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RADIO NEWS



OCTOBER
1939
25c

IN THIS ISSUE

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and Features by **JOHN F. RIDER • SAMUEL MILBOURNE**

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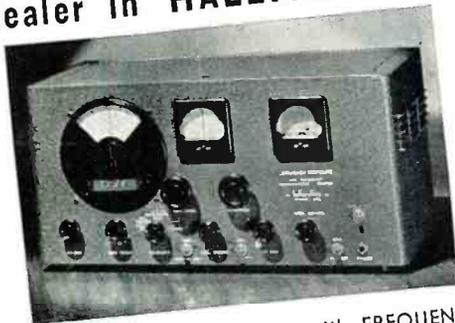
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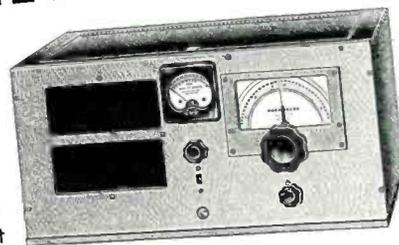
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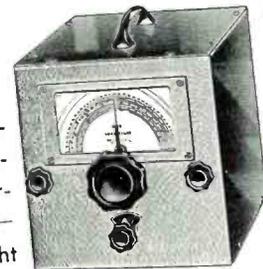
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Many make \$30 \$40 \$50 a week

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J. E. SMITH, President, Dept. 9KR, National Radio Institute Washington, D. C.

Why Many Radio Technicians Make \$30, \$40, \$50 a Week

Radio is already one of the country's large industries even though it is still young and growing. The arrival of Television, the use of Radio principles in industry, are but a few of many recent Radio developments. More than 28,000,000 homes have one or more Radios. There are more Radios than telephones. Every year millions of Radios get out of date and are replaced. Millions more need new tubes, repairs, etc. Over 5,000,000 auto Radios are in use and thousands more are being sold every day. In every branch Radio is offering more opportunities—opportunities for which I give you the required knowledge of Radio at home in your spare time. Yes, the few hundred \$30, \$40, \$50 a week jobs of 20 years ago have grown to thousands.

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The day you enroll, in addition to my regular Course, I start sending you Extra Money Job Sheets which start showing you how to do actual Radio repair jobs. Throughout your training I send plans and directions which have helped many make \$200 to \$500 a year in spare time while learning. I send special Radio equipment; show you how to conduct experiments, build circuits,



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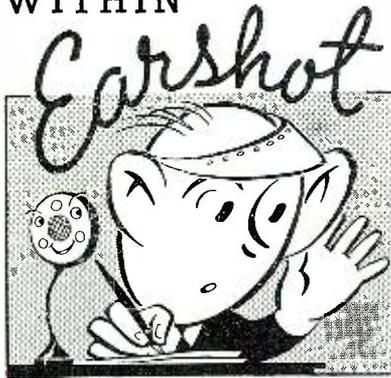
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WITHIN



OF THE EDITOR

WE are happy that so many of the "Editor's Guides" are coming back with the notation on the bottom that our readers really like RN. It is sometimes a great problem as to what will please them and what will not. Not all have the same tastes, and certainly not all are interested in the same phases of the game. We have striven hard to fill our columns with what will "go," and we will continue to keep our hands on the reader-pulse to stay in the "groove" with the type of material that you like to read. Thanks for the vote of confidence!

ONE of the saddest afflictions with which the professional field of radio is pitted is that of small remuneration for the effort and work involved. We know of engineers—their title reads, "Chief Engineer"—servicemen, operators, inventors, designers—in fact the entire rank and file who are being paid terribly low wages. The root of this evil lies fundamentally with the profession itself. The start is all wrong. Take the servicemen, for instance. Usually he commences as a youngster fiddling around radio sets. He becomes quite adept at fixing them. He repairs Mrs. Jones' and Mr. Smith's. The trouble was negligent, and therefore he asks no money in return. Mrs. Jones or Mr. Smith flip him a quarter for the effort, and to "make it all o.k." with the boy. Right there and then is born the feeling that (1) it was easy to make that money, and (2) you don't have to know much to make it, and (3) a quarter is a lot of money for a "favor."

Later when the same youngster goes into the business, he is still charging the same scale of rates that he was taught to expect as a boy, and then the awakening . . . he finds that he cannot make a living out of "favors." What a rude snap-back! He tries to charge a decent wage, but other youngsters in the field will fix sets for a quarter. His competition is terrific, and usually he goes to the wall. What is wrong with the picture?

He started wrong. What he thought was play, was in reality the bread and butter of some other man. He has

(More Earshot on page 63)

RADIO NEWS

Including Articles on POPULAR TELEVISION

The Magazine for the radio amateur
experimenter, serviceman & dealer

VOL. 22, NO. 4

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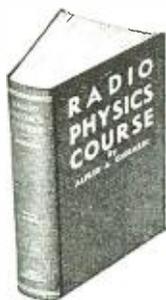
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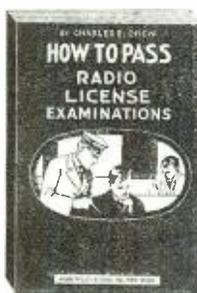
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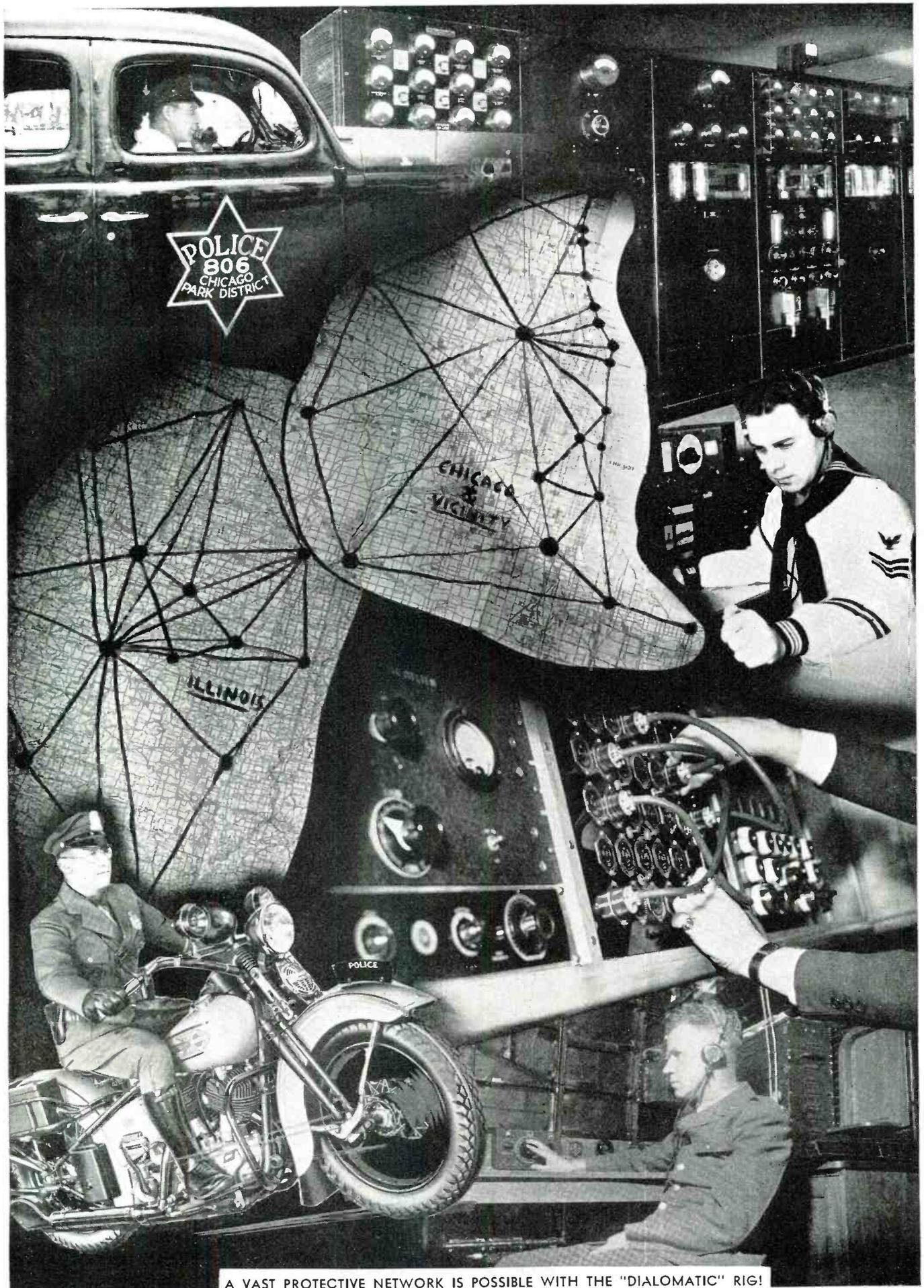
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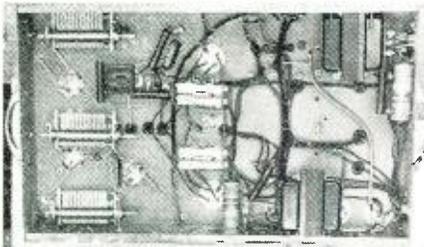
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A VAST PROTECTIVE NETWORK IS POSSIBLE WITH THE "DIALOMATIC" RIG!



Ruggedness in wiring and mounting units is the invariable watchword.

the main handicaps in the construction of multi-band transmitters.

We thought it best to mount the motor generator set directly onto the assembly. This permitted very short leads to be used and made the whole unit much more flexible. The unit chosen for this installation is an *Eicor*, Model 124, which supplies up to 600 volts d.c. at 200 milliamperes. This amp. is more than enough to operate not only the Hy61 but the remaining tubes used in the speech amplifier-modulator unit. Heavy duty vibrator packs might have been used, but whenever a Class B or AB modulator is used there is a constant change in current taking place which would have a deleterious effect on the regulation of the vibrator supply. The motor-generator, on the other hand, counteracts this variation as the instantaneous peaks are not long enough to slow down the speed of the motor, with the result that the current is practically steady and smooth.

Constructional Data

The chassis selected is a *Bud* amplifier foundation unit measuring 17" x 10" x 3" and is available with an all-over dust shield with louvres to permit proper ventilation. A baffle shield is placed as shown in the illustration and serves to isolate the input circuits from the plate circuits and will prevent self-oscillation. The three grid and plate assemblies are made up and wired as independent stages and a choice of the stage to be used is made by means of a rotary selector switch which mounts in the center of the group of plate coils. The 807 or Hy 61 tube shield mounts to one side of the switch assembly where the various interconnecting leads will be as short as possible and, in turn, add to the overall efficiency of the tuned circuits. Coil sockets are provided so that coils for any amateur band or police frequency may be plugged in at will and possibly changed at future dates to include other frequencies. The sockets are mounted above the chassis on *Amphenol* metal cups as shown and the five-prong *Amphenol* steatite sockets are wired before mounting within the cup. Each coil is tuned with a separate variable *Bud* condenser in a simplified pi-network so that each stage may be pre-tuned to the same antenna for rapid band-change.

Holes are drilled in the end of the chassis so that the condensers which are under-slung may be tuned by means of an insulated screw driver

from the outside of the assembly. It is important to use lock washers under all screws and to wire the plate circuits with heavy tinned copper wire as any movement of these leads would cause a slight detuning of the circuit and, in turn, upset the efficiency. The Hy 61 plate circuit is fed through a *Bud* RF choke that is mounted on a stand-off insulator from the baffle shield. The holes used to pass the condenser leads must be large enough so that a short will not occur. Two more variable condensers are mounted on top of the deck as shown, while a third is mounted directly on the baffle shield in a vertical position to conserve space.

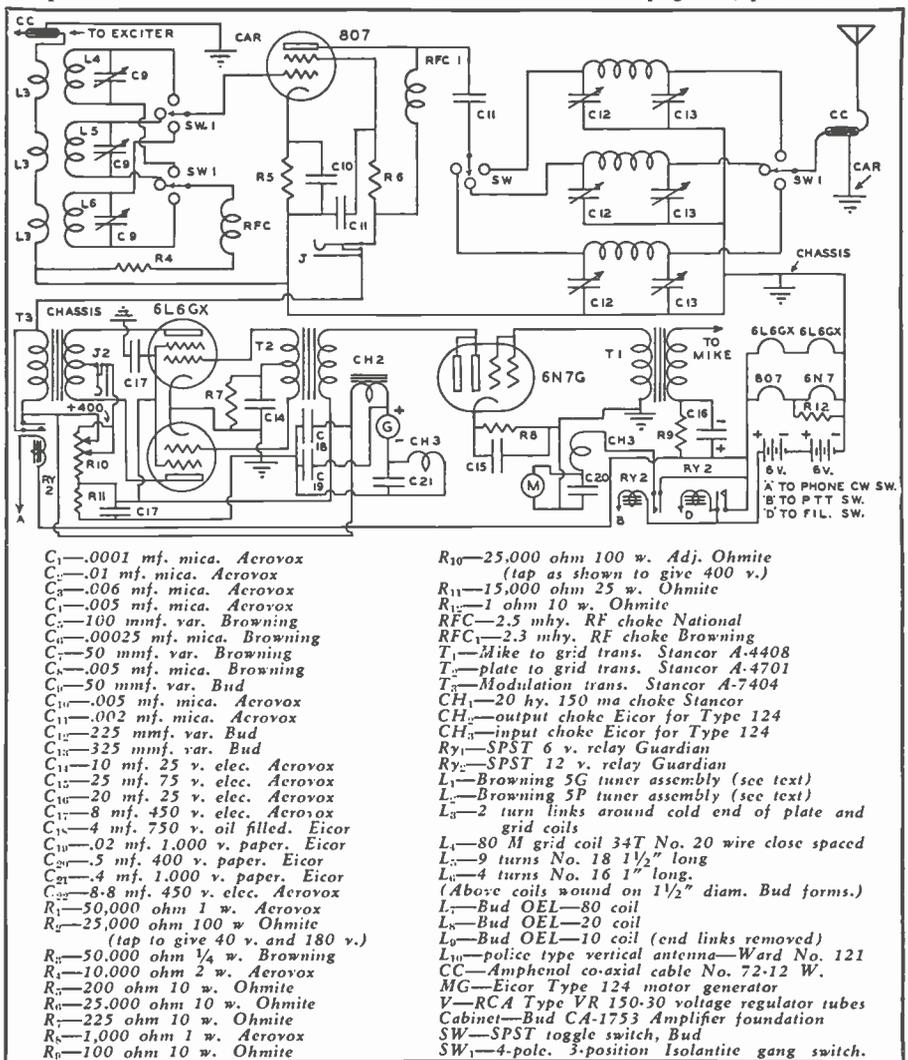
The "dialomatic" mechanism mounts directly in the center of the panel after allowing sufficient room for the motor generator. This versatile unit, which will be fully described next month, consists of the stepping, control and holding relays together with the necessary switch lug assemblies. The three grid coils are shown mounted in their respective four-prong *Amphenol* sockets. A midge tuning condenser is mounted within each coil form and each circuit is pre-tuned and left permanently in place. The 10 meter grid coil is the one which is shown mounted in a horizontal position with the socket mounted

directly on the baffle shield. This affords very short leads which pass through the shield and down to the proper lugs on the selector switch.

An extra *Guardian* relay has been added to the assembly and may be mounted next to the 80 meter grid coil. This relay is used to short out the secondary of the modulation transformer as indicated on the schematic when operation is on c. w.

The *Eicor* motor generator mounts on rubber grommets to prevent vibration to the tube elements. Care must be taken in passing the leads through the chassis so that they will not be cut by the rough metal edge of the holes. Reference to the bottom view of the amplifier unit shows the placement of the various components in the most satisfactory positions. Directly under the 6L6 tube sockets is mounted the input transformer to the modulator, while the microphone transformer mounts on the other side directly opposite. A high voltage filter condenser mounts on one end of the chassis as shown, and the connecting leads to this condenser must be amply insulated to withstand high peaks which would be present if the load were allowed to be removed accidentally.

The two eight-prong *Amphenol* cable sockets are securely mounted on ("Diu" to page 50, please)



A S . . . S E E T!

by **JOHN F. RIDER**

Dean of the Servicemen

Servicing is a business—it should be treated as such. Business cannot be founded on “free” work and succeed.

(The opinions expressed herein are solely those of the author, and do not necessarily represent those of the Publisher nor Editors of RADIO NEWS.)

It Can Be Done

NUMBER of newspapers recently published advertisements signed by H. F. Sinclair concerning *Sinclair Gas*. The price was to be “upped” a certain amount per gallon. The reason was that the company felt that it was entitled to earn a profit and that the American public approved sensible business operations. Furthermore a profit must be made if a company is to exist and serve the public.

We then hear about Hibbing, Minn., Pop. 15,666. Trading area population about 100,000. A man arrives there in 1932. He is going into the radio servicing business. Has no funds. About ten servicemen are already in town. Service charge levels are very low—entirely unprofitable. Our man feels that he can deliver the goods and consequently should get paid for what he does. He barter for the first month's rent—paints a gas station. Punches door bells to get customers. . . . His charge is \$1.50 per call and time is charged at \$2.00 per hour. . . . For a while times are tough. . . . Many turn him down but remember him.

Seven years pass. The service shop now is a store and service charges during 1938 were \$12,000.00.

This is not intended as a success story. . . . What we wish to get across can best be done by quoting this individual, “If a customer has \$5.00 to spend, I want to get my share for *labor*, not tubes and parts.”

Naturally, every dollar income from tubes and parts is important, but what so many servicemen fail to recognize, is that the volume of tube business is never enough to support a service organization. The same applies to the sale of the parts used in completing a service job. . . . The labor represents the maximum share of the service charge. It represents the maximum effort—the maximum amount of time spent—either in pickup, delivery, diagnosis or repair or in all of these operations.

This man in Hibbing had the courage of his convictions. . . . No doubt he can sell, which, of course, is important. No doubt other and less expensive service shops still exist in Hibbing, but from what we gather our man sees to it that he gets not only

his share of the business, which may be the lion's share—he gets his price.

We recognize that economics plays a paramount role in such operations, but one thing is still true; you must get paid for what you deliver, or you don't stay in business. If something is worth a dollar, you can get two—for a while—but not forever. On the other hand, if something is worth \$2.00, you can sell it for \$1.00, but not for long—you will not remain in business very long. . . .

The servicing industry does not have the funds to permit it to operate at a loss—even if it wanted to do so. The nature of the business is such as to forbid such tactics. What you lose today on one job is seldom, if ever, made up on another job for the same customer. . . . What is lost is a permanent loss. . . . There never is enough repeat business in radio servicing to permit operations along the lines employed by various merchandising outfits who might take a loss on one item and make it up on another.

Charity Begins At Home

WE have received a grand letter from an English correspondent who at the moment of writing is on the high seas somewhere in the world. At the time he wrote his letter he was located in Baltimore. Although he is now acting as a radio operator on an English boat, he had spent a number of years as a radio serviceman in Great Britain. His comments are interesting and his philosophy very sound.

To start with, what seem to be problems of the radio servicing fraternity here are apparently not native to the States. They also exist in foreign lands and are of the same character. While it is true that the essence of Mr. Aldersley's letter covers the guarantee problem, certain references to principles of operation seem to us to be of major import. We hope that he will forgive our dismissal of his comments concerning guarantees. We feel that another part of his letter means much more to the welfare of the American servicemen.

Our correspondent's letter closes with what is equivalent to his code of ethics, namely,



John F. Rider

*Serve Yourself—FIRST
Serve The Public—SECOND
But Serve Both Equally Well*

It might appear as if these words express a very selfish viewpoint, yet is that really so? We think the man is right. Maybe our approval will go against the grain of some of the idealists—of some of the men who feel that radio servicing is an ideal. . . . that people must do that best for the glory that follows. . . .

Our friend from the land of Robin Hood speaks sense. . . . We can be true to those we serve—be very honest—very sincere—but why at a financial loss? If we don't serve ourselves first, we will be incapable of serving others. . . . We will not be there to serve the others.

The cowboy who feeds his horse first does so because the animal is vital to his very existence. . . . Of course, there is love between the man and the beast—but without the horse, the rider might not exist. Hence that which is done for the horse is being done for the rider as well.

The American serviceman has been serving the public first. . . . In fact that American radio serviceman has been paying for the entertainment of the radio public. He has been serving the public but not himself. . . . The public has had its receivers repaired—but the serviceman has not in general, acquired its rightful income.

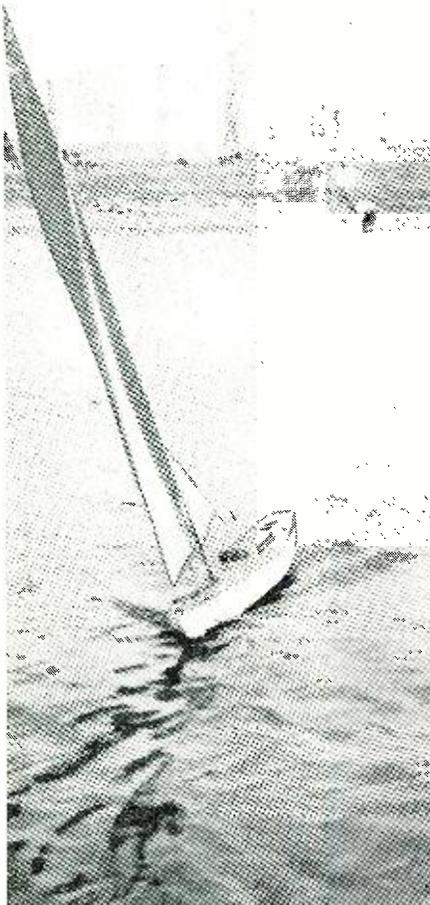
There is no glory in radio service work. . . . It is a business and must be treated as such. . . . Since it is a business it must make money. When it does, then the owner is serving himself first. . . . As far as glory is concerned, we can't forget the well known quotation by Gray, “The paths of glory lead but to the grave.”

Is a serviceman dishonest who says that he comes first and then his public? Maybe the word “dishonest” is not the correct one, but it has been used. Some have used the word “gyp” to describe this type of serviceman. Our viewpoint is the contrary and coincides with that of Mr. Aldersley. As long as the serviceman serves his public well, honestly and fairly, he

(Continued on page 49)

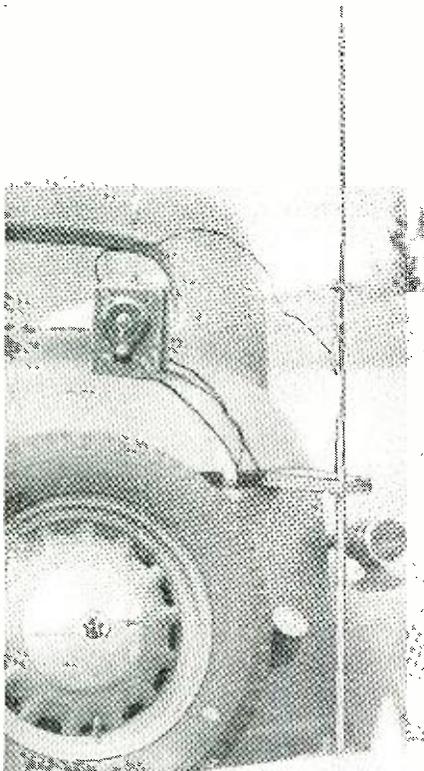
Radio Control

Ever wish that you could adjust your model sail-boat during a race so that you could overcome your opponent's lead. It's very easy to do with a radio-controlled yacht.



Close-hauled and meeting the wind; controlled by radio from the land.

The control unit is mounted in the car and takes up very little space.



THE idea of being able to control a racing yacht from the shore is quite intriguing. The wind vane used on most boats is not absolutely accurate and it cannot be set to compensate for unexpected winds that spring up just when the race is almost won. With these problems in mind we set to work on a radio control that would eliminate both these hazards, and in addition would give the operator power to maneuver his boat for the best winds, and to prevent collisions that often put a boat out of commission. Radio control has been used by the Navy for some time on battleships. The equipment is very bulky and utilizes complicated circuits and parts. *Simplicity* is the keynote and watchword for the model yachtsman.

Our yacht is a fifty-inch standard racing model that proved itself time and time again before the radio installation. It is absolutely necessary that you know how the boat operates or radio control will be almost useless. The deck and all of the wind vane assembly were removed. Most of the cross braces were removed so that there would be sufficient room for the radio.

The First Radio System

We tried several radio systems before the present setup was perfected. The first receiver was a two-tube TRF-DET on six-hundred meters feeding into a sensitive relay. This relay operated a dial telephone type impulse relay. This impulse relay has a lever arm operating on a ratchet. For each impulse received the arm moves up one position and makes a new circuit. After a fixed number of circuits have been made the arm disengages and starts the operations over again. With this type of relay several different circuits can be operated from one control source. For instance, a motor could be connected to swing the boom on the main sail, and another motor could haul up the sheets. Both these motors could operate from the single receiver source without mutual interference.

The impulse relay was connected to an *Erector* motor that was geared to turn the rudder. One pulse started the rudder left, the next pulse stopped it. The next pulse started the rudder

right, and the next pulse stopped it.

For transmitting we used a 42 oscillator and a six-foot loop. Due to insufficient range of the transmitter and too much weight of the impulse relay, this system was soon discarded.

The Second Radio System

The second set-up made use of a three-tube superhet receiver on eighty meters. Midget parts were used throughout and several pounds weight was eliminated. The impulse relay was replaced by a reversing current switch from a *Lionel* train. This switch is small and performs the same task. It requires one-half ampere at six volts for correct operation. Two "B" batteries were used on the receiver, and four number four dry cells operated the motor and reversing switch. A *Sigma* model 2A sensitive relay operated from the plate current change in the receiver. The whole system weighed four pounds, so about three pounds of lead were removed from the keel of the boat to compensate somewhat for this.

The transmitter was a 42 oscillator with a *Mallory Vibropack* supplying 300 volts of "B" power. A twenty-five-foot vertical antenna gave plenty of range to the transmitter. In fact, the receiver was so sensitive that amateur phone signals from distant stations would operate the boat! Hi!

The boat was entered in a 4,000 meter race and was third at the 2,000 meter mark. For some unknown reason a little water leaked in and put the radio out of commission. This necessitated the boat's removal from the race. As this radio system was also a bit bulky we decided to begin anew.

The Present Radio System

Casting about for a system of less weight we found the RK62 tube¹ and the *Hull* escapement movement.² The RK 62 is a gas-filled triode that gives a nice plate current change when used as a super regenerative detector on five meters. Due to our previous experience with a leaky boat we decided to put the receiver, batteries, relay,

¹ Described in *A Radio Controlled Model Airplane*, by R. A. Isberg. RADIO NEWS, February, 1939.

² *Radio Control of Model Aircraft*, by Hull and Bourne, QST, October, 1937.

Model Sailboat

by **GEORGE McGINNIS, W6PCI**
& COLIN CAMPBELL, W6FID

Compton, California.

etc. in a waterproof container. An empty coffee can proved to be just what we needed. The receiver was built in the lid and all other parts were bolted to the bottom.

The receiver is the most critical part of the present setup. A single forty-five volt battery is used for the plate supply. A flashlight cell lights the filament. The 15,000-ohm variable resistor in the plate circuit is adjusted so that the plate current is 1.3 ma. The antenna coupling condenser should be set almost open. With a signal from the transmitter the receiver plate current will drop to .1 or .2 ma. Each receiver adjustment is dependent upon the other, so each must be adjusted carefully or incorrect operation will result. The antenna must be at least three feet long. We tie all the mast guys together, insulate them about six inches up from the deck, and this is very satisfactory. It is best to tune the receiver near the center of the transmitter dial, and any subsequent adjustments can be compensated at the transmitter. After the receiver was operating we sealed it in the metal can.

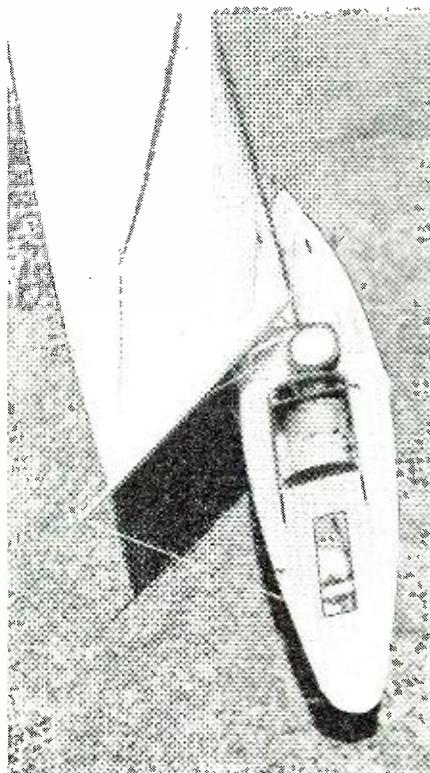
The transmitter is a conventional 42 in a tuned plate tuned grid arrangement. The base was removed from the tube for better efficiency at 56 mc. A 200-volt vibrator supply is used for plate power. The antenna is an eight-foot rod mounted on the car bumper. In actual practice the car is driven along at the water front so that the boat will not get out of sight. The transmitter supplies sufficient power

to control the boat as far as it can be seen.

The transmitting key is an important item. It is absolutely necessary to know where the rudder is at all times. A flat board with four contacts arranged in a circle, with an arm moving around them in sequence gives this desired coordination.

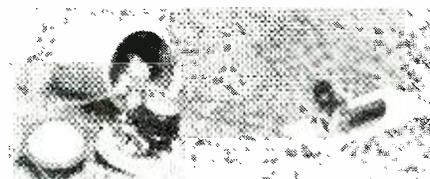
The escapement looks complicated but it can be built up with little effort. The solenoid is wound with number twenty-two wire and the coil has a resistance of twenty ohms. Very long life can be expected from the single flashlight cell from which it operates. The disc is two inches in diameter. Eight holes were drilled an equal distance around the outside and small brass nails were soldered in. Each alternate one is run from an opposite direction, or side of the disc. The nails were then filed down so they were one-eighth inch long. These nails act as stops as the solenoid is opened and closed. The thrust bearing is made from light brass and a bicycle spoke serves as drive shaft on the disc. All other parts are made of brass or copper and are painted with clear lacquer to prevent tarnishing. The escapement is coupled to the rudder with a piece of piano wire. Approximately fifty degrees of rudder motion can be obtained. This is not quite enough unless the rudder is enlarged to about twice the size of the ordinary type. After this change was made the boat turned without the least difficulty.

After all the parts were placed in the boat the deck was secured with

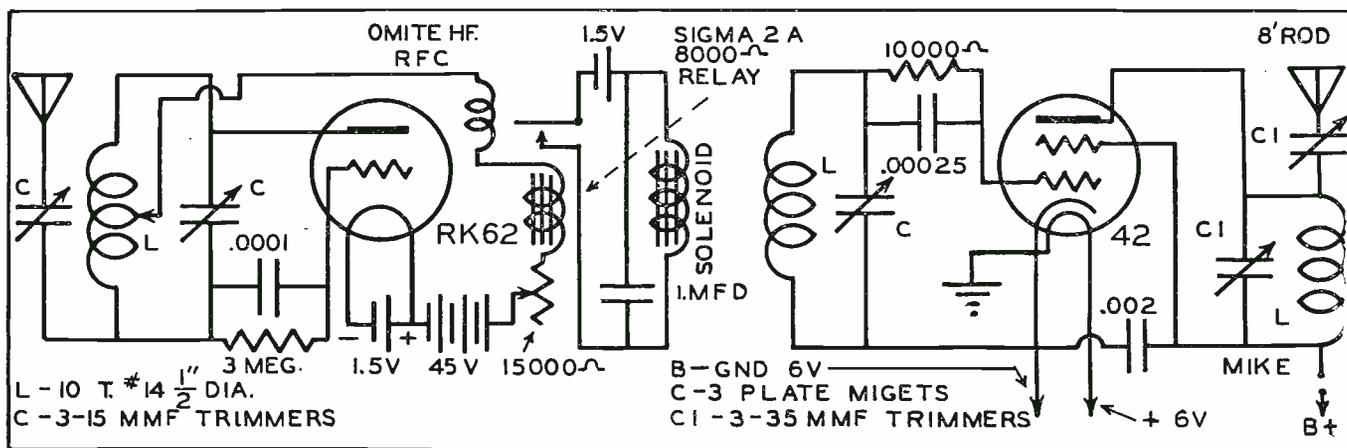


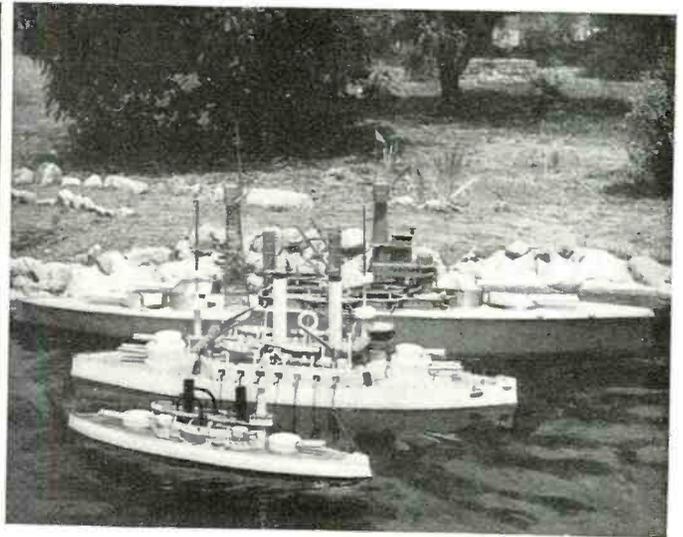
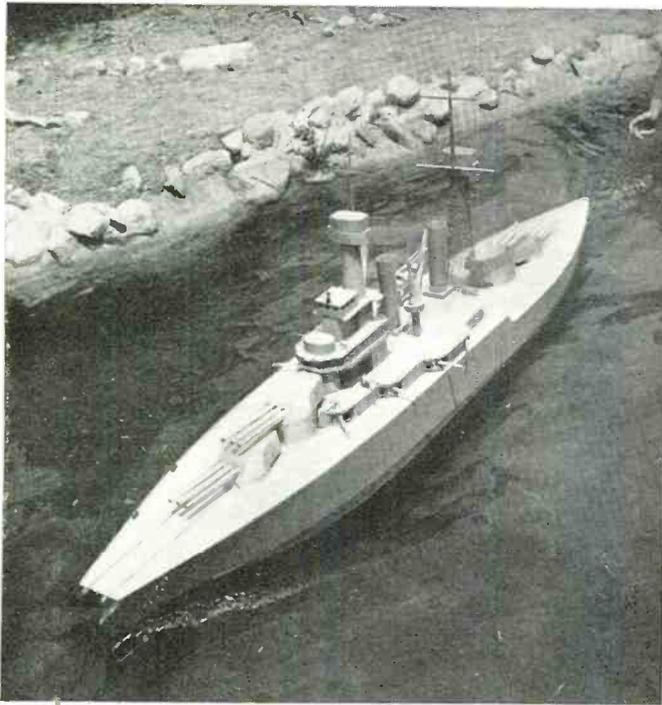
The tiny cockpit holds the entire controlling mechanism of the boat. ↑

The works. Placed in a tin to keep it watertight, the unit weighs 1 lb. ↓



small brass wood screws. Two hatches were cut in the deck so that the parts could be serviced with ease. The boat is always started with neutral rudder, and the proper position is selected after the boat has gone a short distance from shore. It is necessary to go through a fixed set of rudder motions. Neutral, left, neutral, right, etc. These motions can be completed in a





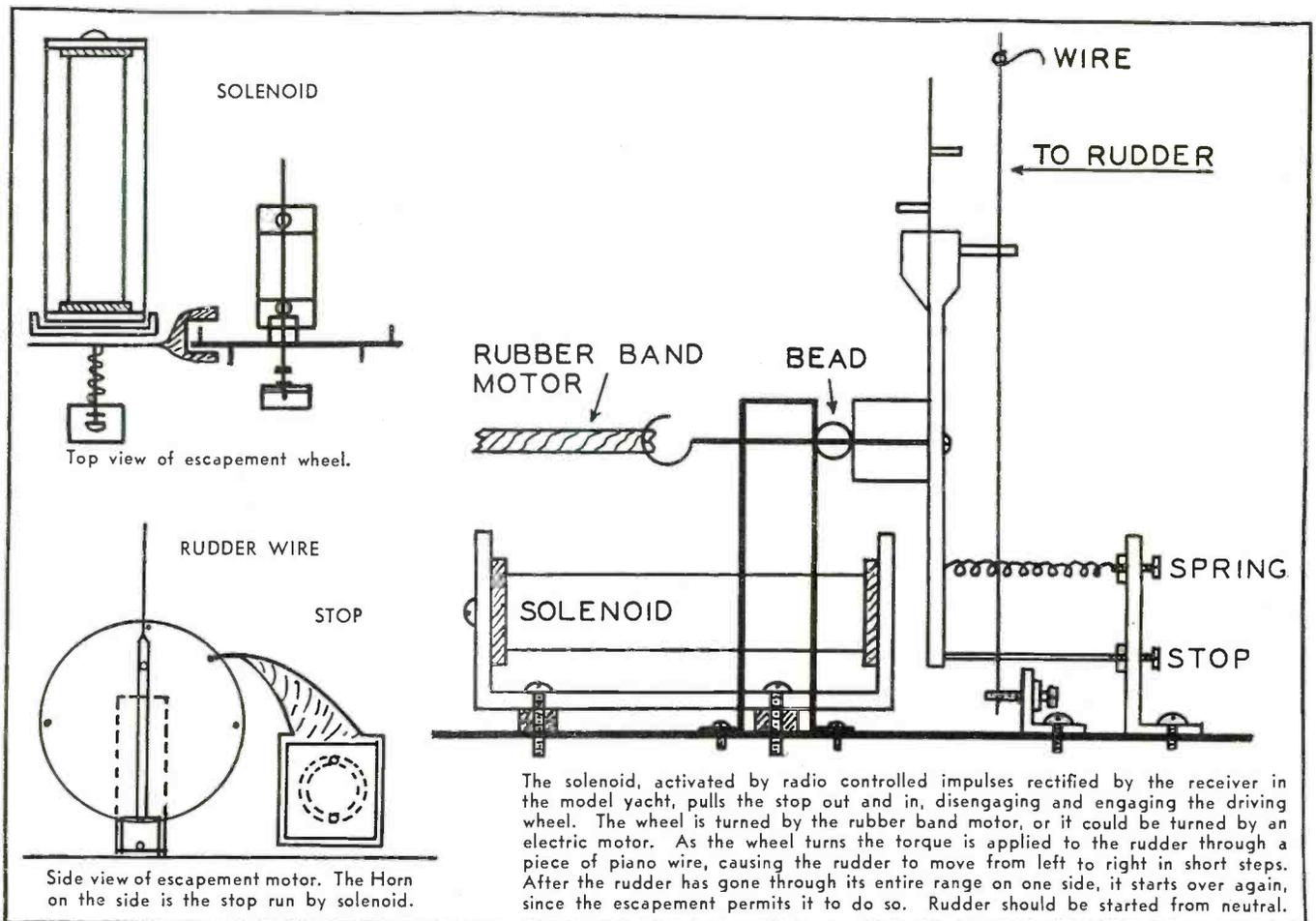
Another example of radio-controlled models are those built by Mr. Howard E. Bixby, of Glendale, Cal. These models are run by twin electrical motors from batteries in the boats. Impulses to maneuver this fleet are furnished both by sound and by radio waves broken up by a telephone dial on the shore. Mr. Bixby's system has much in common with that of the author.

few seconds so that the boat has little time to get off course before the desired rudder position is reached. Since the present radio system only weighs a pound the boat has plenty of speed.

If, after reading this article you want to change your boat over to radio control, there is one thing that must

not be overlooked. *It is absolutely necessary to have a license to operate a transmitter.* The Federal Communications Commission imposed heavy fines on violators. Boat building and amateur radio are rather diverse hobbies, and it is better to excel in *only one* of them. If you have no license

hook up with an amateur and let him work on the transmitting end. If you are a ham you can hook up with a model boat builder as there is much more to it than merely pressing the key.



32 v. Power Supply for the Rural Man

by ALVIN L. CAMPBELL, VE4APZ
Alberta, Canada.

A neat and inexpensive solution to the usual problem of how to get high power for radio sets from the farm's 32v. supply.

POWER supply for the rural ham's rig is always quite a problem where 110-volt a.c. power is not available. The outfit shown on the diagram is being used at the present time to operate the author's rig which consists of a 38 TriTet Oscillator with Xtal or Electron Coupling control optional; a 41 buffer and a 25L6G final. The power supply will deliver about 400 volts at upwards of 80 mils and is sufficient to give from 25 to 30 watts input to the final tank of the above rig. Drain is about 3 to 4 amps from 32-volt line.

The transformers were *Philco* units with rectifier tube sockets already mounted. Secondary wound for 250 volts each side of center tap. The primary was removed and rewound with 180 turns of No. 24 Enamel wire (4.5 turns per volt.) In reassembling the transformers after rewinding, the small laminations were discarded and the large "E"-shaped pieces put thru the core all in the same direction. The open ends of the two cores were then placed together and the whole thing clamped securely together, making one large transformer out of the two.

The Vibrator is a standard *Mallory 501P* unit which is fairly inexpensive. It is altered in the following manner to make it work on 32 volts: The wire from the driver coil originally connects to No. 2 prong. It is removed from this and run down and connected to

the No. 4 prong, thus making it possible to connect the 250-ohm resistor, R1, in series with it to reduce the current in the coil. Condenser C4 is absolutely necessary to soak up the rather large spark which occurs when the vibrator is turned on and the reed first makes contact with the contacts connected to No. 2 prong. With the exception of the buffer condensers, C5, the remaining condensers were used for suppressing hash. The placement of these might vary and can only be found by experiment. The R.F. Chokes are also used for hash suppression.

Type 76 tubes were used for rectifiers in the original model but it is the intention of the author to change these to 1-V's for better efficiency. The latter are therefore shown in the diagram. A choke input filter is used to improve regulation, with the input choke being of the swinging type. Wet electrolytics are used throughout the filter because of their self-healing properties.

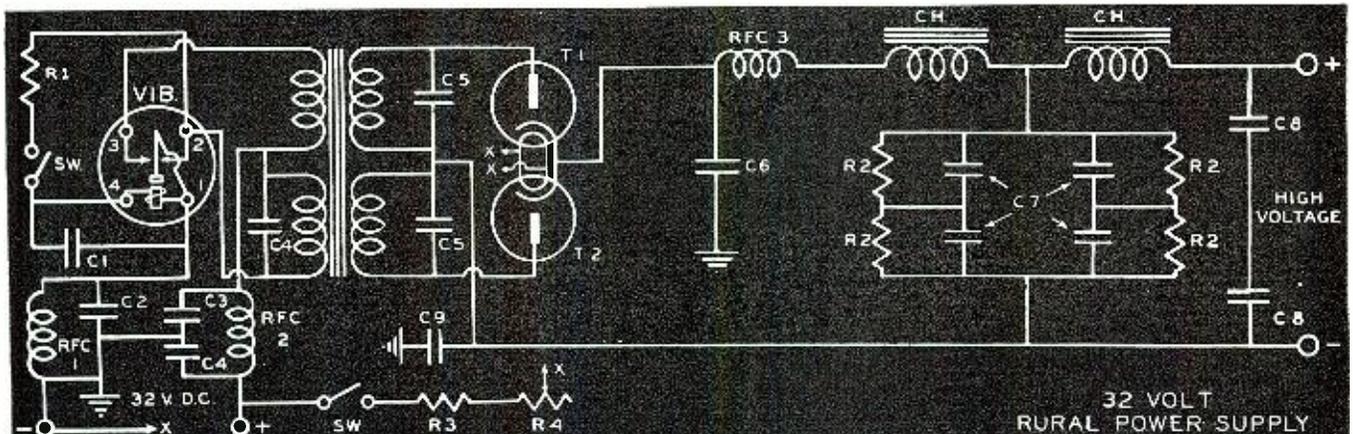
The regulation of this outfit is about average for a unit of this type. With no load the voltage is approximately 600 volts and this drops to 400 volts with the following load on: 70 mils at 400 volts in the final amplifier; 20 mils at 300 volts in the buffer and 15 mils at 250 volts in the oscillator. With this load, the primary current runs at about 4 amps. Thus, the efficiency is nothing to brag about.

A brief word about the rig might be

of interest also. Heaters of all tubes are run off the 32-volt line through suitable dropping resistors and rheostats, a voltmeter and selector switch being used to adjust each one to the proper voltage. Switches are all in a panel at the bottom of the rig along with the meters. Connections to the power supply are made by means of two 5-wire cables, with sockets. The rig is built in rack-and-panel style with the power connection to each unit being thru a 5-wire cable from the switching unit at the bottom.

The power supply described can easily be built up by the rural serviceman and used by his customers for the receivers . . . at a profit to the radio serviceman. To make it really pay, two or three such sets can be built at once and either sold or rented. -30-

- Vib.—Mallory 501P Standard 4-prong 6-volt vibrator. (See text.)
 T₁, T₂—Type 1-V Rectifier Tubes, Half-waves. Transformer—See text.
 C₁—.01 Mfd. Tubular 400 volt.
 C₂—.02 Mfd. Tubular 400 volt.
 C₃—1.0 Mfd. Tubular 400 volt.
 C₄—.5 Mfd. Tubular 400 volt.
 C₅—.1 Mfd. Tubular 1000 volt.
 C₆—.25 Mfd. Tubular 400 volt.
 C₇—6 Mfd. Wet Electrolic, 450 volt.
 C₈—8 Mfd. Wet Electrolic, 450 volt.
 C₉—.05 Mfd. Tubular, 500 volt.
 R₁—250 ohms 2-watt.
 R₂—100,000 ohms 1-watt.
 R₃—40 ohms 1-watt.
 R₄—30 ohm 30-watt Rheostat.
 RFC₁ & ₂—100 T. No. 17. Wound on three sections on 1/2".
 RFC₃—2.5 MH 125 Milliampere Isolantite.
 CH—15 Henry 100 Milliamp Filter chokes.
 SW—SPST Toggle Switches.



Ring the Bell

PROFITS

The first of a series of business aids for the serviceman.

by SAMUEL C. MILBOURNE
Expert Serviceman, Greenwood, Miss.

IF YOU are in the radio service business, you are probably not making as much money as you would like to. Few servicemen do. Why?

In general, radio servicemen are poor businessmen, doing little advertising and running their shops with a complete lack of any coherent plan for increasing service and sales.

I don't say this because I like to—but it is the truth, learned from thousands of contacts with servicemen all over the country. Having been over the bumps myself in the big, bad days around the turn of the decade—B.P.P.—(Before Planned Prosperity) I know what it means to keep body and soul

town, type of customer and even type of serviceman trying it out.

Well, if Service sales building has no "Ohm's Law" to guide you to the mathematically correct answer each time, what can you do to get a few extra *Kopecs for Kiddies' Klothes* each Saturday night? You can follow general business procedure which, while ever changing in *styles and methods*, is always fundamentally the same.

Let's start by studying a few ways

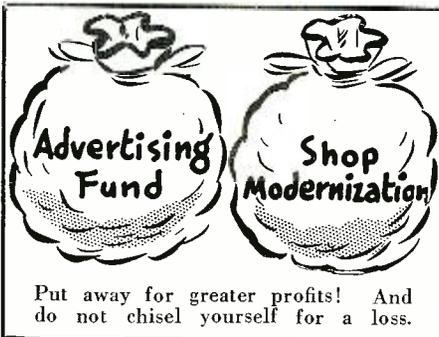
yourself either successfully or unsuccessfully. Every time someone sees your sign in the window as he passes your shop, you give him a definite impression of your store and yourself.

You don't advertise? Of course you do!

However, the important thing is to advertise *effectively* and at the *least cost* for the *greatest returns*.

Many servicemen have told me, "I can't afford to advertise because I don't make enough as it is." Or, "Just as soon as I make enough money I'm going to put on a honey of an advertising campaign."

What they fail to see is the first



together and still find time for business-building ideas.

Let's not blame ourselves too much for not developing our talents along the *sales* line as much as the *technical* line, for there has been such stress placed upon how to *repair* radios that comparatively little has been done to help the serviceman *make a profit* through increased service sales and better business practices.

Now, let's assume that we really want to make more money and we are willing to study fundamental, sound business practices to do so. Can it be done over-night? Not by a damsite! No more than you can explain to the sweet young thing who lives next door "just how radio works in ten easy words."

It's ramifications are as great as is the technical side of radio and as ever changing. A sales building idea which is the cream in one serviceman's coffee may be just sour milk to another due to a difference in location, size of



You MUST advertise in one form or another to get more, new business.

to get more business by simple forms of advertising. In subsequent issues we will take up other sales aids, better business methods, store window work and other helps toward making a better living in servicing.

Every bit of business you ever received was obtained by advertising in one form or another.

What? You say you don't advertise? You don't believe in it? You do believe in it, but you can't afford it?

Nonsense! Every time you fix a radio you advertise your services either satisfactorily or unsatisfactorily. Every time you meet a customer or a prospective customer you advertise



basic rule we want to stress here—"YOU MUST ADVERTISE IN ONE FORM OR ANOTHER TO GET MORE BUSINESS!" Now, once more, this doesn't mean too much or too little advertising. It doesn't mean just any old advertising. It means EFFECTIVE advertising—that which brings you sufficient business to warrant its cost.

How much should you spend for advertising? That depends upon the size of your present business, your location and the length of time you have been in business.

The best way to apportion advertising in a small shop is to set aside a certain percentage of each day's total sales. This amount in other lines varies from less than 2% to over 10% depending upon many factors. Try 5% in your business as a starter. That's not a lot and it is surprising how much good you can do with this amount.

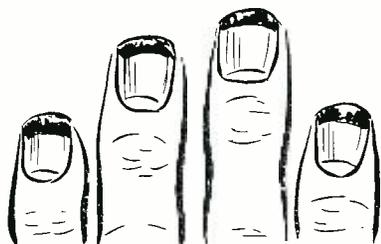
One other point. If you decide on a

certain percentage—DON'T CHISEL ON YOURSELF! Put at least that much aside and use it as effectively as you can. Consider it a legitimate business expense the same as tubes, condensers and resistors.

The first place to start *effective* advertising is to look in a full-length mirror. What do you see? Are you proud of the reflected image or shall we draw the curtain swiftly and silently over the result? Now, I don't mean that you should be a *Clark Gable* or a *Johnny Weismuller*. Nor do I have any desire to make of you a fashion plate or a *Beau Brummell*.

Servicing radios is a *man's* job. Sometimes it is a *dirty* one. All manual labor originates from the *soil*, but it is *not* effective advertising to carry so much of it around on your clothes and under your finger nails. After all, you're not advertising *soil conservation*, it's *radio service sales* you are interested in.

Please do not be offended if I happen to hit home with too hard a wallop. Like the perspiring papa who said, "This hurts me more than it does you," as he dusted off the back side of his son's breeches, I must confess (confidentially) that I hate to shave or get a hair-cut as much as anyone. However, its just one of those things that *must be done* if we want to advertise



It's not soil conservation! It is *Radio Service* that you are selling!

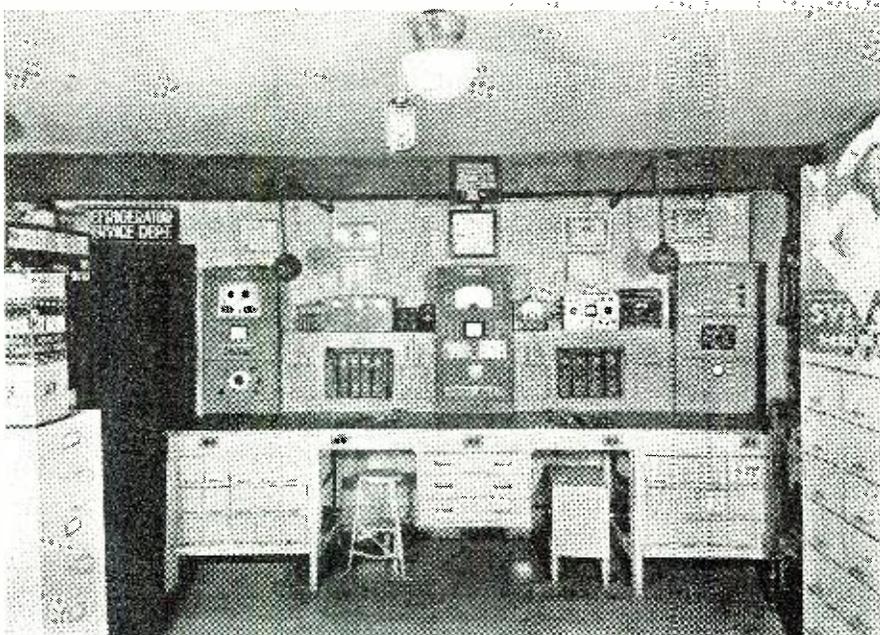
ourselves effectively to those with whom we have business or social contact.

Of course, a skunk does about the most effective advertising job in the world—but who wants to be one?

Spruce up! I'm not going to worry you or the subject further in this issue. Sufficient it is to say that in every line of work, cleanliness, a pleasant appearance and a "brushed up" look pay honest-to-goodness profits. No foolin'!

Next, I want you to walk out of your shop or store, cross the street, get a *Coca-Cola* or some other refreshing drink, and then step out on the street as if you were a prospective customer for a radio repair job. Stand *across the street* and look at your shop. What do you see? A dingy, paint-chipped exterior? Are the sidewalk and gutter clean? How about your sign? Is it big enough? Does it need repainting? Is it illuminated at night?

Let's cross the street. Are the windows clean or do they look like the bleary, fly-specked glasses of an old dingy dump? And those window spaces! When were they trimmed last?



A beautiful service bench is this one of the *Fox Radio Service*, of Richmond, Indiana. This type of installation instills confidence.

Don't you think that *last year's* circus banner can come down? And, while you're at it, how about that other sign advertising last month's high school play together with all those empty tube cartons that are so dirty they are beginning to sprout their own crop of grids?

Don't forget the dead flies. Customers won't. Somehow they don't look quite as fresh as they did last month. Ah yes, and those two second-hand radios you've been trying to sell—how about moving them out of the way so that you can at least *see* that service bench?

Oh, oh! My error. Move the radios back *quickly!* That bench, where is it? It was at one time where that pile of junk parts is now.

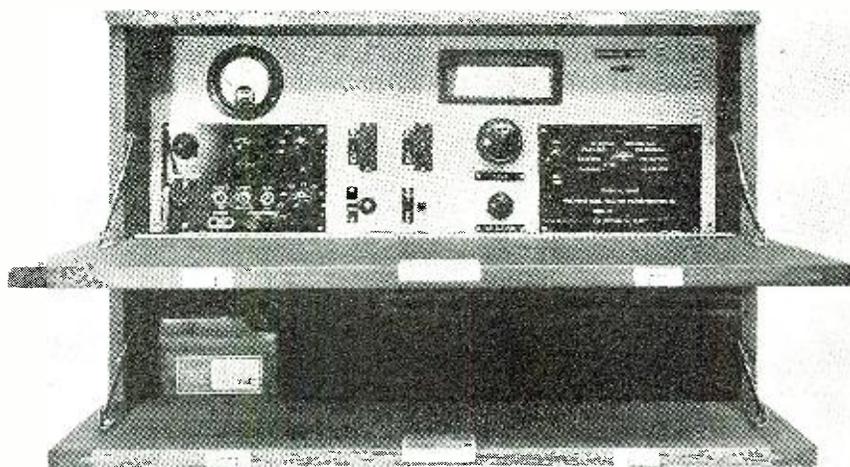
Is that so—the parts just covered up the bench—I see. Well, where do you repair the radios? Oh, on top of the parts cabinet. How do you like that? While we are about it, let's move the

radios over on the repair bench and place the parts back in the parts cabinet. It's easier to work that way—believe it or not. You were very proud of that service bench when you first built it—why not keep it reasonably clean and neat?

Now, let's take a look around the shop. Just stand in the middle of the floor and turn around in a circle *S-L-O-W-L-Y*. Careful—you'll knock over that bridge lamp Mrs. Smith brought in last week to be rewired. Ooops! Catch that pile of radio magazines! Yes, that's the issue you've been looking for all over the shop, but put it down my friend, put it down. We have work to do.

Now, let's roll up our sleeves, catch a broom, a mop, a dust rag and *mucha agua caliente* (a mess of hot water to youse guys) and really clean up this dump and make it look almost as good as it looked before you moved in.

(Ring in page 58, please)



A test bench of English design and manufacture. The Postal Dept. of Birmingham, England, sells these outfits for £ 110.

Serviceman's Experiences

by LEE SHELDON

Chicago, Illinois

When a customer comes in to have his tubes tested, he is presenting you with a golden opportunity.

YOU can always spot a tube customer, because he carries his old ones in a brown paper bag. The bag has a column of delicatessen figures on its side. He places it on the counter and pulls the tubes out, one by one, without saying a word. You stand before him quietly during the ritual; then, after the inner wrappers—sheets of a Saturday supplement—have been removed, he says:

"Can you check these for me?"

"Certainly," I reply. "Step right over here."

This one particular fellow had two 45's, an 80, a 27, and four 24's. Not Not 24A's, mind you—24's. They were so old you could wipe mercuric oxide off the outside of the bulb with your thumb.

"Rather old, aren't they?" I remarked, to prime him pleasantly after waiting four minutes for the first cathode to heat up and give.

"Best set of tubes I ever had," he answered, snapping his suspenders proudly. "In fact, they are the only ones I ever had. Came with the receiver!"

"They all wear out soon or later," I countered, intent upon a sale. I knew Al was in the rear of the store, listening, so I brought all my sales pressure to bear.

But the customer did not respond in the proper manner. He frowned, as if I had insulted an old friend and said: "They *must* be good, or they would have burned out long before this!"

I smiled tolerantly, explaining that a tube was not a light-bulb; that its visible indications had no relation to its efficiency as an electric valve.

"Look!" he said, pointing triumphantly. The needle on the traitorous *Salutary Sales & Service* tube checker, after what surely must have been a tremendous effort, registered GOOD!

"That often happens," I staged-laughed. "Wait until you see the readings of the others." The remaining three 24's, although blinking from age, drive the needle steadily up through DEAD, VERY WEAK, WEAK, VERY MODERATE, MODERATE, VERY DOUBTFUL, DOUBTFUL and over the line to GOOD.

"Hmmm," hummed the customer,

marking them "okay" with a red crayon.

I put the 27 in. It was so old the cathode squeaked when the heat hit it, but it registered GOOD.

"Humph!" the customer reenforced.

I knew the two 45's, being filament tubes, would show their age more definitely than the others. I turned on the checker, and the needle stopped between DOUBTFUL and GOOD. I glanced questioningly at the customer; he appeared uncertain for a moment, but when he examined the scale closely, he said: "The pointer is wiggling—the tube must be trying!"

"It's shaking with age," I main-

Well, I did everything to that rectifier but turn it inside-out. I gave it overload tests, underload tests; I used buttons that had never been touched before; I tested for shorts, for microphonics, for gas, water, and oil. Although our checker is equipped with six or eight visible and audible alarms, none of them went into operation. I was about to give up, but when I turned to O'Leary, he was inspecting one of the tubes we had already passed.

"I'll take one of these," he ordered, handing me the 27. "Why didn't you tell me one of the stems was dirty?"

I pulled one of the new 27's off the shelf and tested it. This time, the needle wavered uncertainly over DOUBTFUL on its way up, but I was too unnerved to care.

"Eighty cents," I announced, dropping the new tube into the brown keg.

"Eighty?" he challenged, "why, I can buy this same—"

"Okay," I conceded from exhaustion, "make it seventy."

I knew my partner would be loaded with sarcasm, so to demonstrate how difficult the sale had been, I entered the rear of the shop with heavy eyelids and arms swinging like an ape's.

Al was at his desk, reading a magazine. "Listen to this," he said, without looking up. "It says here that 'peasants in Bukovina shave with their hats on. When a tourist asks why, they invariably ask him if he ever shaved the top of his head.' Isn't that interesting?"

"Get your feet off the desk so I can see your face," I demanded indignantly. "How can you sit back here reading that twaddle while I am out front wearing my test-prods down to the bakelite for you?"

Al snarled, stood up, and slowly tore the magazine in half. "I'm trying to let you down easily," he said. "I never make fun of a person who stumbles, but I have a justifiable squawk if he blames me for not falling with him. That exhibition you just gave reviewed twenty years of bad salesmanship and misuse of equipment!"

"Gwan," I defended, "I'll bet you couldn't have given that customer a
(More Experiences on page 61)

THEY'LL DO IT EVERY TIME!

by HATLO



tained. "The output tubes have to do with quality. Have you noticed any depreciation of tone?"

"Gets better every day," he replied. "That needle wouldn't quiver if the tube wasn't vibrant and full of life. Here—test the last one."

I put the 80 into position and set my jaw. When I snapped the switch, the needle—after pulling back below zero for a flying start—smacked right over past GOOD. I refined some adjustments, bringing the needle back on scale, but not far enough to be convincing.

"Thanks," the passing prospect said, reaching for the tube. "That's an honest machine you have there, as sure as my name's O'Leary!"

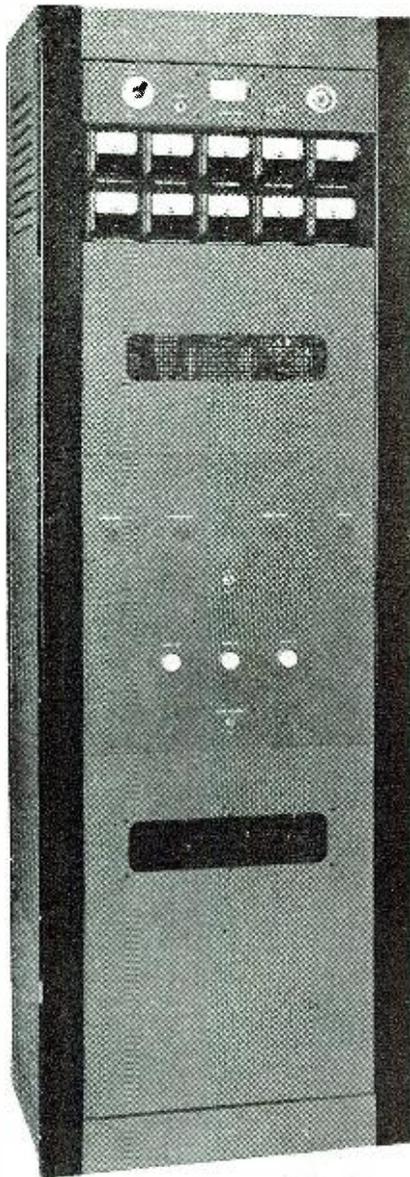
"One moment, Mr. O'Leary," I said, determined to make a sale. "There are other tests. This is the power tube, and one can't be too careful!"

A NEW 63 MC AIRPORT TRANSMITTER

by **CLEFFORD A. HARVEY**

Chief Engineer, Harvey Radio Laboratories, Inc., Cambridge, Mass.

High power on the ultra high frequencies is always intriguing. But when the final frequency is a twelfth harmonic of the crystal oscillator, —then it's "hot."



All tuning is done with an insulated key through holes in the unit's front.

ULTRA high frequency radio communication really comes into its own when supplying a radio telephone link between an aircraft in flight and its ground station. As these UHF signals between, say 40 and 80 mc., are excellent over a *sight* path, they are most useful in a service where it is easy to secure a *sight* line path for 100 or even 200 miles. The absence of reflected waves with consequent fading and selective distortion results in signals that are stronger and more uniform than those of the lower frequencies. Also because of the direct transmission path, one frequency suffices for day or night transmission; whereas at the present time plane-to-ground communication must be carried out over a high day frequency and a lower night frequency, because the high day frequency which must be used to secure the desired transmission range begins to fade out as dusk comes on and skips over the desired area.

Ultra high frequencies are unaffected by atmospherics and possibly will eliminate reception difficulties from snow static, thunderstorms and the like that have had so much attention in recent years.

There have been set aside just recently certain of the ultra high frequencies for use in aircraft and airport work; for instance, 75 mc. is used by transmitters designated as airport marker stations and 63 mc. by a new line of radio range stations, the construction of which is scheduled to start this fall.

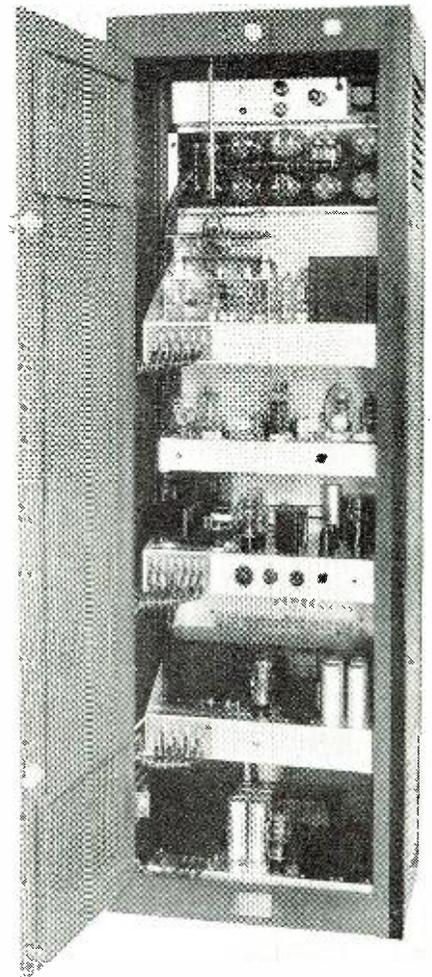
The purpose of this article is to describe the design and construction of a commercial transmitter capable of an output in excess of 100 watts on 63 mc., and whose *high frequency range can be extended to 80 mc.*, and beyond with only a slight loss of output power.

Commercial transmitters must be constructed with a high factor of safety and an eye to unhindered performance. The operator cannot interrupt an important transmission to replace a 10-watt resistor that had just burned out carrying its 20-watt load; a 50-watt one should be there in the first place. That is why a radio amateur can build his 100-watt transmitter on a breadboard using overloaded tubes at a cost of \$50.00 or \$100.00 while a 100-watt transmitter such as that to be described sells for nearer \$2,000.00. *Reliability and performance are of primary importance*, cost is secondary in commercial transmitters, especially those used in aviation services.

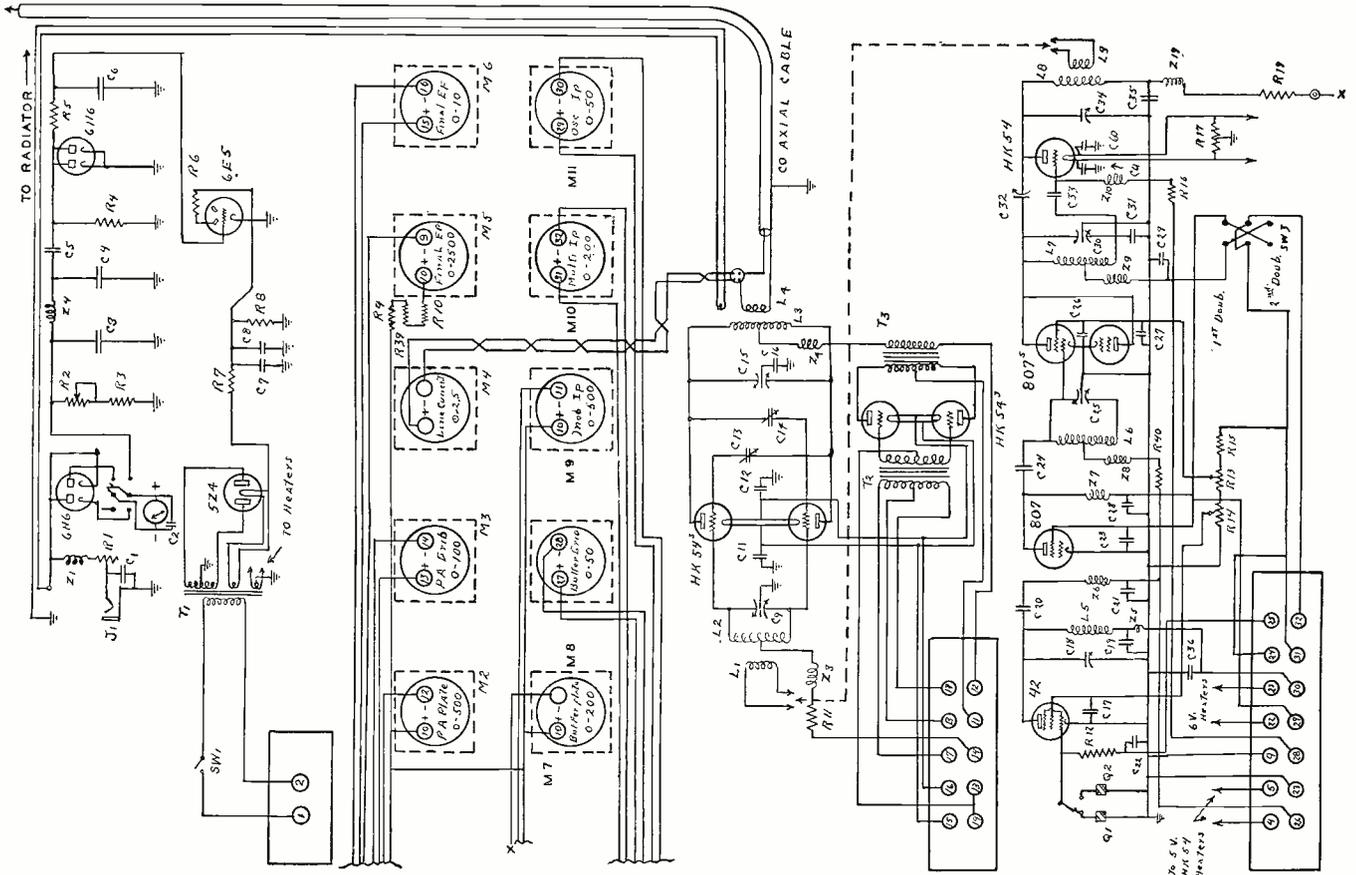
Circuit Considerations

In the design of this transmitter (commercially known as the PF-100), care was taken to have ample leeway between the rating of the various resistors, condensers and transformers and their actual operating values. Particular attention was also given to se-

curing an overabundance of grid excitation to the various stages; "just enough" drive in the case of a transmitter where tubes are new would



That pretty cabling is the sign of the trouble-free commercial!



- C₁—0.02 500 v. mica, Cornell, 1W5D2.
- C₂—0.02 500 v. mica, Cornell, 1W5D2.
- C₃—100 mmf. 500 v. mica, Cornell, 5W5T1.
- C₄—100 mmf. 500 v. mica, Cornell, 5W5T1.
- C₅—0.1 400 v. paper, Cornell, SM4S1.
- C₆—0.05 400 v. paper, Cornell, DT6D5.
- C₇—8 mf. elect., Cornell JRS588.
- C₈—20 mmf. dual, Cardwell, MT20GD.
- C₉—0.1 500 v., Cornell, 3W5S1.
- C₁₀—0.1 500 v., Cornell, 3W5S1.
- C₁₁—3 mmf. air, HRL, Special.
- C₁₂—3 mmf. air, HRL, Special.
- C₁₃—40 mmf. dual air, Cardwell, XC40XD.
- C₁₄—0.02 mfd. 5000 v. mica, Aerovox, 1773.
- C₁₅—0.02 mfd. 500 v. mica, Cornell, 1W5D2.
- C₁₆—50 mmf. variable air, Cardwell, ZR50AS.
- C₁₇—0.02 mfd. 500 v. mica, Cornell, 1W5D2.
- C₁₈—0.02 mfd. 500 v. mica, Cornell, 5W5T1.
- C₁₉—100 mmf. 500 v. mica, Cornell, 1W5D2.
- C₂₀—0.01 mfd. 400 v. paper, Cornell, SM4S1.
- C₂₁—0.02 mfd. 1000 v. mica, Cornell, 4-6-D2.
- C₂₂—0.02 mfd. 500 v. mica, Cornell, 1W5D2.
- C₂₃—0.02 mfd. 1000 v. mica, Cornell, 4-6-D2.
- C₂₄—0.02 mfd. 1000 v. mica, Cornell, 4-6-D2.
- C₂₅—0.02 mfd. 1000 v. mica, Cornell, 4-6-D2.
- C₂₆—35 mf. dual, Hammarlund, MCD-35-SX.
- C₂₇—15 mmf. 500 v., Cardwell, ZR-15-AS.
- C₂₈—4 mmf., HRL, Special.
- C₂₉—100 mmf. 1000 v. mica, Cornell, 4-6-T1.
- C₃₀—100 mmf. Cardwell, MT-20-GS.
- C₃₁—0.02 mfd. 5000 v. mica, Cornell, 4-25-D2.
- C₃₂—0.01 mfd. 500 v. mica, Cornell, 3W5S1.
- C₃₃—0.01 mfd. 400 v. paper, Cornell, SM4S1.
- C₃₄—10 mf. 25 v. elec., Cornell, BR102M.
- C₃₅—0.05 mfd. 400 v. paper, Cornell, DT4S5.
- C₃₆—5 mfd. 400 v. oil, Cornell, VC378D.
- C₃₇—0.1 mfd. 400 v. paper, Cornell, SM4S1.
- C₃₈—5 mfd. 400 v. oil, Cornell, VC378D.
- C₃₉—0.1 mfd. 400 v. paper, Cornell, SM4S1.
- C₄₀—10 mf. 25 v. elec., Cornell, BR102M.
- C₄₁—8 mfd. 450 v. elect., Cornell, BR845M.
- C₄₂—1 mfd. 400 v. elect., Cornell, DT4P1.
- C₄₃—8 mf. dual 450 v. elec., Cornell, EB-8802.
- C₄₄—4 mf. 600 v. oil, Cornell, TL6040.
- C₄₅—4 mf. 600 v. oil, Cornell, TL6040.
- C₄₆—4 mf. 600 v. oil, Cornell, TL6040.
- C₄₇—4 mf. 600 v. oil, Cornell, TL6040.
- C₄₈—1.5 mf. 1250 oil, Cornell, VC682-1.
- C₄₉—1.5 mf. 1250 oil, Cornell, VC682-1.
- C₅₀—1.5 mf. 1250 oil, Cornell, VC682-1.
- C₅₁—1.5 mf. 1250 oil, Cornell, VC682-1.
- C₅₂—4 mf. 600 oil, Cornell, TL6040.
- C₅₃—4 mf. 600 oil, Cornell, TL6040.
- C₅₄—0.1 mfd. 400 v. mica, Cornell, 3W5S1.
- C₅₅—0.1 mfd. 400 v. mica, Cornell, 3W5S1.
- C₅₆—5 mfd. 400 v. oil, Cornell, VC378-D.
- R₁—250 M. volume control with switch. (See S).
- R₂—20 M. volume control slotted shaft, IRC, C.
- R₃—15 M 1 1/2 w., Centralab, 316.
- R₄—1 meg. 1/2 w., Centralab, 310.
- R₅—2 meg. 1/2 w., Centralab, 310.
- R₆—1 meg. 1/2 w., Centralab, 310.
- R₇—15 M 1 1/2 w., Centralab, 316.
- R₈—75 M 1 1/2 w., Centralab, 316.
- R₉—1 meg. wire wound, IRC, WW2.
- R₁₀—5 meg. wire wound, IRC, WW1.
- R₁₁—4 M 25 w. wire wound, Ohmite, 0381.
- R₁₂—50 M 1 1/2 w., Centralab, 316.
- R₁₃—5 M variable 25 w., Ohmite, 0162.
- R₁₄—5 M 50 w., Ohmite.
- R₁₅—2 M 50 w., Ohmite, 0574.
- R₁₆—12 M 25 w., Ohmite, 0216.
- R₁₇—75 ohms CT, IRC, MW2.
- R₁₈—1000 ohms 25 w., Ohmite, 0375.
- R₁₉—2500 ohms 100 w., Ohmite, 0963.
- R₂₀—1 meg. 1/2 w., Centralab, 310.
- R₂₁—2 M 1/2 w., Centralab, 310.

turn out to be "not quite enough" drive after the tubes had aged a bit. To arrive at 63 mc. it was decided to use a relatively low frequency crystal with a fundamental around 5 mc. and multiply 12 times rather than go to a higher frequency harmonically oscillating plate and use fewer multiplying stages.

There are many types of tubes on the market today capable of delivering 100 watts of output power at 63 mc., but there are also a few facts that will assist in narrowing the selection down to a few of them. In the first place a push-pull stage should be used to cut down circuit capacity and high frequency triodes should be selected for the sake of efficiency. If these two

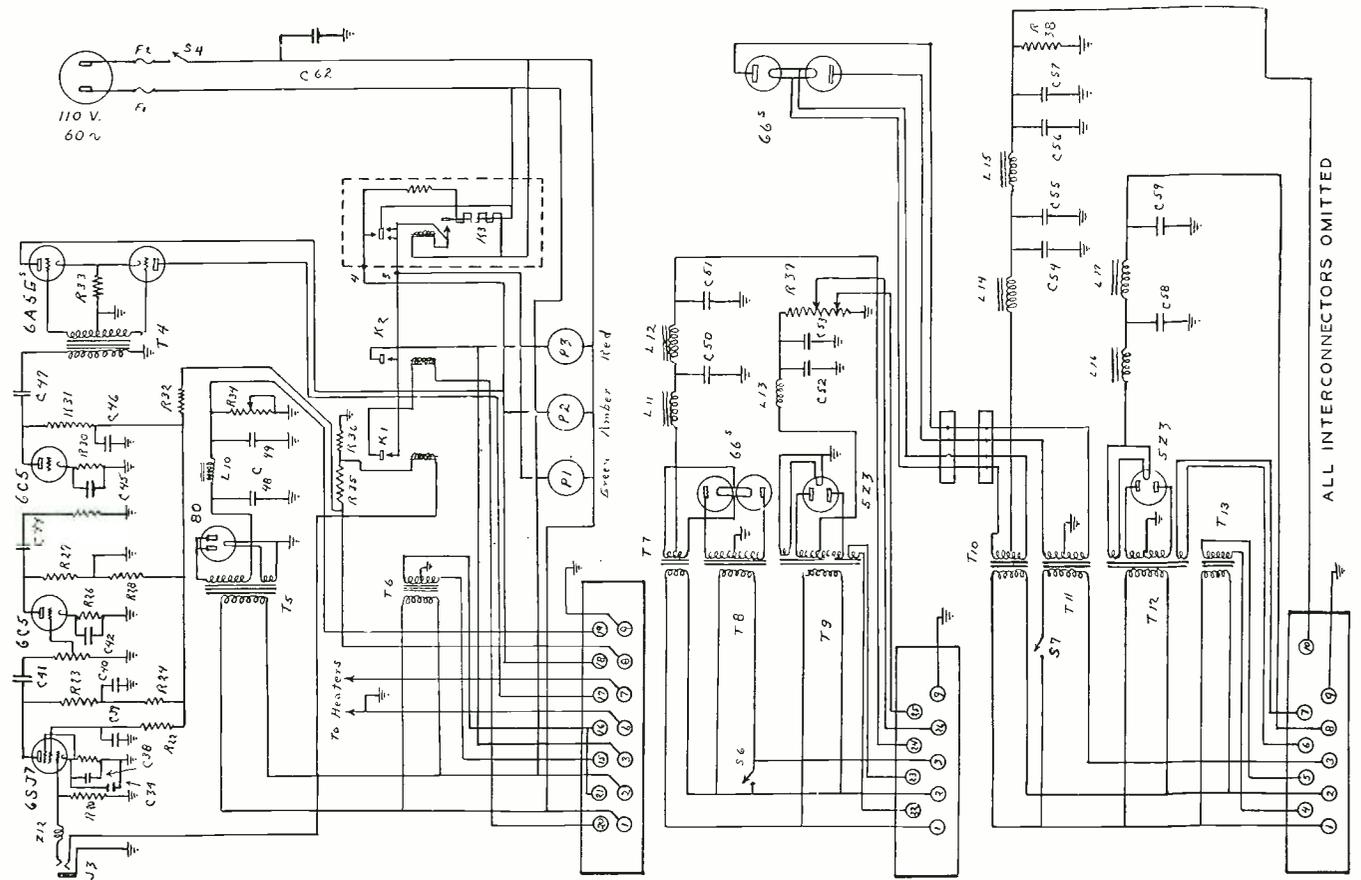
considerations are kept in mind, and a well designed tank circuit is employed it should be quite easy to secure a plate efficiency of about 55% at this frequency which means that an input to the final stage of about 180 watts will be necessary. The plate loss will then be 80 watts or 40 watts per tube, and a pair of Heintz & Kaufman HK-54's should do the job nicely. These are conservatively rated for a continuous plate dissipation of 50 watts and will therefore be just right, as although the plate loss with steady carrier is only 40 watts per tube, the dissipation increases to between 50 and 60 watts when the transmitter is voice modulated. The average is well under the rating of the tube, however, so

they will never be operating in an overloaded condition.

Two of these tubes were decided upon and the question immediately arose as to the proper ratio of plate voltage to current.

Although these tubes are rated for 1,500 volts and 135 ma. maximum these rating cannot be used, as the maximum plate dissipation is reached first, so the plate voltage was reduced to 1,250 volts and the current to about 75 ma. The plate voltage was kept high as this helps the efficiency in that the electron transit time between filament and plate is reduced.

With the input power to the final stage decided upon, the next consideration is the driving power necessary



- R₃₀₀—2 meg 1/2 w., Centralab, 310.
- R₃₀₁—500 M 1/2 w., Centralab, 310.
- R₃₀₂—75 M 1/2 w., Centralab, 310.
- R₃₀₃—500 M variable, IRC, C.
- R₃₀₄—2500 ohm 1/2 w., Centralab, 310.
- R₃₀₅—100 M 1/2 w., Centralab, 310.
- R₃₀₆—50 M 1/2 w., Centralab, 310.
- R₃₀₇—500 M 1/2 w., Centralab, 310.
- R₃₀₈—2500 1/2 w., Centralab, 310.
- R₃₀₉—50 M 1/2 w., Centralab, 310.
- R₃₁₀—25 M 20 w., wire wound, Ohmite, Brown
- R₃₁₁—800 ohms 20 w., wire wound, Ohmite, Brown
- R₃₁₂—40 M 20 w., wire wound, Ohmite, 0375
- R₃₁₃—40 M 20 w., wire wound, Ohmite, Brown
- R₃₁₄—5 M 1/2 w., Centralab, 316.
- R₃₁₅—3 M 75 w., wire wound, Ohmite, 0781B.
- R₃₁₆—100 M 100 w., wire wound, Ohmite, 0625.
- R₃₁₇—5 meg. wire wound, IRC, WW2.
- R₃₁₈—20 M 1/2 w., Centralab, 316.
- L₁—Final link.
- L₂—Final grid.
- L₃—Final plate.
- L₄—Antenna link.
- L₅—Crystal osc. plate.
- L₆—1st mult. plate.
- L₇—2nd mult. plate.
- L₈—3rd mult. plate.
- L₉—Final link.
- L₁₀—Bias choke, Kenyon, T-163.
- L₁₁—Osc. mult. reactor, Kenyon, T-310.
- L₁₂—Osc. mult. reactor, Kenyon, T-166.
- L₁₃—Bias reactor, Kenyon, T-154.
- L₁₄—HY reactor, Kenyon, T-516.
- L₁₅—HY reactor, Kenyon, T-167.
- L₁₆—Speech amp. reactor, Kenyon, T-511.
- L₁₇—Speech amp. reactor, Kenyon, T-165.
- M₁—Carrier shift 0-1 m.a., Triplett, 227A.
- M₂—PA plate current 0-500 m.a., Triplett, 327A.
- M₃—PA grid current 0-100 m.a., Triplett, 327A.
- M₄—Output current 0-2.5 a., Triplett, 347A.
- M₅—PA plate voltage 0-1 m.a., meter with 0-2500
- M₆—PA filament 0-10 v., AC, Triplett, 337A.
- M₇—3rd mult. plate current 0-200 m.a., Triplett,
- M₈—3rd mult. grid current 0-50 m.a., Triplett,
- M₉—Modulator plate current 0-600 m.a., Triplett,
- M₁₀—Modulator plate current 0-100, Triplett, 327A.
- M₁₁—Osc. plate current 0-50, Triplett, 327A.
- Z₁—5 microh, Ohmite, Z1.
- Z₂—5 microh, Ohmite, Z1.
- Z₃—5 microh, Ohmite, Z1.
- Z₄—20 microh, HRL, Special.
- Z₅—2.4 mh., Coto, CI-11.
- Z₆—2.4 mh., Coto, CI-11.
- Z₇—20 mh., Ohmite, 478.
- Z₈—2.4 mh., Coto, CI-12.
- Z₉—5 microh, Ohmite, Z1.
- Z₁₀—20 microh, Ohmite, 478.
- Z₁₁—5 microh, Ohmite, Z1.
- Z₁₂—2.4 mh., Coto, CI-11.
- K₁—Sensitive relay, Dunco, CXB51.
- K₂—Power relay, Dunco, ABTXLB1.
- T₁—Time delay, Dunco, TD327.
- T₂—Modulation indicator power, Kenyon, T-222.
- T₃—Modulator grid, Kenyon, T-259.
- T₄—Modulator plate, Kenyon, T-461.
- T₅—Interstage, Kenyon, T-58.
- T₆—Bias power, Kenyon, T-201.
- T₇—Amplifier modulator filament, Kenyon, T-358.
- T₈—Rectifier filament, Kenyon, T-352.
- T₉—Oscillator-multiplier plate, Kenyon, S-5603.
- T₁₀—Bias power, Kenyon, T-206.
- T₁₁—Rectifier filaments, Kenyon, T-360.
- T₁₂—Amplifier modulator plate, Kenyon, T-667.
- T₁₃—Speech amplifier power, Kenyon, T-212.
- T₁₄—Second multiplier filament, Kenyon, S-7376.

from the preceding stage. Modern high frequency triodes have a much higher power gain than older tubes and experience with HK-54's in other circuits indicated that they would require about 20 watts of drive per pair at 63 mc. About 30 watts can be obtained from one of these HK-54's operating as a power doubler, so this tube was used with an input of about 100 ma. at 750 watts.

The oscillator is a single 42 pentode tube operating at about 150 volts plate, and is crystal controlled by a quartz plate on 5250 kc. This stage is conventional and is run low power to minimize drift due to crystal heating. Two crystals are provided on exactly the same frequency so that if one gives

trouble or needs attention for any reason, the transmitter may be immediately switched to the other. This crystal oscillator drives a single 807 whose plate tank circuit is tuned to the third harmonic of the crystal so that power is developed at 3 times the crystal frequency. The second multiplier stage consists of two 807 tubes with the grids in push-pull and the plates in parallel, working as an efficient doubler circuit and providing about 10 watts output at 31,500 kc. six times the crystal frequency. The third multiplier is the HK-54 power doubler which is driven with 10 watts of power at 31.5 mc. and develops about 30 watts at 63 mc. This tube has a power gain of about 3 and operates at a plate

efficiency of about 35% which is not too bad considering the frequency.

In order to keep the number of component parts down and eliminate unnecessary controls, all circuits are capacitively coupled from the oscillator to the power doubler. These four stages are on the same chassis and coupling leads are kept very short. Link coupling is used between the doubler and the final amplifier as the amplifier is on the next chassis above, and it would be impractical to use capacity coupling here. The Class B plate modulation stage is located alongside the final amplifier and even though the tubes are in a rather intense radio frequency field no shield-

(PSE QSY to page 59)

What's **NEW** in Radio

E. H. Scott Radio Laboratories, Inc., announce the development of their new Scott Phantom Deluxe receiver. Containing twenty of the latest tubes, this set features custom-built chassis and a specially designed 15-inch speaker for reproduction of all audio-frequencies from 30 to 8,500 cycles. To further improve the performance of the set, a high-fidelity amplifier that operates strictly class A is used in connection with inverse-feedback to prevent the presence of unwanted audio peaks from the speaker. Ample power is pro-



vided to fill a large hall and the manufacturer states this to be 30 watts, undistorted. Among other important features are: special RF amplification on all bands, variable selectivity, three-stage iron core I.F. transformers, three-stage audio amplifier and many other worthwhile features that add to the performance of the set. This receiver is completely described in Scott News, Vol. 11, No. 5, a copy of which may be obtained by writing to the manufacturer directly.

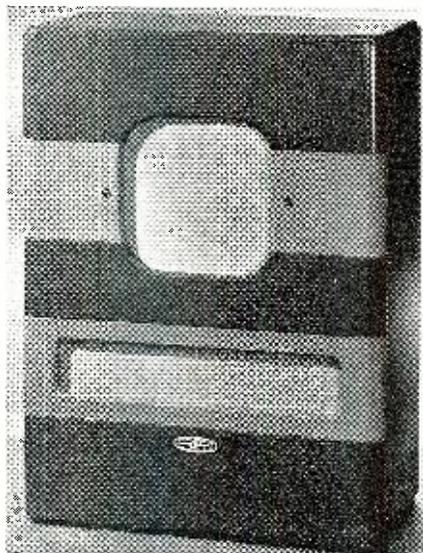
Howard Radio Company of Chicago announce production on their new Model 438 communications receiver. This set covers the frequencies from 43 m.c. to 550 kcs. in 4 steps. It is available with or without crystal filter which permits the operator to obtain the full selectivity of the receiver. Other



controls include R.F. Gain, B.F.O. Pitch, AF Gain, Band Spread, and Xtal Phase. The receiver is extremely compact and has a self-contained dynamic speaker mounted beneath the cabinet grill. A slide-rule type of dial makes tuning easy and the various frequencies are easily identified. It can be used from either a 6v. D.C. source or 110v. A.C.

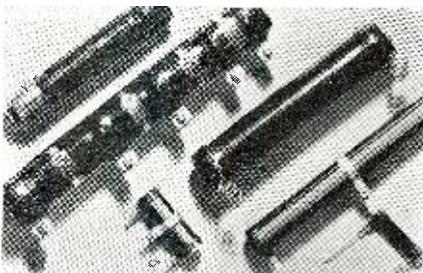
Operadio Manufacturing Company of St Charles, Illinois, present a new "Acousti-Reflex" speaker housing, Type AR. This highly efficient baffle embodies the "acousti-reflex" principle which, the manufacturers claim, was originally developed by Operadio. The design of the unit is such that it will utilize all of the energy emanating from the speaker cone. The sound is taken from the back of the speaker and projected to and out of the front of the speaker cabinet, thus augmenting the volume of sound generated by the front of the speaker cone. Tonal quali-

ties, by virtue of better reproduction of the fundamentals, are richer. Bass frequencies are substantially increased, thus adding to the richness of the music being reproduced.



Feed-back difficulties are greatly minimized. Specifications and further details may be had by writing the manufacturer direct.

Ward-Leonard Electric Co., Mount Vernon, N. Y., announces a new vitreous enameled wire wound resistor. According to a statement by the company more than 10



years of intensive research has been spent in development work on refractories, wire processing and enamels. This produced a crazeless enamel structure that withstands humidity, moisture, immersion and numerous other specified tests. This product is sold under the name of "Vitrohm." Several types are available, including the tapped, fixed and adjustable wire wound.

The Oxford-Tartak Radio Corp., 915 W. Van Buren St., Chicago, Illinois, has brought out a 2" Permag speaker. The over-all size is 2½". The speaker is smaller than the average package of cigarettes.

Western Electric Co. of New York has published a new booklet on their "2A Phase Monitor" which maintains the correct electrical relationship between the towers of a directional antenna system. The new device gives direct indication of phase and magnitude of the radio frequency current in each antenna tower.

Westinghouse Electric Supply Company of New York City announces a new WR-675 portable superhet receiver. The unit contains batteries and its own antenna. The carryette can be furnished with a traveling case. The unit features a 5" speaker and 4 tubes and is competitively priced.

A new universal metal tab for quicker, easier mounting is now a feature of the pop-

ular Sprague PTM 450 Volt cardboard dry electrolytic condensers. The tab permits mounting in any position.

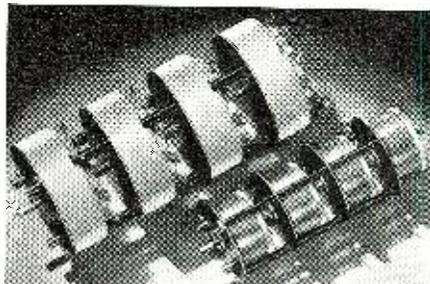
Supreme Instruments Corporation of Greenwood, Mississippi, have published a catalog of their own line of test instruments. It is available to readers on request and includes full information on the Supreme Instruments Corporation's complete line.

A new midget replacement power transformer, T-13R19, designed to meet the requirements of modern midget receivers with unusually low plate voltage and current requirements is announced by Thordarson Electric Mfg. Co. of Chicago. The popular "3A" mounting permits it to be used in half shell, vertical upright, or horizontal upright positions.

Galvin Manufacturing Corporation of Chicago announces two new lines of automobile radios for 1939. One is their standard line of five models and the second ones are specifically designed sets to mount in the instrument panels of nine popular 1939 cars.

Both lines include the precision-built electric motor-driven push-button tuning. The standard line is a specially designed "Boost-O-Matic" set with an automatic variable sensitivity unit.

Ohmite Manufacturing Company, 4835 Flournoy Street, Chicago, Illinois, are now manufacturing a new line of tandem assemblies for the new Ohmite power-tap switches. These assemblies are available in 2, 3, 4, or more of the new power-tap switches which are used to switch both sides of a single-



phase line or to switch all phases of a three-phase line; to provide simultaneous control of separate circuits; and for other applications. Four sizes are available for single or tandem mountings. Data sheet No. 114 gives complete information.

Lafayette Radio Corporation, 100 Sixth Avenue, New York City, presents their new 1940 Catalog which features their complete



line of amplifiers, microphones, public address systems, speakers and associated products. Among the new items is a portable amplifier, Model 458, which provides 30 watts output and which may be operated with equal effectiveness from either the 115 AC volt line or a 6 volt car battery. The amplifier, a phonoturn-table and pick-up, and a 6 volt motor-generator are all built into an all-metal carrying case with a removable cover which provides storage space for records, cables, microphones, etc. Copies of the above catalog may be obtained by dropping a card to Lafayette Radio Corporation.

Shure Brothers, 225 West Huron Street, Chicago, Illinois, announce their new Model 70 ST communications type crystal microphone, designed especially for amateurs and
(More WNIR on page 49)



by **LEE WARD**

Service Manager, San Francisco, California

HOWARD VINCENT O'BRIEN, author, lecturer, and world-traveler, upon asking a banker if war was imminent in Europe, received, after a litigant silence, these heavily-freighted words: "Yes—but not until after the Harvest!" Asked for a breakdown, the banker confessed his position gave him no especial insight into international affairs, but that the answer had been treated with such reverence on a previous occasion that he had been using it ever since.

Popular belief, as reflected from movie screens, demands every newspaper or magazine writer have inside information. The callowest cub, when asked who will win the election, smiles cynically—for he has dormant testimony which, but for the weekly payment of hush money (\$12.75) from the front office, would prevent the election of either candidate.

This unfortunate tradition puts your serviceman-sage on the spot. Television is topical, and I am asked to foretell its effects upon the serviceman. Unaccustomed as I am to stabs in the dark, I must do so. This, then, is a television column.

Clearing the Horizon

TELEVISION has definitely come around that corner. Your present encumbrance makes this statement without knowing whether the curve is abtuse or acute. On a bended knee made stiff by work behind consoles, he confesses he has no inside information at his key-tops.

In my store, customers are asking questions concerning the new art—but they have been asking the same questions for ten years. Of late, the inquiries are more frequent—but the answers are no more sinister. The advent of television has not affected set sales; Mrs. Jones, who has been a customer for twelve years, promised me she would buy a new receiver this summer, and she did. An actor in the next block, living through the summer in hope and a furnished room, got an assignment and paid for a midget out of his first paycheck. I cashed it. The Robbins boy, absent from home for ten years, called at my shop to pick up a table model for his mother. He was not as prodigal as he might have been, after all those years, but he chose a better set than he could afford because he knew its speaker would voice the affectionate words he could never get

PROBLEM OF CONDUCT

You answer a call that takes you ten miles from your shop. The set, a custom-built combination, is located in the library of a fifteen-room house. The owner is a proud eccentric who spends a half-hour describing the set symptoms elaborately. The intended implication is that no set as expensive as his could possibly have anything cheap wrong with it. You know he can afford any expense you mention, and you also know his library has been made public by previous servicemen who failed to approach the chassis with the proper respect.

Finally, after the master finishes, you find—three minutes after you start to work—that the trouble is an eighty-cent second detector tube.

WHAT WOULD YOU DO?

A year's subscription goes to the person submitting the most practical answer; six months' to the second.

Lights! Action! Camera!

through a tightened larynx. As he left the shop with a bouquet in one hand and the set in the other, I pictured him as he would be after the first rapturous greeting: bending over the controls as an excuse to hide his stinging eyes.

None of these customers asked about television. They wanted sets, and they bought them when they could afford them—a store routine that has not changed in fifteen years. I haven't seen any sales figures which indicate a downward trend in receiver trade following the birth of the new art, but if I do, it will be proof of nothing but a salesman's psychological stymie. Some members of *any* profession seize upon the most topical excuse to divert attention from a high lead content.

Bogie or Blessing?

RADIOS are composed of coils, condensers, and resistors, with a tube stuck in at various points to pass current at a controlled rate. Television springs from radio, and the composition of television equipment, except for its optics, will be essentially the same. While its components require more critical design engineering, and while the servicing adjustments are more critical, it is not true that a high frequency dipole goes out of resonance every time the customer's house settles. It is equally untrue that circuit constants can be upset by a damp breath.

The complexity of the coming art

does not frighten me. When the first television console is laid in my showroom, in it will be manufactured provisions which make it as rugged, simple, and fool-proof as the multiple compromise which faces all design engineers will allow. Broadcast engineers, working on television, have long since become reconciled to the fact that they must assume as much responsibility for the *received* program

(*More Bench Notes on page 58*)



Department of Smiling Servicemen

DEAR MR. WARD:

Enclosed is a picture of my service bench and one of myself. A description of the bench follows. . . .

A. J. TOLEOS,
Salem, Mass.

Your service bench is a good one, A. J., and I thank you for telling me about it. I believe, however, that your greatest business asset is your *smile*.

Many of us have a test bench as good as yours, but few such a smile. Too many of us who own top-notch equipment carry it into a customer's home looking as glum as an undertaker returning from an unpaid vacation.

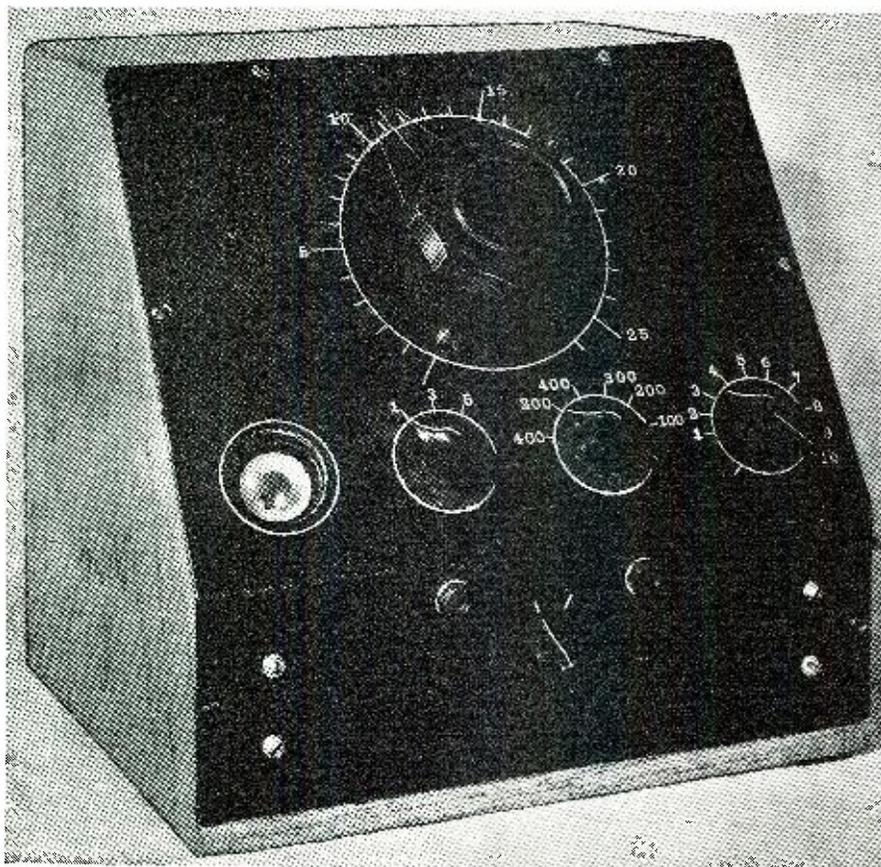
Here's a member of the profession who isn't losing sleep because he conjures up bogies of the future; a person who never lets a competitor get him down; a colleague who knows the cash value of a smile.

Look at the photo, and try to think of something depressing. Go ahead—smile as he smiles, and see if you still feel like getting out of servicing!

V.V.N. Leakage Tester

by **R. K. WHEELER**
Indianapolis, Ind.

Many a job can be serviced in jig time if the serviceman had an instrument to test the condensers. This unit is specially adapted for this.



The sloping front makes the instrument easy reading.

WITH the yearly advance in the design of radio receivers, the complexity of modern sets increases accordingly, and so must the serviceman's technique keep pace. A survey of wiring diagrams reveals the presence of large numbers of by-pass condensers, which are often the cause of obscure troubles, that older test instruments are unable to trace. With this thought in mind, the instrument present herewith was designed and built to measure high resistance leakages in condensers, transformers, and any other parts susceptible to this trouble.

One of the most convenient methods of making such measurements, where the current involved is extremely low, is by use of some form of vacuum tube

voltmeter, which was included, and provision made to switch the input jacks for straight VTVM service or high resistance measurements. Provision was made to test paper and electrolytic condensers of various ratings for leakages up to 200 megohms. For routine service work it was not considered essential to extend the range beyond 200 megohms, although higher ranges may be readily added if desired.

Shortly after the 6E5 tube was released to the trade, it became quickly apparent that this tube was admirably adapted for vacuum tube voltmeter service, on account of its low cost, sensitivity, and self-contained indicator, which eliminates the cost of a meter. Several ingenious circuits were

present by different experimenters, the most suitable for ordinary work being a form of slide-back voltmeter, where the grid is returned to a variable source of negative voltage, which is adjusted to buck out any positive voltage applied to the grid. This form of VTVM is most easily calibrated as it is only necessary to measure the "bucking-out" voltage, which equals the applied d.c. voltage on the grid. In order to increase the accuracy of observations, the cathode is returned to a variable voltage so that the pattern on the target may be just closed at zero input, affording a sharper indication for a reference point.

The power supply is built-in, and should furnish the highest test voltage required (in this case 400 volts) plus 25 to 50 volts for the "bucking-out" voltage across the slide-back control. The d.c. output should be fairly well filtered, and some attention should be given to the filter condensers, if the voltage approaches or exceeds the rating of most electrolytic condensers, 450 volts. Two standard condensers in series across the power supply will provide protection against breakdown from voltages in excess of 450 volts. The voltage divider consists of a 40,000 ohm 50-watt resistor, with taps to provide test voltages of 400, 300, 200 and 100 volts, as well as 250 volts the target of the 6E5; plus a 1,000-ohm "zero set" potentiometer, and another potentiometer for "slide-back" voltage control. The size of this control will depend upon the amount of voltage available in excess of the 400 volts required for testing. At light drains of 10 to 15 milliamperes, most stock transformers will afford a d.c. output from 425 to 450 volts. Reference to the characteristics chart given in a tube manual for a given rectifier tube, will prove of great aid in calculating the voltage to be expected. If 25 volts are available for bucking voltage, the slide-back control should be about 3,000 ohms; while if 50 volts are available, the control should be around 5,000 or 6,000 ohms. It should be particularly noted that the various test voltages are measured from their respective taps to the junction of the two potentiometers, when adjusting the taps to obtain these voltages. The slide-back voltage is measured between the junction of the potentiometers and the moving arm of the control, and the dial or panel calibrated accordingly.

Condenser leakage and other high resistances are measured by connecting the condenser in series with a resistor and applying the proper test voltage by switching, which automatically connects the proper series resistor. The voltage across the resistor is measured by the VTVM, and the

resistance of the component under test calculated.

While the slide-back control and zero-set potentiometer may be calibrated by measuring the voltages with a voltmeter, the meter must be of sufficiently high resistance to prevent a voltage shift due to shunting. Best accuracy will, of course, be obtained by the use of known voltages at the input.

As an example: a paper condenser rated at 400 volts is connected in series with the .25 megohm resistor, and the drop across the resistor measured as 1 volt. Since the voltage applied across the condenser is 400 volts, the ratio is 400 to 1, therefore, the condenser resistance is 100 megohms. If the drop across the resistor measured 25 volts the ratio would be 16 to 1, and the condenser resistance therefore 4 megohms. Since leakages are much higher for electrolytics a lower range must be used, which provides for measurements from 50,000 ohms to 2 megohms. The series resistors for each test setting are calculated to cover the same ranges with different test voltages applied.

The dial of the slide-back control may be calibrated for resistance readings, or this work may be omitted, and the values quickly computed by dividing the slide-back voltage into 100 megohms for the high resistance range, or dividing into 1 megohm when using the lower range. This circuit is really a bridge, with a somewhat novel feature that the voltage across the condenser does not change appreciably, with any amount of leakage within the range of the device. This is due to the fact that any adjustment of the slide-back control required to reclose the eye, automatically adds the required amount of voltage to the bridge, and the dial calibration is thus linear. The .5 mfd. condenser shown across the series resistors, is intended to by-pass any stray a.c. voltage that may be picked up at this point. It is, perhaps, not strictly necessary, but was included refinement.

At the present writing, there do not seem to be any established standards as to the permissible amount of leakage in condensers. However, it is ob-

vious that coupling condensers between a.f. stages should have negligible leakage, and 100 megohms may be set as a lower limit for this service. For by-pass service, such as screen and plate voltage supplies, the lower limit should be about 25 megohms for paper condensers. In such circuits a condenser with a resistance as low as 5 megohms may not immediately affect the receiver operation to any great extent, but it is almost certain that a condenser with a leakage resistance of 10 megohms or less is either semi-defective, or constructed of poor material. First quality paper condensers of reputable make will be found to check 200 megohms or better when new, therefore any paper condenser testing less than 25 megohms may be regarded with suspicion.

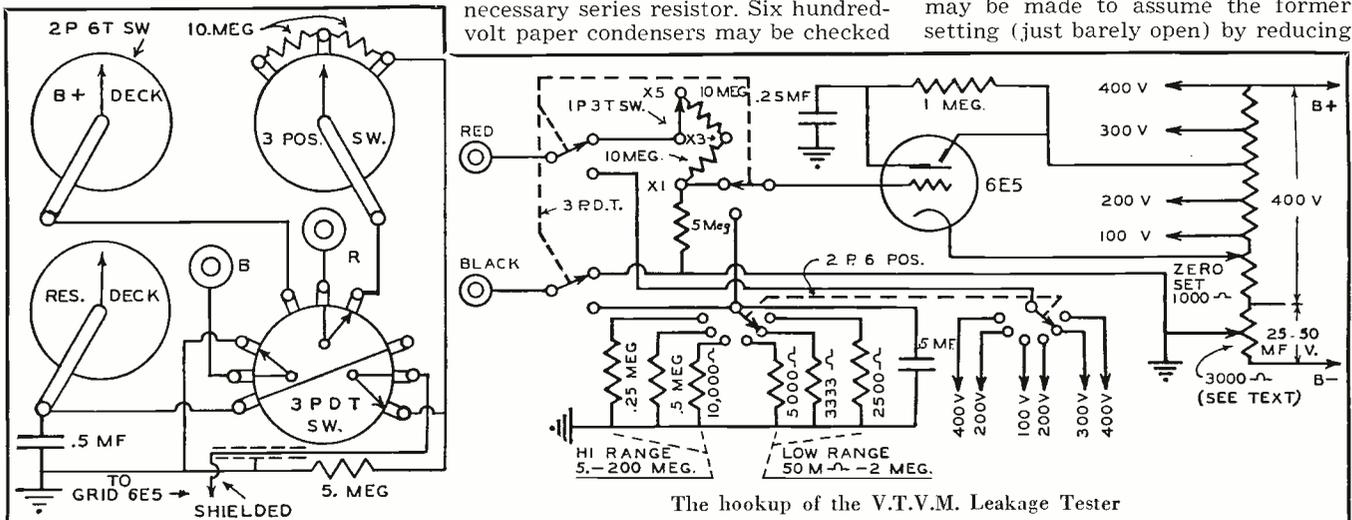
In the case of electrolytic condensers, standards are more difficult to establish, due largely to resistance differences between condensers of different manufacture. As a tentative guide the following minimum standards are suggested for dry electrolytic condensers: working voltage up to 300 volts, minimum resistance 200,000 ohms; up to 500 volts, minimum resistance 300,000 ohms. As a rule first quality condensers, when new will be found to have resistances on the order of 1 megohm or more. The resistance of low-priced condensers of doubtful make will usually be much lower. Wet electrolytic condensers have a somewhat lower resistance than the dry type, and around 150,000 ohms may be the lower limit. Electrolytic condensers that have been in use for some time across voltages less than their rating may show excessive leakage if tested at their rated voltage. Good condensers will eventually re-form to the new voltage in a few minutes, but if the operator is looking for set trouble it may be better to check the condenser at the same voltage as applied by the receiver. No provision has been made in the present model to check low voltage electrolytics, as they may be quickly checked with an ordinary ohm meter. This service may be easily added if desired, by tapping off the required test voltage, and adding the necessary series resistor. Six hundred-volt paper condensers may be checked

acceptably at 400 volts, which will probably be nearer actual working conditions. Since a great majority of paper condensers in receivers are operated at less than 400 volts, the lack of a 600-volt tap is not important, save perhaps to the hyper-critical.

Although the vacuum tube voltmeter is rather elementary and of limited range, it has the advantage of simplicity and easy calibration, and will serve very acceptably as a time-saving device for daily routine service work. In service, the 3-pole-2-throw switch disconnects the 6E5 from the condenser testing network, and at the same time connects the input jacks to the grid circuit multiplier and ground (chassis). With the slide-back control a zero the "zero-set" cathode potentiometer is adjusted until the pattern of the eye is just closed, or showing a thin black line. When positive voltages are applied to the grid the eye will open, and the slide-back control is advanced until the pattern is just closed again. The voltage between the positive terminal and the slider of the control is equal to the input voltage. The dial of this control may be calibrated for d.c. from this measurement, without the use of input voltages. Sixty-cycle a.c. voltages may give practically the same calibration, but if exactness is desired a separate scale should be made.

In this connection it should be noted that the by-pass condenser from the plate of the 6E5 is essential for a.c. measurements, as without it, the target shows several overlapping patterns that are unusable. The upper frequency limit for useful measurement of a.c. probably does not exceed 500 k.c.

Measurements of negative d.c. voltages require a somewhat different procedure, as the grid of the 6E5, if connected to the chassis under test, will measure the leakage from the power transformer to chassis. In order to check negative voltages, such as developed by AVC, the slide-back control is set at zero, and the eye closed as before. A negative voltage on the grid will cause the pattern to overlap, but may be made to assume the former setting (just barely open) by reducing



the cathode bias with the zero-set control. This control should be calibrated in volts, which may be done by measuring the voltage between the slider and the junction of the potentiometers. [Follow voltmeter suggestions given above.—Ed.] The difference between the original setting and the second setting will equal the negative voltage applied to the grid. The two 10-megohm multipliers in the grid circuit, in connection with the 1-pole-3-throw switch, extend the calibrated ranges 3 times and 5 times respectively.

Although such a simple device necessarily has its limitations, it will prove very valuable as a time saver in making routine tests; many of which may be made without unsoldering a wire. A few of the more common tests are outlined:

A.F. Coupling Condensers: Remove the tube feeding the stage, thus applying full voltage to the condensers. Connect the VTVM across the grid resistor of the following tube, and the d.c. voltage read, if any, will indicate the amount of leakage through the condenser.

Grid Bias: May be measured directly at the grid of the tube, with the grounded lead of the VTVM connected to the proper point, cathode or chassis as the case may be. This is a negative measurement to be made as above noted. If any a.c. voltages are present from signal, or other causes their effect may be eliminated by connecting a .5 mfd. condenser across the input to the VTVM.

Filter Condensers: Place a .5 mfd. 600-volt condenser in series with the positive lead, and connect the VTVM across the input filter condenser of the power supply. In most cases the a.c. ripple will be found to be from 10 to 25 volts depending upon the size of the filter condensers. Repeat the measurement across the output filter condenser. The a.c. voltage at this point should be very small, 1 volt or less. A.c. voltages in excess of the ones mentioned indicate either defective condensers, or need of additional capacity.

The actual a.c. voltage developed across the input filter condenser will depend largely upon the capacity of the condenser, the d.c. voltage developed, and the current through the choke. Assuming that the condenser is good, and full-wave rectification is used, the following empirical formula has been worked out as a guide.

$$\frac{\text{A.C. volts} \times \text{D.C. volts} \times \text{D.C. current (amp.)} \times 5}{\text{C mfd.}}$$

$$\frac{250 \times .07 \times 5}{8} = 11 \text{ volts A.C. approx.}$$

As other factors enter into the problem, some variation may be expected. It also should be considered that most electrolytic condensers generally exceed their rated capacity by 10 to 20%, sometimes more.

(Continued on page 52)

PRIZE CONTEST

TITLE THE COVER PICTURE!

WANT to win a prize? Look at the cover of this issue. Think over the situation, and write down a title that explains what you see. It isn't hard, and you may be the one to win!



WE had been going over the back issues of RADIO NEWS. Coming upon last December's number we recalled how popular the "Title the Cover" contest had been. We ought to run another of those, we thought. The Art Director got busy and made up a few ideas. Some were too easy, and others too hard.

The final one was turned over to Hank Kroeger, the photographer who has done so many fine things in our publication. He liked the idea, and started rounding up the props.

Through the courtesy of RCA we obtained one of their latest television receivers. The tag on it said, \$450, and we were happy that we did not have to "lay the money on the line"; but the set was certainly impressive, and we wished that we could have hooked it up and spent the afternoon looking at television pix.

From the *Evans Fur Company*, Chicago, we obtained a loan of the swell outfit the lady is wearing. It, too, had a champagne kick to it, when we read the price tag of \$395 for the coat and \$24 for the hat. We were sure that our picture was not going to suffer from lack of first-class scenery.

Casting the parts of the personnel was not so easy. We had to get a man who was able to act, and also a lady with the same qualifications. The *Blackhawk Restaurant*, Chicago [Remember the midnight to 3 A.M. programs from there in 1925!—Ed.], kindly offered to talk to its star, Johnny "Scat" Davis; and he turned out eager to help. The lady we chose was the same one who had appeared on our January, 1939 cover. She is the wife of a prominent ham, and prefers to remain nameless.

With a temperature outside, that afternoon of 96° in the shade and the thermometer hitting 128° in the studio under the Kliegs, the picture was shot. Both the lady and Johnny were perspiring profusely before they had been "on stage" for five minutes. Imagine wearing a sweater and a fur coat in such heat!

Now for a little back-ground about the *drumatis personae*. Johnny is one of the original *Fred Waring Band*. He migrated to Hollywood where he made "Varsity Show," "Cowboy from Brooklyn," "Hollywood Hotel," and "Broth-

er Rat," his latest release. All these were for *Warner Bros.* While in California he married his childhood sweetheart and now has a baby daughter, aged 12 weeks. Originally, Johnny is from the Hoosier State, is most interested in golf, and next, radio. He can be heard over the WGN-Mutual Network every night.

The idea of the picture is that Johnny, impersonating a college boy or alumnus, has invited his best girl or wife to a foot-ball game. She arrived all decked out for the festive occasion, only to find that Johnny had meant a televised edition instead of the real thing. When his team was making a touchdown, Johnny broke into loud cheers. The lady, disappointed, is bored to death. What we want you to do is to think up a title for the picture.

Here are some tips. Johnny might be a cheer-leader, a scotchman, or just a college lad. The girl might be his sweetheart, his sister, his wife, or just another girl. A title such as, "A Scotchman 'takes' his girl to a ball-game," or "Television is here. Yay!", or "Why did I marry a television expert?", "Just another television problem!", are all suitable ones.

Prizes? You bet! First prize, \$35; 2nd prize, \$10; 3rd prize, \$5; 4th through 10th prizes, \$2 each; 11th through 15th prizes, \$1 each, and 12 honorable mentions, a 6-month free subscription to RADIO NEWS—\$69 cash in all!

You need not be a subscriber, and the title need not be about radio, although it is preferable. Duplicate prizes to duplicate winners. You may submit as many entries as you wish, but each entry must have its own entry blank. Read the rules carefully, and make no mistakes in meeting *each* rule carefully. Infraction of the rules may eliminate you.

What do you say, gang! Lets go!



RULES OF THE CONTEST

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

(Continued on page 51)



Ring out the tubes with the eraser of a pencil to find a noisy tube.

range to see if I can hear any bad spots in the track. Sometimes, with a change in antenna length, the contact arm rides at a different spot—one that isn't worn—and, if the VC is the source of the trouble, the serviceman misses it. I'll take the chassis out of the cabinet without turning the juice off, and listen while I prod some of the parts.

OLD-TIMER: *Have you a magazine I can use?*

MRS. R.: *Here.*

That's to lay under the chassis so the table won't be scratched. Act as though we intended to finish the job in the house—to prevent any objection the customer might have if she thinks you are trying to make a big job out of a little one.

"We've been here forty minutes, and neither set has faded. The antenna checks okay, so the "intermittent" is in the set. Here goes!

OLD-TIMER: *The set is very stubborn today, isn't it? I'm afraid I'll have to continue my test in the shop.*

MRS. R.: *Oh, I wouldn't want that. Mr. Randolph and I always listen to the Soapsie Woapsie Hour on Thursday night.*

O. T.: *You can borrow the midget.*

MRS. R.: *How much will the repair cost?*

O. T.: *It depends upon the results of our test. I will call you on the 'phone as soon as we locate the trouble.*

MRS. R.: *What if I decide not to have it repaired?*

O. T.: *Then the regular service charge applies—the same charge I am making for this call. In other words, you are not being charged extra for use of our shop facilities; the set leaves the house simply to enable us to apply our laboratory treatment. The service charge is dropped if the set is repaired.*

MRS. R.: *All right—but make sure it isn't too much!*

Pick up the set and get out. I'll hold the door open for you. QUICK—before she changes her mind! Well, young fellow—why are you standing

there looking sil'y? Do something!

OLD-TIMER: *Oops! The bathroom! Sorry!*

Well, here's the hall door. Gwan—stop laughing and get a move on! Haven't you ever made a mistake?

We've got the set on the bench, so we're over the first hurdle. We still have three things to do: First, break the set down, so we can chase the trouble. Second, we have to locate the "intermittent" while the set is fading. Third, collect.

Let's turn the set on and tune in a station. Tuning chassis up-side down to expose the parts for test when it fades. Cover it with a newspaper to make it operate at the temperature it goes to under home conditions, when it has the cabinet and wall around it. Bring the circuit diagram for the Zenith 809 over here on the bench, where it will be handy. I won't change any tubes or parts, or disturb anything I don't have to, until after it has faded and we have located the trouble.

Seems warm enough now—I'll start prodding. Press every lead at the points of component connection; bend them in two directions before you pass them. Whoa!—sixteenth of an inch is far enough! A wooden dowel is handy for this operation, but what serviceman bothers to buy one? A crayon pencil is handier.

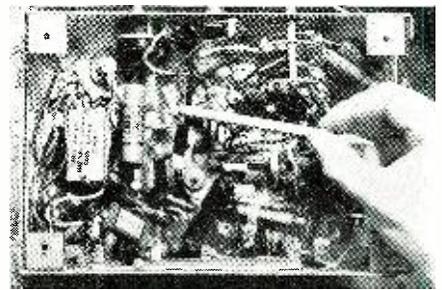
Bypasses first. Move each lead slowly and listen with the VC up as high between stations as the noise level will allow. They seem okay. That coupling condenser looks suspicious, but—pshaw!—they all do, and the trouble is seldom there—so we won't bother with it. There are about fifteen bypasses for every coupling condenser, so the odds are against it.

This metal-cased wire-wound resistor is a possibility. I'll spring the chassis wall a longside it with my hands, and press each lug with the pencil. Nothing happens, eh?

No, I didn't have to throw my tools down. Pardon me if I seem to lose my temper—but sometimes these "intermittents" are enough to drive a person to the crystal ball. Listen to the wretched thing! We've tested everything to make it fade, and what happens? It plays, and plays and plays. C'mon over to the desk and see if we can egg it on by acting indifferent.

I feel like Columbus: before he started, he didn't know where he was going; when he arrived, he didn't know where he was; and when he came back, he didn't know where he'd been. I always try an orderly approach on these jobs, but some of them are so perverse they—LISTEN!—it just faded—hear it? Tip-toe over and we'll catch it with jam on its whiskers. Steady, now—don't be nervous!

Sorry!—pick up that pencil, will you? It slipped from my hand. Now—what comes first? Let me see—let me see—what to do—the coupling condenser, that's it! I'll press ever so lightly, so as not to move anything else. It came back to normal volume!



Tap resistors and condensers to find if connections are soldered.

I'll press it the other way. It faded again!

Whoops!—we've got it under control—we can make the volume go up and down at will, and we've located the source. Just like the customer described it, too, so we're certain we haven't stumbled on something else. Let that be a lesson to you—always check the coupling condenser first!

Out it comes, the little rascal—point oh two mike, four hundred volts. New one goes in—set goes back on test; routine from now on. The old part gets nailed up at the end of that row of previous "intermittent" sources—some collection, isn't it? Every one of them started out as a headache and ended up as a profit. They give me a lot of confidence, sometimes.

Now for tubes. The two 6D6's are a bit low, but passable. 42 should be replaced. 80, fair. 6A7 emits, but it's noisy—get a new one from the front of the store. 75, passable. Now, I'll line up the intermediates and brush off the chassis, just to finish off the job, and put it back on test while I call up the owner and get the contract.

OLD-TIMER: *We have located the trouble, Mrs. Randolph. One of the—*

MRS. RANDOLPH: *How much is it?*

O. T.: *The set needed several things: a coupling condenser, two tubes, and the labor charge come to \$8.75. There is a ninety-day guarantee against—*

MRS. R.: *Last week my sister got a condenser for \$1.25. Your price is too high. Bring it back just like it was. I'll pay the service charge.*

O. T.: *The work is rather complicated, Mrs. Randolph. Could I deliver the set when your husband is home, in order to explain the trouble to him? It's much easier that way, because I can point out the parts I am talking about.*

MRS. R.: *Well—all right. But I'm going to tell him the cost is much too high!*

O. T.: *Thank you, Mrs. Randolph. Seventy-three?*

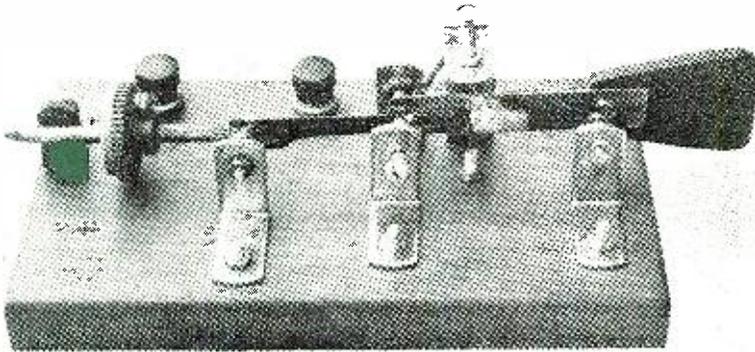
That paves the way a bit. I'll bring the set to her husband—who will already have heard my price—and show him exactly what work he is paying for. We're not too high, and she knows it; but if we come down a nickel, I couldn't blame her for suspecting us. If you can't do business with one member of the family, switch to another!

(Conclude the series on page 56)

B U G B Y J E B O W N "B U G"

by **R. C. MILES, W9KBL**
W. Lafayette, Ind.

The author constructed this speed key for less than 30c! You can do the same by following his careful description and drawings. You will find most parts in your junk box.



The completed "bug" key is quite presentable in appearance.

IN THE February, 1938, issue of RADIO NEWS, W2EAF described a speed key which could easily be made by amateurs. I read the article with interest, and, soon after getting my ticket three months later, I endeavored to build such a key. The cost of the bug was originally estimated as being nearly \$2.00. Not wishing to spend that much if I could avoid it, I cast about for means of building the key at less cost.

The details given here, are the results of my efforts. I claim no advantage in operation over the original key, but my model works as well as could be desired of any key and costs 25 cents or less. It works very well at speeds as high as forty or fifty words per minute and retains its adjustment almost indefinitely.

The most obvious improvement was the elimination of the special dot and dash contact screws. For these were substituted switch points from an old selector switch. These have a broad, flat head and are ideal for an application of this type. They are held in place in the brass angles by two hexagonal nuts, one on each side of the angle, and are easily adjusted with a pair of pliers. Both of these contacts are mounted in one-inch angles. A switch point was also substituted for the round head bolt which fastens the paddle and key bar together. This gives a much better contact. The dash adjuster near to the suspension pin on the key bar was eliminated entirely, as it was not found to be necessary. The dash contactor itself gives sufficient adjustment and the soldered joint at the suspension pin gives plenty of mechanical strength. The two brass bars which form this end of the key bar should be soldered together so that their faces are as nearly parallel as possible to eliminate play in the bar when it is moved from side to side. In order to conserve space, the key bar spring is fastened directly to the angles which form the support for the suspension bolt. A good source for

this spring is an old toggle switch.

The suspension bolts were a bit of a problem. They were finally made from two common 6/32 machine screws, the ends of which had been drilled out with a small metal drill to make a shallow depression, forming a socket for the brad which is used as a suspension pin. The ends of the brad should be filed to a rounded point. The lower suspension bolt is rigid, having its head countersunk into the bottom side of the base. The upper bolt may be adjusted with a screw driver, being held in the supporting angle in the same manner as the dot and dash contacts are fastened.

For the governor post, a 3/4-inch steel angle was substituted for the brass rod specified, as I had no rod of this type on hand. A piece of sponge rubber about 1/8 inch thick cemented to the angle serves as a shock absorber. Two binding posts from the junk box were used, whereas the original key has but one post, the other wire being fastened to the bolt which holds the support for the dot contact. This extra binding post is not necessary, although I considered it desirable. It necessitates an additional connection on the base, from the dot contactor post to the extra binding post.

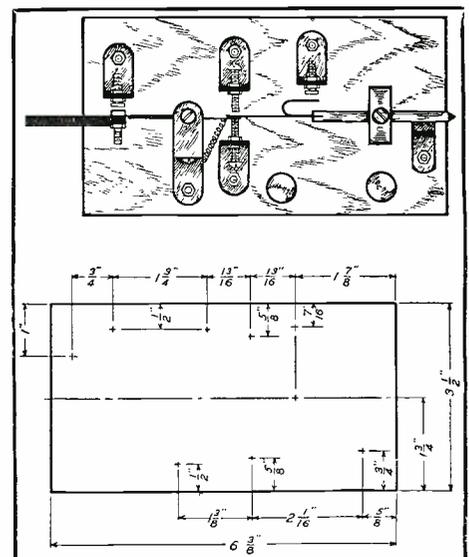
The handle, or *paddle*, was jig-sawed from an old bakelite panel.

One of the most expensive items in the construction of the bug was the speed weight. In my own particular case, a gear from an old dial assembly was used for a weight. This gear had a set screw which had been used to hold it on a 1/4-inch condenser shaft. Because of the size of the hole in the gear, I used a larger nail for the weight bar than the original ten-penny nail so that the set screw could get a firmer grip. The amateur will have to use his ingenuity in finding his own substitute for the weight. There should be something in every junk box which will serve the purpose. It should weigh at least 2 ounces and should not be more than an inch in diameter. It

must, of course, have some means, such as a set screw, to fasten it rigidly to the bar and yet permit easy adjustment.

The one remaining change, and the most difficult one, was the elimination of the U band contactor and collar. This collar is a metal sleeve which slips over the weight bar and to which is fastened a U-shaped piece of tempered steel. This steel contactor, besides making contact with the dot contactor post, also acts as a shock absorber, keeping the bar from bouncing, which would give the dots a "chopped" effect. The U band was made from the mainspring of an old pocket watch. A piece of the spring was heated red-hot in a blow torch flame and allowed to cool slowly. This removed the temper from the spring, allowing it to be bent into the desired shape. The U should be about 3/4-inch long by 1/4-inch wide. The temper was restored by reheating the spring and plunging it, while still hot, into a can of water. An alternative method of bending the spring is heating it red-hot and bend-

(Please turn to page 48)



HAM Chatter

SUCCESS STORY. He was just a ham.—a hard-working one. He was also a musician of sorts. Night after night he worked at his music, and perfected himself. Pretty soon he was an orchestra leader. More hard work and more burning the midnight oil brought him a job with the Broadcasters. His ham rig didn't suffer from this either and he continued to be heard night after night pounding the brass, or going over the 'phone bands. He had many friends and was known as an all right guy. When I get up there, he would say, when I get up there, I sure will see that the ham gets cooperation from the broadcasters. Yessir, that I will. His amateur friends were thrilled to think that they would some day have a champion in the high places.

Well, he finally got his chance, and got up "there." He is program director for a big broadcast station. Recently he was asked to OK a short 15 minute program which would give the hams some publicity, and generally help the ham's cause with the BCL's. Did he OK the program?

No, my little chickadees, he didn't! He gave as his reason, that there would be competition between the big broadcast station and the ham stations which would be mentioned and that the BCL'S might want to listen to the hams after

hams get all the gravy publicity. Watsa? Yrs fer the American Way, Bozo.

DID you know that W7UE is a poet, and a puzzle hound at that? Reprinted from SRC (Spokane Radio Co. Inc.) Ham News: (To the tune of "Three little Fishies") We'll look in on ts ham in his itty bitty shack.

With his feet 'neath the table on the power pack.
He's feeling rather lonely and he's oh so blue.
So he thinks he'll try his luck and call a CQ.

Dah dit. Dah dit. Dah dah dit dah.
Dah dit. Dah dit. Dah dah dit dah.
So let's tune the dials on our radio.
And listen in on his QSO.

Good evening, old man, your sigs are fine.
You're coming in here nearly 5-9-9.
It looks like we'll have a fine QSO.
So I'll turn it back and away we'll go.

The rig here drifts like a tramp on the road.
The poor 45's carry such a load.
The antenna swings like a kite in the breeze.
That's the reason my note has a terrible wheeze.

Too bad you can't read my rotten fist.
While tuning the rig I sprained my wrist.
Perhaps we'd better QRT.
So thanks fer the chat and 73.

Excerpts from the same: (SRC HAM NEWS) which is one swell magazine: W7AYO is trying to develop a new brew for thirsty phone hams. The foam of the new brew will sink to the bottom, and thus will not be blown into the mike, spoiling modulation!

GLEENINGS from Owen Callin's "The Ham Corner" in the Ohio State Journal: W8BZY es W8DCG are the new top ranking officers of the Columbus Amateur Radio Assn. K7AZS is using a new type Marconi antenna in that the radiator is always an odd multiple of 1/4 wave length and the point of feed is 1/2 wave, or a multiple thereof, above ground. 7AXS is located in Anchorage, Alaska, where it gets to 40° below Zero in the Winter. W8RMZ has been transferred from Columbus, Ohio, to the Panama Canal Zone. Because of the difference in the power supply at PCZ, 8RMZ is selling his entire equipment before leaving. W8EDW was certainly surprised when he came home the other night and found a huge neon sign on the roof of his home with his call letters. The sign was the work of an SWL and an ardent admirer of EDW.

K5AF, All Brook Field, Panama, a member of the Air Corps of the United States Army, has a swell QSL card. There are three operators at 5AF and they will QSL promptly. W8JK was one of the speakers at the Columbus Convention.

STUFF from the Toledo Radio Club Official Bulletin. W8TKS is rebuilding. W8SCC is a new member. W8OJO was a bachelor for a short spell and was not on the air very much. Hi! W8GN went to Toledo, set up a five meter rig in his hotel room and had a couple of very swell QSO's. [Thanks to TRC for the swell bouquets on R. N. Hanchatter. Ed.]



No, this is not a hamset! It's the Canadian CZ7Z, Ina MacHummons, op.

W8AVB lost his receiving antenna in the recent high wind.
The Civilian Air Reserve has open squadron maneuvers each week. W8SKB, W8NPH, W8PNX, W8TIV and W8KEV are going to handle communications in the squadrons. Frequencies will be C. W. on 160, and 5 and 2 1/2 on phone.
W8JOE had some tubes go haywire which have been replaced.
Hooray, hooray, W8ESN went on 160 the other night.

[Underline: Thanks to CT001 for the swell QSL card.]

EXCERPTS from the ARC (Asheville Amateur Radio Club) Magazine:
Ted MacElroy has reached the unbelievable code reception speed of 75.2 words per minute. Human tape reading machine, huh?
At the Roanoke Division Convention, Charleston, West Virginia, 360 ham visitors were present and twelve cities were represented.
Here's somepin; Says ARC:
The Ham who doesn't belong to the A. R. R. L. can be likened to the man who lived in Boston all his life and never saw Bunker Hill Monument or the man who lived in Asheville all his life and had never been on Mount Mitchell. Join up now; some of these days you're going to need the league.

W5GIZ is nw a class A man es works all bands fone es CW.
W5FVK is still building a rig this having been his fourth year at it he is nw abt ready to go on the air. Hi, Don.
W5FVK, W4AV es W4BGO are ops. WJBO Baton Rouge, La.
W5HKQ whos shack was demolished by ole man lightning is nw back on 160 fone with 140 FB watts.
W5GIZ es XYL visited with W5HMV, es chewed the rag all afternoon.
W4AV Portable 5 just returned from his vacation on the Gulf Coast with his portable 10-160 rig.
W5BRK has a rotary beam that really works. W5HEZ is vy active on 20es40 c.w.
Five mtrs. has been open several nights down here in the swamps some of the stronger sigs being W3RL, W4EVV, W9AQQ, W8NZ es many others.
W5YW Leo Broussard L.S.U. op. says he is trying for W.A.G. (worked all girls).
When W51CV es W5GIZ get together those



W5GXO (right) es W5HMV get together at Windy Bill's home town fer QSO.

hearing the program and thereby lose the B.C. Station some listeners! Success . . . what strange things it does to fellows.

SUMMER was swell for the hams. Many built portable-mobile equipment into their cars and ran all over the country-side QSO'ing hither and yon. There was not any new or outstanding contribution to mobile rigs except some variations as to the manner of bandchange. There is still a demand for a good, compact all-band communications receiver capable of a.c. or d.c. operation. The set should fit into a car's glove compartment.

In the Mail: Tnx to Ed. R. Lewis fer the crd. Sorri we couldn't make it, on account of we were busy with the column, Ed.
Aside to Owen Callin of the Ohio State Journal's Ham Corner: Dear Owen!—We appreciate your stuff no end, and we believe that you are doing a super-swell job with that column of yours. But don't you think that more news on the U. S. Hams would be more appropriate? We have a hard row to hoe with Congress and John Public as it is to get them to see that we are useful and worthy of keeping our bands, that it does not do us a lotta good to have the furrin



YL looking over W9HKB's gear, with W9KYO and W9GBD chatting in back.



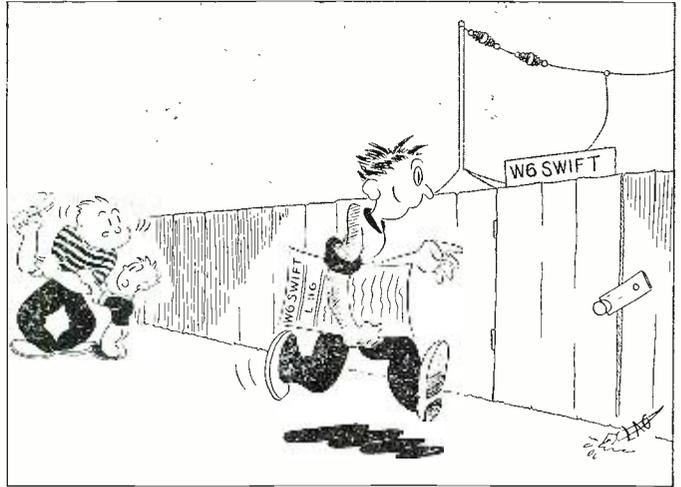
The ice cream brigade at the picnic. Picture taken by W9ANZ, sent by 9MET.



Jack W9MET Pollard, Lincoln, Neb., at the operating position of his xmtr.



A super-deluxe mobile installation which isn't a ham set. It belongs to the Parisian "Nationale."



Be careful, Butch, they say he has a wicked "fist!"

little bottles with the green seals really disappear. Hi, Mack.

W5HZY es W5HKQ are brother ops at Waterproof, La.

W5EXF es W5HJL are brother es sister ops of Alex, La. Edith 5HJL is vy busy trying to take Windy Bills (5HMV) title away from him. Hi, Edith.

W5ADJ Hodge, La. KW is nw putting up a steel tower for a 160 fone.

W5HTJ is a new one on 160 fone.

W5ZY XL op New Orleans, La. got her Pix on the front page of N. O. paper showing her making contact with Hawaii.

[*True to W5HMV for the above. Can't quite understand that motto of yrs. "Windy Bill, who never wkd es never will," when you can send in such fb stuff. Ain't that wkd? Ed.]*

FROM the Mail Bag:
I enjoy your hamchatter column very much but wonder why the gossip isn't more general instead of staying around the east? There is plenty happening out here in the center part of the United States. . . . I wonder if a person can get any pay for gathering this kind of information? Need a new tube!! hi!!

Sincerely, Jack Pollard, W9MET
[*Sure thing MET, we pay, 'n pay, 'n pay! Watch the mail, Ed.]*

MILLFORD, Nebraska was the site for a very fb ham picnic. The picnic was attended by approximately fifty ham and their families. The curious thing about this picnic was that it was not like most hamfests in one respect, there were no long speeches, it was sponsored by no organization, there were no prizes, and no admission was charged!! In spite of the c things many veterans of other picnics all joined in saying that this was the most enjoyable picnic they had attended.

Six portable transmitters and receivers were present: W9EYD, Ashland, Neb.; W9HKB, from Kansas; W9WOA and W9ANZ from Lincoln, Nebraska; W9LEF Brainard, Nebraska; and W9ZTE Wahoo, Nebraska.

W9ANZ was good enough to treat the whole bunch to ice cream and it certainly hit the spot.

W9WKP got several of the boys to join the 160 emergency net. After waiting a week for some wire to come so that he could wind a 110 a.c. generator to run from his car, he finally got it the day of the picnic. He was so disgusted that he didn't even attempt to wind it.

Wilber Schmall, W9NXS, is on 160 fone again after being on forty for a while.

W9ZTE had a 33 foot vertical antenna that he used at the hamfest at Millford.

W9BYR is rebuilding, plans to have a pr. of HY40's in the very far future.

W9RWY claims that a crystal detector would work better for a revr. than the one that he now has. Although said revr. actually heard a KA wudja believe it?

W9LEF is looking for a member of the rag chews club to talk to so he can get his certificate.

Ben Elliot, W9HZC, and his seven junior ops were offering to beat any softball team the guys got together at the picnic.

W9FWW never rebuilds, he just adds another smiter when he decides that he needs it. At present he has three complete smitters and is thinking of another.

W9KYD suggests that some one should collect all the boners that guys have made in hooking up a transmitter, says it would be helpful, yea, and remindful too.

[*True to W9MET for the above. Ed.]*

JOHNNY (W9MGH) Trinko writes:
Now that the cool breezes of Autumn are impending, and activity in the way of rebuilding for the Fall DX is slowly beginning to perk up, comes also the time for picking up one's 'mill,' dust it off in anticipation (it seems this 'mill' needs something else besides 'dusting off,' according to the failure of the crossbar on the 's.), and write some contributions.

The old 2A5-2A5-PP' 10s here finally succumbed from weakness to make way for a line-up consisting of 6F6-6L6-PP 801s, the assembly having been built with the idea in mind of putting the whole works in an enclosed rack in the very near future. Also the 40 meter rock has been laid aside for an 80 meter one, which, we hope, will mean rag-chews of a better nature than can be found on 40."

ED. R. Lewis reports:
In the Sept. *RAY* I reported that 9GGZ had blown up. I now have the sad duty of reporting the death of the operator of that station.

"Jim" Harry Leonard Sadenwater, 28, died of a sudden heart attack at 4 p.m. Friday, Aug. 4th while engaged in repacking a microphone. His body was discovered on the floor of his basement shack by his sisters, Leona and Ramona. He had been suffering with a heart ailment for years but many of us had no knowledge of this affliction because of his cheerful disposition.

"Jim" had a host of friends who will mourn his passing, both in and out of the Ham fraternity. He identified himself on the air as "2 Goats and a Zebra" and had been engaged in radio work for the past 14 years. Beside his sisters, he is survived by his father, Frank Sadenwater, Supt. of Michigan City's Washington Park, and a brother, Lester. His mother and another sister preceded him in death. The old radio club was represented by Earl Killingbeck and Harold Mewes (ticket expired) who acted as pallbearers.

On page 18 of Sept. *HAMCHATTER* we reported 9OZZ as coming thru fb. A later report on page 55 informs you of Joe's tough luck. Joe says the shack was blue with smoke when he got back and it took a week to get the smell out of the house. Well, we can now report Old Zero Zero back on the air and hope nothing happens before the next issue. Hi.

I wonder if amateurs (particularly the veterans), in the hustle and bustle of making as many contacts as possible, do not become callous to the romance, the comedy and tragedy enacted by way of the Ham bands. Really to enjoy these little real life dramas heard almost

every day, more listening and less rag-chewing is required. Finstance there was that contact between two groups of relatives in Los Angeles and New York, who had been separated for some time. What highly emotional and intimate conversations winged their way across the continent that nite!

Then there was the Mexican mother who succeeded in contacting her son in L.A. This contact was made by Ham Radio, the L. A. Telephone Co. and the son's B. C. set. Bet the XE-YL and the W6 who assisted got a lot of satisfaction out of that service.

Have you that how necessary a rig is to U. S. technicians stationed in Frgn. countries? Of course you've listened to that son of Eli in Chile contacting friends in Winnetka and elsewhere about the country.

D'yu hear that Ham who curses so much? Maybe the R. 1's down there don't understand good ol' U. S. expletives. The recent and forgivable grammatical errors of our foreign brethren are sometimes amusing. But I have heard W Hams trying to speak Spanish and that was definitely funny.

W9OCP, self identified as Old Crazy Peterson, is rebuilding and as soon as he replaces his storm damaged ant. is going to give 10 meters a whirl. Marvin says it will be any day now.

KEITH C. MATHIS of Montezuma, Ga., says: Fourth District gossip has it that: W4COW was a visiting in Ga. recently on vacation. The St. Petersburg ham reports that much activity is going on in his neck of the woods.

W4AOX an old timer of Adel, Georgia, reports that he is still among the active list.

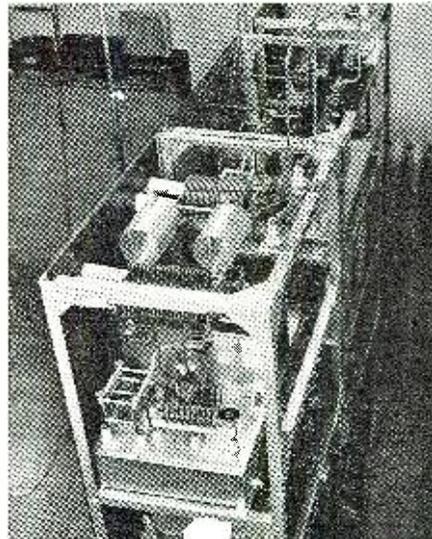
Some of the Ala. guys have learned to their sorrow what "over modulation" means, hi.

FDE is rebuilding.

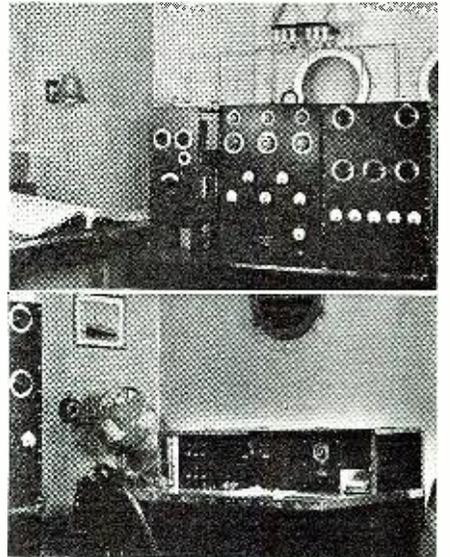
ERS has gone camera and moving picture hazy.

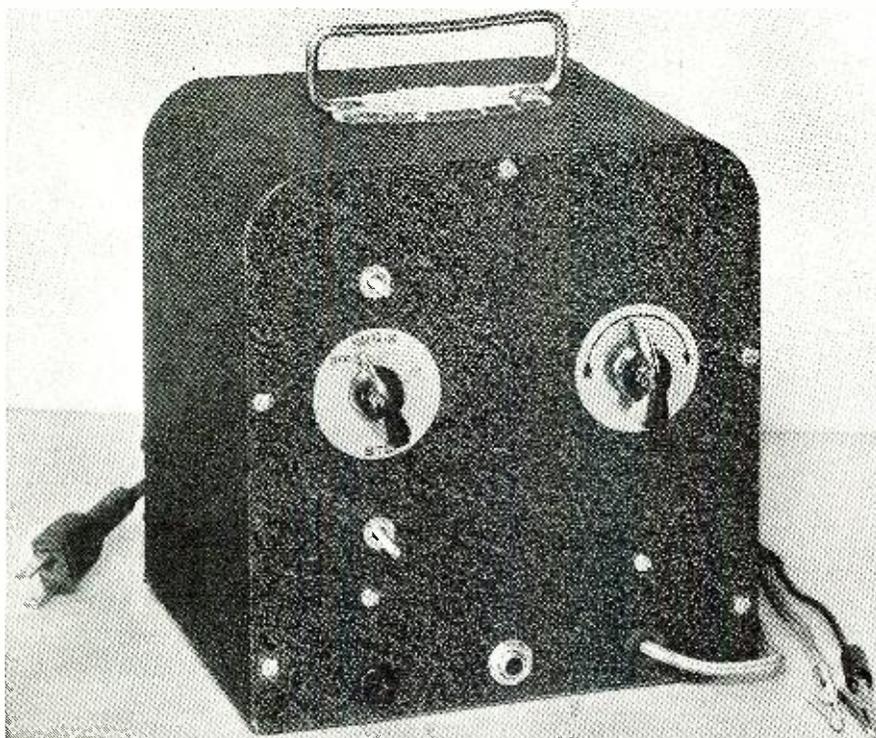
ACO visited the world's fair. The NCS of the Florida Army net reports much going on and storm season always finds the gang ready for any emergency.

(*More Hamchatter on page 63*)



This fine layout belongs to W2EXM. It will make many a ham wish for it.





by
**G. H. BROWNING &
 F. J. GAFFNEY**
 Browning Laboratories, Inc.

signal can readily be obtained with an electron coupled oscillator, and harmonics up to at least the 100th of either the 100 or the 1000 kc. oscillator can readily be heard on a moderately sensitive receiver. No tuned plate circuit is required with an electron coupled oscillator, thus allowing a material saving in original cost. The electron coupled oscillator is also positive in its action and can be depended upon to oscillate each time the switch is thrown.

In order to make the 100 and 1000 kc. modulated calibrator as versatile as possible, a mixer tube is provided as an integral part of the circuit. By means of this mixer tube, signal generators or other apparatus can be checked at any frequency which is an even multiple of 100 kc. by feeding a signal through the 100 mmf. condenser into No. 1 grid of the 6SA7 tube. The standard signal from either the 100 or the 1000 kc. oscillator is fed into No. 3 grid of the mixer tube. An audio frequency is thus produced in the plate circuit of the mixer tube which is the difference between these two frequencies; and by adjusting the unknown frequency to an exact even multiple of 100 or 1000 kc., zero-beat will be obtained. To produce an audio note which is sufficiently loud for accurate zero beat setting, a 25A7 pentode is used as an audio amplifier. The rectifier section of this tube is also used in the a.c.-d.c. power supply provided.

To utilize the 100 and the 1000 kc. signal for checking the calibration of television receivers, radio receivers, or other pieces of apparatus directly, modulation of the 100 and the 1000 kc. oscillators is practically indispensable. This is provided by means of a 6C5 used in an audio oscillator circuit. The note on this audio oscillator has been made higher than 400 cycles purposely, so as to be readily distinguishable from signal generators, etc. This modulation may be cut off at will by a switch associated with the phone jack, and so arranged that the modulation is eliminated when the phones are plugged in. This is most convenient, for when phones are used, a c. w. signal is always required.

Construction

The construction of the apparatus is straightforward in every way. The photographs of the top and the bottom of the chassis show plainly the layout of parts and wiring. The 100-1000 kc. oscillator is an integral unit mounted in a shield can together with a band-switch for choosing the 100 or the 1000 kc. oscillator at will. The band switch also incorporates an *off* position in

100 KC-1000 KC Prec. Generator

WITH great stress being placed daily upon the need for accurate frequency measurement in conjunction with present day all-wave receiving equipment and the engaging new field of *Television*, the need for accurately calibrated equipment is coming more and more to the fore. In all but the best precision signal generators, however, the accuracy of frequency calibration leaves much to be desired and, inasmuch as the precision type are usually considerably out of the price range of the average service man, he is left in somewhat of a quandary as to how to obtain the required precision from the ordinary service type unit. This problem has been very satisfactorily solved through the use of a 100-1000 kc. modulated calibrator which can be used to check an ordinary service type signal generator throughout its complete range at intervals of 100 kc. The unit also proves of inestimable value in providing spot frequencies 100 kc. apart for receiver checking without the aid of a signal generator.

The circuit diagram of the unit em-

loys an extremely stable electron-coupled oscillator which can readily be adjusted to zero beat with the *National Bureau of Standards*, station WWV or against any broadcasting station which is a multiple of 100 kc. in less time than it takes to describe. Maximum stability of the 100 and the 1000 kc. oscillator is obtained by utilizing a very high ratio of capacitance to inductance and employing fixed condensers which have practically no capacitance change with temperature or humidity. A novel inductance arrangement which is unusually stable is combined with these capacitors. No variable condensers are employed. A small change in frequency of the standards is obtained by slightly varying the inductance of the coils by means of brass plungers. In fact, a 100-1000 kc. standard of this type has certain advantages over crystals, as both the 100 and 1000 kc. oscillators are entirely independent of each other. Therefore, both oscillators may be adjusted independently to exact frequency by zero beating against a signal from WWV at 5 mc. A strong

For the alignment of new receivers, the latest television receivers, a frequency generator is absolutely necessary. The one described by the authors is easy to build and will answer the problem satisfactorily.

case it is desired to eliminate the r.f. signal and still have the apparatus warmed up and ready for instant operation. As will be noted, this oscillator is mounted in the right front corner of the chassis. Its associated 6SK7 tube is placed so that the leads are very short. Rigid bus bar wiring should be used for making connections between the tube and the 100 and 1000 kc. oscillator, for changes in position of the leads might shift the frequency slightly. In fact, it is recommended that bus-bar wiring be used throughout since the maintenance of calibration depends largely upon the mechanical rigidity of the system. The 6C5 tube is placed conveniently close to the oscillator tube and the transformer for obtaining audio frequency modulation is located near the 6C5. The mixer tube and the audio amplifier-rectifier tube are placed in the rear of the chassis. The 10,000-ohm output volume control is mounted on the left side of the front panel. A shield lead is brought out from this potentiometer for connecting to the radio or television receiver or other apparatus it is desired to check. The power supply system is of the a.c.-d.c. type using a dropping resistor cord. This eliminates a great deal of heat from the interior of the cabinet and thus materially aids frequency stability. The 1200-ohm 10-watt resistor and the dual 16 mfd. condensers make an entirely adequate filter system. The metal condenser housing the two 16 mfd. condensers is mounted in the center rear of the chassis; and the whole assembly is mounted in a metal cabinet $7\frac{3}{4}'' \times 7\frac{3}{16}'' \times 6''$. The metal cabinet has the advantage of serving as an additional shield, for, although the 100-1000 kc. oscillator is completely shielded, it is necessary to shield the complete assembly in order to eliminate radiation directly from the wiring and have the output attenuator operate satisfactorily. Since a considerable amount of time has been spent on the mechanical and electrical layout of the apparatus, it is advisable to mount the tube sockets with the pin connection as shown since this facilitates short leads. Mounting the apparatus and completely wiring usually consumes only about two or three hours.

After the apparatus is completely

assembled, a check on its operation can be made by connecting the center lead of the shielded output to the antenna of a radio receiver, whereupon the audio modulated signal should be heard at approximately 100 kc. intervals when the switch on the oscillator is thrown to the 100 kc. position and at 1000 kc. intervals when the switch is thrown to the 1000 kc. position. The attenuator will vary the r.f. output voltage from a few microvolts output to about 0.1 volt at the tenth harmonic.

After correct operation is obtained, the next step is to set the 100 kc. and 1000 kc. oscillator to exact frequency. This may be done in the following manner:

Adjusting the 1000 Kc. Oscillator

1. Plug a pair of phones in the jack provided. This operation automatically eliminates the modulation from the 100 and 1000 kc. signals.

2. Advance the attenuator on the modulated calibrator to maximum output.

3. Tune in on a radio receiver station WWV operating on a frequency of 5 mc. (WWV operates on 5 mc. daily except Saturday and Sunday from 4 p.m. to 2 a.m.).

4. Clip the center conductor of the shielded lead of the calibrator over the insulated antenna lead-in (this gives a small capacity coupling from the calibrator out to the input of the radio receiver).

5. Connect the shield of the lead to the receiver chassis and turn the calibrator to 1000 kc. whereupon an audible beat note may be heard from the speaker of the receiver.

6. Adjust the 1000 kc. screw slightly until zero beat is obtained. If upon adjusting the 1000 kc. the beat note is weak (this occurs when WWV signal is strong), clip the conductor of the shielded lead of the calibrator directly to the antenna post of the receiver.



The extreme simplicity of assembly is apparent. Servicing and ease of construction are the main features.

The 1000 kc. oscillator, when beating against WWV, can only be set at 1000 kc. as there is insufficient frequency change to allow the 6th or the 4th harmonic of lower or higher frequencies, respectively, to beat with WWV.

Adjusting the 100 Kc. Oscillator

1. With the receiver still tuned to WWV, turn the switch (clockwise) to the 100 kc. position.

2. Adjust to zero-beat by means of the 100 kc. adjusting screw. It is possible that this adjustment is the 51st or 49th harmonic of a frequency lower or higher, respectively, than 100 kc. instead of the 50th harmonic of 100 kc. This may be checked this way:

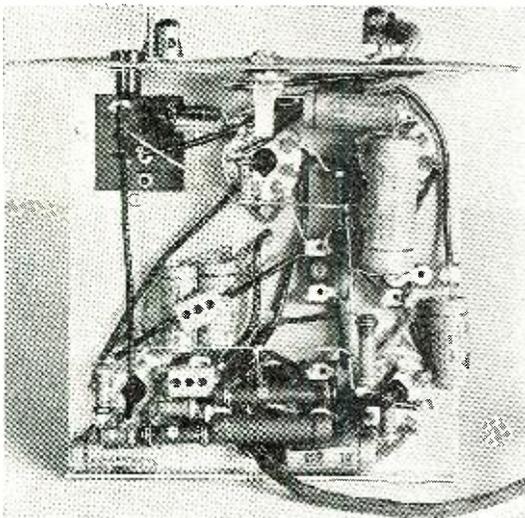
- (a) Tune in a broadcast station the frequency of which is an even multiple of 100 kc. If the 100 kc. oscillator has been correctly adjusted, practically zero beat will be obtained under these conditions. If the 100 kc. oscillator, however, has been adjusted to the 49th or 51st harmonic, the note in the receiver will be high pitched.

- (b) Re-adjust to zero beat on the broadcasting station (American broadcasting stations are required by law to maintain their frequency within 50 cycles of the assigned value and the transmission frequencies are usually within about 5 cycles of the assigned values).

- (c) Re-tune the receiver to WWV.

- (d) Adjust the 100 kc. oscillator to exact zero beat with WWV.

Before making final adjustments on the 100 kc.-1000 kc. oscillator, a warm-up period of 45 minutes should be allowed for maximum stability.



Rigidity is an absolute necessity in any construction of a frequency meter.

For very accurate measurements, it is advisable to check the 100 kc. oscillator frequently against WWV. It will be found that these oscillators are extremely stable and will hold their frequency to very close limits over long periods of time.

The accuracy of setting both standard oscillators should be somewhat as follows. Either oscillator may be easily set to zero beat with WWV at 5 mc. to within 25 cycles. This means that the 100 kc. oscillator is oscillating at 100 kc. within 1/2 cycle and the 1000 kc. oscillator is within 5 cycles. This is an accuracy of .005%, or 1 part in 20,000. By carefully setting to zero beat, much better accuracy than the above may be obtained (Accuracy of WWV is better than 1 part in 5,000,000).

Checking Radio or Television Receivers

Having adjusted the 100 kc. and 1000 kc. oscillators to exactly 100 kc. and 1000 kc. by the method outlined, the calibration of radio or television receivers may be checked in the following manner:

(1) Connect the shielded output lead to the antenna post of the receiver and the shield to the chassis.

(2) Remove the phone plug from the jack so that audio frequency modulation will be obtained.

(3) In case the receiver does not have a tuning eye or an R meter, connect an output meter to the output of the receiver.

(4) Set the receiver on the band it is desired to check.

(5) Turn the switch to the 1000 kc. position. Signals will be heard in the output of the receiver every 1000 kc. It is advisable to keep the input signal to the receiver as low as possible, for if the signal is too strong, images may be tuned in. The amplitude of the signal fed to the receiver is conveniently adjusted to the required amount by the attenuator.

(6) If it is desired to check at 100 kc. intervals, throw the switch to the 100 kc. position and signals will be heard every 100 kc. The correct tun-

ing point on the receiver is, of course, indicated by the electric eye, a tuning meter, or an output meter. Calibration curves of receivers may be drawn readily by the method outlined above.

It will be found that harmonics of the 100 kc. oscillator can be heard up to 20 mc. on a receiver having a sensitivity of about 1 microvolt. In the case of the 1000 kc. oscillator, there is sufficient harmonic content so that frequencies up to about 70 mc. may be checked.

Checking the Frequency of Signal Generators, Oscillators, etc.

As before indicated, a mixer tube has been provided in the 100 kc.-1000 kc. modulated calibrator to facilitate

checking radio frequency signals at 100 kc. and 1000 kc. intervals. A pin jack is provided, as shown, for introducing the signal from the signal generator, oscillator, etc., into the calibrator. It is usually unnecessary to connect the ground lead of the signal generator or oscillator to the modulated calibrator. However, this can be determined by trial and if it is found advisable, clip connection can be made to the shielded output lead. Having made connection from the output of the signal generator or oscillator and set the output of this apparatus to maximum, plug the phones into the output of the modulated calibrator and proceed as follows:

(1) Low-frequencies may be checked by setting the switch on the 100 kc. position and adjusting the signal generator or oscillator until zero-beat is obtained, as determined by the phone.

(2) 1000 kc. points may be obtained by switching the modulated calibrator to the 1000 kc. position and adjusting the signal generator to zero-beat, as determined by the phones.

Thus exact 100 kc. and 1000 kc. points may be readily obtained, and the calibration of the signal generator

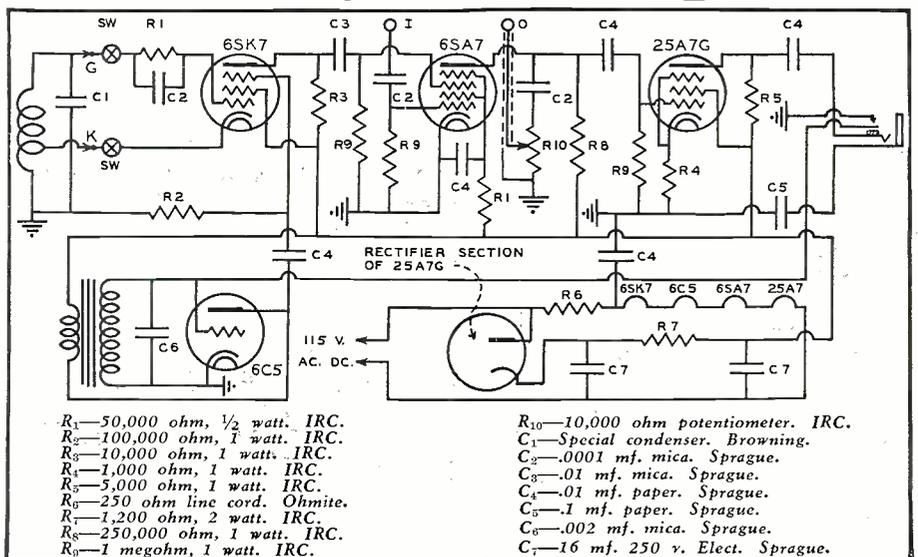
or oscillator accurately determined. Signal generators which have output of about 1/10 volt, may be checked with the 100 kc. standard and audible beat notes obtained up to about 15 mc. while beat notes with the 1000 kc. oscillator are audible up to 50 mc. or more. In some signal generators there is a great deal of attenuation in the shielded output leads and, as a consequence, very weak beat notes may be obtained on the very high frequencies.

Beat notes are also obtained from harmonics of the apparatus being calibrated beating with harmonics of the 100 kc. or 1000 kc. oscillator. In this way checks at 50 kc., 33 1/3 kc., etc., points may be made. Since these higher order beats are much weaker than those due to fundamentals, their definite recognition is not always easy and great care should be taken in using them to be sure to identify them correctly.

Many signal generators change their frequency slightly with output attenuation and this can be readily determined by setting the signal generator for zero beat as determined by the phones and changing the output attenuation. If there is a frequency shift, an audible beat note will be heard. Signal generators and oscillators can also be checked for drift over a period of time by setting to zero beat and determining whether or not an audible beat note is heard after some period. The 100-1000 kc. modulated calibrator can readily be checked to see whether it changes its frequency with time by rechecking against WWV's signal. It will be found that, after a warm-up period of about one hour, the 100 and the 1000 kc. oscillator will have a negligible drift.

The versatility, accuracy, and convenience of frequency determination with the apparatus described should have a wide appeal, in view of the increasing stress being placed on rapid and precise frequency measurement.

-30-



- R₁—50,000 ohm, 1/2 watt. IRC.
- R₂—100,000 ohm, 1 watt. IRC.
- R₃—10,000 ohm, 1 watt. IRC.
- R₄—1,000 ohm, 1 watt. IRC.
- R₅—5,000 ohm, 1 watt. IRC.
- R₆—250 ohm line cord. Ohmite.
- R₇—1,200 ohm, 2 watt. IRC.
- R₈—250,000 ohm, 1 watt. IRC.
- R₉—1 megohm, 1 watt. IRC.

- R₁₀—10,000 ohm potentiometer. IRC.
- C₁—Special condenser. Browning.
- C₂—.0001 mf. mica. Sprague.
- C₃—.01 mf. mica. Sprague.
- C₄—.01 mf. paper. Sprague.
- C₅—1 mf. paper. Sprague.
- C₆—.002 mf. mica. Sprague.
- C₇—16 mf. 250 v. Elect. Sprague.

SIGHT & SOUND NEWS

WOKO TAKES FINCH FACSIMILE EQUIPMENT

NEW YORK, N. Y.: W. G. H. Finch, president of the Finch Telecommunications Laboratories, Inc., N. Y. City has announced that WOKO in Albany, N. Y. has concluded an agreement for use of Finch Facsimile apparatus.

WOKO will go on the air just as soon as it receives its FCC facsimile grant.

Other broadcasters now using Finch facsimile equipment are WLW, WOR, WGN, WSM, WHO, WWJ, KSTP, WHK-WCLE, WSAI, WGH, and W2XBF.

CARRIER PIGEONS SPEED NEWS AND PICTURES FOR WLW-W8XUJ FACSIMILE RADIO NEWS

CINCINNATI, O.: The oldest and newest methods of communication were combined recently when the Crosley Corporation's facsimile station W8XUJ used carrier pigeons to speed pictures of the Cincinnati Reds-Pittsburgh Pirates baseball game to its studio for immediate transmission.

Black Comet, world-record racing bird on whose back was strapped the official harness of the United States Signal Corps, flew the negatives from the baseball park to the Crosley plant, a distance of approximately four and a half miles, in three minutes and the photos were developed and on the air twenty minutes after being taken. Six birds were used in carrying the thirty-two pictures snapped on the playing field. The standard Signal Corps harness for pigeons was secured through cooperation of the NEA.

According to Wilfred Guenther, Crosley coordinator of facsimile and television, pigeons may become regular members of the WLW-W8XUJ staff to increase the speed of picture service.



The only working Baird system in NY at present. The produced picture is 12'x15'.

TELEVISION PICK-UP MADE OUTSIDE LINE OF SIGHT

SCHENECTADY, N. Y.: In a little shack atop Pinnacle Point, a 1,600-foot elevation in the Helderberg hills about 12 miles from this city, a group of 20 farmers from New Scotland and Altamont saw the King and Queen as they inspected the New York World's Fair better than 99 per cent of the million or more people who were actually present at the fair. Literally speaking they had ringside seats, for the images of both Their Majesties were flashed instantly and clearly by television over the 130-mile airline space between New York and the television receiving equipment installed by General Electric engineers on top of this hill.

Contrary to the theory that television can be picked up but 40 or 50 miles from the point of origin and at no spot beyond the horizon as seen from the transmitter antenna, General Electric engineers received the complete two and one-quarter hour program of the King and Queen's visit to the fair as telecast from atop the Empire State building. Even though the telecast originated at about 1,300 feet elevation in New York and was received atop a 1,600-foot hill, the "line of sight" was still 8,000 feet above the receiving antenna, according to C. A. Priest, General Electric's chief radio engineer.

"We feel there was nothing accidental about this reception even though it seems to be contrary to the rules of television," Mr. Priest explained. "In two preliminary tests, we picked up the complete program as telecast by NBC in New York, and both picture and voice were received very clearly. I really don't believe we will have any trouble in receiving television programs sent from New York, even when the airline distance is 130 miles and we are a mile and a half below the line of sight."

Among the small group present for the first telecast of the royal couple



Note the tropical helmet worn by the telecameraman to prevent heat prostration.

was John D. Ogsbury, veteran editor and publisher of the Altamont Enterprise, a weekly newspaper. Despite his years, he tramped up the hill for the demonstration.

"It was worth the effort. It was history being made in my neighborhood. I never thought I would ever see anything so wonderful in my day," Mr. Ogsbury said. "It was better than if I had been at the fair. When the King and Queen came out from the building in which they had lunched, they walked right up to within a few feet of the television camera and I got a mighty fine look at both of them. It was one of the greatest things I have seen in all my life."

The receiver, of standard G.E. type, was set up in a small shack hurriedly erected atop the hill. Power to operate it was supplied by a small gas-driven generator hauled to the spot. A special directive antenna was erected, diamond in shape, on four poles 40 feet above the ground. This covered in all a space of about 300 by 600 feet. The spot is located about two miles from the new high-power television station that General Electric is building, which is expected to be in operation early in November.

DU MONT FILES APPLICATIONS FOR ADDITIONAL TELEVISION LICENSES

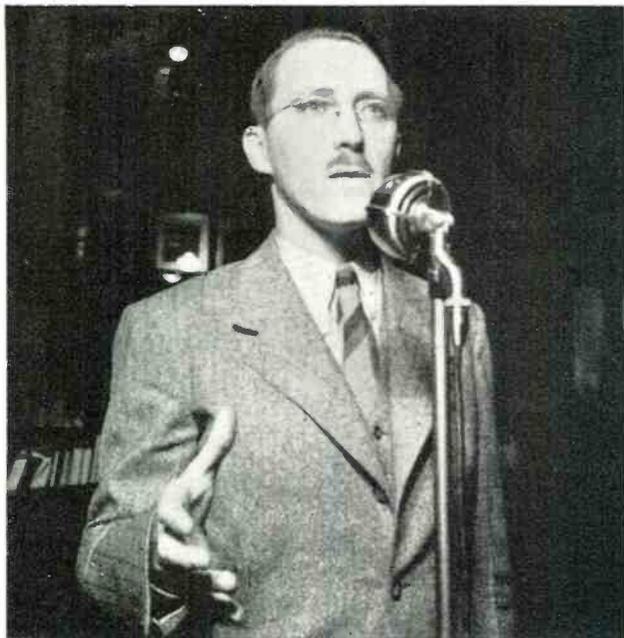
PASSAIC, N. J.: Stepping up its television activities in transmitting quite as well as the production of television sets and tubes, the Allen B. DuMont Labs., Inc., of Passaic, N. J., have just filed applications for additional television transmitting licenses.

One application covers a portable mobile transmitter to be carried on a motor truck, for picking up outside events and flashing them via ultra short wave back to the main transmitter for retransmission. Another application covers a 1 KW transmitter to

(More S & S News on page 56)



An exhibition of wired television, where a viewer is in the same room with xmtr.



Representative Leo Hoegh making a speech in Chambers.



The Iowa State Capitol Building, where the P.A. was placed.

THE IOWA STATE CAPITOL AMPLIFIER

by **LLOYD MOORE**

Moore's Radio Shop, Chariton, Iowa.

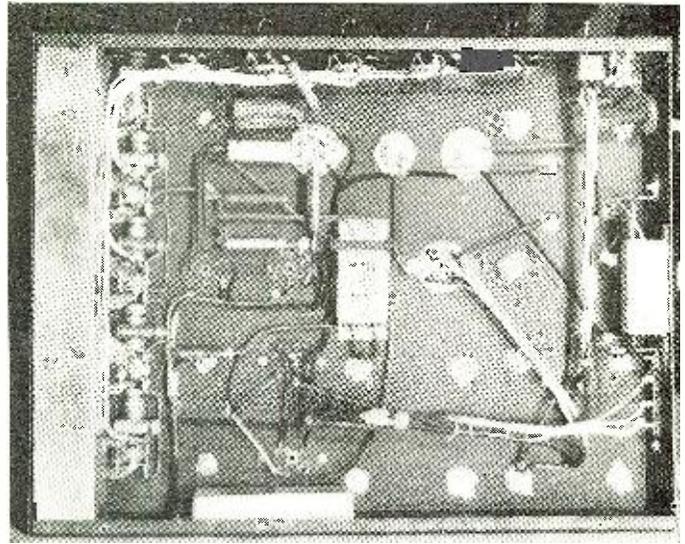


The placement of the parts permits easy servicing when it shall become necessary. No feed-back was experienced.

THIS is the story about the first amplifier to be installed in the State Capitol building at Des Moines, Iowa. Notice was given that the Representatives wished an amplifier for their chamber in the State house. Bids were taken as all purchases made for the state are made, other things equal, from the lowest bidder.

Before making our bid we talked with the members of the committee in charge of buying the amplifier, to find what results they expected after the amplifier was installed and also to find out if possible just about how much money they wished to spend in order to determine what quality and price apparatus to consider offering in our bid. The members of this committee were non-technical men of course none of whom had previously had any experience with this side of sound work. It was explained to them that when using microphones in a room of this type where the loudspeakers were located in the same room and in some cases only a few feet from the mike itself, it would be necessary for the speaker to hold himself about eight inches away from the mike and use a good voice. Some of the committee had used a studio mike, but they readily understood about the feedback problem that would be encountered when it was explained to them. The Representatives' chamber in the state house is a very large room (overall about 100x100x50 feet high) with hard walls and ceiling to cause reverbera-

In building up the amplifier to be used in the Iowa State Capitol, it was a serious problem to overcome feed-back. How the author did it, and how the entire system was installed makes fine reading for P.A. men who might meet the very same conditions.



Notice the clean wiring and layout job which the author did in building up this efficient amplifier.

tion and echo. All this was explained to the committee in detail, however we assured them that what little interference that we might encounter would in no way detract from the usefulness of the system. When we were sure that all understood the conditions under which the system would have to operate, we submitted our sealed bid. It is very important that this part of the deal be discussed thoroughly, as this will simplify collecting for the sound system later.

After having been notified that our bid had been accepted we began in earnest to plan a suitable system to satisfy the needs of the assembly. Our bid had been high enough to allow us to use the best of materials in the construction of the amplifier along with a reasonable amount for the labor involved. It was decided the system should have the following features:

1. Heavy duty construction throughout insuring trouble free operation under continuous duty service.
2. Circuit itself must be simple, and using no new ideas not thoroughly tried out in actual practice before (this is just a safety measure).
3. Operation of the system must be simple enough for anyone to operate. There was to be no regular operator.
4. Five inputs were to be provided so they could be mixed in any desired manner. Provision was made to add extra inputs low or high if the need should arise.
5. Power must be enough to provide coverage and still not so high as to be hard to handle or cause undue trouble from hum or feedback.

The heavy duty part was solved by using a power transformer able to furnish *three times* the amount of power required by this amplifier. Of course the voltage on a transformer of this type used on this load would run higher than necessary. This was solved by placing a heavy duty resistor (1000 ohms) between the centertap of

the high voltage winding and the ground. The drop in voltage across this resistor is used to supply the semi-fixed bias to the power tubes. These were 2A3's adjusted to draw 80 mils at 300 volts on the plate.

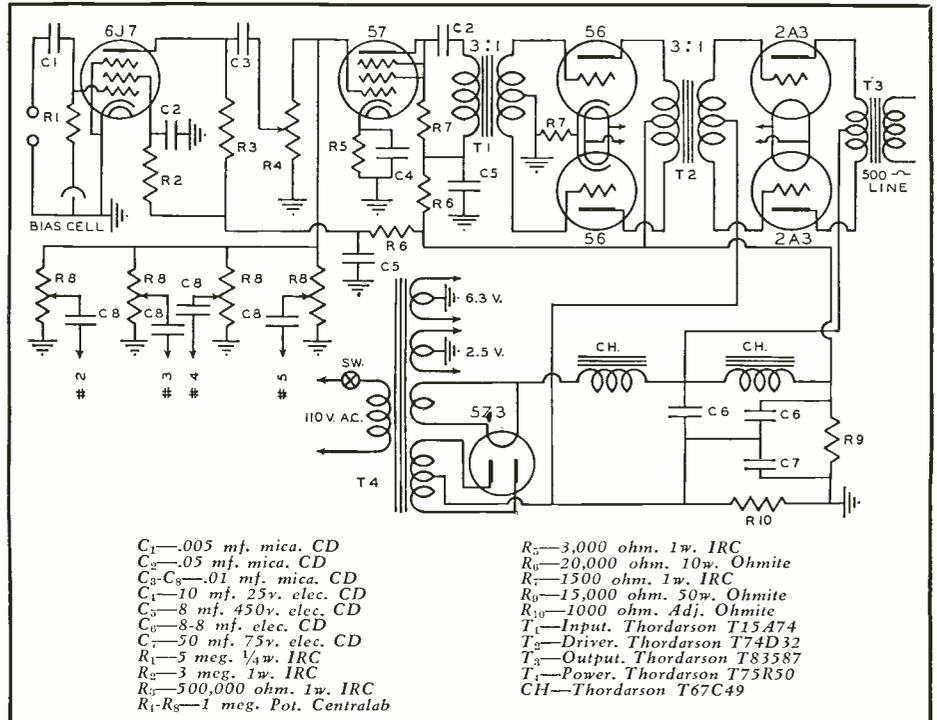
The two chokes used were made to carry 200 mils each. The output transformer was made to carry four '50 type tubes in PP parallel. This impedance worked out very well. Then by using oversized resistors built to carry twice the load and condensers in both the by-pass and filter positions that were rated far above the operating voltages in the amplifier, we eliminate as far as possible any trouble that might come from this end.

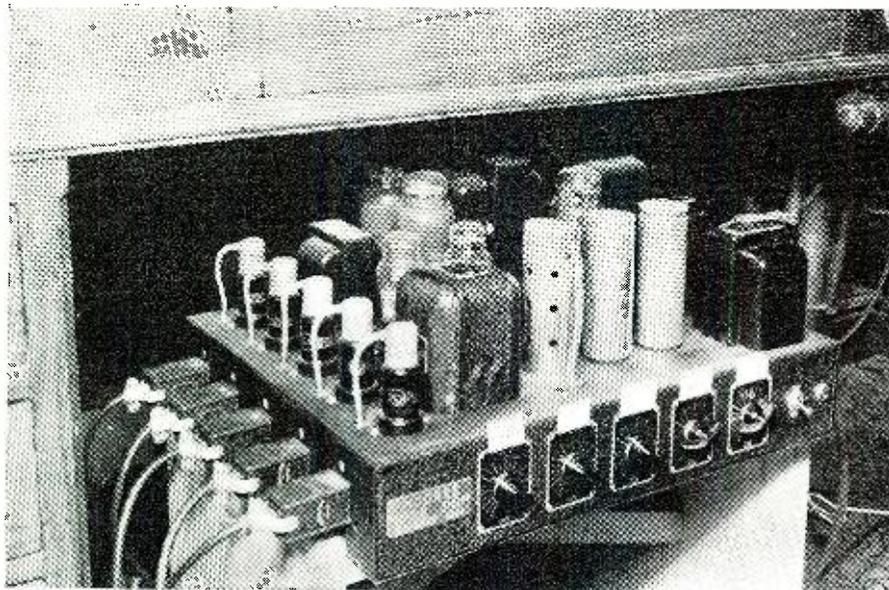
The circuit itself is a class A amplifier of four stages, using five separate input channels. The tubes used were

6J7's for the input stages, a 57 tube for the mixer stage, two 56's for the drivers and the power stage two 2A3s used with a semi-fixed bias. A 5Z3 tube was used for the rectifier.

This makes an amplifier that is both simple to build and operate and also has plenty of gain for its purpose. The gain is not excessive to cause any trouble from microphonic tubes or hum pickup. None of the mikes would begin to feedback till the control was turned way past the middle.

Any of the five inputs could be used individually or all together without change in the power or tone of the amplifier. All that is necessary for any one to do is merely snap the switch, and turn on any mike they wish to use. A small card placed directly above each control shows the limit to





The amplifier was placed under the Clerk's desk. White cards attached over the inputs, designated where the mikes were.

which that control might be turned without causing feedback.

Very little need be said about the actual construction and circuit the amplifier as the schematic and photos describe this part better than words. A large chassis (3x13x17) was used to prevent any crowding of the parts which might cause heating or some electrical interaction which would cause trouble.

The large chassis also makes servicing, when necessary, a much simpler job as the parts are not piled up, but spread out making the circuit easy to trace and test. The power transformer and two chokes are mounted along the right end of the chassis, while the five inputs are ranged along the left end. This separation of the input stages and the hum fields of the power transformer and the chokes helped eliminate any chance of hum. 6J7 metal tubes were used in the input stages because of their high gain, self shielding and freedom from microphonics. Two and one-half volt tubes were used for the remainder of the circuit because the transformer used provided this voltage and also we believe that a filament type power tube such as the 2A3 will last longer with less trouble than power tubes of the cathode heater type.

Jones plugs were used for both the cable ends and for the mike sockets on the amplifier. The backs of these Jones plugs serving as input connections are shielded individually by a shield built of tin. In each shield we have the socket, the grid bias cell, the grid resistor and the isolating condenser, or coupling condenser. The cover for these shields is built in one piece and is easily removed when necessary. The output of these stages are separately run to their respective volume control where they are mixed or switched as the case may be. Shielded wire is of course used for all signal voltages as far as

the mixer stage. The five one megohm volume controls are all connected in parallel, with each input from the 6J7 tubes connected to a moving arm on its respective control. This type of mixer was used after several other schemes were tried. It is simple, works well for this purpose and there is practically no mixer loss as compared to other mixing methods.

The 57 mixer tube is resistance-capacity coupled to the hum-free transformer feeding the driver tubes. This transformer is of the balanced winding type to prevent any hum pick-up from stray fields. The drivers then feed the power tubes through a special transformer made to drive two 2A3's when used with a semi-fixed bias. The 2A3's in turn feed the output transformer. This transformer was originally designed for 4 250's. This transformer was used because the winding is heavy enough to operate for hours without becoming even warm. The impedance, although not as required for two 2A3's, matches very well, even seems to have a more solid or heavy character to the voice than does the regular transformer. This helps to make the amplifier easier to understand.

The speakers selected for this job were heavy duty 12-inch permanent magnet type. These two speakers were mounted in baffles 30 inches square by 10 inches deep. They were left with an open back. The speakers themselves were rated to operate at 15 watts continuously. Much smaller speakers could have been used with good results, but here again it is desirable to have a wide margin of safety as well as better efficiency. The speaker boxes were hung in front of a balcony railing grill. In this position there was no back pressure on the cone which seemed to make the voice more easily understood. 500 ohm lines were run to the speakers which were about

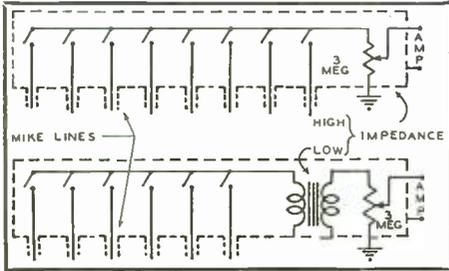
75 feet apart, with the amplifier about midway between them. Voice coil leads to the speakers were also tried and no difference in power or tone could be noticed on the voice frequencies. 500 ohms however is to be preferred as it makes the system more independent as to speaker placement. Ordinary duplex rubber covered wire was used to connect the speakers to the amplifier. This was run along the woodwork and floor and fastened with small staples, being careful not to drive them too tight so as to cut through the insulation. By experimentation the speaker boxes were pointed where there seemed to be the best coverage with the least reverberation or echo. This had to be done when the house was in session as the chamber presented an entirely different problem when filled than it did when empty.

Something might be said here about the selection of microphones to be used. Several different makes and types were tried here just to make sure that we were using the best that we could under the conditions we had. Features necessary for best operation were: high output, freedom from feedback tendencies, small size and weight, along with reasonable price. Dynamics, ribbon and crystal mikes were tried. The mike selected as the best all-around and especially free from feedback was the *Shure Bros. Uniplex* which is a specially designed crystal microphone. This mike would pick up the speaker's voice about twice as far away without feedback. It seemed to work well no matter which way it was pointed while some of the others tried had a marked tendency to feedback when turned in the wrong direction. Of course it must be remembered that the amount in the bid allotted to be spent for mikes left the choice only in the low priced field.

The question comes up here, would it not be better to use low impedance mikes and lines for these mike circuits? It would be all right to use low impedance of course and under some conditions in some installations it might be necessary to use low impedance circuits for the mikes, but here we used mike lines up to 100 feet long, high impedance lines and these were strung out amongst all sorts of signal circuits and the electrical voting machine wires that are beneath the chamber floor. With all this and while using high impedance circuits throughout not a trace of hum can be heard. In fact, you can't tell whether the rig is on or not till you start to talk. This lead to each Representative giving the mike a couple of thumps just to make sure he had been turned on, before he began to speak. The mike lines were grounded only at the amplifier itself. The amplifier in turn was grounded to the conduit bringing the 110 volt circuits up to the speaker's desk. We tried grounding the shield on the extension lines running out to the floor plug-in positions, but it caused a slight hum pickup. The final ground was made

to the ventilator system which ran beneath the floor.

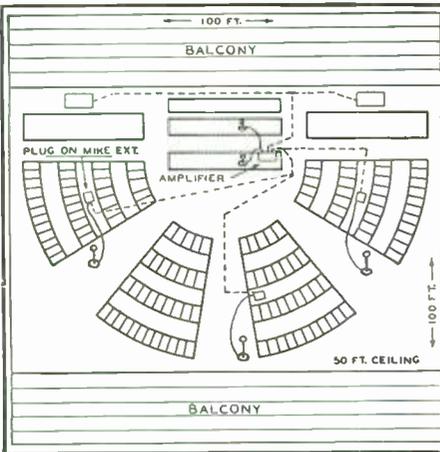
One microphone was placed on the speaker's desk, one on the reading clerk's desk and the other three, one to each division on the floor. The extension lines were run out to a central point in each of these divisions and provided with a plug-in connection.



Method used for connecting both hi and lo impedance microphones to amp.

The mike for each section was mounted on a floor stand and provided with a long cord allowing it to reach any desk in that section. These mikes were then moved by page boys to any Representative wishing to speak. This idea was used only as a trial. After the spring session the entire floor is to be wired. This will allow any number of mikes necessary to be used. This can still be done with the present equipment by using a switching system to pickup the mike or mikes that wish to be heard. A switchboard for each section will be necessary. Each of these three switchboards will then feed into the corresponding preamplifier tube. If two mikes used in same section they are paralleled connected.

The amplifier itself was placed beneath the reading clerk's desk. He could turn on any mike needed. Most of the activity of the Chamber's busi-



Seating arrangement of the House was surely conducive to feed-back, but amplifier design prevented it.

ness centered around his desk so he always knew what was going on and what was likely to take place out on the floor. Fortunately for us, and the Representatives, one of the clerk's assistants, a girl, had been an operator in a broadcasting station. She knew about gain, feedback, mike placement and many other things that made her
(Switch to page 61, please)

The VIDEO Reporter

by SAMUEL KAUFMAN

THE RADIO CORPORATION OF AMERICA went to town in a big television way at the recent convention of the National Association of Broadcasters in Atlantic City. The best in video developments RCA had at its command in New York and Camden were rushed to the seaside resort so that station owners and broadcasting executives could see just how far television has really advanced. There, assembled, was the greatest single group of prospective television station owners. But even broadcasters who have realized huge profits in sound programs are cautiously eyeing this thing called television before deciding to plunk many thousands of dollars into it. Anyway, RCA didn't miss a bet in putting its video achievements across. And all the stunts made a big hit with the crowd.

The opening day of the convention called for a demonstration of the much-publicized mobile unit which was brought down the coast from New York. The television station-on-wheels was en route to Camden for overhauling and the addition of a second iconoscope camera. An assortment of boardwalk and surf programs was picked up on sets installed in the Ambassador Hotel. At times a camera on the hotel terrace was left on unattended and persons peeking at the receiver models indoors were able to view the familiar boardwalk scene.

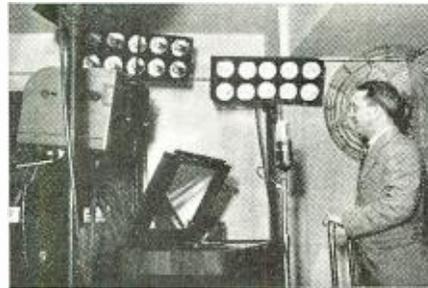
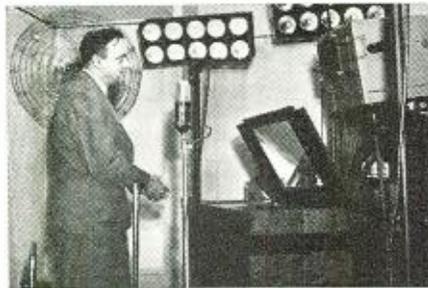
All these stunts were highly interesting to the delegates but what really stole the show was the two-way television demonstration whereby a delegate on one floor of the hotel could hold a conversation with a delegate on another floor while viewing each other. The Video Reporter took part in one of the test conversations and felt that it was easier to get tanned by the studio lights than by the famous Atlantic City sunshine outside. Nine years or so before, your Video Reporter participated in a similar two-way sight-and-sound demonstration conducted by the Bell Telephone Laboratories in New York. RCA made no bones about not being the first to try the stunt. But the Camden lads did emphasize that their arrangement was the first experiment with two-way high-definition television, pointing out that the previous experiment was a mechanically-scanned job.

The RCA two-way test was accomplished by a crude layout of equipment. But it worked. And that's what counted. Two separate circuits were laid out over wires. The person facing the camera under the battery of lights merely had to glance down on the mirror lid of a receiver in front of him to see the person to whom he was talking. And the other one saw him in a like manner. The receivers had to be draped with a small

mask opening for viewing purposes, this being essential to keep out the excessive light needed for the pick-up portion of the arrangement. The video monitoring was accomplished by the new "Jeep" unit which made its formal debut at the broadcasters' sessions. And the "Jeep" is a thing we'll tell you more about.

THE reason we are using quotes on the word "Jeep" is because that isn't the official name of the unit. It is more formally known as "television picture equipment." But the name "Jeep" seems to be sticking and, unless anyone owns commercial rights to it, that may easily become the unit's regular cognomen.

The unit resembles the firm's 12-inch screen television receiver in outward appearance. This is especially emphasized in the use of a mirror lid for monitoring purposes. The "Jeep" accommodates a single iconoscope camera and produces a television picture for demonstration purposes or for television receiver servicing. It can demonstrate television theory in areas where no video signals are on the air. Thus, it can be employed at fairs, schools and other locations for promotional or educational purposes. Also, it is invaluable for testing and adjusting television receivers, particularly at times when no sight- and-sound program is on the air. Also, it is understood that the "Jeep" can be employed for television program pickups, the chief drawback in this usage being the limitation to a



RCA recently accomplished two-way television-telephone conversation. During the conversation one can see the person to whom one speaks.

single camera.

THERE'S considerable grumbling among television set and equipment makers over the public's slow response to television in terms of receiver sales. And it's no easy task to find the reason. But there are several good hints.

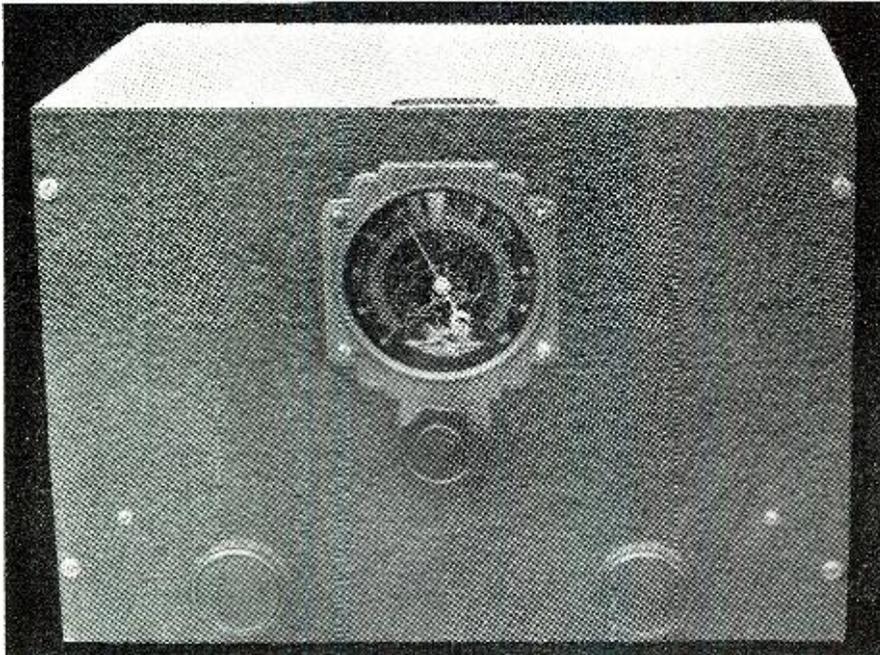
Publicity for television has been quite satisfactory since the launching of the regular schedule last spring. Newspapers in the New York area gave the new art considerable space at a time when dailies in other parts of the country were sharply reducing editorial lineage devoted to radio. But there's a bit of a question over how long television can linger without paying its board. It seemed that television showed every sign of developing with boom-like swiftness. But the actual commercial pace is slow and, unless public interest warrants good-sized advertising appropriations, it is doubtful whether newspapers in television service areas will continue playing up the new art. It would be different if substantial numbers of receivers were sold; television, under
(More Video Reporter on page 52)

A Pre-selector for the 1.4-v. Ham Superhet

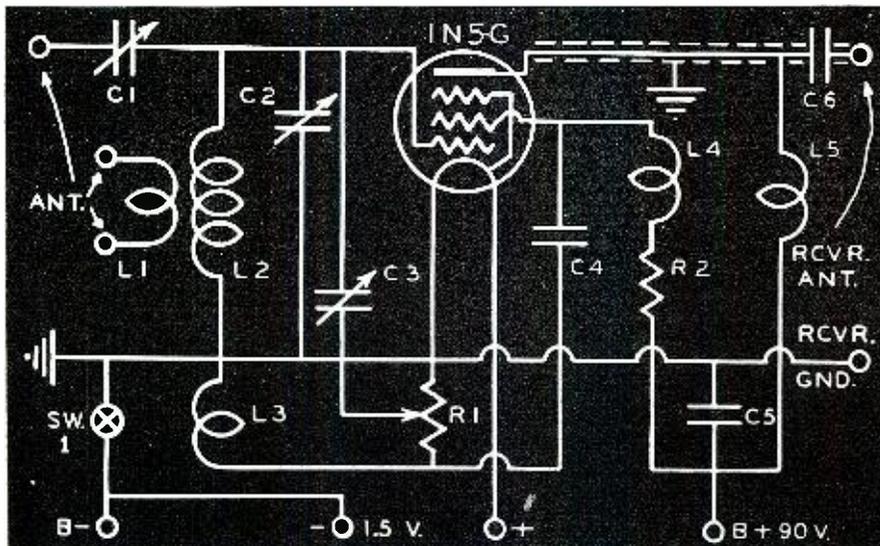
by **HARRY D. HOOTON, W8KPX**

Henderson, West Va.

Last month we published an article on the construction of the 1.4-v. superhet. This month the author tells how to build a companion unit.



The pre-selector is commercial in appearance—and performance, too.



ALTHOUGH this pre-selector was designed particularly for operation in conjunction with the battery-operated "ham" superheterodyne using the new 1.4 volt tubes, [RADIO NEWS, Sept. 1939, page 23], it can be used with practically any short wave receiver of either the superheterodyne or tuned-radio-frequency type. For the superhet not having a tuned r.f. stage ahead of the mixer, this unit affords a positive relief from *image interference*. It also enables the operator, especially when listening on the frequencies higher than 14 megacycles, to bring in with good volume, *weak* stations that otherwise would be lost in the noise level.

The circuit is extremely simple and straight-forward. The tube is the 1.4 volt type—the type 1N5-G, which requires no "C" bias and only 1.5 volts of "A" and 90 volts of "B" power. The filament and plate currents are only 0.05 amperes and 1.2 milliamperes respectively. Thus it may be readily understood that two or three flashlight batteries connected in parallel for "A" current and a couple of "midget" size 45 volt "B" blocks will furnish all of

C₁—3-30 mmfd. Midget.
C₂—100 mmfd. (band-set)
C₃—35 mmfd. (band-spread)
C₄—0.006 mfd. mica
C₅—0.5 mfd., 400 volts, paper
C₆—0.00025 mfd., mica
R₁—2,000 ohms, with SPST switch (SW₁)
R₂—10,000 ohms, 1/2 watt
L₁, L₂, L₃—Plug-in coils. See coil table.
L₄, L₅—R.F. chokes, 2.5 MH, midget. See text.

MS-989—PARTS LIST COIL DATA

Band meters	Turns L ₂	Spaced over	Wire size	L ₃	L ₄
10-20	3	1 3/4"	14 E.	2 1/2	3
17-41	9	1 3/4"	16 E.	4	4
40-80	17	1 3/4"	22 E.	6	6
80-160	35	1 3/4"	24 E.	9	6
160-270	58	1 3/4"	28 E.	14	6

All coil forms six-prong type, 1 1/2" diameter. All tickler and antenna coupling coils are wound close with No. 30 d.s.c. wire. Spacing refers to the length of the winding on the form, not the distance between turns. Range given is only approximate.

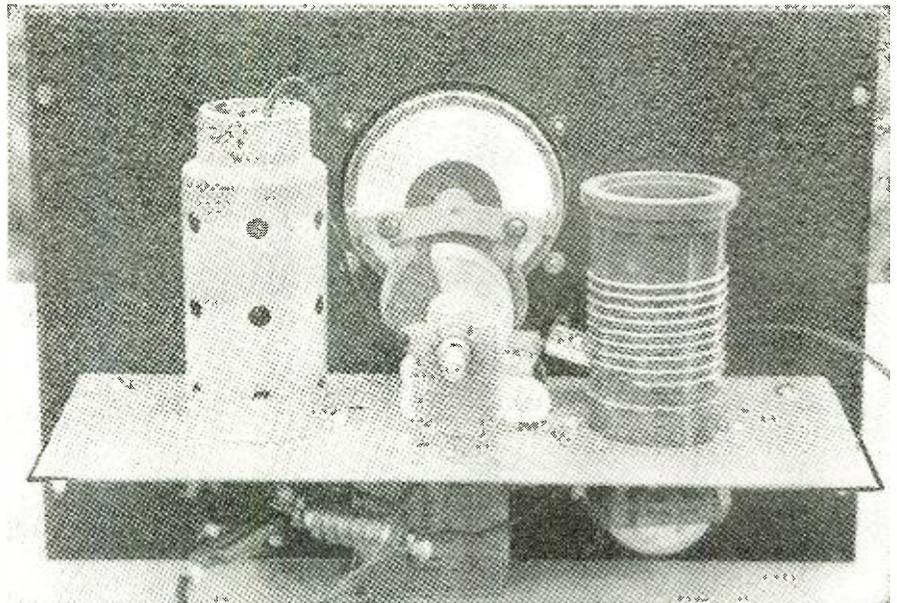
← Connecting the pre-selector presents no unusual situations.

the power required, even for a considerable period of time. In designing the preselector unit, enough space back of the sub-base has been left to permit the batteries to be placed inside of the cabinet. This is quite convenient as it allows the pre-selector to be removed from the receiver, when its use is not desired, without disturbing the receiver batteries or connections.

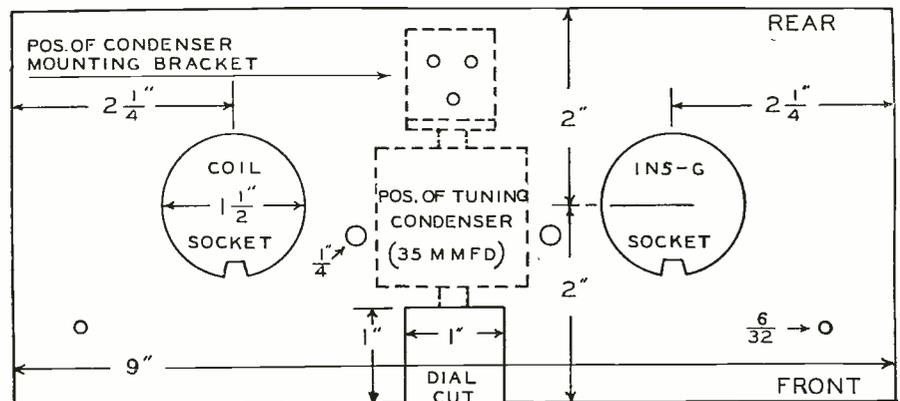
An examination of the diagram shows that the circuit is of the electron-coupled variety, the tickler being placed in the screen-grid circuit. The r.f. choke, L4, is quite essential to the proper operation of the circuit and should be of good quality. The resistor, R2, is used to drop the screen voltage to the point where maximum sensitivity is obtained. The value used has been determined with the aid of a sensitive voltmeter and should not be changed. The method of controlling regeneration by shunting a 2,000 ohm potentiometer, R1, across the tickler coil was found to be superior to the method of varying the potential applied to the screen.

The coils are of the regular commercially-wound six-prong, plug-in type, five being required to cover the full range from $9\frac{1}{2}$ to 200 meters. The condenser, C2, of 100 mmfd. maximum capacity is the band-setting condenser; the 35 mmfd. condenser, C3, is used to spread the bands out over the entire 270 degrees of the tuning dial. Provision has been made for using either a plain single wire type of antenna or a doublet antenna. When using the doublet antenna, it is advisable to remove the primary winding from the plug-in coils all except three or four turns. If the entire winding is used for coupling the antenna to the grid circuit, difficulty in obtaining regeneration may be encountered.

The construction of the unit is not at all difficult. Drill and cut the various holes in the panel and sub-base before any of the parts are mounted. Mount the tube and coil sockets and the tuning condensers in the positions that will give the shortest and most direct r.f. wiring between them. The various r.f. chokes, by-pass condensers and fixed resistors are mounted directly on the socket terminals themselves, their tinned wire leads being of sufficient stiffness to hold them erect. Use either the solid or stranded, tinned, push-back hook-up wire for making the connections between the various parts. Keep the leads as short and direct as possible without sharp bends or turns and solder each joint carefully with a clean, hot and well-tinned iron and rosin-core solder. All of the negative (ground) leads are connected to a *single length* of *insulated* bus wire which is soldered to the chassis at *one* point only. This method of construction helps to eliminate instability and noise that would be caused by eddy currents circulating in the metal chassis if the connections were made to several points. The output lead from the 1N5-G plate to the antenna post on the receiver must be kept short—not over



The very freedom from any complications in the layout of this compact unit assures the success in its use. Fine for DX sigs.

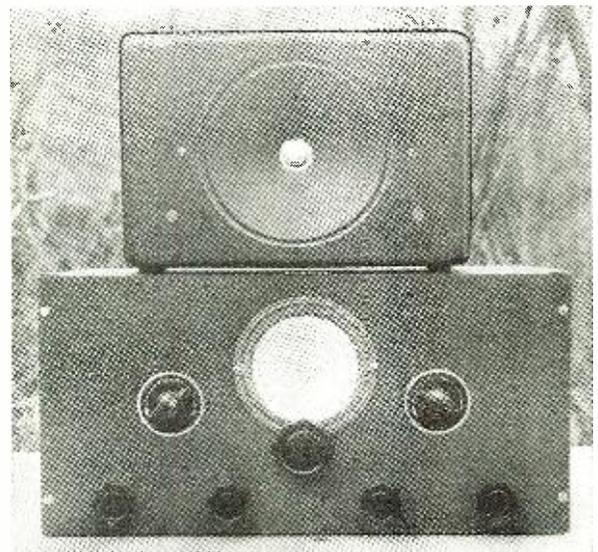


Mechanical drawing of parts' position on sub-base.

one or two feet long at the most—and must be shielded. The cable used for the shielded lead should be of the *low-capacity* type; otherwise, most of the signal, especially on the high frequencies around 28 megacycles, will be *by-passed* to the ground and lost.

The operation of the pre-selector is simplicity itself. Hook up the batteries and the antenna and ground wires. Connect the shielded wire to the antenna and ground posts on the receiver. Tune in a signal on the receiver, set the pre-selector tuning dial at about one-half scale and rotate the band setting condenser until the signal is loudest. Turn up the regeneration control, R1, until the pre-selector is *operating just below* the point where oscillations begin. If

a plain one-wire antenna is used, coupling condenser, C1, should be adjusted, at the same time varying the regeneration control, (Tune in on page 48)



The superhet for which the preselector was designed. This receiver was described last month.

TECHNICAL BOOK & BULLETIN REVIEW

TELEVISION — AN OCCUPATIONAL BRIEF, compiled and published by Western Personnel Service, 30 North Raymond Avenue, Pasadena, California, contains a general explanation covering the various fields of television, with a complete bibliography as to choice of reading matter for a complete discussion of the television subject. Chapters include: "Television: Whence and Whither," "Research," "Manufacturing," "Station Development and Operation," "Program Production," "Factors Influencing Television Development," and "Getting Into the Television Industry." The booklet is priced at 50c and may be obtained by writing to the Western Personnel Service.

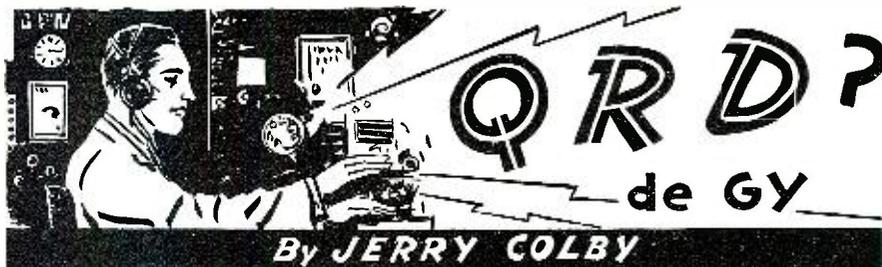
TELEVISION CYCLOPEDIA, compiled by M. N. Beitman and published by the Supreme Publications, Chicago, Illinois. Inasmuch as Television has a language all its own, there has been a definite need for a complete listing of the various terms and phrases used in this new subject. The author explains in this booklet all of the terms and phrases used in both the early methods of television as well as the very latest. Schematic diagrams are shown of commercial receivers together with many illustrations which describe the various types of equipment, its application and use, and contains a complete resume on modern cathode ray television tubes. Copies of this booklet may be obtained from Supreme Publications, 3719 W. 13th Street, Chicago, Illinois, at 50c per copy.

Hy-Grade Sylvania Corporation, Emporium, Pa., has issued their latest **TUBE COMPLEMENT BOOK WITH I. F. PEAKS** for the serviceman. This booklet will be a valuable addition to the serviceman's library as it contains a complete listing of all receivers together with the proper I. F. frequency to which the set must be adjusted for maximum performance. Heretofore, this information has been lacking to the serviceman and the publishers have cooperated with the serviceman in the publishing of this booklet. The new book with the original and supplement tube complement book is priced at 25c, the same as the first edition. The supplement alone can be purchased for 10c. Sylvania servicemen can buy these books from their jobber or direct from Hy-Grade Sylvania Corporation, Emporium, Pa.

Crowe Nameplate & Manufacturing Co., 370 Ravenswood Avenue, Chicago, Illinois, have a new bulletin, No. 225, just off the press, which contains many new items. This catalog has been greatly enlarged and special attention is called to the various plates which cover not only every requirement for transmitters and receivers, but for television as well. Several new type dials are shown together with a complete new line of knobs in colors as well as in standard black and brown. The new illuminated call letter emblems for the amateur are shown and two complete sets of letters are furnished with each unit. Copies of the new catalog may be obtained by writing direct to the manufacturer.

Solar Manufacturing Corporation, 599-601 Broadway, New York, N. Y., announce their new bulletin—T-1—which gives complete specifications on television condensers. Many new tubes have been developed to meet the stringent requirements set forth by the manufacturers of television equipment wherein high voltages are commonly used. Copies are available from the manufacturer upon request.

Thordarson Electric Manufacturing Co., 500 W. Huron Street, Chicago, Illinois, have brought out their new catalog, Number 600-D. Many new items are contained which feature amplifiers of modern design and appearance and with a wide range of choice as to applications. The units range from 8 w. to 75 w. power output.



WE eat humble pie and apologize to the *CTU-Mardiv* for having connected them with the "slave mart" item in last month's column. Their story is that they were called to supply men for the *Pilsudski* by a Mr. Trechezsky of the *Gydnia America Line* and he was advised of the terms upon which men would be supplied: union wage scale to be continued until arrival in New York, return transportation to be first class or cabin if on a big liner, and all subsistence and incidentals to be borne by the company. As the matter was not carried any further, it was forgotten. But later it was learned that Fred Howe supplied the men at the identical scale of wages, etc., \$160 for Chief, \$145 for 1st Asst., \$130 for 2nd Asst.

AN open letter from an ardent (?) reader:

"After a number of years of ripping shingles off in the seat of my pants installing aerials, doing acrobatics installing auto radios, mollifying irate customers when telling them that tubes could not be replaced after little Johnny had poked them with a broom handle, and the thousand and one irritating items that constitute the grief of the serviceman, I finally quit the game cold. The bug had bitten too deeply, however. So I removed the handbooks and manuals from the remote corners of the bookcase, dusted them off, arduously crammed, went up for examination, and in due course received the document stating that I had been inducted into that brotherhood of Radiotelephone Operators of the First Class. Armed with my ticket and a couple of letters from leading citizens, I sallied forth. I tried Broadcast, from the little ones to the big ones. "What experience have you had? Why do you think you are qualified to work in a station? Are you affiliated with any union?" "No," I was forced by honesty to admit. "Go out and grab a few years of experience and then come back to see us," was the universal reply. I went to see about the union card. "Are you employed by a station?" I was asked. "No," I sheepishly admitted. "Go get a job and then come to see us," said the man. That didn't make sense, because I had held a musician's card, and the only requirement had been to demonstrate that I could carry a tune. So I tried the police. No soap. I wasn't kin to anybody. That is, anybody with pull. Next, the airports. Still no soap. The boys with third-class tickets seemed to be doing all right. I asked one what kind of modulation he was using and got the amazing reply that the rig was a thoroughly modern one using 'amplitude' modulation. [He had you there, brother! Ed.] The Communications Act specifically states that an operator holding a license of the specified grade must be in attendance at each transmitter. I gathered from the rules and regulations that the first-class ticket is the highest that may be issued to any operator. Instead of being a badge of honor, a certified statement of technical qualification, my license is an ornament, framed and hung on the wall. It is certainly not the entrée to the door of opportunity that I had hoped it would be."

ANSWER to the above letter from said ardent (?) reader: Years ago a great cry went up from the throats of student operators whenever they got into trouble on a ship. Their usual complaint was "inexperience" and the necessity for a "big brother" to show them the ropes. After a few years Congress decided to do something about this noise and granted an Apprentice

tag to 2nd Class Ticket holders. This tag carried the requirement of six months of actual operating experience before being qualified to hold down a berth alone. In other crafts the average apprenticeship is from 3 to 4 years, whereas in this case, schooling considered, it seldom is more than one year of experience. And if an inexperienced operator is shipped out it isn't long before the whole coast is demoralized with impossible operating antics. Therefore, until shipping and broadcast pick up a little, this operator and hundreds of others like him should try for other fields that aren't so congested, and where the grass most certainly will be greener.

ACCORDING to Jordan of the *ACA*, shipping conditions are getting better all the time, with very few men on the beach. Fourteen new billets were made available with the *American Export Lines*, where the Auxiliary operator who will work the special equipment for the Clipper ships will receive a pay equal to that of the cargo op, \$125.00 per month. Also, a new policy has been inaugurated in the *ACA-Mardiv*—men with unsavory reputations unmanageable in foreign ports, drunk and disorderly aboard ship, insolent to their superior officers so that they are rejected on certain ships when assigned to them, and those acting in a manner to bring discredit upon all radio operators, will be dismissed, or rather, unassignable always. This is a noteworthy step in the right direction, but we hope that those who sit in the judge's seat will temper justice with mercy and especially wisdom.

THE Airways seem to be in need of operators, especially good ones, and it is rumored that they are taking on even poor ones because of the difficulty of getting first-class men. The general contention is that they might pay less than so-called "man-size" wages and, perhaps, for this top-notch marine men have stayed aloof. But we believe if they might be "organized," better pay would be forthcoming so that the scale would be higher. Remarkable how the Communications divisions of the Airways seems to be so neglected by the unions, yet continue to carry on. How come???

THERE'S a system of shipping men out to ships in *ARTA* known as the *Rotation System*, which deserved commendation. The names of all members are prominently posted on a huge board. At a glance one can see how far he is from the leader numbers and there is no chance of playing favorites as when names are kept hidden. Also the active and inactive lists give you an immediate picture of the situation when you hit the beach. And each man is given a chance to act as the shipper for a day, which gives him a chance to come face to face with the problems which confront a dispatcher. Incidentally, this method saves the salary of the man who would otherwise be employed for the daily task.

DUTY is as duty does is the case of *ARTA* man Hathaway, who was shipped on the Norwegian *SS Thornild* at 150 buttons, and Ed Saltez who has a berth on a Norwegian freighter, *Athos*. Instead of them learning the Norwegian dialect, we bet they'll be teaching the crew Americanese!

AFTER reading the publications issued by the two main organizations for radiops, it seems to me (apologies to Heywood (More QRD? on page 57)

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SERVICEMAN'S CASE HISTORIES

by **ALFRED A. GHIRARDI, B.S., E.E.**

Author of "The Radio Physics Course," "Modern Radio Servicing"; member Radio Servicemen of America, New York Electrical Society, Institute of Radio Engineers.

B.O.P. CHEVROLET Auto Radio

Pronounced vi-1) if noise stops when '75 tube
brator buzz is removed, but is not affected when the grid of this tube is shorted to ground with a screwdriver, the filter output condenser is "open." Connect a 4-mfd. condenser from the B-plus of the '75 tube to ground

Dead1) connection inside female (no plate volt- speaker plug broken by age on one '89 or both '89 tubes)

shielding back over cable about 1 inch, turn the plug cover and slip it back, exposing the lugs and the broken connection. (Chevrolet set and some United Motors models require a connection from the set chassis to speaker frame in order to operate when they are placed on test bench)

Motorboating . . .1) (in 1934 receivers) generally due to breaking of an r-f cathode by-pass condenser

Steady whistle . . .1) inspect the largest condenser of cluster of three, jammed between lid and the other two

B.O.P.—OLDSMOBILE, PONTIAC

Same Case History as listed for B.O.P.—Buick

B.O.P. 980459

Intermittent . . .1) carefully check condition of reception, primary winding of push-pull input transformer. Voltage analyses may be misleading, as voltages are not likely to be affected

BOSCH JR.

Same Case Histories as those listed for Bosch 16, 17, 18

BOSCH "LITTLE SIX"

Inoperative . . .1) trimmer condenser causing a "short" across the input of one of the tuned stages. The trimmers are located in front of the tuning condenser gang near the panel

BOSCH R6, R7

Poor selectivity 1) receiver circuits out of alignment. Retrim with only a short length of wire connected to antenna post (no ground) and a signal between 1400 and 1500 kc tuned in (with volume control set at "max."). Now, without moving tuning dial, connect back regular antenna, reduce volume control setting, and retune the first (ant.) trimmer. Advise set owner to use a fairly short antenna with the set, as it trims up better on one

BOSCH 5-C

Inoperative . . .1) open-circuited field coil

BOSCH 10

Fading on weak 1) due to defective '27 AVC stations tube. To test, tune to a signal, then remove AVC tube. If volume increases, the '27 AVC tube is not operating properly, and should be replaced

BOSCH 16, 17, 18

Inoperative. . .1) carefully examine the volume control and tuning gang shafts to make sure they are not "shorted." If they are "shorted" together, signals will be practically inaudible

Oscillation, . . .1) high-resistance variometer wiping contact. Remove the inner shaft of the variometer and carefully clean the wiper blade and brass contact surface. In assembling the unit, bend the blade so that it will make better contact

Noisy tuning 2) broken pigtail at condenser next to the variometer. Solder a new one about 1½-inches longer

3) poor tension of contact springs or rotor of tuning condenser gang. Clean condenser gang, or solder in better tension, or solder in pigtail between the rotor and condenser frame

Weak reception 1) variometer rotor not working together with condenser gang. When the tuning condenser is at zero setting, the variometer rotor should be at right angles to the stator

Oscillation 2) defective tubes

Hum1) open-circuited section in cen-

- 3) ter-tapped resistor unmatched a u d i o transformer secondary windings
- 4) connect a 2-mfd. filter condenser from one side of the speaker field terminals to chassis, determining exactly which is the best side by trial connections
- 5) choke tuning condenser "shorted"
- Weak reception, 1) open-circuited 500-ohm carbon resistor in the control-grid circuit of the second or third r-f stage
- Poor sensitivity (high plate current in 2nd or 3rd r-f tube) 2) volume control shaft short-circuiting to metal panel
- Noisy reception 1) leaky 0.001-mfd. detector plate by-pass condenser

BOSCH 20

Inoperative . . .1) short-circuited 40,000-ohm, 1-watt oscillator plate-voltage dropping resistor. Replace with a 3- or 5-watt unit

Poor control of 1) remove the antenna lead volume from the volume control and use the control only on the cathode of the i-f tube. Add a 1,000-ohm minimum bias resistor to the 200-ohm volume control unit in the set at present

BOSCH 28, 29

Inoperative. . .1) carefully examine the volume control and tuning gang shafts to make sure they are not "shorted." If they are "shorted" together, signals will be practically inaudible

Extremely weak reception 2) inspect rubber-covered wire from antenna variometer to volume control for possible "shorting" to chassis where it passes through sharp-edged drilled holes

Inoperative. . .1) black lead from the variometer stator "shorts" to chassis intermittently. The sharp-edged hole through which the lead passes cuts through its insulation and the vibration causes it to touch the chassis intermittently. Replace with a heavier insulated lead, providing also adequate insulation at the hole. Remove any burrs or sharp edges at the hole

Intermittent re-1) loose lug on front of first ception, condenser stator section

Fading 2) open-circuited 50,000-ohm detector plate supply resistor

Weak reception, 1) noisy 50,000-ohm detector plate supply resistor

Distorted recep- 2) noisy primary windings of tion 4-f transformers

Noisy reception 1) noisy volume control. Replace with new unit

2) add another condenser (not over 0.002-mfd.) in parallel with the present one used to by-pass the detector plate resistor

Motorboating, . .1) another remedy is to use a lower detector plate resistor—say 20,000 to 40,000-ohms

Oscillation 2) look for 6 adjustment condensers near the tube sockets (being careful not to confuse the hum-neutralizing condensers with those used to trim the tuning condensers)

Hum1) "shorted" r-f bias resistor. May be caused by a "short" in one of the two condensers in series (with their center terminals grounded) which are connected across the '26 tube filament circuit

Hum at res- . . .1) open-circuited supply line by- onance pass condenser. Out of neutralization

Replacing . . .1) use a Centralab replacement volume control unit (3 72-102) of 25,000 ohms. Install it at the point of control instead of at the located. Ground metal cover on rear of replacement unit to prevent oscillation. This type of installation makes the control cables and pulleys unnecessary

BOSCH 31, 32

Inoperative. . .1) if routine tests indicate no plate voltage on tubes, disconnect leads from last i-f transf. Check for prim-sec "short"

Intermittent reception 2) faulty 300,000-ohm resistor in the i-f stage. Substitute another of equal value

Fading,1) intermittently open-circuiting screen voltage-divider resistor

Intermittent reception 2) intermittently open-circuiting second-detector screen resistor

Hum1) open-circuited filter condenser

2) short-circuited field coil "bypass" or "tuning" condenser

Weak reception, 1) short-circuited field coil tuning condenser

Hum 2) open-circuited second detector screen resistor

Muffled tone . .1) intermittently open-circuiting 2-megohm screen-grid resistor. Replace

Distorted 2) low volume

Poor tone at . .1) intermitently open-circuiting low volume 2-megohm screen-grid resistor. Replace

BOSCH 38

Same Case Histories as those listed for Bosch 28, 29 receivers

BOSCH 46

Oscillation, . . .1) open-circuited type '226 tube bias-resistor condenser

Weak reception 2) short-circuited or intermittently short-circuiting compensating condenser

Inoperative. . .1) this receiver requires a very good ground for hum-free operation. Try several available types of grounds

Hum at low-fre-1) quency end of dial

Intermittent 2) clean all contacts of wiper fingers on variable condensers, also the one hidden under the mounting of the variometer which turns with the rotors

BOSCH 48A, 48AA

Oscillation, . . .1) poor grounding of the shield on the variometer. Drill two small holes through cap and base (where they overlap)—about 1½ inches apart—and drive in two self-tapping screws after rim contacts have been cleaned thoroughly

Noisy tuning 2) See Case Histories listed for Bosch 16, 17, 18 and 48 receivers

BOSCH 49

See Case Histories listed for Bosch 16, 17, 18 and 48 receivers

BOSCH 54 D.C.

Noisy tuning, . .1) see Case History for similar Oscillation trouble listed for Bosch 16, 17, 18

Weak reception, 1) see Case History for similar Oscillation trouble listed for Bosch 16, 17, 18

Distorted1) weak or exhausted "C" battery

Low or no output grid bias 2) open-circuited grid suppressor resistor

High plate current on 2nd or 3rd r-f tube 3) open-circuited detector cathode by-pass condenser

Weak reception, 1) open-circuited detector cathode by-pass condenser

Distorted, Resonance hum

BOSCH 58

Lack of sensi- 1) adjust antenna aligning condenser, located above antenna and ground posts, at 1,000-ke for maximum volume

tivity 2) defective 2-megohm coupling resistor in the grid circuit of the first a-f tube. Replace with a new unit

Set dead,1) test variable condenser across antenna coupling stage for short-circuited plates. The cap screws holding the rotor plates usually work off center and touch stator plates

(set operates when control-grid lead of first r-f tube is touched)

Inoperative, . . .1) examine rectifier tube socket for evidence of carbonization

(with power transformer overheating, 2) and rectifier tubes red hot)

due to arcing between the terminals. Replace it if necessary leads from the transformer to the rectifier plates have poor insulation which permits "shorts" to occur between them if they cross over. Replace these leads with wire having high-grade insulation

Hum 1) tighten all bolts in the casing and core of the power transformer to prevent vibration of the laminations

Distortion, 1) open-circuited detector screen resistor

Weak reception, 2) Station "hiss" resistor

Weak in "local" 1) position, Station "hiss" open-circuited 500-ohm resistor in local-distance switch circuit

BOSCH 60

See also all Case Histories listed for Bosch 61 receiver

Inoperative 1) short-circuited 0.25-mfd. r-f plate by-pass condenser located under the tube sockets behind the r-f tuning unit

Weak reception, 1) distortion adjust antenna aligning condenser (located above antenna and ground posts) at 1,000-ke for maximum volume

2) poor contact at the phono switch which should cut out the r-f stages when the tuning condenser plates are disengaged

Intermittent re- 1) ception, Pilot light flicker replace the 1-meg. black-and-white resistors in the detector screen circuit with a 2-meg. unit. (This resistor is about an inch long)

Hum 1) connected between each side "open" 1-mfd. condensers of line and chassis

"Local" position 1) of local-distance switch inoperative open-circuited carbon resistor between antenna tuning condenser and ground

BOSCH 61

Two-spot tun- 1) ing, Weak reception, Distorted, choked reception, Poor sensitivity, Erratic tuning meter

Station "hiss," 1) Weak reception 2) 1) open-circuited r-f de-coupling resistor

2) "open" r-f sec. return by-pass cond.

3) broken lead to 500-ohm resistor in local-distance switch circuit

4) open-circuited 500-ohm resistor in local-distance switch circuit

BOSCH 62 (1933)

Inoperative 1) Weak reception 1) inoperative AVC tube leaky or partially short-circuited AVC plate by-pass condenser

BOSCH 73

Low volume 1) when set is switched on—reception becoming normal about 15 minutes after set is operating

BOSCH 79C AUTO RADIO

Weak reception 1) efficiency of r-f and oscillator stages lowered by presence of three or four ohm resistance in the tuning condenser leads and contacts. This may be corrected by tightening the screws that hold the insulating bracket on the stator plates

BOSCH 80

Weak reception, 1) poor tone quality entire condenser gang out of line. Rotor plates should be adjusted so they are accurately and evenly positioned between the stator plates. Then align the receiver

2) loudspeaker needs adjusting. Loosen the two adjustments provided on the speaker and center the armature so as to allow a clearance of about 0.009 inch on each side

BOSCH 96A

Weak reception, 1) Distortion loose driving rod on the magnetic speaker cone. Solder the rod to the cone

BOSCH 126

Same Case Histories as those listed for Bosch 46 receiver

BOSCH 140

Inoperative ... 1) "shorted" 0.01-mfd. condenser inside of plug-in type vibrator unit. Trouble is indicated by continuity being obtained between

two or more of the five prongs at the base (except between those corresponding to the grid and cathode of a '27 tube). Remove the three screws at the base of the vibrator unit. Open the case, and slip off the sponge rubber casing. Replace the 0.01-mfd. condenser with one of the small tubular type

Intermittent re- 1) ception defective coupling condenser between '75 tube plate and '41 tube grid. This condenser is in a case with seven others, and can be cut out of the circuit. Replace it with new 0.001- or 0.005-mfd. cond. Howling 1) (audio feedback) if the '75 tube grid lead (which is brought up from below) between this tube and the '41 is too close to the '41 tube, audio feedback will occur. Keep this lead as close to the '75 tube as possible by twisting the grid clip—or shield it and "ground" the shield under one of the feet of the i-f can next to it.

BOSCH 146

Same Case Histories as those listed for Bosch 46 receiver

BOSCH 150

Short-wave re- 1) ception at center of dial i-f amplifier out of alignment (i-f is 175 kc)

2) oscillator not tracking properly. Check tracking of oscillator condenser

3) loose coil and tube shields. Tighten them securely

Erratic opera- 1) tion over part of dial loose screws holding the condenser stator plate assembly. Tighten these screws, and realign the receiver

Hum, 1) Pilot light flicker imperfect contact or connection where one side of filament winding is connected to the chassis by means of a lug on the same rivet that fastens the 2A6 tube socket and shield to the chassis. Resolder this connection.

BOSCH 166, 167

Same Case Histories as those listed for Bosch 46

BOSCH 200, 201

Weak reception, 1) Noisy reception leaky dual 4—8-mfd. electrolytic filter condenser in power pack. Replace

2) defective 0.01-mfd. line buffer condenser. Replace with new unit

BOSCH 242, 243

Weak reception, 1) Poor tone (a) remove 0.05-mfd. audio coupling condenser between detector and first audio tubes. (b) remove the 1-megohm resistor in the plate circuit of the '56 detector tube. (c) connect together the two open leads which are left as a result of the above—(one is from the volume control, and one is from the '56 plate)

BOSCH 350

See also Case Histories listed for Bosch 352 receiver

Hum modula- 1) tion of signal faulty contact at "grounding" rivet in common-return of filament supply and various grid returns. This rivet is located at about the middle of the chassis shelf and fastens one of the tube sockets in place

Intermittent re- 1) ception loose rivets holding soldering lugs of grounded sides of filaments at tube sockets. Make sure all these rivets are tight and are making good contact with the chassis, or solder heavy wires from the ground lugs to chassis. The contact of the filament-line "grounding" rivet which holds the '2A6 tube socket and base of tube shield to the chassis is especially important

Short-wave 1) interference at middle of dial check the i-f and the oscillator condenser, making sure that the tube shields and coils are tight

BOSCH 352

Inoperative on 1) No. 1 band imperfect contacts on wave-band switch. Replace

Oscillation 1) "detune" r-f padder slightly

2) clean condenser wiper fingers

BOSCH 360

Intermittent os- 1) cillation corroded joints (poor "grounding") between tube shield and shield bases. Drill a hole through the side of each shield and through the base. Put a small "Parker-Talon" self-threading screw in each hole

Steady or in- 1) termittent oscillation on weak stations poorly grounded tube shields or corroded contacts between the shields and chassis. Bond shields to chassis with separate pigtail or aluminum solder

Dead 1) condensers C-39 and C-40 short-circuiting or a section of resistor R-3 open-circuiting

BOSCH 370

Weak reception, 1) Hissing Oscillation 1) (weak) primary winding in antenna coil "open" by-pass condenser in antenna circuit "open"

BOSCH 402

"Howls" 1) (only while set heats up) Inoperative faulty type '6F7 tube (even though it may test O.K.). Replace with new tube

BOSCH 501

Oscillation, 1) (whistles) loss in capacity of either (or both) filter condensers. First, try replacing either or both filter condensers. Try shunting a 0.1-mfd. 400-volt paper condenser across the second filter if you find that the foregoing replacement does not eliminate the trouble

BOSCH 502

Whistling on ... 1) every station place a shield plate between the '75 and '43 tubes and solder it to the chassis

BOSCH 505

Noisy 1) install new volume control

BOSCH 536

See Case Histories listed for Bosch 636, 637, etc., Auto-Radio Receivers

BOSCH 595M

Noisy 1) replace the input transformer with the new type which is sealed in wax

BOSCH 636, 637, 736A2, 737A2, 738A2—1936 Model Auto-Radio Receivers

Inoperative ... 1) (vibrator dead, no plate voltages) check the fuse in the container on the lead from the control-head to ammeter

Inoperative ... 1) (tubes do not light) remove the loudspeaker cover and disconnect the speaker plug. Remove the vibrator and the tubes. Check with an ohmmeter

from hot "A" side of receiver battery cable to ground. Should this show an open circuit, obviously a tube or the vibrator is shorted and these parts can be checked separately to determine which is faulty. On the other hand, if the ohmmeter shows a closed circuit, the chassis should be removed from the housing and checked for an internal short circuit

Inoperative ... 1) (tubes light and vibrator buzzes) check the "B" voltage (approximately 240 to 250 volts) from the middle terminal of the electrolytic filter condenser to "ground" of the chassis. This point is easily reached with the speaker cover removed. If no voltage or low voltage is observed, test the vibrator and the '0Z4 or '84 rectifier tube. If voltage is still incorrect, the receiver should be removed from the housing and the component parts checked for shorts. The power pack should first be checked alone by disconnecting the receiver load

2) with the speaker plugged in, remove the clip from the grid cap of the '6F5 tube and touch the clip to the grid cap of the '6F5 (in models 536-636-637) this will be the '75 tube) several times in succession. A clicking noise should be heard in the speaker. This is an effective test for the audio amplifier and speaker. If this clicking noise is not heard, the '6F5 and '6F6 tubes in the case of models 736A2, 737A2, 738A2 (and '75 and '43 tubes in models 536, 636, 637) should be tested and the voltage checked at the plates of these tubes. The speaker should be checked with a volt-ohmmeter by testing across the prongs of the speaker plug for continuity. While making this test, the cable should be moved back and forth to show up a possible intermittent open circuit in the speaker cable. Check the voice coil and field coil for proper resistance values

3) if the audio and speaker are still dead, the chassis should be removed from the housing if the audio and speaker are working correctly, test the remaining tubes and check the voltage at each socket

4) to remove the chassis from the car for repairs proceed as follows:

disconnect all external cables and the flexible shafts from the receiver. Remove the speaker cover and pull out the speaker plug. Remove receiver from the bulkhead and remove chassis from housing by taking out the five mounting screws, four of which are located on the side and one on the bottom of the housing. Locating trouble 1) to locate a "short," "open," or defective unit which causes low or no "B" voltage, disconnect the power

(Continued on page 61)

SHORT WAVE FLASHES

BY CHARLES A. MORRISON
and JOHN D. CLARK

By Charles A. Morrison
Frequency in megacycles Time is Eastern Standard

SPECIAL GOOD-WILL PROGRAMS

SUNDAYS of September 10, 17, 24, at 12:01 a.m. EST, and Sundays of November 12, and 19, at 10 a.m. EST, over YL2CD, operated by A. Vitolins of Miera Isla 52-5, Riga, Latvia, on a frequency of 14.04 mcs., for the first three programs and on 28.08 mcs. for the last two programs. Sunday, September 24, from 9 to 10 p.m. EST, over LRX (9.66), of Buenos Aires, Argentina.

NEW SCHWARZENBURG TRANSMITTER BURNS

According to a dispatch from Switzerland, on the evening of July 6, the new 25,000 watt government short-wave station which had just been completed at Schwarzenburg, Switzerland, was completely destroyed by fire of unknown origin. The labors of two years were entirely lost. Initial tests from the new station were very successful, the transmissions beamed on North America being received with excellent signal strength. Although the losses are estimated at more than a million Swiss francs, plans for a new station are being pushed forward. In the meantime special transmissions for Swiss residents in the United States will be continued over the League of Nations stations at Prangins, Switzerland, on Monday nights from 6:45 to 8:30 p.m. EST.

NEW OFFICIAL CALLS FOR COLOMBIAN STATIONS

I am indebted to Earl Roberts of Indianapolis, Indiana, for the following list of new official calls for the Colombian short wave stations:—**HJGX** (4.745), 750 watts; "La Voz de Colombia," Bogota; **HJEB** (4.755), 1,000 watts, Buenaventura; **HJFB** (4.765), 5,000 watts, Manizales; **HJGB** (4.775), 750 watts, Bucaramanga; **HJAB** (4.785), 750 watts, Barranquilla; **HJFI** (4.795), 750 watts, Ibague; **HJDU** (4.805), 250 watts, Medellin; **HJBB** (4.815), 600 watts, Cucuta; **HJED** (4.825), 750 watts, Cali; **HJAE** (4.835), 500 watts, Cartagena; **HJCD** (4.845), 1,000 watts, Bogota; **HJCF** (4.855), 750 watts, Bogota; **HJBJ** (4.865), 750 watts, Santa Marta; **HJFH** (4.875), 600 watts, Armenia; **HJDI** (4.885), 5,000 watts, Medellin; **HJCH** (4.895), 750 watts, Bogota; **HJAG** (4.905), 1,000 watts, Barranquilla; **HJFC** (4.915), 500 watts, Pereira; **HJAP** (4.925), 600 watts, Cartagena; **HJCT** (4.935), 5,000 watts, Bogota. The last named station is being constructed by the Ministry of National Education of the Colombian Government.

MYSTERIOUS STATION PUZZLES LISTENERS

For sometime now a mysterious foreign station has been broadcasting nightly from approximately 8:55 to 10:15 p.m. on a frequency of 15.41 meg. Both men and women announcers are employed on the program but no announcements in English have ever been heard. Some listeners feel positively this transmitter is "Radio Bucharest" at Bucharest, Roumania, while others are equally positive the station is at Moscow. We would be glad to hear from any listener, or listeners who can positively identify this station.

NEW SHORT-WAVE STATIONS (On the Air)

COSTA RICA—TI2RH (6.151), relays TIRH of San Jose, irreg.

DOMINICAN REPUBLIC—R. B. Oxrieder of Corozal, Canal Zone, reports hearing HI2M (6.993) of San Pedro de Macoris, broadcasting irregularly.

ENGLAND—GSU (7.26) and GSW (7.23), are new Daventry transmitters operating on the 41-meter broadcast band, that will be put into service this month for directive transmissions to Australia, and the Far East.

HUNGARY—During the period from July 24 to August 11, inclusive, another new Budapest experimental station was put into use, namely HAD, which transmitted as follows: on 21.68, from 11 a.m. to 2 p.m., for North America; on 11.85, from 2 to 6 p.m., for South America, and on 9.825, from 6 to 9 p.m., for North America.

ITALY—August Balbi of Los Angeles, California, notifies me that 2R016 (21.51), is now in use daily from 9 to 9:55 a.m.

MANCHOUKUO—The new station which I mentioned last month as being under construction is now on the air and broadcasting as follows: over MTCY, Hsingking, on 6.125, daily from 7 to 9 a.m. and on 11.775, daily from 1:30 to 2:30 a.m. The latter frequency, which was first heard by August Balbi of Los Angeles, on July 20, provides a signal even superior to that of JZK. The news in English is broadcast at 1:35 a.m. and the identification is a series of four consecutive chime tones. According to the announcer, reports should be sent to the Central Broadcasting Station at Hsingking.

Manchoukuo. Ashley Walcott of San Francisco, California, reports hearing MTCY at 7 p.m., on a frequency of 15.2, sending a program to NBC. Due to interference from DJB on the same channel the transmission had to be cut.

NICARAGUA—TN1P (7.284), the Instituto Pedagogico at Managua, may be heard broadcasting occasionally.

PHILIPPINES—KZEG, the Sun-shine broadcast station in Manila, is being relayed daily on 6.14, from 5 to 9 a.m. or later. This is probably KZRM's new transmitter. KZRH (6.1) of Manila, is testing irregularly from 5 to 8 a.m. and comes in slightly louder than KZEG. KZHS (9.585), P. O. Box 119, Manila, broadcasts daily from 6 a.m. on, promising verifications to all who write in.

PORTUGAL—CSWS (7.26), "Radio Nacional" at Lisbon, may be heard Tuesdays, Thursdays and Saturdays, from 4 to 5 p.m. CSWA (6.67) seems to have discontinued its broadcasts.

ROMANIA—A Bucharest station on 12.16, heard at 2 p.m., identifies itself as follows, "This is the short-wave station of the Polytechnic School in Bucharest, Roumania."

SYRIA—A. R. Tuff of London, England, reports, a new station at Aleppo, is in operation on 12.215 mcs.

SWEDEN—The new transmitter at Motala is operating as follows: over SBT (15.155), from 1 to 4:15 p.m., in parallel with SBP (11.705), and over SBU (9.335), from 4 to 5:05 p.m., in parallel with SDO (6.065). SBT replaces SM5SX, the former experimental station that operated on 15.155 mcs.

UNITED STATES—The new 100 kw. transmitter of W2XAF at Schenectady, New York, should be in operation by the time this reaches print. Two of the new type tubes, in which the filament can be replaced will be used in the transmitter. These are the largest tubes of their kind yet to be built in this country, and will produce an effective directional power output equivalent to more than 600 kw.

VENEZUELA—New short-wave stations now under construction are given as follows in a list furnished by Earl Roberts of Indianapolis, Indiana: YV6RE (4.78), 500 watts, Barcelona; YV5RR (4.83), 5,000 watts, Caracas; YV6RQ (4.86), 5,000 watts, S. Fernando; YV5RT (4.98), 10,000 watts, Caracas; YV4RK (5.000), 10,000 watts, Maracay; YV4RZ (5.03), 10,000 Watts, Maracay, and YV0R (11.725), 15,000 watts, Caracas. The last named station will be government-owned and controlled. P. J. Montenegro of Caracas, Venezuela, writes that the following new stations are now in operation on the low-frequency tropical band: YV3RV (3.4), "Radio Tropical," Caracas; YV5RV (3.5), "Emisora Vargas," La Guaira, and YV3RF (3.49), "La Voz del Llano."

UNDER CONSTRUCTION

CANADA—The Canadian Government is going to build a very strong National Short-Wave Station for the use of the Canadian Broadcasting Corporation and to publicize Canada abroad.

CHILE—CB94B (9.46), power 5,000 watts, to relay CB150 and CB118 of Santiago, is said to be under construction.

COLOMBIA—The Colombian Government is building a 2,500 watt short-wave station of the most modern construction, to operate on a frequency of 9.63, with the call HJCT.

CUBA—A license has been granted for a new station, COCN (9.437), to be located on the highway between Habana and Guanabacoa.

FRANCE—Two new 100 kw. transmitters are to be added to the French Government Short-Wave Station at Paris, by the beginning of 1940.

SPAIN—A new 50 kw. government station is under construction at Madrid. This will when completed, replace the present EAQ.

NOTES OF INTEREST

AUSTRALIA—VLK (10.52), Sydney. Calls GBP (10.77), almost daily between 10 and 11 a.m. . . . H. Amers of Pomona, California, writes the 9MI M/V Kanimbla, is being heard very well on the West Coast since it shifted frequency to 6.05.

ANGOLA—CR6AA now shapes the 15.195 channel with TAQ of Ankara, Turkey. The exact schedule is unknown.

BRAZIL—Commercial station PPH (11.93) was heard at 5:30 a.m. with a special program for Japan.

BULGARIA—Roger Legge of Binghamton, New York, informs me that "Radio Sofia" (9.2), is being heard just before 1:45 a.m. and on Sundays near 8:15 a.m.

CANTON—Pan American Airways Co. has been granted a permit to move short-wave transmitter KABS (6.75), from Phoenix to Canton Island.

CHILE—CD1190 (11.91) of Valdivia, Chile, is anxious to get reports from listeners on its new antenna system.

CHINA—Ashley Walcott of San Francisco, California, believes XOJD at Hankow, is the station being heard on 6.87, mornings from 8 to 8:35 a.m. with all-Chinese programs.

COLOMBIA—HKF (1.04), Bogota, was heard calling and working WNC, Hialeah, Florida, at 7 p.m.

COSTA RICA—TI4NRH (9.69), was heard at 1 a.m. testing with W4WQ.

CUBA—COCQ (8.85) and other short-wave stations in Cuba have been operating on Daylight Saving Time.

DOMINICAN REPUBLIC—John Larsen of Geneva, New York, advises that HI5P (6.565), is not being heard any more.

GREAT BRITAIN—GSO (15.18) and RV96 (15.18), heterodyne each other badly when both are on in the early evenings. . . . Desmond Callan of Readville, Mass., is the proud possessor of a genuine verification for reception of Daventry. This came in the form of a letter from an Engineer in the Engineering Department.

GUATEMALA—Edwardo Perez of short-wave station TG2 (6.19) of Guatemala City, notifies me that that station has completed its third reprint of Spataro QSL cards, reports in this new radio language becoming ever more popular. To stimulate further interest in the special dx programs that are radiated over TG2 each Sunday morning from 2 to 2:30 a.m., special awards are being made each week for the best report received, and the report received from the greatest distance. TGQA (6.4) of Quetzaltenango will soon inaugurate programs in Spanish.

HAITI—The popular Wednesday night program dedicated to Janaiaca and broadcast over HH2S (5.987) of Port-au-Prince, has been discontinued for the time being.

ITALY—John Larsen of Geneva, New York, writes that an unidentified Italian station on 15.23 is being heard daily to 7:30 p.m. in parallel with 2R012 (15.1) and 2R06 (15.3).

MANCHOUKUO—JDY (9.926) was heard phoning in Japanese at 4 a.m.

MEXICO—XEBF (6.09), Jalapa, seems to be the station that is interfering with ZNS on the same channel.

PARAGUAY—ZP14 (11.72) signs-off nightly at 7:55 mcs.

NEW GUINEA—Several New Guinea airways planes were logged between 12:05 and 1 a.m. by Ashley Walcott of San Francisco, Calif. One of the planes was overdue and the Central field station on 6.91 was calling the roll of landing fields. The only field identified by call was VHX, Lea, on 6.94.

POLAND—August Balbi, of Los Angeles, California, reports reception of SP19, Warsaw, testing on a new frequency of 15.16, irregularly from 8 to 9 p.m. and SP25 (11.74), testing from 12:45 to 2 a.m. . . . SPW (13.635), Warsaw, is back on the air again, following several days shut-down due to transmitter trouble.

SPAIN—"Radio Malaga" (14.44), Malaga, is still being heard nights near 7:30 p.m.

UNITED STATES—The World Wide Broadcasting Corp. of Boston, Mass., seeks a modified license for WLXAR to permit the addition of two new frequencies, namely 6.68 and 25.6 mcs. . . . WLXAL was off the air for several weeks during August to permit extensive alterations to the station's transmitter and the addition of powerful new beam antennae. . . . E. F. McDonald Jr., of Chicago, Ill., has been granted a license to use a 400 watt telephone transmitter aboard his yacht Mizpah, on a frequency of 8.655 mcs. . . . A 50 watt coastal-harbor station will be installed at Cape Girardeau, Missouri, to communicate on 2.738 mcs., with vessels on the Mississippi and Ohio Rivers. . . . The new 50,000 watt transmitters for W8XAL of Cincinnati, Ohio, will probably not be completed until early in 1940. . . . W6XBE is proving immensely popular with listeners throughout the Orient, in the Antipodes, in South Africa, and in Latin America. Buck Harris, Manager of the Station, hopes to find it possible to retain W6XBE on Treasure Island, as a permanent location even after the close of the Golden Gate Exposition, since he feels the extremely good signals with which the station is being received in far distant lands are partially accounted for by the favorable location of the transmitter. . . . Weather reports for the Great Lakes Region may be had from WMI of Lorain, Ohio, at 11 a.m. and 10 p.m., on simultaneous frequencies of 2.55, 6.47 and 11.37 mcs.

U.S.S.R.—Roger Legge of Binghamton, New York, reports hearing a Soviet station RZZ (14.96), on Thursdays from 6 to 7 p.m.

REVISED SCHEDULES

AUSTRALIA—VK2ME (9.59), operates Sundays, from 12:01 to 2, 4:30 to 8:30, and from 10:30 a.m. to 12:30 p.m. . . . VLR (9.58), is now operating daily from midnight to 8:30 a.m. and on Sundays, from midnight to 7:30 a.m.

BAHAMAS—ZNS (6.09), relays Daventry, almost nightly from 6:20 to 8 p.m. and puts on a local program from 8 to 9, or 10 p.m.

DOMINICAN REPUBLIC—HI9B (6.39), is now on the air nightly from 5 to 8:40 p.m.

FRANCE—TPB11 (7.28), operates from 10:15 a.m. to 12:45, and from 1 to 5:15 p.m. for Africa.

IRELAND—EIRE is now operating daily from 7:30 to 9 a.m. on 17.84, and from 11:30 a.m. to 3:30 p.m. on 17.84 or 9.595 (alternate days).

ITALY—The Italian Short-Wave Station at Rome, is operating as follows: over 2R03 (9.635), daily from noon to 3 and from 5:30 to 9 p.m.; over 2R04 (11.81), daily from 4:30 to 8:45, from 10 a.m. to 2:30 and from 6 to 9 p.m.; over 2R06 (15.3), daily from 4 to 5:10 p.m. to noon, 1:40 to 2:30 and from 3 to 5:30 p.m.; 2R08 (17.82), daily from 5 to 8:45 a.m.

and from 6 to 9 p.m.; IQA (14.795), daily from 4:30 to 4:55 a.m.; IQY (11.673), daily from 5:20 to 5:40 a.m., from 12 to 12:56, and from 1:50 to 2:30 p.m.; IRF (9.835), daily from 5:20 to 5:40, 12 to 12:25, from 12:40 to 1, from 1:50 to 2:30, and from 6 to 9 p.m.; and over IAC (6.355), from 3 to 3:35 p.m.

MOZAMBIQUE—CR7AA (6.037) and CR7AB (3.49), broadcast weeknights from midnight to 1 a.m., and CR7BD (15.24) and CR7BH (11.78), broadcast weekdays from 4:30 to 6:30, 9:30 to 11 a.m., and from noon to 4 p.m.

POLAND—SP31 (9.525) and SP48 (6.14), are reported to be operating daily from 2:35 to 3 p.m. at present.

SIAM—HSPJ (9.51), Bangkok, is now operating daily except Mondays from 7 to 10 a.m. HSPJ (19.02), is operating Mondays only from 8 to 10 a.m. but expects to be operating on an extended schedule soon.

SOUTH AFRICA—ZRG (9.523), Pretoria, operates weekdays from 5 to 7 a.m. and on Sundays from 5:30 to 7 a.m.; ZRH (6.007), Pretoria, operates weekdays except Saturdays from 11:45 p.m. to 12:50 a.m., weekdays from 9:30 a.m. to 3:30 p.m., and on Sundays from 8:40 to noon and from 12:15 to 3:15 p.m.; ZRL (9.606), Capetown, operates weekdays except Saturdays from 11:45 p.m. to 12:50 a.m., weekdays from 3:30 to 7:20 and from 9 to 11:45 a.m. and on Sundays from 3:30 to 5 a.m., from 5:30 to 7 a.m., and from 9 to 11:35 a.m.; ZRK (6.0973), Capetown, operates weekdays from noon to 4 p.m., and on Sundays from noon to 3:20 p.m.; ZRJ (6.0975), Johannesburg, operates weekdays except Saturdays from 11:45 p.m. to 12:50 a.m., from 3:15 to 7 and from 9 to 11:30 a.m. and on Sundays from 3:30 to 4:30, from 5:30 to 7 and from 8:40 to 11:30 a.m.; ZRD (6.1475), Durban, operates from 11:45 p.m. to 11:15 a.m.; ZRO (9.755), Durban, operates weekdays from 11:45 p.m. to 12:50 a.m., from 3:30 to 7:30 a.m., and from 9 to 11:35 a.m. and on Sundays from 3:30 to 7 and from 9 to 11:35 a.m.; ZRD (4.878), operates weekdays from 11:20 a.m. to 3:45 p.m. and on Sundays from 11:20 a.m. to 3:20 p.m.

UNITED STATES—W2XE of New York City, N. Y., is now operating as follows: on 17.83, Mondays through Fridays, from 7:15 to 9 a.m., from noon to 5 p.m., on Saturdays, from 7:15 a.m. to 11 a.m. and from 11:30 a.m. to 5 p.m., and on Sundays, from 7 to 11 a.m. and from 11:30 a.m. to 5 p.m.; on 15.27, daily from 7:30 to 7:30 p.m.; on 11.83, daily from 8 to 10:30 p.m., and on 11.82, nightly from 11 p.m. to midnight; W6XBE on Treasure Island, at San Francisco, is now working on the following extended schedule: on 9.53, daily from 7 a.m. to noon and from midnight to 3 a.m., and on 15.33, daily from 6:30 to 11:15 p.m. All transmissions on the 9.53 channel are directive to Asia, while those on 15.33, are directive to Latin America.

FREQUENCY CHANGES

BRAZIL—PSE to 14.94.
COSTA RICA—TIGPH2, San Jose, to 5.825; TIPG, San Jose, to 9.615; TIRCC, San Jose, back to 6.55; TIWS, Puntarenas, to 6.38.
CUBA—COEX to 9.205; COCH to 9.44; COCM variable from 9.812 to 9.822; COJK, varying in the vicinity of 8.65.
DOMINICAN REPUBLIC—HI1J now varying in the vicinity of 5.913; H1LS to 6.43.
ECUADOR—HCK, Quito, to 5.36; HC2CW to 9.12.
GUATEMALA—TGWB to 6.486, where it QRM's HILL.
HAITI—H2S to 5.987; H3W to 9.77.
NICARAGUA—YNDG, Leon, to 7.66.
PANAMA—HP5F, Colon, to 6.093.
PHILIPPINES—KZIB, Manila, to 9.492.
STRAITS SETTLEMENT—ZJH, Penang, to 6.09, where it is being heard with increased power.

DATA

AUSTRALIA—QSL cards are now being received from VLR and VLR3.
BELGIAN CONGO—The call for "Radio Leo" (6.14), Leopoldville, is OQ2AA.
BRAZIL—PSH (10.22), operates weekdays from 6 to 7 p.m.; Mondays from 8 to 8:30 p.m. and on Fridays from 7 to 7:30 p.m.; PSE (14.94), operates weekdays from 6 to 7 p.m.; Wednesdays from 4 to 4:10 p.m.; Thursdays from 3 to 3:30 p.m. and on Saturdays from 3 to 3:30 p.m.; PSE (14.94), verifies with a card similar to that sent out by PSH. The address is P. O. Box 709, Rio de Janeiro.
CEYLON—According to a communication received by Harve Amers of Pomona, California, VPB (6.15), Colombo, went off the air for good on May 31. It was claimed that it did not serve any larger area than the regular broadcast station.
CHINA—XGOY (11.89), Chungking, now comes on the air daily at 5:55 a.m. . . . The QSL card issued by XMHA (11.855), "Call of the Orient," 445 Race Course Road, Shanghai, is cream with black lettering and is signed by E. L. Healey, who states the station has been compelled to shift in frequency three times since it came on the air last January, in order to avoid deliberately imposed interference on their channel. The station is American owned and the only short-wave station licensed by the Chinese Government outside of the National station at Chungking. XMHA often relays W6XBE at 9 a.m.
COLOMBIA—The slogan for HJGB (4.82), formerly HJ7GAB, Bucaramanga, is "Radio Santander," and the address is Apartment 37, Bucaramanga. . . . A. V. Deterly of Baton Rouge, Louisiana, reports that the QSL card issued by HJ1AB (now HJAN) of Barranquilla, Colombia, is modernistic in design and printed in red, black and yellow.
CUBA—The interval signal for COCO (now on 8.685), is three strokes on a gong. Announcements are made on the quarter, and the half-hour.

ENGLAND—A special transmission for Latin America was inaugurated from Daventry on July 3. This broadcast is made daily from 6:25 to 9:20 p.m., over GSO (15.18) and GSC (9.58). In addition the news in Portuguese is given daily at 5 p.m. and the news in Spanish at 5:15 p.m., over GEX (9.69) and GSA (6.03), especially for reception in Europe.

FRENCH INDO-CHINA—Harve Amers of Pomona, California, writes that "Radio Saigon," The Voice of France in the Far East, issues a cream QSL with the station name in red, the writing in black, and a cut of a native girl overprinted in green. The schedule is given as daily on 6.116, from 7:30 to 8:30 a.m., from 6:45 to 7:15 and from 11:45 p.m. to 12:15 a.m. and on 11.78, daily from 12:15 to 12:45 and from 9:15 to 9:45 a.m. A new station in Saigon, operating on 9.49, transmits simultaneously with "Radio Saigon." English programs are broadcast at midnight and 8:15 a.m.

GUATEMALA—TGXA (6.132), owned by Senor Miguel Angel Mejicano Novales, having studios in the building of the newspaper "El Liberal Progresista," relays TGX irregularly.

HUNGARY—Roger Legge of Binghamton, New York, reports HAAQ2, experimental station of Budapest, verified his report with the same red, green and white card used by HAS/HAT.

INDIA—According to the latest Berne list in the possession of Earl Roberts of Indianapolis, Indiana, the call for the Delhi, India, station on 4.92, is VUD8, that of the Calcutta station on 4.88, VUC5, and that of the Delhi station on 15.16, VUE8.

IRAN—The two new 20,000 watt short-wave transmitters under construction at Teheran, will use the following calls and frequencies when they go on the air next spring: EQB (6.155) and EQC (9.68).

IRAQ—The 5000 watt station at Baghdad, operates on the following frequencies and with the following calls: HNF (9.683); HNG (11.724); HNH (15.143) and HNT (17.815). HNF is being heard on the Western Coast of the United States daily from about 8 to 9:30 a.m.

IRELAND—"Radio EIRE" (17.84), verified by letter, signed by T. J. Monaghan, Engineer in chief, Dept. of P & T, The Castle, Dublin. Reports are welcome.

LITHUANIA—Since last February, LYR (9.29), 500 watt government experimental short-wave station, has been testing daily from midnight to 1 a.m. and from noon to 2 p.m.

MARTINIQUE—"Radio Martinique" (9.7), Fort-de-France, has a power of 200 watts.

MEXICO—Julius Pedersen of Bridgeport, Conn., writes that on July 14, XEDQ of Guadaluajara, Mexico, shifted to a new frequency of 9.517.

MOZAMBIQUE—Murray Buitkant of the Bronx, New York City, advises me that the call for the Lourenco Marques station on 15.24 is CR7BD.

NICARAGUA—YNDG (7.66), Leon, operates weekdays from 8:30 to 9:30 p.m. The owner Dennis Gallo still operates on amateur frequencies of 7.14 or 14.072 mcs., Sundays, under the call YN5DG.

NORWAY—The Oslo transmitter occasionally operates on 17.825, under the call LLN.

POLAND—SPW (13.635) has a new QSL card, picturing a tower surmounted by a statue in brown against a blue sky background.

PORTUGAL—Desmond Callan of Readville, Mass., informs me that CSW of Lisbon, is licensed to operate on the following frequencies: 9.67, 9.74, 11.04 and 15.155 mcs.

SPAIN—EAQ verifies with a "Radio Nacional de Salamanca" QSL card, picturing two figures on horseback in brown and white. Reports should be sent to Radio Nacional de Espana, Burgos, according to Jack Wells of Phenix, Alabama. "Radio Malaga" (7.22), can still be heard broadcasting from 3:30 to 5:40 p.m.

SPANISH MOROCCO—EAGAH (14), Tetuan, verified in seven months with a new red, white, black and gold QSL card, with the call letters in red.

SWEDEN—On May 21, the new Swedish experimental station SBT, replaced SM5SX on 15.155 mcs. According to the Director General of Telegraphs, for Sweden, QSL cards are not used for Swedish stations.

UNITED STATES—Julius Pedersen of Bridgeport, Conn., writes that he heard one of the initial tests of W2XAF's new 100,000 watt transmitter on July 26, at 10 p.m. Reception was good, with strong signals and no fading, he said. . . . NBC has increased its schedule of short-wave programs to Latin America by three and one-half hours daily. W3XAL (21.63) is now beaming in that direction from 12 noon to 3:30 p.m. W3XL (17.78), also transmits to Latin America, daily from 4 to 10 p.m. and over W3XAL (9.67), from 4 p.m. to midnight. . . . W6XBE on Treasure Island, at San Francisco, California, is now issuing QSL cards, similar in design to those used by W2XAF and W2XAD, but, WWV, frequency monitoring station at Beltsville, Maryland, issues a cream and black QSL card with 3/8 inch call letters.

U.S.S.R.—The calls RV96 and RAN, not RW66 and RAL, are correct, according to latest information from Radio Center, Moscow.

URUGUAY—The QSL card issued by CXA6 (9.62), "SODRE Uruguay," Montevideo, is of the folder type. The front and back are printed in black with a modernistic blue drawing of an antenna tower on a silver background. The inside is printed in six languages. The SODRE transmitter located at Mercedes 823, Montevideo, has been assigned the following frequencies and calls: CXA4 (6.125), CXA5 (9.62); CXA10 (14.895), and CXA18 (15.3).

VENEZUELA—All of the Venezuelan stations seem to be operating near their assigned frequencies in the 62-meter band with the excep-

tion of YV4RX and YV6RU which have not been located as yet, according to R. B. Oxrieder of Corozal, Canal Zone. . . . Martin Olthoff of Independence, Kansas, writes that YV1RJ (4.97) of Coro, signs-off near 9:25 p.m. with the selection "Blue Danube Waltz."

TRANSMISSIONS OF INTEREST

Daily—at 4:55 a.m., news in English, over JW3J (11.725) of Tokio, Japan; at 6:15 a.m., news in English, over XGOY (11.94) of Chungking, China.

Sundays—at 9 p.m., "Voice of Hawaii" program from Honolulu, Hawaii, over KQH (14.92) of Kahuku.

Saturdays—at 3 p.m., talk in English, over TAP (9.465) of Ankara, Turkey.

AMATEUR RECEPTION NOTES

AZORES—Desmond Callan of Readville, Mass., reports frequent reception of CT3BP (14.134), 50 watts power. He speaks very good English, as well as Portuguese.

BASUTOLAND—According to Harve Amers of Pomona, California, South African amateurs report that ZS4P, the only amateur in Basutoland, is now operating on 40 meter CW but will soon be on 20 meter phone.

LITHUANIA—Jack Wells of Phenix, Alabama, reports hearing LY1J (14.08), nightly from 11 p.m. on with special test transmissions. He asks for reports and says they will be verified. Tests consist of playing of phonograph recordings.

PAPUA—Roger Legge of Binghamton, New York, writes that he heard VK4NK (14.04) at Port Moresby, contacting PK6XX at Hollandia, Dutch New Guinea, at 5:40 a.m.

UNITED STATES—Donald Ellas Clark, is the operator of a 100 watt amateur transmitter aboard the Schooner "Effie M. Morrissey," enroute to the Arctic. The transmitter is also licensed to transmit on the following experimental frequencies: 6.425, 8.655, 9.135, 12.8625 and 17.31 mcs. under the call W10XDA.

ULTRA-HIGH FREQUENCY

W6XNU has moved to Carew Tower in Cincinnati, Ohio, and would like reports as to comparative signal strength in new location. W1XAR has applied for a permit to use a frequency of 23.6. W3XAU hopes to make use of its 25.725 frequency soon.

The Journal Company of Milwaukee, Wisconsin, owners of W9XAZ, have applied for permission to shift frequency of the station to 42.26, and to change location of station in Milwaukee; also to increase power of station to 5 kw.

The Louisville Times Company of Eastwood, Kentucky, have been granted a construction permit for a new 500 watt facsimile broadcast station to operate on 26.25.

WOKO, Incorporated of Albany, New York, will operate a 500 watt facsimile station on a frequency of 25.05 mcs.

TELEVISION

One of television's greatest problems, that of providing studios with twice the light now required by the movies, yet not subjecting articles to unbearable heat, has been solved by General Electric engineers in its television station near Schenectady, New York, by the use of a battery of four new-type water cooled quartz mercury-arc units containing 12 lamps having the light output equivalent to that provided by nearly 30,000 watts of incandescent light, at the same time giving off no appreciable amount of heat. The lamps are about the size of a cigarette and have an exterior of quartz. Surrounding the tube is another quartz jacket through which water passes at the rate of three quarts a minute, to prevent the lamp from destroying itself, due to the intense heat. . . . Four shimmering bars of polished aluminum have been inched out into space just below the burnished neck of the Chrysler tower in New York City. These are the first of the antennae for CBS' new television transmitter, W2XAB, which should be on the air with initial tests by the time this article reaches print. . . . The FCC now has 17 television applications on hand, five of which are from Los Angeles, California. . . . Studio programs from NBC television station W2XBS were discontinued during the month of August, so that necessary alterations and improvements could be effected. Outdoor telecasts were, however, continued and included the telecasting of several major sporting events, a significant prelude of what viewers may expect to see in the years to come.

LAST MINUTE NOTES

HAITI—HHK, "Radio Haiti," now under construction near Port-au-Prince, will have a power of 25,000 watts when completed, and will operate on 6.2, 9.62, 11.82, 17.85 and 21.67 mcs.

MEXICO—According to Julius Pedersen of Bridgeport, Conn., XEDQ of Guadaluajara, Mexico, has shifted to a new frequency of 9.517.

ITALY—2R016 (21.51), a new frequency for the Rome Short Wave Station, is now in use daily from 10 to 10:55 a.m. EDT.

SHORT WAVES FOR DX'ERS ON THE WEST COAST

by JOHN D. CLARK

All Times Are PACIFIC STANDARD

MANCHUKOO

A POWERFUL new 20 kw. broadcaster, located in Sinking, Manchukuo, is testing on 11.775 meg. regularly between 10:30 and 11:15 p.m. Most announcements are given in English, and programs conclude with "Please address all communications to Central Broadcasting Commission, Sinking, Manchukuo."

This station has also been assigned frequencies

(Continued on page 53)



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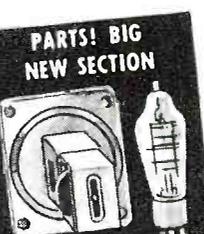
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Brimful of information for amateurs—free—at all RCA Power Tube Distributors. See March-April, 1939, issue for data on RCA-807, including details on a push-pull beam power r-f amplifier having 75 watts output for Class C telegraph service.



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RADIO PHYSICS COURSE

by Alfred A. Ghirardi

(Continued from September issue)

Note: The arbitrarily selected standard receiving antenna which is used in measurement work is an antenna of 4 meters effective height, 25 ohms resistance, 200 micro-microfarads capacitance and 20 microhenries inductance. Such a standard antenna may easily be constructed artificially for test purposes (except as to height).

Inducing voltage in the receiving antenna: We may consider the voltage induced in the aerial circuit to really be caused by the following two actions:

First, the passing electrostatic fields which are alternating in direction very rapidly (at a rate equal to the carrier frequency of the broadcasting station), produce distortion of the electron orbits in the air dielectric around the antenna system. This causes unbalanced electrical forces which tend to cause motion of the free electrons in the antenna wire in contact with the atmosphere; in other words an e.m.f. is induced in the wire. The e.m.f. will vary in direction and strength exactly in accordance with the variations in the passing fields. The action is practically the converse of the action taking place during the charging of a condenser by an applied e.m.f.

The other portion of the induced e.m.f. may be considered as being caused by the electromagnetic induction set up by the rapid movement of the passing electromagnetic field. The high-frequency e.m.f. induced in the antenna circuit will cause a surge of electrons rapidly up and down the circuit at a frequency equal to that of the carrier wave of the transmitting station, the strength of the individual cycles varying in accordance with the modulation impressed on the carrier wave.

The microphone: In order to broadcast sound programs by radio we must first convert the to-and-fro vibrations of the air which constitute the sound waves, into corresponding variations of current in an electric circuit. The device for accomplishing this is known as the *microphone*. There are several types of microphones in use in radio telephony and in sound picture work, but perhaps the simplest one for us to understand at this time is the popular carbon type. The principle of operation of the carbon microphone used in radio is exactly the same as that of the common telephone transmitter used in millions of homes. The microphones used for radio broadcasting are designed to operate satisfactorily over a wide frequency range which includes both that of speech and that of musical frequencies up to around 5,000 cycles. The ordinary house telephone transmitter is designed to operate only over the limited range of important speech frequencies.

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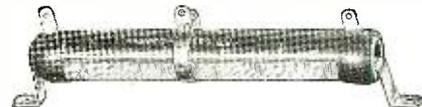
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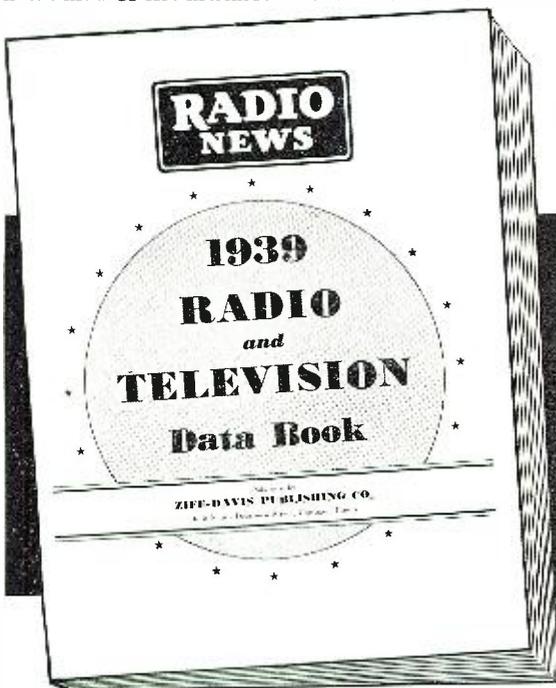
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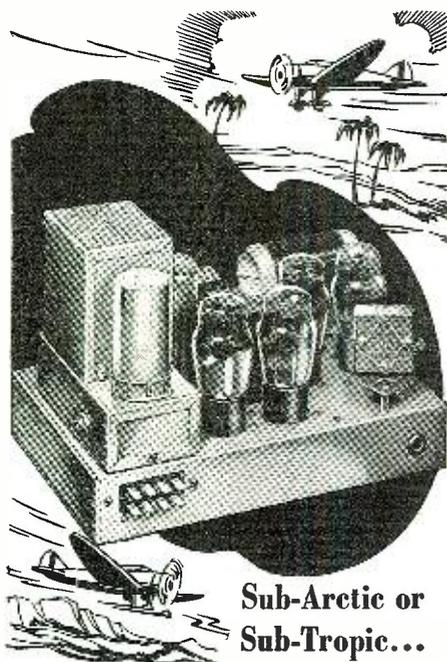
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An interesting contrast in service requirements is provided by the aircraft transmitter illustrated here . . . built for weather report service by Mr. L. M. Rundlett of Titusville, Florida, and the transceiver built by Mr. Reudy Heuss, pilot for Canadian Airways Limited.

Says Mr. Rundlett: "The transmitter is powered by a Mallory VP-552 Vibrapack and has given complete satisfaction. The pilot informs me that the transmitter is more economical from the standpoint of power consumption than any he has previously used."

Mr. Heuss constructed his transceiver so that he could receive weather reports in remote trading posts and trappers' cabins without returning to the plane in extreme weather, when landings had to be made several miles away.

Says Mr. Heuss: "This portable transceiver was not satisfactory until I installed a Vibrapack which gives me a transceiver with fifteen watt output with voice and T.R.F. receiver. All noises are eliminated from the power supply."

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AUDIO WILL BE AFFECTED BY VIDEO

ATLANTIC CITY, N. J.—"Broadcasting will be more directly affected by television than will Hollywood or the theatre," according to Orrin E. Dunlap, Jr., radio editor of The New York Times, whose paper, "Television, Facsimile—Their Future Effect on Broadcasting" was read in his absence at the recent annual convention of the National Association of Broadcasters.

In part, Mr. Dunlap's paper read as follows: "Television is just another motion picture, but it is a broadcast picture. It's in the air on wavelengths and that's where you are. It appeals directly to your audience and therefore to hold them, eventually you must add sight to sound. Your future as broadcasters is in ultra-short waves. Just as amusement centers shift, also shopping, residential, publishing and transportation terminals, so too will broadcasting's center of entertainment shift to keep pace with progress. It will go below ten meters. In years to come the present broadcast band may be abandoned like an old theatre after the shows moved uptown to a modernistic, bright-light street glorified by a shift in the population.

"The radio population, however, has nothing to fear. Broadcasters will make it as convenient as possible to take them along. Ultra-short wave converters will avert obsolescence of the existing radios. They will continue in use until gradually they are replaced by popularly priced combination tele-radios attuned to ultra-short waves."

-30-

Build Your Own Bug
(Continued from page 27)

ing it with pliers, keeping it hot while bending. It should be cooled quickly in a can of water after the desired shape has been obtained. The collar for the U band is eliminated entirely by soldering the band directly to the key bar at the point where the hacksaw blade and weight bar join. The band is parallel to the key bar with one side of the U running next to the vibrator spring, the closed end of the U toward the suspension assembly.

-30-

1.4 V. Preselector
(Continued from page 39)

until the best results are obtained. Do not, under any circumstances, permit the 1N5-G to oscillate; when in doubt as to whether the circuit is oscillating or not, adjust the regeneration control to just below the point where a loud "click" is heard in the receiver when the pre-selector grid is touched with the finger.

If desired, the doublet antenna winding may be removed from the coils and a separate antenna-series trimmer condenser placed inside of each coil form. Once adjusted, these coupling condensers require no attention, and the proper antenna adjustment will be made automatically when the coils are changed.

-30-

CREATING A SENSATION!!!



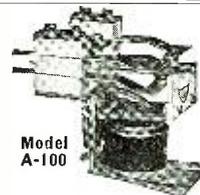
The "Dialomatic" Mobile Rig (Described in This Issue) Utilizes a BUD "Streamline" Amplifier Foundation, a BUD Utility Cabinet, and BUD Tuning Condensers!!

Here again is evidence of the wide acceptance of BUD Radio Parts in apparatus requiring the highest quality parts obtainable.

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GUARDIAN ELECTRIC

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What's New in Radio

(Continued from page 20)

commercial phone services. This new unit contains a built-in RF filter which protects against burn-outs. The newly designed stream-lined Desk Mount combines new beauty with stable support at correct height. The output level is 26 db below 1 volt for 10-bar speech signal. The microphone is finished in rich satin chrome—the desk mount in iridescent gray. The desk mount, Model S36A, can also be obtained separately. For complete details, write for free catalog No. 152.

-30-

As I See It!

(Continued from page 9)

is a sucker unless he looks out for the first person.

Did you ever read a real estate lease; the kind signed by tenant when he rents a new apartment. You as the tenant give up everything but the air you breathe. You promise to abide by every imaginable regulation set forth by the landlord. He, on the other hand, agrees to very little. Yet the public has become accustomed to signing these leases and they do so daily.

Don't for one moment think that we are recommending a single move that is contrary to the welfare of the servicing industry. No more than we think that Mr. Aldersley took advantage of his customer when he practiced the philosophy set forth in the beginning of this article. The jobber who sells merchandise to the serviceman thinks of himself first—rightfully so, because it means the existence of his business. . . . The jobber gets his price—he *must* get his price. The jobber who eliminates his profit eliminates himself.

Wherever the serviceman turns—when he is the buyer—he pays the price. . . . He is dealing with people who deliver the money's worth, but they get their price and make their profit. . . . But when the serviceman sells—he feels that he must be philanthropic—that as a technical man, any semblance of profit is a prostitution of his art. . . .

Servicemen speak about the lack of public confidence as one reason why the servicing business is not what it should be. . . . Operating at a loss or on a non-profit basis most certainly is no way to restore public confidence. Public confidence depends upon rendering proper service—effecting the repair. Others say that service business can be had only if the prices are low. . . . There is much truth in that, but there is an irreducible minimum for service charges—and that limit is the absence of profit. . . . Operating at a loss is past the common sense irreducible minimum. There can be no benevolent generosity when running a business. This is not being hard-boiled—it is simply realization of what the requirements are for normal sane living. . . . In a highly competitive world, a paramount requirement of serving oneself first, then the others, but all equally well.

(Continued on page 64)



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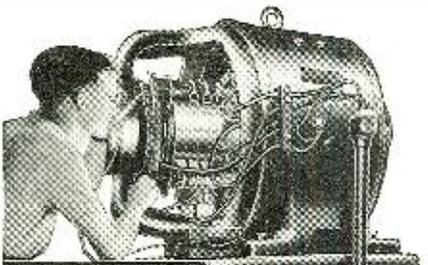
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- RADIOHM
- FIXED RESISTOR
- CERAMIC CAPACITOR
- WAVE BAND SWITCHES

Centralab
Division of Globe-Union, Inc., Milwaukee, Wis.

Dialomatic
(Continued from page 8)

either side of the handle and the connecting leads are securely banded together. The filter choke from the motor generator may be seen on the same side on which the mike transformer is mounted and directly alongside are mounted the two jacks which enable modulator plate and amplifier plate circuits to be read by means of a suitable meter and phone plug. The other two connectors shown are used to plug in the *Amphenol* coaxial cable, the one going to the exciter unit and the other to the antenna.

The *Guardian* plate and filament control relays may be seen mounted in the center of the assembly. In between is mounted the RF choke which is located in the hot lead of the generator. Placement of all of the other component parts is clearly shown and no trouble will be experienced in locating them.

The requirements to modulate the 807 are 25 watts. This is furnished from the type 6L6G tubes operating in Class AB1. The filaments of these two tubes are wired in series and this also applies to the 807 and the 6N7. Inasmuch as the 6N7 has a different current rating than the 807 it is necessary to make up the difference by shunting the 6N7 filament with a 1 ohm *Ohmite* resistor so that the current drawn will be the same as that of the 807. Cathode bias is used to the two 6L6G, and ample drive is provided from the preceding tube with the plates and grids connected in parallel.

If the microphone selected provides more than sufficient output fully to modulate the transmitter, a voltage divider may be added between the output of the mike to grid transformer and the 6N7 as a gain control. Better yet, a fixed net work may be installed after determining the proper audio level and thereafter kept constant. This procedure is made possible by virtue of the fact that a telephone hand set will be used and that this unit will be held at the same distance from the operator's mouth at all times when in service. The microphone current is supplied through a dropping resistor and filter condenser as indicated on the schematic, thus eliminating the necessity for a separate "C" battery. Inasmuch as no alternating current leads are used within the cable, no trouble will be experienced from any time of hum pick-up.

Next month we will discuss the tuning and adjustment of all of the various units comprising a complete transmitter mobile installation. The "Dialomatic" unit has been highly perfected and has gone through a series of radio tests with flying colors. This unit in its completed form will be fully illustrated and described together with the various control units at the dash position, the installation of the *Howard* 438 communications re-

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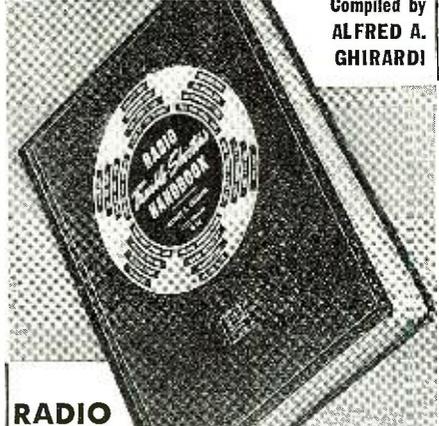
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-30-

Contest

(Continued from page 24)

2. You may send in as many entries as you wish, but only one (1) to a blank.
3. You may use the blank below, or a facsimile.
4. You must say whether or not you are a subscriber to RADIO NEWS. You need *not* be a subscriber.
5. You must describe your interest in radio. One word will suffice for this, such as: Serviceman, Experimenter, Licensed Amateur, DX Listener, Dealer, No Radio Interest, etc.
6. Your entry must be postmarked not later than October 31, 1939.
7. Your title entry must be 25 words or less.
8. If your title is in a language other than English, you must send in an English translation.
9. Entries will be judged solely on (1) Neatness, (2) Cleverness, (3) Originality, and (4) Reasoning.
10. The Judges will be the Editorial Staff of RADIO NEWS:
 - B. G. Davis, Editor,
 - K. A. Kopetzky, Managing Editor.
 - Oliver Read, Technical Editor.
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.

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

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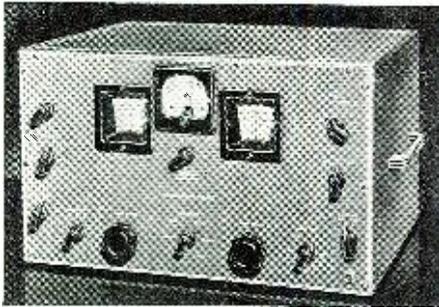
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Video Reporter
(Continued from page 37)

such conditions, would be a public service topic for newspapers, much in the same manner as sound radio is today.

And, to many newspaper publishers, television is an unknown quantity that may turn out to be either a boom or a boomerang. They are reluctant to give a helping hand to an industry that may turn out to be strongly competitive as an advertising medium.

At any rate, television manufacturers must admit that they've been getting splendid newspaper breaks. The slowness of set sales can't be blamed on poor publicity. There may have been negative points in some television stories but in virtually every instance it was fact rather than opinion. Such mentioned points as limited service areas, expensive installation costs, high set prices, and limited program schedules certainly didn't boost sales. But the industry, in all fairness, cannot blame the news writers for mentioning them.

THE AMERICAN TELEVISION CORPORATION is featuring lens arrangements on its new models to slightly magnify images on small-size cathode-ray tubes. The use of a lens in front of a 5-inch tube gives an illusion of viewing a 9-inch picture. Actually, the picture isn't quite as large as that produced by a 9-inch tube, a company representative declared, but the diameter of the lens framed on the face of the cabinet does give the impression that the picture is larger than the actual magnified size.

We learned at our visit to the firm's New York laboratory that list prices of all receivers include installation. This is a decided merchandising asset inasmuch as some installation estimates are as high as \$50 and some dealers were reported to have refused making sales unless customers agreed to this surcharge. Many installations are complicated and are easily worth that fee. But, in a great many of instances, the job is so simple that buyers can't understand the service fee.

It is important at this stage of the new art to make certain that every sale is a satisfactory one. Every set sold today, if satisfactory, will sell many additional sets in the near future. To most people television is still a novelty and the purchasing of a video unit for a private home indicates that it will be seen by relatives and friends of the buyer—all of whom are potential buyers themselves. Hence it is to the maker's advantage from many angles to ascertain that every unit sold will function efficiently.

-30-

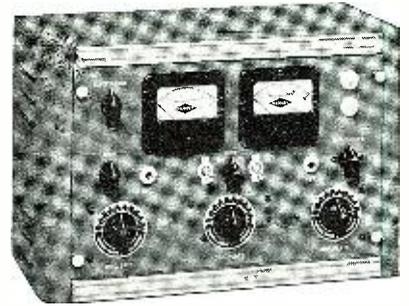
Leakage Tester
(Continued from page 24)

Plate Filter Condensers: In most receivers, one or more amplifying tubes have a filter in the plate circuit, consisting of a resistor in series with the load, the junction by-passed to ground. Such condensers may be checked by removing the tube, and measuring the d.c. voltage across the filter resistor. Any voltage appearing is due to leakage through the condenser to ground.

Many other tests are possible, and may be developed as the operator becomes more familiar with the instrument's use. Fuller information on the subject may be obtained from other sources, among them an excellent exposition by George Connor, in *Sylvania News*.

The labor of assembly may be greatly simplified if the following procedure is observed. The power supply should be constructed first, and the 6E5 connected to it. The potentiometers should be installed on the panel

For the Beginner



Harvey UHX-10

This portable, low-power rig was designed especially for beginners. Easy to operate—all controls and meters are on the front panel. A special switch selects CW or PHONE emission. Coils for the various bands may be changed easily and quickly through the hinged cover of the smart gray cabinet. Versatile—can be operated from either an AC power pack or 6-volt dynamotor. Inexpensive to buy and operate. The UHX-10 has no equal in its power class. Investigate this unit before you buy. Write for large illustrated catalog.

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and the panel temporarily bolted to the power supply chassis. Calibration of the potentiometers should now be carried out, marking the dials or panel accordingly. The panel is then detached from the chassis, and the switches and jacks installed. The various resistors are mounted directly on the switches, and connections made between the switches and jacks as required. Reference to Fig. 2 will facilitate this work. The panel is then bolted to the chassis and the remainder of the connections completed between the voltage taps and switches.

If no errors are made in assembly and wiring there will be no "bugs" to iron out, and only one precaution comes to mind. *The rectifier* (if heater type, such as the 84 or 83v) *should not be served from the same filament winding as the 6E5.* It will probably be necessary to install a resistance in the filament line to the 6E5, to reduce the voltage to the correct 6.3v.

It is quite obvious that if measurements of very high resistances are to be made with any assurance, the parts used in construction must be of known high quality. This is particularly true of the resistors and switches. The resistors should be a fully insulated type, such as *IRC* or *Centralab*, and of 5% tolerance or better. Incidentally, the 3333-ohm value was obtained by paralleling a 5,000 and a 10,000 ohm resistor. *Yaxley* switches and jacks were used with very gratifying results, as no leakage was detected, although tests were made up to 500 megohms.

The finished instrument will prove very useful to the small shop, with a limited budget, and also pleasing to the man who believes that "a dollar saved is a dollar earned," as only reasonably priced, stock parts are used and the design is intended to eliminate little used services which would add too much to the cost.

Short Wave Flashes
(Continued from page 44)

of 6.125, 9.545, 13.53, and 15.2 meg. It has often been logged on the lowest of these near 6 a.m., and it is possible that it may be the mysterious transmitter which has been heterodyning between YDB and VPD2 during the hours just before daybreak. Call letters are MTCY.

CHINA

Several listeners have reported reception of what seems to be ZBW2 of Hongkong, China, between 9 and 10:15 p.m., irregularly. The station usually becomes audible on the high frequency edge of Treasure Island's W6XBE, or approximately 9.535 meg.

A new Chinese broadcaster has now been reported by many fans on 11.86 meg., giving news in English at 6:15 a.m., and identifying itself as XMAA, "The Call of the Orient."

CRY9 of Macao, South China, although assigned a frequency of 6.08 meg., continues to move up as high as 6.11 meg. to avoid code interference. Listen for this one Monday only from 5:30 to 7 a.m.

Another Chinese transmitter has been logged on about 7.70 meg. irregularly near 4 or 5 a.m. This may be XPSB, an alternate relay station of Chungking's XPSA, which has an assigned frequency of 9.69 meg.

JAPAN

JZK (15.16 meg.) is now commencing the Overseas Program at 9 p.m., instead of 9:30 p.m., nightly. This is evidently one of the first moves in the proposed extended overseas service. JZK will undoubtedly be replaced by JZJ (11.8 meg.) in the very near future.

Two reports indicate that JLK of Tokyo is broadcasting to Java and the South Seas on 6.18 meg. from 6 to 7:30 a.m., but this has not as yet been confirmed.

JFAK of Taihoku, Formosa, has not shifted to 9.68 meg. as announced from several sources. The station is still operating on 9.63 meg., but its programs are being relayed by a powerful

new transmitter on 9.68 meg., both working simultaneously.

STRAITS SETTLEMENTS

ZHJ and ZHO are both on the air, despite many reports to the contrary. ZHJ has evidently increased its power, and is now being heard well in all parts of the Pacific Coast from 3:40 to 5:40 a.m., weekdays. It is located in Penang, Malaya, and works on an announced frequency of 6.08 meg.

ZHO, located in Singapore, although considerably weaker than ZHJ, may nevertheless be tuned in from 1:40 to 6:40 a.m. On Sunday the transmission commences with a church service at 2:40.

ZHP has raised its frequency slightly to about 9.7 meg. to avoid interference with the new Japanese Formosa relay station.

AUSTRALIA

VLR seems to have abandoned its 11.88 meg. frequency, and is now using 9.50 meg. for all transmissions. It is being received in this region with excellent volume from 9:30 to midnight, and from 12:15 to 5:30 a.m. daily.

VK6ME of Perth is still scheduled on 9.59 meg. from 3 to 5 a.m. weekdays, but is unreported for the past two months.

UNIDENTIFIED

An unidentified broadcaster, speaking English and believed to be located somewhere in Australia, has been heard on approximately 7.17 meg. near 5:30 a.m. irregularly.

FASTEST WAY TO LEARN CODE

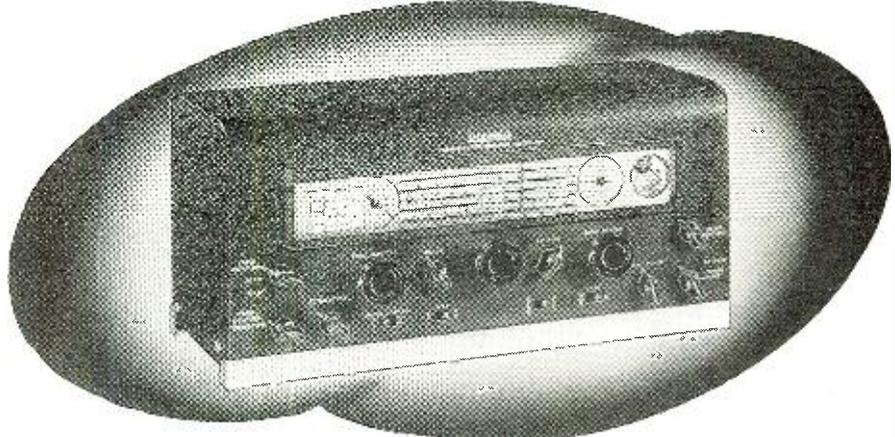
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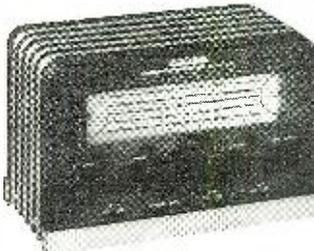
Model 460 has two BFO systems; conventional i.f. BFO with adjustable pitch and intensity and frequency monitor BFO which checks the frequency of the incoming CW signal as it is being received! **Extended Electrical Band Spread** which can be calibrated against the Monitor!

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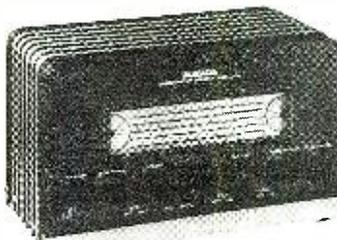
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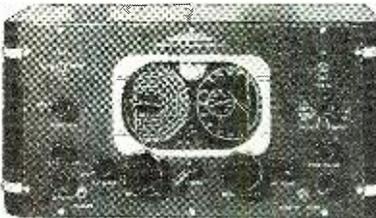
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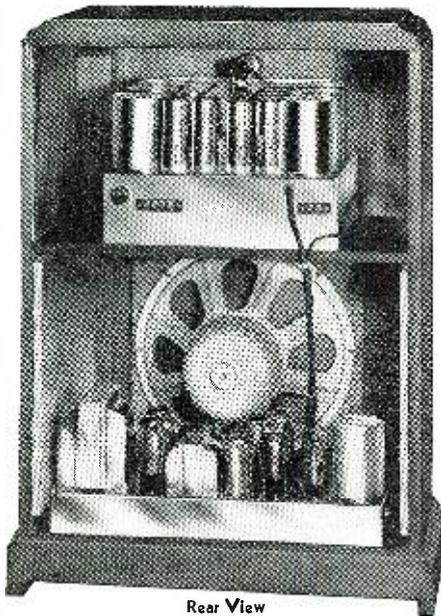


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Rear View

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Name

Street

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

A fairly strong Oriental station occupies the 7.95 channel near 5 or 6 a.m., but does not announce in English.

Another unidentified transmitter, employing a woman for English announcements, and giving a frequency of 11.718 meg. has been received several times signing off at about 5:50 a.m. According to the announcer, a 49 meter wave is being used simultaneously.

A new station in Siberia is operating on approximately 3.86 meg. near 5 a.m., with announcements in Russian and Chinese.

MISCELLANEOUS

Our listeners tell us:
 that YDX of Medan, Sumatra, is audible on 7.21 meg. from 2:30 to 4:45 a.m. daily;

that HSGPJ of Bangkok, Siam, is using 15.23 and 19.02 meg. simultaneously for its Monday 5 to 7 a.m. broadcasts;

that VUM2 of Madras, India, may be heard weakly on 11.87 meg. from 12:30 to 1 a.m.;

that LKQ of Oslo, Norway, comes on 11.73 meg. at 11 p.m., but is not audible on America's Pacific Coast until JVV3 closes down at 11:20;

that ZRG of Johannesburg, South Africa, is the station which many fans have reported slightly lower in frequency than ZBW between the hours of 2 and 4:30 a.m.;

that PMH of Bandoeng, Java, is now on the air Saturday nights from 9:30 to 10:30 p.m. in addition to its daily 2 to 7:30 a.m. transmissions;

that FOSAA of Papeete, Tahiti, is now working Friday only from 9:00 p.m. to 12:30 a.m. and is heard fairly well when not blocked by code;

that a new Italian station has been relaying the programs of 2RO on 11.95 meg., signing off at 4:30 p.m.;

that a newcomer on about 11.8 meg. sends news in English at 5:20 a.m. (This may be XGOK of Canton, China.)

ACROSS THE DIAL AT 7 P.M.

This is the third of a series of sections designed to show west coast listeners just which overseas sections may be heard at various hours of the day and night. Stations listed include only the strongest and most reliable. This month the hour is 7 p.m., PST.

17.8 meg.. XGOX, Chungking, China. (Irregular tests are carried out between 6 and 7 p.m.)

15.33 meg.. W6XBE, Treasure Island, San Francisco, Calif.

14.60 meg.. JVH, Tokyo, Japan. (Time signal at exactly 7, followed by announcements in Japanese.)

12.46 meg.. HCJB, Quito, Ecuador. (Irregular.)

11.90 meg.. XEWI, Mexico City, Mexico.

11.88 meg.. TPB7, Paris, France.

11.87 meg.. W8XK, Pittsburgh, Pa.

11.83 meg.. W2XE, New York, N. Y.

11.82 meg.. XEBR, Mexico City, Mexico.

11.75 meg.. GSD, London, England. (Always very strong.)

11.72 meg.. TPA4, Paris, France.

11.71 meg.. HP5A, Panama City, Panama.

9.96 meg.. COBC, Havana, Cuba.

9.83 meg.. COCM, Havana, Cuba.

9.60 meg.. TI1NRH, Heredia, Costa Rica.

9.69 meg.. TGWA, Guatemala City, Guatemala.

9.66 meg.. LRX, Buenos Aires, Argentina.

9.65 meg.. W2XE, New York, N. Y. (7:30 to 8:30 only.)

9.63 meg.. HJ7GAD, Bucaramanga, Colombia.

9.62 meg.. HJ1ABP, Cartagena, Colombia.

9.61 meg.. TTPG, San Jose, Costa Rica. (New station relaying programs of station on 6.41 meg.)

9.60 meg.. HP5J, Panama City, Panama.

9.59 meg.. W3XAU, Philadelphia, Pa.

9.58 meg.. GSC, London, England. (Always a very strong English station.)

9.57 meg.. W1XX, Springfield, Mass.

9.55 meg.. W2XAD, New York City, N. Y.

9.53 meg.. W2XAF, New York City, N. Y.

9.51 meg.. GSB, London, England.

9.50 meg.. XEWW, Mexico City, Mexico.

9.42 meg.. COCH, Havana, Cuba.

9.10 meg.. COCA, Havana, Cuba.

8.10 meg.. COCQ, Havana, Cuba.

8.03 meg.. COJK, Camaguey, Cuba.

Balance of 7 p.m. will be given next month. This is undoubtedly the most satisfactory hour for west coast short wave reception, since more stations are audible than at any other time of day.

This month we present the second in a new series of "Let's Listen" sections. Since a great many listeners are interested in reception of particular countries, it is the purpose of this section to show how, by hour west coast reception from individual foreign nations. Seasonal atmospheric changes may alter reception conditions from time to time, but the data below is quite accurate as we go to press.

LET'S LISTEN TO DUTCH EAST INDIES
 YDA, Tandjongpriok, Java—Originating station for Javanese Network Programs.
 YDB, YDC, YDD, Sourabaya, Java—Relay stations for Javanese Network Programs.
 PLV, PLE, Bandoeng, Java—Javanese trans-Pacific phone stations.
 PMN, PLP, Bandoeng, Java—Additional relay

GUTHMAN Presents **THIS MONTH'S FEATURE**

U-35 "KEYTONER"

SIMPLIFIES CODE-LEARNING

Learn code rapidly with this unit. Plug in key, connect to A.C. or D.C. and every dot-dash reproduced through built-in speaker. Knob selects one of five pitches between 300 and 3000 cycles. Ideal both for code mastery and class-room sending. Learn with Keytoner, and master hardest part of becoming an amateur. Size 7"x5"x4".

	List	Net
U-35K KIT	\$11.50	\$6.50
U-35W WIRED, less tube	16.50	9.90
1 70LGT Tube	2.35	1.35

Order from your jobber, or if he is out of stock, order direct... giving jobber's name.

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 CABLE ADDRESS: GTHMCHIC

NEXT MONTH!
Final Installment
"The DeLuxe
DIALOMATIC
MOBILE RIG"

Construction of Remote Control Unit

Here's the last and most valuable section of the continued article on the 3 band mobile transmitter. Don't fail to reserve your copy of the

NOVEMBER ISSUE
RADIO NEWS
On Sale October 8

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 608 S. Dearborn St., Chicago, Ill.

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stations for Javanese Network Programs.
 PMH, PMY, Bandoeng, Java—Local Native Programs.
 YDE, Solo, Java—Local Native Programs.
 PMD, Bandoeng, Java—Variety native and western programs.
 Midnight—None Audible.
 1 a.m.—YDB (9.55 meg.); PLP (11.00 meg. weak).
 2 a.m.—YDB (9.55 meg. after 2:30 fair); PLP (11.00 meg. good after 2:30); PMN (10.26 meg. weak after 2:30); PMH (6.72 meg. good after 2:30); YDX (7.21 meg. weak after 2:30); PMY (5.14 meg. fair); YDD (6.06 meg. weak); YDF (4.96 meg. weak); YDA (3.04 meg. weak).
 3 a.m.—YDB (9.55 meg. good); PLP (11.00 meg. good); PMN (10.26 meg. fair); PMH (6.72 meg. good); YDX (7.21 meg. fair); PMY (5.14 meg. fair); YDD (6.06 meg. weak); YDF (4.96 meg. weak); YDA (3.04 meg. weak).
 4 a.m.—YDB (9.55 meg. good); PLP (11.00 meg. good); PMN (10.26 meg. fair); PMH (6.72 meg. good); YDB (15.30 meg. fair but irregular).
 5 a.m.—YDB (9.55 meg. fair); PLP (11.00 meg. good); PMN (10.26 meg. fair); PMH (6.72 meg. good)—these stations sign off at 7:30 weekdays, 8 Friday, and 8:30 Saturday; PLV (9.42 meg. strong but irregular).
 6 a.m.—PMN (10.26 meg. fair).
 7 a.m.—None Audible.
 8 a.m.—None Audible.
 9 a.m.—None Audible.
 10 a.m.—None Audible.
 11 p.m.—PMD (7.99 meg. weak); YDA (7.25 meg. weak and irregular).

MANCHUKUO AND TAIWAN

MTCY, Sinkiang, Manchukuo—Powerful new station announcing in both English and Japanese.
 JDY, Darien, Kwangtung—Announces in English and Japanese. News in English at 4:45 a.m. daily.
 JFO, JIB, Taihoku, Taiwan—Announces almost entirely in Japanese, but gives news in English at 6:05 a.m. daily.
 Midnight to 3 a.m.—None Audible.
 4 a.m.—JDY (9.92 meg. good and 6.13 meg. fair); JFO (9.63 meg. good and 9.69 meg. relay strong).
 5 a.m.—JFO (9.63 meg. good) and relay (9.69 meg. strong).
 6 a.m.—JFO (9.63 meg. good) and relay (9.69 meg. strong); JIB (10.53 meg. good) and relay (7.325 meg. good).
 7 a.m.—JFO (9.63 meg. fair) and relay (9.69 meg. good); JIB (10.53 meg. fair) and relay (7.325 meg. good).
 8 a.m.—None Audible.
 10 p.m.—None Audible.
 11 p.m.—MTCY (11.78 meg. good).

AUSTRALIA

VLR, Melbourne, Australia—Station relays programs from 3AR, 3LO, and other Australian broadcast band stations.
 VK3ME, Melbourne, Australia—Broadcasts recorded music.
 VK2ME, Sydney, Australia—International broadcast station transmits recorded music and variety programs.
 VK6ME, Perth, Australia—Broadcasts recorded music.
 VK2MA, Sydney, Australia—Relays programs of various Australian Broadcast band stations.
 Midnight—VLR (9.58 meg. very good).
 1 a.m.—VLR (9.58 meg. very good); VK3ME (9.51 meg. good).
 2 a.m.—VLR (9.58 meg. very good); VK3ME (9.51 meg. good); VK2ME (9.59 meg. Sunday only); VK6ME (9.59 meg. daily except Sunday—weak).
 3 a.m.—VLR (9.58 meg. very good); VK3ME (9.51 meg. good); VK2ME (9.59 meg. Sunday only—fair); VK6ME (9.59 meg. daily except Sunday—weak); VK2MA (6.73 meg. Sunday only irregularly—fair).
 4 a.m.—VLR (9.58 meg. very good); VK2ME (9.59 meg. Sunday only—fair); VK6ME (9.59 meg. daily except Sunday—weak).
 5 a.m.—VLR (9.58 meg. very good); VK2ME (9.59 meg. Sunday only—fair).
 6 a.m.—None Audible.
 10 p.m.—VLR (9.58 meg. fair); VK2ME (9.59 meg. Sat. only).
 11 p.m.—VLR (9.58 meg. fair or 11.88 meg. fair); VK2ME (9.59 meg. Sat. only—fair).

ENGLAND

GSA, GSB, GSC, GSD, GSE, GSF, GSG, GSH, GSI, GSJ, GSK, GSL, GSN, GSO, GSP, GRX, GRY, GRZ, London, England—Stations broadcasting daily programs directed to various foreign nations. Stations and frequencies are changed quite often without notice, but data below is correct as we go to press.
 Midnight—GSI (15.26 meg. weak); GSD (11.75 meg. fair); GSB (9.51 meg. weak).
 1 to 6 a.m.—None audible.
 7 a.m.—GSH (21.47 meg. fair); GSG (17.79 meg. fair); GSF (15.14 meg. good); GRX (9.69 meg. weak).
 9:25 a.m.—GSG (17.79 meg. weak); GSP (15.31 meg. fair); GSD (11.75 meg. weak); GSI (15.26 meg. weak).
 10, 11 a.m.—GSG, GSP, GSD, GSI, weak and irregular.
 Noon—GSD (11.75 meg. fair); GSI (15.26 meg. weak).
 1:20 to 3 p.m.—GSP (15.31 meg. weak); GSF (15.14 meg. weak); GSD (11.75 meg. good); GSC (9.58 meg. weak).
 3:20 to 6:15—GSF (15.14 meg. fair); GSD (11.75 meg. very good); GSB (9.51 meg. fair).
 6:20 to 8:30 p.m.—GSD (11.75 meg. very good); GSC (9.58 meg. very good); GSB (9.51 meg. good).
 10 p.m.—None Audible.
 10 p.m.—GSD (11.75 meg. good); GSB (9.51 meg. fair); GSI (15.26 meg. weak).



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NEW VITROHM, the enamel now used in the manufacture of all Ward Leonard Resistors, has a crazeless structure that has been tested and proven to more than meet the requirements to withstand humidity, moisture, and immersion. Available in all sizes and types. Write for full information. Ask for Resistor Bulletin.

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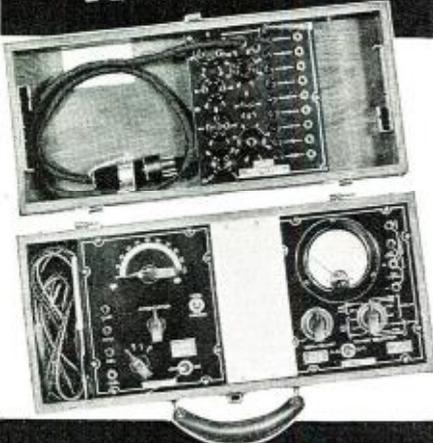


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Dealer Net Price.....\$41.84

● Many servicemen prefer the extreme compactness of the Model 1181-B Portable Laboratory, which was first offered a few years ago, and which like other Triplet instruments, has been kept up-to-date in engineering features.

This portable laboratory includes Models 1125-A Volt-Ohm-Milliammeter (eight AC-DC voltage ranges; five AC-DC Milliamperer ranges; and low and high ohms ranges)—1151 Signal Generator (110 Kc to 18 Mc) and 1166-B Free Point Tester with sockets on the panel for all the latest tubes. Volt-Ohm-Milliammeter has 3" Triplet indicating instrument with RED•DOT Lifetime Guarantee.

WRITE FOR CATALOG



The Triplet Electrical Instrument Co.
1510 Harmon Ave., Bluffton, Ohio
 Please send me more information on Model 1181-B; I am also interested in

Name

Address

City State

S & S News

(Continued from page 33)

be installed at the New York quarters of the DuMont organization, on the top floor of 515 Madison Avenue. This proposed television station is for the purpose of studying program problems and possibilities under actual working conditions. A third application covers a similar television station to be installed in the National Press Building, Washington, D. C.

Solving the Intermittent

(Continued from page 26)

Chances are, after I come to the house tonight with the set finished and a receipted bill in my hand, her husband will accept the work. It's a chance we have to take. If all radio work was certain, it wouldn't be half as interesting!

Jensen, Smith, Wentworth, Randolph. What floor was that—three, wasn't it? Ring the bell.

OLD-TIMER: *Good evening, Mr. Randolph. Here is your set. I spoke to your wife on the phone earlier today, but she couldn't understand the work we were doing—naturally, a woman can't be expected to follow electrical work—any more than a man can pick out the living-room drapes! I have completed the work in order to show you what was necessary in order to bring the set back to normal. This part was defective at times, but was normal when the set was playing at the proper volume. We located it by two of the tubes were necessary, and—although the others have been used for quite some time—we passed them as okay in order to keep the price down. The labor charge is below the average for work of this type; sometimes it runs into twice or three times this amount. But an "intermittent" set never stops giving trouble until it has had the correct treatment. We were fortunate—*

Mr. R.: *How do we know it won't fade again?*

O. T.: *Only my NEW customers ask that, Mr. Randolph!*

Mr. R.: *I didn't mean to offend you. Granted that you are honest, and that you know your business—what assurance have we, if we pay to eliminate fading—or an "intermittent," as you call it—that the trouble won't come back?*

O. T.: *I see your point. Tell you what I'll do: You need a set of tubes; if you replace them all tonight, I'll leave the receiver for a week's trial, and collect for the repair later. Frankly, I am making this arrangement to get you as a new customer.*

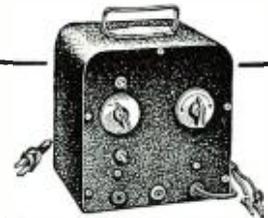
Mr. R.: *Sounds fair enough to me. What do you say, Helen?*

Mrs. R.: *I guess we DO need tubes—we've had the set so long. That is, providing YOU pay for them.*

Mr. R.: *I'll take them. Drop in next Thursday for the balance—if the set doesn't fade before then!*

O. T.: *It won't. I wouldn't risk my reputation on it if I wasn't sure.*

**THE NEW
BROWNING
FREQUENCY GENERATOR
(A 100-1000 Kc. Modulated Calibrator)**



At last here is an accurate 100-1000 Kc. standard which is designed for spot checking frequencies of television or radio receivers at intervals of 100 and 1000 Kc., yet at a price which is within the means of the average pocketbook. A built-in mixing circuit is also provided for accurately checking at 100 and 1000 Kc. intervals the frequency of oscillators, signal generators, transmitters and other apparatus. Note these outstanding features:

1. Ingenious circuit gives unprecedented versatility.
2. Bed-rock stability on 100-1000 Kc. oscillator.
3. Audio modulation for accurately checking calibrations of receivers, etc.
4. 100-1000 Kc. oscillators readily adjusted to 1 part in 200000 against WWV's frequency.
5. Adjustment of 100-1000 Kc. oscillators absolutely independent.
6. Built-in mixer circuit allows checking signal generators, oscillators, excitors, transmitters, etc.
7. Completely self-powered 110 volt AC-DC.
8. Phone Jack provided for accurate zero beat adjustment.

List price of completely built unit, less tubes, \$33.00. **\$19.80**

NET PRICE
Also available in kit form, complete with instructions. List Price, less tubes \$27.00
NET PRICE **\$16.20**
If your jobber cannot supply you write us direct giving his name.

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750 Main St. Winchester, Mass.

**WHY
LINDBERGH
CAME
HOME...**

What are the mysterious facts surrounding Lindbergh's heretofore unexplained return to the U.S.A.? NOW IT CAN BE TOLD! A sensational scoop by America's Top Aviation Magazine—an exclusive account by Drew Pearson and Robert S. Allen, famous columnists and authors of the renowned Washington Merry-Go-Round! DON'T FAIL to read this startling inside story—but REMEMBER, it can be found only in the big

**OCTOBER ISSUE
POPULAR
AVIATION**

Now On Sale At All Newsstands

Snap into it, young fellow—your work isn't over yet. Check that window strip again. Pull on the leads at each end; make sure the tacks don't go into the metal molding. Look for corrosion. Then, after you're certain it's perfect, rip it out and put in a new one. Costs us three cents, and might save a lot more. It's good protection. I'll put in the new tubes and connect the set.

OLD-TIMER: *There you are. Here is the bill for the tubes—\$7.30 less ten percent—\$6.57.*

Mr. R.: *Here's a ten—apply the change on next week's bill.*

O. T.: *Thank you, very much!*

Mr. R.: *Have a highball?*

O. T.: *Sure—next Thursday night. You'll be an old customer of mine by that time!*

Mr. R.: *That's a hot one! Did you hear what he said, Helen? He said—*

Mrs. R.: *The Soapsie Woopsie program is on.*

O. T.: *Good evening, and thank you both.*

Come on, young fellow. I've got the tool-kit—you carry the midget. This time, don't open the wrong door!

[This completes the series on "Intermittents" by Mr. Bradley. A new series will start in an early issue. Watch for it.—Ed.]

-30-

QRD? de Gy

(Continued from page 40)

Broun) that the art of throwing onions at each other is an insult to the intelligence of the American radiop... or are we too optimistic? We thought that only others figured the national mind to be that of a 12 year old child. It has been taught from time immemorial that the only way to beat your competitor is: (1) ignore him as though he doesn't exist; (2) build up your own product or service; (3) make him like you because of your fairness in all dealings. Ask any salesman whether this plan hasn't some merit to it. And if it isn't straight salesmanship that is involved in enticing, inveigling and lassoing wary radiops into the unions, then we don't know our Roget.

MATT MURRAY, former radiop who has gradually built himself a nice police billet, recently returned from a 30 day leave of absence. It started out as a vacation but turned out to be a siege of dysentery and acute colitis. After losing 14 pounds, even his shadow disowned him. We're glad to report he's up and around now and has returned to active duty, waiting for next year's 30 day vacation with renewed hope.

DOLPH TUGGLE who is holding down the berth on the *Calmar Line's SS Penmar*, KUNF, tells us that he was up off the Oregon coast when the *Auto Alarm* sounded at 4 a.m. one morning. Quote him. Went up and found VAK Victoria, B. C., had sent the alarm. The *Temple Bar*, GNQJ, had run aground 20 miles south of Tatoosh Island. The op contacted VAK, then tied the key down and left the ship with the others. The transmission continued for ten minutes, then stopped. The crew got ashore OK and the Coast Guard picked them up when dawn broke. The *Texmar* of this line was the first to arrive on the scene but couldn't find them. The captain had placed position of the wreck on Carrol Island, but in reality had run ashore almost 15 miles from there. Unquote him. Does getting up at this unearthly hour constitute overtime? Does it?

(Please turn the page)

THE MOST COMPLETE CATALOG

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JUST OFF THE PRESS! And the most complete line in the industry. Two big sections: Amateur and Commercial—devoted to relay racks, enclosed racks, transmitter racks, all purpose metal cabinets, several new types of rack panels, speaker cabinets, and new models of amplifier foundation chassis. Many new De Luxe chromium trimmed, streamlined models in both black or grey ripple finish are included.

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The NEW Meissner 1939-40 Catalog—just off the press that describes in its 48 pages over 800 new, different and improved Radio and Television items including:

- TELEVISION KIT for \$139.50—pages 4 and 5
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- PORTABLE BATTERY OPERATED KIT—page 19
- SIGNAL CALIBRATOR AND AUTOMATIC ANTENNA SELECTOR—page 22
- DELUXE SIGNAL SHIFTER—page 23
- ADAPTER KITS AND 6 PUSH BUTTON TUNER—pages 24-26
- POWER RELAY AND ANTENNA CHANGE-OVER RELAY—page 29
- IMPROVED PLASTIC I. F. TRANSFORMER for \$1—page 33

and hundreds of other up-to-the-minute developments in radio and television.

FREE!!! To all service men, amateurs, hams, experimenters. Mail coupon below today for your copy.

SEND 50 CENTS for Meissner's "NEW GUIDE TO RADIO AND TELEVISION," a complete, scientific instruction book and Trouble-Shooter's Manual for Kit Builders and Operators. Fully illustrated. 168 Pages.



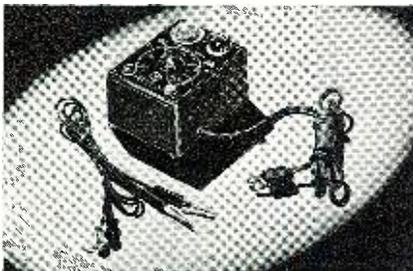
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Mt. Carmel, Ill.—Dept. N-10.
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 Enclosed find 50 cents for Instruction Book.

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

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A big job of servicing and a big job of money-making. It's Cornell-Dubilier's new ultra-compact Capacitor Bridge. Quickly and accurately measures all types of capacitors between limits of .00001 mfd. and 50. mfd. Employs Wien Bridge circuit for all measurements. Operates on any 110 volt, 60 cycle power line . . . 12A7 tube acts as rectifier and amplifier, 6AF6-G for "visual eye" detector. Send today for new 1939-40 Catalog No. 167-A and complete feature story of Cornell-Dubilier's sensational Capacitor Bridge.

PRODUCT OF THE WORLD'S LARGEST MANUFACTURER OF CAPACITORS



SO toodleoo and cheerio, me hearties, es tnx for the msgs you've QSO'd whether beefs or congrats, we like them. It tells us what you're thinking. So 73 . . . ge . . . GY. —30—

Bench Notes (Continued from page 21)

as possible; when they are faced with the selection of a more critical receiver or a more expensive transmitter, the latter is the invariable choice. In other words, future sightcasters will combine a moral responsibility with sound engineering to make the repairman's work as simple as possible.

This does not mean that a serviceman should float in the back-wash of progress until television points the way to retirement; but today's design engineers, fully aware of the problems concerned with transmitter operation, are at the same time aware of the problems of receiver maintenance, and will minimize them to increase service area and quality.

There will be some servicemen who will drop out of the television picture between now and the time the profession matures; but then, servicemen always have been leaving. The letters I get from beginners asking me how to get into servicing are equal in number to those from *old-timers asking me how to get out*. From this, one might conclude the profession is in equilibrium. It isn't—this come-and-go is an indication of healthy activity. It is only when no newcomers enter, and no old-timers leave a profession, that the field is not fertile.

Few radio repairmen start with the intention of staying in the business all their lives. Many find, after spending long years in servicing, that they are happier or better-paid doing something else. Others have expanded their business to contain allied activity—a graduation sans diploma which often leads to work, even in the same profession, that more closely follows their needs or inclinations.

—30—

Binging the Bell (Continued from page 15)

(We drop the curtain to allow ample time for a thorough shop cleaning.)

Now that we have at last cleaned up the shop, the windows, the outside front wall, the signs, bench, shelves, cabinets, back alley, etc., what next?

Let's paste up this sign in our hat band: **RULE NO. 2—ALWAYS KEEP YOURSELF AND YOUR SHOP AS CLEAN AND NEAT AS POSSIBLE. SOAP AND WATER DISSOLVE A LOT OF SALES RESISTANCE.**

While you were cleaning up, did you notice how dingy the walls and floor were, even after they were scrubbed or dusted? How about starting in right now to put aside a sufficient amount for completely redecorating the store or shop both outside and inside?

You say that this will take more than the 5% originally planned? Prob-

ably it will, but actually, the store or shop upkeep including decorations and furnishings is not a true advertising expense, but another type of business investment. Your signs, window and counter displays are the only things directly chargeable to advertising.

Let's stretch good business practice a bit and agree that after deducting all costs (including the new 5%

EASY TO LEARN CODE

It is easy and pleasant work to learn the modern way—with an **Instructograph Code Teacher**. Ideal for the beginner or advanced student. Many tapes available ranging from alphabet for beginners to typical messages on all subjects. Speed range 5 to 40 WPM. Always ready, no QRM, beats having someone send to you.



FOR SALE OR RENT
STANDARD with 10 tapes and book of instructions . . . \$20.25
JUNIOR with 5 tapes and book of instructions (not rented) \$12.00

RENTAL Standard with 10 tapes and book of instructions \$3.00 first month, \$2.25 each additional month. All rental payments may be applied on the purchase price should you decide to buy the equipment.

Write for details today

INSTRUCTOGRAPH COMPANY

Dept. NR, 912 Lakeside Place, Chicago, Illinois
Representatives for Canada:
Radio College of Canada, 863 Bay Street, Toronto

DON'T BUY—SAVE \$\$\$

ON RADIO SETS—PARTS, TUBES, PHONOGRAPH RECORDS—UNTIL YOU HAVE SENT FOR OUR NEW GIANT MONEY-SAVING FALL CATALOGUE
UNITED RADIO COMPANY, Dept. B Newark, N. J.

\$ MAKE \$ MONEY WITH YOUR CAMERA

You, too, can make MONEY with your camera in your spare time! There's a big market for good pictures. You don't have to be an expert nor own expensive equipment. The easy way to learn how to take pictures that sell is to read the LEADING MAGAZINE IN PHOTOGRAPHY every month! Start with the:

OCTOBER ISSUE
Popular Photography

NOW ON SALE AT ALL NEWSSTANDS

advertising program) from all radio service work received as a *direct result* of the new advertising, the net profit should be plowed under and used for a renovating program which eventually will result in your having the *finest looking radio repair shop* in town!

Remember, this will include a re-finishing or, at least a repainting of the store front. A newer and larger outside sign (preferably lighted) or a repainting of the present sign if considered satisfactory. Then, it includes the replacement of cracked window panes, repolishing or refinishing any bright work on doors and everything else necessary to brighten up the store.

Remember, that the money you will use for this work is EXTRA profit you never would have made if it were not for an EFFECTIVE advertising program. I know that it will hurt mighty bad to kick into the modernization kitty money which could be used to bolster up the family fortune—but pinch, brother, pinch—it will be returned to you many-fold in increased business and the ability to charge better prices for your work.

In later issues we will discuss shop interiors, their decoration and arrangement. But, put this up at home: **RULE NO. 3—YOUR STORE OR SHOP MUST BE MODERN AND EFFICIENT. REPLANNING AND REDECORATING WILL INCREASE BOTH THE NUMBER AND THE PER-JOB PROFIT ON SERVICE SALES.**

Start in right now to save for advertising and modernization. Be sure to apportion these amounts correctly. Obtain two envelopes or boxes and mark one "Advertising Fund" and the other, "Shop Modernization." You won't use the second one until next month when we really get going on new business, but get it ready. And remember, to make the plan work, you must follow through consistently—if you falter, your whole plan is liable to failure. As you use each advertising idea, try it long enough to get results. If a few fail for you—there will be plenty more to substitute in their place.

Next issue, we will write about telephone advertising—how it can be used to get you those EXTRA profits. If you have no phone now, get busy and hustle up enough business to have one installed. Get those names of old customers out and review them. We're going to need them next month.

-30-

63 MC Transmitter
(Continued from page 19)

ing has been necessary and no trouble has been experienced with radio frequency feedback.

Constructional Details

The transmitter is constructed on several individual chassis all mounted in a large upright cabinet rack which is provided with interlock switches to

protect the operating personnel from coming in contact with any voltage when the cabinet doors are open. The radio frequency chassis are constructed of heavy-gauge aluminum finished in gray baked enamel, and the steel power chassis are finished in a similar manner after first having been rustproofed to prevent corrosion. Panel pilot lights are provided and one rather novel pilot was used to indicate the warm-up time of the tube filaments. Whenever a time delay relay is used as was the case in this transmitter, it is not always easy to tell when the relay has closed. In this instance an amber "warm up" pilot goes on whenever the main input switch is closed, and remains lit until the time delay relay trips which may be from 30 seconds to a minute afterward. As this occurs the amber pilot goes out and a green "stand by" pilot lights indicating that the tubes are ready for plate voltage. When this is applied a red "carrier" pilot comes on. The circuit of this light may be followed in the complete transmitter diagram. This time delay relay and the main power relay are mounted on a small bakelite panel and the panel in turn is supported on these small airplane type shock mounts, to deaden the clatter caused by the relays closing, and to keep the chassis from acting as a sounding board. A press-to-talk crystal microphone is used with the transmitter and the switch in the microphone stand oper-

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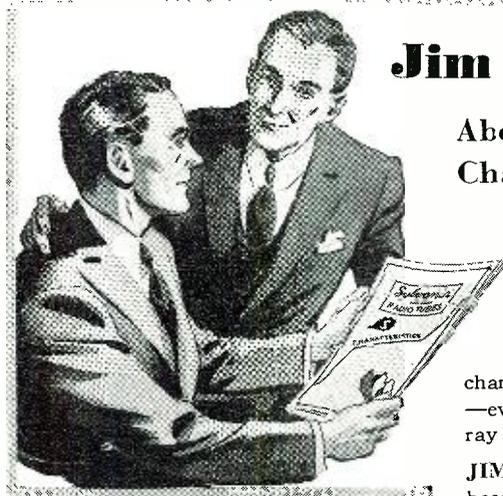
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JIM: Yep. And in the back here are base and bulb diagrams for all types—and complete dope on Sylvania panel lamps.

JOE: Sa-ay—this would be a big help to my business! Where can I get it and how much does it cost?

JIM: It's free—one of Sylvania's many serviceman helps. All you have to do is send to Hygrade Sylvania Corporation, Emporium, Pa. I'm telling you, Joe—better do it today!

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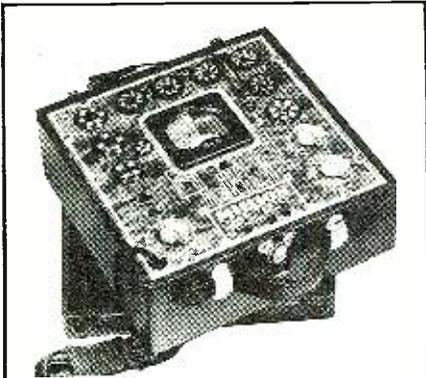
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ates a small sensitive relay which in turn closes the power relay. An interesting situation arose from the decision to mount the sensitive relay on the bakelite base and shockproof all three relays at once. It was found that the slight jar occurring when the power relay closed was just enough to make the contacts of the sensitive relay chatter, and of course when this circuit opened intermittently the power relay chattered all the more.

It took quite a while to figure this out, as the sensitive relay could be held closed and everything behaved nicely, yet when closed electrically the power relay vibrated like a buzzer. The moral to all this is: never mount a sensitive relay alongside a power one, on a floating base.

In designing the power output circuit of the Class C amplifier, some consideration was given to the use of a linear tank circuit with large quarter-wave tubes. These would possibly have raised the plate efficiency of the amplifier a few per cent but this did not seem sufficient to warrant the mechanical difficulties involved in mounting and insulating the rods in the rack. A conventional tuned coil was decided upon and care was taken to make this as efficient as possible. It was constructed of 1/4" copper tubing wound on a form about 2" in diameter, and each end was sweated to a solid bar that made contact in two places with each half of the tuning condenser. As the circulating current in this resonant circuit is easily in excess of 50 amperes, low resistance contacts are imperative. To still further help things, the coil with its bar connectors was heavily silver plated. As a result this 63 mc. tank acts very much like a 2 mc. one, with the no load amplifier plate current dipping to a low value at resonance.

Ten meters are used in the transmitter, exclusive of the carrier shift meter on the modulation indicator, and all ten are mounted on a bakelite sub panel behind a glass front panel. These meters read the following: Crystal oscillator plate current, First and second multiplier plate current, Third multiplier grid current, Final amplifier grid current, Final amplifier plate current, Final amplifier filament voltage, Final amplifier plate voltage, Modulator plate current, and R.F. output feeder current.

By their use the condition of the tubes and the tuning of the various circuits can be kept under constant surveillance.

A small exhaust fan was mounted on the rear door to help keep the component parts cool and was arranged to be turned on whenever the plate voltage was applied. This fan aids materially in cooling, as on a several-hour full-load test the temperature inside the cabinet did not exceed 38 degrees C., which was about a 17-degree C. rise above the ambient temperature.

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Servicemen's Case Histories

(Continued from page 42)

back from the receiver section by disconnecting the two red leads (models 738A2, 737A2, 738A2) at each end of the 4,000-ohm resistor in the power pack that pass into the receiver section. Check the voltage at the input side of the resistor, (which should be approximately 250 volts)

Capitol Amplifier

(Continued from page 37)

valuable in helping the new "operators" learn to handle the system.

It is very important in the beginning to see that the system is understood by those who are to use it. In a five minute talk to the Legislators (probably the only one the author will ever make to such an important body) we explained, while using the system to demonstrate our talk just what the amplifier would do, how to talk into the mikes, why you couldn't stand two feet away and be heard, what caused feedback and how to stop it, how to turn the set on and off and also how to select any mike they wished to make "hot." It required only a week or so before they were familiar with its operation. It was hard to imagine just how they had managed without a P. A. System all the years before. One thing might be said: many of the law-makers had never been able to hear what was going on in their own sessions till after the system was installed. —30—

Serviceman's Experiences

(Continued from page 16)

season pass to the Kentucky gold cache. Besides, we need a new tube tester."

"You and your corny methods confine us to chicken-feed," Al replied. "When a customer comes into the store carrying a bag of tubes, it is an open confession something is wrong with his set. Go after the receiver maintenance first—and then sell tubes!"

"You mean I should ask him to walk out with his tubes and bring the chassis and speaker back with him?" I asked.

"It's a cinch no one ever retired on tube profits alone," he replied.

"Foolishness," I said. "Don't tell me I should turn away trade!"

"You shouldn't force any sale," was the answer. "Our tube stock and checker are meant to be useful adjuncts to our servicing business—not our main stock in trade."

Just then a customer entered. "Here comes a brown bag," Al whispered, "watch me!"

"I have been to three radio stores trying to get this tube checked," the newcomer declared angrily, "and not one of the servicemen could pass on it. One of them tried to sell me a refrigerator; another offered me a bargain combination of flat-iron and goldfish; and the last one tried to get me to leave my car for a carbon and valve

job. Failing that, he tried to get me to stand in a stall while he pressed my pants. Before we go any further—is this tube good, or isn't it?"

Al inspected it. "An 874," he commented. Then he held it to his ear, tapped it with his finger, and handed it back. "It's okay—let me see the others," he requested.

"Do you mean to say," the customer asked, handing the bag to Al, "that I have actually located an old-fashioned radio serviceman, and that all the tube needed for test was a knowing ear? I had begun—"

Al was unwrapping the newspapers from the remaining tubes, calling their type numbers: "two 81's, a 10, some 26's, and a 27. Yes, some of us are still alive. Tell me—did your Kolster act up a bit before it broke down?"

"Say—your name isn't Holmes, is it?" the customer asked, pleasantly astonished. "No, it didn't—it just stopped. Are all the tubes good?"

"The two 81's are shot," my partner announced.

"How much are they?" the prospect asked, reaching for his pocket-book.

"Two twenty-five apiece," Al said, "but I won't sell them to you!"

"No?" the customer asked, shedding some of his good-will. "Haven't you any in stock?"

"Sure," my partner replied, "but if I sold them to you, you'd take them home, put them into your set, and burn them out within fifteen minutes—"

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without hearing any music."

"Why is that?"

"Your filter block is shorted. Let me follow you home in the truck, and I'll show you what I mean," Al said, walking to the door and picking up the tool-bag on the way. "You see, I want to sell you exactly what you need to bring your set back to normal—not something both of us will lose money and good-will on."

Al returned with the chassis in about an hour. He lugged the pieces to the bench, and announced: "Filter block, volume control, complete set of tubes. Isn't that better than begging for a premature tube sale?"

"How did you know it was a *Kolster*?" I asked, curious, but unwilling to admit defeat, "and how did you know the filter block was shot?"

"Ever come across another set with the same tube combination?" Al asked. "I guessed on the filter block—the 8I's were both open, and even if they had been the trouble, I wouldn't have sold them without making sure he wouldn't ruin the new ones as soon as he put them in—and put me in a spot where I couldn't make a replacement under the guarantee."

"You were just lucky in this one case because of the trouble he had on the 874," I said. "On another set—"

"—I would have used my head some other way," he answered impatiently. "Ah—how can I change you in five minutes, after you've had the habit of bad thinking for thirty years? Go to the front of the store and think it over for a while!"

I walked out and leaned against the show-window railing. My partner can be very perturbing at times. Of course, he was partly right, but why should I have to admit—

The door flew open. O'Leary handed me a tube.

"Give me back that seventy cents, you daylight burglar," he shouted. "I put it into the set, and it didn't play. What kind of a racket you running here, anyway?"

"I'll go home with you and look at the set," I suggested meekly.

"Not after you sold me a tube I didn't need, you won't," he yelled. "I intend to do business with an honest serviceman—if there's a *radio* store in the neighborhood!"

I refunded his money and walked slowly to the rear of the store with heavy eyelids and arms swinging like an ape's. Al's feet were on the desk, and he was reading half a magazine.

"Listen to this," he said, without looking up. "It says here that 'A certain wide-awake manufacturer attends every convention of twins he hears about, in order to sell cuspidors to spitting images.' Isn't that interesting?"

"Yes," I sighed in defeat, "please read some more."

Al looked up slowly and gave me one of his infrequent smiles. "Another ten years, and I'll make a serviceman out of you," he said.

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Hamchatter

(Continued from page 29)

Georgia hams got a preview of television in Atlanta recently.

DSB is back on 75 after being QRT for several months.

W1PFP of Brunswick reports by air that he received a SWL card from Australia, all on less than 75 watts and on 160.

W1EFD of Montgomery, Ala. built a FB new shack with the help of the Jr. Op.

W1PAN, Jacksonville, Fla., is plenty QSOing on 160 and reports that hamming is much on the go in that city.

W1ENJ Troy, Ala. reports that after all he is still on 160 and not in the doghouse as reported, somebody might sell him a receiver though.

W1GFF of Cordele says that he is ready with his 50 watts on 160 and will take on all comers. Hoke Johnson of Panama City, Fla. reports three active hams in his area.

We recently visited fourteen hams and all had *RAY* on deck which is something if you ask me! [Tne, Ed.]

MORE fm Keith still about the 4th District: FXT reports that the Birmingham gang is very active with 160 and 75 being the most worked bands.

EQZ reports regular schedules with DXW. PKP on ten all stations being about 60 miles apart.

How about some news out of the S. C. and N. C. hams.

FW and JDE report a nice trip to Hot Springs, Ark. recently. Some hams have money anyway.

You yanks up north who are QRAing in Florida for the winter should let us know about your activities down south.

Personal to W9ELB you other listen for some Ws that we know.

Who knows the QRA of W1AFT?

How come we can't make our traffic total in the 4th better than it is?

Is DXW readying his hamfest for New Years day?

Here is our XYLs definition of a HAM. "A ham is a man who loves his radio, marries a wife, QRMs the neighborhood, and is not a fit subject to live with." Wow!!!

And that's the thanks we get for all our efforts.

W1COS does some swell old time operating on ten and 160. How about 40, George?

EAY and AUP report in from Montgomery and advise us that they are plenty active.

AUP was our first contact years ago and is a ole timer. How about some activity from you Donah, Ala. hoys?

Archie, W1FCE, Tallahassee, Fla. reports that he is rebuilding and also working for the local BC station.

W4BZD Fitzgerald, Ga. is 20 meter phoning at present.

W1EGH, Quitman, Ga. reports that he is inactive at this time but will rebuild soon.

[Ain't Keith the Winchell, though? Ed.]

W4FBK, Auburn, Ala. is expecting to be active on 160 when winter sets in. Fred does some nice hamming and is a credit to the 4th district fraternity.

Forrest Towns W4ENS McRae, Georgia expects to be back on 160 soon.

W1EJU, Gainesville is on 160 with a nice signal.

W1DRM is active on 75.

W4EJK Pickens, S. C. is running 200 watts and using a vertical on 160.

W4EGH, Lexington, S. C. "Bill" is on 160.

W4EQM, Langdale, Ala. after being on ten all the summer is on 160 and 40 meter.

W4PAH is active at Ailey, Georgia.

W4ERM reports that he is very active at Kellerton, Ala.

[Tne a million, Keith! You swing a mean mill, Ed.]

AL (W4FMN) Steinberg sent us the following:

"I just finished absorbing the Hamchatter Column in September *RN*, as it sure fb except for the crack sum zuy made about the Miami gang being very nil at present. This is a gross misrepresentation of the true facts of the case, in as much as it is just that the boys are so busy working the YK's or ZS's on 2 1/2 meters that they haven't had a chance to give the W's a break. However, just so U won't think we've passed out altogether, I'll pass along sum dope for the colym es will probably be able to send in a little choice item now es then. (Please excuse QRM from typewriter, as I ama lid at it es it drifts on me, hi!!)"

W4CYU (Change ur underwear) has finally put a motor on his six element rotary. Bob wore out three pairs of shoes in two weeks running down stairs to turn the beam on a piece of choice dx.

W4EPH is building a six element rotary job on 10, es the OB is also trying to learn Spanish. He can be heard nightly on 10 llamandoing en general en diez metros.

W4PLH has a new three element on 10 that has been working so fb he is starting to call "CQ no DX" Hi!

W4FMN has a new rig on fone with a TZ40 in the final. It took a long time to get old "4 Forgit me not" off that bug and back in front of a mile.

W4DTJ says he wud like to go on CW if he could remember the code; anyway, he's goin' fer Class A burty soon.

W4EDD is still portable mobiling on 10.
W4FWW is temporarily off the air.
W4EEM is studying to be one of them commercials at Boston Radio Telegraph School. With his fist, Harry shud make a fb op.
W4ETQ has a peanut whistle on 75 fone es hopes to contact South Miami by Winter.
W4DLH was on a vacation wid a 20 watt portable job in his car on 20 phone.
W4AKI is a bachelor agn. His xyl came back fer abt a week and then had to leave agn. I don't think the boys on 20 will let Freddy get lonesome though.

-30-

Within Earshot

(Continued from page 4)

done a little in his youth to drag down the pay-level for the servicemen. And so it is with the engineers. Starting as "hams" they build equipment for friends, for other "hams," for local police departments. They do not charge overhead, because "Dad" pays that; they do not charge engineering because they do not count themselves as real professional engineers. They charge a small sum for their own time. Later, should they take up radio engineering as a profession, those small "favors" done will rise to keep their salaries uniformly low. Once again the start was all wrong.

We agree that the profession should pay better, but we cannot see it doing it, until the kids, and the putterers get out of it, and give those who want to make a living out of the game a chance. And we believe that we are telling the truth, that were the requirements for radio engineers raised; were they licensed by their respective states the same as architects, lawyers, doctors, etc., then the deplorable conditions existing in the radio field would be improved . . . even if only a little. What do you readers think?

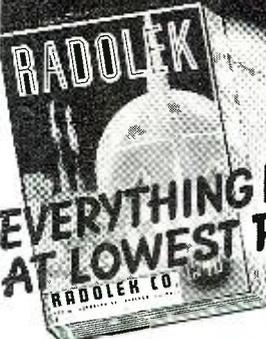
THE column, *Hamchatter*, continues to flourish. We take personal pride in the way that column is going although we have the least to do with it. Over 99% of the material is submitted by the hams, themselves. There were some who said that it could not be done, but we felt that such an article was not only interesting; but that the hams, given half a chance, would be happy to send in items. We still are weak in the W6's and the W7's. How about it, you fellows out there?

A GOOD sign of the times is that a few of the B.C. Stations are giving over some of their programs to the amateurs,—not the Major Bowes variety, though we dare say they are very popular, but to the radio operator hams. These men and women who have given over 13,000 of their number to the signal services of our country during the World War, who have disregarded their own safety and health to undertake what seemed super-human tasks in times of emergency in peace, deserve a little from BC's. It is no excuse that they do not comprise the majority of the listeners of the Broadcast Bands; they do make up the backbone of the Nation's communication system. As such, the general public should be made aware of their existence in times other than that of

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WOODSTOCK TYPEWRITERS

emergency, and little cooperation from the Big Brother BC Stations would not be remiss. In specific regard to this problem, read the "Success Story" in this issue's HC.

A FEW of our servicemen readers have written in to jeer at "Tester" Bradley, whose series on the Intermittent concludes with this issue. They claim that the gentleman hiding behind that pen-name knows less than nothing about the subject. We feel this way about it: If Intermittents were not as tough, as mysterious, as hard to lick as they are, then the articles should have been written in a manner which would lead the reader-serviceman directly to the source of the trouble. But because the Intermittent is what it is, the advice on how to lick the problem must, of necessity, stick to generalities. As a good "jumping-off place" towards the solution of the vexatious Intermittent, "Tester" Bradley's approach has been without equal. The reports we have from many service engineers indicate that, and we believe it. If any of you servicemen think that you can write a good series on the subject, we will be happy to see it; and, if it meets with our publication standards, run it. Watsa?

WE have been given to understand that Henry Ford, driving down the streets of Detroit, telephoned his Buenos Aires representative from his moving car. This form of communication is just around the corner; when you will be able to call the office while touring through the countryside. How unbelievable this was to some of the public, may be determined from the statement made to us by a friend who, when being told thereof said, "He musta had a wire trailing behind him." As radio advances further and further, we think this sort of telephone-radio will become commonplace. Radio, as a servant to mankind, has not even had its surface scratched... and it all came from a little bit of wire in a vacuum!

NEXT month we conclude the article on the DeLuxe "Dialomatic." The heart of the system, the remote stepper will be described completely. We hope to meet Henry Ford's record (above) though for the life of us we cannot think of anyone in Buenos Aires to whom we can telephone. Perhaps it is just as well.

AT a ball game the other evening—yes, it was a night game—an elderly gentleman sat down next to us with one of those portable radios. We expected to hear as well as see the game. To our utter amazement, the oldster calmly tuned in, "The Lone Ranger" and listened carefully, paying the game no attention whatsoever. "I have to get that program every night it is on," he said, "my daughter is deaf, and when I get home I will write out what the Lone Ranger and Tonto did tonight." Funny world! KAK

As I See It!

(Continued from page 49)

Our Television Antenna

BELIEVE it or not but we recently finished quite a hectic argument with a builder concerning our own television antenna. We decided to move to new quarters. When I say we decided, I should say Mrs. R. decided. At any rate we refused to sign the lease unless proper provision was included concerning a television antenna.

Well, the brilliant individual who is responsible for the construction of the building was very much upset—what guarantee would we give that the erection of an antenna for television reception would not interfere with the centralized antenna system installed by the building? . . . What guarantee would we give that the television antenna would not interfere with elevator motors and control units located upon the roof? . . . What guarantee could we give that the television antenna would not cause a shower of meteors to fall upon the roof?

What guarantee could we give that the erection of the television antenna would not cause the whelping of blonde pups to a pink dachshund with green ears? . . . And, by the way, the electrician who installed the centralized antenna system said that it could be used for television reception. . . . Apparently every body who has installed a di-pole television antenna is crazy and the engineers who have designed special antennae for television reception, likewise have been wasting their time.

Frankly, we don't know the answer. Maybe this guy is just stupid or pig-headed. Maybe he is waiting until the time when centralized television antennae can be installed. We drew word pictures, described the height and length of such aerials; told him the moon would continue shining and the planets would not be altered in their orbits . . . told him that his elevators would continue running—that his other tenants would enjoy their regular radio reception, live happily, have progeny—but still no soap. . . .

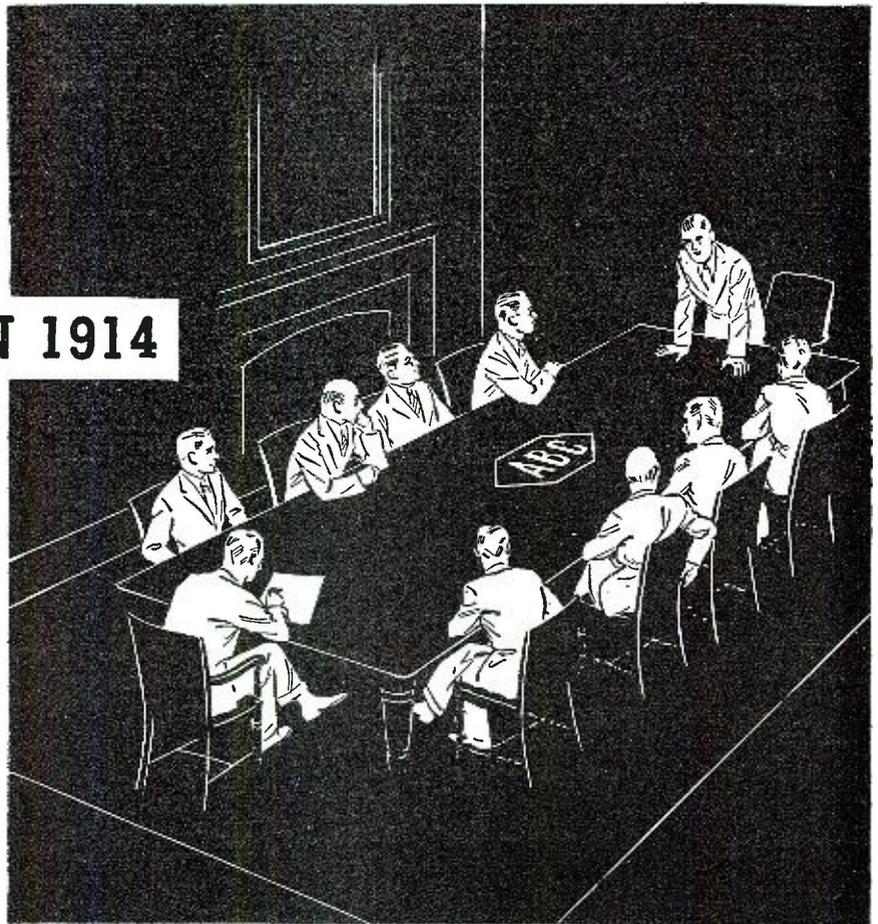
Such is progress and the people who retard it. . . .

[By-the-by, John, did you move, after all? Ed.]

Tube Stocks in Service Shops

AS each day passes and more tube types are announced it becomes more and more difficult for servicemen to stock tubes. Very few, if any, servicemen who are active in tube sales can afford to maintain a stock of tubes. It seems as if the tube stocks will have to be maintained by tube jobbers whose men might make daily rounds and make daily deliveries. If not, servicemen will be called upon to determine what tubes are needed for replacement in any one receiver and get them from the jobber. . . . Upon

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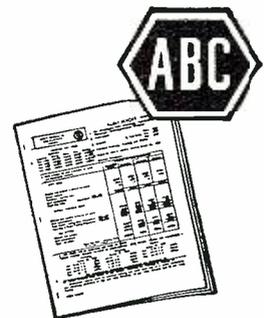
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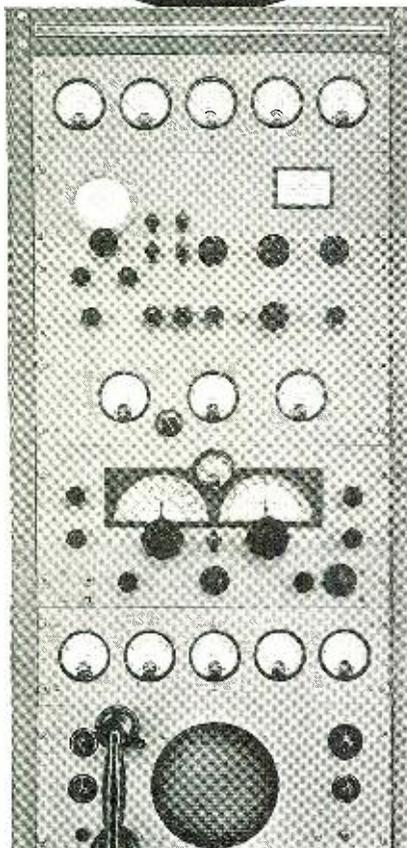
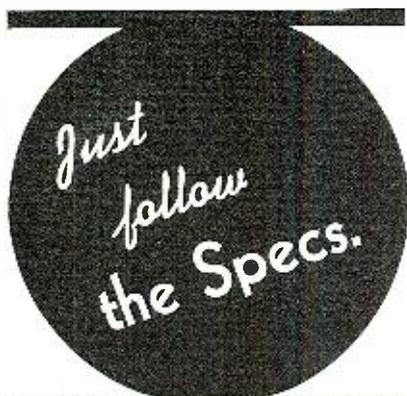
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the surface this means more work than ever, but how can it be avoided? The solution grows more difficult and complex each day.

It is possible that servicemen might keep some standard stocks of those tubes which are most representative of receivers which come into his shop for service. In many localities certain brands of receivers sell better than others and have sold in greater quantity than others. Such being the case, the tubes required are those which are used in the majority of the instances in these receivers.

We recognize that even such procedure calls for a stock of quite a few tube types, but this cannot be avoided unless all tube stocks are done away with and daily calls are made to the jobbers. Naturally, such form of operation would make tube sales by servicemen more expensive than heretofore, but, if it cannot be avoided, nothing can be done about it.

It seems illogical for a service shop to tie up too much of its funds in a tube stock. It is too much of a guess to establish the type tubes which will be needed over the period of a month. We have seen a number of service shops wherein between three hundred and four hundred dollars worth of tubes were in stock, some of which had not moved ever since the date of purchase. We feel that it is better to maintain a cash and carry basis of operation in tubes and thereby have the funds in cash for use as working capital.

From what we hear, more tube types will be announced and while they will not have any immediate effect because receivers using these tubes will not come into the shop for service, it just makes the picture for the future so much more complex. If any change is to be made so as to make the tube burden of the serviceman lighter, it might just as well be made now. Maybe this means hand to mouth buying with minimum quantity discounts, but as a rule these discounts are still sufficient to show a profit when the tubes are sold at the normal price. . . . At any rate it does not tie up vitally needed capital.

Free Inspection

AFTER much thought and analysis of comments made by different classifications of service shops, we have come to the conclusion that the best interests of the servicing industry would be served if free inspection were eliminated.

We realize that free inspection has been responsible for many calls to a home and has resulted in service jobs and that in many instances a charge for inspection resulted in the request not to call. All that notwithstanding, it seems as if the industry at large cannot afford the money lost as a result of free inspection. Free inspection is only a lure. . . . There can be no free inspection because the time consumed is costing the service station operator a certain amount of money—which money must in the final an-

alysis be paid by the customer. Since he is paying for it, why not let him pay for it as a regular thing.

No doubt this statement is going to cause prolonged discussion, but, when discussing the subject, bear one pertinent thing in mind. Practically every one of the really successful service shops is charging for inspection and the customer knows it. He is made to understand that a service man cannot call at the home at the receiver owners request without being paid. If these successful shops can do it, why not the rest of the industry. The money received from such inspection calls helps contribute to the success of the shop. . . . I would be tempted to say that such was the case, because the man did not give costly time away for nothing. . . .

We appreciate that there can be voiced an untold number of arguments in favor of free inspection as against paid inspection. But is it not also true that free inspection is the easiest way—the path of least resistance? We have listened to many arguments in favor of free inspection—and they were good arguments—sound arguments, but we invariably saw that the successful shops in many towns maintained a \$1.00 or \$1.50 inspection charge.

Maybe the success and the paid inspection are coincidental, that is to say, the ability to sell enables the shop to charge for inspection and the continued ability to sell makes the shop successful. But one thing is certain, the customer *can* be talked into paying for the inspection. That is clearly evident. . . . If such is the case, why not have all inspection paid for. . . . Perhaps the fees will not be alike, depending upon the public being served, but a fee *can* be charged. It all depends upon how the customer is trained—to what he becomes accustomed.

Will free inspection prevail if some of the cheap sets are brought into the service shop by the customer? . . . It most certainly should not be done free of all charges. Some nominal charge should be made. Maybe that charge can be absorbed if the receiver is left for service, but a charge should be made. No doubt, many of these portables and midgets will be brought into service shops. . . . Start the public off right—make them pay for what they get. —30—

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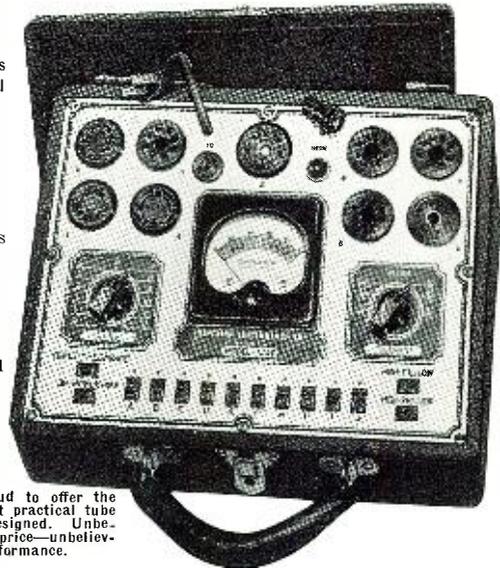
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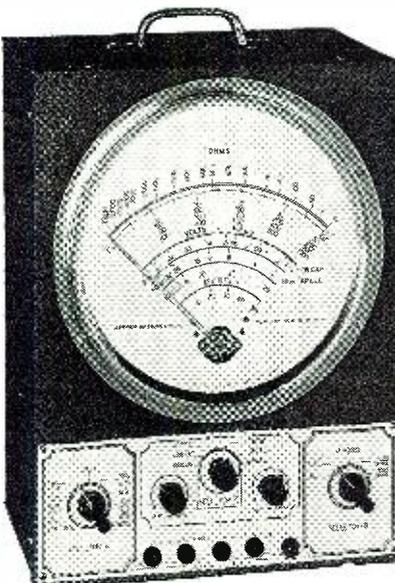


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 D.B. based on 6 M.W. at 500 Ohms —10 to +29, —10 to +43, —10 to +49. Audio frequency measurements in both radio and P.A. amplifiers.

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today, with three giant central distributing points from which flow thousands of shipments daily.

As we have grown however, so too have grown the demands of the people we serve. Industry, for new and better materials; individuals, for finer instruments and forms of reception. We have lived to see many new developments replace the old, many of our former services, once essential, no longer required.

In fact, our very name for so many years perfectly adapted to our business now belongs to yesterday. It does not fit with our plans for tomorrow.

Naturally, we were attached to our old name, but sentiment has no place in progress. And so from now on we shall be known as

Radio Wire Television Inc.

A name selected because it accurately pictures the very business we are engaged in.

What do we mean? Let's look at that name more closely.

RADIO : Up through the years we have grown and expanded with Radio—very backbone of our business. Yet even in the face of today's magic, life-like reception, much remains to be done. So naturally Radio Broadcasting will continue to engage our interest.

WIRE : A new service gaining momentum with each day is WIRE BROADCASTING. Already many of today's entertainment forms are available by means of wire with great fidelity, reliability, and economy. We believe that soon the art of broadcasting by wire will encompass the transmission of both sight and sound. Every current technological development points to this end.

TELEVISION : Third and newest term in our name. Breath-taking is television's power to reproduce for man's entertainment and knowledge, the life and happenings of storied lands afar, the news events that will make tomorrow's headlines. With television a vast new field of human relationship is magically thrown open. Whichever way you choose to receive your television programs, by wire or radio, we will offer the finest services available anywhere.

The new name, thus embodies all of those features which from now on are to comprise the principal part of our business. Radio Wire Television Inc., proposes to extend its activities into every phase of the electronic art. Several associate enterprises which control important patents relating to the entire communications field have already been merged with our com-

pany. With these patents, we hope to throw open a vast number of new services to the general public. Of special interest are plans to expand the number of retail outlets for Radio Wire Television Inc. in order that local branches may be placed at the disposal of all who are interested in finer entertainment services, better products and lower costs.

Radio Wire Television Inc., is licensed by arrangement with Electrical Research Products Inc. under patents of Western Electric Company, Bell Telephone Laboratories, Inc., and American Telephone & Telegraph Company.

Radio Wire Television Inc.

formerly WHOLESALE RADIO SERVICE CO., Inc.

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