RADIO CONTROLLED MODEL NAVY

DECEMBER 25c

RADIO NEWS

THIS ISSUE:

NEW HAM REGULATIONS

DIVERSITY RECEPTION FOR $25.00

ONES 8 TUBE SUPERHET

MARINE XMTR-RCVR

Modernizing he Phonograph

Speech Amplifier ith Voltage Control

PRIZE CONTEST!
TITLE THIS PICTURE
SEE PAGE 26

AMATEUR DIVISION
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Cortlandt St.,
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DAVEGA

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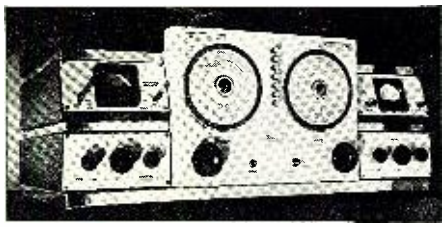
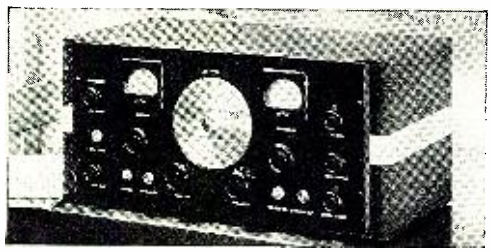
Finest and Largest Display of Amateur Receivers and Transmitters in New York!

DAVEGA is New York's Pioneer dealer in HALLICRAFTER



HALLICRAFTER DIVERSITY: 6 Bands covering from 545 KC. to 44 MC. and there are 25 tubes in the complete system • Separate "Diversity Action" meters • Average sensitivity of better than 1 microvolt • Audio amplifier output of 10 watts (Tuner only 50 milliwatts) • Infinite adjacent channel rejector.



SKY CHALLENGER II: 9 Tubes • Infinite Image Rejector • Recessed Main Tuning Dial • 1000 Spiral Band Spread • 38 MC. to 540 KC. (7.9 to 557 Meters) • Iron Core I.F.'s • Crystal Filter Circuit. Model S-18.....$77.00

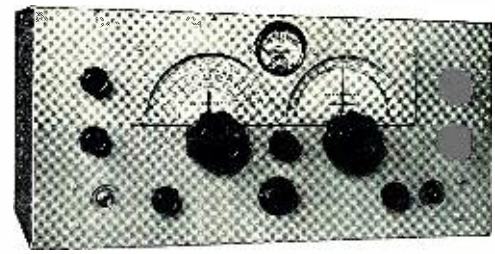
Davega has the largest stock of Hallicrafter Receivers and Transmitters in New York

Including the following:

- Skyriders
- Champion
- Special 5-10
- Marine Models
- Sky Buddy
- Hallicrafter Transmitters

DAVEGA has the most complete Stock of R.M.E. in New York

R.M.E. 70. Latest development of R.M.E. laboratories. One of the finest receivers manufactured today by a company known for its rigid standards of quality. Now on demonstration at Davega. Ready for delivery.



R.M.E. 69. A receiver that is praised by engineers, amateurs and B.C.L.'s throughout the world. One of today's communication standbys.

DB 20 by R.M.E. Signal Amplifier, image rejector guaranteed to improve any set enormously or money refunded.

510 X Frequency Expander. Expands your present receiver into 5 meter reception. Utilizes all present power and adds sensitivity.

R.M.E. Rack panel models. All types in stock.

DAVEGA prices are the LOWEST available anywhere on Amateur Equipment

EASY TERMS

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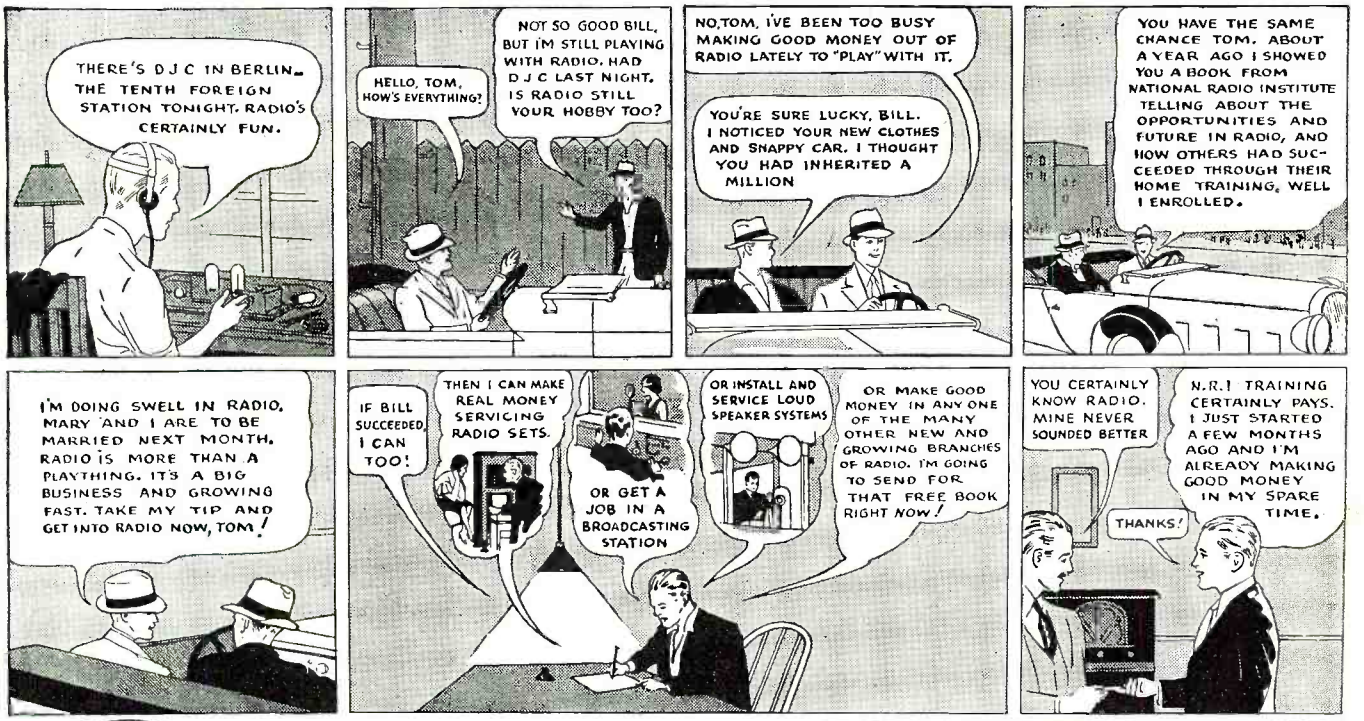
- Temco Model 50
- New R.M.E. Models
- Howard Com. Receivers
- Garrard Record Changers
- Temco Model 100
- Sargent Marine Receivers
- RCA, All Types
- Astatic Microphones
- RCA A.C.T. 20
- Patterson P.R. 15
- Presto Sound Recorders
- RCA A.C.T. 150

Liberal TRADE-IN ALLOWANCES

How a "Tip" got Tom a Good Job



J. E. Smith, President
National Radio Institute
Established 1914

I will train you to start a spare time or full time Radio service business WITHOUT CAPITAL

Many Radio Experts Make $30, $50, $75 a Week

Radio broadcasting stations employ engineers, operators, station managers and pay up to $5,000 a year. Fixing Radio sets in spare time pays many $200 to $500 a year—full time jobs with Radio jobbers, manufacturers and dealers as much as $30, $50, $75 a week. Many Radio Experts open full or part time Radio sales and repair businesses. Radio manufacturers and jobbers employ testers, inspectors, foremen, engineers, servicemen, and pay up to $6,000 a year. Automobile, police, aviation, commercial Radio, loud speaker systems are newer fields offering good opportunities now and for the future. Television promises to open many good jobs soon. Men I trained have good jobs in these branches of Radio. Read how they got their jobs. Mail coupon.

Many Make $5, $10, $15 a Week Extra in Spare Time While Learning

The day you enroll I start sending Extra Money Job Sheets; show you how to do Radio repair jobs. Throughout your training I send plans and directions that made good spare time money—$200 to $500—for hundreds, while learning. I send you special Radio equipment to conduct experiments and build circuits. This 50-50 method of training makes learning at home interesting, fascinating, practical. I ALSO GIVE YOU A MODERN, PROFESSIONAL ALL-WAVE, ALL-PURPOSE RADIO SET SERVICING INSTRUMENT to help you make good money fixing Radios while learning and equip you for full time jobs after graduation.

I Also Give You This Professional Servicing Instrument

Here is the instrument every Radio expert needs and wants—an All-Wave, All-Purpose, Set Servicing Instrument. It contains everything necessary to measure A.C. and D.C. voltages and current; to test tubes, resistance; adjust and align any set, old or new. It satisfies your needs for professional servicing after you graduate—can help you make extra money fixing sets while training.

Find Out What Radio Offers You

Act Today. Mail the coupon now for "Rich Rewards in Radio." It's free to any fellow over 16 years old. It points out Radio's spare time and full time opportunities and those coming in Television; tells about my training in Radio and Television; shows you letters from men I trained, telling what they are doing and earning. Find out what Radio offers YOU! MAIL COUPON in an envelope, or paste on a postcard—NOW!

J. E. SMITH, President, NATIONAL RADIO INSTITUTE, Dept. 8NR, Washington, D. C.

HERE'S PROOF THAT MY TRAINING PAYS

$3,500 a Year in Own Business

"After completing the N. R. I. Course I became Radio Editor of the Buffalo Courier. Later I started a Radio Service business of my own, and average over $3,500 a year."—T. J. TELAAK, 657 Broadway, Buffalo, N.Y.

$10 to $25 a Week in Spare Time

"I am making from $10 to $25 a week in spare time while still holding my regular job as a machinist. I owe my success to N. R. I."—WM. F. RUPP, 205 Front St., Conshohocken, Pa.

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I want to prove that my training is practical, gives money-making information, that it is easy to understand—that it is just what you need to master Radio. My lesson text, "Radio Receiver Troubles—Their Cause and Remedy" covers a long list of Radio receiver troubles in A.C., D.C., battery universal, auto, T. R. F., superheterodyne, all-wave and other types of sets. 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 the lesson Free. No obligation. Just mail coupon.

Mail this Now Get 64-page Book FREE

J. E. SMITH, President, Dept. 8NR,
National Radio Institute,
Washington, D. C.

Dear Mr. Smith: I want to take advantage of your offer. Without obligating me, send me your Free Lesson and your book "Rich Rewards in Radio." (Please write plainly.)

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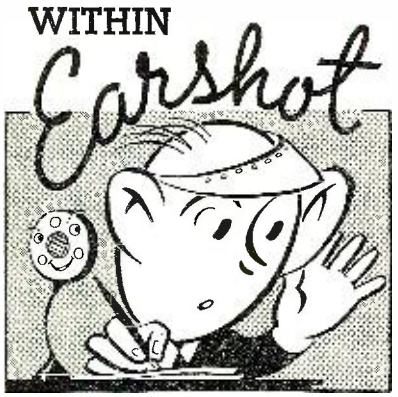


OF THE EDITOR

TELEVISION has been given a boost in Indianapolis by the Y. M. C. A. there. A group there has been formed into a ham club to construct televisors and television receivers. The signals are sent to the members over a regularly licensed ham station operating in the 5 meter band. Excellent results have been reported with the initial tests. The Indianapolis Y. M. C. A. claim to be the first ham club to do this. Are there any other clubs that dispute this claim? In any event, our congratulations to this fine, enterprising bunch.

* * *

THE "Dot & Dash" contest that we mentioned in our last month's column brought forth a great number of replies. Many were quite right, but came too late. Even when we got down to deciding, we had to pick the winner as the one who most closely approximated the correct answer, using *proper terms*. The winnah, gentle readers, is Mr. Les Hague, Apt. C4, 2804 33rd Ave., Astoria, L. I., N. Y., who not only gave the right answer but also gave the proper terms to the various components of the answer. Congratulations to all who participated and extra fb congrats to Brother Hague for his work. The correct solution lies in the time unit necessary to space one character from the next. An entire article written on this by a code expert will appear in a forthcoming issue of R. N. Watch for it.

* * *

EVERY mail brings us inquiries from young men and sometimes young women who want to make radio their life's work. They ask us to recommend a course of study and procedure to them. Leaving out the girls we will try to tell these young hopefuls what it is all about and what method we would pursue in breaking into this greatest of all fields.

There is not any doubt that radio has advanced far beyond the tinkering stage, and no longer can a young man prepare himself for the future by learning at a home-made work bench, although that, too, has its place in the scheme of things. Rather must he decide the branch of the industry for which he wishes to fit himself. Radio runs the gamut of pretty nearly everything, from drama of the stage, as prepared for the microphone, to servicing radio sets under the competent instruction

(*More Earshot on page* 55)

RADIO NEWS

Including Articles on AMATEUR TELEVISION

DECEMBER 1938
VOL. 20 NO. 6

The Magazine for the radio amateur experimenter, serviceman & dealer

Contents

RADIO NEWS is published monthly by the Ziff-Davis Publishing Company at 608 S. Dearborn St., Chicago, Ill. William B. Ziff, Publisher; B. G. Davis, Editor; A. F. Maple, Executive Assistant; Karl A. Kopetzky, W9QEA, Managing Editor; E. Stanton Brown, Associate Editor; Herman R. Bollin, Art Director; John H. Reardon, Circulation Director. New York Office, 381 Fourth Ave. Subscription $2.50 per year; single copies, 25 cents; foreign postage $1.00 per year additional, except Canada. Entered as second class matter, March 9, 1938, at the Post Office, Chicago, Illinois, under the Act of March 3, 1879. Contributors should retain a copy of contributions. All submitted material must contain return postage. Contributions will be handled with reasonable care, but this magazine assumes no responsibility for their safety. Accepted material is subject to whatever revisions necessary to meet requirements. Payment will be made at our current rates upon acceptance and, unless otherwise specified by the contributor, all photographs and drawings will be considered as constituting a part of the manuscript in making payment.

3 TUBE KIT

IT'S FUN TO BUILD IT IN ONE EVENING!

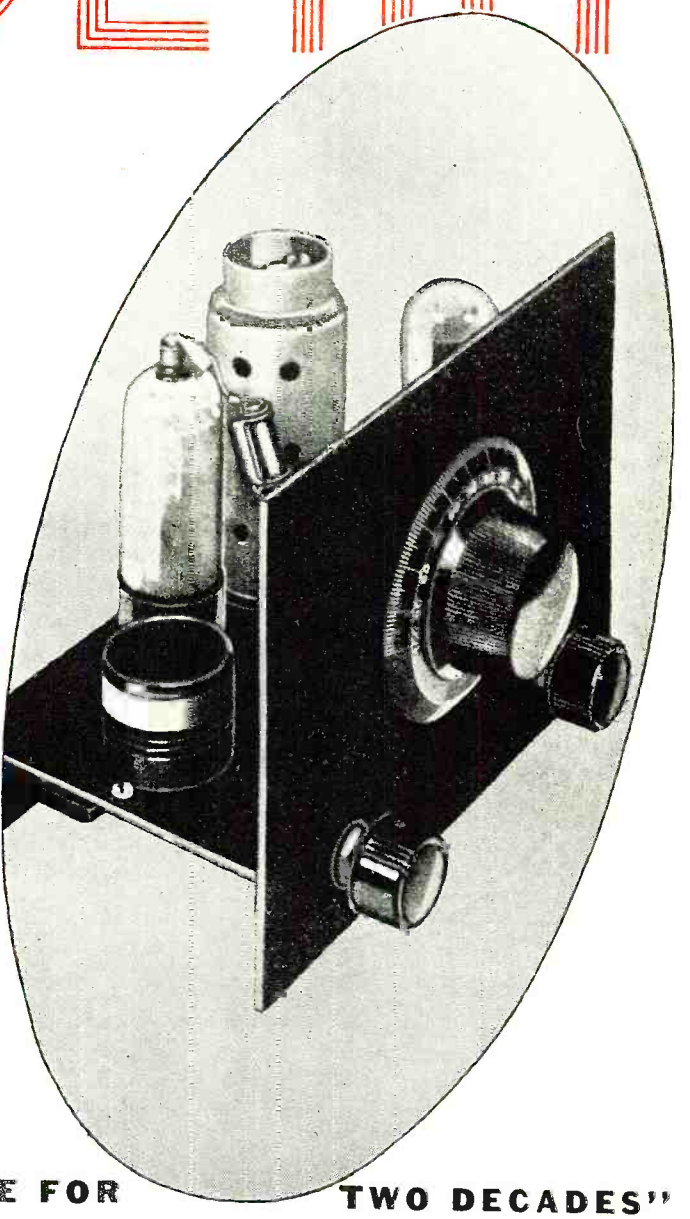
These new Meissner Kits are remarkable little radio receivers—efficient in operation—and very easy to assemble.

This 3-Tube Model will operate a magnetic or permanent-magnet speaker. Utilizes the very last word in battery set engineering—the 1½-volt series of tubes! Has three controls—tuning, regeneration and volume.

Each Kit comes to you in a package—complete with all parts necessary for the construction of a complete receiver including panel, chassis, sockets, resistors, condensers, wire, hardware and a broadcast band plug-in coil. Does not include tubes, batteries or speaker.

AND IT IS GUARANTEED TO WORK OR MEISSNER WILL FIX IT FOR YOU!

$3.75



2-TUBE KIT!

Same as Model described above except no volume control. Operates a headphone.

$3.00

1-TUBE KIT!

A practical little 1-Tube receiver that really works. Looks like the illustration except no volume control. Operates a headphone.

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"A FAMOUS NAME FOR TWO DECADES"

ASK YOUR PARTS JOBBER!

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Meissner Mfg. Co., Dept. RN-12
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Please rush me information on
☐ 3, 2 and 1-Tube Kits.
☐ Larger Kits.

Name.....

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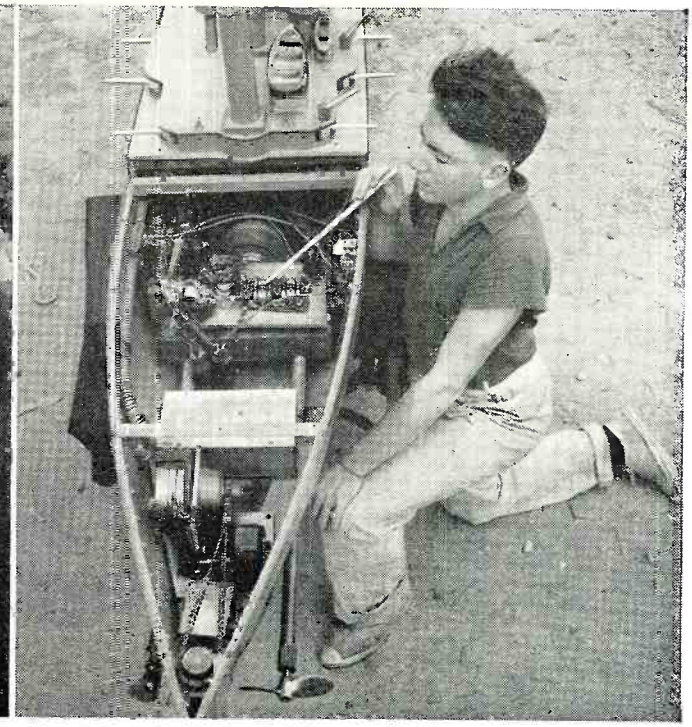
Engineer Howard E. Bixby's radio controlled fleet of models.

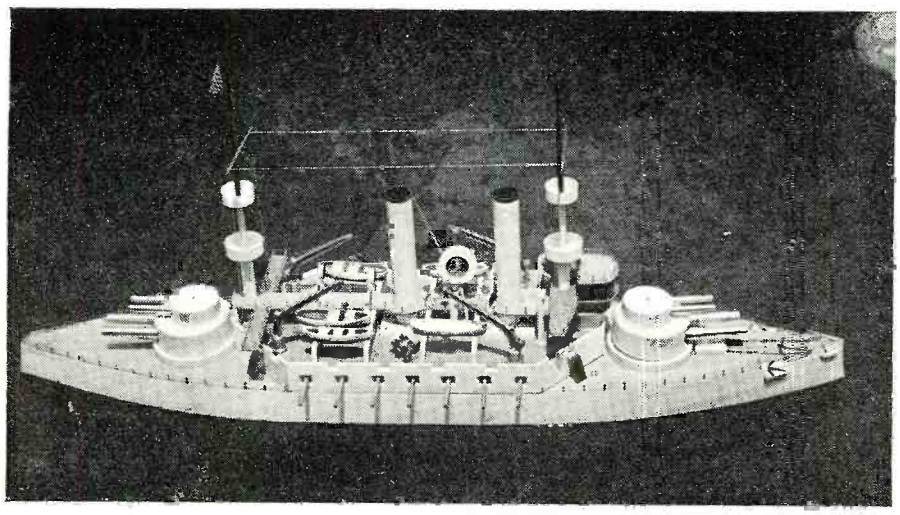


Model U. S. S. "California" is controlled by means of many relays.

Radio Controlled

by ANDREW R. BOONE
Los Angeles, California

Maneuvered by radio wave impulses or by whistles, the model navy moves at the will of its designer. Real shells can be fired from the guns by radio.

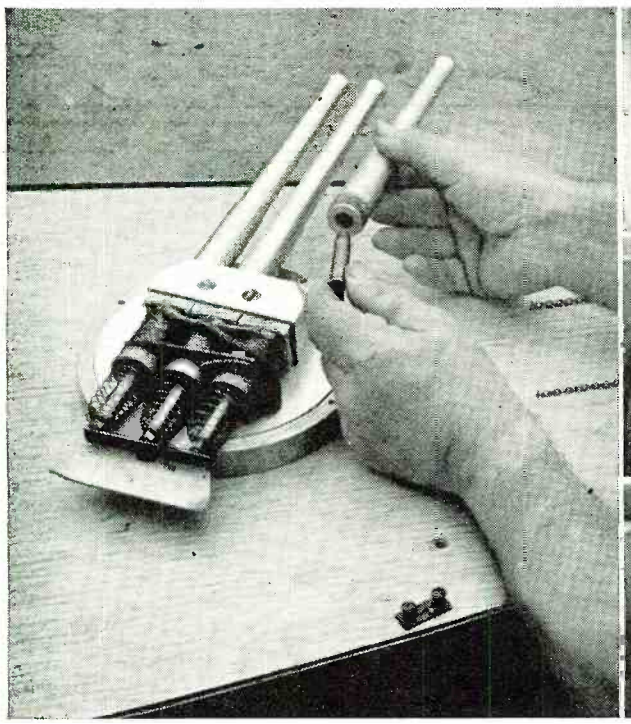


Microphone slung between U. S. S. "Kentucky's" stacks picks up controlling sounds.

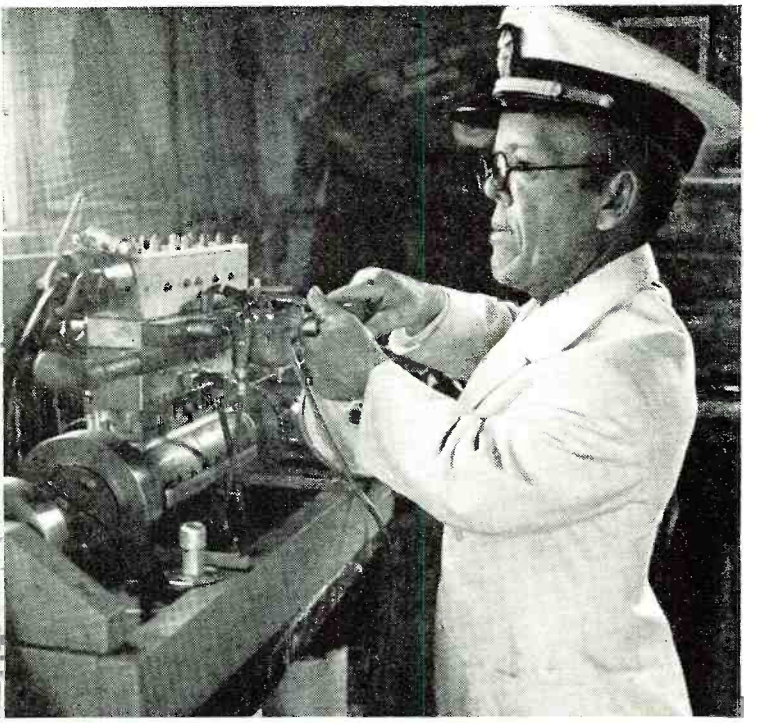
AMAZINGLY like full-scale ships of the American Navy boats of a miniature fleet built by Howard E. Bixby, retired electrical engineer of Glendale, California, not only sail on the ocean, but are maneuvered by radio and sound. As Bixby stands on shore or rides in a nearby boat, swinging an ordinary telephone dial or whistling, the *California* and *Kentucky*, newest members of his navy, start, stop, maneuver and fire guns as he directs.

Five ships constitute the novel fleet. Bixby started several years ago by building scale replicas of the *Monitor* and *Merrimac*. Later he constructed the *Oregon*, following her with the *Kentucky* and *California*, replica of the United States Fleet's present flagship. Thus he has preserved specimens of principal capital ships representing five periods in the navy's evolution.

Since boyhood, Mr. Bixby has been building models, and he developed the idea of controlling both the ships themselves and the guns they carry when the *U. S. S. Utah* reached the Pacific Coast several years ago and was used as a radio-controlled target for big guns of the battleships. A microphone swung between the masts picks up sound for the *Kentucky*, amplifies and rectifies the signals until they are strong enough to actuate a telephone selector which distributes current to the twin electrical motors which turn the screws, and to solenoids at the base of each gun. Steering is accomplished by stopping one propeller temporarily. The guns on



Forward turret uses .38 cal. shells fired with solenoids.



Mr. Bixby tinkers with the U. S. S. "California" 4 cyl., 5 H.P. gas motor.

Model Navy

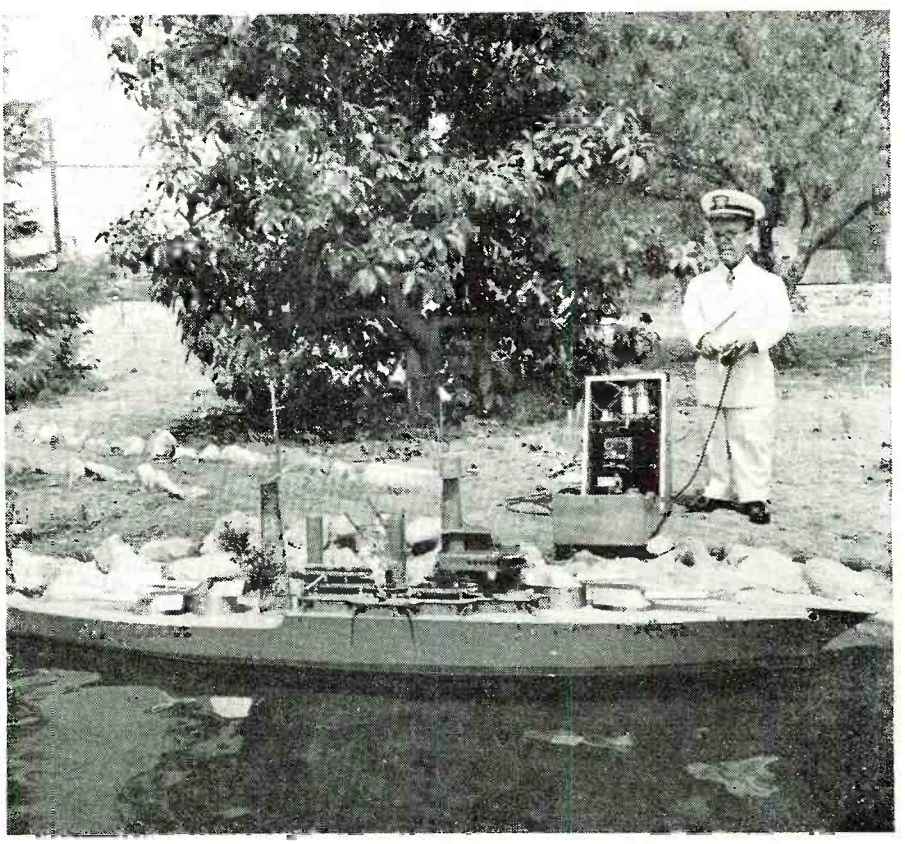
the U.S.S. *Kentucky* are fired individually.

To control the *California*, which is driven at a speed of 12-15 m.p.h. by a four-cylinder 5-h.p. gasoline engine, Mr. Bixby swings the dial of an ordinary telephone transmitter, which sends impulses over the 160 meter band. These signals open and close the throttle, swing the rudder, reverse the screws, swing the turrets and fire the guns. When he dials "5," the *California* goes ahead; "8" revolves the turrets; "9" fires the turret guns; "7" fires the broadside batteries; "6" returns the controls to neutral; "3" closes the throttle. Twenty-four guns, 12 in the main batteries firing .38 caliber shells, and 12 in the broadside batteries firing .22s, are mounted on the *California*. Broadsides may be fired in series from both sides of the ship, or one may be withheld for a later radio command.

The *Kentucky* weighs only 150 lbs., and is launched by two boys lowering her into the water. When he comes to placing the 350-lb. *California* in a bay or the Pacific Ocean, Mr. Bixby removes her superstructure and first launches the hull. After ballasting and balancing her with scrap steel, the rear deck, on which are mounted the two after turrets, is placed in position, followed by the fore deck, with main batteries and forward turrets. Unlike the *Kentucky*, the *California* is steered by a mechanism which swings her rudder to port and starboard.

Three gallons of gasoline are carried in

(*Turn to page 62, please*)



Using a telephone dial, Mr. Bixby controls the movements of his model radio navy.

Scoop! $25 W...

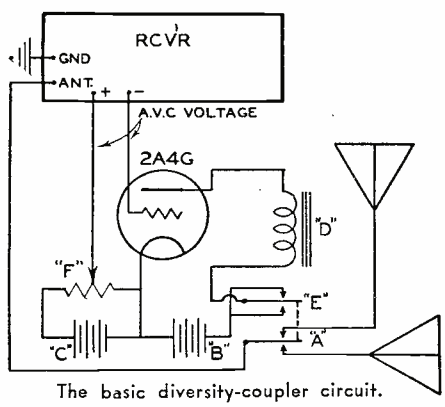
Equip Your Superhet fo... ...ual Diversity Receptio...

by McMURDO SILVER
Chief Engineer, McMurdo Silver Corporation
Chicago, Illinois

The author describes what the Editors of RADIO NEWS believe will be *the* radio invention of 1938. It will bring dual diversity reception with all its advantages within the grasp of every superhet owner.

EVER since the value of short-wave radio communication was first discovered, consistent effort has been made to overcome the two disadvantages which so seriously mitigate the tremendous advantages inherent in any system of communication capable of spanning long distances at relatively low cost. These two ever-present ills of short-wave transmission and reception are noise interference and fading. With the first the writer is not here concerned, particularly as any means of eliminating or reducing the second ill of fading automatically results in very considerable reduction in noise interference through preventing the signal from fading down into local noise.

During the several years past amateur circles have given increasing thought to the principles and methods of so-called "diversity reception" as disclosed in two papers by Beverage and Peterson which appeared in the April, 1931, *Proceedings of The Institute of Radio Engineers*. These papers set forth what, up to now, have been the only methods generally known by which the effects of fading, or the periodic rise and fall in the strength of a received signal, may be counteracted. Practically speaking, the first method applicable to private radio reception is the use of automatic volume control circuits such as every good broadcast or communication receiver is equipped with today. This method may therefore be ignored for the moment, for though present in almost every modern receiver, fading is still with us—seemingly a bit more aggravated due to wide-spread interest in short-wave reception.



The basic diversity-coupler circuit.

Automatic volume controls' lack of effectiveness is, not that it will not level down a signal as it rises in its fading cycle, but that no A.V.C. system can hold up to constant volume a signal which fades down, first into local noise, and then to inaudibility. Even were the signal fading down toward out not on the way to momentary extinction, its entertainment value and even its communication value, is greatly impaired or lost altogether when it fades down below the local noise and any attempt is made to lift it up, for such attempt in practice always seems to lift the noise up faster than the signal. Despite, therefore, the occasional foreign reference to automatic volume control circuits as "anti-faders", this method must be discarded as of little value in eliminating fading.

Diversity reception takes advantage of the fact that the same signal practically never fades in the same direction at the same time in two different antennae. Thus, given two antennae, either spaced a wave length or more apart as in "space diversity", or in different planes (one vertical, one horizontal) as in "polarized diversity" reception, it is a practically safe assumption that when the signal is fading down in one antenna it will be fading up in the other. This premise is extraordinarily easy to demonstrate, given two antennae, a receiver and single-pole-double-throw switch to connect first one and then the other antenna to the receiver. As the signal fades down, and maybe out, in the first antenna, throwing the switch to select the second antenna will almost invariably bring it back strong. This is the simplest diversity receiving system, and a most effective one.

Since Beverage and Peterson suggested the desirability of combining the signal received in two or more antennae for telephone reception some years ago, it seems that all thought upon the subject has since started from this premise. Thus, a diversity receiver today is thought of as actually two complete receivers from antenna through audio detector, where their demodulated audio signals are combined into one. The reasons for this use of what is substantially two separate receivers (for a two antennae system) lies in the fact that the signal from the two separate antennae cannot be combined before demodulation.

This will be clear if we consider the nature of fading itself. Fading is due to the single desired signal reaching the receiver over two or more atmospheric paths of unequal and varying length. This is due to variation, slow or rapid, in the path conditions between transmitter and receiver. Thus, the receiver must deal with not one, but two or more signals—identical presumably in modulation and carrier frequency, but arriving at the receiver at different times. At one instant these signals arrive in such manner that they add together, which condition prevails at the "top" of a fade, while the next instant their time of arrival is such that one cancels the other completely out, and nothing is heard. **In**

McMurdo Silver, in his laboratory, demonstrates the foundation-piece of the diversity-coupler which is an unusual ratchet relay.

between these extremes, the two or more signals add or subtract in greater or lesser degree, depending upon their respective arrival times.

This inherent explanation of the phenomena of fading signals is the very reason that the several signals arriving at different instants of time may not be combined at radio or intermediate frequencies for the very time difference, or phase shift, which is causing the fading prevents their advantageous combination. But they can be combined at audio frequency, or after detection. Thus, the diversity receiver usually consists of two radio receivers the detector output of which is combined. Each receiver has its own antenna, upon the sound assumption that as the signal contributed by one receiver falls, that contributed by the other rises. To prevent the non-signal-contributing or "weak" receiver, from contributing undesirable noise as its a.v.c. raises its sensitivity to follow the fading signal down into the noise "graveyard", both receivers employ a common a.v.c. system, which, regulated by the strong-signal-contributing receiver, prevents the weak-signal receiver introducing noise. Obviously, this type of reception is not limited to only two antennae and two receivers —it is limited only by the pocket-book, and may employ two, three, four, or more antennae and receivers.

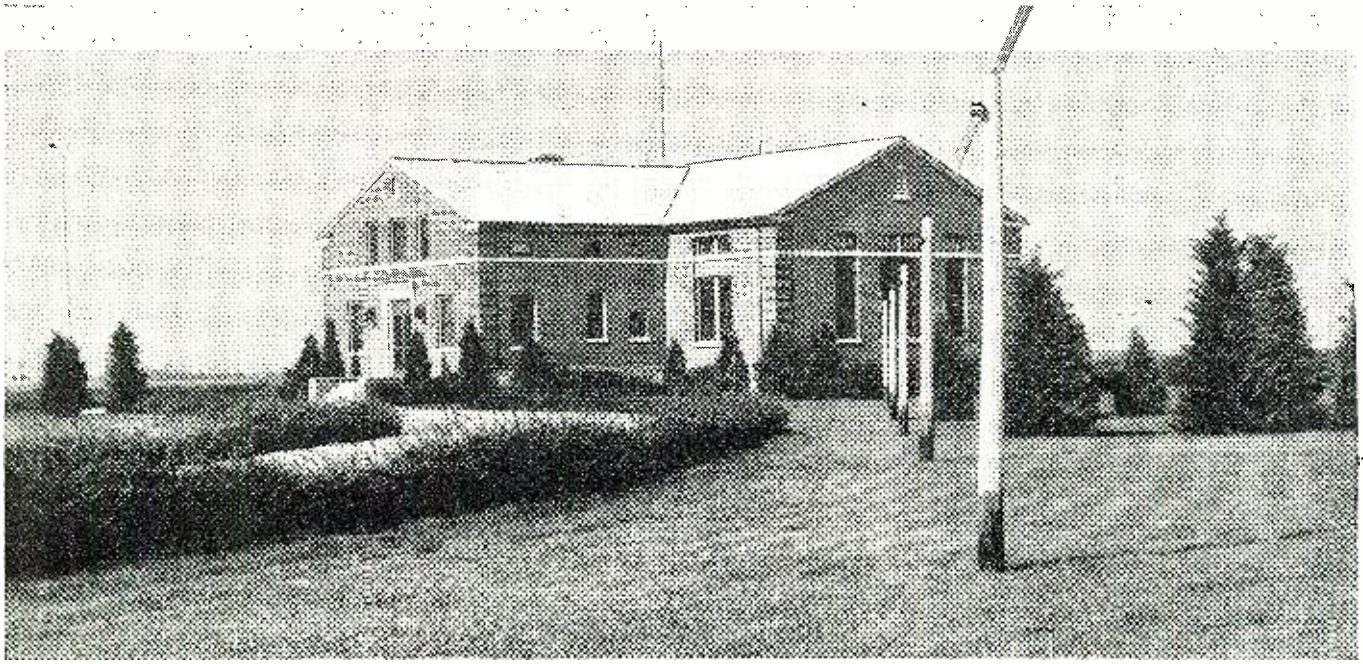
In practice, the gain from more than two channels, or a dual-diversity system, is expensive. Fading is eliminated by "averaging" the fading of the same signal received in two antennae, the actual gain obtained through combination having been estimated by one of America's largest engineering laboratories at 6/10 of one decibel —a negligible average signal strength gain considering the cost involved, but a tremendous advantage in keeping fading signals up out of the noise.

Every amateur or broadcast listener would love to possess a diversity receiver, but the cost of such a unit, coupled with the need of junking his present receiver, prevents wide-spread use of diversity reception. For some time past the writer has considered this problem, and upon the principle that there are almost invariably at least two ways of doing any job, has carefully perused the literature of the art, not to mention having burned much midnight oil on the problem. The net result is what is believed to be an essentially new solution of the fading problem—a solution which in being applicable to *any good modern* superheterodyne receiver at very small additional expense, brings the anti-fading benefits of diversity reception within the reach of all.

Neglecting chronological presentation of the developments which resulted in the system about to be described, it might be said to have started from a realization of the benefits obtained through the use of a simple manual switch to select whichever one of several antennae gave the strongest signal at any given instant of fade. Thus, by using *one or the other* of two antennae in a dual system, the cost and complication of a dual receiver to combine their audio outputs, of which only the strongest is really useful, would be completely escaped. From an average volume standpoint, this entailed no objection, since the combining benefits of the dual-receiver scheme were only 6/10th of one decibel, or less than the listener could ever hear—certainly 6/10th of one decibel are not worth the doubling receiver cost to obtain. In brief, there was little point in seeking to combine the two versions of the same signal found in two different antennae, and there was nothing to combine when the signal in one had faded out while the other antennae provided the strong signal!

The single disadvantage of such a switching system would lie in its discontinuous function — the inability to use vacuum tubes economically to connect first one and then the other antenna to the single receiver. Because this function was discontinuous, a mechanical switch was indicated, and proved the best practical and economical way of doing the job. Such a means of alternately connecting one or the other of two (or more) antennae to one receiver would result in an audible "click" every time the change over was made. This click would only occur once to each

(*Fade in page* 48, *please*)

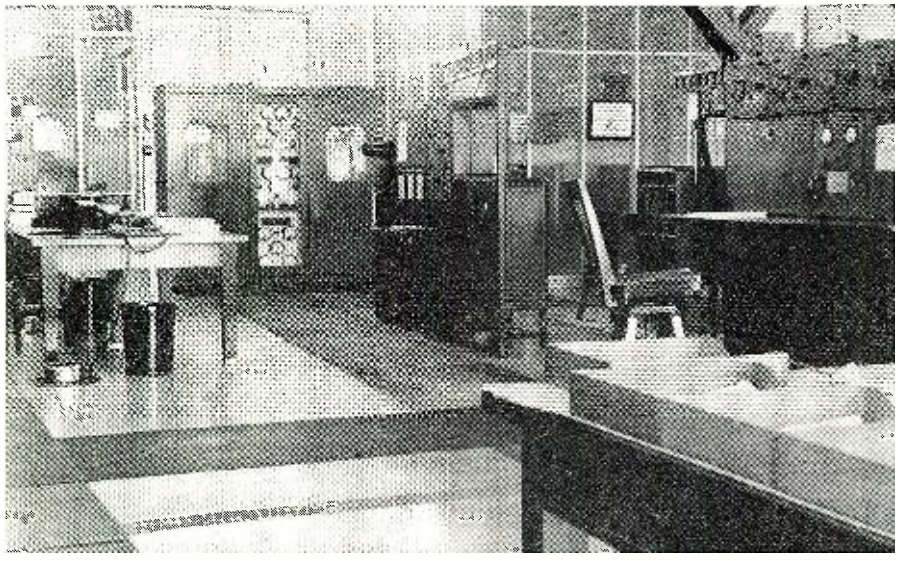


Situated on a plain, near the geographical center of the U. S. is the world's biggest monitoring station, maintained by our Government.

GRAND ISLAND
-Where Pink Slips Are Born

by STANLEY JOHNSON, W9LBV
Grand Island, Nebraska

Often have we wondered what sort of place the birthplace of the infamous "Pink Slip" was. The author describes this most interesting receiving station where DX is very commonplace.



Nary a transmitter in sight in the main room of the Grand Island Monitoring Station.

EVERY good radio operator, whether he is a "ham," a broadcast engineer, or a seagoing "sparks," has heard of Grand Island, Nebraska. Most "bad" radio operators have heard from it, since the government monitoring station, which polices the radio lanes of the world, is located a few miles west of this midwestern city. The station houses radio's equivalent of the "G-men."

However, unlike the "G-men," radio inspectors seldom deal with cases which are clearly of a criminal nature. Most violations of radio regulations are the result of maladjustment of equipment or errors in operating technic. For this reason, the usual penalty is a simple statement of the nature of the offense and a notice to explain how it happened. The revocation of a license, which may, of course, spell financial ruin for a broadcasting station or deprive an operator of his means of earning a living, is regarded as a severe penalty. Fines and imprisonment are rare and their occasional imposition only serves to re-

mind those who have the urge to violate radio laws that the laws have teeth in them.

There are several monitoring stations in the United States but the largest in this country, or for that matter the world, is that located at Grand Island, Nebraska. The stations are maintained by the Federal Communications Commission.

Tourists from other states who visit the Grand Island station are first of all impressed with the plains country in which it is located. The land is extremely flat, with only occasional clumps of trees. The buildings for the station stand alone on a bare square mile of land, with but two farmhouses closer than half a mile. Airway warning lights, on top of the antenna masts of the station, are visible from the transcontinental Lincoln Highway (No. 30) three miles south. There are not even power lines to break the bareness of the scene, all of the wires being brought in underground.

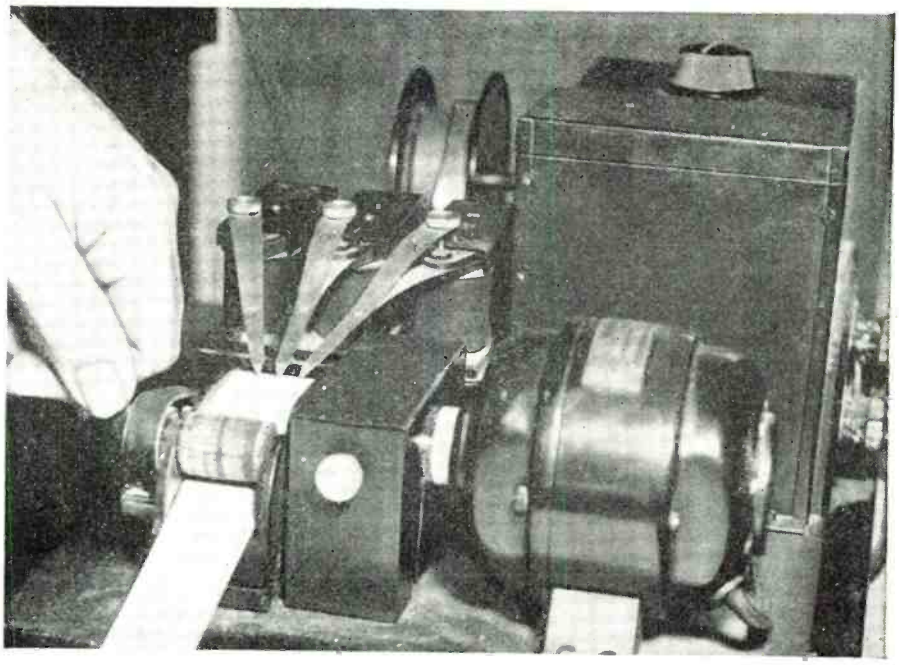
The "wide open" location of the station helps to make the spot a paradise for radio reception. Since the antennas are higher than any nearby objects and there are no hills to interfere, weak signals are picked up with a minimum of loss. Too, since the land is so flat, the station's directive antennas can extend in perfectly straight lines and are extremely effective—signals from all over the world pounding in with "local" strength. "Ham" visitors usually mutter something about "What a spot for rhombics—a couple of rhombics." The chief requirement for the popular rhombic antenna is a backyard the size of a farm.

The location of the station has some important geographical advantages, too. Grand Island is very near the exact center of the United States, less than seventy-five miles from the spot in northern Kansas to which map makers have given that distinction. Thus radio stations on either coast can be picked up with approximately the same signal strength and with a minimum of interference from each other. Another feature of the location is its freedom from nearby broadcasting stations which might block the signals from weak, distant transmitters. The nearest broadcasting station is KMMJ in Clay Center, Nebraska, a distance of approximately 30 miles, airline. The 20,000 watt KFAB, Lincoln, is the closest high power station and it is almost 100 miles away.

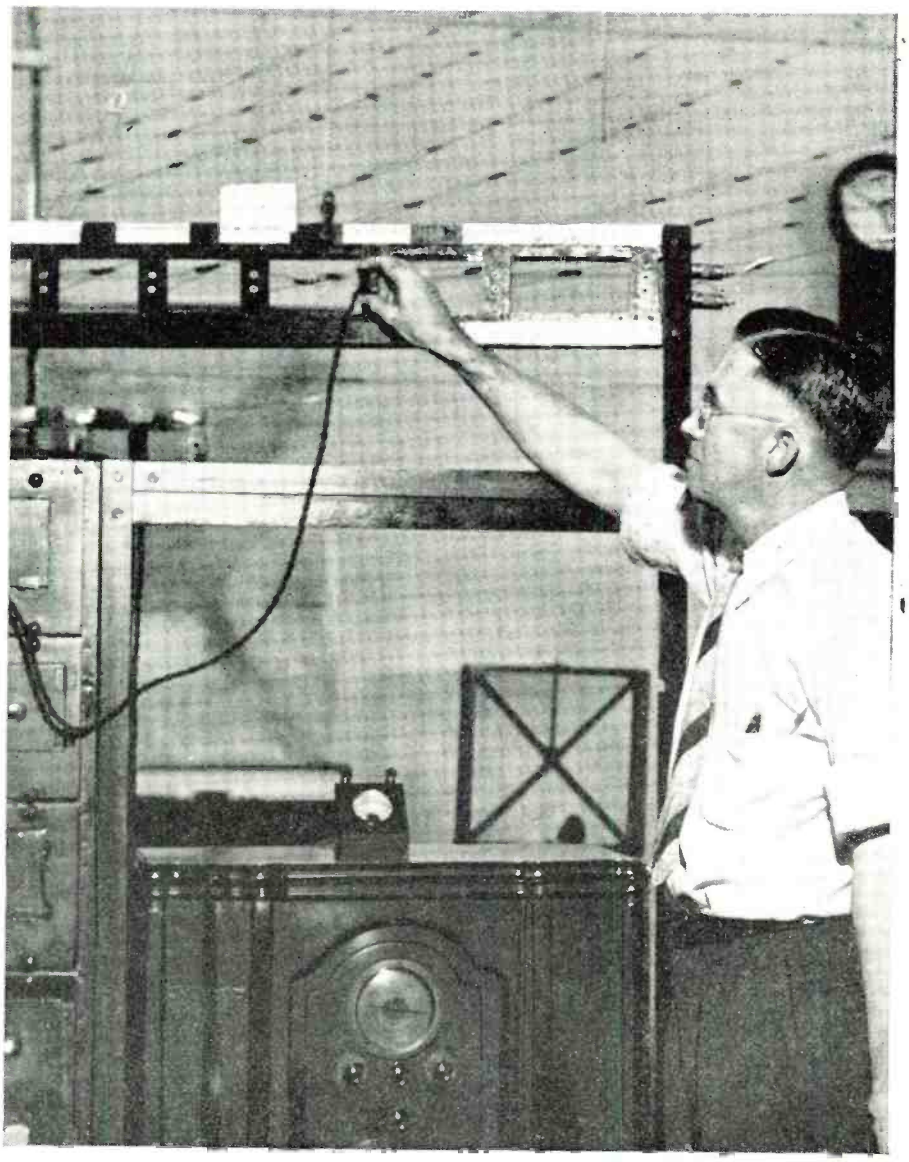
Grand Island, a city of twenty thousand, stands in the heart of a rich farm trading area—making it an ideal spot for a broadcasting station—but when the monitoring station was proposed, city officials promised that no commercial transmitters would be erected in the city. So far, this promise has been kept. The only stations on the air in the Grand Island area are half a dozen amateur "rigs," an eight meter police transmitter, and a low power airway beam station located a few miles north of the city.

The monitoring station has no transmitting equipment. All of the necessary apparatus is housed in two brick buildings standing on grounds landscaped with thick grass and low bushes—but no trees of any size. Receiving equipment is in the larger of the two buildings.

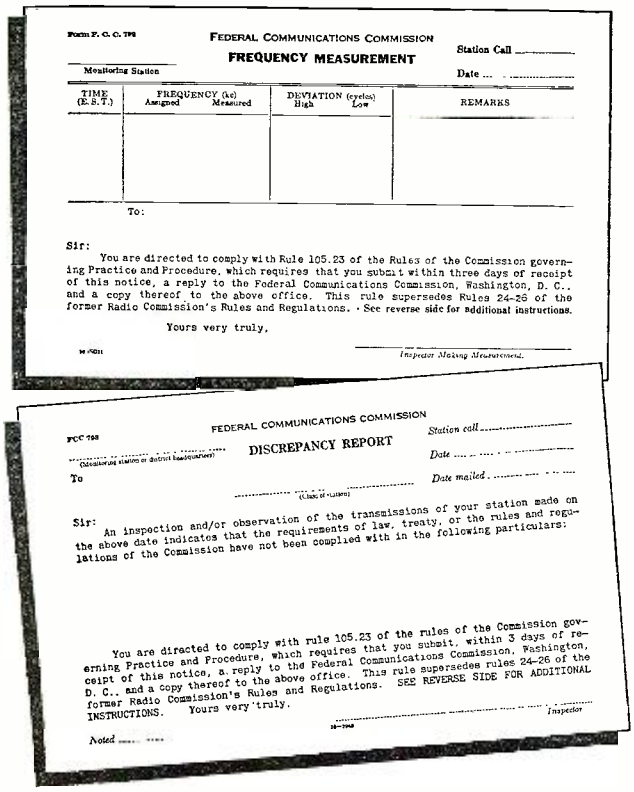
On one side of the entrance hallway is the office of Benjamin Wolf, inspector in charge of the station. Two secretaries as-



An intricate time clock recording system is used for frequency standard checking.



Antennae run in all directions. Clips are used to select the correct receiving pair.



Form F. C. C. 793 — FEDERAL COMMUNICATIONS COMMISSION — FREQUENCY MEASUREMENT — Station Call ____ — Monitoring Station ____ — Date ____

TIME (E.S.T.)	FREQUENCY (kc) Assigned / Measured	DEVIATION (cycles) High / Low	REMARKS

To:

Sir:

You are directed to comply with Rule 105.23 of the Rules of the Commission governing Practice and Procedure, which requires that you submit within three days of receipt of this notice, a reply to the Federal Communications Commission, Washington, D. C., and a copy thereof to the above office. This rule supersedes Rules 24-26 of the former Radio Commission's Rules and Regulations. · See reverse side for additional instructions.

Yours very truly,

Inspector Making Measurement.

FCC 788 — FEDERAL COMMUNICATIONS COMMISSION — DISCREPANCY REPORT — Station call ____ — Date ____ — Date mailed ____

To ____ (Name of station)

Sir:

An inspection and/or observation of the transmissions of your station made on the above date indicates that the requirements of law, treaty, or the rules and regulations of the Commission have not been complied with in the following particulars:

You are directed to comply with rule 105.23 of the rules of the Commission governing Practice and Procedure, which requires that you submit, within 3 days of receipt of this notice, a reply to the Federal Communications Commission, Washington, D. C., and a copy thereof to the above office. This rule supersedes rules 24-26 of the former Radio Commission's Rules and Regulations. SEE REVERSE SIDE FOR ADDITIONAL INSTRUCTIONS. Yours very truly,

Inspector

Noted ____

Above, the green frequency measurement slip sometimes sent to hams. Below, the famous "pink slip" which hams usually receive.

sist him with administrative details, which include issuing "pink slips." Across the hall is a well equipped kitchen, the scene of many a "snack" during the long watches. The kitchen also enables the operators to double in brass as cooks and live at the station when blizzards block the roads. Living quarters are provided on the second floor of the building.

The hallway leads to a large room in which all of the monitoring is done. Here the visitor is faced with a maze of receiving and frequency measuring equipment which only the dyed-in-the-wool radio fan can fully appreciate. Arranged in rows of racks, sitting on the floor with aisles between them, are almost every conceivable type of receiver. There is a small detector for picking up signals as high in frequency as 300 megacycles; there are large long wave receivers with direction loops, communications type short wave receivers, chattering receivers inking field strength charts, frequency meters in long racks, and overhead, dozens of transposed antenna leadins terminating in jacks above the receiver panels. At the north end of the room are two large booths, completely enclosed by copper screen shield. In one of these is the multi-range multivibrator, in the other the complex radio clocks which measure radio frequencies by comparing them with time signals. Between the two booths stands the rack of the primary frequency standard.

This primary frequency standard is perhaps the most unusual technical feature of the station. It is, in brief, an oscillator maintaining a definite and known frequency which is used as a standard for frequency measurement. There are two of these primary oscillators, both on the same frequency which can be used alone, in case of breakdown. Extraordinary precautions are taken to hold them on one frequency. The oscillators use low drift crystals mounted in temperature ovens to keep the temperature constant. To avoid vibration, they are suspended from long springs. Then, as a final precaution, each oscillator is mounted in a glass bell jar from which the air is exhausted by an electric pump which starts automatically when the air pressure changes.

Checking the frequency of these oscillators is quite a problem for the simple reason that there are few standards in the world of equal, let alone greater accuracy. For this reason, the oscillators are checked by a complicated process involving time signals. A string of frequency dividers splits up the 100 kilocycle fundamental into fifty cycles. This fifty cycle current is used to run a synchronous clock in somewhat the same fashion as the sixty cycle current from 110 volt lines turns electric clocks in our homes.

Even barbwire is insulated against QRM.

Inspector Scanlon checks a frequency.

The time signals from each of the two clocks—each of the primary frequency oscillators has its own clock—are fed to a stylus arm of a tape recorder. The operator tunes in the time signals from NAA (time signals are often broadcast over radio stations as "tone beats" to indicate time) and feeds it to the center of the three stylus arms, the signals from the oscillators' clocks actuating the stylus arms on either side. The three arms make impressions on the tape and record seconds as visible changes in the lines, a "hump" in a line showing a second. By measuring with a centimeter rule the length of the seconds made on the tape by the oscillator clocks and comparing this with the seconds made on the tape by the NAA time signals (which are of extreme accuracy), the operator can, with a simple mathematical formula, determine the error, if any, in the frequency of the primary standard.

The primary standard serves as a basis for most frequency measurement at the station. First of all, however, the signal must be picked up. One feature of the monitoring station which is often a surprise to radio minded visitors, who expect "super" receivers, is that the short wave sets are standard communication types of the sort available from any large radio dealer. The ability of the station to pick up DX results more from the antenna system than from the sensitivity of the receivers. The operator can select an antenna for any given direction which will greatly increase the strength of the signal to be received and will usually reduce interference from other stations. For example, if it is desired to monitor a station in Oregon which is on the same frequency as a station in Oklahoma, by selecting an antenna which is directional toward Oregon the desired signal can be built up and the interfering signal almost eliminated.

Most of the frequency measurements are made in the primary measuring rack, which like the clocks is inclosed in a booth shielded with screen. The rack contains several different types of oscillators, including four multivibrators, the latter furnishing a useful signal every ten kilocycles to as high a frequency as 30 megacycles. The multivibrators are controlled by the primary standard so the ten kilocycle harmonics are very accurate, giving the operator "marker" signals to shoot at.

To describe "how" a signal is measured for frequency, it is best to consider first the procedure by which amateur stations are measured because the process is not quite so involved as that used for checking broadcast band stations. The initial step is tuning in the signal on one of the receivers. Then the heterodyne frequency meter in the measuring rack is set to zero beat with the received signal and the dial setting noted. The multivibrator is switched on and the operator notices the frequency meter dial readings for the ten kilocycle multivibrator harmonics above and below the signal to be measured. The frequency of each of these multivibrator harmonics is known and can quickly be ascertained by

(*Monitor further on page 66*)

Serviceman's Experiences

by LEE SHELDON
Chicago, Illinois

While business may be slow when you leave the shop, don't take the afternoon off. Something may break while you are out to bring in many rush repair jobs.

A FEW days ago we got a call from a sugary woman who wanted service on her Stromberg. Al wiped the honey from the earpiece, hung up, and gave me the address.

"Get going," he said, "but keep your mind on your work!"

"That's a fine way to talk," I remonstrated, "after I've worn my test prods down to the bakelite for you. It's not fair to condemn me because of a customer I've never met. You should know by this time nothing can ever come between me and a defective set."

"I'm just warning you," Al replied. "Many a call is put in because the set owner, not the set, needs attention. This girl was entirely too cordial—no woman ever got glamorous on a rainy afternoon simply because her set stopped playing."

"You can rely on me to steer a profitable course," I said, with excusable pique. "Cleopatra herself couldn't take the wind out of *my* sales!"

The week before, my partner had taken me to task for shooting a game of peapool during business hours. It did no good to remind him that I had been playing with a customer, and therefore was increasing goodwill. He answered with a five-letter plural which concerned sixteen articles used in the game, and he indicated that while a radio man should know his peas and cues, he should never try to mix business with pleasure.

Thinking along these lines, I couldn't help being nervous when I rang Miss Carlson's bell. She opened the door tentatively, and I saw she had nice eyes.

"Salutary Service!" I announced, in a strictly businesslike manner. "I have come to bring music back into your home!"

"How sweet of you! Please come in," she said, as if the apartment had been rented just for the purpose of making our meeting possible.

"Beware, beware," I repeated to myself as I entered and looked about for the set. All I could see were soft furnishings: drapes, pillows, and carpets. The room had a dead sound, but my heart didn't.

"Where is the Stromberg?" I asked, in sudden alarm.

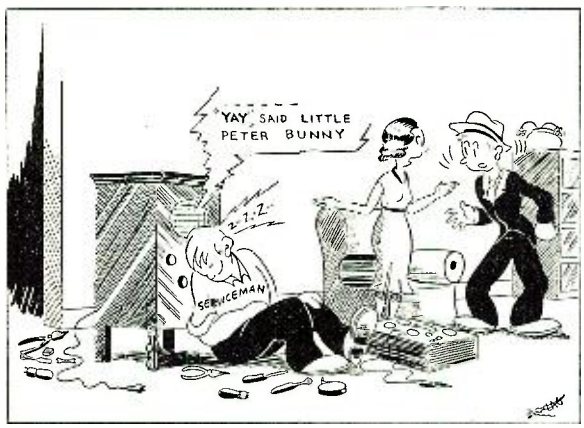
"Right in front of you," she answered. "I hope you don't mind the way I'm dressed," she continued, socially.

I had noticed she wore fancier clothes than were required for the usual repair job, but I lied, "Not at all," and got a firmer grip on my analyzer. It weighs about ten pounds, and, with the proper handling, becomes an excellent weapon of defense. "I hope you don't mind the way *I'm* dressed, either," I added.

"Certainly not," she said. "Many a shiny suit reflects an honest character. You can work on the radio while I go and change my dress, can't you?"

I couldn't have if she didn't. I glanced after her as she left the room. She *did* have nice eyes.

The weather seemed unseasonably warm, so I opened a window before I went to work. Nothing was wrong with the set except weak tubes. I replaced all of them, made out a bill, and sat uncomfortably on my tube kit. If I'd suspected my good appearance was going to get me into a situation like this, I'd have asked Al to answer the call. I wondered how men were in the Carlson family; it's easy for an innocent serviceman to get into a jam where his face is in danger of being broken into.



"I made a mistake and called him during 'Slumber Hour.'"

She came back, okayed the bill, but said she didn't have change. She glanced out of the window, turned to me and asked: "Do me a favor?"

"Of course," I said, confusedly forgetting Al's warning.

"I have tickets to an amateur theatrical that starts in fifteen minutes, and can't get a taxi in this pouring rain. Could you drive me to that big residence on Fiftieth Avenue and Shell Street?"

"After you," I said, bowing gallantly as I opened the door of a clothes-closet.

"Let's go out *this* way," she said, waving toward the hall. "Quicker, and saves tearing a hole in the wall."

When we reached the theater, she remarked: "I have an extra ticket—want to see the show with me? Just an informal gathering of neighbors. Lasts about an hour."

Right then I should have refused, asked her to settle the bill, and gone back to the shop. But I didn't—those eyes got me. Anyway, business had been very slow lately; what difference would another hour or so make, as long as I had been out longer than I should already? Then, too, I was naturally curious to learn whether that avid look in her eye meant infatuation or hunger.

I parked the car and returned to the frame house. The largest room had about a hundred chairs in it, facing a curtained end which was to serve as a stage. I recognized several customers in the audience, and didn't have nerve enough to walk among them to my hostess. She wasn't exactly inconspicuous, and if those women saw me with her during business hours, the whole county would tell Al of it. It wouldn't have helped the store reputation any, either.

Suddenly, a rush of conscience went to my head, and I decided to let Al know I wouldn't be back when he expected me. There was a little time before the lights in the room would be darkened, so I hurried around the house, trying to locate a 'phone. Finally, out of breath, I located a telephone stand in a room where two women and a boy were talking. They stared impolitely as I put in a call for *Salutary Sales & Service,* but they were not customers, so I ignored them.

"That you, Al?" I asked. "Say, I'm having a little trouble with that Stromberg of Miss Carlson's, and I won't be able to get back to the shop for another hour or so."

A Bronx cheer, being rich in overtones, does not carry very faithfully over telephone equipment. I noticed, however, that it carried well enough to startle the three other persons in the room.

The play had begun when I returned to the living-room. The lights had been put out; I tiptoed guiltily to the chair beside my hostess, patted her hand, and said:

"Sorry to be late—had trouble finding a parking space. Did I miss much of the first act?"

"*Miss* it?" she growled, pulling her hand away. "You were *in* it!"

I glanced at the stage; saw two women, a boy and a telephone stand.

It felt good to be out in the street again, even though I hadn't been paid for the tubes. I decided to pay for them myself, rather than to meet her again, and turn the job ticket and money over to Al as if nothing unusual had happened. A woman scorned hath no fury like an aroused business partner.

I unparked the car, and occupied myself with probable excuses for being late as I drove back to the shop. I let the bus bite off as much gas as it could chew. Fortunately, the legal and mechanical limits

(*More Experiences on page* 58)

The New "HAM" Regulations

RADIO NEWS presents the new official Federal Communications Commission Rules Governing Amateur Radio Stations and Amateur Radio Operators.

FEDERAL COMMUNICATIONS COMMISSION

Washington, D. C.

ORDER

In a regular meeting of the Federal Communications Commission held at its offices in Washington, D. C., on the 4th day of October, 1938:

The Commission having under consideration a revision of its rules in respect to the amateur service and having adopted the attached "Rules Governing Amateur Radio Stations and Amateur Radio Operators" to become effective on December 1, 1938.

IT IS ORDERED, That the following rules, which are now in effect, are hereby cancelled as of December 1, 1938:

361	376	402, as amended
362	377	403
364	378	404. as amended
365	379	405
366	380	406
366 (a)	381, as amended	407
367	382. as amended	408
368. as amended	383	409
370	384	410
371. as amended	384 (a)	411
372	385	412
373	386	413
374	387. as amended	414
374 (a)	400	415
375	401	

By the Commission.

(Sgd.) T. J. Slowie,
Secretary.

October 4, 1938.

Table of Contents

PART 150—DEFINITIONS

Sec. 150.01 *Amateur service.* The term "amateur service" means a radio service carried on by amateur stations.

Sec. 150.02 *Amateur station.* The term "amateur station" means a station used by an "amateur," that is, a duly authorized person interested in radio technique solely with a personal aim and without pecuniary interest. It embraces all radio transmitting apparatus at a particular location used for amateur service and operated under a single instrument of authorization.

Sec. 150.03 *Amateur portable station.* The term "amateur portable station" means an amateur station that is portable in fact, that is so constructed that it may conveniently be moved about from place to place for communication, and that is in fact so moved from time to time, but which is not operated while in motion.

Sec. 150.04 *Amateur portable-mobile station.* The term "amateur portable-mobile station" means an amateur station that is portable in fact, that is so constructed that it may conveniently be transferred to or from a mobile unit or from one such unit to another, and that is in fact so transferred from time to time and is ordinarily used while such mobile unit is in motion.

Sec. 150.05 *Amateur radio communication.* The term "amateur radio communication" means radio communication between amateur stations solely with a personal aim and without pecuniary interest.

Sec. 150.06 *Amateur operator.* The term "amateur operator" means a person holding a valid license issued by the Federal Communications Commission authorizing him to operate licensed amateur stations.

PART 151—AMATEUR OPERATORS

Licenses; Privileges

Sec. 151.01 *Eligibility for license.* The following are eligible to apply for amateur operator license and privileges:

Class A—A United State citizen who has within five years of receipt of application held license as an amateur operator for a year or who in lieu thereof qualified under Section 151.20.

Class B—Any United States citizen.

Class C—A United States citizen whose actual residence, address, and station, are more than 125 miles airline from the nearest point where examination is given at least quarterly for Class B; or is shown by physician's certificate to be unable to appear for examination due to protracted disability; or is shown by certificate of the commanding officer to be in a camp of the Civilian Conservation Corps or in the regular military or naval service of the United States at a military post or naval station and unable to appear for Class B examination.

Sec. 151.02 *Classification of operating privileges.* Amateur operating privileges are as follows:

Class A—All amateur privileges.

Class B—Same as Class A except specially limited as in Section 152.28.

Class C—Same as Class B.

Sec. 151.03 *Scope of operator authority.* Amateur operators' licenses are valid only for the operation of licensed amateur stations; *provided, however,* any person holding a valid radio operator's license of any class may operate stations in the experimental service licensed for, and operating on, frequencies above 300,000 kilocycles.

Sec. 151.04 *Posting of license.* The original operator's license shall be posted in a conspicuous place in the room occupied by such operator while on duty or kept in his personal possession and available for inspection at all times while the operator is on duty, except when such license has been filed with application for modification or renewal, or has been mutilated, lost, or destroyed, and application has been made for a duplicate.

Sec. 151.05 *Duplicate license.* Any licensee applying for a duplicate license to replace an original which has been lost, mutilated, or destroyed, shall submit to the Commission such mutilated license or affidavit attesting to the facts regarding the manner in which the original was lost or destroyed. If the original is later found, it or the duplicate shall be returned to the Commission.

Sec. 151.06 *Renewal of amateur operator license.* An amateur operator license may be renewed upon proper application and a showing that within three months of receipt of the application by the Commission the licensee has lawfully operated an amateur station licensed by the Commission, and, that he has communicated by radio with at least three other such amateur stations. Failure to meet the requirements of this section will make it necessary for the applicant to again qualify by examination.

Sec. 151.07 *Who may operate an amateur station.* An amateur station may be operated only by a person holding a valid amateur operator's license, and then only to the extent provided for by the class of privileges for which the operator's license is endorsed. When an amateur station uses radiotelephony (type A-3 emission) the licensee may permit any person to transmit by voice, provided a duly licensed amateur operator maintains control over the emissions by turning the carrier on and off when required and signs the station off after the transmission has been completed.

Examinations

Sec. 151.15 *When required.* Examination is required for a new license as an amateur operator or for change of class of privileges.

Sec. 151.16 *Elements of examination.* The examination for amateur operator privileges will comprise the following elements:

1. Code test—ability to send and receive, in plain language, messages in the International Morse Code at a speed of not less than thirteen words per minute, counting five characters to the word, each numeral or punctuation mark counting as two characters.
2. Amateur radio operation and apparatus, both telephone and telegraph.
3. Provisions of treaty, statute and regulations affecting amateurs.
4. Advanced amateur radiotelephony.

Sec. 151.17 *Elements required for various privileges.* Examinations for Class A privileges will include all four examination elements as specified in Section 151.16.

Examinations for Classes B and C privileges will include elements 1, 2, and 3 as set forth in Section 151.16.

Sec. 151.18 *Manner of conducting examination.* Examinations for Class A and Class B privileges will be conducted by an authorized Commission employee or representative at points specified by the Commission.

Examinations for Class C privileges will be given by volunteer examiner(s), whom the Commission may designate or permit the applicant to select: in the latter event the examiner giving the code test shall be a holder of an amateur license with Class A or B privileges, or have held within five years a license as a professional radiotelegraph operator or have within that time been employed as a radiotelegraph operator in the service of the United States; and the examiner for the written test, if not the same individual, shall be a person of legal age.

Sec. 151.19 *Additional examination for holders of Class C privileges.* The Commission may require a licensee holding Class C privileges to appear at an examining point for a Class B examination. If such licensee fails to appear for examination when directed to do so, or fails to pass the supervisory examination, the license held will be canceled and the holder thereof will not be issued another license for the Class C privileges.

Whenever the holder of Class C amateur operator privileges changes his actual residence or station location to a point where he would not be eligible to apply for Class C privileges in the first instance, or whenever a new examining point is established in a region from which applicants were previously eligible for Class C privileges, such holders of Class C privileges shall within four months thereafter appear at an examining point and be examined for Class B privileges. The license will be canceled if such licensee fails to appear, or fails to pass the examination.

Sec. 151.20 *Examination abridgment.* An applicant for Class A privileges, who holds a license with Class B privileges, will be required to pass only the added examination element No. 4 (see Section 151.16).

A holder of Class C privileges will not be accorded an abridged examination for either Class B or Class A privileges.

An applicant who has held a license for the class of privileges specified below, within five years prior to receipt of application, credited with examination elements as follows:

Class of license or privileges	Credits
Commercial extra first	Elements 1, 2 & 4
Radiotelegraph 1st, 2nd, or 3rd	Elements 1 & 2
Radiotelephone 1st or 2nd	Elements 2 & 4
Class A	Elements 2 & 4

No examination credit is given on account of license of Radiotelephone 3rd Class, nor for other class of license or privileges not above listed.

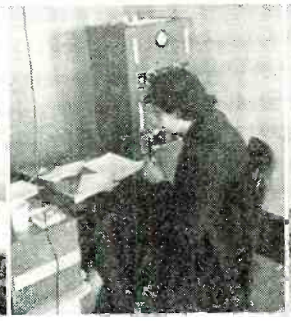
Sec. 151.21 *Examination procedure.* Applicants shall write examinations in longhand,—code tests and diagrams in ink or pencil, written tests in ink—except that applicants unable to do so because of physical disability may typewrite or dictate their ex-

(*Continued on page 42*)

RADIOPIX

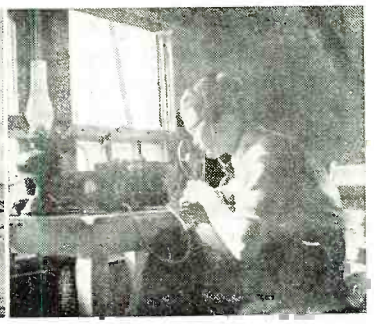
Four Pictures from East Coast Hurricane Zone.

Norman MacKenzie, W2GGV, at State Police Barracks, Bayshore, L. I.

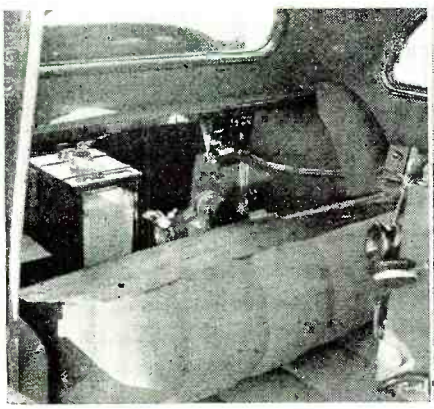


Vi Grossman, W2JZX, L.I. Emergency Coordinator.

Bill Meissner, W2HYG, at his shack at Ocean Beach, L. I.

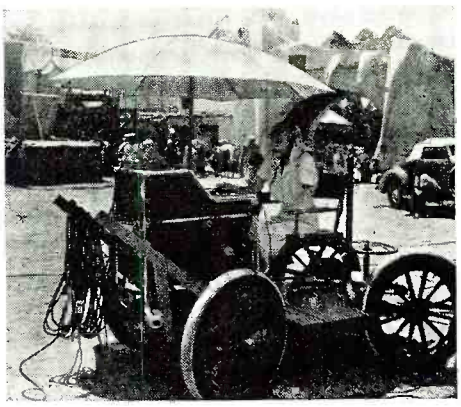


Dave Gordon, W2KXC, operating during the emergency. Fire Island.



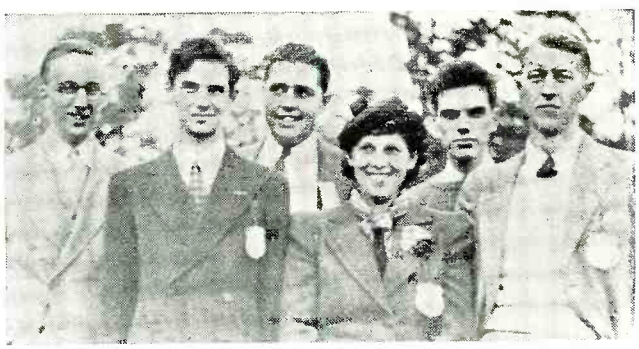
CBS uses this mobile unit with which to make field intensity surveys. Note graph.

Engineer Sandretta of United Air Lines points to his new radio-beam altimeter.

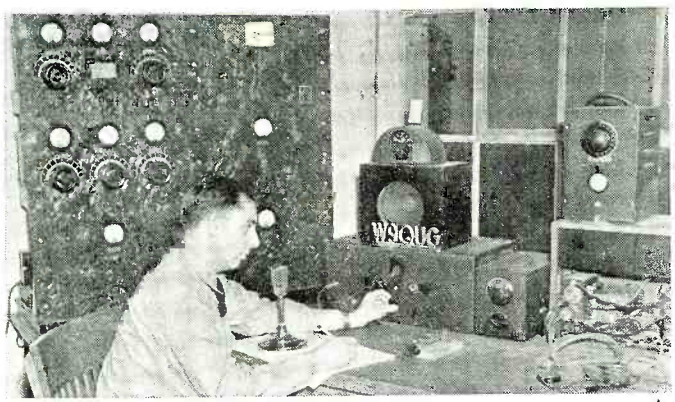


Movie-makers sound equipment. A movable truck carries all necessary amplifiers.

Ray E. Everly listens for a distant station. He has a high dx quota. ←

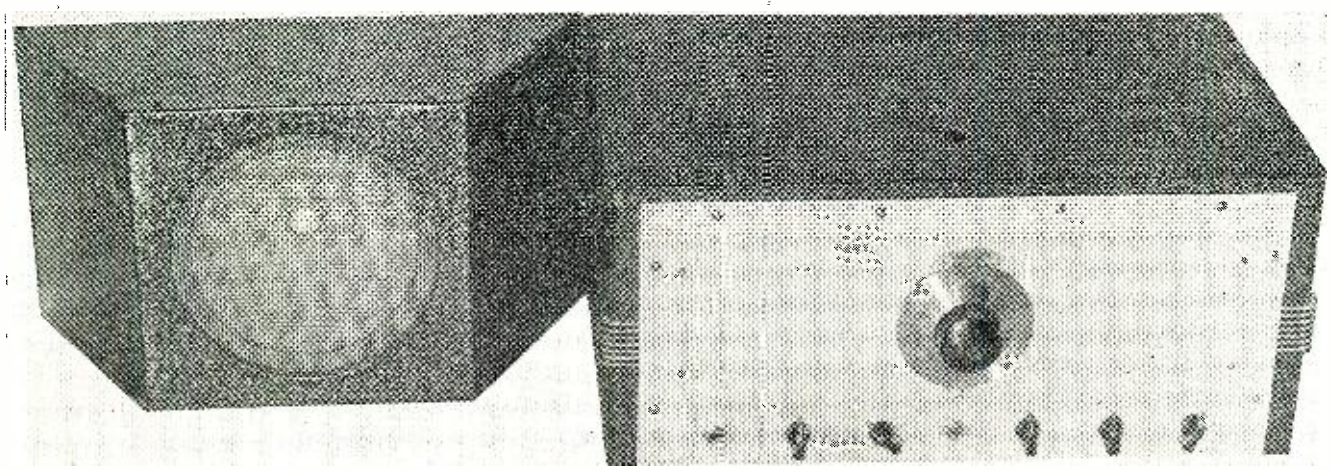


→ Emergency ham operators of the East Coast Hurricane. Left to right: W2JTG, W2LJJ, W2-DXO, W2JZX, W2LAH & W2HYJ, all of whom did their best to help.



Ham rig of 109th Air Sq., 34th Div., Holman Airport, St. Paul, Minn. ↑

After 16 years of service, the old crystal set still brings 'em in.



Commercial in every respect, the new Jones Receiver is fairly easy to build and will make a welcome addition to any shack.

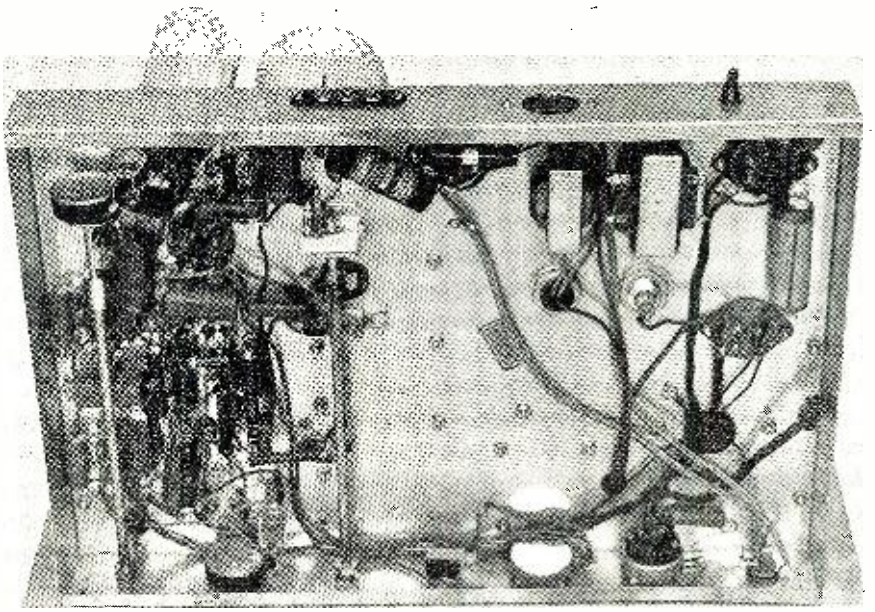
Build the Jones 8 Tube Superheterodyne

COMMERCIALLY built communication receivers are being used by a great many amateurs. However, experimenters still like to build their own. Some of the experimental receivers have circuit improvements which can be added to existing receivers without too much effort, thus bringing the nearly obsolete receiver up to date in performance. For these reasons, magazine articles on both simple and complicated receivers are of interest to nearly all readers. The receiver illustrated here has a number of good circuit improvements such as high C oscillator, low C r.f. and detector tuned circuits; modern tuned plate hexode mixer system; simple variable selectivity crystal filter circuit; high IF amplifier frequency with high image rejection; simple second detector, AF and BFO circuit with a 6N7G tube; and a new noise limiting circuit.

The receiver was primarily designed for code reception with a view to obtaining a high signal to noise ratio. It is quite satisfactory for phone reception though no AVC or R meter circuits were included. It would be possible to use AVC on the two IF stages with a separate amplified AVC circuit with a 6B8 tube without disturbing the present circuit layout. Plug-in coils, inside of removable shield cans provide good efficiency and short r.f. leads with less difficulty in construction than in the case of a band-switching system.

Band spread over each amateur band is accomplished by tapping the ganged midget tuning condensers across the proper amount of coil turns in each case. This tuning condenser is connected across the whole 80 and 160 meter coils but is tapped part way down for the other bands. The coil table gives the turns and dimensions for all bands from 10 to 160 meters.

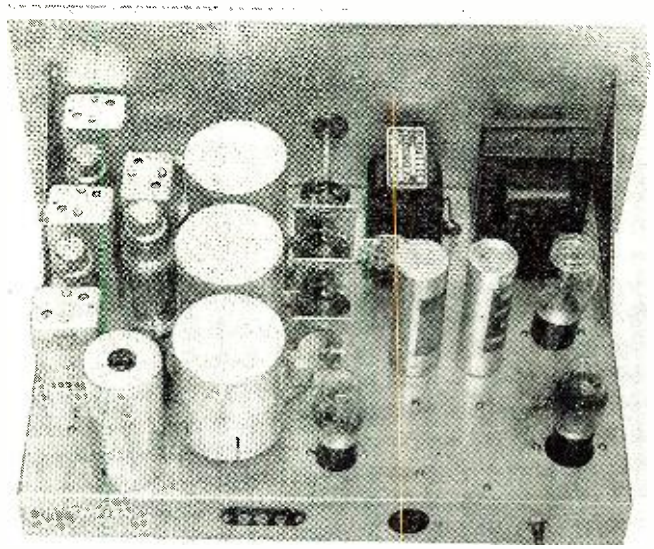
Low C to L ratio is extremely desirable for the signal frequency tuned circuits for weak signal reception. A low C oscillator circuit is unstable and tends to drift badly while the receiver is reaching its normal operating temperature. These effects can be nearly eliminated by using a high C to L ratio in the oscillator circuit. It was found that very good tracking of the tuned r.f., detector and oscillator circuits was possible with a high C oscillator over the relatively narrow amateur bands. The trick is to calculate the values of inductance and capacitance which will cause the oscillator



Underside the chassis. Notice that tube components are grouped around tube sockets.

There are still many experimenters who like to build their own receivers. This one, as described by Frank C. Jones, has many innovations which could be included in a 1938 model of a single-signal superheterodyne.

by FRANK C. JONES, W6AJF
Associate Editor, *Radio*
Berkeley, California



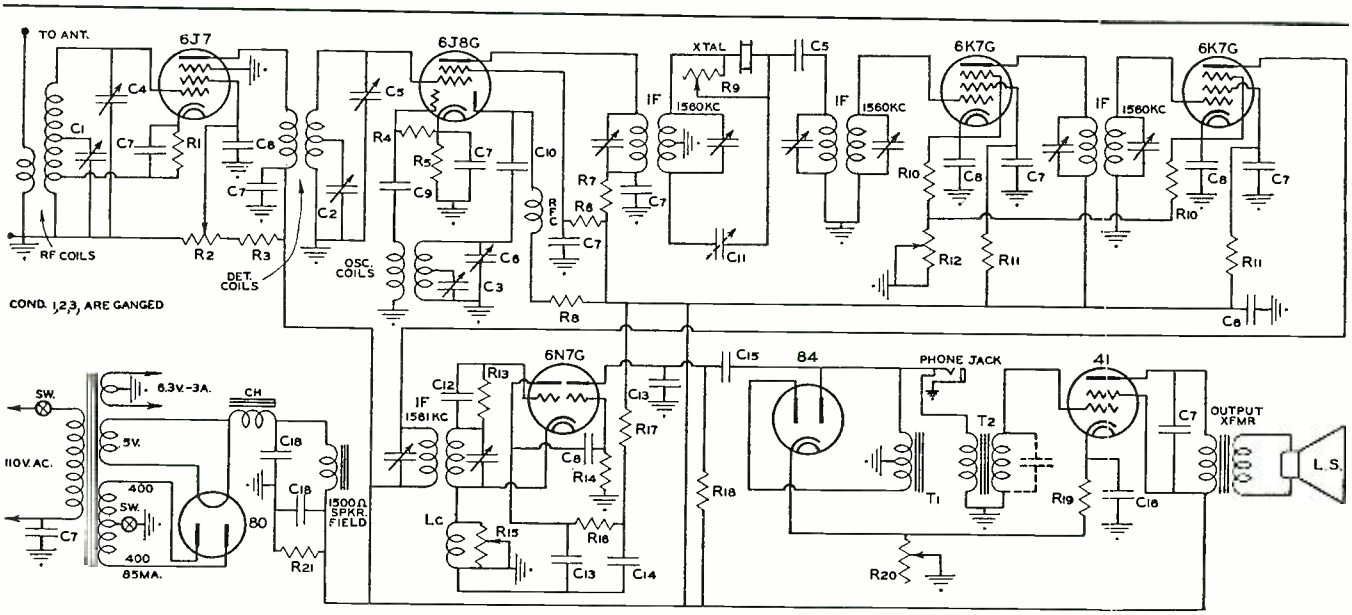
The very careful engineering is clearly shown behind the superhet panel.

to tune to about 1600 KC (1560 KC in this receiver) higher in value than the detector and r.f. circuits. This can be accomplished with either a low C or high C oscillator circuit with a low C r.f. and detector circuit.

The oscillator circuit has an effective capacity of about 3 or 4 times as great as that used in the r.f. circuits even though it is tuned to a higher frequency. The oscillator semi-fixed padder condenser C_6 is set at nearly 100 mmfd. for all bands, while the detector and r.f. padders C_3 and C_4 are set to about 10 or 15 mmfd. The oscillator tuning condenser C_3 has to have about twice as high a maximum capacity as the other tuning condensers C_1 and C_2. The latter each are 20 mmfd. and the oscillator condenser C_3 is 35 mmfd. These three condensers are mounted on individual 10 ga. aluminum brackets about three inches high by one and three-quarters inches wide, which act as shields between condensers as well as rigid supports. Flexible shaft couplings provide a method of single dial control. The oscillator tuning condenser is nearest the front panel in order to reduce any tendency for shaft and coupling backlash in the tuning dial. A flexible shaft coupling between the oscillator condenser and the dial is a necessity to prevent any detuning effects from slight movement of the front panel.

The three plug in coils for each band fit into isolantite coil sockets mounted in-

(*Construct further on page* 64)



Circuit diagram of the Jones 8 Tube Superheterodyne.

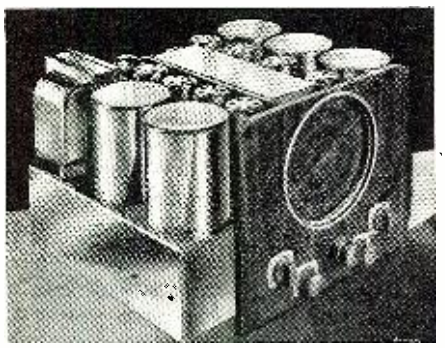
C_1—20 mmfd. var. Bud 323
C_2—20 mmfd. var. Bud 323
C_3—35 mmfd. var. Bud 322
C_4—15 mmf. var. Hammarlund HF15
C_5—3-30mmfd. trimmer Hammarlund
C_6—100 mmfd. max. padder Bud 321
C_7—.01 mfd. 600 v. paper C-D
C_8—.1 mfd. 600 v. paper C-D
C_9—.0001 mfd. mica Mallory
C_{10}—.001 mfd. mica Mallory
C_{11}—25 mmfd. var. Hammarlund H
C_{12}—.00005 mfd. mica Mallory
C_{13}—.002 mfd. mica C-D
C_{14}—½ mfd. paper 400 v. C-D
C_{15}—¼ mfd. paper 400 v. C-D
C_{16}—20 mfd. elec. 50 WV C-D
C_{17}—9 mfd. elec. 450 v. C-D
C_{18}—16 mfd. elec. 450 v. C-D

T_1—center tapped audio choke—primary of PP pentode to loud speaker transformer
T_2—3:1 interstage AF trans.
CH—15 henry 85 ma. filter choke
LC—2nd detector cathode coil—30 turns No. 28-DCC random wound on a ½"diameter porcelain rod insulator

R_1—300 ohms ½ w. Centralab
R_2—50,000 pot. (RF regeneration) Centralab
R_3—20,000 1 w. Aerovox
R_4—50,000 ½ w. Aerovox
R_5—300 ½ w. Centralab
R_6—50,000 1 w. Aerovox
R_7—5,000 ½ w. Aerovox
R_8—10,000 1 w. Aerovox
R_9—5 megohms (xtal selectivity control) Centralab
R_{10}—1,000 ohm ½ w. Centralab
R_{11}—100,000 1 w. Aerovox
R_{12}—50,000 pot. (IF control) Centralab
R_{13}—10 meg. 1/5 w. Centralab
R_{14}—20,000 ½ w.
R_{15}—1,000 pot. (2nd det. regeneration) Centralab
R_{16}—10,000 ½ w. Aerovox
R_{17}—25,000 ½ w. Aerovox
R_{18}—50,000 1 w. Aerovox
R_{19}—350 ohm 10 w. Ohmite
R_{20}—70 ohm rheostat (misc. silence bias) Frost
R_{21}—25,000 10 w. Ohmite

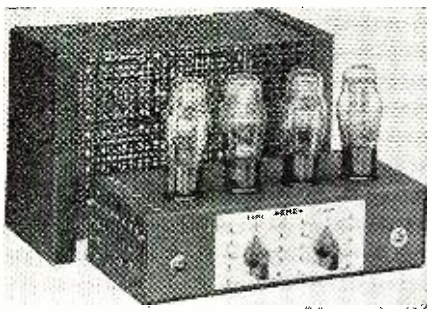
What's NEW in Radio

E. H. Scott Radio Laboratories, Inc., 4450 Ravenswood Ave., Chicago, Illinois, have announced the new Scott Super XII, a four wave band receiver covering all frequencies from 13 to 550 meters. A 12



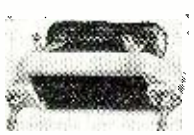
tube job, it has no gaps between the bands and tunes everything on the U.S.A. and foreign short wave bands, amateur, police, aircraft, and American broadcast bands. The receiver has an undistorted power output of 9 watts, features high fidelity reception, variable selectivity, automatic volume control. It is claimed that satisfactory performance may be had with any antenna.

The "Vocatrol" has been announced by the Electronic Manufacturing Engineers of 19 South Wells Street, Chicago, Ill.



This unit, featuring four tubes, can be used by radio amateurs and ship owners to control the radio transmissions so that when speech is put over the carrier the transmitter is turned on and when the speech is removed, the transmitter is shut off and the receiver is turned on. All resistance amplification is used together with a power voltage doubling system.

Ward Leonard Electric Co., Mt. Vernon, N. Y., announces its 507-622 Parasitic

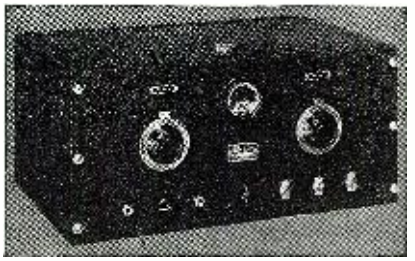


Suppressor to be connected in one of the grid or plate leads of parallel push-pull R.F. amplifiers. The company's Circular 507 gives complete details together with diagrams illustrating the installation of the 507-622.

Tilton Electric Corp., 15 East 26th Street, New York City, is giving away free a six-drawer, pressed steel cabinet with each purchase of 250 or 500 EX-STAT insulated 1 watt resistors.

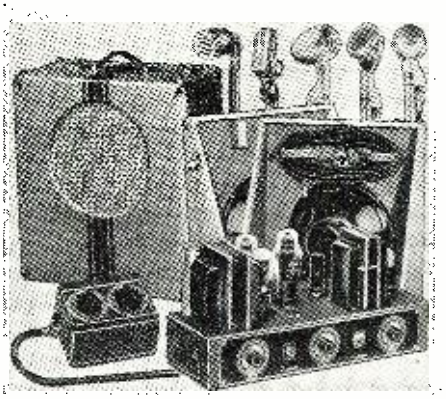
Designed to meet the demand for an economical, portable, self-contained transmitter, The Stancor 2-P is now being offered in kit form. The crystal controlled unit is a complete phone and C. W. transmitter operating on any frequency from 1.6 to 60 MC. Meter switching for all important circuits and oscillator keying to permit break-in operation are incorporated. Descriptive literature may be had by writing Standard Transformer Corp., 1500 N. Halstead, Chicago, Ill.

The company has also installed their own export department to facilitate the export of transformers, electric fans, amplifier and



transmitter kits, and power devices. Mr. Vicente Casillas is in charge.

The Transformer Corp. of America, through its newly formed organization, the Clarion Institute of Sound Engineers, announces the addition of two new complete portable systems, with and without remote control. Both systems are ready to operate. Amplifier, speakers, remote control box, and cables all fit into a single carry-

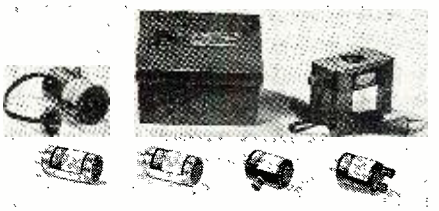


ing case. A choice of six modern microphones is given at no extra cost. The systems are described completely in the company's new fall catalog which may be obtained by addressing the Clarion Institute of Sound Engineers, 69 Wooster Street, New York City.

David E. Johnson, for 13 years head of Dayrad Co. and sales manager for three years of the Bendix Dayrad Division, has been appointed sales manager of the Dayton Acme Co., Cincinnati, Ohio, which has taken over the manufacture of test equipment from the Bendix Products Corp. Test equipment will be manufactured under the trade name "DACO." Mr. Johnson has received official authority from the Bendix organization to carry on all service work on Dayrad instruments that are out in the field. This includes modernizing and furnishing technical data.

A new transmitting beam power amplifier tube, designated as RCA-813, has been made available by RCA Manufacturing Co., Harrison, N. J. Designed according to principles involving the use of directed electron beams, the 813 has extremely high power sensitivity and is capable of giving 260 watts output in typical class C telegraph service. Full power output can be obtained at frequencies as high as 30 mc. The manufacturer claims that it is an excellent power amplifier for the final stage of high power amateur transmitters in which quick band change without neutralizing adjustments is often desired.

A new line of filters to be used in conjunction with electrical appliances has been made available by the Cornell Dubilier



Electric Corp., South Plainfield, N. J. Seven types are now available with new units being developed in the engineering laboratories.

Thordason Electric Mfg. Co., Chicago, Ill., announces a new line of isolation transformers with plug-in connections to meet line requirements. These transformers have an electrostatic shield between primary and secondary for elimination of line noises or to keep RF out of the incoming line for amateur transmitters. The transformers find other uses in conjunction with therapeutic machines and electrical accessories for the home, beauty shops, and barber shops.

Two azimuthal world projection maps prepared by the Radio Department of the General Electric Co., at Schenectady, N. Y., are available to Hams, free upon request. One, designated GES-1996, is centered on Schenectady and is for use only in the northeastern U. S. The other, GES-1999, is for amateurs in the western part of the country and is centered on Oakland, Calif. Principal cities throughout the world are indicated on the maps, and determining the paths of signals, as well as distances between points, is simplified.

(*More New Radio Products, page* 54)

BENCH NOTES

Dealer's Choice

by LEE WARD

Service Manager, San Francisco, California

The pluggers I described have not revolutionized our business, nor have they led us to the end of the rainbow. They have, however, helped appreciably in forming a background of much-needed customer contact. Some of the card-calls are slow in getting to the shop, but they're worth waiting for. Get enough cards out, and it's just like money in a trust fund—you'll get it, providing you don't change your address too often.

We have, during the past three years, distributed 90,000 cards. That's a lot of cards, but they have been looked upon only as an adjunct activity to service work; we are radio men, not advertising experts. The data we have collected as we gave out the cards should be of interest to others in the same profession. Perhaps, with modifications befitting your location, budget, and customers, you can evolve a card that is best for *your* business.

Specifications are as follows:

Size: 1¾x4 inches. The width was decided upon because it is the greatest which permits entrée into mailbox slots. (If your postmaster objects, slip 'em under doors. You know your postmaster better than I do; if you don't, you had better!) The length forms a good proportion with the width when lines run across the shorter dimension.

Stock: White, weight that of a good calling-card; heavy enough so the prospect's instinct prompts him to leave it flat instead of folding it. A good stock helps to distinguish your advertising from that of the local fish market.

Type: 6 or 7-point, light-face; Vogue. Allow 90 or 100 words of copy without squeezing. Only one line should be in boldface; the words in the heavy line need not be pertinent to your business. Simply make them conspicuous without disclosing the gist of the card to the person who gives it a quick glance.

A person who comes across the card is more likely to drop it if he can understand it immediately. If one line piques his curiosity, and if the remaining text is *too small to read at the time,* chances are about 4 out of 5 he will pocket it. Hence the small type.

Copy: Say whatever you wish, but keep it simple and innocuous. Business name, address, and 'phone number are the essentials. Change the wording every month or so—helps you later, when you become curious concerning the most effective means of distribution, and wish to co-ordinate results with time of year or format.

In our organization, the repairmen pass out the cards; they carry them at all times, afoot or awheel. They are left in mailboxes; in cigar stores; in back of, and on top of, consoles; with persons they meet; and—heaven forgive them—even in beer gardens. When business is slack, they are distributed systematically during spare-time intervals; during our occasional rushes, of course, they attend to pick-ups, repairs, and deliveries.

Ours is a radio repair shop fitted exclusively for maintenance. No frills—

NO DRAPERIES

—everything in the shop is there for the single purpose of conditioning all radios quickly, properly, and at moderate cost.

Often it is some minor fault which keeps a set from playing—in that case, a repair is made immediately, in your home.

If a major repair is necessary, we have the largest stock of tubes and replacement parts in the county.

call

Lincoln 4321

Open until 10 p.m.

SMITH RADIO

1234 N. 56 St.

Bellwood

Exact size of card of which the author sent out over 90,000 with good results.

Here is some incidental information which might provide you with a short cut or two: in apartment house mailboxes, 70% of the cards are wasted—thrown on the lobby floor immediately; the remaining 30% are pocketed. (Seems wasteful, but the average for other business cards is even higher than 7 in 10. They would pay, I believe, if 9 in 10 were thrown away.)

Two distinct responses follow their distribution. First, the immediate one, following a coincidental card and set failure; the customer calls the number on the card because he is too lazy to open a 'phone book. There is an average of one call per thousand cards that comes in immediately. A customer in this class is like the man who gets a wife by writing to a matrimonial agency — *any* matrimonial agency. He is good picking, though, for, despite his conviction that all servicemen are alike, he resigns himself to set breakdown as a trick of fate, and rarely questions price. His money is paid in the spirit of a man giving out alimony or taxes; he is reconciled to the fact there is no appeal. He seldom, because of this cynical attitude, become a staunch supporter of your shop.

The *delayed* response is more difficult to check. Some customers dislike being asked how they learned of you, or why they called your particular store. There will be, over long periods, enough calls from sections which have been carded to assure you it is worth while, whether or not you manage to trace the media. Getting the work is the important thing. Hew to the repair job—let the quantitative data fall where they may!

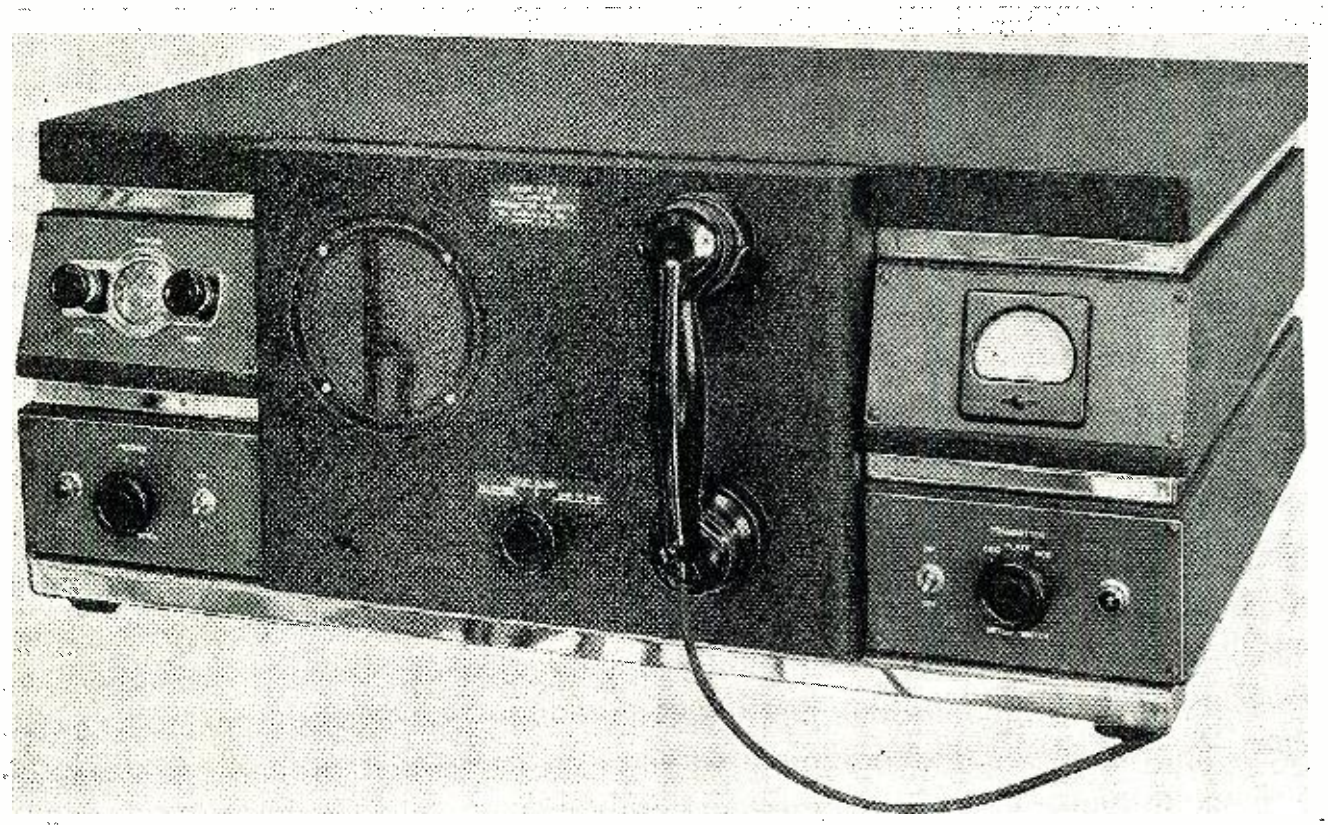
There is often a considerable period between a customer's receipt of a card and his 'phone call. Naturally a man's radio does not blow up just because he puts your name on file. We are getting calls from persons who got some of our first copy; and some of these set owners have not had a repairman in the house for three or four years. These tardy customers are among our best; their lives are well-settled, they usually own their homes, and their receivers, although older, are higher-priced than those of the semi-transient kitchenetters.

It is easier to give out cards in large apartment houses than in private homes, but the apartment resident is sated by a continual shower of mailbox advertising. The greatest response *per thousand cards* comes from smaller buildings. They find fewer pieces of advertising in their mailboxes, and give each piece more attention, for the same reason a child in a small family gets more attention than a child who is one of many.

Many persons, pretending they are discouraging a bothersome practice, make rules which say they will never trade with any concern that uses door advertising. It has been my experience that such a person, when he wants his set repaired in a hurry, forgets all principle and calls the repair shop which has put its 'phone number closest to his hand. Don't be frightened by any thought of making ill-will with advertising of any type. If you do *anything* ninety thousand times, *someone* is going to be offended.

Once, following an especially weak moment, I distributed cards advertising free radio service in a six-block area. Then, to compare results, I covered the same neighborhood with cards announcing a dollar service charge. Although the cards were nearly identical in size and makeup, the results were very different. We got the

(*More Bench Notes on page* 57)



With the receiver incorporated on the left, the transmitter on the right, the installation is compact and easy to operate.

A Commercial Marine Transmitter-Receiver

by R. J. HIGGINS, W9AIO, and R. E. SAMUELSON
Engineering Dept., The Hallicrafters, Inc., Chicago, Illinois

Here is a complete description of a commercial transmitter-receiver for the yachtsman or ham.

SHIP to shore radio, previously found only on larger craft has come into its own for the small boat navigator. For many years radio equipment has been required by law on larger boats. Smaller boats while permitted this privilege seldom made use of it, due to the high cost of both equipment and experienced personnel to operate it—to say nothing of the difficulty of passing Federal examinations for a license.

With the recent establishment of harbor telephone facilities as well as a modification of previous laws all barriers for a small boat radio installation have been removed.

As the application of radio to small boats is becoming more universally accepted the number of users is rapidly increasing. Boat owners have appreciated the usefulness of a radio installation for their convenience or necessity, and the unit pictured fulfills all requirements of ship to shore radio telephone service.

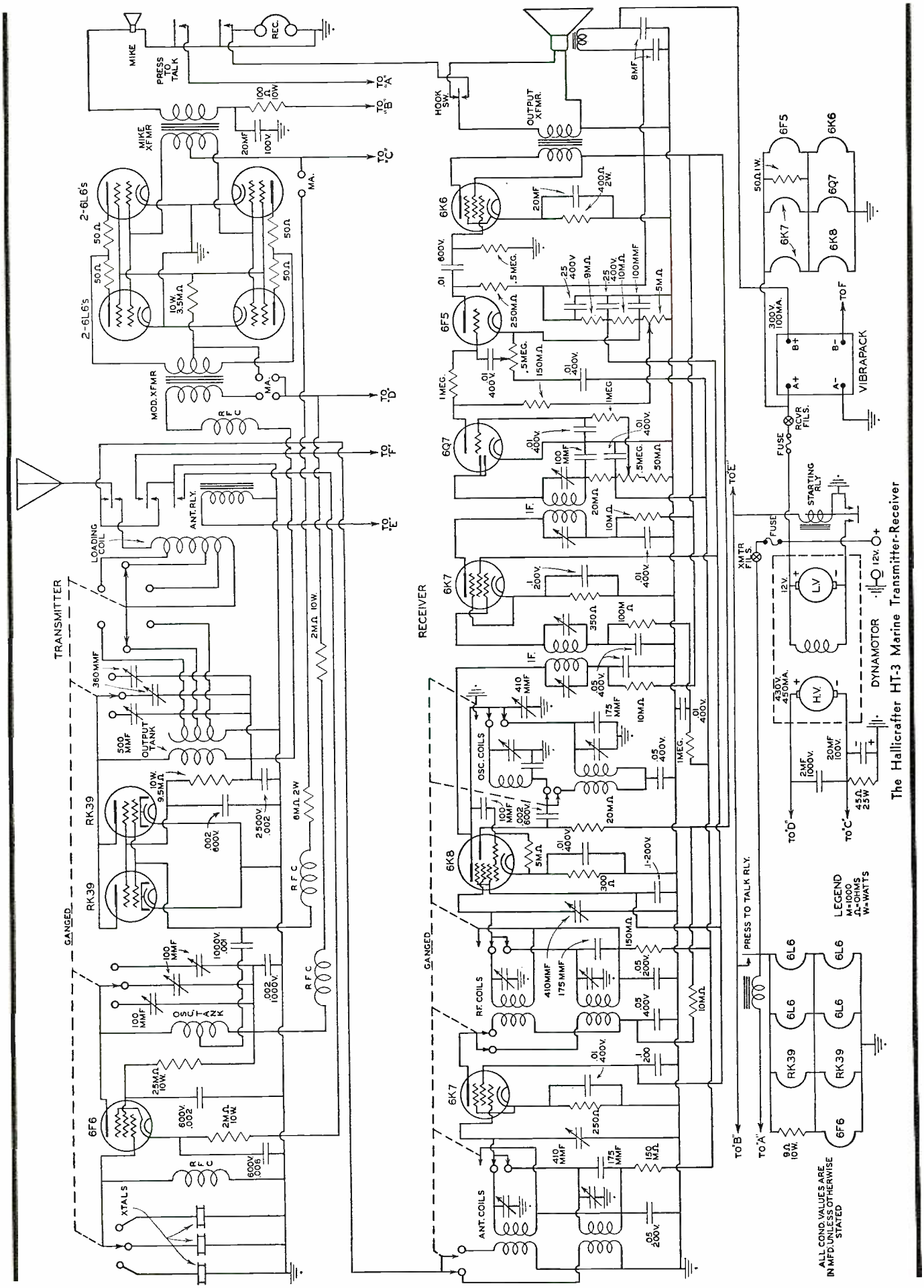
The model herein described is operated from a 12 volt d.c. source of power. The unit comprises both receiver and transmitter housed in one metal cabinet. The receiver covers the recently assigned ship to shore band of 2100 to 2900 kc in addition to the standard broadcast frequencies on another band. Tuning adjustments are made manually with the controls appearing in the left hand section on the front panel.

The plate voltage of the receiver is supplied by a vibrapack, which is mounted directly behind the 12 volt d.c./450 volt d.c. dynamotor. The output of the receiver is normally connected to the loud speaker, but when the hand set is raised the speaker is disconnected and the signal then is heard in the earphone of the hand set. When the transmitter is placed in operation the transmitting tube filaments are lighted by the switch to the left of the meter switch.

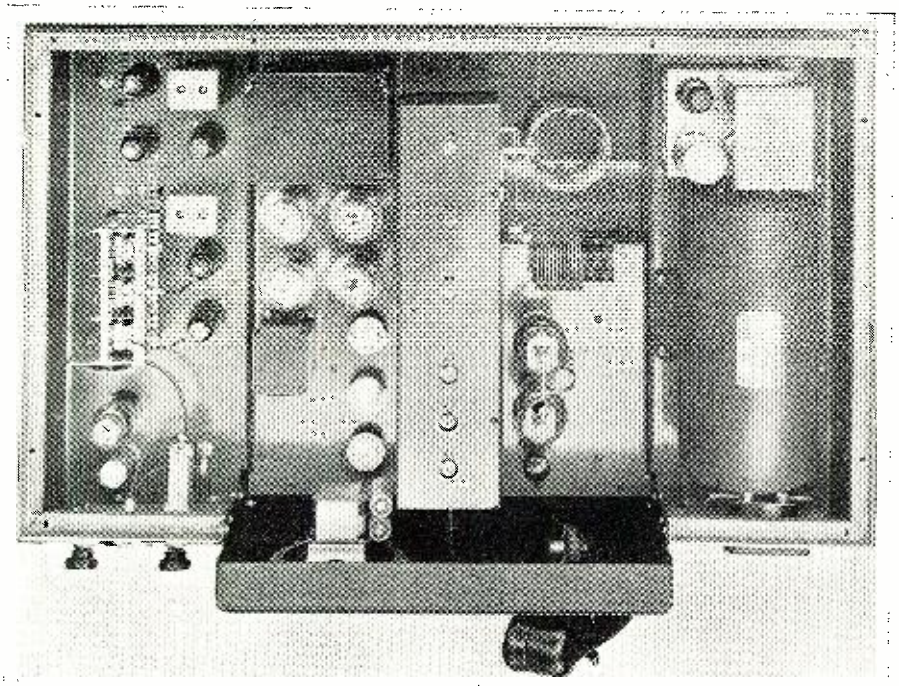
Depressing the control button in the hand set operates the antenna changeover relay, connecting it to the transmitter, and places the dynamotor in operation.

As indicated by the schematic the transmitter oscillator is crystal controlled and is a 6F6. Any one of three crystals in the ship to shore channel are selected by the band switch on the front panel. When this switch is operated the proper crystal is selected and the pretuned circuits are connected in the oscillator and power amplifier which consists of parallel RK39's. The inside top view will show the complete transmitter and the controls which pretune the oscillator and amplifier to the three desired frequencies. The modulator

(*Further data on page 22*)



The Hallicrafter HT-3 Marine Transmitter-Receiver



Behind the panel, shows that repairs, should they ever be needed, could be made at sea.

consists of 46L6 tubes in push-pull parallel operating Class B. These tubes are driven directly from a single button microphone mounted in the hand-set and modulate both the plates and screens of the RK39's.

Provision is made with a loading coil for resonating the transmitter to the antenna that would be used on the average small boat, although at least 35 feet of wire need to be used for an antenna for satisfactory results.

The receiver has a 6K7 as an r.f. amplifier, a 6K8 first detector-mixer, 1 stage of I.F. amplification at 465 kc using a 6K7 tube. The second detector is a 6Q7 which also has a "between-carrier-squelch" circuit for quietness of operation. A 6F5 tube is used as the first stage of audio which drives a 6K6 tube in the power output stage.

Maritime repairs have been given very careful attention in the design of the rig. Every seaman knows the difficulties encountered in making any repairs while in a heavy sea. In laying out the component parts of the transmitter-receiver this was taken into consideration, and ample finger space was allowed. The extreme value of such a move can only be appreciated by the dyed-in-the-wool marine operator. Plenty of ventilation has also been provided to allow for moisture drying out of corners.

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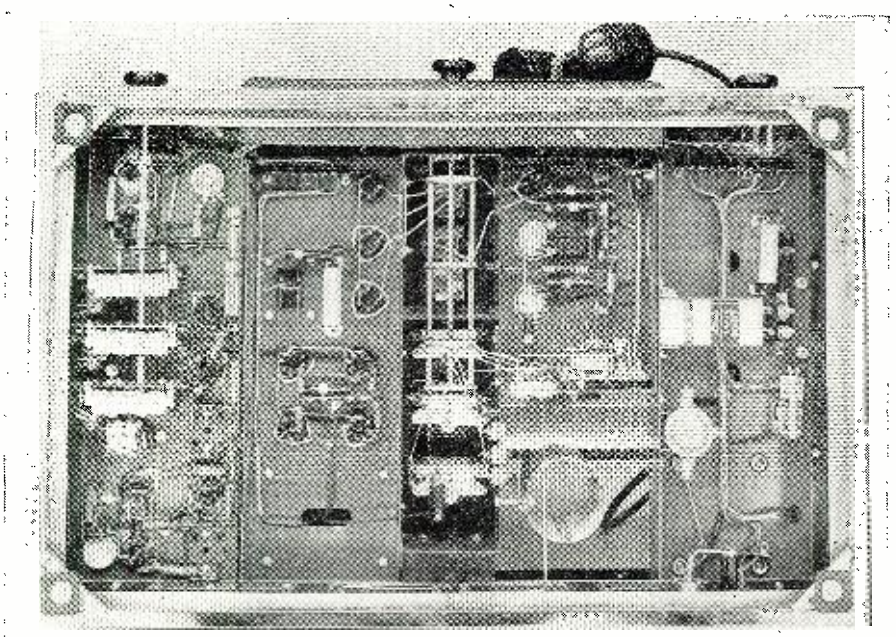

Under chassis view shows consideration given towards making every part ship-shape.

GRACE LINE INSTALLS EMERGENCY P.A. SYSTEM

THE latest improvement for combustion passenger and cargo ships of the Grace Line is an emergency loudspeaker for two-way communication between the bridge and all parts of the ship.

This speaker system was devised as the most efficient means of avoiding confusion among the passengers and to enable the captain to be in constant communication with officers or crew in time of emergency, regardless of what part of the ship they might be in. He is able to speak to officers or crew in any part of the ship, in one particular section, in all sections of the ship at once, below and above deck. These speaker systems are compulsory on all American flag ships which have lifeboats more than 100 feet from the bridge.

Because of the variety of conditions which the speaker system would encounter, salt water, shock, and temperature tests were made. The system showed no corrosion and operated successfully after a 20 per cent salt water solution spray. All metal parts were plated against corrosion. Control cabinets and amplifiers, after a 25-pound drop-shock test, operated without distortion of sound. A 100%, 100° Fahrenheit humidity test was given the amplifiers throughout a twenty-four hour period.

Speakers are placed on the boat deck, embarkation deck, in the crew quarters, fore and aft, starboard and port. The speaking apparatus is similar to a radio microphone, but by pressing a button at the deck receiver or turning a switch on the bridge panel the receiver becomes a "mike" and vice versa.

Each deck has a separate circuit, and duplicate amplifiers are provided. Should the electric generator be disabled, an auxiliary is cut in. Any time that the electric current falls 20 per cent below normal, current for the speaker system is furnished by batteries located in the chart room just off the bridge. If one speaker fails, the others are not affected.

The panel, controlling the system, is on the bridge, and consists of six switches, with one green and four red lights. When the green light is on, the system is working. A red light on above any one of the switches, controlling the four crew speakers, is a talk-back signal from that section of the ship. By means of this talk-back switch, the captain and officers have a two-way communication from the bridge to members of the crew on watch at all times.

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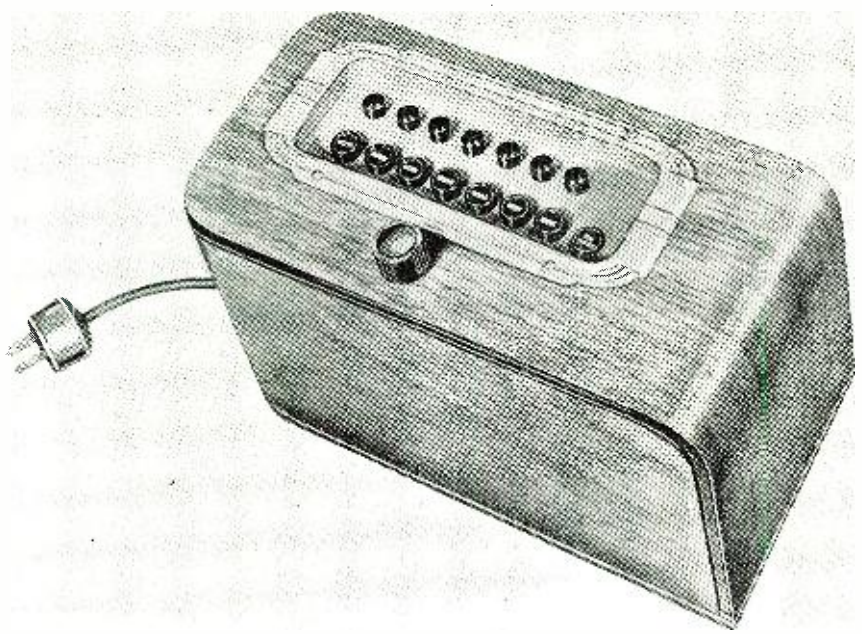
Built-in B.C. Receiver Control for the Home

by RAYMOND P. ADAMS
Laguna Beach, California



The remote system is contained in a box which can be moved from room to room

The author describes a remote receiver control system which, if built into the home, will enable the set to be tuned from wherever outlets are put.

THE application possibilities of the radio remote control have, for most of us, been always rather intriguing; but, until very recently, we have had little or no chance to exploit these possibilities to any practical advantage—and for the simple reason that we have had available to us relatively few control instruments suitable for either special service or popular home use. Most of the factory-built units have lacked "eye appeal" and proper cabinet housing, have suggested experimental rather than finished product engineering, and have in general been of little effective value, either to the serviceman, the dealer, or the general listener.

The Meissner 9-1000—A Typical Remote Control Unit

The assembly under discussion, however, is the latest in design and is definitely out of the "experimental" class. It is economical to operate, as it employs only two tubes (a 6A7 converter and 1V rectifier) and it connects directly to the aerial and ground posts of any type of receiver equipped for broadcast band coverage, requiring no external change-over switch. It does not affect receiver performance in any way, and it provides for control of the radio's effective volume level. The unit is a push-button job, provided with seven buttons for selection at will of any one of a similar number of stations, seven individual permeability-tuned circuits, seven small knobs permitting individual circuit tuning adjustments, and an extra button for dial tuning—in other words, a release button which when pushed automatically turns off the remote control unit and shifts antenna input to the receiver proper.

Three of the buttons are for stations between 520 and 820 kc., two for stations between 720 and 1,120 kc., and two for stations between 970 and 1,620 kc. A complete list of station call letter tabs is provided, from which a user may select any seven related to desired signals.

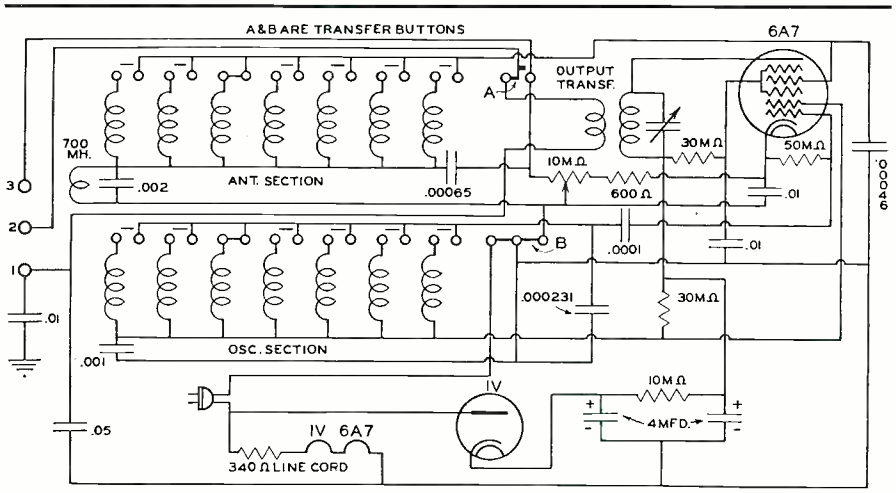
The control is a true converter, the 6A7 being employed in a mixer circuit whose input or detector portion tunes to the preselected stations and whose oscillator portion tunes away from station frequencies by an amount equal to an arbitrarily selected input frequency in the radio; in other words, the instrument produces an intermediate frequency which is of a value within the receiver's own broadcast band tuning range. The control, by the way, is designed to provide optimum efficiency in operation when connected to a receiver whose tuning dial pointer is set at some clear channel point near the *low frequency* end of the scale—related to maximum mesh in the radio's ganged tuning condensers; and when once this point is decided upon and the individual control circuits aligned with respect to it, the dial pointer must be returned to the same reading whenever the remote unit is employed for station selection.

Applications:

In the home, on a permanent multi-outlet wiring basis, the control unit provides for station selection and volume level adjustment from any room in the house provided with the necessary plug-in facilities.

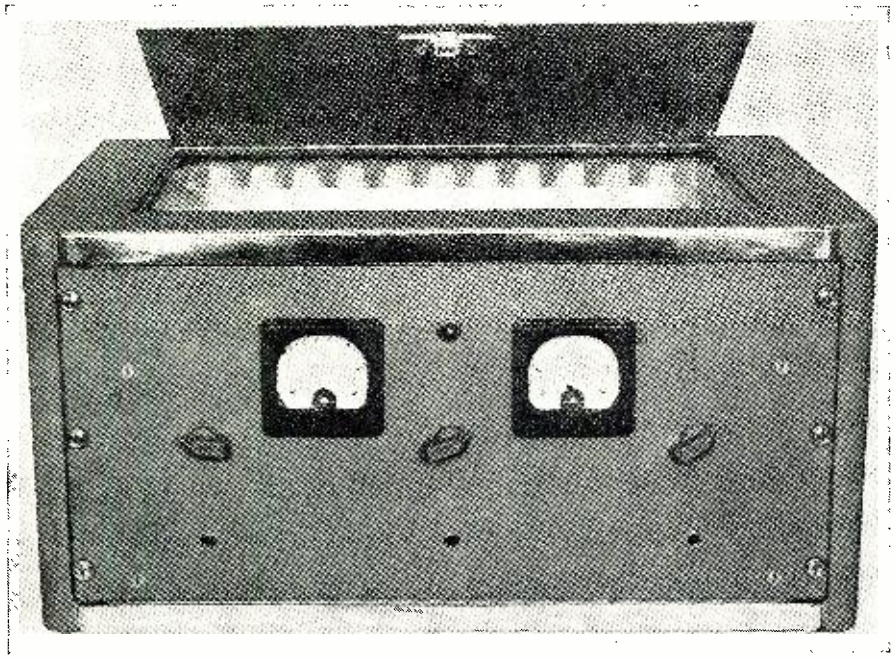
Required for this type of installation are:

(*Tune in on page 62, please*)



Circuit diagram of the remote control unit.

Inverse Feedback and Voltage Regulation in Speech Amplifiers



Commercial in appearance, the speech amplifier could be used by broadcasters. It will make an ideal addition to the serviceman's as well as the ham's shack.

by GENE TURNEY, W2APT
Elmhurst, L. I., N. Y.

Here is the speech amplifier for which you have been waiting. It has everything including inverse feedback and also B+ voltage regulation for the 2A3 output tubes.

SPEECH Amplifiers will come and Speech Amplifiers will go, but the one herein described should linger the longest of them all. Not only does its appearance lend itself to suit almost any surrounding (from a lowly P.A. job to a control table in a De Luxe broadcast station) but its electrical design makes its application almost universal. Its circuit incorporates all the well-known features such as voltage regulation, inverse feedback, hum control, fixed bias, visual monitoring together with two variable low-level inputs and a high level input capable of accommodating land line, phono, both crystal and magnetic, and mikes down as low as 75 db. By means of the controls on the front panel they may be mixed at will and their output level determined by the db. meter.

It is the purpose of this article to describe in every detail the construction and practical application of such a speech amplifier starting from scratch and finishing with the desired product. If every detail is carefully followed the builder may be assured of an excellent product giving deluxe broadcast quality absolutely devoid of feedback, hum, oscillation and other numerous amplifier troubles encountered when the gain is over 100 db.

The Speech Amplifier

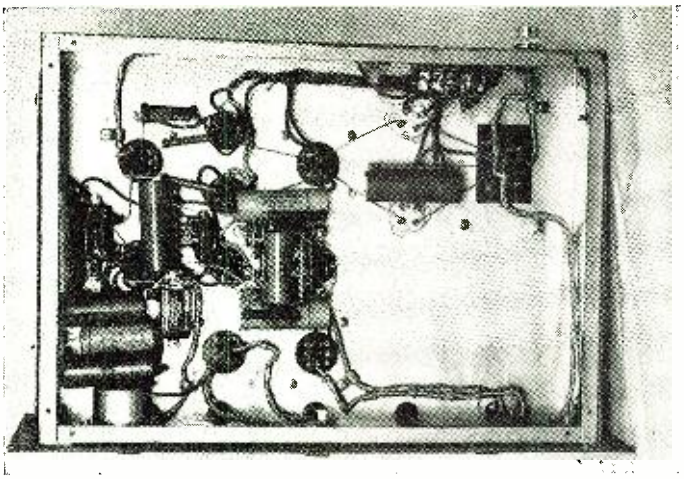
The speech amplifier is designed to mix three separate incoming lines with ample gain down to 70 db. for the low output mikes. No provision has been made for carbon mikes because of their poor frequency response as compared to the more modern types available at a slightly higher price. It was felt by the author that carbon mikes are becoming obsolete so fast that it would not be worth the labor and expense involved to incorporate such a provision in the circuit design.

It will be noticed that no switching is necessary, making it possible to run all three channels simultaneously. In the low level stages, the first tubes are 6N7's which are resistance coupled into the plate of the 6C5 following the 6J7 Pentode. A separate volume control for each low-level stage is provided, which controls are connected across the secondary of the variable impedance line matching transformers.

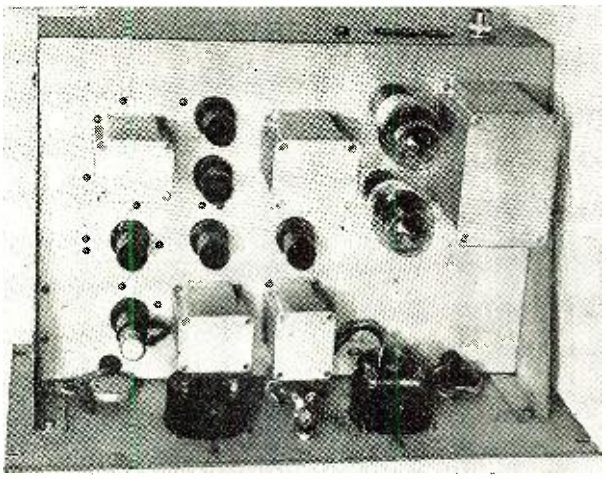
The first tube for the high impedance stage is a 6J7 whose approximate gain of 1000 is sufficient for most all types of mikes. This is resistance coupled to the second tube, a 6C5, in whose grid circuit an audio gain control is incorporated. The 6C5 is in turn shunt-fed into a push-pull audio transformer which feeds the grids of the 6N7's whose elements are tied in parallel. It will be noted that the audio transformers are used with the d.c. voltage removed from the primary circuits. It is a well known and established fact that this tends toward greater frequency response. Of course a slight sacrifice is made in gain, but in as much as the amplifier has gain to spare, there is no need to worry. The 6N7's are transformer coupled through a

(*Design continued on page 26*)

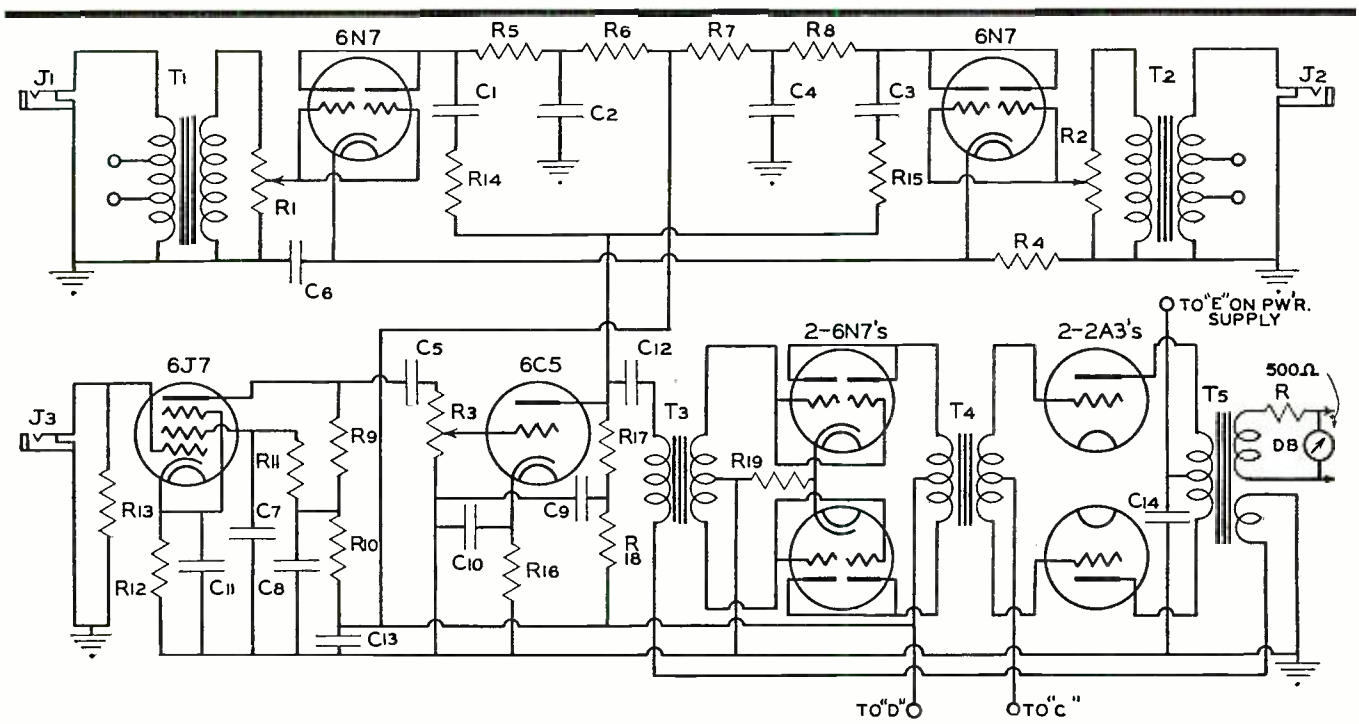
R_1—*500,000 Carbon Volume Control*
R_2—*500,000 Carbon Volume Control*
R_3—*1 meg. Carbon Control*
R_4—*500 ohms, 1 w.*
R_5—*150,000 ohms, ½ w.*
R_6—*50,000 ohms, ½ w.*
R_7—*150,000 ohms, ½ w.*
R_8—*50,000 ohms, ½ w.*
R_9—*250,000 ohms, ½ w.*
R_{10}—*100,000 ohms, ½ w.*
R_{11}—*1 meg., ½ w.*
R_{12}—*1,000 ohms, 1 w.*
R_{13}—*5 meg., ½ w.*
R_{14}—*50,000 ohms, ½ w.*
R_{15}—*50,000 ohms, ½ w.*
R_{16}—*2,000 ohms, 1 w.*
R_{17}—*100,000 ohms, ½ w.*
R_{18}—*50,000 ohms, ½ w.*
R_{19}—*500 ohms, 1 w.*
R_{20}—*30,000 ohms, 1 w.*
J_1, J_2, J_3—*Single Circuit Shorting Jacks*
C_1—*.25 mfd. oil filled*
C_2—*8 mfd. @ 600 v. working*
C_3—*.25 mfd. oil filled*
C_4—*8 mfd. 600 v. working*
C_5—*.25 mfd. oil filled*
C_6—*25 mfd., 35 v.*
C_7—*.25 mfd. paper*
C_8—*8 mfd., 600 v. working*
C_9—*8 mfd., 600 v. working*
C_{10}—*25 mfd., 35 v.*
C_{11}—*25 mfd., 35 v.*
C_{12}—*.25 mfd. oil filled*
C_{13}—*8 mfd., 600 v. working*
T_1—*Multiple line to 1 grid 500-333-250 ohms*
T_2—*200-125-50 Humbucking (Kenyon T2)*
T_3—*Single Plate to Push-Pull grids (Kenyon T52)*
T_4—*Push-Pull Plates to Push-Pull grids (Kenyon T256)*
T_5—*Push-Pull Class AB plates to 500 ohm line or 15-8-4 ohms. Primary 5,000 or 3,000 ohms (Kenyon 301)*
Marion Meters } *1—0-300 mill. d.c. meter*
1—DB meter
C_1—*.01 mfd., 400 v. paper*
C_2—*8 mfd., 1,000 v. peak (Solar)*
C_3—*8 mfd., 450 v. peak (Solar)*
T_1—*Power Trans. 425 each side (Kenyon T214) 5 v. @ 3 amp. (EE) 2.5 v. @ 3 amp. (AA) 2.5 v. @ 5 amp. (BB) 6.3 @ 3 amp (CC)*
L_1, L_2, L_3—*15 Hy., 165 MA filter choke (Kenyon T154)*
R_1, R_2—*30 ohms, variable (Ward-Leonard)*
R_3—*500,000 ohms, 1 w.*
R_4—*10,000 ohms, 1 w.*
R_5—*25,000 ohms, 1 w.*
R_6—*20,000 ohms, wire wound—Volume control*
R_7—*10,000 ohms, 1 w.*
R_8—*Slider type 10,000 ohms, 50 w. (Ward-L.)*
R—*50,000 ohm pot.*
P_1—*Jones 8 prong plug*
SW—*S.P.S.T. toggle switch*

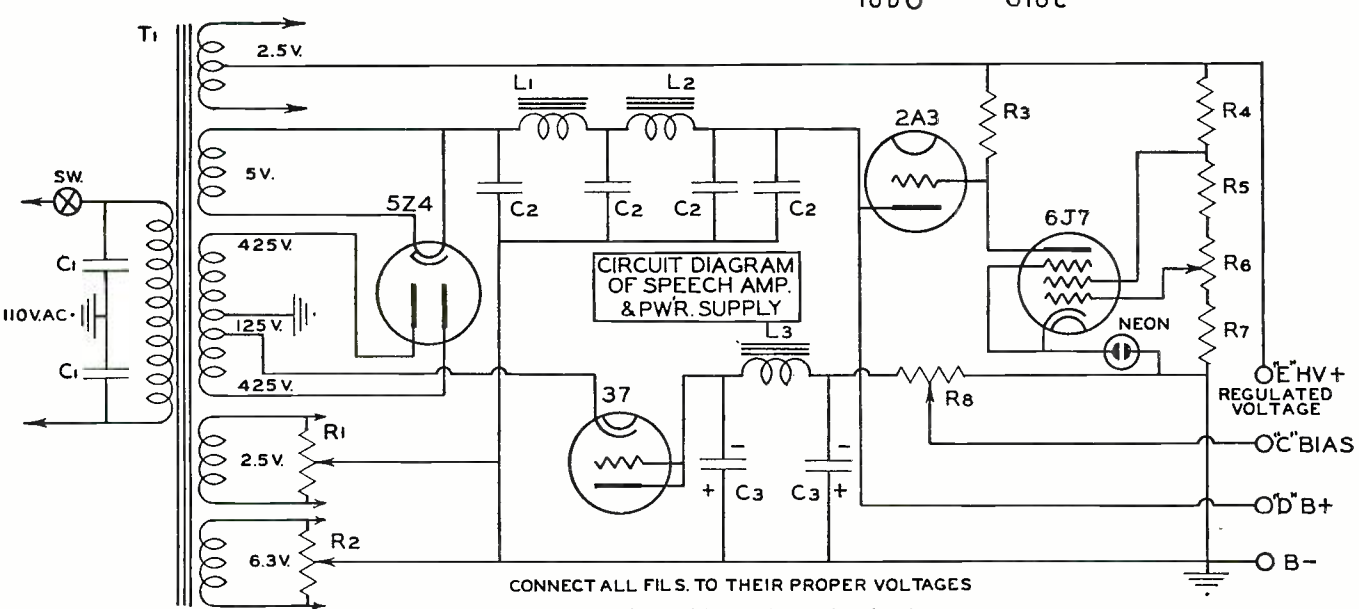


Underside chassis shows components grouped around tube sockets.

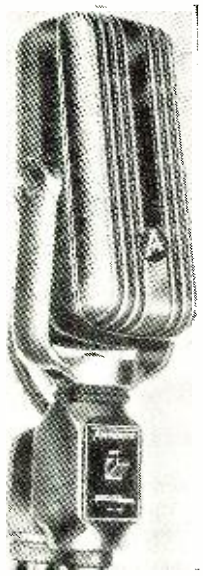


Symmetrical arrangement has been engineered on top chassis.





Circuit diagram of speech amplifier with regulated voltage.



Amperite velocity mike used by the author.

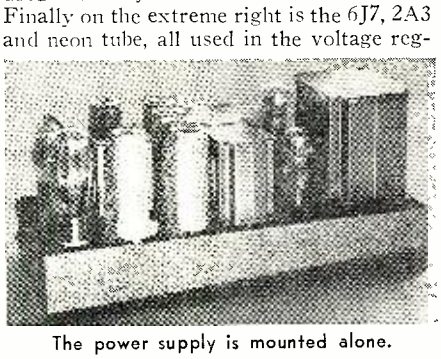
push-pull plate to push-pull grid transformer to the 2A3's which are operating class-AB with fixed bias. In turn the 2A3's are transformer coupled into a 500 ohm line which transformer supplies the necessary amount of feedback through the medium of the voice coil winding. The use of 8-mfd. condensers in the plate circuits of the low level and high level stage preceding the push-pull 6N7's serve as decoupling condensers and provide maximum filtering. The bias is obtained from the slider resistor. The front of the panel contains the db. and plate milliammeter. Looking at the front view left to right are: the three gain controls, low level, low level and high level respectively, and directly under them are their respective Jacks. Between the db. and plate milliammeter is the pilot light.

Layout and Design

The actual layout of the parts is shown. This is very important because long leads are eliminated and the placement of parts should be followed faithfully. The top view shows looking left to right the two variable impedance low-level transformers directly behind which are their corresponding 6N7 tubes. Next in order is the high-level 6J7 Stage. Behind the 6J7 is the 6N7 Second stage. At the rear of the chassis going from right to left is the single plate to push-pull grid transformer, then the push-pull 6N7's, the push-pull plate-grid transformer. This is all mounted on a Par-metal 12"x17" heavy chassis with bottom plate.

The Power Supply

Looking at the bottom view of the power supply and reading left to right are the off-on switch, line cord, filament hum-bucking controls. Then the power transformer, 5Z4, 37 and the two chokes for the plate supply. The four condensers for filtering this supply follow. Next comes the choke, 2 condensers and bleeder which provide the 2A3's with 62½ negative volts through the separate winding on the power transformer used in conjunction with the 37 tube. Finally on the extreme right is the 6J7, 2A3 and neon tube, all used in the voltage regulating circuit. The Jones type plug is also shown on the right, as is the 10,000 ohm wire wound control which adjustment will be taken up in another chapter. In constructing the power supply, if the illustration is followed, all the parts will be arranged for the shortest possible leads. A Jones terminal strip holds the necessary resistors and is located just above the neon tube socket. The whole unit is built on a Par-metal 7"x17"x3" chassis, and top screen. The cable carrying the power leads is about eight feet long, and it is extremely important that extra heavy wires are used for the filaments. *Do not* trust the chassis of the power supply for a ground. Run a separate wire for all ground points right up to the Jones plug. Poor grounds raise trouble in this type of speech equipment.

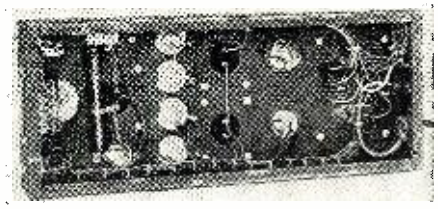


The power supply is mounted alone.

Inverse Feedback with Voltage Regulated Power Supply

From the illustrations it will be seen that an Amperite Velocity microphone is being used. While this particular type of amplifier will accommodate almost any type of mike we particularly liked this type because of the feature that the frequency response is controllable at the operator's fingertips. It has an acoustical compensator which is a device which acts in the following manner. A shutter located at the back of the microphone is gradually opened and closed by means of a button which operates in a vertical track. When the button is down the shutter is open thus causing the microphone to be of the velocity type, when the button is up the shutter is open thus creating an air cushion behind the ribbon. The mike is now operated as a pressure dynamic one.

This is of particular use when working through QRM where the highs get through much better than the lows. Where a clear channel is available the lows seem to round out the speech much better.



Underside the power supply chassis.

It will be noticed from the schematic that no provision was made for the insertion of an r.f. choke. In this particular installation where the amplifier was used this was not necessary due to the transmitter being completely shielded but if trouble is encountered due to r.f. feedback the use of a 2.5 millhenry choke will usually eliminate the trouble. The addition of a 100 mfd. condenser across the line may also help.

Checking for Hum

The construction of an a.c. amplifier for both music and voice operation is no easy job and in spite of all the usual precautions some hum develops. Before starting, however, it might be well to determine whether the trouble is in the microphone. This can be determined by using a pair of phones in the output and turning the mike switch to the off position. Make sure that the shield

(*Further data on page* 57)

COVER TITLE PRIZE CONTEST

★

MOST amateurs, servicemen and experimenters have a keen sense of humor. They are also resourceful. RADIO NEWS is happy to give them a chance to make these characteristics pay them some prize money. Here is the way to do it.

Look at the cover picture which was taken by Henry F. Kroeger, Jr., of Chicago. We have omitted to title it. Now all that the entrant has to do is think up a titl for the picture and send it in o the entry blank furnished below or make out your own entry blank and send it in with what you think would be a good title for the picture.

For example, if we were doing the contesting, we might think of such a caption as "Glad t have dropped in on you, OM!" or, "Wonder what his radiation is?" or, "This Santa Claus business ain't what it's cracked up to be," or, "Fall guy." There ar an unlimited number of title which can be given the picture and they need not concern themselves with radio, although that is preferable.

The prizes? First Prize, $25 in cash, Second Prize, $10 in cash Third Prize, $5 in cash, and 4th to 13th Prizes $1 each. In case of a tie, duplicate prizes will be awarded.

RULES OF THE CONTEST

1. Anybody is eligible except employees Ziff-Davis Publishing Co., and their famili

2. You may send in as many entries as y wish, but only one (1) to a blank.

3. You may use the blank below, or a fa simile.

4. You must say whether or not you ar subscriber to RADIO NEWS. You need not a subscriber.

5. You must describe your interest in rac One word will suffice for this, such as: Se iceman. Experimenter, Licensed Amate DX Listener, Dealer, No Radio Interest.

6. Your entry must be postmarked not l than December 31, 1938.

7. Your title entry must be 25 words less.

(a) On a separate sheet give the reaso why you picked the title you submitted Please be brief.

8. If your title is in a language other tha English, you must send in an English trans lation.

9. Entries will be judged solely on (1) Neatness, (2) Cleverness, (3) Originality and (4) Reasoning.

10. The Judges will be the Editorial Staf of RADIO NEWS.

B. G. Davis, Editor,
K. A. Kopetzky, W9QEA, Managing Editor.
E. S. Brown, Associate Editor.

(*Continue rules on page* 50)

The Talking Machine

by H. W. PARO
Sound Engineer, Wholesale Radio Service Co.
New York City, N. Y.

The "Talking Machine" has come a long ways from the original wax cylinder to the modern unit with its bass-expander and high fidelity response. The author describes the latest in the up-to-date machine.

Left, the 1938 version of the old-time "Talking Machine" which appears to the right.

changing records, resetting the pick-up arm, and finally turning off the motor—without being touched by hand. It, of course, requires none of the old laborious winding by hand and never runs down.

From the standpoint of fidelity of reproduction, data on the new Lafayette console phonograph are presented in Figure 1. The solid line represents the frequency response characteristics of the amplifier; flat within 3 decibels from 50 to 10,000 cycles. The crystal pick-up, as represented by the broken line, is likewise excellent, showing a maximum variation of 6 db. from 40 to nearly 8,000 cycles. It is interesting to note that the minimum response centers around 2,000 cycles. This is the frequency range in which the human ear is most sensitive and the droop in the pick-up curve, slight as it is, is therefore compensated in the ear itself.

Aside from fidelity of reproduction, volume expansion offers the most important contribution toward realistic duplication of music. In the making of records the range of volume must be limited. The minimum must be above the scratch or surface noise and the maximum must not result in cutting beyond the width of the groove on the record. It is therefore the practice in recording studios to "compress" volume by attenuating all sounds above a certain level so that the maximum will not exceed the value indicated by the groove width. Thus the softer passages of the music are recorded at natural volume, the loudest passages are very greatly reduced and the medium passages are reduced to values somewhere between these limits.

These reductions are taken care of automatically during the recording. The result is that when the record is played it has a certain "flatness" of dynamic range which tends to remind the listener that he is listening to a reproduction which is less than lifelike. The automatic volume expander system mentioned above overcomes this fault by automatically "decompressing." Its action is exactly the reverse of that used during the recording. The expander system remains inoperative below a certain predetermined value and therefore functions in the ideal manner.

Figure 2 shows the effect of this ex-

(*More data on page* 30)

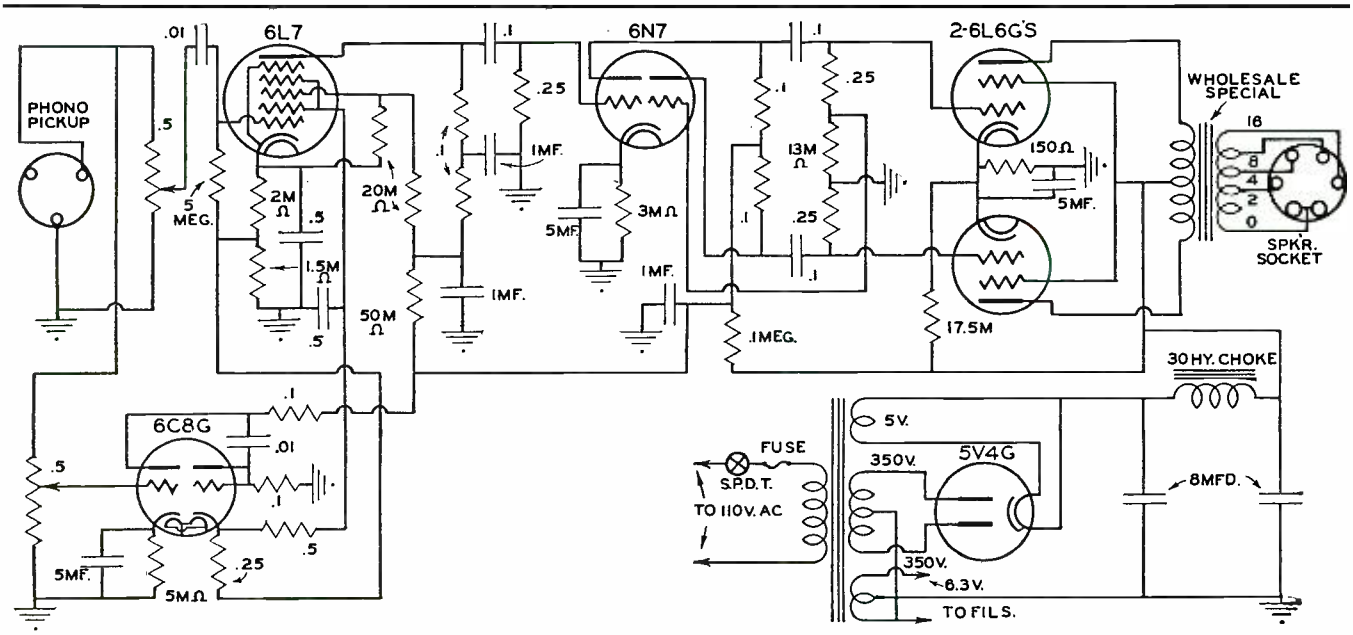


Fig. 3. Circuit Diagram of the modernized phonograph.

pander in graphic form. In making the measurements presented in this curve, the volume control was set at the midway position and the expander control advanced to a point where the expanded output equalled the output rating of the amplifier. These adjustments represent normal operating levels. The curve representing the "original" volume (unexpanded output) was taken with the expander knob "off"; the other with the expander knob advanced to this predetermined position.

At zero level (normal operating volume) the test signal is expanded approximately 13 db. As the input is reduced the amount of expansion falls off gradually until at 14 db. below the zero level there is no expansion. The range of volume below this, of course, represents the soft musical passages which are not "compressed."

By setting the expander control knob at a more advanced position greater expansion than that shown is obtained, and vice versa. This permits adjustment for the most appropriate degree of expansion for each type of music. In the reproduction of symphonic music, for instance, the dynamic range may be extremely great and therefore a wide expansion range is desirable. Dance orchestras, on the other hand, require far less expansion, and speech is usually best with no expansion.

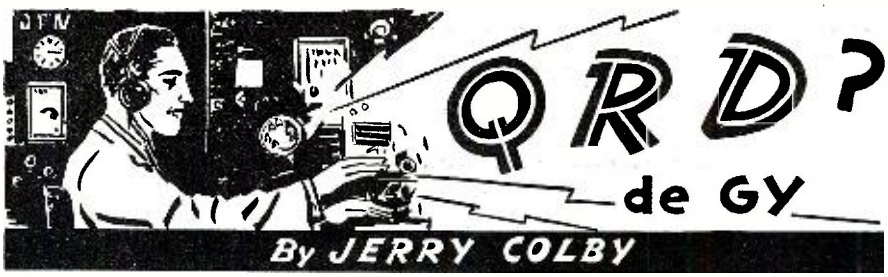
For those who may be interested, the amplifier circuit is shown in Figure 3. Six tubes are employed. A 6L7 high-gain voltage amplifier is followed by a 6N7 dual triode which functions as voltage amplifier and phase-inverter and drives a pair of 6L6G's in the push-pull output stage. A 6C8G, one of the new dual triodes in which each section has its own cathode, serves as the expander amplifier and rectifier. The power-supply rectifier employs a 5V4G.

The amplifier has a gain of 66 db. and is capable of delivering 13 watts without distortion and up to 18 watts on momentary peaks. The speaker (or speakers) is of the permanent-magnet type and may be augmented by others if desired, the output of the amplifier terminating in a 6-prong socket arrangement which provides for loads of 2, 4, 8 and 16 ohms.

For ordinary records the gain will be much more than is necessary, and it is advisable to run the gain at a low setting. In this manner the least amount of distortion is introduced into the quality. Also the expansion need not be opened as wide to get the fullest effect. One thing must be remembered however, that should the amplifier be run too far down on the input, the output might not be sufficiently powerful to drive the speakers on low notes. A happy medium is the best.

So we have today's phonograph. In a sturdy cabinet with acoustically treated tone chamber but without the "gingerbread" ornateness of the old days; and with the innumerable features of modern engineering and design, it costs less than a quite ordinary, hand-wound model of twenty years ago. Yet it can outperform, in every respect, the finest of phonographs available in those days. No wonder the demand for phonographs is again assuming high proportions, especially with the proportionate improvements that have been made in the quality of records.

—30—



THE CTU Mardiv is sure throwing its chest out. When the S. S. *York* of the M&M Lines collided with a freighter off the Delaware Capes, her antenna was completely destroyed. In a short time Brother Kempf had rigged up an emergency system and was back on the air handling distress traffic. This contributed muchly toward saving the vessel and bringing it into Philadelphia for repairs. Then the Savannah Line's *City of St. Louis* stranded on Fisher's Island and its Radio Officers did a bang-up operating job. All men are CTU members.

* * *

'TIS rumored that the FCC has heard the pleas of ops and will make it a five-year ticket, cut out the physical, moral and mental clause, and put the practical examination into force. Incidentally, radiops will be used, under the auspices of the WPA, to build equipment for these exams for the FCC.

* * *

FOR various and sundry reasons the tuna fish fleet is about fifty percent laid up, but the item which should interest operators is the fact that these ships will have to find new fishing grounds. Many of the boats are moving north off the Columbia River, which means that this long stretch from their home-grounds and offices will necessitate the use of long-range radio equipment because of the impracticability of telephone sets. So that where a telephone is now being worked by a skipper with a third-class license, a second-class ticket will have to go along, and new equipment will be installed. Which is "all to the mustard" for all concerned.

* * *

SMARTEST idea was started by the ARTA when they rotated seafaring ops to shore jobs and vicky verky. After all, a fellow going to sea continually, with only a week or so in port, kinda loses touch, not only with the latest developments of the radio art, but also with his family, if he has any. And the men who have been warming chairs on point-to-point service, or control circuits, lose the feel of the roll of a ship and its operating technique. And then again, the shore-side boys would like to get away from bill collectors, or even for a change of air. So more of this, for the betterment of everyone.

* * *

TELEVISION must be upon us, corporation executives notwithstanding, when our good friend, Harry Lubcke, Chief Engineer for the Don Lee Network, just succeeded in having his xmtr power upped from 50 watts to 1,000 watts. Also, newly designed equipment and further research will necessitate a great deal of money to be expended. And CBS will spend six hundred and fifty thousand dollars to operate a television xmtr from the top of the Chrysler Building in New York. This xmtr will be augmented by electrical transformers and feeders planned to supply 1500 kw. of power. A system of safety devices will be installed to protect ops from the high voltage generated in the xmtr. And on the master control desk a panel of 20 lamps will flash the exact location of any technician working near high voltage equipment. Rather something, what?

* * *

THIS is not an editorial—just reminiscing. We came up from the wireless days to the automatic machine days, and then we arrived at broadcast radio. Then we went a little further and came to telephone transmitters, receivers, and facsimile. We continued travelling and now we're arriving, slowly but surely, to television. Now, brother radio officers, how many of you who began with wireless have kept in step with this continuous progress? Who of you is prepared to greet television with confidence in the knowledge that you can now step into a higher position? We hope that many of our readers read and heeded the advice in previous issues of this column, but it is still not too late to burn the midnight oil and learn because there will be plenty of jobs open for men trained in television engineering. So go to it, me hearties, and the divil take the hindmost.

* * *

F. J. BOCK, as chief op WPGN, Police Radio Station at South Bend, Indiana, writes he's helping to keep crime down to a new low. And he exultantly states that the city fathers are planning to put in a two-way communication system. He's still got his ham outfit, W9AMI, on the air, which has been in operation since 1919 on 3532 kcs. Although it's only a 100 watt C Wrig, he really stretches out and would like to hear from all the boys who can hear him.

* * *

HO Hum. . . . Five meter shortwave impulses travel in straight lines, so they say. . . . But a few of the inquisitive boys out at CalTech decided to disprove this theory and sent out a wave over the ocean, which by all previous calculations should have continued moving straight out until its strength dissipated. But the receiving set, twenty miles away, and below the horizon or curvature of the earth's surface, received the signal. So it was proven that either five meter waves do bend or the earth is flat! They are now intending to continue further experimentation until they get down to one meter. Just between us, there's no telling how far these scientists will go to disprove an established theory.

* * *

A SAD case for the secretary of the ARTA Frisco local is Harold and Gerald Estep, the twin radiops, who are so much alike that they even think that way. It's sure been difficult routing these chaps because you can't tell whether to bawl out Herald or Gerald for an infraction.

* * *

MACKEY Radio was socked for plenty t'other day when they were made to pay more than $40,000 as back salary to members of the ARTA. Part payments are now coming in and some of the men are receiving such large sums that they can retire for some time to come. Dave Wingate is one of the boys who is due to collect approximately $4,000. . . . And that ain't buttons even with the low exchange. ARTA deserves plenty of credit for its stick-to-it-iveness in this case.

* * *

THE CTU-Mardiv recently signed an agreement with the Clyde Mallory Lines. To us the outstanding point of that whole agreement was "Recognition as Radio Officers." Of course, wage increases, seniority rights, vacations with pay, etc., are all to be desired. But I believe the radiop has been sliding over this item in his mad scramble for the other advantages. Perhaps it does sound foolish, this harping on something that does not pay the rent, but it does give that pride in the education and experience of being a Radio Officer. And now the idea is to conduct oneself as one.

* * *

WELL, gang, there's been quite a pick-up in shipping these last few weeks and with the new subsidies being granted to shipping organizations, there should be some real subtracting from the shoreside list. There's also a big demand for first-class radiops in the airways, but they need first class men. They must be able to handle 35 wpm. have first class telephone ticket, know the teletype system, and be able to handle five circuits with dispatch.

* * *

SO keep your eyes peeled and your ears to the ground for the latest and bestest news for retransmission to brother ops one and all. And with 73....ge....GY.

—30—

"S RELA"
—A UNIVERSAL RADIO LANGUAGE

by E. STANTON BROWN
Associate Editor, RADIO NEWS

Continuing the series on the remarkable radio language invented by Carlo Spatari, we take up the subject of Universal Radio Time.

LAST month you received your introduction to the unique universal radio language invented by Professor Carlo Spatari, based on the eight notes of the musical scale. By means of this novel language system, which requires no memorizing and allows you to compose messages and think in your own language, a single message compounded of but a few code words may be understood simultaneously by a number of listeners, each having knowledge of only his own particular language. The message may be either written or spoken. SIRELA's greatest value is that it offers practically no phonetic difficulties in any language.

From the information and charts given last month you should now be able to compose almost completely a verification request in SIRELA, as the Spatari Radio Language is known. This month we will go a step further and will deal with the use of the Universal Radio Time Chart, since it is necessary that this be used in composing your verification request in order to correlate your time properly with that of the country in which is located the station you are addressing. A complete Universal Radio Time Comparison Chart is given on the next two pages. This provides a fool-proof method whereby all time, anywhere in the world, may be expressed in a common unit to avoid all possibility of your giving a wrong time period during which you heard the program, and which may be understood correctly by anyone, anywhere in the world.

In order to use the chart, first locate your country on it. For example, if you live in Little Rock, Arkansas, which operates on Central Standard Time, you would find the correct horizontal line of hours after, "United States of America (C.S.T.)." Let us say that you heard a program from Buenos Aires, Argentina, at 11:00 p. m. your time, (C.S.T.). Scan across the horizontal line of hours after the name of your country and time zone until you come to 11:00 p. m. Then read up the vertical column until you come to the horizontal line after, "Argentina. Buenos Aires." The time there, as indicated, would be 1:00 a. m. their time. Continuing up to the very top of the vertical column you will note that the Universal Radio Time equivalent is 5:00 a.m. and that the SIRELA code word for the time is "LA." This is the code word you would use in informing the Buenos Aires station of the time at which you heard their program.

Having taken this brief glance at the chart, let's now look at it more closely. Beginning on the left side, you will note two vertical columns under the heading "Time Differences." Below this are two subheadings, "12 Noon E.S.T." (Eastern Standard Time—Ed.) and "Midnight U.R.T." (Universal Radio Time—Ed.). Under these two subheads are two more subheads, both entitled "H.M." The vertical columns under "H.M." indicate the number of hours (H) and minutes (M) which the time in any country is *ahead* or *behind* of Eastern Standard Time or Universal Radio Time. Whether or not the time is *ahead* or *behind* is indicated by asterisk signs (*) after the name of the country and before the first vertical column of hours headed "MI SO." One asterisk (*) means that the time of that country is *behind* U.R.T. Two asterisks (**) indicate that the time of that country is in the next meridian, or more than 12 hours *ahead* of Universal Radio Time.

The hours of Universal Radio Time are numbered from 1 to 24. Twenty-four o'clock U.R.T. is equivalent to midnight Greenwich Mean Time. The hours from 24 midnight to 12 noon are known as *Antemeridian* (a.m.) and are printed in light face type. The hours from 12 noon to 24 midnight are known as *Postmeridian* (p. m.) and are shown in bold face type.

To continue across the chart from left to right, the first column after the Time Differences consists of a vertical column of boxes (□). You may check your country and time zone in one of these to facilitate reference to the chart. The next column is a vertical one containing the time zone designation of the country followed by another vertical column of the names of countries. Following this is a column which indicates by means of an abbreviation in which continent or area the country lies. The abbreviations of the names of the continents or areas are as follows:

AA—Australasia	NA—North America
AF—Africa	NC—North Atlantic
AO—Atlantic Ocean	NP—North Pacific
AS—Asia	OC—Oceania
CA—Central America	PO—Pacific Ocean
EA—Europe-Asia	AS—South America
EU—Europe	WI—West Indies
IO—Indian Ocean	Z—Zone Number

Following the abbreviation column there are the vertical columns of time which occur at the same instant in all the countries listed. Horizontally across the top of the chart there appears the SIRELA (Spatari Radio Language) equivalent for the Universal Radio Time hours which appear in another horizontal line directly beneath. At the right hand side of the chart the Time Zones, Countries, Continents, and Time differences are duplicated for ease of reference. At the extreme right of the chart appear the Spatari equivalents for numerals which you will use in noting the minutes after the hour. For example 17:24 U.R.T. would be written or spoken as RE BO MI SO [(RE BO)—17, (MI)—2, (SO)—4].

The listener hearing this over the air, or the station receiving it on a verification request, looks at the extreme right hand part of the chart under "Decoding," from which he would find that the time given would be 17:24 o'clock Postmeridian Universal Radio Time. By putting his finger on the country in which he is located, and then looking in the vertical column under 17:00 U.R.T. he will find the equivalent time in his own country. Adding 24 minutes to this time will give him the time referred to.

In the upper right hand corner of a Spatari Verification Request card (illustrated last month) appears the SIRELA code word for addressing the director of the station: **REBODODO**, which translated means, "Greetings: Dear Director (or whom it may concern), I would appreciate a verification of the program heard at: (K (first give time, then month and day and date)." This sequence must be adhered to. You will note that the example given on the card illustrated last month was as follows, "RE FASO MI SIRE." Translated, it would read, "1:00 Antemeridian Universal Radio Time (RE); Wednesday (FASO); 2nd (MI); June (SIRE)."

The "Time Zone" designations locate a particular area in which local time as indicated prevails, regardless of a particular city which may be shown. Just as there are many cities in the United States operating on Eastern Standard Time, so are there many cities with the same time in each time zone.

SIRELA is coming into wider use every day as more and more people discover it and use it. A recent letter from Senor Julio Meza Caballeros, Director General of Electrical Communications for the Republic of Guatemala, of stations TG-1 (1310 kc.) and TG-2 (6.19 mc.), stated that Spatari verification requests were being received almost daily by the two stations. Acknowledgment is being made to the listeners in Spatari. If you tune in on either of these stations, here is an opportunity to try out your SIRELA on them.

[See Time Chart on Next Page]

UNIVERSAL RADIO TIME
AS COMPILED BY

Time Differences 12 NOON E.S.T.	MID-NIGHT U.R.T.	ZONE No.	COUNTRIES, PROVINCES, CAPITALS, AND CHIEF CITIES	Continent	MI SO	RE	MI	FA	SO	LA	SI	BO	DODO	DORE	RE DO	RE RE	RE MI
H. M.	H. M.		SPATARI RADIO LANGUAGE		MI SO	RE	MI	FA	SO	LA	SI	BO	DODO	DORE	RE DO	RE RE	RE MI
05:00	00:00	☐ A-1	**UNIVERSAL RADIO TIME**		24:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00
09:00	04:00	☐ E	**AFGHANISTAN, Kabul**	AS	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	NOON	1:00	2:00	3:00	4:00
04:00	09:00	☐ P	Alaska, Yakutan Bay	NA	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	MIDNT.	1:00	2:00	3:00
01:00	04:00	☐ U-1	Argentine, Buenos Aires	SA	8:00	9:00	10:00	11:00	MIDNT.	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00
15:00	10:00	☐ K	Australia, New South Wales	OC	**10:00	11:00	NOON	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00
14:00	09:30	☐ J-2	South, Adelaide	OC	** 9:30	10:30	11:30	12:30	1:30	2:30	3:30	4:30	5:30	6:30	7:30	8:30	9:30
13:00	08:00	☐ I-1	West, Perth	OC	** 8:00	9:00	10:00	11:00	NOON	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00
03:00	02:00	☐ W	Azores, Ponta Delgada	NC	10:00	11:00	MIDNT.	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00
05:00	00:00	☐ A-1	**BELGIUM, Brussels**	EU	MIDNT.	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	NOON
07:27	04:32	☐ T-3	Bolivia, La Paz	SA	7:27	8:27	9:27	10:27	11:27	12:27	1:27	2:27	3:27	4:27	5:27	6:27	7:27
12:20	07:30	☐ H-3	Borneo, Sandakan	AS	7:30	8:30	9:30	10:30	11:30	12:30	1:30	2:30	3:30	4:30	5:30	6:30	7:30
02:00	03:00	☐ V	Brazil, Rio de Janeiro	SA	9:00	10:00	11:00	MIDNT.	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00
01:00	04:00	☐ U-1	Brazil, (West)	SA	8:00	9:00	10:00	11:00	MIDNT.	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00
01:15	03:45	☐ U-2	British Guiana	AF	8:15	9:15	10:15	11:15	12:15	1:15	2:15	3:15	4:15	5:15	6:15	7:15	8:15
01:00	04:00	☐ U-1	**CANADA, (Atlantic Time)**	NA	8:00	9:00	10:00	11:00	MIDNT.	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00
02:00	07:00	☐ R	Alberta, Edmonton	NA	5:00	6:00	7:00	8:00	9:00	10:00	11:00	MIDNT.	1:00	2:00	3:00	4:00	5:00
03:00	08:00	☐ Q	British Columbia, Vancouver	NA	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	MIDNT.	1:00	2:00	3:00	4:00
01:00	06:00	☐ S-1	Manitoba, Winnipeg	NA	6:00	7:00	8:00	9:00	10:00	11:00	MIDNT.	1:00	2:00	3:00	4:00	5:00	6:00
00:00	05:00	☐ T-1	Ontario, Toronto	NA	7:00	8:00	9:00	10:00	11:00	MIDNT.	1:00	2:00	3:00	4:00	5:00	6:00	7:00
01:00	04:00	☐ U-1	Quebec, Quebec	NA	8:00	9:00	10:00	11:00	MIDNT.	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00
03:30	01:30	☐ X-1	Canary Islands	NC	11:00	MIDNT.	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00
10:30	05:30	☐ F-2	Ceylon, Colombo	AS	**5:30	6:30	7:30	8:30	9:30	10:30	11:30	12:30	1:30	2:30	3:30	4:30	5:30
00:00	05:00	☐ T-1	Chile, Santiago	SA	7:00	8:00	9:00	10:00	11:00	MIDNT.	1:00	2:00	3:00	4:00	5:00	6:00	7:00
12:30	07:30	☐ H-3	China, Nanking	AS	**7:30	8:30	9:30	10:30	11:30	12:30	1:30	2:30	3:30	4:30	5:30	6:30	7:30
13:30	08:30	☐ I-2	China, Shanghai	AS	**8:30	9:30	10:30	11:30	12:30	1:30	2:30	3:30	4:30	5:30	6:30	7:30	8:30
00:00	05:00	☐ T-1	Colombia, Bogota	SA	7:00	8:00	9:00	10:00	11:00	MIDNT.	1:00	2:00	3:00	4:00	5:00	6:00	7:00
01:00	06:00	☐ S-1	Costa Rica, San Jose	CA	6:00	7:00	8:00	9:00	10:00	11:00	MIDNT.	1:00	2:00	3:00	4:00	5:00	6:00
00:00	05:00	☐ T-1	Cuba, Havana	WI	7:00	8:00	9:00	10:00	11:00	MIDNT.	1:00	2:00	3:00	4:00	5:00	6:00	7:00
00:00	05:00	☐ T-1	Curacao, Willemstad	SA	7:00	8:00	9:00	10:00	11:00	MIDNT.	1:00	2:00	3:00	4:00	5:00	6:00	7:00
00:20	04:40	☐ T-2	**DOMINICAN REP. Santo Domingo**	WI	7:20	8:20	9:20	10:20	11:20	12:20	1:20	2:20	3:20	4:20	5:20	6:20	7:20
00:40	05:14	☐ S-4	**ECUADOR, Quito**	SA	6:46	7:46	8:46	9:46	10:46	11:46	12:46	1:46	2:46	3:46	4:46	5:46	6:46
00:35	05:19	☐ S-3	Ecuador, Guayaquil	SA	6:41	7:41	8:41	9:41	10:41	11:41	12:41	1:41	2:41	3:41	4:41	5:41	6:41
07:00	02:00	☐ C-1	Egypt, Cairo	AF	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	NOON	1:00	2:00
05:00	00:00	☐ A-1	England, London	EU	MIDNT.	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	NOON
08:00	03:00	☐ D-1	Etniopia, Addis Ababa	AF	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	NOON	1:00	2:00	3:00
17:00	12:00	☐ M	**FIJI ISLANDS, Suva**	OC	NOON	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	MIDNT.
05:30	00:39	☐ A-3	Fernando Po	AF	12:39	1:39	2:39	3:39	4:39	5:39	6:39	7:39	8:39	9:39	10:39	11:39	12:39
05:00	00:00	☐ A-1	France, Paris	EU	MIDNT.	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	NOON
06:00	01:00	☐ B	**GERMANY, Berlin**	EU	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	NOON	1:00
03:00	02:00	☐ W	Greenland, Sydproven	NA	10:00	11:00	MIDNT.	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00
01:00	06:00	☐ S-1	Guatemala, Guatemala	SA	6:00	7:00	8:00	9:00	10:00	11:00	MIDNT.	1:00	2:00	3:00	4:00	5:00	6:00
01:00	03:40	☐ U-3	Guiana, Dutch	SA	8:20	9:20	10:20	11:20	12:20	1:20	2:20	3:20	4:20	5:20	6:20	7:20	8:20
00:00	05:00	☐ T-1	**HAITI, Port-Au-Prince**	WI	7:00	8:00	9:00	10:00	11:00	MIDNT.	1:00	2:00	3:00	4:00	5:00	6:00	7:00
06:30	10:30	☐ N-2	Hawaii, Honolulu	NP	* 1:30	2:30	3:30	4:30	5:30	6:30	7:30	8:30	9:30	10:30	11:30	12:30	1:30
05:20	00:20	☐ A-2	Holland, Amsterdam	EU	12:20	1:20	2:20	3:20	4:20	5:20	6:20	7:20	8:20	9:20	10:20	11:20	12:20
06:00	01:00	☐ B	Hungary, Budapest	EU	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	NOON	1:00
10:30	05:30	☐ F-2	**INDIA, BOMBAY**	AS	5:30	6:30	7:30	8:30	9:30	10:30	11:30	12:30	1:30	2:30	3:30	4:30	5:30
10:53	05:53	☐ F-3	India, Calcutta	AS	5:53	6:53	7:53	8:53	9:53	10:53	11:53	12:53	1:53	2:53	3:53	4:53	5:53
05:00	00:00	☐ A-1	Ireland, Dublin	EU	MIDNT.	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	NOON
06:00	01:00	☐ B	Italy, Rome	EU	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	NOON	1:00
14:30	09:30	☐ J-2	**JAPAN, Tokyo**	AS	** 9:30	10:30	11:30	12:30	1:30	2:30	3:30	4:30	5:30	6:30	7:30	8:30	9:30
07:30	02:30	☐ C-2	**KENYA, NAIROBI**	AF	2:30	3:30	4:30	5:30	6:30	7:30	8:30	9:30	10:30	11:30	12:30	1:30	2:30
04:00	01:00	☐ X-2	**LIBERIA, MONROVIA**	AF	11:16	12:16	1:16	2:16	3:16	4:16	5:16	6:16	7:16	8:16	9:16	10:16	11:16
12:00	07:00	☐ H-2	**MALAY STATES, JOHORE**	AS	7:20	8:20	9:20	10:20	11:20	12:20	1:20	2:20	3:20	4:20	5:20	6:20	7:20
14:00	09:00	☐ J-1	Manchukuo	AS	**9:00	10:00	11:00	NOON	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00
05:00	10:00	☐ O	Marquesas	SP	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	MIDNT.	1:00	2:00
03:00	08:00	☐ Q	Mexico, Mexico City	NA	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	MIDNT.	1:00	2:00	3:00	4:00
16:30	11:30	☐ L-2	**NEW ZEALAND, Wellington**	AA	11:30	12:30	1:30	2:30	3:30	4:30	5:30	6:30	7:30	8:30	9:30	10:30	11:30
01:00	06:00	☐ S-2	Nicaragua, Managua	CA	6:15	7:15	8:15	9:15	10:15	11:15	12:15	1:15	2:15	3:15	4:15	5:15	6:15
07:00	02:00	☐ C-1	**PALESTINE, Jerusalem**	AS	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	NOON	1:00	2:00
00:00	05:00	☐ T-1	Panama, Panama City	SA	7:00	8:00	9:00	10:00	11:00	MIDNT.	1:00	2:00	3:00	4:00	5:00	6:00	7:00
01:00	04:00	☐ U-4	Paraguay, Asuncion	SA	8:23	9:23	10:23	11:23	12:23	1:23	2:23	3:23	4:23	5:23	6:23	7:23	8:23
00:00	05:00	☐ T-1	Peru, Lima	SA	7:00	8:00	9:00	10:00	11:00	MIDNT.	1:00	2:00	3:00	4:00	5:00	6:00	7:00
13:00	08:00	☐ I-1	Philippine Islands, Manila	PO	8:00	9:00	10:00	11:00	NOON	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00
06:00	01:00	☐ B	Poland, Warsaw	EU	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	NOON	1:00
01:00	04:00	☐ T-2	Puerto Rico, San Juan	AO	7:20	8:20	9:20	10:20	11:20	12:20	1:20	2:20	3:20	4:20	5:20	6:20	7:20
08:00	03:00	☐ D-2	**RUSSIA, Moscow, (U.S.S.R.)**	EU	3:01	4:01	5:01	6:01	7:01	8:01	9:01	10:01	11:01	12:01	1:01	2:01	3:01
10:00	05:00	☐ F-1	Tobolsk to Tomsk	EU	5:00	6:00	7:00	8:00	9:00	10:00	11:00	NOON	1:00	2:00	3:00	4:00	5:00
11:00	06:00	☐ G-1	Tomsk to Lake Baikal	EU	6:00	7:00	8:00	9:00	10:00	11:00	NOON	1:00	2:00	3:00	4:00	5:00	6:00
15:00	10:00	☐ K	Sakhalin to Kamchatka	EU	10:00	11:00	NOON	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00
16:00	11:00	☐ L-1	Kamchatka to Cape Olyirtorski	EU	11:00	NOON	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00
06:00	11:00	☐ N-1	**SAMOA, Pago, Pago**	OC	* 1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	MIDNT.	1:00
12:00	07:00	☐ H-1	Siam, Bangkok	AS	7:00	8:00	9:00	10:00	11:00	NOON	1:00	2:00	3:00	4:00	5:00	6:00	7:00
05:00	10:00	☐ N-1	Society Islands	SP	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	MIDNT.	1:00
05:00	00:00	☐ A-1	Spain, Madrid	EU	MIDNT.	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	NOON
11:30	06:30	☐ G-2	Sumatra, N. W	AS	6:30	7:30	8:30	9:30	10:30	11:30	12:30	1:30	2:30	3:30	4:30	5:30	6:30
06:00	01:00	☐ B	Switzerland, Berne	EU	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	NOON	1:00
06:00	01:00	☐ B	Tripolitania, Tripoli	AF	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	NOON	1:00
01:00	06:00	☐ S-1	**UNITED STATES of Amer. (C.S.T.)**	NA	6:00	7:00	8:00	9:00	10:00	11:00	MIDNT.	1:00	2:00	3:00	4:00	5:00	6:00
00:00	05:00	☐ T-1	(E.S.T.) New York, N. Y., U.S.A.	NA	7:00	8:00	9:00	10:00	11:00	MIDNT.	1:00	2:00	3:00	4:00	5:00	6:00	7:00
02:00	07:00	☐ R	(M.S.T.) Denver, Col., U.S.A.	NA	5:00	6:00	7:00	8:00	9:00	10:00	11:00	MIDNT.	1:00	2:00	3:00	4:00	5:00
03:00	08:00	☐ Q	(P.S.T.) San Francisco, Cal., U.S.A.	NA	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	MIDNT.	1:00	2:00	3:00	4:00
01:30	03:30	☐ U-5	**URUGUAY, Montevideo**	SA	8:30	9:30	10:30	11:30	12:30	1:30	2:30	3:30	4:30	5:30	6:30	7:30	8:30
00:30	04:30	☐ T-4	**VENEZUELA, Caracas**	SA	7:30	8:30	9:30	10:30	11:30	12:30	1:30	2:30	3:30	4:30	5:30	6:30	7:30
05:00	00:00	☐ A-1	**UNIVERSAL RADIO TIME**		24:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00
Time Differences			SPATARI RADIO LANGUAGE		MI SO	RE	MI	FA	SO	LA	SI	BO	DO DO	DO RE	RE DO	RE RE	RE MI

All the times appearing in the same COLUMN occur at the same instant, therefore need but one Spatari Symbol.

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CARLO SPATARI

All the times appearing in the same COLUMN occur at the same instant, therefore need but one Spatari Symbol.

RE FA	RE SO	RE LA	RE SI	RE BO	RE DO	DO RE	MI DO	MI RE	MI MI	MI FA	ZONE No.	Continent	COUNTRIES, PROVINCES, CAPITALS, AND CHIEF CITIES	Time Differences 12 NOON E. S. T.	Time Differences MIDNIGHT U. R. T.
13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	☐ A-1		**UNIVERSAL RADIO TIME**	05:00	00:00
5:00	6:00	7:00	8:00	9:00	10:00	11:00	**MIDNT.**	1:00	2:00	3:00	☐ E	AS	**AFGHANISTAN, Kabul**	09:00	04:00
4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	**NOON**	1:00	2:00	☐ P	NA	Alaska, Yakutan Bay	04:00	09:00
9:00	10:00	11:00	**NOON**	1:00	2:00	3:00	4:00	5:00	6:00	7:00	☐ U-1	SA	Argentina, Buenos Aires	01:00	04:00
11:00	**MIDNT.**	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	☐ K	OC	Australia, New South Wales	15:00	10:00
10:30	11:30	12:30	1:30	2:30	3:30	4:30	5:30	6:30	7:30	8:30	☐ J-2	OC	South, Adelaide	14:00	09:30
9:00	10:00	11:00	**MIDNT.**	1:00	2:00	3:00	4:00	5:00	6:00	7:00	☐ I-1	OC	West, Perth	13:00	08:00
11:00	**NOON**	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	☐ W	NC	Azores, Ponta Delgada	03:00	02:00
1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	☐ A-1	EU	Belgium, Brussels	05:00	00:00
8:27	9:27	10:27	11:27	12:27	1:27	2:27	3:27	4:27	5:27	6:27	☐ T-3	SA	**BOLIVIA, La Paz**	07:27	04:32
8:30	9:30	10:30	11:30	12:30	1:30	2:30	3:30	4:30	5:30	6:30	☐ H-3	AS	Borneo, Sandakan	12:20	07:30
10:00	11:00	**NOON**	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	☐ V	SA	Brazil, Rio de Janeiro	02:00	03:00
9:00	10:00	11:00	**NOON**	1:00	2:00	3:00	4:00	5:00	6:00	7:00	☐ U-1	SA	Brazil, (West)	01:00	04:00
9:15	10:15	11:15	12:15	1:15	2:15	3:15	4:15	5:15	6:15	7:15	☐ U-2	AF	British Guiana	01:15	03:45
9:00	10:00	11:00	**NOON**	1:00	2:00	3:00	4:00	5:00	6:00	7:00	☐ U-1	NA	**CANADA, (Atlantic Time)**	01:00	04:00
6:00	7:00	8:00	9:00	10:00	11:00	**NOON**	1:00	2:00	3:00	4:00	☐ R	NA	Alberta, Edmonton	02:00	07:00
5:00	6:00	7:00	8:00	9:00	10:00	11:00	**NOON**	1:00	2:00	3:00	☐ Q	NA	British Columbia, Vancouver	03:00	08:00
7:00	8:00	9:00	10:00	11:00	**NOON**	1:00	2:00	3:00	4:00	5:00	☐ S-1	NA	Manitoba, Winnipeg	01:00	06:00
8:00	9:00	10:00	11:00	**NOON**	1:00	2:00	3:00	4:00	5:00	6:00	☐ T-1	NA	Ontario, Toronto	00:00	05:00
9:00	10:00	11:00	**NOON**	1:00	2:00	3:00	4:00	5:00	6:00	7:00	☐ U-1	NA	Quebec, Quebec	01:00	04:00
NOON	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	☐ X-1	NC	Canary Islands	03:30	01:30
6:30	7:30	8:30	9:30	10:30	11:30	12:30	1:30	2:30	3:30	4:30	☐ F-2	AS	Ceylon, Colombo	10:30	05:30
8:00	9:00	10:00	11:00	**NOON**	1:00	2:00	3:00	4:00	5:00	6:00	☐ T-1	SA	Chile, Santiago	00:00	05:00
8:30	9:30	10:30	11:30	12:30	1:30	2:30	3:30	4:30	5:30	6:30	☐ H-3	AS	China, Nanking	12:30	07:30
9:30	10:30	11:30	12:30	1:30	2:30	3:30	4:30	5:30	6:30	7:30	☐ I-2	AS	China, Shanghai	13:30	08:30
8:00	9:00	10:00	11:00	**NOON**	1:00	2:00	3:00	4:00	5:00	6:00	☐ T-1	SA	Colombia, Bogota	00:00	05:00
7:00	8:00	9:00	10:00	11:00	**NOON**	1:00	2:00	3:00	4:00	5:00	☐ S-1	CA	Costa Rica, San Jose	01:00	06:00
8:00	9:00	10:00	11:00	**NOON**	1:00	2:00	3:00	4:00	5:00	6:00	☐ T-1	WI	Cuba, Havana	00:00	05:00
8:00	9:00	10:00	11:00	**NOON**	1:00	2:00	3:00	4:00	5:00	6:00	☐ T-1	SA	Curacao, Willemstad	00:00	05:00
8:20	9:20	10:20	11:20	12:20	1:20	2:20	3:20	4:20	5:20	6:20	☐ T-2	WI	**DOMINICAN REP., Santo Domingo**	00:20	04:40
7:46	8:46	9:46	10:46	11:46	12:46	1:46	2:46	3:46	4:46	5:46	☐ S-4	SA	**ECUADOR, Quito**	00:40	05:14
7:41	8:41	9:41	10:41	11:41	12:41	1:41	2:41	3:41	4:41	5:41	☐ S-3	SA	Ecuador, Guayaquil	00:35	05:19
3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	**MIDNT.**	1:00	☐ C-1	AF	Egypt, Cairo	07:00	02:00
1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	☐ A-1	EU	England, London	05:00	00:00
4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	**MIDNT.**	1:00	2:00	☐ D-1	AF	Ethiopia, Addis Ababa	08:00	03:00
1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	☐ M	OC	**FIJI ISLANDS, Suva**	17:00	12:00
1:39	2:39	3:39	4:39	5:39	6:39	7:39	8:39	9:39	10:39	11:39	☐ A-3	AF	Fernando Po	05:30	00:39
1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	☐ A-1	EU	France, Paris	05:00	00:00
2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	**MIDNT.**	☐ B	EU	**GERMANY, Berlin**	06:00	01:00
11:00	**NOON**	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	☐ W	NA	Greenland, Sydproven	03:00	02:00
7:00	8:00	9:00	10:00	11:00	**NOON**	1:00	2:00	3:00	4:00	5:00	☐ S-1	SA	Guatemala, Guatemala	01:00	06:00
9:20	10:20	11:20	12:20	1:20	2:20	3:20	4:20	5:20	6:20	7:20	☐ U-3	SA	Guiana, Dutch	01:00	03:40
8:00	9:00	10:00	11:00	**NOON**	1:00	2:00	3:00	4:00	5:00	6:00	☐ T-1	WI	**HAITI, Port-Au-Prince**	00:00	05:00
2:30	3:30	4:30	5:30	6:30	7:30	8:30	9:30	10:30	11:30	12:30	☐ N-2	NP	Hawaii, Honolulu	06:30	10:30
1:20	2:20	3:20	4:20	5:20	6:20	7:20	8:20	9:20	10:20	11:20	☐ A-2	EU	Holland, Amsterdam	05:20	00:20
2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	**MIDNT.**	☐ B	EU	Hungary, Budapest	06:00	01:00
6:30	7:30	8:30	9:30	10:30	11:30	12:30	1:30	2:30	3:30	4:30	☐ F-2	AS	**INDIA, BOMBAY**	10:30	05:30
6:53	7:53	8:53	9:53	10:53	11:53	12:53	1:53	2:53	3:53	4:53	☐ F-3	AS	India, Calcutta	10:53	05:53
1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	☐ A-1	EU	Ireland, Dublin	05:00	00:00
2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	**MIDNT.**	☐ B	EU	Italy, Rome	06:00	01:00
10:30	11:30	12:30	1:30	2:30	3:30	4:30	5:30	6:30	7:30	8:30	☐ J-2	AS	**JAPAN, Tokyo**	14:30	09:30
3:30	4:30	5:30	6:30	7:30	8:30	9:30	10:30	11:30	12:30	1:30	☐ C-2	AF	**KENYA, NAIROBI**	07:30	02:30
12:16	1:16	2:16	3:16	4:16	5:16	6:16	7:16	8:16	9:16	10:16	☐ X-2	AF	**LIBERIA, MONROVIA**	04:00	01:00
8:20	9:20	10:20	11:20	12:20	1:20	2:20	3:20	4:20	5:20	6:20	☐ H-2	AS	**MALAY STATES, JOHORE**	12:00	07:00
10:00	11:00	**MIDNT.**	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	☐ J-1	AS	Manchukuo	14:00	09:00
3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	**NOON**	1:00	☐ O	SP	Marquesas	05:00	10:00
5:00	6:00	7:00	8:00	9:00	10:00	11:00	**NOON**	1:00	2:00	3:00	☐ Q	NA	Mexico, Mexico City	03:00	08:00
12:30	1:30	2:30	3:30	4:30	5:30	6:30	7:30	8:30	9:30	10:30	☐ L-2	AA	**NEW ZEALAND, Wellington**	16:30	11:30
7:15	8:15	9:15	10:15	11:15	12:15	1:15	2:15	3:15	4:15	5:15	☐ S-2	CA	Nicaragua, Managua	01:00	06:00
3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	**MIDNT.**	1:00	☐ C-1	AS	**PALESTINE, Jerusalem**	07:00	02:00
8:00	9:00	10:00	11:00	**NOON**	1:00	2:00	3:00	4:00	5:00	6:00	☐ T-1	SA	Panama, Panama City	00:00	05:00
9:23	10:23	11:23	12-23	1:23	2:23	3:23	4:23	5:23	6:23	7:23	☐ U-4	SA	Paraguay, Asuncion	01:00	04:00
8:00	9:00	10:00	11:00	**NOON**	1:00	2:00	3:00	4:00	5:00	6:00	☐ T-1	SA	Peru, Lima	00:00	05:00
9:00	10:00	11:00	**MIDNT.**	1:00	2:00	3:00	4:00	5:00	6:00	7:00	☐ I-1	PO	Philippine Islands, Manila	13:00	08:00
2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	**MIDNT.**	☐ B	EU	Poland, Warsaw	06:00	01:00
8:20	9:20	10:20	11:20	12:20	1:20	2:20	3:20	4:20	5:20	6:30	☐ T-2	AO	Puerto Rico, San Juan	01:00	04:00
4:01	5:01	6:01	7:01	8:01	9:01	10:01	11:01	12:01	1:01	2:01	☐ D-2	EU	**RUSSIA, Moscow, (U.S.S.R.)**	08:00	03:00
6:00	7:00	8:00	9:00	10:00	11:00	**MIDNT.**	1:00	2:00	3:00	4:00	☐ F-1	EU	Tobolsk to Tomsk	10:00	05:00
7:00	8:00	9:00	10:00	11:00	**MIDNT.**	1:00	2:00	3:00	4:00	5:00	☐ G-1	EU	Tomsk to Lake Baikal	11:00	06:00
11:00	**MIDNT.**	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	☐ K	EU	Sakhalin to Kamchatka	15:00	10:00
MIDNT.	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	☐ L-1	EU	Kamchatka to Cape Olyirtorski	16:00	11:00
2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	**NOON**	☐ N-1	OC	**SAMOA, Pago, Pago**	06:00	11:00
8:00	9:00	10:00	11:00	**MIDNT.**	1:00	2:00	3:00	4:00	5:00	6:00	☐ H-1	AS	Siam, Bangkok	12:00	07:00
2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	**NOON**	☐ N-1	SP	Society Islands	05:00	10:00
1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	☐ A-1	EU	Spain, Madrid	05:00	00:00
7:30	8:30	9:30	10:30	11:30	12:30	1:30	2:30	3:30	4:30	5:30	☐ G-2	AS	Sumatra, N. W.	11:30	06:00
2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	**MIDNT.**	☐ B	EU	Switzerland, Berne	06:00	01:00
2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	**MIDNT.**	☐ B	AF	Tripolitania, Tripoli	06:00	01:00
7:00	8:00	9:00	10:00	11:00	**NOON**	1:00	2:00	3:00	4:00	5:00	☐ S-1	NA	**UNITED STATES of Amer. (C.S.T.)**	01:00	06:00
8:00	9:00	10:00	11:00	**NOON**	1:00	2:00	3:00	4:00	5:00	6:00	☐ T-1	NA	(E.S.T.) New York, N. Y., U.S.A.	00:00	05:00
6:00	7:00	8:00	9:00	10:00	11:00	**NOON**	1:00	2:00	3:00	4:00	☐ R	NA	(M.S.T.) Denver, Col., U.S.A.	02:00	07:00
5:00	6:00	7:00	8:00	9:00	10:00	11:00	**NOON**	1:00	2:00	3:00	☐ Q	NA	(P.S.T.) San Francisco, Cal., U.S.A.	03:00	08:00
9:30	10:30	11:30	12:30	1:30	2:30	3:30	4:30	5:30	6:30	7:30	☐ U-5	SA	**URUGUAY, Montevideo**	01:30	03:30
8:30	9:30	10:30	11:30	12:30	1:30	2:30	3:30	4:30	5:30	6:30	☐ T-4	SA	**VENEZUELA, Caracas**	00:30	04:30
13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	☐ A-1		**UNIVERSAL RADIO TIME**	05:00	00:00
RE FA	RE SO	RE LA	RE SI	RE BO	RE DO	DO RE	MI DO	MI RE	MI MI	MI FA	Zone No.		**SPATARI RADIO LANGUAGE**	Time Differences	

DECODING

DO — 0
RE — 1
MI — 2
FA — 3
SO — 4
LA — 5
SI — 6
BO — 7
DODO 8
DORE 9

★

ENCODING:

01 DO RE
02 DO MI
03 DO FA
04 DO SO
05 DO LA
06 DO SI
07 DO BO
08 DO DODO
09 DO DORE

★

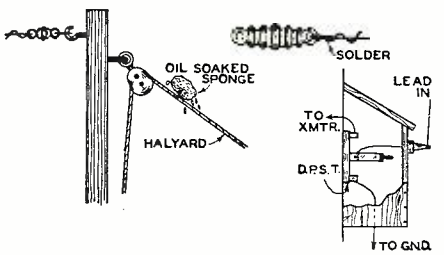
0 DO
1 RE
2 MI
3 FA
4 SO
5 LA
6 SI
7 BO
8 DODO
9 DORE
10 RE DO
11 RE RE
12 RE MI
13 RE FA
14 RE SO
15 RE LA
16 RE SI
17 RE BO
18 RE DODO
19 RE DORE
20 MI DO
21 MI RE
22 MI MI
23 MI FA
24 MI SO
25 MI LA
26 MI SI
27 MI BO
28 MI DODO
29 MI DORE
30 FA DO
31 FA RE
32 FA MI
33 FA FA
34 FA SO
35 FA LA
36 FA SI
37 FA BO
38 FA DODO
39 FA DORE
40 SO DO
41 SO RE
42 SO MI
43 SO FA
44 SO SO
45 SO LA
46 SO SI
47 SO BO
48 SO DODO
49 SO DORE
50 LA DO
51 LA RE
52 LA MI
53 LA FA
54 LA SO
55 LA LA
56 LA SI
57 LA BO
58 LA DODO
59 LA DORE

"RADIO Gadgets"

Winterizing the Antenna

Whether your antenna is used for receiving, transmitting, or both, it should be given a good "once over" before winter sets in. Much of the pleasure and efficiency of good radio depends upon the antenna system. So give every joint the benefit of the doubt.

If you employ a mast, look it over for weak points in construction and remedy



them. If possible, slap on a heavy coat of paint. An unpainted mast will deteriorate rapidly.

Look over the stays. Any stay that is kinked badly or rusted should be replaced with a new one. A broken stay during a 60 mile winter gale will probably mean disaster. Better fix it now.

A rope halyard, supporting any strain, is good for about a year. Any that appear suspiciously weak must be removed and new rope reeved through the pulleys. No need to climb the mast or lower it to do this. Just butt the ends of the new and old rope together and spiral a piece of wire along the joint from one to the other. Then carefully haul the joint up and through its pulley until the new rope is in place.

Before reeving in *any* new halyard it will be wise to weatherproof it as follows. Fill a bucket with boiled linseed oil and coil the rope into the bucket. Leave it there overnight. Then stretch it between posts and wipe off all extra oil, catching this in a bucket as you work along. Such treatment makes the rope pliable and just about doubles its life.

Metal pulleys will rust in time making them hard or impossible to turn. To cure a hard turning pulley without taking down the mast is a simple matter. Tie a small sponge to the halyard, as shown. Soak the sponge in oil and then pull it up to the pulley by the halyard. Slapping it against the pulley will squeeze some of the oil out onto the pulley and thus thoroughly lubricate it.

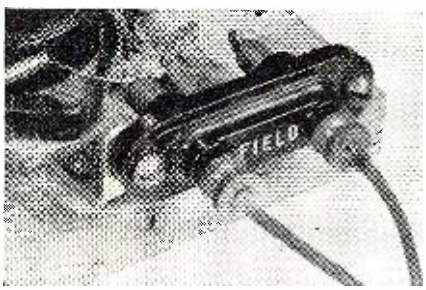
Finally, lower the antenna and go over it carefully for bad joints and contacts. Where corrosion or broken soldering is evident, remake the joint and resolder. The electrical connection must be perfect or efficiency is lost. It is very important that all electrical resistance must be overcome in soldered joints and time given to this will be well repaid in increased signal transmission and reception.

If your antenna system employs a lightning switch, see to it that snow and ice cannot collect in the winter and short signals to ground. The best way is to build a simple shed roof shelter for it as indicated in the sketch. Bring the feeder or feeders down to long stand-off insulators. From there the leads pass inside the shelter to the switch and to their proper connections without fear of weather conditions.

Look over all other points for weaknesses such as cracked or chipped insulators, loose halyard cleats, stay connections to ground, and mast base supports. When winter gales blow and temperatures drop into the zero region a strong mast and efficient antenna will add to your radio pleasure and not be a constant source of worry.

Handles for Phone Cord Tips

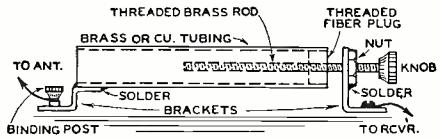
The tips of phone cords can be more easily withdrawn from the pin jack if a 6/32" knurled nut from a battery binding post is soldered to the tip. The knurled



nut should be drilled out so that it can be passed over the phone tip and soldered to the end, as illustrated. The knurled edge makes removal and insertion of the tips, extremely simple.

Home-Made Antenna Tuning Condenser

An efficient antenna tuning condenser can be made for ultra high frequency receivers from material found in the parts box. Use a piece of ½" brass or copper tubing about 2" long. Solder a small mounting bracket



to one end and mount the tube horizontally on a baseboard. A binding-post and screw can be used to attach the bracket as shown.

Fashion a tight fitting plug of bakelite or fiber for the opposite end of the tube. Drill and tap the center of the plug for a piece of standard threaded brass rod. Then find a brass nut to thread on the rod and solder a bracket to this nut and mount it vertically in front of the plugged end of the tube as shown.

Attach a bakelite binding post knob to one end of the threaded rod. Run the rod through the brass nut and threaded plug as shown. The antenna lead-in is connected to the binding post and the wire to the receiver grid circuit to the brass nut. Screwing the thread in the tube increases the capacity; threading it out decreases it. If there is any tendency for the rod to touch the inside of the tube, line it with paper.

You will find that this condenser will make possible fine tuning of the antenna circuit to gain the maximum of signal strength.

Mark the Resistors and Save Time

If you will mark each carbon resistor with its ohmage value, using quick drying lacquer and a small brush, much time will

be saved when selecting the correct resistor in set building or in repairing. Condensers, r.f. chokes, etc., too, can also be labelled with their capacities.

Cure for Noisy Volume Control

When the resistance strip of a volume control becomes worn or broken it will cause noisy operation and will ruin reception. Here is a stunt that will enable the user to continue using the set without any servicing expense.

Take out the volume control and remove the resistance strip. Locate the break and, cleaning the ends of the wire, solder them together. Then gently bend the strip until what was the back side becomes the front or convex side. Put it back on the form. This will present a fresh side over which the contact will slide or roll without interference or break and it will be as quiet as when new.

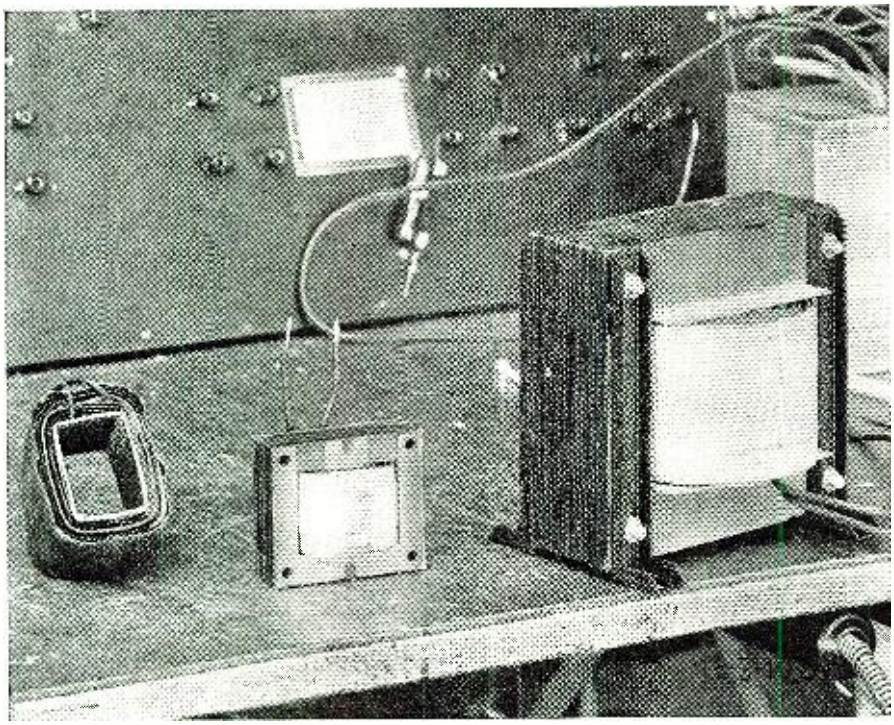
Keeping Transmitters Cool

A serious problem encountered by many amateurs who have completely enclosed transmitters of relatively high power, or medium power rigs of extremely compact design, is over-heating. This not only endangers parts but also increases circuit "drift," necessitating frequent retuning.

Ideal for cooling such rigs are small electric "stack" fans designed for insertion in the chimneys of certain kitchen stoves. Pictured is a typical fan of this type cut into the back door of a half-kw. job at W2TY, presenting a neat appearance and at the same time providing forced ventilation without objectionable mechanical noise or current-drain.

The fan illustrated draws only 9 watts

(*Gadget further on page* 61)



Showing the internal construction of chokes and a transformer (left).

Filter Packs

by LOUIS J. GAMACHE, W9RGL

Development Engineer, Standard Transformer Corp., Chicago, Illinois

The author describes the actions of a filter pack. This article is of primary importance to all servicemen and amateurs who design their own D.C. power supplies.

A FILTER power supply consists of a transformer to convert house current of from 115 volts, 60 cycles, to various voltages and currents needed from the power house supply. This voltage and current is then fed to a rectifier which changes the current from 60 cycles a.c. to a pulsating direct current. This pulsating direct current contains a certain amount of super-imposed alternating current component called ripple. The percentage of ripple may be determined by inserting a high resistance a.c. voltmeter in series with a condenser across that part of the circuit in which it is desired to know the percentage of ripple.

NOTE: It is important that the meter be shorted when the voltage is turned on or off to prevent the condenser charged by the voltage and current, from burning out the meter.

A pure sine wave appears under figure (1) and is approximately the type of current supplied from house circuits. This current has approximately the same appearance after leaving the transformer. The few discrepancies caused by hysteresis, phase shift, core loss, permeability, etc., will be disregarded in this article because of their complexity.

Figure (2) illustrates the top portion of the sine wave which may be likened to the output of a half wave rectifier if it were perfectly linear. However, this curve will be modified in most commercial rectifiers. From this curve, it is apparent that only 180 degrees of the sine wave is utilized and that for 180 degrees of the cycle, no voltage appears on the upper side of the line. In most commercial applications where direct current is needed, a full wave rectifier is utilized. In a full wave rectifier, the bottom part omitted in a half wave rectifier (Fig. 2) is transposed to the top part of zero potential (Fig. 3).

It might be well at this time to explain that current can flow through a rectifier in one direction only, i.e., from positive to negative. With the above in mind, and utilizing a transformer with a center tap as indicated, the center tap being used as the zero line or negative, it is found that on the top portion of the cycle, current will flow through the top portion of the rectifier because it is then more positive than the filament. The lower part of this winding will be idle because negative current cannot flow through the rectifier. However, when the top portion of the cycle becomes zero, the negative portion will become positive with respect to the center tap, allowing current to flow through the bottom part of the rectifier. This action may be likened to that of a push-pull circuit; when one side is pushing, the other side is pulling. This, of course, is literally speaking.

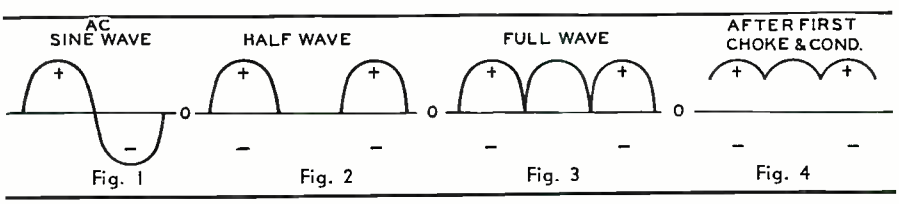
The first filter application will be that utilizing a single condenser. The action of this condenser in the circuit is to raise the direct current voltage by storing the peak energy which is 1.41 times the RMS voltage applied to the rectifier. Using a transformer and a tube which delivers 270 volts at .001 amperes, it is found that by applying a 4 mfd. condenser, the voltage will be increased to 500 volts or 1.85 times the voltage from the rectifier without the condenser. When the load resistance decreases, this increases the current flowing through the circuit, then a value of 1.85 will not be true. The value will be approximately 1.71 times the voltage without the condenser.

The above applies only to this value of condenser; other values will require different factors. The regulation of the transformer and rectifier combination must be considered in these measurements. The percentage of ripple across this particular setup, utilizing the first measurement without the condenser and the second value with a condenser, it is found that the remaining ripple is approximately 25% of the original ripple.

For ordinary purposes, the condenser type filter has the following disadvantages. First: the capabilities of the rectifier must be used to only 50% of their capacity. Second: the regulation from this combination is rather poor. Third: the condenser must withstand the high peak voltage.

The next type of filter circuit is one which uses a swinging choke and condenser. Chokes offer a high resistance to alternating current. This value of resistance is expressed in "henries." Most important of all is that the mere expression of the word henries referring to a choke *is meaningless unless used in conjunction with the value of direct current flowing through the choke.* Swinging chokes are rated from minimum inductance to maximum inductance. The minimum value of inductance is the rating of the choke in henries at the maximum rated current. The maximum value of inductance is the rating of the choke with the minimum current used with the choke. This may be expressed by the statement that at low current, the choke offers very high impedance to the a.c. com-

(*Design further on page* 53)



THE NATIONAL QSO PAGE

OUR PLATFORM

IN SPITE of our repeated statements to the contrary, rumors continue to be circularized that we and our publication are seeking the overthrow of the American Radio Relay League. Nothing could be further from the truth! Not only are the Editor and the Managing Editor of RADIO NEWS members of the A.R.R.L.; but we believe that they are more interested in the continuance of the League than are those members who are either sitting by doing nothing at all, or are using up valuable energy throwing brickbats at anyone who is trying to accomplish anything in what will surely become a very serious situation by 1942.

We agree that it is easy—very easy—to find fault. It is harder to give a constructive suggestion. And it is hardest of all to stick to one's guns in the face of abject apathy or a barrage of vituperative expletives.

In order that there may be no mistake, we once again reiterate our stand, and what we hope to accomplish.

First, and foremost we are *for* the League! We urge all to join it! We do not believe that a second League is indicated at this time, nor should there be a second league until such a time that the A.R.R.L. conclusively shows that it is unable to carry on the work of the American ham, or that it becomes too involved with the publication of its radio magazine, *QST*.

We do believe, and we think that there is justification for our contention that the League is too loosely run, that the ham's problems are not handled as well as they might be, and that little if anything is being done to improve the American Amateur's status.

We indicated last month and the month before that that the subscription to *QST*, *automatically* made the subscriber a member of the League. That is wrong, and it should be remedied. We know of a very fine Medical Society whose weekly magazine has a circulation of over 25,000 while the membership of that Society is less than 5,000. Anyone can subscribe to their magazine. They would accept the money from any person, or in any name . . . but membership in their Society, ah, that's different. Here they have solidly founded qualifications, and the member must meet not only the qualifications of being a reputable doctor, but his private life must be morally above reproach. We do not advocate that the League adopt the same measures to the extent of requiring the careful survey of membership being made as does the Medical Society, but we do say that at the minimum A.R.R.L. membership should be limited to those who apply for it as such, and who are able to qualify under the statement that appears on the flyleaf of every *QST*, and is stated in the League Constitution.

We recall that when we applied for membership in the League, that we were sent an application blank to fill out requesting sufficient information which would have prevented any dog such as Terry Law (See RADIO NEWS, November, 1938) or any infant like Joel Davis (See RADIO NEWS, October, 1938) from becoming a member. If the League is able to use that system in handling *membership applications*, why can't it use the same technique in handling *plain subscriptions*. It could mail the would-be subscriber an application blank for membership, unless the subscriber-to-be requests membership at the same time that he sends in the subscription? Is this asking too much. We think not. And give a thought to the natural results.

When making a statement concerning the membership in the League, the force of knowing that for every member there was at least an *application on file*, would strengthen the A.R.R.L. We believe that to be almost elementary.

Next we are in favor of a greater publicity campaign for the ham to be conducted by the League. Not only in the papers, but in the state and Federal Government Legislature. The benefits of such a move would be to have *laws passed* in favor of the ham, and not resort to the interpretation of the laws by the executive body, the Federal Communications Commission.

Too few, since directly after the World War, have been the attempts by our League to have favorable legislation passed. And too extreme has been our unction towards the executive branch of the government which cannot of itself *make any* laws. The A.R.R.L. has pursued the line of least resistance in hewing to the F.C.C. in an attempt to have the ham situation strengthened, when it should have devoted itself to Congress and the Senate. It is these who make our laws as the representatives of the people, not the Commission whose sole purpose is to enforce and interpret them. It is to them that our messages should be addressed.

Until we as members can and do put the League on a tax-paying basis and thereby clear the decks for the employment of honest lobbyists, to promote our interests with the *law-makers*, and not the law-enforcers, we must of necessity come out a bad second to each and every commercial or non-amateur interest, which has long, long ago learned that valuable lesson.

And so we advocate that the A.R.R.L. amend its ways, pay its just taxes and place itself in a position of equality with the other interests who are at this very time pounding the Congressmen and Senators for more, and more, and more of what is now ours.

We have excellent information from a good source, that a move will be made in Congress, to outlaw all power for the hams which exceeds a quarter kilowatt to the final stage of transmitter. What are we going to do about it? Will the FCC be able to help us? The answer must be NO, since if the LAW says that a quarter kilowatt is all that shall be legal, then the FCC MUST enforce that provision, regardless of our puny cries to them for assistance and relief from that enactment. What if anything has the League done about this?

Finally we have been accused of trying to run a circulation campaign at the expense of the League and also the ham. This cannot be true since we do not need the circulation as we have the largest for our type magazine, right at the very time that you are reading this.

We are tied up into a great industry. That industry flourishes on the foundation and basis that the ham will survive indefinitely. If he is "liquidated" in 1942, the industry must fail with him. With that failure comes the end not only to the League as it is presently constituted, but also *QST* and RADIO NEWS as it is made up today. True, we can switch over to servicemen (who already spend more than 20 times a year what the ham does) but with that switch we will lose our identity as a leading ham publication. So we feel that we can *see* as well as *read* the writing on the wall, and can foresee that if there is not any aroused ham opinion BEFORE 1942, there will not be much of any hams after 1942.

To that end, we are striving hard and earnestly to awaken the amateur to the fact that his only salvation lies in *making* his League get down to brass tacks. Stop all this quibbling, this eternal and wanton waste of time and energy. This situation will not and is not getting any better for the ham, it is getting worse. While to some the year 1942 is far, far away, we know that three years is almost too little time to accomplish what we MUST to survive as hams. That is our point and our stand. We urge all serious minded hams to think on it, and see if there is not a modicum of logical reasoning behind it all.

MORE CONCERNING THE PLAN

THE plan which was noticed in the last issue, is still being worked on. It has turned out to be a gigantic task, and one which will deserve the attention of every licensed amateur in the country. As soon as the work is completed, and that should be in a month or six weeks, we will be happy to print it for your comments. It will be a plan envisaging the correction of some of the faults which are holding back the amateur from acquiring the firm place he should have in the run of things.

IT CAN HAPPEN HERE!

FROM some sources has come a criticism of the method which we are using to attract the attention of the hams to their plight. It is argued that a more subdued type of editorial would suffice to put the story over. If the ham were anything but what he is this would be true. Unfortunately the amateur is beset with many problems at home, and in his business. He takes his hobby seriously, but with—for the most part—a sort of lackadaisy as to just what is going on. He surrounds himself with a hard shell of disinterest in the future of his hobby, and his League, and sings, "We'll let George do it." These sort of tactics can only be met with blasts, with dynamite, and with the strong type of editorials which we have been featuring. The points could as well be made in quiet, unassuming words, but would the ham read them . . . would he take them to heart, would he even give it a moment's thought? He would not! So we hope that by hitting hard we can rouse the American Amateur that he *must fight*, that he *must not fall asleep at the switch*, and that his end in 1942 is too close at hand for comfort.

There are others who flatly refuse to believe that "It can happen here" and that the ham can be legislated out of existence. Well, he can. Hams are now prohibited in Greece, in Palestine, and are heavily curtailed in Germany, Spain, Morocco, Russia, Italy, and wherever the government is opposed to the free thinking of its people. It can certainly happen here, and it will but take the stroke of a pen in the hand of the President to wipe out—with one fell swoop—each and every ham now on the air. Think it over, and don't be a radiostritch. Let's get to our guns!—The Editors.

"We'll Need a Stronger House Next Time"

CORRESPONDENCE

Dear Sirs:

I write you as a member of the ARRL and as an amateur.

Upon first reading your column I was led to believe that I was reading cheap, prejudiced information. However, I see now that I am decidedly wrong and that you are stating facts and not unfair, biased reports.

During my brief experience with ARRL I have found nothing wrong with it. Maybe because I've been kept in the dark about League activities.

I firmly believe that immediate steps should be taken to better "Ham" conditions, and as a ham I stand behind R.N. or any other organization that has the intestinal fortitude to do it. . . .

Yours for wider bands,
(Sgd) Chas. Ballantine, W8SHA.

Gentlemen:

I heartily agree with RN as regards the present prospective loss of our frequencies, with the coming Radio Conference. (*Rome, 1942. Ed.*)

I do not believe that it is too late to do something about it, but WE MUST FORGET OUR FALSE CONFIDENCE IN THOSE WHO IN OUR MIND HAVE SERVED US WELL, REINVESTIGATE THEIR ACTIONS, AND AFTER WE HAVE OUR ANSWER, REALIGN OURSELVES WITH AFFILIATIONS WHO FIGHT WITH US, AND NOT AGAINST US.

IF those in charge of the ARRL will not open their publication to controversial matters concerning this situation and the conduct of the League, IF they will not here and now state their intentions and how they intend to go about it. IF they do not show some intentions of action, and I mean ACTION, THEN THEY SHOULD BE ADJUDGED AS BEING AGAINST US AND ALL SUPPORT BY EVERY AMATEUR DROPPED.

The amateur radio operators MADE the league, they can BREAK it if they see fit, or they can build it into an organization to be reckoned with by any enemy of amateur radio.

. . . and believe you me, if the rest of you don't get together instead of wasting valuable time arguing about it all the time, you're going to be hanging signs in front of your house some morning with the legend, RECEIVER, TUBES, TRANSFORMERS AND ANTENNA WIRE FOR SALE! 73

(Sgd) Frank C. Champlin,
W6PFF, ex-W7DEB, ex-DNCS, AARS.

Dear Sirs:

Have been reading your Editorials with much interest and concern and agree with you on most of what you say about the ARRL. I am and have been a member of the ARRL for the past five or six years, and am still for the league, but like you, I think it should clean house. Therefore you can count me as one ham who is willing to put up a fight for what I think is right.

. . . I firmly believe that if we hams do not wake up and demand a housecleaning of the ARRL, the time (1942 or sooner) will come when we will be sorry that we turned a deaf ear. 73.

(Sgd) E. L. Felder, W5FSS.

Gentlemen:

I am certainly glad someone has the initiative to bring to the open the deplorable conditions of the ARRL. . . . Some of the panty waists who can't weigh both sides of the question are the first ones to condemn a worthy undertaking such as yours to right this wrong. . . .

(Sgd) Wm. Hansen, ex-W8AUO.
Niles, Mich.

Dear Ed.:

I am certainly glad to see you come out in the open and stand up for the hams in their fight for existence. . . .

Steadily the Europeans, South and Central Americans moved in on us. Nothing but an Act of Congress can do us any good. Why not start picketing our congressmen and senators as well as the League spending some of the money for competent lobbyists and lawyers. It's a cinch if we make enough noise in Washington, Congress will prick up their ears as to what we have to say and the law should be amended to give us more recognition. I am not a member of the League I quit "donating" about 1932. When they start working for us and not the advertisers, then I shall join again.

(Sgd) D. E. Heisler, ex-W9ECS,
Reno, Nevada.

Dear Sir:

After reading the "NATIONAL QSO PAGE" in the September issue of RADIO NEWS I can readily understand why the Amateurs have been losing parts of their bands. It's about time someone did something about it. . . .

The whole thing looks to me more like a political setup where the party in office, with no opposition, just forgets about everything except drawing his salary. They need to be stirred up now and then to show them that the Amateur wants more than a magazine for his money. . . .

We need all the representation that we can afford, and we can get it if we go after these officers. . . .

(Sgd) A. Pearson, W9RYQ-KDOS,
S. S. "Swiftarrow."

Dear Sirs:

Congratulations for starting great fight in defense of Amateur Radio. Your National QSO Page is fine business. Keep the gallant fight going. Amateurs the world over must be made to realize this is their last opportunity to preserve their gentle art from complete disintegration. There is no sane reason why our DX bands should be confiscated for any other service whatsoever. The cheese paring has gone on long enough. Stop the rot! Otherwise Amateur Radio as we know it today will be a Dead Loss after 1942. Good luck and prosperity to your publication. . . .

(Sgd) Jas. Stewart-Mark, GM3DD,
Fife, Scotland.

Editor:

Congratulations on your stand towards the ARRL. It is about time certain happenings were aired for the benefit of the members, among whom I am numbered. We have a right to know what our League does, and if it must be through your efforts that we obtain this information, it is only fair that we give you our loyal support, and follow your suggestions. I believe you have been fair in

stating the situation, and in printing angry but childish insults hurled at you by those who believe in the "Divine Right of Kings" theory, or the "ARRL—Right or Wrong."

. . . and I hereby assert my faith in you by entering my subscription at this time.

(Sgd) Sperry B. Skilton, W1KKG.

■ **To all of the above, who together with many, many others have voiced their approval of our ARRL stand, we give our sincerest thanks. We need all the support we can get, if we are to be successful in making the League "go to town" for us and save the hams from utter extinction by 1942. The best way to get us a "reprieve" and a permanent one, is to talk it up, over the air, by letters, and by personal contacts, that this glorious American Institution the American Ham shall not be put under, ever!—The Editors.**

THINKS OUR CAMPAIGN TOMMY-ROT

Sir:

Your campaign is a bunch of tommy-rot. You will never overthrow the League, and you will break your necks trying. Why not give up?

(Sgd) J. Thomas Worthington,
Lawrence, Mass.

■ **We are not now, nor have we ever tried to overthrow the ARRL, Mr. Worthington. Nor will we break our necks trying, as you say. Our stand is clearly defined in the opening paragraphs at the head of the page, which we believe is more than the latter day actions of the League can say. As long as there are hams, and as long as these conditions exist, we have no intention of giving up. We're in this fight *for* the amateur to stay.—The Editors.**

ASKS WHAT WE INTEND

Dear Sirs:

What do you hope to accomplish by your attack on the League? Others have tried it and failed. That will be your story, too.

(Sgd) James C. Caley, Chicago, Ill.

■ **We hope to better ham conditions, establish them on a firm footing which will not be swept away by the mere passing of a foreign power's fancy, get the hams more frequencies to be used under certain conditions, see that the ham is properly represented *by the league* in Washington in the *legislative* as well as the executive branch, and get him the fighting directors to which he is entitled if he will but take the interest to vote. We will not fail, not that others haven't before us, but that our fight is definitely *not* against the ARRL, rather is it *for* the League to clean its own house.—The Editors.**

DOESN'T KNOW WHAT LEAGUE IS DOING

Gentlemen:

. . . Incidentally, your attempt to obtain action by the A.R.R.L. deserves hearty praise. For many years I have felt that the A.R.R.L. did not represent the amateur . . . but represented only its members. Even there I must add a qualification, for I was at one time a member of that organization and during that period (one year) I knew no more of what the League was doing for me (or against me) than I know now.

. . . Keep up the good work!

(Sgd) John E. Frost, W8MBP.

■ **Thank you, W8MBP, for your comments. Your complaint is the same as that of many who have written to us. Neither do you know what the League is doing, nor does anyone in the Legislative Branch of the Government at Washington know. Why the League should persist in this type of behavior is hard to understand, unless—and we hope that it would be otherwise—they are in reality not doing a thing to the ham's betterment. We aim to bring this condition out into the open in the hopes that the aroused membership will get what it needs most of all—ACTION.—The Editors.**

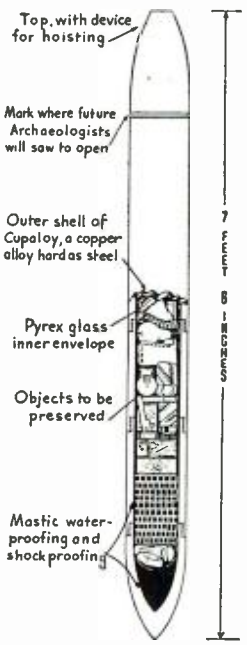
RADIO TO LOCATE "TIME CAPSULE" IN 6939 A.D.

FIVE thousand years from now historians of the future will receive an 800-pound metal letter, a Cupaloy *Time Capsule* containing information about us and our times. It will be deposited fifty feet below the surface of the New York World's Fair grounds by the Westinghouse Electric & Manfacturing Company and officials of the Fair.

And if future historians do find the *Capsule*, major credit will go to a Canadian geophysicist, Sherwin Kelly, head of Geophysical Explorations Ltd., of Toronto, upon whom the Westinghouse Electric & Manufacturing Company called to provide information for discovering the Capsule by electro-magnetic prospecting.

Mr. Kelly's message to the future is to be published in a specially prepared *Book of Record of the Time Capsule*, which will be preserved in libraries, museums, and other repositories throughout the world. The book is printed on special rag paper, with specially compounded permanent inks, and well bound. It is expected that some copies will survive for 5,000 years, and will guide future historians back to the spot where the metal Capsule waits. In addition to exact latitude and longitude, given accurately enough to locate a spot less than an inch in diameter on the earth's surface, instructions are given for building and using geophysical prospecting instruments to locate the *Time Capsule*.

TIME CAPSULE



The message to the future, signed by Mr. Kelly, is as follows:

"Though in all probability methods more sensitive than any we have today will be employed in the future to seek for metallic bodies beneath the earth, it is possible, too, that this will become a lost art. It is therefore suggested that the *Time Capsule* may be discovered by detecting the secondary electro-magnetic field induced in it by a strong primary electrical field created at the surface of the ground.

"Construct a loop some ten feet in diameter, composed of several turns of well-insulated wire, fashioned in such a manner that it can be moved systematically over the area within which the *Capsule* is believed to lie. While the loop stands vertically, pass through it an alternating current of 1,000 to 5,000 cycles, using a power source of approximately 200 watts. The primary electro-magnetic field thus set up around the loop will intersect any metallic material in the vicinity such as the *Capsule*, and induce in it a secondary current. This current will produce a secondary electro-magnetic field such as will distort the primary field of the 'energizing' loop. This distortion, properly interpreted, will indicate the location of the *Time Capsule*.

"To investigate this phenomenon, construct a second, smaller coil, approximately a foot in diameter, made up of a large number of turns of insulated wire. To the coil should be connected an amplifier which in turn is connected to some type of current indicator, such as a galvanometer or telephone receiver. Some means should be provided for accurately measuring the 'strike' or direction of the coil in the horizontal plane, as well as its 'dip' or deviation from the vertical position. On level ground, where there is nothing to distort the primary field, the current generated in the small, or 'pick-up,' coil will be at a minimum (that is, produce the least deflection of the galvanometer needle or the least sound in the telephone receiver) when its plane is perpendicular to that of the large coil. Conversely, the maximum current will be observed when the two coils are in the same plane. It is well to take both observations as a checkup before beginning the search for the *Capsule*. If the instrument is working properly, the positions of minimum and maximum current in the pick-up coil should be at right angles to each other.

"In exploring for the *Capsule*, observations may be made with the pick-up coil in two ways.

"First: Take measurements in the plane of the energizing loop, moving farther and farther away from it in short stages of 5 or 10 feet. Do not work too close to the energizing loop. If during this survey the pick-up coil passes over buried metallic material it will be noted that the positions of the coil do not correspond to those described for an undistorted field. The divergence from the normal dip will be at a maximum over the hidden body, whereas the deviation from the normal strike will increase as the metallic substance is approached, reverse to a maximum in the opposite direction as the spot is passed over, and then decrease as the coil moves farther away.

"Second: Take readings along lines at right angles to the measurements suggested in the First Method above. These readings should be taken approximately 5 to 10 feet apart, extending fifty to one hundred feet each side of the plane of the energizing coil. The lines of observation should cross the first line every five feet. Observe the position of maximum current in the pick-up coil. In an undisturbed field the coil should stand vertically. As the metallic body is approached the position of maximum current in the pick-up will stand at an angle from the vertical, and its plane will point

(*Turn to page* 58, *please*)

IN order to give complete and useful information, two authorities on short wave conduct this column. Charles A. Morrison supplies information of interest to readers everywhere in his section entitled *Short Wave Flashes—General.* All frequencies in Mr. Morrison's column are in *megacycles* and all time is *Eastern Standard Time.*

John D. Clark conducts his column specifically for short wave listeners residing on the Pacific Coast, where reception differs considerably from the rest of the United States east of the Rockies. Mr. Clark's data is based on reports from listeners in all parts of the Pacific Coast area. In this section of *Short Wave Flashes* entitled *Short Waves for West Coast DX'ers,* all frequencies are also given in *megacycles* but all time is *Pacific Standard Time,* for the West Coast short wave listeners.

SHORT WAVE FLASHES—GENERAL
by CHARLES A. MORRISON
(All Times are Eastern Standard)

Short-Wave International Friendship Programs

THURSDAY, November 17th, from 2:00 to 2:30 a.m., over W8XAL (6.06), of Cincinnati, Ohio (sponsored by the Lutheran Church).

Tuesday, November 22nd, from 9:00 to 11:00 p.m., over HC2RL (6.635) of Guayaquil, Ecuador.

Thursday, November 24th, from 9:00 to 10:00 p.m., over T14 NRH (9,695), of Heredia, Costa Rica.

Expedition Will Search for Lost Pyramid in Brazil

Bill Hungerford, ex-VP3THE of Terry-Holden Expedition fame, will act as radio operator for an expedition soon to leave for the "head-hunters country," deep in the Amazonian jungles of Brazil, where a search will be made for a mysterious pyramid, which according to rumors was built about 11,500 B. C. For communications with the outside world and the advance exploration party, Bill will operate a compact 150 watt transmitter on the 10 and 20 meter amateur bands, under the call PY8THE.

DX Reception Before Hurricane

Herbert Campbell of Athens, Pennsylvania, located on the edge of the recent Hurricane disturbance, writes that for about 48 hours prior to the great storm, reception was phenomenal. Quality and signal strength were unbelievable, stations in Australia, Hong Kong, and the Fiji's being received with volume equal to local broadcast stations.

New Short-Wave Stations
(On the Air)

A mysterious new station, whose call commences with CR5 or CR9, is being heard by Roy Myers of Los Angeles, on 6.085, until 9:45 a.m. Music and announcements are in Portuguese.

COLOMBIA—Earl Roberts of Indianapolis, Indiana, reports HJ7EAB (4.75), relaying HJ7EAK of Bucaramanga, heard signing-off at 10:10 p.m. with organ solo, *Kiss Me Waltz.* Uses many gongs and three cuckoo calls as interval signals.

ITALY—An unidentified station on 9.67, relays the "American Hour from Rome" program of 2R04 (11.81), nightly from 7:30 to 9:00 p.m.

NICARAGUA—YNRF (6.71), Managua, badly bothered by code QRM, is being heard nightly until 10:00 p.m., or later.

NEW ZEALAND—The experimental government transmitter at Wellington, operates on 6.96, under the call 2ZB.

PAPUA—VIG (7.31), relays broadcast station VK4PM of Port Moresby, the first and third Saturdays of each month from 3:00 to 5:00 a.m.

VENEZUELA—The Newark News Radio Club reports the following new stations: YV2RN (4.87), "La Voz de Tachira," San Cristobal; YV4RE (11.827), "Radio Valencia," Valencia, relays YV4RH nightly to 9:30 p.m. or later; YV5RM (5.01), "Radiodifusora Venezuela," Caracas, relays YV5RD, and YV6RU (4.88), "Ecos del Orinoco," Ciudad Bolivar, relays YV6RA.

(Under Construction)

AFGHANISTAN—The new transmitter at Kabul will be completed late in 1938.

BAHAMAS—A new short-wave transmitter, to relay broadcast station ZNS of Nassau, is being contemplated.

IRELAND—The 1500 watt transmitter now under construction by the Posts and Telegraphs Department at Athlone, will be on the air near the end of this year.

LUXEMBOURG—A powerful short-wave transmitter to relay the sponsored programs of "Radio Luxembourg"—giant long-wave station—is being constructed at Junglinster. Directional antennas are also being built and it is believed the station will be inaugurated early in 1938.

Notes

ARGENTINA—Summaries of news in the United States are now being short-waved to Buenos Aires daily from 5:10 to 5:15 p.m. over W3XL (17.78), for rebroadcast by Argentine broadcast station "Radio Splendid".

BRAZIL—PSH (10.22) is reported to be operating weekdays from 6:00 to 7:00 p.m.

COLOMBIA—HJ3ABX (5.99), is being badly QRM'ed by COCO of Havana, Cuba, at present.

CZECHOSLOVAKIA—Transmissions from Prague for North America are now being effected daily except Saturdays and Sundays from 7:55 to 11:00 p.m., over either OLR4A (11.84), or OLR4B (11.76). OLR4A has been on the air almost continuously since the beginning of the crisis in Czechoslovakia.

DOMINICAN REPUBLIC—HI3X (15.28) is being heard frequently Sunday mornings.

ECUADOR—The Quito broadcaster on 12.46, is reported to be using the new call sign HC2JB. According to a letter from Dr. Levi, owner of HC2RL (6.635), of Guayaquil, that station issues verifications without expecting listeners to enclose return postage with their reports.

ENGLAND—At the recent radio show held in London, all-wave receivers with push-buttons for automatically locating any one of the short-wave broadcast bands were on display.

FRENCH INDO-CHINA — Commercial station FZR3 (16.23), Radioelectrique Centre de Saigon, Postale Boite 238, Saigon, phones FTK (15.89), almost daily near 10:00 a.m. An easily identified 5-tone interval signal is used by FZR3 prior to the establishment of the contact. The new address for "Boy Landry" (11.71) is 17, Place A. Foray, Saigon.

ITALY—According to the National Radio Club, the following frequencies have been reserved for use by the new 50,000 watt transmitters of the Italian Short-Wave Center when these stations go on the air in the near future: 21.65, 21.58, 21.56, 17.85, 17.83, 17.8, 15.36, 15.19, 15.1, 11.9, 9.69, 9.67, 7.25, 7.22 and 6.19 m.c.'s.

JAPAN—Gail Beyer of Chicago, Illinois, writes that the Tokio stations are now issuing QSL cards picturing the transmitters and aerials at Nazaki on one side, and material concerning the station on the reverse side.

JAVA—YDA (6.04), of Batavia, is now relaying the NIROM network programs mornings in parallel with PLP (11), and PMN (10.26).

MEXICO—XEWW (15.16) of Mexico D.F. is broadcasting irregularly from 1:00 to 3:15 p.m.

MOZAMBIQUE—CR7BH (11.718) of Laurenco Marques, is being heard on the Pacific coast, daily from 9:00 to 11:00 a.m.

NEW ZEALAND—ZLT (11.05), Wellington, as a rule does not verify, but Roy Waite of Ballston, New York, reports this station verified his third report in which he enclosed a prepared QSL card with the request that the chief engineer sign and return same.

PARAGUAY—A station believed to be ZP8 in Asuncion is being heard nightly to 8:00 p.m., on a frequency of 9.26.

PHILIPPINES—J. Amado Aranta, the new owner of shortwave station KZRM of Manila, plans to boost the power of this transmitter to approximately 10,000 watts.

POLAND—Reports on reception of the new stations SP19 (15.12), and SP25 (11.74), are being verified by letter. Later on when the transmitters assume a regular broadcasting schedule QSL cards will be printed.

SIAM—The Bangkok transmitter is now operating as follows: over HS6PJ (15.23), Mondays 8:00 to 10:00 a.m. and over HS8PJ (9.51), Thursdays 8:00 to 10 a.m.

SOUTH AFRICA—ZRK (9.61), Klipheuvel is again being well heard in the United States nightly from 11:45 p.m. to 12:45 a.m.

SPAIN—QSL cards from EAR (9.488), P. O. Box 782, Madrid, picture tanks advancing through a battlefield.

TAHITI—FO8AA (7.1), after several months absence from the air, is again being heard on Tuesdays and Fridays from 11:00 p.m. to 12:30 a.m.

UNITED STATES—Explorer Lincoln Ellsworth's plane has been licensed for operation on 3.105, 6.21, and 12.42, with 100 watts power.

WGN, Chicago, has a new low frequency relay station WGNA, power 50 watts, which operates on 1.622, 2.058, 2.15 or 2.79.

The following additional frequencies have been requested for short-wave station W2XE of New York City: 6.18, 9.67, 17.83 and 21.57.

W3XAL of Bound Brook, New Jersey, has been granted two additional frequencies, namely 9.67 and 21.63. The latter will be used by NBC during the daytime to carry to Latin America the programs which are now beamed towards Europe on 17.78. The new 9.67 megacycle frequency will be used to put a better signal into the lower half of South America during evening hours.

Installation of the new CBS television transmitter, W2XAX, has been started in the tower of the Chrysler Building in New York City. It will take several months to move this 100,000 pound complicated transmitter piece by piece from Camden, N. J. to its new home.

Thorne Donnelley of Lake Bluff, Illinois, has been granted a permit for a new 400 watt coastal station to operate on 1.614, 6.425, 8.655, and 12.862; also a permit to install a 50 watt transmitter aboard his Yacht *Mako* to operate on the same frequencies.

NBC's new 35 kw transmitter is now operating under the call W3XL on 17.78. Signal strength is tremendous but quality very poor at present.

W1XAL of Boston, Mass., has been transmitting special test programs to Europe daily at 10:00 a.m., on a frequency of 21.46.

U. S. S. R.—The Soviet transmitter on 15.18, variously reported as RV26, and RV96, of Moscow, is being heard intermittently from 9:30 a.m to 4:00 p.m. and near 3:00 a.m., the latter period being in English.

Transmissions

Daily—6:00 to 9:00 p.m., experimental transmissions over new Warsaw, Poland, stations SP19 (15.12), and SP25 (11.74); 6:45 to 7:45, and 8 to 9 p.m., test transmissions over new Bern, Switzerland, station on 9.535.

Mondays—at 10:30 p.m., "Central European Review of Affairs," over OLR4A (11.84), of Prague, Czechoslovakia.

Wednesdays—at 10:30 p.m., "SWL Chatterbox," over W8XWJ (41), of Detroit, Michigan.

Fridays—at 3:00 p.m., Argentina news review, directed toward Europe, in Spanish, French, English, and German, and at 5:00 p.m., directed toward North America, in Spanish, French, Portuguese, and English, over LRA (18.115, and 9.69), of Buenos Aires; 9:45 to 10:45 p.m., "American Hour," directed upon the United States, over CSW7 (9.735), of Lisbon, Portugal.

Revised Schedules

FRANCE—"Paris Mondial" now operates as follows: over TPB11 (9.55), and TPA3 (11.885), 2:00 to 5:00 a.m., and 11:15 a.m. to 6:00 p.m.; over TPB3 (17.81), 9:30 to 11:00 a.m.; over TPB6 (15.13), and TPA4 (11.718), 7:00 to 9:15 p.m., and over TPB7 (11.885), and TPA4 (11.718), 9:30 p.m. to midnight.

JAPAN—The schedule for the "Overseas Hours" is now as follows: over JZJ (11.8), 7:00 to 7:30 a.m., 8:00 to 8:45 a.m., 2:30 to 4:00 p.m., 4:30 to 5:30 p.m.; over JZK (15.16), 12:30 to 1:30, 8:45 to 9:30 a.m., 2:30 to 4:00, 4:30 to 5:30, and 8:00 to 8:30 p.m.

SPAIN—EAR (9.488), Madrid, daily 4:40 to 5:00

(More DX Flashes on page 45)

WORLD SHORT WAVE TIME-TABLE

Compiled by the Editors of RADIO NEWS

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

HOURS OF TRANSMISSION

8 9 10 11 M 1 2 3 4 5 6 7

EASTERN STANDARD TIME

Wave-length Meters	Call Letters	Frequency Kc.	City Country
13.93	W8XK	21540	Pittsburgh, Pa.
13.93	GSJ	21530	Daventry, England
13.94	W2XE	21520	New York, N. Y.
13.95	W2XAD	21500	Schenectady, N. Y.
13.97	GSH	21470	Daventry, England
13.99	DJS	21450	Zeesen, Germany
15.77	HS8PJ	19020	Bangkok, Siam
16.86	GSG	17790	Daventry, England
16.87	JZL	17785	Nazaki, Japan
16.87	W3XAL	17780	Bound Brook, N. J.
16.88	PHI2	17770	Huizen, Holland
16.89	DJE	17760	Zeesen, Germany
19.56	DJR	15340	Zeesen, Germany
19.57	W2XAD	15330	Schenectady, N. Y.
19.60	GSP	15310	Daventry, England
19.62	LRU	15290	Buenos Aires, Arg.
19.63	DJQ	15280	Zeesen, Germany
19.65	W2XE	15270	New York, N. Y.
19.66	GSI	15260	Daventry, England
19.68	TPA2	15243	Pontoise, France
19.71	PCJ2	15220	Huizen, Holland
19.72	W8XK	15210	Pittsburgh, Pa.
19.74	DJB	15200	Zeesen, Germany
19.76	GSO	15180	Daventry, England
19.79	JZK	15160	Nazaki, Japan
19.82	GSF	15140	Daventry, England
19.84	HVJ	15121	Vatican City
19.85	DJL	15110	Zeesen, Germany
19.88	RKI	15090	Moscow, U.S.S.R.
20.04	LZA	14970	Sofia, Bulgaria
20.08	PSE	14935	Rio de Janeiro, Brazil
20.64	HBJ	14535	Geneva, Switzerland
22.00	SPW	13635	Warsaw, Poland
24.52	TFJ	12235	Reykjavik, Iceland
25.00	RNE	12000	Moscow, U.S.S.R.
25.21	XEWI	11900	Mexico, D. F.
25.24	TPA3	11885	Pontoise, France
25.27	W8XK	11870	Pittsburgh, Pa.
25.29	GSE	11860	Daventry, England
25.31	DJP	11855	Zeesen, Germany
25.34	OLR4A	11840	Podebrady, Czech.
25.36	W9XAA	11830	Chicago, Ill.
25.36	W2XE	11830	New York, N. Y.
25.40	2RO4	11810	Rome, Italy
25.42	JZJ	11800	Nazaki, Japan
25.45	W1XAL	11790	Boston, Mass.
25.49	DJD	11770	Zeesen, Germany
25.51	OLR4B	11760	Podebrady, Czech.
25.53	GSD	11750	Daventry, England
25.58	CJRX	11720	Winnipeg, Canada
25.60	TPA4	11718	Pontoise, France
25.60	CR7BH	11718	Lourenzo, Marques
25.63	SBP	11705	Motala, Sweden
25.64	HP5A	11700	Panama, Pana.
25.66	XTJ	11690	Hankow, China
26.01	SPD	11535	Warsaw, Poland
26.24	COCX	11435	Havana, Cuba
26.31	HBO	11402	Geneva, Switzerland
27.17	CSW	11040	Lisbon, Portugal
27.27	PLP	11000	Bandoeng, Java
29.04	ORK	10330	Ruysselede, Belgium
29.24	PMN	10260	Bandoeng, Java
29.35	PSH	10220	Rio de Janeiro, Brazil
30.43	EAQ	9860	Madrid, Spain
30.52	IRF	9830	Rome, Italy
30.81	CSW	9737	Lisbon, Portugal
31.06	LRX	9660	Buenos Aires, Argentina
31.09	CS2WA	9650	Lisbon, Portugal
31.10	HH3W	9645	Port-au-Prince, Haiti
31.14	12RO3	9635	Rome, Italy
31.20	HJ1ABP	9616	Cartagena, Colombia
31.25	RAN	9600	Moscow, U.S.S.R.
31.28	VK6ME	9590	Perth, Australia
31.28	W3XAU	9590	Philadelphia, Pa.
31.28	VK2ME	9590	Sydney, Australia
31.28	PCJ	9590	Huizen, Holland
31.28	HP5J	9590	Panama City, Pana.
31.32	GSC	9580	Daventry, England
31.32	VKVLR	9580	Lyndhurst, Australia
31.35	W1XK	9570	Millis, Mass.
31.37	OAX4T	9562	Lima, Peru
31.38	DJA	9560	Zeesen, Germany
31.41	W2XAD	9550	Schenectady, N. Y.
31.42	OLR3A	9550	Podebrady, Czech.
31.42	XEFT	9550	Veracruz, Mexico
31.45	DJN	9540	Zeesen, Germany
31.48	W2XAF	9530	Schenectady, N. Y.
31.48	LKC	9530	Jeloy, Norway
31.49	ZBW3	9525	Hong Kong, China
31.51	OZF	9520	Skamlebak, Denmark
31.55	GSB	9510	Daventry, England
31.55	HJU	9510	Buenaventura, Colom.
31.55	VK3ME	9510	Melbourne, Australia
31.58	PRF5	9500	Rio de Janeiro, Brazil

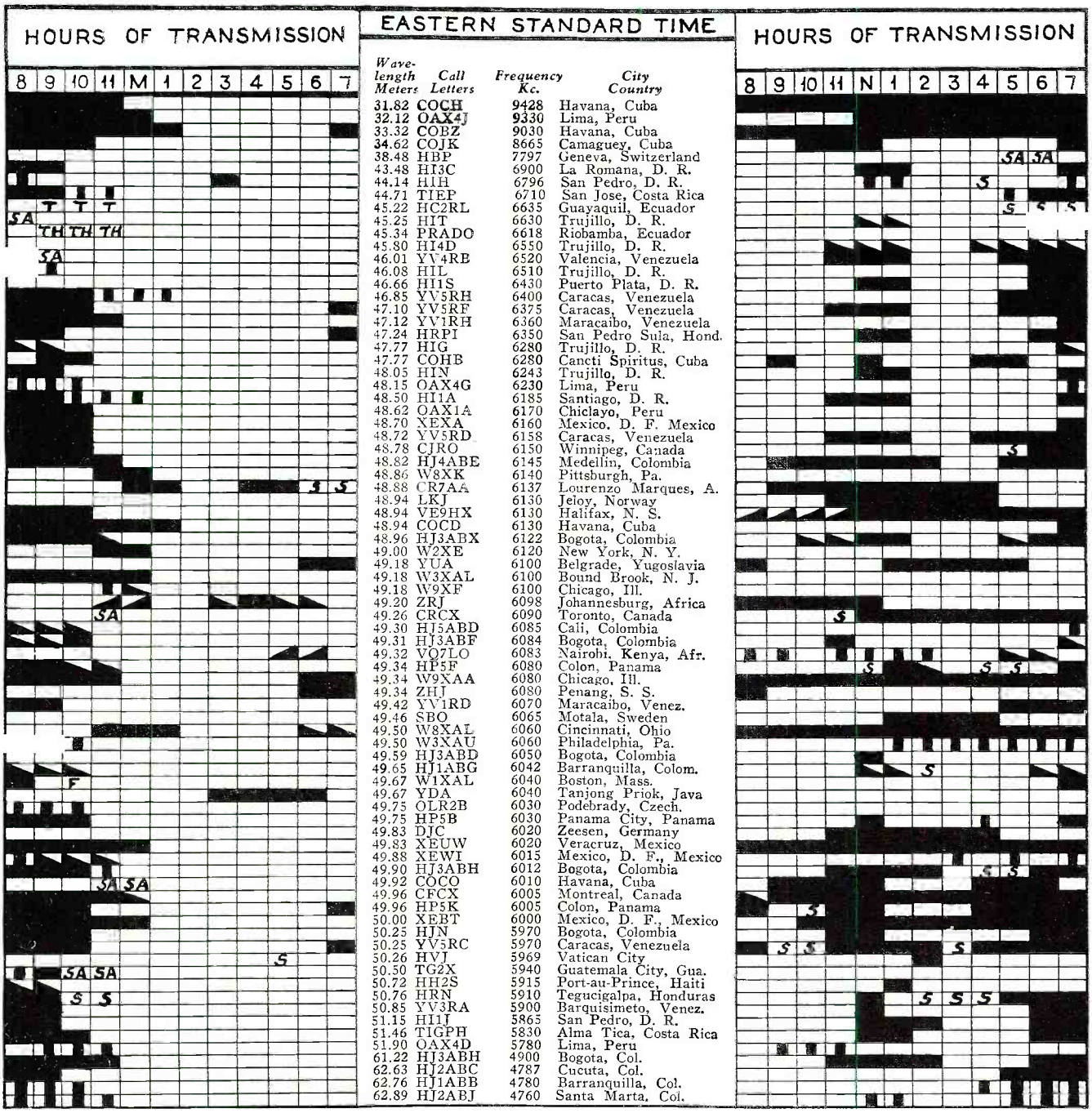
HOURS OF TRANSMISSION

8 9 10 11 N 1 2 3 4 5 6 7

WORLD SHORT WAVE TIME-TABLE

Compiled by the Editors of RADIO NEWS

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



Wave-length Meters	Call Letters	Frequency Kc.	City Country
31.82	COCH	9428	Havana, Cuba
32.12	OAX4J	9330	Lima, Peru
33.32	COBZ	9030	Havana, Cuba
34.62	COJK	8665	Camaguey, Cuba
38.48	HBP	7797	Geneva, Switzerland
43.48	HI3C	6900	La Romana, D. R.
44.14	HIH	6796	San Pedro, D. R.
44.71	TIEP	6710	San Jose, Costa Rica
45.22	HC2RL	6635	Guayaquil, Ecuador
45.25	HIT	6630	Trujillo, D. R.
45.34	PRADO	6618	Riobamba, Ecuador
45.80	HI4D	6550	Trujillo, D. R.
46.01	YV4RB	6520	Valencia, Venezuela
46.08	HIL	6510	Trujillo, D. R.
46.66	HI1S	6430	Puerto Plata, D. R.
46.85	YV5RH	6400	Caracas, Venezuela
47.10	YV5RF	6375	Caracas, Venezuela
47.12	YV1RH	6360	Maracaibo, Venezuela
47.24	HRPI	6350	San Pedro Sula, Hond.
47.77	HIG	6280	Trujillo, D. R.
47.77	COHB	6280	Cancti Spiritus, Cuba
48.05	HIN	6243	Trujillo, D. R.
48.15	OAX4G	6230	Lima, Peru
48.50	HI1A	6185	Santiago, D. R.
48.62	OAX1A	6170	Chiclayo, Peru
48.70	XEXA	6160	Mexico, D. F. Mexico
48.72	YV5RD	6158	Caracas, Venezuela
48.78	CJRO	6150	Winnipeg, Canada
48.82	HJ4ABE	6145	Medellin, Colombia
48.86	W8XK	6140	Pittsburgh, Pa.
48.88	CR7AA	6137	Lourenzo Marques, A.
48.94	LKJ	6130	Jeloy, Norway
48.94	VE9HX	6130	Halifax, N. S.
48.94	COCD	6130	Havana, Cuba
48.96	HJ3ABX	6122	Bogota, Colombia
49.00	W2XE	6120	New York, N. Y.
49.18	YUA	6100	Belgrade, Yugoslavia
49.18	W3XAL	6100	Bound Brook, N. J.
49.18	W9XF	6100	Chicago, Ill.
49.20	ZRJ	6098	Johannesburg, Africa
49.26	CRCX	6090	Toronto, Canada
49.30	HJ5ABD	6085	Cali, Colombia
49.31	HJ3ABF	6084	Bogota, Colombia
49.32	VQ7LO	6083	Nairobi, Kenya, Afr.
49.34	HP5F	6080	Colon, Panama
49.34	W9XAA	6080	Chicago, Ill.
49.34	ZHJ	6080	Penang, S. S.
49.42	YV1RD	6070	Maracaibo, Venez.
49.46	SBO	6065	Motala, Sweden
49.50	W8XAL	6060	Cincinnati, Ohio
49.50	W3XAU	6060	Philadelphia, Pa.
49.59	HJ3ABD	6050	Bogota, Colombia
49.65	HJ1ABG	6042	Barranquilla, Colom.
49.67	W1XAL	6040	Boston, Mass.
49.67	YDA	6040	Tanjong Priok, Java
49.75	OLR2B	6030	Podebrady, Czech.
49.75	HP5B	6030	Panama City, Panama
49.83	DJC	6020	Zeesen, Germany
49.83	XEUW	6020	Veracruz, Mexico
49.88	XEWI	6015	Mexico, D. F., Mexico
49.90	HJ3ABH	6012	Bogota, Colombia
49.92	COCO	6010	Havana, Cuba
49.96	CFCX	6005	Montreal, Canada
49.96	HP5K	6005	Colon, Panama
50.00	XEBT	6000	Mexico, D. F., Mexico
50.25	HJN	5970	Bogota, Colombia
50.25	YV5RC	5970	Caracas, Venezuela
50.26	HVJ	5969	Vatican City
50.50	TG2X	5940	Guatemala City, Gua.
50.72	HH2S	5915	Port-au-Prince, Haiti
50.76	HRN	5910	Tegucigalpa, Honduras
50.85	YV3RA	5900	Barquisimeto, Venez.
51.15	HI1J	5865	San Pedro, D. R.
51.46	TIGPH	5830	Alma Tica, Costa Rica
51.90	OAX4D	5780	Lima, Peru
61.22	HJ3ABH	4900	Bogota, Col.
62.63	HJ2ABC	4787	Cucuta, Col.
62.76	HJ1ABB	4780	Barranquilla, Col.
62.89	HJ2ABJ	4760	Santa Marta, Col.

LIST OF SYMBOLS

S—Sunday

M—Monday

T—Tuesday

W—Wednesday

Th—Thursday

F—Friday

SA—Saturday

SS—Saturday, Sunday

—Daily

—Irregular

—Daily Except Sunday

—Daily Except Saturday, Sunday

New Ham Regulations

(*Continued from page* 14)

aminations and, if unable to draw required diagrams, may make instead a detailed description essentially equivalent. The examiner shall certify the nature of the applicant's disability and, if the examination is dictated, the name and address of the person(s) taking and transcribing the applicant's dictation.

Sec. 151.22 *Grading.* Code tests are graded as passed or failed, separately for sending and receiving tests. A code test is failed unless free of omission or other error for a continuous period of at least one minute at required speed. Failure to pass the required code test will terminate the examination. (See Sec. 151.23).

A passing grade of 75 per cent is required separately for Class B and Class A written examinations.

Sec. 151.23 *Eligibility for reexamination.* An applicant who fails examination for amateur privileges may not take another examination for such privileges within two months, except that this rule shall not apply to an examination for Class B following one for Class C.

PART 152—AMATEUR RADIO STATIONS

Licenses

Sec. 152.01 *Eligibility for amateur station license.* License for an amateur station will be issued only to a licensed amateur operator who has made a satisfactory showing of control of proper transmitting apparatus and control of the premises upon which such apparatus is to be located; provided, however, that in the case of an amateur station of the military or Naval Reserve of the United States located in approved public quarters and established for training purposes, but not operated by the United States Government, a station license may be issued to a person in charge of such a station although not a licensed amateur operator.

Sec. 152.02 *Eligibility of corporations or organizations to hold license.* An amateur station license will not be issued to a school, company, corporation, association, or other organization; nor for their use; *provided, however,* that in the case of a bona-fide amateur radio society a station license may be issued in accordance with Section 152.01 to a licensed amateur operator as trustee for such society.

Sec. 152.03 *Location of station.* An amateur radio station, and the control point thereof when remote control is authorized, shall not be located on premises controlled by an alien.

Sec. 152.04 *License period.* License for an amateur station will normally be for a period of three years from the date of issuance of a new, renewed, or modified license.

Sec. 152.05 *Authorized operation.* An amateur station license authorizes the operation of all transmitting apparatus used by the licensee at the location specified in the station license and in addition the operation of portable and portable-mobile stations at other locations under the same instrument of authorization.

Sec. 152.06 *Renewal of amateur station license.* An amateur station license may be renewed upon proper application and a showing that, within three months of receipt of the application by the Commission, the licensee thereof has lawfully operated such station in communication by radio with at least three other amateur stations licensed by the Commission, except that in the case of an application for renewal of station license issued for an amateur society or reserve group, the required operation may be by any licensed amateur operator. Upon failure to comply with the above requirements, a successor license will not be granted until two months after expiration of the old license.

Sec. 152.07 *Posting of station license.* The original of each station license or a facsimile thereof shall be posted by the licensee in a conspicuous place in the room in which the transmitter is located or kept in the personal possession of the operator on duty, except when such license has been filed with application for modification or renewal, or has been mutilated, lost, or destroyed, and application has been made for a duplicate.

Call Signals

Sec. 152.08 *Assignment of call letters.* Amateur station calls will be assigned in regular order and special requests will not be considered except that a call may be reassigned to the latest holder, or if not under license during the past five years to any previous holder, or to an amateur organization in memoriam to a deceased member and former holder, and particular calls may be temporarily assigned to stations connected with events of general public interest.

Sec. 152.09 *Call signals for member of U.S.N.R.* In the case of an amateur licensee whose station is licensed to a regularly commissioned or enlisted member of the United States Naval Reserve, the Commandant of the naval district in which such station is located may authorize in his discretion the use of the call-letter prefix N in lieu of the prefix W or K, assigned in the license issued by the Commission, provided that such N prefix shall be used only when operating in the frequency bands 1715-2000 (Subject to change to "1750 to 2050" kilocycles in accordance with the "Inter-American Arrangement Covering Radiocommunication," Havana, 1937) kilocycles, 3500-4000 kilocycles, 56,000-60.000 kilocycles, and 400,000-401,000 kilocycles in accordance with instructions to be issued by the Navy Department.

Sec. 152.10 *Transmission of call signals.* An operator of an amateur station shall transmit its assigned call at the end of each transmission and at least once every ten minutes during transmission of more than ten minutes' duration: *provided, however,* that transmission of less than one minute duration from stations employing break-in operation need be identified only once every ten minutes of operation and at the termination of the correspondence. In addition, an operator of an amateur portable or portable-mobile radiotelegraph station shall transmit immediately after the call of the station the fraction-bar character (DN) followed by the number of the amateur call area in which the portable or portable-mobile amateur station is then operating, as for example:

Example 1. Portable or portable-mobile amateur station operating in the third amateur call area calls a fixed amateur station: W1ABC W1ABC W1ABC DE W2DEF DN3 W2DEF DN3 W2DEF DN3 AR.

Example 2. Fixed amateur station answers the portable or portable-mobile amateur station: W2DEF W2DEF W2DEF DE W1ABC W1ABC W1ABC K.

Example 3. Portable or portable-mobile amateur station calls a portable or portable-mobile amateur service station: W3GHI W3GHI W3GHI DE W4JKL DN4 W4JKL DN4 W4JKL DN4 AR.

If telephony is used, the call sign of the station shall be followed by an announcement of the amateur call area in which the portable or portable-mobile station is operating.

Sec. 152.11 *Requirements for portable and portable-mobile operation.* A licensee of an amateur station may operate portable amateur stations (Section 150.03) in accordance with the provisions of Sections 152.09, 152.10, 152.12 and 152.45. Such licensee may operate portable and portable-mobile amateur stations without regard to Section 152.12, but in compliance with Sections 152.09, 152.10 and 152.45, when such operation takes place on authorized amateur frequencies above 28,000 kilocycles.

Sec. 152.12 *Special provisions for portable stations.* Advance notice in writing shall be given by the licensee to the inspector in charge of the district in which such portable station is to be operated. Such notices shall be given prior to any operation contemplated, and shall state the station call, name of licensee, the date of proposed operation, and the locations as specifically as possible. An amateur station operating under this Section shall not be operated during any period exceeding one month without giving further notice to the inspector in charge of the radio inspection district in which the staton will be operated, nor more than four consecutive periods of one month at the same location. This Section does not apply to the operation of portable or portable-mobile amateur stations on frequencies above 28,000 kilocycles. (See Section 152.11.)

Sec. 152.13 *Special provisions for non-portable stations.* The provisions for portable stations shall not be applied to any non-portable station except that:

(a.) An amateur station that has been moved from one permanent location to another permanent location may be operated at the latter location in accordance with the provisions governing portable stations for a period not exceeding sixty days, but in no event beyond the expiration date of the license, provided an application for modification of license to change the permanent location has been made to the Commission.

(b.) The licensee of an amateur station who is temporarily residing at a location other than the licensed location for a period not exceeding four months may for such period operate his amateur station at his temporary address in accordance with the provisions governing portable stations.

Use of Amateur Stations

Sec. 152.14 *Points of communication.* An amateur station shall communicate only with other amateur stations, except that in emergencies or for testing purposes it may be used also for communication with commercial or Goverment radio stations. In addition, amateur stations may communicate with any mobile radio station which is licensed by the Commission to communicate with amateur stations, and with stations of expeditions which may also be authorized to communicate with amateur stations. They may also make transmissions to points equipped only with receiving apparatus for the measurement of emissions, observation of transmission phenomena, radio control of remote objects, and similar purely experimental purposes.

Sec. 152.15 *No remuneration for use of station.* An amateur station shall not be used to transmit or receive messages for hire, nor for communication for material compensation, direct or indirect, paid or promised.

Sec. 152.16 *Broadcasting prohibited.* An amateur station shall not be used for broadcasting any form of entertainment, nor for the simultaneous retransmission by automatic means of programs or signals emanating from any class of station other than amateur.

Sec. 152.17 *Raidotelephone tests.* The transmission of music by an amateur station is forbidden. However, single audio-frequency tones may be transmitted by radiotelephony for test purposes of short duration in connection with the development of experimental radiotelephone equipment.

Allocation of Frequencies

Sec. 152.25 *Frequencies for exclusive use of amateur stations.* The following bands of frequencies are allocated exclusively for use by amateur stations: 1715 to 2000 kilocycles (subject to change to "1750 to 2050" kilocycles in accordance with the "Inter-American Arrangement Covering Radiocommunication," Havana, 1937), 3500 to 4000 kilocycles, 7000 to 7300 kilocycles, 14000 to 14400 kilocycles, 28000 to 30000 kilocycles, 56000 to 60000 kilocycles, 112000 to 118000 kilocycles (the Commission reserves the right to change or cancel these frequencies without advance notice or hearing), 224000 to 230000 kilocycles (the Commission reserves the right to change or cancel these frequencies without advance notice or hearing), 400000 to 401000 kilocycles.

Sec. 152.26 *Use of frequencies above 300000 kilocycles.* The licensee of an amateur station may, subject to change upon further order, operate amateur stations, with any type of emission authorized for amateur stations, on any frequency above 300000 kilocycles without separate licenses therefor.

Sec. 152.27 *Frequency bands for telephony.* The following bands of frequencies are allocated for use by amateur stations using radiotelephony, type A-3 emission: 1800 to 2000 kilocycles, 28500 to 30000 kilocycles, 56000 to 60000 kilocycles, 112000 to 118000 kilocycles (the Commission reserves the right to change or cancel these frequencies without advance notice or hearing), 224000 to 230000 kilocycles (the Commission reserves the right to change or cancel these frequencies without advance notice or hearing), 400000 to 401000 kilocycles.

Sec. 152.28 *Additional bands for telephony.* An amateur station may use radiotelephony, type A-3 emission, in the following additional bands of frequencies: *provided* the station is licensed to a person who holds an amateur operator's license endorsed for Class A privileges, and actually is operated by an amateur operator holding Class A privileges: 3900 to 4000 kilocycles, 14150 to 14250 kilocycles.

Sec. 152.29 *Television and frequency-modulation transmission.* The following bands of frequencies are allocated for use by amateur stations for television and radiotelephone frequency-modulation transmission: 112000 to 118000 kilocycles (the Commission reserves the right to change or cancel these frequencies without advance notice or hearing), 224000 to 230000 kilocycles (the Commission reserves the right to change or cancel these frequencies without advance notice or hearing), 400000 to 401000 kilocycles.

Sec. 152.30 *Facsimile transmission.* The following bands of frequencies are allocated for use by amateur stations for facsimile transmission: 1715 to 2000 kilocycles (subject to change to "1750 to 2050" kilocycles in accordance with the "Inter-American Arrangement Covering Radiocommunication," Havana, 1937), 56000 to 60000 kilocycles, 112000 to 118000 kilocycles (the Commission reserves the right to change or cancel these frequencies without advance notice or hearing). 224000 to 230000 kilocycles (the Commission reserves the right to change or cancel these frequencies without advance notice or hearing), 400000 to 401000 kilocycles.

Sec. 152.31 *Individual frequency not specified.* Transmissions by an amateur station may be on any frequency within the bands above assigned. Sideband frequencies resulting from keying or modulating a transmitter shall be confined within the frequency band used.

Sec. 152.32 *Types of emission.* All bands of frequencies allocated to the amateur service may be used for radiotelegraphy, type A-1 emission. Type A-2 emission may be used in the following bands of frequencies only: 56000 to 60000 kilocycles, 112000 to 118000 kilocycles (the Commission reserves the right to change or cancel these frequencies without advance notice or hearing), 224000 to 230000 kilocycles (the Commission reserves the right to change or cancel these frequencies without advance notice or hearing), 400000 to 401000 kilocycles.

Equipment and Operation

Sec. 152.40 *Maximum power input.* The licensee of an amateur station is authorized to use a maximum power input of 1 kilowatt to the plate circuit of the final amplifier stage of an oscillator-amplifier transmitter or to the plate circuit of an oscillator transmitter. An amateur transmitter operating with a power input exceeding nine-hundred watts to the plate circuit shall provide means for accurately measuring the plate power input to the vacuum tube, or tubes, supplying power to the antenna.

Sec. 152.41 *Power supply to transmitter.* The licensee of an amateur station using frequencies below 60000 kilocycles shall use adequately filtered direct-current plate power supply for the transmitting equipment to minimize frequency modulation and to prevent the emission of broad signals.

Sec. 152.42 *Requirements for prevention of interference.* Spurious radiations from an amateur transmitter operating on a frequency below 60000 kilocycles shall be reduced or eliminated in accordance with good engineering practice and shall not be of sufficient intensity to cause interference on receiving sets of modern design which are tuned outside the frequency band of emission normally required for the type of emission employed. In the case of A-3 emission, the transmitter shall not be modulated in excess of its modulation capability to the extent that interfering spurious radiations occur, and in no case shall the emitted carrier be amplitude-modulated in excess of 100 per cent. Means shall be employed to insure that the transmitter is not modulated in excess of its modulation capability. A spurious radiation is any radiation from a transmitter which is outside the frequency band of emission normal for the type of transmission employed, including any component whose frequency is an integral multiple or submultiple of the carrier frequency (harmonics and subharmonics), spurious modulation products, key clicks, and other transient effects, and parasitic oscillations. The frequency of emission shall be as constant as the state of the art permits.

(*Continued on page* 52)

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MUSIC AIDS WORKERS

IN a recent address before the American Psychological Association at the Ohio State University, Professor John F. Hume, Pennsylvania State College psychologist, presented the results of a series of tests which he made last winter in the Sylvania Tube plant at Emporium, Pa. The story, as released by United Press, has been given extensive publicity in newspapers, and has been used as a theme by columnist and cartoonists.

The experiments were made through the use of the Sylvania amplifying system, which for a number of years has been used to provide music for employees at intervals throughout the working hours. The present system, installed about a year ago, carries recorded music through 48 outlets to all production departments in the factory.

Professor Hume made careful weekly tests as to the effects of different types of music, such as waltzes, marches, swing, and mixed tempos, and of various intervals between periods of music and length of periods. For one week no music was played, with the significant result that the management received a petition signed by a large number of workers, requesting that it be resumed. During one week a list of available records was submitted to each production unit, and operators were permitted to make their own selections.

The results of the test while not entirely conclusive, according to Professor Hume, showed that when music was played at frequent intervals workers in general performed their work on tube assembly lines, requiring a high degree of hand and finger dexterity, with less "shrinkage" due to errors; and that "from the point of view of factory morale music is highly beneficial and desirable."

At the end of the experimental period a questionnaire was passed to each employee, including the management. The questions, formulated to afford valuable information from the psychological viewpoint, covered musical training, preferances, and mental and physical reactions to various types of music and timing intervals. The happy medium, as to preference and favorable reaction, seemed to be the playing of two records every half hour with "Slow Swing" and "Sweet" music of the Bing Crosby and Hawaiian type in the lead.

That the use of music aids production efficiency largely because of its pleasant effect on the workers, and not because it creates a tendency to increase production speed is deduced from the fact that Professor Hume found no significant difference between the slow and fast tempo periods in their effect on production.

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SPECIAL BROADCAST PROGRAMS FOR THE DX FAN

THE new 1939 Broadcast Band DX season has only started and there is every indication that it will surpass other years as far as activity is concerned. The increasing power of the stations and the superior receiving equipment should certainly help you all to hang up bigger and better verified logs. All the DX Clubs are calling attention to the renewed interest in this old pastime, so don't forget to send in your logs, information on special programs, etc.

New Stations and Revisions

Change of Call Letters

KTFL to KOME Tulsa, Okla.

New Stations

Call	Kc.	Location	Power
WHMA	1420	Anniston, Ala.	100 W.
WMRO	1250	Aurora, Ill.	100 W.
WGKV	1500	Charleston, W. Va.	100 W.
WJHL	1200	Johnson City, Tenn.	—
WSTP	1500	Salisbury, N. C.	—
KWEW	1500	Hobbs, N. Mex.	—
WRAL	1210	Raleigh, N. C.	100 W.

Granted License for Power Change and Time

KGPF, Santa Fe. N. Mex. to 50 W.
KWJB, 1210 kc., Globe, Ariz. 100-250 W., unlimited.
WHLS, 1370 kc., Port Huron, Mich. 250 W. DT
KYSM, 1500 kc., Mankato, Minn. 100 W.N. —250 W. Unlimited
KAWN, 1500 kc., Gallup, N. Mex. 250 W.
WCOU, 1210 kc., Lewiston, Me. 100 W. Unlimited Time
WSYB, 1500 kc., Rutland, Vt. Unlimited Time
KVRS, 1370 kc., Rock Springs, Wyo. N. sta. 100 N. —250 D. Unltd.
KONO, 1370 kc., San Antonio, Tex., to 250 W.
KGFW, 1310 kc., Kearney, Neb., to 250 W.
KIT, 1250 kc., Yakima, Wash. 1 Kw. LS.

DX Calendar

Listed below are the special DX broadcast programs dedicated to RADIO NEWS. Tune in on these special broadcasts and do not fail to send in your report to the station. Give them complete information. Practically all of the stations listed will be pleased to verify reports. The schedule is shown in *Eastern Standard Time* and all *hours are A.M.* unless otherwise indicated.

NOVEMBER

Day	Hour	Call	State	Kc.	Power
8	5:35-5:50	KGMB	T.H.	1320	1.
11	5:30-5:45	KWYO	Wyo.	1370	.1
11	4:20-4:35	WRAK	Pa.	1370	.1
12	4:05-4:20	WJBO	La.	1120	.5
12	3:50-4:05	WGAR	Ohio	1450	.5

DECEMBER

9	5:30-5:45	KWYO	Wyo.	1370	.1
9	4:20-4:35	WRAK	Pa.	1370	.1
10	4:05-4:20	WJBO	La.	1120	.5
10	3:50-4:05	WGAR	Ohio	1450	.5
13	5:35-5:50	KGMB	T.H.	1320	1.

PERIODIC PROGRAMS

Frequency Checks and Dedications to DX Clubs and RADIO NEWS

Wednesdays—

4:35-4:50 a.m., 1500 kc., KDAL, Duluth, Minn., .1 kw. (IDA).

Saturdays—

2:45-4:00 a.m., 780 kc., CHWK, Chilliwack, B. C., .1 kw. (URDXC).

Sundays—

12:45-1:00 a.m., 1280 kc., KLS, Oakland, Calif., 25 kw. (URDXC) (tips).
2:45-3:00 a.m., 1010 kc., CKWX, Vancouver, B. C., Canada, .1 kw.
3:00-3:30 a.m., 1410 kc., CKMO, Vancouver, B. C., Canada, .1 kw.
3:30-3:45 a.m., 570 kc., KMTR, Los Angeles, Calif., 1 kw. (tips).

Monthly—

1st day of each month, 3:00-4:00 a.m., 1260 kc., WTOC, Savannah, Ga., 1 kw.
2nd Monday, 5:20-5:40 a.m., 1250 kc. WAIR, Winston-Salem, N. C., .1 kw. 4:20-4:35 a.m., 1310 kc., KVOX, Moorehead, Minn., .1 kw.
2nd Tuesday, 5:00-5:30 a.m., 1370 kc., KRMC, Jamestown, N. Dak., .1 kw. 5:00-5:20 a.m., 1210 kc. WSAY, Rochester, N. Y., .1 kw. (NNRC).
2nd Wednesday, 3:40-4:00 a.m., 1310 kc., KAND, Corsicana, Texas, .1 kw. (NNRC).
2nd Thursday, 4:00-4:20 a.m., 1330 kc., KRIS, Corpus Christi, Texas, .5 kw. (NNRC).
2nd Friday, 4:00-4:20 a.m., 1370 kc., WBTM, Danville, Va., .1 kw.
2nd Friday, 1:30-2:00 a.m., 1060 kc., Norfolk, Nebr., 1 kw.
2nd Saturday, 4:35-4:50 a.m., 1310 kc., KTSM, El Paso, Texas, 1 kw. (FC).
2nd Saturday, 4:25-4:40 a.m., 1500 kc., KYSM, Mankato, Minn., .1 kw. (NRC).
5th day of each month, 3:00-3:30 a.m., 1370 kc. KTEM, Temple, Texas. .25 (FC.)

Notes from Readers and DX Clubs

All DX Observers who were able to tune in on the Newark News Radio Club special program from station KFYR, Bismarck, N. D., on the morning of Oct. 13th, please send in your reception report to the station KFYR.

Readers on the Pacific coast and elsewhere will be interested in knowing that there is a new International Listeners' Association with headquarters at Dryden, Wash. Also there is a movement on foot for a Consolidated Pacific Coast DX Club. New station in Gastonia, N. C., WGNC who can tell us their transmitting frequency.

The National Radio Club DX News keeps well posted on the monthly frequency checks schedule. Latest corrections from their bulletin—

AM-EST

Add—2nd Tuesday, WFAM-1420 kc. 4:05-4:20
Add—2nd Wednesday, KWEW-1500 kc...3:50-4:05
Add—2nd Wednesday, KTEM-1370 kc....4:00-4:15
Add—2nd Wednesday, KRIC-1420 kc.....4:05-4:20
Add—2nd Wednesday, WHLS-1370 kc....5:00-5:15
Add—2nd Wednesday, KRBA-1310 kc....5:45-6:00
Add—2nd Friday, WOMI-1500 kc.....4:50-5:05
Add—1st Wednesday, KVCB-1370 kc....3:00-3:30
Add—1st Saturday, KEUB-1420 kc.....3:00-3:30
Add—1st Saturday, KSAL-1500 kc.....3:30-4:00

Starting October 3rd the National Radio Club will issue their well prepared bulletin weekly. Reported in the N.N.R.C. that a Detroit member finished last season with a log of 1113, of which 1087 verified. Another member from Hamilton, Ohio, heard 1157 with 1152 stations verified; records to be proud of.

-30-

Short Wave Flashes

(*Continued from page 39*)

p.m., 7:30 to 8:00 p.m, and 8:40 to 9:00 p.m.

UNITED STATES—W1XK (9.57), Boston, Mass., daily 6:00 a.m. to 1:00 a.m.; W2XE of New York City, on 21.52, Mondays through Fridays, 7:30 to 10:00 a.m., and Saturdays and Sundays 8:00 a.m. to 1:00 p.m.; on 15.27, Mondays through Fridays, 1:00 to 6:00 p.m. and on Saturdays and Sundays, 2:30 to 6:00 p.m.; on 11.83, daily 6:30 to 11:00 p.m. and on 6.12, daily 11:30 p.m. to 12:30 a.m.; W8XK of Pittsburgh, Penna., on 21.54, daily 6:45 to 9:00 a.m.; on 15.21, daily 9:00 a.m. to 7:00 p.m.; on 11.87, daily 7:00 to 11:00 p.m. and on 6.14, daily 11:00 p.m. to 1:00 a.m.

Frequency Changes

COLOMBIA—HJ2ABJ, Santa Marta, to 4.864; HJ1ABG, Cartagena, to 4.86; HJ5ABD, Cali, to 4.873; HJ6ABU, Pereira, to 6.023.

CUBA—COBC to 9.99; COBX to 9.195; COBZ to 9.005; COCA to 9.095; COCO to 5.992, where it badly QRM's HJ3ABX; COCM to 9.79, and COCQ to the vicinity of 9.715.

GUATEMALA—TGWB, Guatemala City, to 6.498.

NICARAGUA—YNLF, Managua, reported to have moved to 6.76.

VENEZUELA—YV4RA, Valencia, to 5.805.

Data

AUSTRALIA—Elmo Smith of Red Wing, Minn., writes that VLR of Melbourne, has a new 2000 watt transmitter capable of working on three different frequencies in operation. News periods take place over VLR as follows: weekdays 4:15 and 7:30 a.m., and on Sundays 4:15 and 6:45 a.m.

BELGIAN CONGO—Bob Hetzel of Milwaukee, Wisconsin, is the proud possessor of a verification from "Radio Leo" (6.14) of Leopoldville in the Belgian Congo. This verification in the form of a very poorly typed letter states that a new 250 watt transmitter is being installed and that listeners are requested to tune for this station on Sundays from 5:35 to 7:00 a.m.

BRITISH HONDURAS—ZIK2 (10.6), a 200 watt station operated by the Government at Belize, broadcasts on Tuesdays, Thursdays and Saturdays from 1:30 to 2:00 p.m. and from 8:30 to 9:00 p.m.

BULGARIA—LZA, "Radio Sofia," is again on the air, and operating as follows on a frequency of 14.97: Mondays, Wednesdays, Fridays and Saturdays, from 5:00 to 7:00 a.m. and 10:00 a.m. to 5:00 p.m.; on Tuesdays and Thursdays from 1:00 to 3:00 p.m. and on Sundays from 12:30 to 8:00 p.m., and 10:00 a.m. to 4:30 p.m. The announcer is a woman, and the mailing address is 19, Moskovska St., Sofia, Bulgaria.

CHILE—CB1180 (approx. 11.99), "Radio Sociedad Nacional de Agricultura," Casilla 40-D, Santiago, is broadcasting on an experimental basis. When a regular frequency and schedule has been adopted, QSL card will be printed.

COLOMBIA—HJ1ABE (4.802), P. O. Box 31, Cartagena, is issuing a very modernistic new red, white and blue QSL card; HJ1ABG (6.042), "Emisora Atlantico" of Barranquilla, relays a broadcast station on 1060 kc, weekdays from 11:00 a.m to 11:00 p.m. and on Sundays from 11:00 a.m. to 8:00 p.m. The station's QSL card is white with red lettering, picturing a landscape view and aerial towers; HJ4ABU (8.652), "Emisora Universidad de Antioquia," Apartado Postal 217, Medellin, issues a black and white folder QSL card, with the call in orchid.

COSTA RICA—TIEMT (10.29), "Radio El Mundo," relays TIEM, Apartado Postal 1049, San Jose, nightly to 8:00 p.m. An attractive QSL card with gold letters is issued by the station; TI2XD (11.928), "Voz del Radio Pilot," P. O. Box 1729, San Jose, owned by John G. Daly, operates daily from 10:00 a.m. to noon and from 4:00 to 10:00 p.m. The opening theme is *March Don Quixote*, and the closing selection is *The Peanut Vendor*. The QSL card is red and black on a peach background.

DENMARK—OZH (15.165) of Skamlebak, operates Sundays from 8:00 a.m. to 1:30 p.m., but is best heard from about 12:30 p.m. to close-down. The QSL card is white with red lettering.

GERMANY—Anti-Nazi station, "Deutsche Freiheits Sender," varying in frequency between 9.75 and 10.1, is still being heard almost daily from 4:00 to 5:00 p.m. Announcements in German are made every quarter hour and the station signs-off with the *Internationale*.

ECUADOR—The following small stations are not given in most short-wave lists: HC2ROZ (7.2), "Radio Ortiz," Guayaquil; HCT (5.003), Guayaquil; HC2FA (26.25), "Radio Paris," Guayaquil;

HC1PM (9.419), "El Palomar," Quito; HC1EC (8.6), "El Comercoi," Quito, and "La Voz de Zaruma" (5.6), of Zaruma.

FIJIS—As soon as the contemplated power increase for VPD2, "Radio Suva," to 10,000 watts goes into effect, the station will add three new frequencies, namely, 6.13. 11.895 and 15.16 m.c.'s.

FRENCH SOMALILAND—Reports on reception of FZE8 should be addressed to Dept. de la Telegraphie sans Fil, Station Intercoloniale de Djibouti, French Somaliland.

INDIA—VVN (13.35) of Madras. verified by letter in less than two months. Reports on reception of this station should be sent to The Assistant Engineer, Wireless, In Charge Madras Fort Radio, Madras, India; All-India Radio short-wave transmitters operate as follows: VUD2 (9.59), and VUD3 (15.16), Delhi, daily 8:30 to 10:30 p.m.; VUD2 (4.995), 1:30 to 3:30 a.m., 6:30 a.m. to 12:30 p.m.; VUB2 (9.55), Bombay, 9:30 to 10:30 p.m.; VUB2 (4.905), Bombay, midnight to 2:00 a.m., and 6:00 to 11:30 a.m.; VUM2 (4.95), Madras, 6:00 to 11:00 a.m.; VUC2 (9.53), Calcutta. 1:06 to 3:06 a.m. and VUC2 (4.88), Calcutta, 6:06 to 11:06 a.m.

MANCHUKUO—MTT (13.53). owned by the Manchuria Telephone and Telegraph Company, Radio House, Hsingking, Manchukuo, power 20 kw, is reported to be operating daily from 10:30 to 11:30 p.m.

NEW CALEDONIA—FK8AA (6.122), "Radio Noumea," is now operating Tuesdays and Saturdays from 2:30 to 3:30 a.m.

PHILIPPINES—KZRM (9.57), "Radio Manila," located in the Insular Life Building. Manila. operates Mondays to Fridays from 5:00 to 9:00 a.m. and 4:30 to 6:00 p.m.; Saturdays from 5:00 to 10:00 a.m., and on Sundays 4:00 to 10:00 a.m.

TURKEY—According to the International Dx'ers Alliance, TAO (9.465), Ankara is frequently heard between 6:30 and 7:00 a.m. TAO (15.195), Ankara, operates daily from 1:20 to 5:00 p.m. but after 4:40 p.m the station is blotted out by DJB's powerful carrier wave. Oriental music is often featured, but after 4:00 p.m. American recordings are frequently played. This station apparently relays 2RO4, Rome, Italy, upon occasions, and at these times the announcement is "2RO4." The station announcer is Mademoiselle Hadjimihal, who speaks fluently in Turkish. German. French and English. The new short-wave transmitters. which relay a 60 kw long-wave station, were formally opened on October 29th.

UNITED STATES—W4XB (6.04), Isle of Dreams Broadcasting Corp., Miami, Florida. power 5 kw, relays WIOD weekdays from 1:00 to 3:00 p.m., and 9:00 p.m. to midnight, and on Sundays from 4:00 to 6:00 p.m.. and from 9:00 p.m. to midnight. Announcements are in English and Spanish.

VENEZUELA—YV5RR (5.835), P. O. Box 185, relays YV5RS of Caracas, daily from 6:30 to 7:30, 10:30 a.m. to 1:30 p.m. and from 3:30 to 10:00 p.m. Power is 2500 watts, and station verifies with an attractive double-post card view of the studios.

Amateur Reception Notes

BOLIVIA—Roger Legge of Binghamton. New York, reports heading CP1BA (14.02) of Sucre, with a good signal near 11:30 p.m.

CHINA—Guy Bigbee of Fort Benning, Georgia, writes that XU6TL, owned by T. L. Shew, Box 132, Canton. verifies with a light orchid colored QSL card, with call letters and information printed in black.

ESTONIA—There are at present 20 licensed amateurs in Estonia. These amateurs are organized into the Estonian Radio Amateur's Union (Eesti Raadio-amatooride Uhing). Postkast 220, Tallinn.

GREECE—The possession and use of radio transmitting equipment by private individuals was recently prohibited in Greece. At present there are only three amateurs operating, namely, SV1KE, SV1CA and SV1NK. There is no recognized amateur organization but a QSL office is maintained at 17 Bucharest St., Athens, by C. Tavaniotis, owner of SV1KE.

GUATEMALA—The address for amateur TG5 is P.O. Box 12. Guatemala City.

MEXICO—Amateur XE1AC, Alfonso Velasco of Mexico. D. F.. operates a 100 watt fone transmitter on 7.149, 7.035. 14.07, or 14.298.

NEW GUINEA—M. W. Soplop of Alleghany, New York, reports hearing VK9XX (14.275), in Rabaul, New Guinea. several mornings near 6:30 a.m.

PITCAIRN—The last ship to stop at Pitcairn, brought 500 letters from Hams and Short-Wave listeners. All reports on reception of VR6AY. accompanied by an international reply coupon, will be answered, but self-addressed envelopes bearing 1 pence New Zealand stamps are preferred. Envelopes should not be smaller than 4½ by 6 inches.

ST. LUCIA—VP2LB (14.1), the first amateur in this island, is on the air. Power is approximately 50 watts, and the station is usually heard near 6:30 a.m.

TANGIERS—Reports on reception of CN1AF (14.278), owned by Jose M. Sierra, 19, Rue des Sources, Tangier International Zone, first mentioned in this column last month, are being promptly confirmed with an attractive QSL card bearing a photograph of the city. The power of the transmitter, a Utah, is 500 watts.

TRINIDAD—According to Len Harbin of Trinidad. the following amateurs are in operation there: VP2GD (7.001), Grenada; VP2SA (7). St. Vincent; VP4GA, temporarily off the air, and VP4TN (7.177). owned by Eric Dugt, 28 de Verteuil, Port of Spain.

Last Minute Notes

ADDITIONAL INTERNATIONAL FRIENDSHIP PROGRAMS:

Sunday. December 4th, 3:00 to 4:00 a.m., HJ7ABD (9.63), of Bucaramanga, Colombia.

Friday, December 9th, or Saturday. December 10th, 2:00 to 4:00 a.m.. San Jose, Costa Rica. stations TI2XD (11.92), TIXD (800 kc), and TIRH (950 kc).

January 15th, from 9:00 to 10:00 p.m., OAX4J (9.34), Casilla No. 1166, Lima. Peru.

The Monday 6:45 to 8:30 p.m. broadcast for Swiss nationals in the United States, is now being radiated over HBL (9.345), and HBP (7.797), of Geneva, Switzerland.

ZRD (6.147), Durban, South Africa, shifts to 4.82, daily at 11:30 a.m. and remains on this frequency until 2:45 p.m. The power of the transmitter is 250 watts.

SHORT WAVES for DX'ers Living on the WEST COAST

by JOHN D. CLARK

(All Times Are PACIFIC STANDARD)

AS winter reception conditions settle down on all sides, the lower frequencies have suddenly come to life again, and listeners west of the Rockies are reporting excellent reception from Asiatic stations operating between 4 and 7 megacycles.

Indian stations VUD2, Delhi (4.99 meg.); VUB2, Bombay (4.90 meg.); VUC2, Calcutta (4.88 meg.); and VUM2, Madras (4.95 meg.); have been received with surprising volume near 4:30 or 5:00 a.m. Occasionally several of these 60 meter Indians send signals to America's Pacific Coast which are even stronger than those of VUD2's 31 meter transmitter on 9.59 meg. However, the lower frequencies usually fade out near 5:30 a.m., while the 9.59 meg. wave is still quite good as late as 7:00 a.m.

The Island of Java is also well represented on these lower frequencies. In addition to PMY (5.14 meg.) there is a new transmitter YDX, located at Medan, Sumatra, which is now reported with good volume on 5.17 meg. from 3:00 a.m. until it fades out shortly after daybreak. YDX relays the same programs as PLP, PMN, YDC, and YDB.

On 5.00 meg. an unidentified Javanese transmitter may be heard broadcasting native music between 3:00 and 5:30 a.m. YDE2, Solo. Java (4.82 meg.) is also audible at about the same time. Even YDA on the extremely low frequency of 3.99 meg. may be picked up before daybreak relaying the Javanese National Network programs. The old East Indian stand-bys PLP (11.00 meg.). PMN (10.26 meg.), YDB (9.55 meg.). and PMH (6.72 meg.) are still coming through from 1:30 to 7:30 a.m.. although changing seasonal conditions have slightly weakened the first three. Note that all these stations are now remaining on the air until 7:30 and until 8:30 on Friday and Saturday, a thirty-minute increase in time schedule.

Although YDB (15.3 meg.) and YDC (15 15 meg.) are both on the air from 7:30 to 11.00 p.m., according to station announcements, neither has been heard in this region during the past month.

Nippon

JZK (15.16 meg.) is still carrying the Overseas Program for North America's Pacific Coast, but a shift to JZJ (11.8 meg.) is quite certain to be made on almost any day now.

JZL (17.78 meg.) was replaced by JZK (15.16 meg.) last month for the daily 5:00 to 5:30 p.m. transmission. This broadcast is now received with excellent volume west of the Rockies. News in English is released at 5:05 p.m.

The morning broadcast, which the Broadcasting Corporation of Japan directs to China and the South Seas, from 5:00 to 6:30 a.m., has weakened considerably through JZJ (11.8 meg.), but JVP (7.51 meg.) has made up for the loss with a greatly improved signal.

JVH (14.6 meg.) is beginning to weaken. but is still audible at irregular intervals throughout the afternoon and early evening. JVN (10.66 meg.) is now coming on the air at 10:30 p.m., instead of 10:50 p.m.

Straits Settlements

Station SHP, located in Singapore, which com-

menced operations on 9.69 meg. only two months ago, has suddenly been taken off the air and replaced by ZHO on an announced frequency of 6.175 meg. Note that ZHO has raised its 49 meter frequency, since it formerly operated on 6.01 meg. The schedule—3:40 to 6:40 a.m.—remains the same. ZHO announces "This is Singapore Calling—ZHO, O for Ocean."

ZGE of Kuala Lumpur, is again audible on 6.20 meg. The schedule is Sunday, Tuesday, and Friday from 3:40 to 6:40 a.m.

U.S.S.R.

There seems to be quite a difference of listener opinion regarding the European broadcaster which operates on 15.18 meg. Some fans seem quite certain that it is the new Finnish station, but it seems fairly well established as we go to press that it is located in Moscow, and uses the call RV26. Western listeners report reception from 10:00 p.m. until fadeout between 10:30 p.m. and 11:00 p.m. and again near 7:00 a.m. when it is the strongest European on the 19 meter band.

RV15 of Khabarovsk, U.S.S.R. is now audible on 4.27 meg. as early as 11:00 p.m. After midnight, the station thunders its signals across the Pacific with tremendous volume, and is undoubtedly the strongest Asiatic on the dial between midnight and 6:00 a.m. Programs are in Chinese and Russian.

General European Reception

Many marked changes in European reception have been observed during the past 30 days. The excellent reception on the 19 meter band after 9:00 p.m. has practically vanished. German, French, and English stations have weakened to the point where it is probably safe to say that European signals between 8:00 p.m. and 6.00 a.m. have become virtually extinct. GSD (11.75 meg.), which is still fair when it comes on the air at 11:00 p.m. is probably the only exception to this statement.

On the other hand, the 25, 19, and 16 meter bands are beginning to come to life between 6:00 and 9:00 a.m. Only a short time ago European stations were quite weak and unreliable during these early morning hours, but now a number of trans-Atlantic broadcasters are audible, reaching maximum volume near 7:00 a.m. It is probably safe to say that European reception at this time of day will continue to show improvement. Records show that the winter months usually bring west coast listeners their best a.m. signals from across the Atlantic.

The hours between 6:00 and 8:00 p.m. still produce the best volume from British, French, and German stations. Stations GSD (11.75 meg.), DJD (11.77 meg.), and TPB7 (11.89 meg.) are probably the most reliable. 31 meter stations GSC (9.58 meg.), GSB (9.51 meg.) and DJN (9.54 meg.) have shown a noticeable improvement, while all 19 meter transmitters have weakened considerably.

Indo-China

"Radio Hanoi," located in Hanoi, Indo-China, is again back on 11.90 meg. from 2:00 to 6:30 a.m. This station seems to shift frequencies, working sometimes on 11.90 meg. and sometimes on 7.44 meg., changing from one to another without notice.

"Radio Boy Landry" of Saigon, Indo-China, has shifted its frequency slightly to avoid interference with ZGE. The new frequency has not been announced definitely as yet, but dial readings would indicate it is approximately 6.17 meg. It is extremely close to the new frequency of Singapore's ZHO.

The 9.76 meg. frequency of "Radio Boy Landry" has not been reported for two months.

Late Western Tuning Tips

RANGOON, BURMA. The general improvement in 49 meter signals has resulted in a newcomer which has not been heard from since last winter. A station in Rangoon, Burma, operating on 6.00 meg. is now audible with fair volume near 6:00 a.m.

MADAGASCAR. "Radio Tananarive," located in Tananarive, Madagascar, has been reported by several listeners on 6.06 meg., as it comes on the air at 7:00 a.m. The station fades out rapidly, however, and is usually inaudible before 8:00 a.m. This one of the few Africans which may be heard on the Pacific Coast.

CEYLON. Station VPB, Colombo, Ceylon, is another 49 meter station which has become audible with the improved winter reception conditions. VPB works on 6.16 meg. and seems to reach maximum volume near 5:30 a.m.

NEW CALEDONIA. "Radio Noumea," station FK8AA, has greatly improved its signal on 6.12 meg. The schedule is announced to be Wednesday and Saturday from midnight to 1:00 a.m., although several fans have reported reception on other days.

UNIDENTIFIED. . . . Several listeners have re-

ported a new Asiatic station on approximately 9.33 meg. near 5:00 a.m. The signals are quite strong, but musical selections are played one after another with no announcements. . . . A station believed to be located somewhere in India is working irregularly on about 6.58 meg. near 5:30 a.m. This one was reported several times in June and July, and after a silence of several months, is being heard again. . . . A weak station has been logged several times on about 6.34 meg. near 5:00 a.m. No clue to the identity of this one has been found as yet.

FRENCH WEST INDIES. "Radio Martinique," located in Forte de France, Martinique. has been relaying the programs of the French "Radio Mondial" between 5:30 and 7:30 p.m. Many western listeners report this station now furnishes the best opportunity to hear French programs, since "Radio Martinique" is heard better than the French stations themselves.

FIJI ISLANDS. Station VPD2, Suva, Fiji Islands, has evidently increased its power, and is now being heard with tremendous volume on 9.54 meg. from 2:30 to 4:00 a.m. daily. Programs consist mostly of recorded dance music, and announcements are in English.

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Dual Diversity

(*Continued from page 9*)

cycle of fading, which would be only once every half-minute to every several minutes, and would be of such extremely short duration as not to be annoying during the reception of voice or music. This was considered no disadvantage as compared with the interval during a downward fade of nothing but noise such as would prevail on a fading signal without this system. (In a second article the methods of adapting it to telegraph reception will be explained. They are very simple, but for the initial explanation, it is simpler to consider only telephony where a continuous, though wavering carrier signal is present.

Having gotten so far, the only task was to make the signal itself select the antenna and connect to the receiver automatically that antenna which had the rising signal. The weak antenna could contribute no noise when disconnected, while the receiver's a.v.c. system would take care of the rising signal and hold it at constant volume until it faded down, when this antenna would be disconnected in favor of the second antenna in which the signal was fading up. Thus, on paper, everything was delightfully simple, since the varying voltage to control the antenna switching operation was easily obtained from the receiver's a.v.c. system.

It was only necessary to provide the switching units and circuits which would cause decreasing a.v.c. voltage to switch antennae. Because there were no such switches generally available, the actual translation of them on paper, oh, so simple, idea into a working reality was fraught with much difficulty and disappointment. But the final result was worth the effort, for when finished a method of eliminating fading in voice or broadcast reception was actually realized which had all the advantages of previous diversity systems such as are now becoming popular, and all at a cost to the ultimate user of not more than ten or twenty dollars!

Fundamentally, this new system consists of a magnetically operated single-pole-double-throw switch. The signal fading downward in one antenna connected to a receiver through this switch causes the switch to disconnect this antenna in favor

of a second antenna, in which the same signal is fading upward. This action occurs automatically whenever the signal fades downward to any predetermined level-predetermined by the single knob on the final unit. This switch is actuated by the a.v.c. voltage developed in the receiver itself, which voltage varies in proportion to the received signal strength. As the average receiver only produces from a fraction of one volt to possibly five to twenty volts, and as the system must be adaptable to every receiver having an a.v.c. system now in use by amateurs or broadcast listeners, some means of amplifying the a.v.c. voltage of the receiver to the power necessary to operate the antenna switch is needed. This is supplied by the new 2A4G Thyratron gas triode tube, which translates a small change in grid voltage into a large change in plate current.

The whole diversity circuit is shown in the diagram, together with its five connections to any receiver—one to the receiver antenna binding post, one to the chassis or ground binding post, one to the a.v.c. load resistor and one each to the two antennae. What could be more simple, when compared with the breath-taking complexity of previous diversity receiving systems? Switch A rests either up or down, connecting either one of the two antennae to the receiver. As the received signal in the connected antenna fades down, the negative a.v.c. voltage which adds to the adjustable negative bias provided by battery "C," drops to a point where the 2A4G Thyratron "ignites," or ionizes, and passes its large plate current through switch's magnet coil "D" in series with plate battery "B." This causes the switch contacts to disconnect the weak antenna and immediately connect the second, or strong-signal, antenna, in its place. As the switch shifts, the second switch "E" (part of the single switch assembly) breaks the 2A4G plate circuit, de-ionizes or "extinguishes" this tube's plate current, and then recloses its plate circuit, after having shifted antennae so that the receiver's a.v.c. system has developed sufficient negative a.v.c. voltage from the stronger signal found in the second antenna to prevent re-ignition of the 2A4G Thyratron—until the signal in this second antenna again fades down, when the antenna change is automatically repeated. The signal level at which this switching occurs is determined by the potentiometer "F" across bias battery "C." This level may be set just above the local noise level, for example, and so keep the fading always above the local noise.

Just so simple is this new means of adding the benefits of diversity reception to any existing receiver the reader may possess—just so simple has it now become to eliminate the ruination of short-wave—and long-wave radio reception by fading. By the time this article appears in print, not only will the necessary parts to build a practical, fully a.c. operated "diversity coupling unit" be available at low cost for the amateur and experimenter, but a complete unit selling for less than $20.00 can be bought.

Next month full home constructional details will be given, together with several more "angles" upon the functioning of this system.

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TECHNICAL BOOK & BULLETIN REVIEW

ATLAS RESISTOR CO., 423 Broom St., New York City.

Catalog No. 9 has just been released. It contains detailed information regarding wattages, resistance, and rating of all the company's resistors from the five watt pigtail to the 200 watt transmitting size. A copy will be mailed upon request by addressing the manufacturer.

ALLIED'S RADIO BUILDER'S HANDBOOK, by the Engineering Staff of Allied Radio Co. Size 8½ x 11, 40 pages. Price 10 cents. Published by Allied Radio Corp., 833 Jackson Blvd., Chicago, Ill.

Prepared to help novice radio builders, experimenters, and future amateurs, this book gives concise coverage of radio fundamentals in a simplified, practical manner. Sections are contained on selecting suitable circuits, reading schematic diagrams, laying out and punching chassis bases and panels, placing and wiring parts, and operating receivers and transmitters. It includes tube socket data, coil winding information and other valuable charts, as well as many diagrams and parts lists for beginner's sets, a 10 watt transmitter, fence control, and other equipment.

STANDARDS ON RADIO RECEIVERS, 1938, size 6 x 9, 58 pages. Price 50 cents. Published by The Institute of Radio Engineers, Inc., 330 West 42nd Street, New York City.

This report, restricted to the field of radio reception, contains definitions of terms, graphic symbols, methods of testing broadcast radio receivers, requirements and characteristics of testing apparatus, and test procedures. It also is indexed for reference.

STANDARDS ON ELECTRONICS, 1938, size 6 x 9, 59 pages. Price 50 cents. Published by The Institute of Radio Engineers, Inc., 330 West 42nd Street, New York City.

This report is restricted to the field of electronics and is a revision of the vacuum-tube portion of the 1933 report. It contains definitions of terms, treating them in a general manner and also specifically as regards gas tubes, cathode-ray oscillograph tubes, and photoelectric devices. There is a chapter on symbols and further chapters on methods of testing vacuum tubes.

CAPITOL RADIO ENGINEERING INSTITUTE, Washington, D. C., has issued an attractive 48 page booklet setting forth the home-study, residence, combination of home study and residence, and evening courses they offer in radio, and radio and television. Free upon request.

CORNELL-DUBILIER ELECTRIC CORP., 1000 Hamilton Blvd., South Plainfield, N. J., has issued its catalog No. 161 on radio capacitors. It is a 40 page booklet illustrating, listing, and describing the capacitors marketed by the company. Free upon request.

TRIMM RADIO MFG. CO., 1770 West Berteau Ave., Chicago, Illinois, has issued a loose-leaf catalog covering their headsets, headset accessories, hearing aid installations and accessories, and other products.

HOW TO BUILD RADIO RECEIVERS, 120 pages, size 8½x11, price 50c. Published by Meissner Manufacturing Co., Mt. Carmel, Ill.

This book presents the instruction sheets for all 1938 Meissner receiver kits with complete schematic and pictorial wiring diagrams, together with a collection of convenient radio formulæ for ready reference and a discussion of the characteristics of many types of r.f. and IF transformers, with their advantages and disadvantages in all types of circuits. A nomograph is included for calculating any two of the following items—current, voltage, wattage, resistance—if the other two are already known. There is an interesting and informative chapter containing a technical discussion of radio design principles.

CLAROSTAT MANUFACTURING CO., Brooklyn, New York, N. Y.

This company has published a series of loose-leaf sheets covering a wide range of resistors and resistance devices. Complete technical data, in many cases illustrated with curves, is given on the products treated. Hams, experimenters, servicemen, and jobbers are invited to write for pages J-1 up to and including J-19. Free upon request.

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Cover Title Contest

(*Continued from page 26*)

11. The decision of the Judges will be binding on the entrants and final.

12. All entries must be addressed to Cover Contest, % RADIO NEWS. 608 S. Dearborn St., Chicago, Ill., and must be mailed postpaid. None will be returned, and all become the property of RADIO NEWS. No inquiries concerning the contest will be answered. and no discussion with the entrants can be entertained.

★

ENTRY BLANK

COVER CONTEST,
RADIO NEWS, 608 S. Dearborn St.,
Chicago, Ill.

I hereby enter the following title in your December cover contest.

.....

.....

.....

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.....

.....

Subscriber to RADIO NEWS? ☐ Yes ☐ No.

My interest in radio is (describe).....

.....

NAME .....

ADDRESS .....

R.C.A. Radio Facsimile

AFTER ten years of laboratory research, RCA Victor engineers have announced that a simplified radio facsimile system designed to flash pictures, news bulletins and other text through the air and into the home has been made available to radio broadcasters.

The first demonstration of the newly developed facsimile apparatus was recently made for the benefit of the radio broadcasting executives and engineers at the Willard Hotel, in Washington, D. C.

Already, seven large radio stations in different sections of the country, most of them owned by newspapers, have placed orders for the new apparatus, preparatory to launching their experimental facsimile transmission services. These stations are KMJ (580 kc.), Fresno, and KFBK (1490 kc.), Sacramento, California, both owned by the McClatchy Properties, publishers of the Fresno and Sacramento Bee papers; KHQ (590 kc.), Spokane, Washington; WBEN (900 kc.), owned by the Buffalo Evening News; WTMJ (620 kc.), owned by the Milwaukee Journal; KGW (620 kc.), owned by the Portland Oregonian; and WOR (710 kc.), of the L. Bamberger Company of Newark, N. J.

All of the above named stations have applied to the Federal Communications Commission for permission to carry on their experimental programs, and several wavelengths have already been assigned. The FCC requires each station to install a minimum of fifty receiver-printers for each facsimile scanner-transmitter. The experimental programs will determine, among other things, public reaction to facsimile broadcasting as a radio service, the best type of program material, and the technical requirements for both scanner and receiver.

Radio facsimile service, as it is being considered by broadcasters, will probably supplement existing sound broadcast programs. It is planned to broadcast pictures and text on standard broadcast wavelengths during the early morning hours, local station time, between midnight and dawn, so that a complete bulletin will be ready for the user when he arises in the morning. The FCC has also set aside a number of ultra-short wavelengths for day and night facsimile service.

The new facsimile system, which was developed by Charles J. Young, RCA Victor research engineer, and his associates, utilizes ordinary white paper, or newsprint paper, and ordinary carbon paper, at the receiving end. The width of the paper roll on which the facsimile material is printed is 8½ inches. The proposed length of each page is 12 inches on a continuous roll. Printing speed is at the rate of three feet of record per hour. A time clock arrangement at the printer-receiver automatically turns the apparatus on and off in accordance with a pre-determined transmission schedule.

The facsimile receiver-printer is encased in simple wood cabinet measuring only 18" by 18" by 12". All the mechanism and controls are inside so that they may not be tampered with once they have been properly adjusted. The paper rolls out through a slit in the front of the cabinet. Two designs of facsimile receiver-printers have been developed by RCA Victor. One is fairly elaborate and automatically cuts the paper into 12 inch pages and deposits them neatly in a tray. The other is much simpler, and does not cut the paper into strips. It is felt that for experimental purposes the home apparatus should be as simple and inexpensive as is consistent with good reproduction.

The new, simplified facsimile system was developed in the RCA laboratories after years of experimentation with many different types of facsimile apparatus, some which were employed for

(*Continued on page* 53)

New Ham Regulations

(*Continued from page* 42)

Sec. 152.43. *Modulation of carrier wave.* Except for brief tests or adjustments, an amateur radiotelephone station shall not emit a carrier wave unless modulated for the purpose of communication.

Sec. 152.44. *Frequency measurement and regular check.* The licensee of an amateur station shall provide for measurement of the transmitter frequency and establish procedure for checking it regularly. The measurement of the transmitter frequency shall be made by means independent of the frequncy control of the transmitter and shall be of sufficient accuracy to assure operation within the frequency band used.

Sec. 152.45. *Logs.* Each licensee of an amateur station shall keep an accurate log of station operation, including the following data:

(a.) The date and time of each transmission. (The date need only be entered once for each day's operation. The expression "time of each transmission" means the time of making a call and need not be repeated during the sequence of communication which immediately follows; however, an entry shall be made in the log when "signing off" so as to show the period during which communication was carried on.)

(b.) The signature of the person manipulating the transmitting key of a radiotelegraph transmitter or the signature of the person operating a transmitter of any other type (type A-3 or A-4 emission) with statement as to type of emission, and the signature of any other person who transmits by voice over a radiotelephone transmitter (type A-3 emission). (The signature need only be entered once in the log provided the log contains a statement to the effect that all transmissions were made by the person named except where otherwise stated. The signature of any other person who operates the station shall be entered in the proper space for his transmissions.)

(c.) Call letters of the station called. (This entry need not be repeated for calls made to the same station during any sequence of communication, provided the time of "signing off" is given.)

(d.) The input power to the oscillator, or to the final amplifier stage where an oscillator-amplifier transmitter is employed. (This need be entered only once, provided the input power is not changed.)

(e.) The frequency band used. (This information need be entered only once in the log for all transmissions until there is a change in frequency to another amateur band.)

(f.) The location of a portable or portable-mobile station at the time of each transmission. (This need be entered only once provided the location of the station is not changed. However, suitable entry shall be made in the log upon changing location, showing the type of vehicle or mobile unit in which the station is operated and the approximate geographical location of the station at the time of operation.)

(g.) The message traffic handled. (If record communications are handled in regular message form, a copy of each message sent and received shall be entered in the log or retained on file for at least one year.)

The log shall be preserved for a period of at least one year following the last date of entry. The copies of record communications and station log, as required under this section, shall be available for inspection upon request by an authorized Government representative.

Special Conditions

Sec. 152.50 *Additional conditions to be observed by licensee.* An amateur station license is granted subject to the conditions imposed in Sections 152.51 to 152.54 inclusive, in addition to any others that may be imposed during the term of the license. Any licensee receiving due notice requiring the station licnsee to observe such conditions shall immediately act in conformity therewith.

Sec. 152.51 *Quiet hours.* In the event that the operation of an amateur station causes general interference to the reception of broadcast programs with receivers of modern design, such amateur station shall not operate during the hours from 8 o'clock p.m. to 10:30 p.m., local time, and on Sunday for the additional period from 10:30 a.m. until 1 p.m., local time, upon such frequency or frequencies as cause such interference.

Sec. 152.52 *Second notice of same violation.* In every case where an amateur station licensee is cited a second time within a year for the same violation under Section 152.25, 152.27, 152.28, 152.30, 152.31, 152.41, or 152.42, the Commission will direct that the station remain silent from 6 p.m. to 10:30 p.m., local time, until written notice has been received authorizing full-time operation. The licensee shall arrange for tests at other hours with at least two amateur stations within fifteen days of the date of notice, such tests to be made for the specific purpose of aiding the licensee in determining whether the emissions of his station are in accordance with the Commission's Regulations. The licensee shall report under oath to the Commission at the conclusion of the tests as to the observations reported by amateur licensees in relation to the reported violation. Such reports shall include a statement as to the corrective measures taken to insure compliance with the Regulations.

Sec. 152.53. *Third notice of same violation.* In every case where an amateur station licensee is cited the third time within a year for the same violation as indicated in Section 152.52, the Commission will direct that the staton remain silent from 8 a.m. to 12 midnight, local time, except for the purpose of transmitting a prearranged test to be observed by a monitoring station of the Commission to be designated in each particular case. Upon completion of the test the station shall again remain silent during these hours until authorized by the Commission to resume full-time operation. The Commission will consider the results of the tests and the licensee's past record in determining the advisability of suspending the operator license and/or revoking the station license.

Sec. 152.54 *Operation in emergencies.* In the event of widespread emergency conditions affecting domestic communication facilities, the Commission may confer with representatives of the amateur service and others and, if deemed advisable, will declare that a state of general communications emergency exists, designating the licensing area or areas concerned (in general not exceeding 1,000 miles from center of the affected area), whereupon it shall be incumbent upon each amateur station in such area or areas to observe the following restrictions for the duration of such emergency:

(a.) No transmissions except those relating to relief work or other emergency service such as amateur nets can afford, shall be made within the 1715-2000 (subject to change to "1750 to 2050" kilocycles in accordance with the "Inter-American Arrangement Covering Radiocommunication," Havana, 1937) kilocycle or 3500-4000 kilocycle amateur bands. Incidental calling, testing, or working, including casual conversation or remarks not pertinent or necessary to constructive handling of the general situation shall be prohibited.

(b.) The frequencies 1975-2000, 3500-3525, and 3975-4000 kilocycles shall be reserved for emergency calling channels, for initial calls from isolated stations or first calls concerning very important emergency relief matters or arrangements. All stations having occasion to use such channels shall, as quickly as possible, shift to other frequencies for carrying on their communications.

(c.) A five-minute listening period for the first five minutes of each hour shall be observed for initial calls of major importance, both in the designated emergency calling channels and throughout the 1715-2000 (subject to change to "1750 to 2050) kilocycles in accordance with the "Inter-American Arrangement Covering Radiocommunication." Havana, 1937) and 3500-4000 kilocycle bands. Only stations isolated or engaged in handling official traffic of the highest priority may continue with transmissions in these listening periods, which must be accurately observed. No replies to calls or resumption of routine traffic shall be made in the five-minute listening period.

(d.) The Commission may designate certain amateur stations to assist in promulgation of its emergency announcement, and for policing the 1715-2000 (subject to change to "1750 to 2050" kilocycles in accordance with the "Inter-American Arrangement Covering Radiocommunication," Havana, 1937) and 3500-4000 kilocycle bands and warning non-complying stations noted operating therein. The operators of these observing stations shall report fully the identity of any stations failing, after due notice, to comply with any section of this regulation. Such designated stations will act in an advisory capacity when able to provide information on emergency circuits. Their policing authority is limited to the transmission of information from responsible official sources, and full reports of non-compliance which may serve as a basis for investigation and action under Section 502 of the Communications Act. Policing authority extends only to 1715-2000 (subject to change to "1750 to 2050" kilocycles in accordance with the "Inter-American Arrangement Covering Radiocommunication," Havana, 1937) and 3500-4000 kilocycle bands. Individual policing transmissions shall refer to this Section by number, shall specify the date of the Commission's declaration, the area and nature of the emergency, all briefly and concisely. Policing-observer stations shall not enter into discussions beyond essentials with the stations notified, or other stations.

(e.) These special conditions imposed under this Section will cease to apply only after the Commission shall have declared such emergency to be terminated.

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Filter Packs

(*Continued from page 35*)

ponent in the circuit, and at high current, the choke offers less impedance to the a.c. component in the circuit. The condenser used with this choke has the opposite effect. In other words, it offers a low resistance path to ground to the alternating current component and offers a high resistance to the direct current in the circuit.

It will be seen from the above, that they have a dual action: one offering resistance to the alternating component and the other passing the alternating current component to ground without effecting the direct current.

Another circuit commonly used is called condenser input, which utilized an input condenser as described in a previous paragraph, and a choke which offers a more or less constant impedance to the alternating current component, and is called a filter choke. Also a filter condenser which acts similar to the condenser described above used with the swinging choke.

Probably the best circuit is that which utilizes a swinging choke and condenser plus a filter choke and condenser. This filter choke and filter condenser may be designed to reduce the ripple to the value required for a specific application.

A few examples as to where the various circuits are used in commercial applications are as follows:

A condenser input with choke and filter condenser is used in radio sets, power supplies, and low voltage power supplies in transmitters. A swinging choke filter condenser type is used on high voltage power supplies with mercury vapor rectifiers, also in high current power supplies with other types of rectifiers. A swinging choke and filter choke circuit is used in circuits requiring a greater degree of filtering than the above mentioned, having the advantage of better regulation and reducing high inverse peak current through the rectifier.

—30—

Definitions

by Foo-9-Foo

RADIO AMATEUR...is one who has bands of frequencies some foreign power will in 1942 liquidate him almost entirely off of.

FREQUENCY...is something within which an amateur ought to operate in order not to get a pink slip for getting out of it.

OVERMODULATION...is what you ought not to make your 'phone transmitter do in order to stay off your brother-ham's signal mostly.

KEY CLICKS...are those things your key is not supposed to make noise in your neighbor's broadcast set with.

RADIO TUBE...is something which you give Little Willie hail columbia for trying to play with when you told him not to over three times a while ago.

HETERODYNE...is that which your best QSO is washed out because of, almost completely.

Facsimile

(*Continued from page 51*)

commercial transmission of weather maps and information to ships at sea, and for the transmission of photographs and other material across the Atlantic. The new equipment was developed by Mr. Young and his assistants as most practicable for the home.

The picture, drawing or text to be transmitted is placed on the roller drum of the "scanner." A beam of light travels horizontally across the page as the drum revolves. The light is reflected and focussed on a sensitive photo-electric cell in the various degrees of shading corresponding to the picture. The photo-electric cell transforms the light into electrical impulses which are flashed through the air.

The receiver is synchronized to the transmitter-scanner. The signals are picked up exactly as in sound broadcasting, but instead of passing through the loudspeaker, they are made to actuate the printer mechanism.

The facsimile signals may be heard on the loudspeakers of ordinary radios as high tones of varying intensity.

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What's New in Radio

(*Continued from page* 18)

Victor J. Andrews, 6429 S. LaVergne Ave., Chicago, Ill., announces a new remote indicating antenna ammeter. It uses a current transformer with electro-static shield, a vacuum tube rectifier, and d.c. indicating instruments.

Announcement has been made by the Cornell-Dubilier Electric Corp., South Plainfield, N. J., of the introduction of the TQ series of transmitting capacitators. Hermetically sealed in round drawn aluminum containers, they are impregnated and filled with non-explosive and non-inflammable Dykanol. The TQ series are available in ratings from 1 mfd. 600 to 2 mfd 2000 V. D.C. Complete details are in catalog No. 161.

Over 50 completely coordinated sound systems and 40 amplifiers are included in the 1939 line of Lafayette sound equipment just announced by Wholesale Radio Service Co., New York City. Special requirements of churches, schools, sports arenas, recording studios, musicians, sound laboratories and outdoor advertising have been recognized and systems designed to meet these specialized requirements.

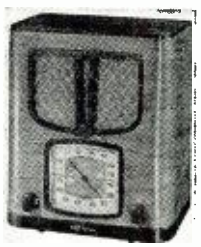
Stark Electrical Instruments, 418 South Wells Street, Chicago, Ill., announces a tube tester operated from a self-contained power supply for use in rural areas which are not equipped with electrical current. The life of the self-contained batteries is about one year. Known as the model SY, the portable tube tester has a large fan-type meter, tests all DC and auto radio tubes including new 1.4 v. series, plus many AC types, hot filament hot test, cathode leakage to 250,000 ohms, three DC voltage ranges, 0-10-100-300, three resistance ranges 0-1000-100,000-1 meg.

Further refinements are featured in the new Pyrohm Jr. wire-wound vitreous-enameled resistors just announced by Aerovox Corp., 70 Washington St., Brooklyn, N. Y. Special resistance wire of low temperature coefficient of resistivity is wound on refractory tubing. This assembly, including terminal connections, is coated with powdered glassy enamel and fired at red heat. Units come in the popular 10 and 20 watt sizes and in a wide range of resistance values. The same refinements are reflected in the new Slideohm adjustable resistors available in 25, 50, 75, 100 and 200 watt ratings. One slider band is supplied with each unit.

Eicor, Inc., 515 S. Laflin St., Chicago, Ill., is a new company manufacturing dynamotors, converters, gas electric plants, and other rotary electrical apparatus. Mr. Joe Nader is President and Mr. R. D. Wright is Vice President and Sales Manager.

Mims Radio Co., Texarkana, Ark. is now making available in kit form a rotary beam antenna known as The SS39 Signal Squirter. A direction indicator requiring no mechanical connection or additional wiring is also available. Direction indication is by means of a band sweeping over an azimuthal map of the world. An open wire feed system is used in the antenna and the radiators are entirely self-supporting.

The Electronic Manufacturing Engineers, 19 S. Wells St., Chicago, Ill., announces it will confine its interests to custom built transmitters, receivers, P.A. systems, Call Systems, and all forms of electronic apparatus. Its export department is one of the most unique in that it is equipped to custom-build radio apparatus which conforms to all of the various problems encountered outside the U.S.A.



RCA Victor has introduced a line of battery receivers with push button tuning for the rural listener. There are two complete series. One comprises four receivers employing the 1½ volt tube, while the other consists of three 6-volt radios using a single storage battery. Two 8-tube, 6-volt instruments, announced earlier, are being continued in the line.

A new "Vacuum-Type" Dummy Antenna Resistor has been developed by the Ohmite Mfg. Co. to provide a simple, accurate and convenient means of checking the output and efficiency of high-frequency radio transmitters used in amateur, aviation, communication, police, and broadcast services. The new Ohmite Model D-100 Dummy Antenna Resistor is built like a vacuum tube with a glass bulb. It has a four prong ceramic base which mounts in a standard tube socket. It is rated at 100 watts with a resistance of 73 ohms.

Clarostat Mfg Co., Brooklyn, N. Y., announces a line of voltage-dropping power cords either for initial or replacement use with a.c.-d.c. sets. Each cord is made up of three conductors enclosed in heavy braided covering, and including the resistance winding. Generous proportions cause these cords to operate coolly and safely. Eight types cover all standard 110-v. a.c.-d.c. set needs. Another type provides voltage reduction from 220 to 110 volts.

Jensen Radio Mfg. Co. has issued a comprehensive catalog covering a wide selection of loud speakers. Free upon request by addressing the manufacturer at 6601 Laramie Avenue, Chicago, Ill.

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Earshot of the Editor

(*Continued from page 4*)

of a master serviceman. Where do you want to fit? Normally one man will want to do something different from another, and the first prerequisite is to know just exactly what you wish to do in the field.

For those who are citizens of these United States, and who are physically and mentally qualified, there is not any finer training than the Army Radio School. To get into that school will require that the man sign up for three years in the Army as a private or plain soldier. Once passed by the recruiting board, the soldier may choose the radio service. He will eventually be given complete training in the fundamentals and finally in the fine points of commercial radio from the technical end. Also he will, at the same time, have a chance to see a bit of the country and to meet and learn to get along with his fellow men.

For those who, for one reason or another, are unable to follow this course, there remains that of carefully, step by step, preparing himself for the profession. A good general education with a slight leaning towards the mathematical side will be an asset not to be minimized. Early training in mathematics, physics, and chemistry will prove invaluable later. For those who want to go into radio design and engineering, mathematics through calculus will also be a necessity.

Having obtained the required pre-education, the next step is to choose a school or college which will carry that education further into the channels chosen by the student.

For those able to qualify there are the great American technical colleges such as Massachusetts' Institute of Technology, Yale's Sheffield, Harvard's Cruft Laboratory, Armour's Technical Institute, to name but a few. Which of these to attend must be the choice of the applicant, and depends solely on two things. First—how far the student wishes to prepare himself along engineering lines. Second—the financial ability to afford these fine schools. On equal footing, but with a different type of training, are the many technical schools of good repute and with excellent curricula and staffs which dot the country from coast to coast. In these schools training may be had in subjects ranging from the proper method of being an announcer to the building of commercial television transmitter stations. Here again the choice of the school lies with the student and his choice of what part of the radio profession he would enter.

There are those who will want to do research. This is an unusual field, commanding small pay but engaged in by many engineers who have a real love for radio engineering. The laboratories maintained by the big public utilities such as Bell Telephone, and the Electric companies come under this category. To enter these usually requires an advanced education along highly technical lines, and the positions are zealously sought by all engineers seeking this type of work.

So that is the resumé of what the prospective student is up against. One thing is certain, do not enter the radio field with the idea that it is easy. It is not! It is hard, hard work—no matter which section of the field you attempt. It is fraught with disappointment, and hours of work have absolutely no meaning. Radio is all-absorbing and will generally permit no other parallel interest. It is a jealous taskmaster. The rewards? Well, if you want to be in a field which is probably the only one serving the whole of humanity regardless of race, color, or creed—if you want to be associated with serious men who are making a new industry grow under their very hands—if you want to be in a field where the first frontier has just been barely scratched and the inventions to come are far in excess of what has been invented, then you will want to be in RADIO.

* * *

BEHIND the Panel—

Why is it that there is nothing that some radio clubs will stop at to get some publicity for themselves? Even to stooping to real meanness. . . .

It has been said that the hams have no loyalty to anyone . . . not even to ideals, if it suits them. Certainly a sad commentary on what should otherwise be a fine bunch of men. . . .

At one time the fight pro and con the ARRL got so hot in a mid-western city that the hams went around pulling down each other's antennas. The police were finally called in to stop the wanton, useless

and wholesale destruction. . . .

Even big corporations get into fights among themselves. Recently a group of radio stores went out of their way to "punish" one of their number. We don't know the outcome, but it was not to anyone's advantage. . . .

Manufacturers continue to fall for *so-called* author's stories that they will have an article published in this or that magazine and furnish them with free parts. If the manufacturers banded together and PAID *real* authors or hired honest-to-goodness publicity men to do their work, both the hams and the manufacturers would materially benefit. . . .

When a certain broadcast chain was reported using the ham bands for a "cue" channel, and a complaint was lodged with them, they are said to have said, "Aw, fergit it, the hams don't care about their bands anymore!" Hmmmmm! . . .

* * *

IT was a dearly learned lesson that high voltage can kill that was taught with the untimely end of Ross Hull, of *QST*. All hams ought to know that you attack a problem in adjustment or connection on the rig with *one hand in your pocket. And don't wear ear phones, either!* Unfortunately, few will heed these words! . . .

Why is it that competition among the manufacturers is *so bitter,* instead of just being *keen?*" . . .

Before the new ham regs go into effect, the holders of ham licenses can still adjust and operate *any* equipment operating on a frequency above 30,000 kc. The new regs push that to 300,000 kc. Seems like we are being dismissed as teachers in the operation of commercial u.h.f. apparatus. Hohum, . . . well we taught them well, anyway! . . .

What a blow the prohibition against the use of music on the ham bands will be to those gents who used to try out Aunt Suzy or Girl Friend Maggie on the unsuspecting hams. . . .

Didn't the choke & condenser boys get a break in the new regs, though? Gotta have pure d.c. on everything below 60 mc. now. . . .

And won't those 'phone guys feel blue because they won't be able to let their carriers run for hours at a stretch without modulating, or telling who they are? . . .

We wonder who the unpopular people will be who will become "advisers" to the FCC in policing the bands. We hope that the FCC picks good, *understanding* men!

* * *

FOLLOWING up the report in our last column, here are the number of hams located in the mentioned foreign countries. This will help to check on the "booties" who say that they are in those countries when in fact they may not be. Our authority is the U. S. Department of Commerce. In Anglo-Egyptian Sudan there are only 3 amateurs; Mexico, 700; Japan, 1,000-1,200; Norway, 180; Belgian Congo, 23; Newfoundland, 30-40; Spanish Morocco, 2-3; Sierra Leone, 0; Gold Coast, unknown; Iraq, 2; Finland, 275; Afghanistan, 1-2; British Honduras, 6; China, 400; Bahamas, 5; Portuguese Guinea, 0; Philippine Is., few; Palestine, 0 (prohibited); El Salvador, few; Paraguay, 5; Greenland, 2; Fiji Islands, 2; Guadalupe, 0; French Guinea, unknown; Greece, 3; (hams recently prohibited in Greece); Estonia, 20; French Morocco, 20; Haiti, 10; Hungary, 1,800; Guatemala, 2; Libya, 0; Martinique, 2; Netherland Indies, 150; Portugal, 200; and Poland, 308. This is all that we have information on at this time, but as we get more we will publish it. In the 35 countries above listed there are 5,151 amateurs, or less than in the 9th U. S. District, we believe.

* * *

IN THIS issue we scoop the radio world with a circuit which will make any receiver of superhet design into a dual diversity set providing that suitable antennas and AVC are made available. Since the former is not hard to do, and the latter is included in most every superhet, we believe that every DX fan, every ham and every experimenter will be interested. Developed by McMurdo Silver, it certainly shows that the old maestro has not lost his touch. For a brilliant comeback into the field of outstanding inventors, our congratulations to you, Mac!

* * *

THE AMATEUR regulations have been changed by the Federal Communications Commission and we are happy to be able to reprint them in full. A number of changes have been made in the various bands. Among the extra good ones are those prohibiting the broadcasting of music over any ham station whether for test or otherwise. Hams cannot let their carriers run without modulation, and last but not least, a licensed ham must throw the switch which puts the station on and off the air—and not the unlicensed listener who is "over to see how it all works." All of these regs are very fb. They go into effect December 1, 1938. Watch your step, boys, the regs have real teeth in them!

* * *

A PETITION is being circulated by the Hollywood Television Society, 763-765 Gower St., Los Angeles, Cal., requesting the Federal Communications Commission to issue commercial licenses to Television Stations. We are not sufficiently acquainted with the project to know whether the impetus behind it is commercial or just the listener reaction (the petition mentions that the signers want to *see* as well as hear their program), but all who are interested in joining the movement are urged to contact Mr. G. H. Seward at the Society's address.

* * *

LAST month we reported that a new contest would be run this issue. We do have one on the cover title, but that is not the one we had in mind. Space was at such a premium this month that we were forced to leave the new contest out. It will appear in the January issue, and will be one for every dx'er, ham, experimenter and serviceman. Watch for it!

* * *

AND so another month and a year has passed. Wonder if the boss will "go" for a new antenna meter for us for Christmas? Merry Xmas, es 73. We'll be seeing you next year! . . . W9QEA.

-30-

Inverse Feedback

(*Continued from page 26*)

cable has a good ground. Again a .0001 mfd. fixed condenser across the mike output will help. It also might be advisable to leave the mike "live" and rotate it in a complete circle to be sure that the background noise such as power transformers, chokes, etc., are not being picked up. Power supply hum can be traced by putting a magnetic speaker in series with a 1. mfd. condenser of suitable voltage breakdown across the B plus supply.

Use of the DB. Meter

A db. meter, which is in effect only a milliampere reading device with a rectifier attached, is used to read output levels across the 500 ohm line. If speech levels are desired, and the db. meter designed for operation across the 500 ohm line as this one was, then no resistor in series with the meter is used, and it can be read directly from the face. Its use will be limited to those applications where a definite input level is being fed to another amplifier or line (such as in broadcast work) and the gain control will control the actual amount of power, measured in db.'s that is going over the output stage. *Do not test the meter without a load, as there is grave chance of burning it out!*

For "ham" use, the db. meter acts as a check on percentage of modulation, by reading the meter at exactly 100% modulation as checked with an oscilloscope. In the case of the author, the insertion of a 50,000 ohm, 1 watt resistor in series with the meter gave a "0" reading for 100% modulation with a *prefixed and determinable position of the gain control.* If the gain control were to be advanced beyond that position, then the reading would not be true. Remember one thing, db. meters are sluggish—even the fastest of them—and a reading of *less* than 100% should be used as a reference point so as not to *overmodulate* the transmitter on voice peaks.

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Bench Notes

(*Continued from page 19*)

expected response from the latter; the former, however, provoked calls from the cheapest bunch of chislers I ever came across in my life. I learned then that, even though free service advertising resulted in more calls, they were from customers I didn't want.

If you are the type of person who is too proud, or too occupied with a rushing business to distribute cards, you can hire some kids to get rid of them for you. They will—down a sewer!

Try This on Your Partner

Two servicemen disagreed as to which was the faster with a soldering iron. A third professional suggested a match. Bets were made, conditions agreed upon.

Each was free to choose the iron, solder, and tools he was to use. The wiring of an

Who Are the Vigilantes? Ask Any Ham!

a.c. midget was removed. The contestants were to take turns, working from a print, in rewiring the chassis. With equal neatness, the one finishing in the shortest time was to be the winner. The test bench was cleared, tools and wire supplied.

The first man finished in 18 minutes. The second man laughed as he began, thinking it was in the bag. Within five minutes, however, we could see he had lost his head. He was nervous; his fingers became thumbs, his iron a clumsy tool. Before the 18 minutes were gone, he had thrown his tools down in disgust.

The winner voiced the last laugh, collected the money, and walked away happily. He wouldn't have, though, if the loser had known his soldering flux tin had been filled with heavy grease.

Final Analysis

Interesting to reflect that, while electricity is utilized so expertly in our profession, there is yet much difference of opinion concerning its nature. Four sources are drawn upon in getting information as to its nature:

To Funk & Wagnalls, electricity is "a material agency, which, when in motion, exhibits magnetic, chemical, and thermal effects; and which, when at rest, is accompanied by stress."

To Croft, in *Practical Electricity:* "Electricity is the *stuff* of which everything tangible is made."

To Morecroft, in his *Principles of Radio Communication:* "The electron is nothing but electricity."

To the power company: 7½c per kilowatt-hour.

—30—

"Time Capsule"

(*Continued from page* 38)

roughly to the buried metallic mass. When it passes over the *Capsule,* the plane of maximum current of the pick-up coil will again become vertical. As the coil passes beyond, it will reverse, and point in the opposite direction. The strike will undergo a maximum deviation from its normal position as the *Capsule* is passed.

"By a combination of these two methods it should be possible to locate the position of the *Time Capsule* within a few feet. However, if any other metallic objects lie within the area, they may also give indications. In our day we know of no way to distinguish by geophysical prospecting between different types of metallic substances when they are concealed beneath the ground."

The 5,000-year Westinghouse *Time Capsule* will contain books reproduced in microfilm, statements of this age's scientific, engineering, industrial, social, religious and philosophic achievements. It will also contain specially preserved small articles that moderns wear or use; motion picture film illustrating how we look, act and talk; photographs of famous people and things of our time, and messages from great men of today for the future.

Westinghouse engineers and metallurgists have designed the *Time Capsule* for permanence. It is torpedo-shaped, seven and a half feet long and eight inches in diameter. The outer shell is made of Cupaloy, a new temperable alloy of copper which has the strength of steel and high resistance to corrosion. The inner crypt is lined with a Pyrex glass envelope set in waterproof mastic. This crypt will contain film and articles, preserved in an inert gas (nitrogen).

—30—

Serviceman's Experiences

(*Continued from page* 13)

of our car coincide.

As I pulled up to a rubbery stop, I noticed a truck in my usual space. It was labeled *Redoubtable Radio Repairs.* Inside the store, strange hands were taking chassis out; they belonged to Johnson, the "outside" man of our closest competitor.

"Hello, Johnny," I said, with as much true cordiality as exists between peace conference delegates. "I see you have to bring your repair jobs to a *good* repair shop when the going gets tough!"

"Not exactly," he said. "Better alibi yourself before your partner sees you!"

"Sit down," Al said. "This is a very busy organization, in which you have had little part today!"

I sat. When Johnson loaded the last set in his truck, Al pulled the juice off his workbench, lit a cigarette, and sat at the desk.

"Glad you dropped in," he said, very deliberately. "What have you been doing since you quit work here?"

"I—"

"Don't answer me—I hate to see you use an elaborate lie to excuse yourself from a simple truth. Furthermore, I know exactly what happened since you left. You might know a few things about wireless, but you have much to learn about *underground* wireless. Within ten minutes after you finished your amateur performance, three customers called me to say they had seen you squiring a woman whose red dress fit like she had grown into it."

"She—"

"Yes. And in the meantime, seven calls came in, following a news report that a South American president had died naturally. It was only because the serviceman from *Redoubtable* is very able and wide-awake that I was able to handle these calls. Johnson is no Casanova, but he made more today than you did. His rates are as high as the conditions justify, and the total charge will be taken from your salary this Saturday. Put up a squawk, and I'll have Brown fire you!"

"Listen, Al—"

"Next time, tend to business. Now, after you turn in the money you collected on that Stromberg, you will be free to go and finish your vacation. If you hurry, you'll still have time to escort Miss Carlson home."

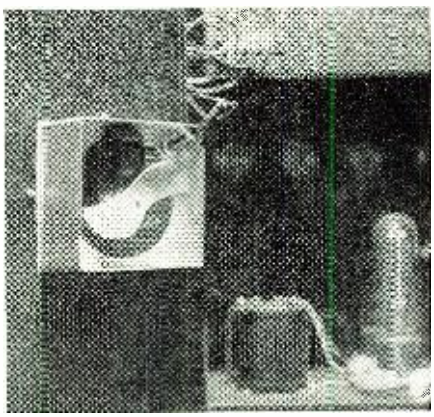
I paid Al, and went home to work on my new invention—a pendulum speaker for swing music. The next time a customer speaks to me socially during business hours. I'm going to answer in the deaf and dumb language.

—30—

Radio Gadgets

(*Continued from page 34*)

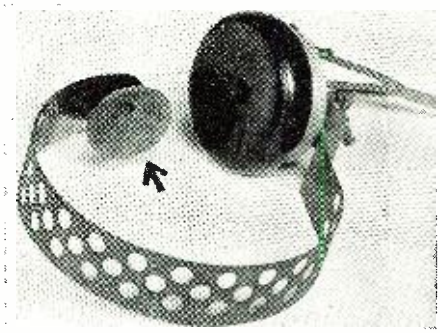
from the 110-volt a.c. line, is quite inexpensive, comes complete just as it is pictured. Ideal spot for such a fan (where space is available in the cabinet) is in the



bottom, operating as an intake system, or at the top, operating as an exhaust. Two might be used with even better results, one in each position recommended.

Greater Comfort with Headphones

If a small rubber suction cup used for attaching objects to smooth surfaces is fastened to a single headband phone, the



earpiece can be more comfortably worn. The steel band should be annealed before drilling the hole for the rubber tip of the suction cup.

A Resistor Kink

Many times the amateur radio constructor will find urgent need of a resistor of a value not in stock. If some carbon resistors of lower value are on hand the value of one of these can be raised considerably by using the following method.

Obtain a reading on a voltmeter by placing the resistor in series with a battery and the meter. Say for instance the resistor is one of 500 ohms and the reading is half scale on a 0-to-10 voltmeter.

To raise the resistance of the resistor to 750 ohms it is only necessary to file or grind down one side of the carbon cylinder a little at a time until the meter reads 2½ volts and you will have a resistor of approximately 750 ohms. Any meter can be used so long as you can get comparative readings.

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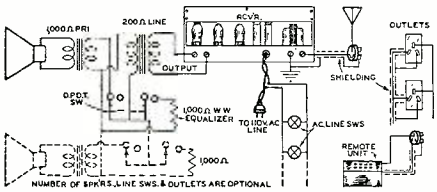
B.C. Receiver Control

(*Continued from page 23*)

a. A remote control tuner—one featuring push-button station selection, light weight, portability, and no necessity for direct antenna connection at the tuner itself.

b. Three-terminal wall outlets—one each for every room for which facilities for remote control are required, and one for installation near the receiver.

c. Two matching three-terminal plugs, one for fixed connection to the control leads, one for connection to the radio's input terminals and to the antenna.



Multi-Control home installation circuit.

d. (Optional—if room speaker service is to be featured.) Individual permanent-magnet type wall or table speakers, one for each control point—and provided with suitable matching transformers; two-terminal outlets if the reproducers are for table mounting; and on-off speaker switches, preferably mounted on the outlet plates or the speaker cabinet. Individual speaker volume controls will not be required, as the audio level may be adjusted at the tuner—but it might be in line with completeness of control to provide additional on-off switches at each control point for the express purpose of conveniently making or breaking the a.c. input circuit to the main receiver itself.

e. Heavy-duty, braid shielded wire for control output connection to the radio; well-insulated wire for antenna connection between radio and control outlet; speaker lead wire if required; heavy-duty a.c. line wire and approved conduit if receiver on-off is to be featured (the a.c. wiring should preferably be installed by a licensed electrician and should, of course, be properly inspected and OKed).

Suitable connection procedure follows:

First, the various outlets should be installed where required and connected together. Logically, this should be done during the course of building construction. A.c. and speaker lines, if used, should be wired in at the same time.

One terminal of each outlet connects to an unshielded wire, one to the shielded wire, one to the latter's shield-braid covering. Of course the termination at each outlet should be identical; for instance, if the shielded wire is connected to the number 2 terminal at one outlet, it should be connected at this same terminal at all outlets, so that tuner connections will be proper at any point of remote control plug-in. Outlets are simply paralleled across the two-wire (effectively three-lead) system.

Toggle or other on-off switches should similarly be paralleled across the two-lead a.c. line and the individual reproducers across the speaker line—the latter items in series with suitable switches and in such a way that when an individual speaker is turned off a compensating resistance is switched in to keep the effective load impedance in proper match with the output transformer at the radio receiver.

Next, the remote control unit is connected to a three-terminal plug by means of the two-wire cable provided with the tuner. The unshielded wire ties to the unit's No. 3 screw terminal. the shielded to the No. 2 terminal, the shield covering for the latter to the No. 1. Logically, the termination at the plug should be such that with control plugged in these wires will observe proper continuity in the overall point-to-point hookup.

Lastly, the receiver itself is connected to a suitable plug so that the circuit may be completed once this plug is inserted into the outlet in the radio room. The connections should be such that with the plug in place the shielded wire (overall) will tie to the receiver's antenna post, and the shield braid covering to the ground post. The antenna itself must be removed from the receiver and connected to a third plug terminal or lead from that terminal related to the system's *unshielded* wire.

Certain precautions should logically be observed in making the installation. Most of these are patent enough to call for no discussion here. One, however, might well be mentioned and for that matter emphasized:

As the shielded wire carries r.f., it should be kept as short as possible. The remote control i-f or output frequency is not itself affected by the length of this wire except in minor degree; but the strength of the signal *is* affected. Too long a line may attenuate the control's output considerably, especially on weaker stations, and particularly in view of the fact that this line must be shielded.

The illustration gives a suitable wiring and general layout diagram for a four-place system. A complete installation is indicated—one with station selection, volume level, and a.c. on-off control at each remote point and provided with individual control-point speaker service. The only thing lacking in this suggested array is provision for remotely re-setting the receiver's dial pointer at a specific low-frequency reading related to proper control unit operation—but then we can't have everything.

—30—

Radio Controlled Model Navy

(*Continued from page 7*)

the *California's* tanks, enough to propel her 27 miles. In fact, Mr. Bixby plans an ocean voyage for her which will carry the vessel 22 miles from Los Angeles harbor to Catalina Island. He will direct her course while following in another boat.

In all cases, the guns are controlled by solenoids, mounted at the base. Each gun is made of tooled duralumin having a tensile strength equal to steel, and the turrets, whose tops are removable, are aluminum castings. Three thousand man hours of labor went into the building of the fleet which is valued at $10,000.

—30—

RADIO PHYSICS COURSE

by Alfred A. Ghirardi

(Continued from October issue)

Frequency of electromagnetic radiations: Frequency, referrred to alternating electric currents flowing in conductors, means the number of times the current or flow of electrons reverses in direction each second. Frequency as we apply it to radio, is simply the number of groups of these bundles of energy that are shot off into space from radio transmitting aerial every second. It follows that the so-called *wavelength* is simply the number of meters that one group or cloud of quanta has travelled before the next one is started on its way. The energy is actually propagated through space at the speed of 186,000 miles or 300,000,000 meters per second. For example, if one million groups are shot off every second, the frequency will be one million, and each group will have travelled 300,000,000 ÷ 1,000,000 or 300 meters before the next one is started. Therefore the *wavelength* is 300 meters. The greater carrying power of the shorter radio waves (high frequency) of 100 meters or less may be explained by considering that the higher the frequency the larger is the size of the individual particles of quanta radiated from the transmitting aerial.

Familiar radiations: Radio waves or rays, radiant heat rays, visible light rays, ultra-violet light rays, X-rays, gamma rays emitted by radium, and the cosmic rays received from interstellar space, are all produced by similar electromagnetic radiations. The difference between them is that they are produced by radiations of different frequencies.

The radiations having frequencies between 10 kc. and about 60,000 kc. constitute the so-called useful radio waves. This band is drawn to an enlarged scale at the top for conveniences and labeled the *Radio Spectrum*. The small band from 550 to 1500 kilocycles is used for commercial radio and broadcasting, the transmitters of our common radio stations sending out into space electromagnetic radiations having frequencies lying within this band. The large band of higher frequencies between 1500 kc. and about 60,000 kc. is commonly termed the *short wave* band and is allotted for use by television broadcasting stations, amateur stations, etc., as noted. Radio amateurs are constantly pushing down into the shorter waves (high frequencies) and much experimental work is now being done on frequencies as high as 300,000 kc. (1 meter wavelength). The short radio waves and radio heat waves discovered by E. H. Nichols and Dr. J. Tear comprise the range from about 3,000,000 cycles to 300,000,000 cycles per second.

Recently, radiations having frequencies between 10,000 and 14,000 kc. (30 to 21 meters wavelength) were found to create artificial fevers in human beings by raising the temperature of the blood stream. These may prove helpful in studying the causes and cures for various fevers and other diseases. Above these lie the heat and infrared rays, then come the visible light rays, arranged according to frequency as follows, (lowest frequency first) red, orange, yellow, green, blue, violet.

(To be continued)

Jones 8 Tube Superheterodyne

(*Continued from page* 17)

side of the three large coil shields shown in the rear view of the receiver. These coil shields have removable covers and are reasonably rigid though not as heavy as would be desired.

The r.f. stage is regenerative, controlled by the screen grid potentiometer and the cathode tap on the tuned grid circuit. A 6K7 should be used in locations near strong signal stations such as broadcast stations in order to prevent cross-talk into the short wave bands. In other locations a 6J7 sharp cut-off tube will provide a little better signal to noise ratio and higher gain. An 1853 or 1851 tube will provide even more r.f. gain but are not easily handled when controllable regeneration is desired.

The first detector-oscillator is a 6J8G hexode which is much more effective than any of the older combination mixer tubes. It is fairly similar to the 6K8. A tuned plate oscillator circuit provides better frequency stability and less detector reaction than the conventional oscillator tuned grid circuits. The 6J8G tube has an extra internal grid connected to the oscillator grid for injection similar to the 6L7 tube.

A high intermediate frequency was chosen in order to minimize image response in the high frequency amateur bands and to improve the sensitivity for 10 meter band reception. The usual 465 KC IF causes the oscillator to be tuned to more nearly the same frequency as the detector grid and space charge effects tend to decrease the signal to noise ratio in the 10 meter band region. This degenerative effect is reduced when the oscillator frequency is far enough away from the signal frequency so the ratio of frequencies is more like that obtained in the 80 meter band with a 465 KC IF. The 1600 or 1560 KC IF is very desirable for a receiver designed for 10 and 20 and even 40 meter band reception. The gain is less with a 1560 KC IF and so two stages are needed, though in this case each stage is overbiased enough to reduce the gain to a value about equal to a single 465 KC high gain IF stage. The additional tuned IF stages aid in selectivity.

The crystal filter circuit includes a 1560 KC crystal shunted by a variable 5 megohm resistor. This simple arrangement provides continuous selectivity from no crystal to full crystal selectivity without any appreciable detuning effect. It is quite easy to properly adjust the phasing condenser C_{11} for single signal reception even with a high frequency crystal. Condenser C_{11} was mounted near the crystal socket and is not adjustable from the front panel.

The second detector, audio amplifier and beat frequency oscillator are combined into one 6N7G tube which is a double triode similar to a 6A6. This portion of the circuit is quite similar to the one used in the "Super-Gainer" receivers. For phone reception the resistor R_{15} is set to a low enough value to practically short-circuit the external cathode coil which backs the second detector out of oscillation. This cathode coil is mounted underneath the chassis near the variable resistance R_{15} and the 6N7G socket. The resistor is controlled by a knob on the front panel and an extension shaft. The r.f. trimmer condenser C_4 is also controlled by an extension shaft and knob for precise adjustment with regeneration in the r.f. stage.

The second section of the 6N7G tube acts as an audio frequency amplifier with resistance coupling to the regenerative detector section. The noise limiter is a full wave diode type 84 tube in a push-pull circuit which limits both "positive" and

JONES 8 TUBE COMMUNICATION RECEIVER COIL DATA

COIL BAND in METERS	R. F.	DETECTOR	OSCILLATOR
	All coils 1½" diam. (except 10 osc.)		
10	4½ turns No. 20 DCC ¾" long Cond. tap at 4 turns Cath. tap at ¼ turn	4½ turns No. 20 DCC ¾" long Cond. tap at 4 turns	1⅘ turns No. 20 DCC ½" long—1⅛" diam. No cond. tap
	Ant.—2 turns No. 26	Primary—4 turns No. 34 DSC interwd.	Grid — 2⅘ turns No. 26 DCC interwd.
20	12 turns No. 22 DCC 1¼" long Cond. tap at 5 turns Cath. tap at ⅓ turn	12 turns No. 22 DCC 1¼" long Cond. tap at 5 turns	4⅓ turns No. 20 DCC 1" long Cond. tap at 2⅔ turns
	Ant.—3½t No. 26 DCC	Primary—8 turns No. 34 DSC interwound	Grid—5 turns No. 26 DCC ¼" long
40	24 turns No. 22 DCC 1½" long Cond. tap at 12 turns Cath. tap at ½ turn	24 turns No. 22 DCC 1½" long Cond. tap at 12 turns	10 turns No. 20 DCC 1⅛" long Cond. tap at 5 turns
	Ant.—5 turns No. 26 DCC closewound	Primary—12 turns No. 34 DSC interwound	Grid coil—7 turns No. 26 DSC interwound
80	40 turns No. 24 DCC 1¼" long No cond. tap Cathode tap at ¾ turn	40 turns No. 24 DCC 1¼" long No cond. tap	15½ turns No. 20 DCC ⅞" long. No cond. tap
	Ant. 8 turns No. 26 DCC closewound	Primary—20 turns No. 34 DSC interwound	Grid coil—10 turns No. 26 DCC closewound to plate coil
160	80 turns No. 26 E 1.4" long No cond. tap Cathode tap at ¾ turn	80 turns No. 26 E 1.4" long No cond. tap	24 turns No. 22 DCC 1" long No cond. tap
	Ant.—10 turns No. 26 E closewound	Primary—32 turns No. 34 DSC closewound below secondary	Grid coil—15 turns No. 26 DSS closewound below plate coil

"negative" peaks of noise. This type of noise limiter or suppressor is quite effective for reducing auto ignition noise. The center-tapped choke T_4 (the primary of a small push-pull output to speaker transformer) reverses the "negative" peaks to "positive" peaks for operation on the diode plates which only work on positive peaks.

The diode plates act as a partial short circuit across the audio amplifier during periods of noise pulses greater than the cathode bias on the 84 tube. This tends to punch a hole in the desired signal during periods of strong noise peaks but since noise peaks are of extremely short duration, this causes no apparent distortion.

The delay bias on the 84 cathode is obtained from a small 70 ohm cathode bias variable resistor connected in series with the normal 350 or 400 ohm cathode resistor in the 41 power amplifier tube. This delay voltage is adjustable in order to set the noise suppressor starting action at any desired level.

With no delay bias the noise reducing action takes place on all audio signals and distorts voice reception. A delay voltage of ½ to 5 volts eliminates this distortion and allows that amount of audio signal to pass through without distortion. Since noise voltage peaks are usually several times as great as the desired cw or phone audio signal, the noise limiter does its work and makes weak signal reception possible even in noisy locations. The audio transformer T_2 steps up the audio voltage from the 6N7G tube to swing the grid of a 41 pentode tube for loudspeaker reception. The plate supply to the audio section of the 6N6G tube is shunt fed through a resistor R_{18} in order to prevent any d.c. flowing through the center-tapped choke T_4.

The noise limiter circuit is connected so as to work for either headphone or loudspeaker operation. This type of limiter can be connected into nearly any existing radio receiver.

The receiver illustrated was built on a standard 12" x 17" x 2" chassis. The front panel was made of 10 gauge aluminum 8¾" x 19" with a satin finish. The parts layout is not at all critical and the set can be duplicated by arranging the parts on a chassis for layout marking details. Because of plug-in coils, the cabinet must have a hinged lid.

A test signal oscillator or generator is needed in aligning the IF and r.f. circuits. This line-up procedure is somewhat lengthy to describe and reference should be made to any edition of any radio handbook in case the experimenter is not already familiar with such procedure; or a local serviceman can be called to assist.

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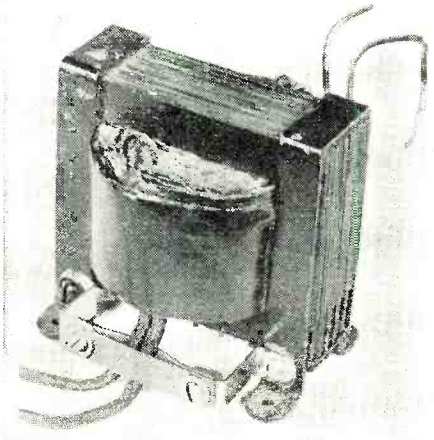
Protection Kink for Transformer Leads

The breaking off of a primary or secondary transformer lead at the coil winding has been a sad experience for most experimenters. If the leads are held between



two insulating strips and mounted by "Z" brackets on the transformer as shown, this condition can not occur.

Grand Island—Where Pink Slips Are Born

(*Continued from page* 12)

consulting calibration charts. Thus the operator knows that the signal has a frequency within a given ten kilocycles, for example, 14200 and 14210. Given the three dial readings on the frequency meter—the two multivibrator harmonics and the one for the signal—the operator, by a simple mathematical process, "interpolates" and determines the frequency. A long slide rule bolted to the desk makes the calculation easy.

This method of frequency measurement is accurate to one part in fifty thousand, more than enough for checking amateur stations and most other short wave stations. However, for even greater accuracy in the case of signals which fall on harmonics of ten kilocycles, as do stations in the broadcast band, a beat note is obtained between the signal and a harmonic of the multivibrator. Then, with an audio oscillator, the operator counts the frequency of the beat note and adds or subtracts this from that of the multivibrator harmonic, the frequency of which is known.

Frequency measurement by this method has an accuracy of one part in a million. If a civil engineer could lay out a highway with equal accuracy, the error in a road long enough to reach around the world at the equator would be less than half of a small city block.

Once the frequency of a station is determined, the signal which it broadcasts, particularly if a radiophone, undergoes an examination by the cathode ray oscillograph, the X-ray of radio. Most radio fans are familiar with the oscillograph, which changes a radio signal into a visible pattern which glows on the flat end surface or "screen" of the cathode ray tube. The modulation of amateur phone stations is checked by comparing the image on the oscillograph with a chart made up of photographs showing the type of image for each ten degrees of modulation. For example, if a signal produces an image which looks the most like that for ninety per cent modulation, the station is rated at that percentage.

If the station which has been monitored is guilty of off frequency transmissions or of some other violation, perhaps overmodulation, the radio inspector who does the monitoring fills out two "pink slips," one of them going to the violator and the other to the F.C.C. offices in Washington. The wording of these slips is enough to make anyone sit up and take notice. The sixth in a list of instructions for radio amateur reads, "The importance and necessity of operating your transmitter in strict compliance with the rules and regulations cannot be too strongly emphasized. You are directed, therefore, to state why the Commission should not take action to suspend your operator's license and revoke your station license."

The Grand Island monitoring station spends approximately ten per cent of its operating hours in checking amateur stations. This percentage does not hold true for individual days, however. As one of the radio inspectors described it to the writer, "The ham catches it when there isn't anything else to do." The inspector said this with considerable good humor, having once been an amateur himself and knowing something of the trials of ham radio. When there are special transmissions from broadcast band and commercial stations to be monitored, the amateur bands receive little attention. At the present time, more amateurs run afoul the regulations concerning the type of signals than are guilty of off frequency operation, the more common complaint a few years ago.

One question which radio amateurs frequently ask the "hams" who are on the air in Grand Island is, "You live so close to the monitoring station, do you ever have any trouble?" The answer is that the amateurs in the city have always been careful in using their equipment, frequently checking each other. To the writer's knowledge, there has been only one case of a member of the "G.I. gang" tangling with the regulations and that was under circumstances which made it something of a joke on both the monitoring station and the offending "ham."

The case in question would not happen now, since the routine of sending "pink slips" has been changed. At that time, four or five years ago, the monitoring station simply recorded the call letters of the station in error, not determining its location, and mailed a notice of the violation to the Washington offices, which issued the discrepancy report.

The amateur who was the victim of circumstances lived in the country, a little more than a mile from the monitoring station—in fact, the buildings can be seen from his home. He went on the air with a low power transmitter, monitoring it frequently to keep it in the band. Nevertheless, one day he opened the mail box to find it fairly stuffed with heavy brown envelopes postmarked "Washington."

The blanks showed that while the fundamental frequency of his transmitter was in the band, he had been picked up on *six* harmonics not falling in amateur bands and to make matters worse one of the harmonics, the third, was reported as being an illegal type A-2 transmission!

Of course, the matter was straightened out eventually—since the amateur transmitter was so close, reception at the monitoring station on a number of harmonics was unavoidable. But the amateur operator spent several days filling out affidavit after affidavit explaining why it really was not his fault at all!

So that's Grand Island. If any of the ham readers should ever get a "pink slip" they will have some idea of what means were used to check their frequency and discrepancies. Above all, however, the inspectors are more than fair in all their dealings with the radioists, and they have one thing—understanding of the problems involved.

—30—

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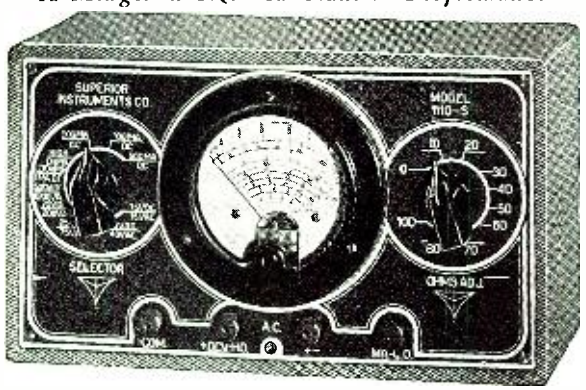

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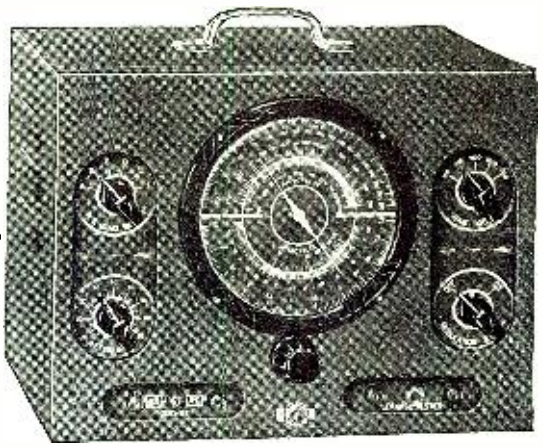

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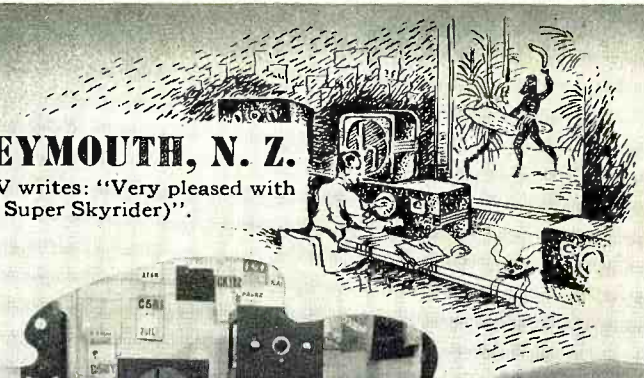
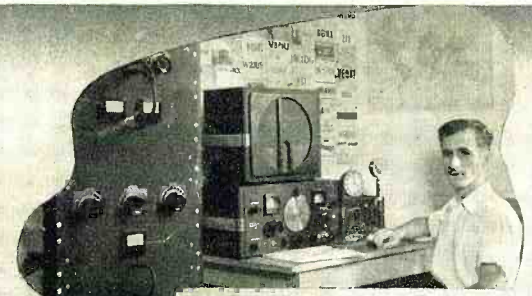


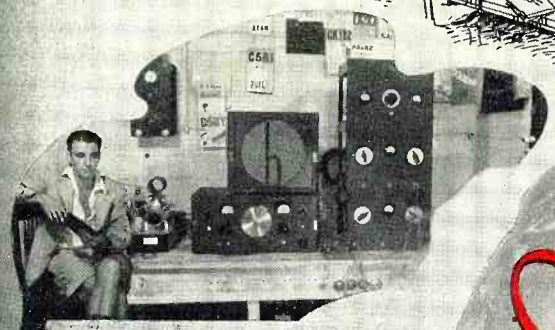
GREYMOUTH, N. Z.

ZL3BV writes: "Very pleased with set (A Super Skyrider)".



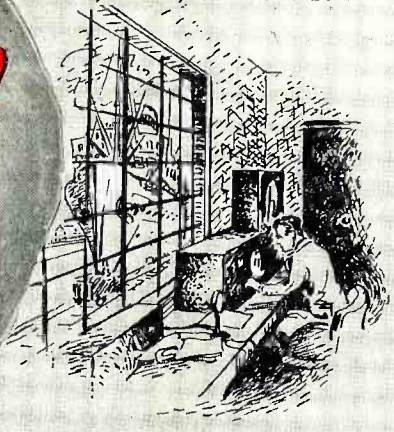
HAVANA, CUBA

CO2WM writes: "During the last DX Phone Contest, I worked 601 stations in about 60 hours, under all weather conditions, and had perfect results with my new SX17. I consider the SX17 a wonderful receiver, one of, if not *the* best"



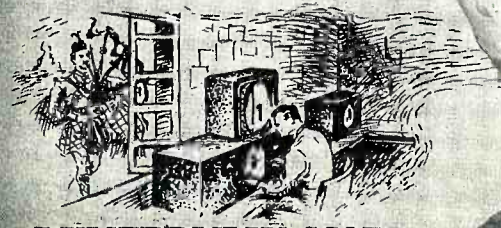
BULAWAYA, SOUTH AFRICA

ZE1JZ writes: "The set, (A Super Skyrider) has been a first class performer—the construction and workmanship have been admired by many people—ease of operation and stability with good tonal qualities have delighted me".



GATUN, Canal Zone

From U. S. Naval Station, NAX regarding the SKY CHAMPION —"Extremely good selectivity and sensitivity".



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