loud. Reception was also obtained from Bandoeng, PLV, and from JVH on 14,000 k.c. The South Americans were represented by HJ1ABB, HJ3ABH, HJ5ABE (on 20m), YV2BC, YV3RC, YV6RC. This 49-meter band was very noisy in July, as every short-wave fan knows. Additional stations picked up include, KIO, PCJ, PHI and both ends of the contact between W3XL and the stratosphere balloon.

20 meter amateurs of all districts, including four "Sevens" came in loud, and the following foreign "hams" were received: F8DR, XIQ, X2HH, XIG, CO2SV, CO2WZ, Cuban 8YB, PY1CK, HP1A, VE3TD, VE1CR, VE2GA, G5CV, G5NI, TI2AV, VO1I and VP5PV.

75 meter amateurs were picked up from all except the 6th and 7th districts; on 160 meters reception was restricted to ones, twos, and threes, due to bad static.

Police stations from all parts of the U. S. and Canada come in, including such places as Chicago, Minneapolis, Washington, etc. The receiver seems very sensitive and unusually selective and should make a fine piece of equipment for short-wave work.

Backstage

(*Continued from page 231*)

recently completed for the opening of an elaborate studio setup in Hollywood by NBC. It was revealed by Richard C. Patterson, Jr., executive vice-president of the network, that after a long period of investigation and study of suitable locations, NBC has leased the entire building of the Consolidated Film Industries for the construction of modern studios which will be ready for operation in the Fall.

9-Tube Receiver

(*Continued from page* 209)

circuit, this type power tube permitted a much higher conversion gain and assured oscillation on the very high frequencies. The i.f. stage employs a 6D6 tube and is followed by a 6B7, used as a diode detector and automatic volume control tube. This is followed by a type 6C6 in the first a.f. stage and a type 42 for the power stage. A type 76 is used for the beat frequency oscillator and a type 80 for rectification.

The duties of the various controls as shown on the front panel, follow in this respective order: The control to the extreme left is the line supply on-off switch, next the tone control, followed by the stand-by switch, next the phone jack and above this the volume control. The next knob is the automatic or manual volume control and manual + beat-frequency oscillator switch, then there is the dual-speed tuning dial followed by the sensitivity control and last the wave-band switching knob.

The set gave a good account of itself on the 20-, 80-, and 160-meter amateur phone-bands and especially on the 20-meter band where a great deal of testing was done. Space does not permit the complete listing of all stations so we are picking at random some representative calls for all the American districts and the foreign calls from the 20-meter band log: W1ICE, W2HFS, W3MD, W4WP, W5CCB, W6DDA, W7BCI, W8GLA, W9HBK; (Foreign) CO2WZ, CO7HF, G5NI, HI7G, HP1A, VE2CA, VE2FG, VE1IN, VE2BE, VE3QD, VO1I, and X2HH.

On the 40 meter c.w. band it was no trick at all to receive far western and European calls. Police and aeronautical calls on the upper short-wave bands were received with ease. In the reception tests on the ham bands and even on the short-wave broadcast channels, it was seldom necessary to use the full sensitivity of the set.

In checking over the short-wave broadcast reception results, it was found that the following standard English and German stations were well received: GSG, GSF, GSD, and GSC; DJB, DJD, DJA, DJN and DJC. Other foreign calls heard included RW59—Russia, FYA—France, ORK—Belgium, EAQ—Spain, VK3LR and VK3M—Australia, also many South and Central American stations. Static was very heavy on the regular broadcast wavelengths which handicapped our tests. However, many distant midwestern and southern stations were heard.

Signal Generator

(*Continued from page* 215)

cannot mar woodwork, since felt-covered supports are provided. Fabric-covered, shielded output leads are included with the instrument.

This signal generator presents features of definite value and interest to servicemen, engineers and technicians. It well illustrates the advantages of long and careful study of the difficult problems associated with the designs of such instruments, eighteen months having been devoted to its development.

HRO Receiver

(*Continued from page* 208)

assemblies are as follows: 1.7 to 4.0 megacycles; 3.5 to 7.3 megacycles; 7.0 to 14.4 megacycles, 14.0 to 30.0 megacycles. In addition to these coils (which are furnished with the receiver) two other assemblies may be obtained covering the bands between 2.0 megacycles and 500 kilocycles.

Of course, one of the main features of the receiver is the remarkable mechanical accuracy of the combination tuning dial and 4-gang condenser unit, which works free of backlash, while providing the smoothest operation which has been our experience to witness (*without the least trace of backlash*)!

Still another big feature of the receiver is the crystal circuit and filter, which allows interfering stations to be eliminated by adjustment of the phasing condenser which can be set on one side or another to "peak" the wanted signal, and "lose" the interfering one.

The receiver is designed to be used with the National type 5897 AB power unit, employing a 280 type rectifying tube. Other units that can be used with the set are: a National permanent-magnet dynamic with a 7000 ohm input transformer and a National coil-rack assembly (shown in the accompanying illustrations).

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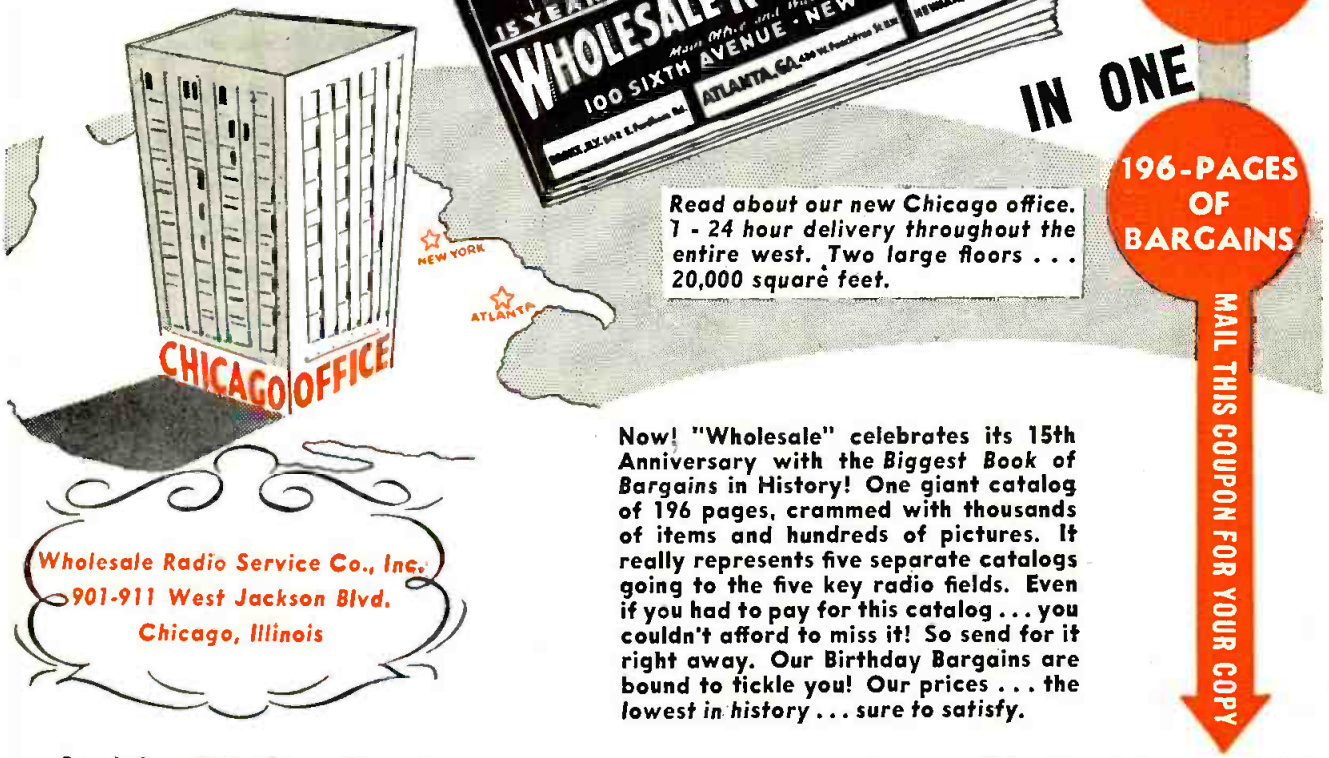

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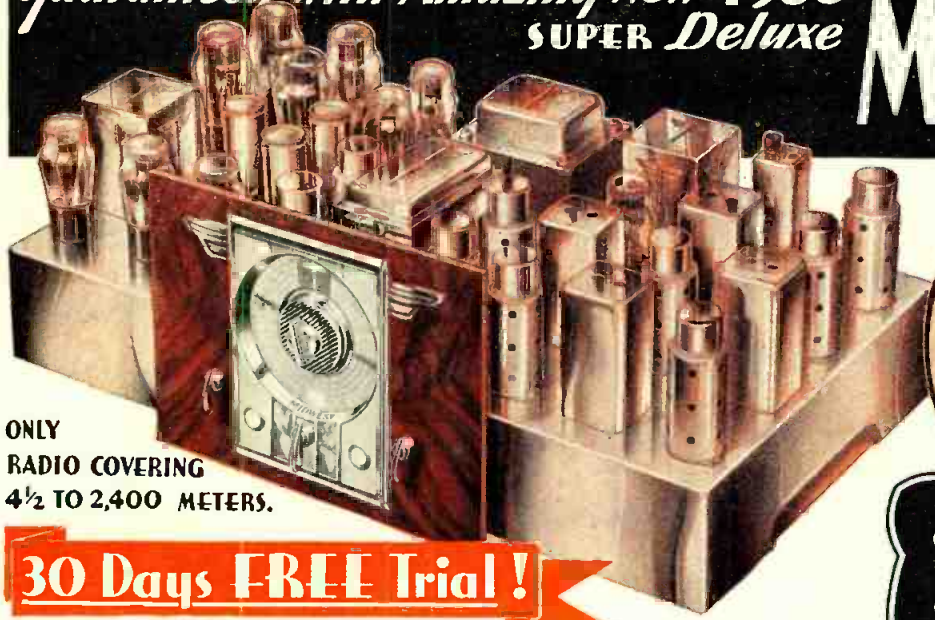

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