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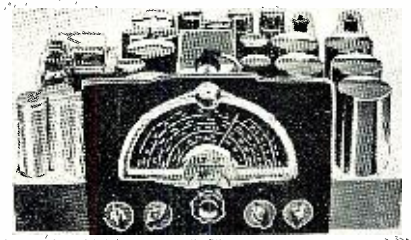
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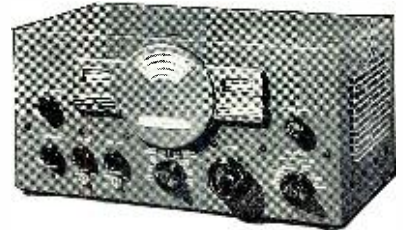
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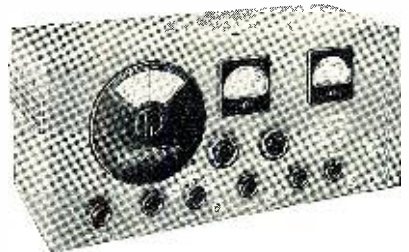
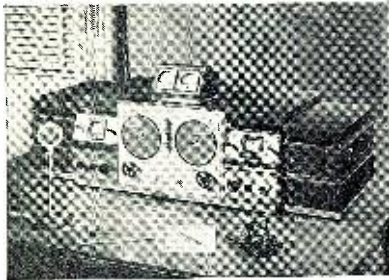
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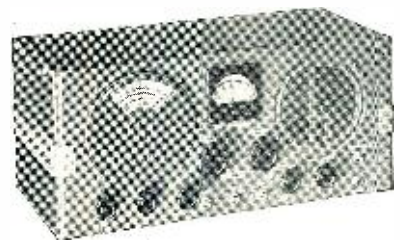
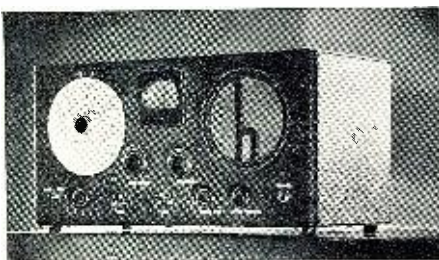
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SKY CHAMPION

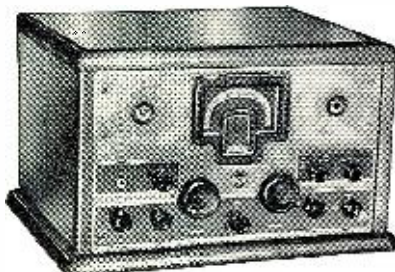
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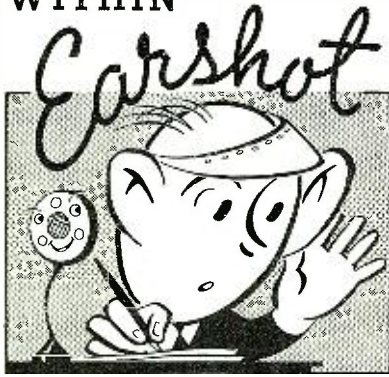
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WITHIN



OF THE EDITOR

GOSSIP... What an intriguing and yet what an unnecessary adjunct to the radio industry! Someone once said that because the radio industry was so very lightly populated, that you could start a rumor at nine o'clock in the morning and have it back to you by noon and be sure that everybody in the trade had heard it. From our own personal observation of 27 years standing in the radio business, we can safely say that it's one field where "rumor" and its next door cousin, "gossip," are never gone. Unfortunately, there are people who take, as a fact, the wildest fiction and gossip that can be imagined. We have heard of manufacturers changing their whole line because someone whispered into their collective ear that "so-and-so said that the ZYX Mfg. Co. was going to do thus-and-such." True it is, that radio is comparatively young and hence subject to all the ills of a "youth," but we think that it is high time that we deserved our "longies" and gave gossip the go-by. The sooner that we can relegate mere chance expressions to the proper perspective, just that soon will the industry as a whole grow into greater stature.

* * *

HEARDED over the ultra short wave B.C. band—the one devoted to remote pickups: "Say, George, tell Erna that I will be late for dinner, will yah? ... OK! This is the Blank Broadcasting Company operating on a frequency of so-and-this, signing off." Hmmm!

* * *

DID YOU ever build up a unit designed by someone, and published in a magazine? We have, and sometimes we had ideas that bettered the author's rig quite a bit. How to let the rest of the radio fraternity know. Well, there just wasn't any particular way except by writing to the Editor. That poor chap, caught between deadlines, generally growled something deep into his chest about radio men in general and yourself in particular, and wrote you a nice letter thanking you for the information—and then dismissed it from his mind. After you got the letter, you had a sort of dead feel-

(Continued on page 54)

RADIO NEWS

Including Articles on POPULAR TELEVISION

The Magazine for the radio amateur
experimenter, serviceman & dealer

VOL. 23, NO. 5

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F. W. Walter **10**
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For use with a radio receiver to listen to records, this I-tuber is tops.
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HT-8 25 WATT Marine Radiophone

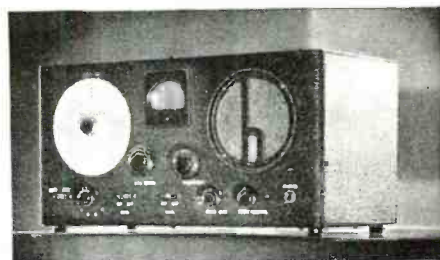
- 25 watts phone carrier • 5 marine frequencies • Separate power supply • Crystal controlled transmitter • Simple to operate • Precision built • 7-tube receiver
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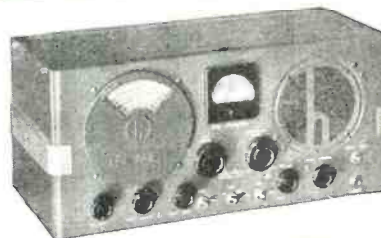
Hallicrafters SKY BUDDY—Model S19R

6 tubes, tunes to meter band, electrical bandspread, coverage and bandspread from 545 kc to 44 mc. Includes BFO, AVC switch, phone jack, pitch control, send-receive switch, built-in speaker. An amateur's receiver in every respect! Cash price **\$29.50** Terminal's 12 month Plan: \$10 down, \$2.10 per month.



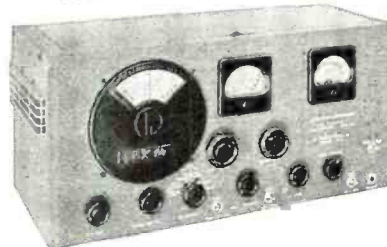
Hallicrafters SKY CHAMPION—Model S20R

9 tubes, covers 545 kc. to 44 mc., automatic noise limiter, 2 I.F. stages, drift compensated hi-freq. oscillator, built-in speaker. Includes essential controls for good amateur reception: RF gain, tone control, phone jack, AVC switch, BFO switch, send-receive switch, audio gain, pitch control, 4-position band switch, separate electrical inertia controlled bandspread tuning. Cash price **\$49.50** Terminal's 12 month plan: \$10 down, \$3.85 per month.



Skyrider DEFIANT—Model SX24

Incorporates every advanced feature: accurately calibrated bandspread dial, frequency stability, highly efficient noise limiter, six point variable crystal selectivity from sharp CV to high fidelity, provisions for break-in relay operation, meter calibrated in "S" and DB units. Controls include RF gain, selectivity switch, crystal phasing audio gain, pitch control, main tuning control, bandspread tuning control, A.N.L. switch, Hi-Lo tone, send-receive switch and BFO switch. Supplied complete with crystal and tubes, but less speaker. Cash price **\$69.50** Terminal's 12 month plan: \$14.50 down, \$5.15 per month. 10" PM 23 speaker in matching cabinet, extra **\$12.00**



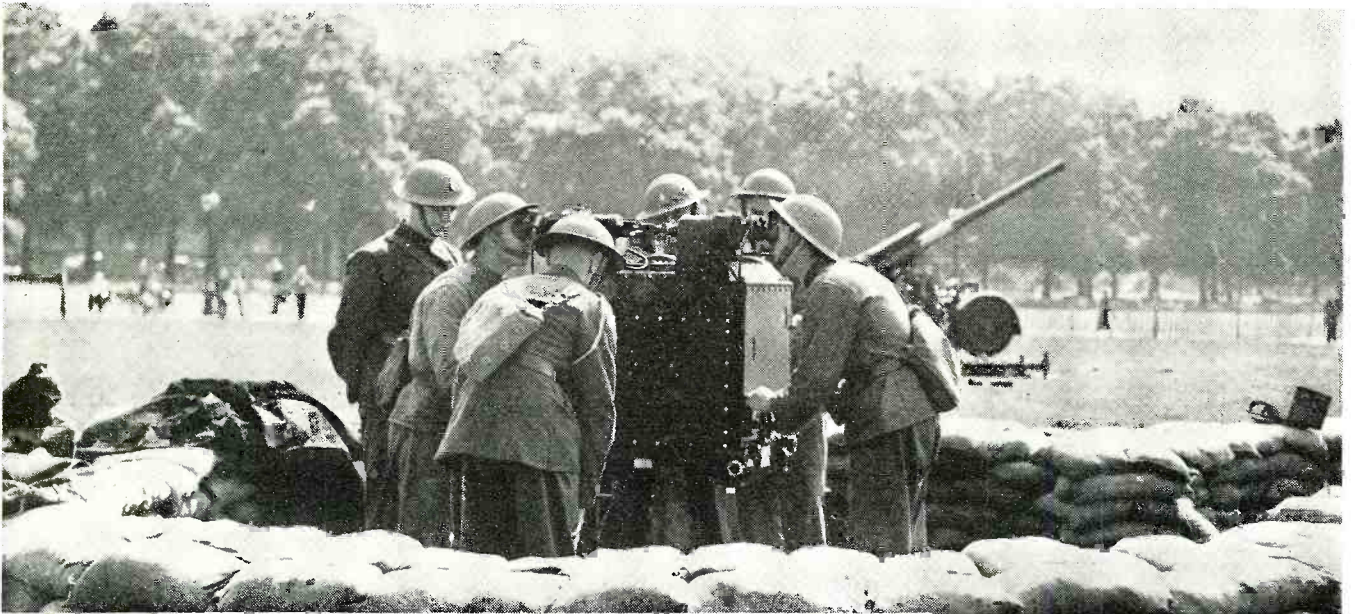
Skyrider Marine—S22

Specifically designed for marine service, in the range from 16.2 to 2150 meters. Directly calibrated main tuning dial, efficient mechanical bandspread. Incorporates all essential communications features. For 110 volts AC-DC operation, but has provisions for adding inexpensive converter for 6 volt DC operation. Complete with tubes and built-in speaker. Cash price, **\$64.50**. Terminal's 12 month plan: \$14.50 down, \$4.75 per month.



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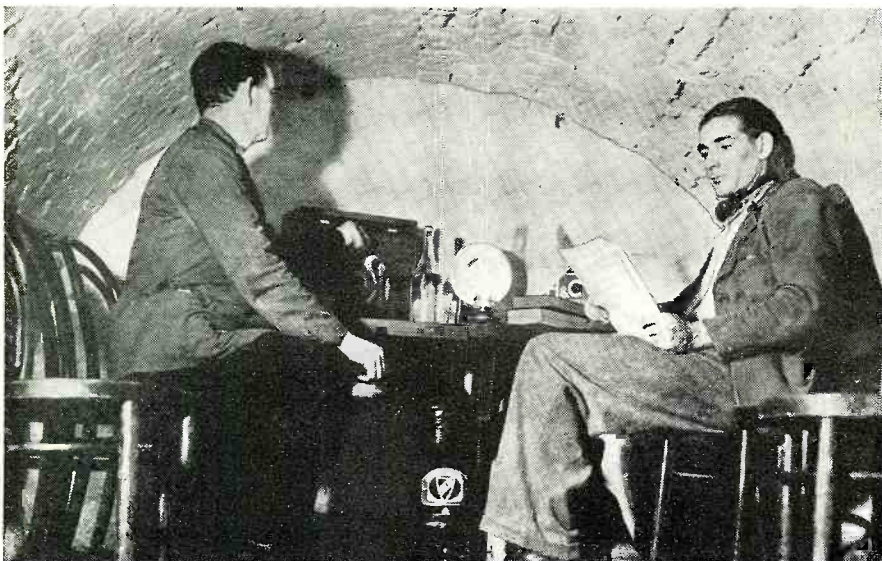


Servicemen found their experience valuable on remotely operated guns.

WAR COMES TO THE BRITISH SERVICEMEN

by **E. J. G. Lewis**
Southall, Middlesex, England

**Did the war put the British Servicemen
out of business? Read this censored story**



[Editors Note: For days we had been sitting back in the swivel chair wondering just what was happening to television, radio and the serviceman in those areas presently infested by war. We knew of no particular way in which to get the story, especially since censorship restrictions were so extensive. Lo and behold, the mailman brought us just what we wanted. This story, for some reason, got through the censor, though by reading "between the lines" a very accurate picture of just what is going on in England can be obtained. The author is well-known for his previous works, "Radio Receiver Servicing and Maintenance," "Television Technical Terms and Definitions," etc. In spots, the story felt the shears of the censor, but we were able to piece in the missing parts, from—of all things—several copies of London Newspapers which furnished us with complete details of the British system for misdirecting the enemy bombers! We offer it to you for what it is worth—a story of a first class city gone haywire with War. The pictures were furnished by our own press associations, while the diagrams peculiarly got through the censor and were sent over by the author, as were the technical pictures of the Air Raid Precaution (ARP) instruments.]

AFTER six months of war conditions, the radio trade here in England is settling down to a new standard of business which is, quite frankly, better than we had ex-

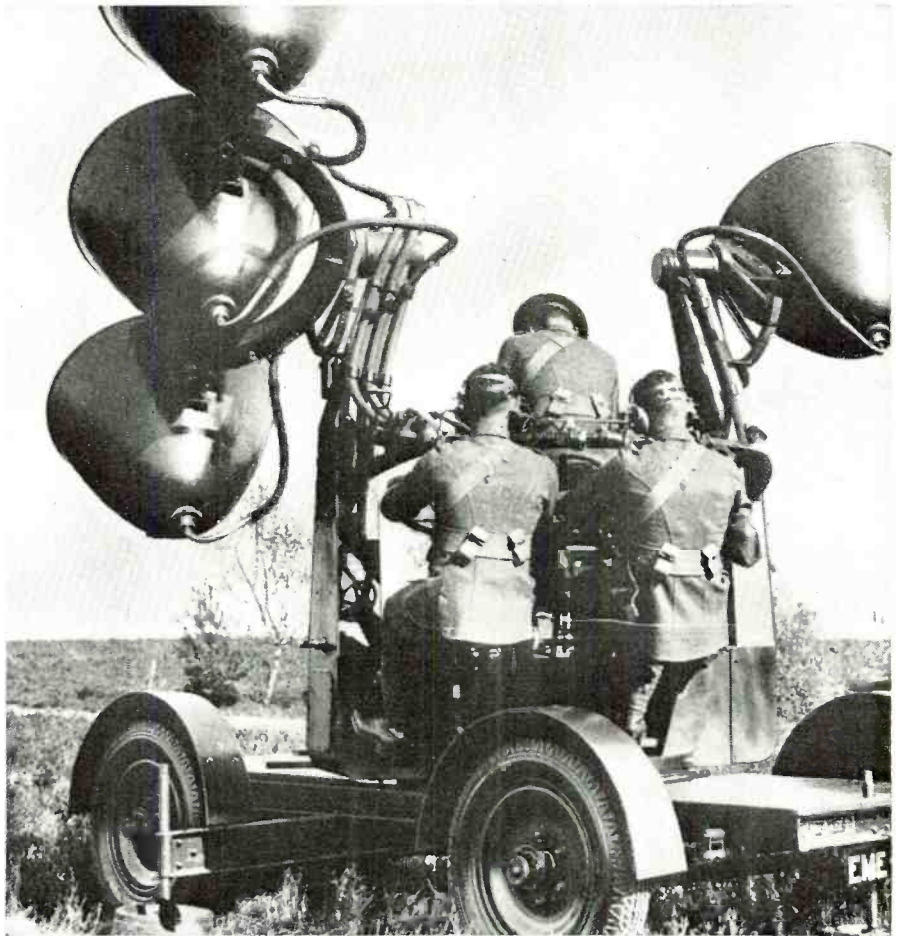
Most air-raid shelters are radio equipped. Programs are never interrupted.



Busses are few and far between; deliveries must be made on foot, on a bicycle, and some times in general conveyances such as these which are used by everyone whenever they can.



Power-line-failure substitute light plants are sold by the servicemen.



Some of the servicemen have, of course, been called to the colors, where their radio and amplifier experience is of great use in running airplane detectors.

pected before hostilities commenced. Those last few days of our annual radio exhibition—*Radiolympia*, we call it—were steeped in impending disaster. Every hour crowds deserted the exhibits to bunch around loudspeakers to hear the latest official news bulletins. After the broadcasts, discussions on the various news items detracted attention from any really worthwhile business although we tried to talk technicalities and compare competitive radio gear. But at the back of our minds was always the ever present question—"Is there going to be war?"—and we would glance at the great clock in the main hall to see how long there was to wait before the next news bulletin.

There were so many things going on around us that gave rise to excited conversations. The writer, for example had for weeks struggled optimistically to produce leaflets and catalogues for his firm's exhibition stand and had proudly driven up with the first issues straight off the press of what he felt sure was the best brochure on *Television Aerials and Accessories* ever given away at any radio show! But in his car journeys between printers, block makers and artists he had witnessed many sights, descriptions of which were well worth recounting to his colleagues working on the stands.

The barrage balloons were arriving at the parks. Lorry loads of ammunition for the anti-aircraft guns were coming into London. Great sound locaters and range finders were constantly filtering through the city. The traffic lights at the *Circus* had been put out of action and police had taken over control to allow convoys of soldiers to be passed quickly through on their appointed way. Oh yes, things were humming!

This was about two weeks before war actually broke out. Well, the exhibition duly opened despite the gathering storm, an exhibition at which television was the predominating feature. Then matters began to get more personal and intimate. It seemed that every time you left the exhibition, one of your pals was missing when you returned.

"Where's Bill?" you would ask.

"Oh, he received a telegram to report at—"

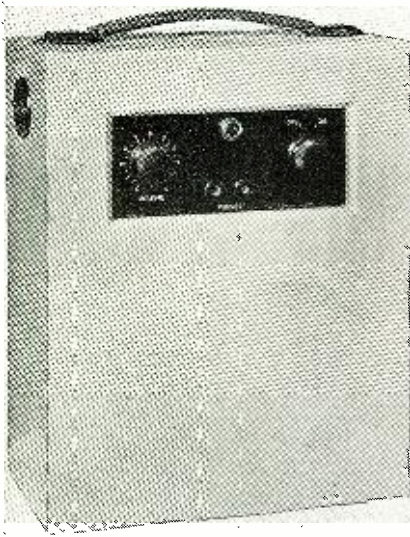
He was in the Royal Air Force Reserve, you know."

And so they went, from good old Jack in his fifties who had done his twenty-one years in the navy and whose steady head would influence the youngsters if any crisis blew up in his boat to young Evans in his 'teens who was on the *Civilian Wireless Reserve* and had devoted his spare time to



Radio sets left at the curb might be totally ruined by the gas decontaminator out on a "mock" ARP. Below: An air-raid listening post.





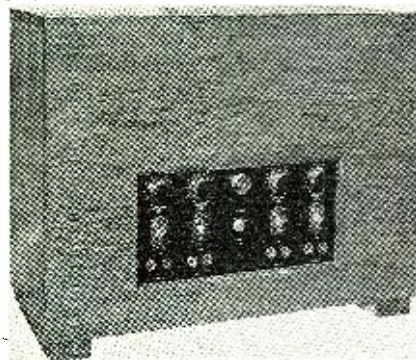
Small air-raid shelter listening amplifier for family and private use.

learning the code and *R.A.F.* procedure.

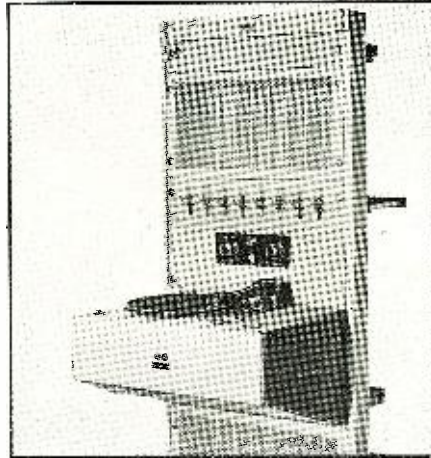
The days passed and we were approaching the fateful week-end. The show was to have finished on the Saturday, but by Thursday we had received our marching orders. The exhibition was to get out of the huge building as quickly as possible as the *War Department* were taking it over for billeting. Even as we got the last of our gear out at one end of the building, the troops marched in at the other, and we knew then that war was inevitable.

This is not the place to dwell upon personal feelings—on those 10,000 Television Brochures, most of which to this day remain in their original packing; of a fortnight's holiday that had to be cancelled and of hectic hours blacking out windows and filling sand-bags.

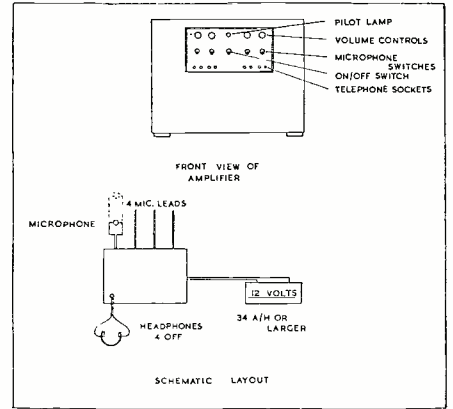
After a few weeks re-organization to fill the gaps in the staff and to discover how best to attack the problems before us, we felt more able to take an intelligent interest in things and to exploit markets for our radio designs and servicing facilities. Christmas was not far off and the radio programs were once again giving entertainment as well as news. Then came



This is the unit described in the schematic of the factory listening post. Fool-proof and lightweight.



A combination air-raid warning, calling, and entertainment amplifier.



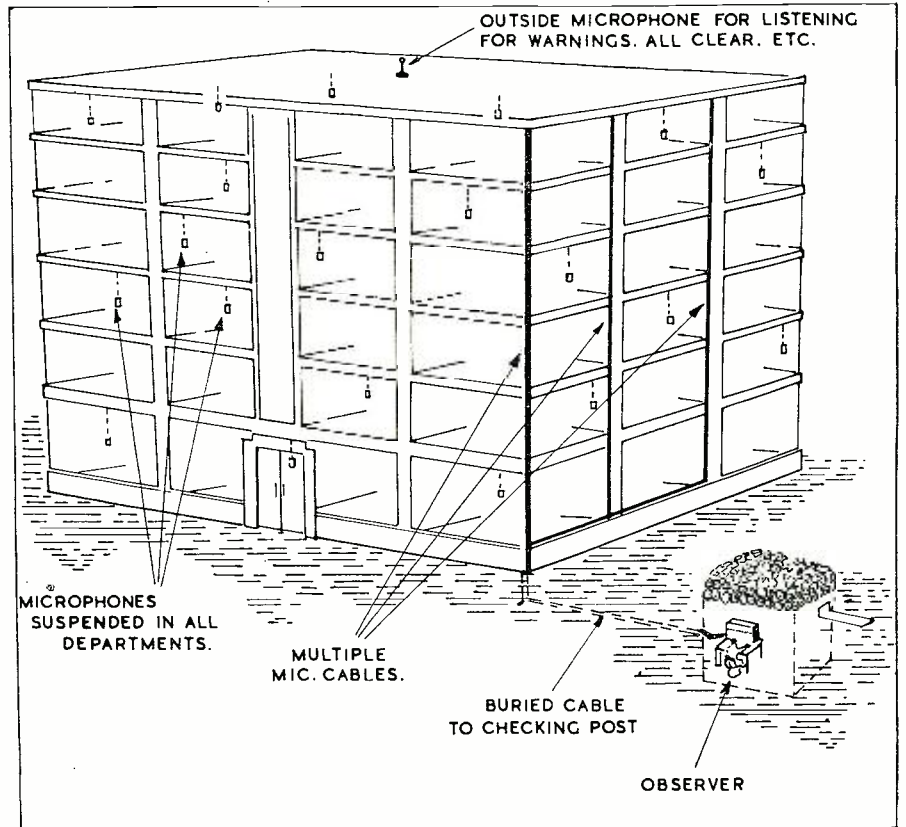
Schematic of the listening-post amplifier and microphone hook-up described below. The serviceman is installing these at a very nice profit.

the ending of "Summer Time" [*Day-light Saving Time.—Ed.*] and with it dark evenings.

Calls on the Service Department were seriously increased due to the "blackout." After dark, no lights may be shown and our transport systems had to carry on under great difficulties. It was not too bad in the stations and covered goods yards but street deliveries caused many casualties to radio instruments. Packing cases were dropped or allowed to stand

upside down because the directions on them were unreadable in the darkness. Automatic radiogramophones do not take kindly to such treatment and many instruments required servicing before they would operate correctly for the first time after unpacking.

At one period matters became still more troublesome owing to acute shortage of proper packing materials—cardboard and wood in particular. Even gramophone records had to be
(Continued on page 47)



This diagram passed through the British censors. It shows how the listening post in the lower right hand corner, though buried below ground, is kept in constant touch with the factory building by means of microphones suspended on each floor. These are to listen for bombs. The microphone on the top of the building is to advise the listening post when the "all-clear" signal is sounded. Without this microphone, there would be no way for those in the air-raid shelters to know when they could come above ground. The system has yet to get its first trial under actual service conditions, but should work well.

Build the CAMERA RADIO

by

BILL BARTLETT

Ava, Illinois

Compact and efficient is this tiny receiver which can be carried to all the sports without fuss or bother. Build it yourself and enjoy a "ringside" seat



The author "focuses" on a fine radio program which he receives through the camera radio.

YOUR friends will think that you are carrying an ordinary box camera when you walk down the street with your camera radio. Unless, of course, you have it turned on.

In outward appearance, there is very little to distinguish this two-tube radio from a box camera. Yet, when it is tuned in, music issues from the midget 3-inch speaker that is mounted behind the hole in the camera case that originally accommodated the camera lens and shutter.

All batteries fit conveniently into the case, and the camera radio will bring in stations as you carry it along the street. Within seventy miles of a broadcasting station, the little set will provide ample output to energize a 3-inch speaker. If the station is farther away, best results will be obtainable if headphones are used.

Since the space inside the camera case is limited, the diagrams should be followed explicitly when mounting the circuit components.

Two metal style octal tubes are used in a regenerative arrangement to give optimum sensitivity and output. A 6J7 is used as a regenerative detector, working into a 6F6 audio.

Both tubes mount on a metal subpanel, two inches wide by four inches long. This subpanel bolts to the side of the camera case as high as possible, so that there will be room for circuit wiring beneath the sockets. The octal sockets should be of the midget

type, with mounting holes close together, to conserve space.

One coil is wound on a 1¼" lo-loss form. To match the 140 mmfd. tuning condenser, it consists of a primary of 145 turns of Number 34 enameled wire, closewound. This coil-condenser combination will suffice to cover the greater part of the broadcast band.

The tickler coil (L2) is also wound of Number 34 enameled copper wire, 20 turns, closewound, over the primary winding.

No secondary winding is used, the antenna impulses being fed directly into the upper tap of the primary (L1) section.

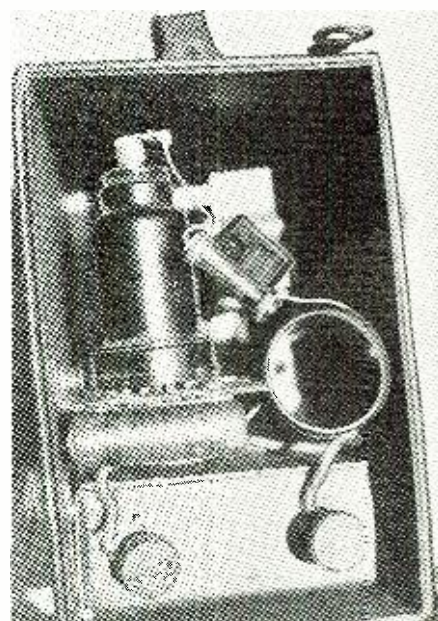
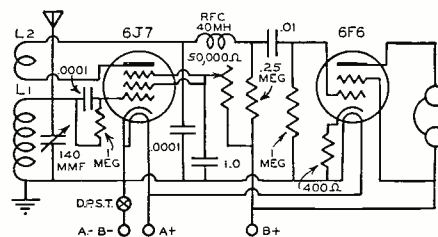
The tuning coil, when wound, is mounted with a single bolt on the side of the case opposite the subpanel.

For convenient hook-up and short leads, the 140 mmfd. tuning condenser is situated immediately above the coil. This condenser must be of the midget type or it will not fit into its allotted space.

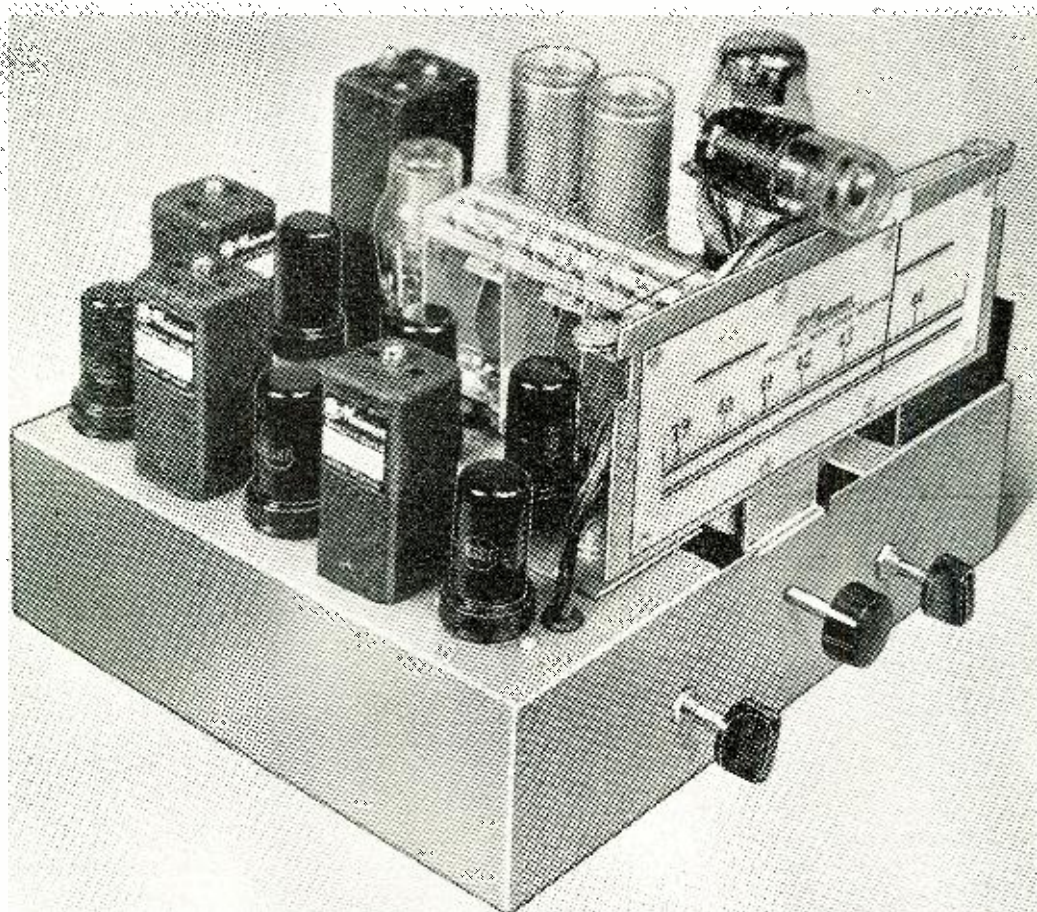
The volume control and "on-off" switch are incorporated into a single unit, controlled by an adjusting knob. Volume is monitored with a 50,000-ohm potentiometer used to vary the potential applied to the screen and suppressor grids, which are tied together at the socket. This switch-potentiometer should be of "baby" proportions.

A 40 milli-henry radio frequency choke is used to block the passage of

(Concluded on page 55)



Inside the camera, showing the parts.



As compact as a modern "ordinary" receiver, the F. M. receptor is simple to operate and build.

Design Notes on a

FREQUENCY MODULATION RECEPTOR

by **F. W. WALTER**
Mt. Carmel, Illinois

Frequency Modulation seems here to stay and so we present a very fine receptor for those who are located within the range of these stations

A SYSTEM of radio broadcasting and reception that practically eliminates all natural and man-made interference has been known to radio engineers for several years. Only lately has the news of this new system reached the public through the medium of newspaper and news magazine articles. Few people, even well-informed Servicemen, Amateurs or Experimenters, have a sufficiently clear idea of the operation of the system to be able to explain wherein the new and the old systems of broadcasting differ and what eliminates the static and interference in the new system.*

The purpose of this article is to bring out the fundamental differences in the two systems of transmission and reception and to explain how the static is truly eliminated, a feat "proven impossible" by several noted and capable engineers.

The results achieved by the use of *Frequency Modulated* transmission

* Strictly speaking, F.M. is not new. See Morecroft, "Principles of Radio Communication," 3rd Ed. Pages 824-828. Ed.

(the new system) are so marvelous that they must be witnessed to be believed and fully appreciated. For example, in the densely populated sections of New York City where there is every conceivable type of elevator control, and many other types of electrical equipment producing a regular barrage of electrical noise, programs transmitted by the new system are received with perfect satisfaction in places where the older type of set was useless.

Unlike regular broadcasting, fre-

quency-modulated broadcasting is now being done on frequencies around 40 megacycles. It is notably free from interference of all kinds and has, with a few watts of transmitter power, delivered a cleaner signal than hundreds, or in some cases even thousands, of watts at broadcast frequencies over equal distances. In addition, the fidelity obtained with the new system has been exceptional.

There are two basic characteristics of a receiver for frequency-modulated signals that enable the receiver to re-

produce program material without static. First, the receiver is so designed that it will not respond to *amplitude* variations in the received signal; therefore, static impulses are not reproduced because a static discharge appears as a voltage (or amplitude) variation. Secondly, the program is transmitted by means possessing none of the amplitude modulated characteristics which are similar to static or other electrical interferences of the usual type.

Of course, a man-made interfering signal can be produced intentionally, but no man-made interference of the type resulting from sparking electrical equipment, or from automobile ignition systems can generate that characteristic of a Frequency-Modulated transmission.

Since the explanation of the performance of a receiver for Frequency-Modulated signals requires a circuit diagram, the *Meissner Frequency Modulation Receptor* was chosen as a typical example for discussion, and its particular suitability for illustrating the various points in the explanation.

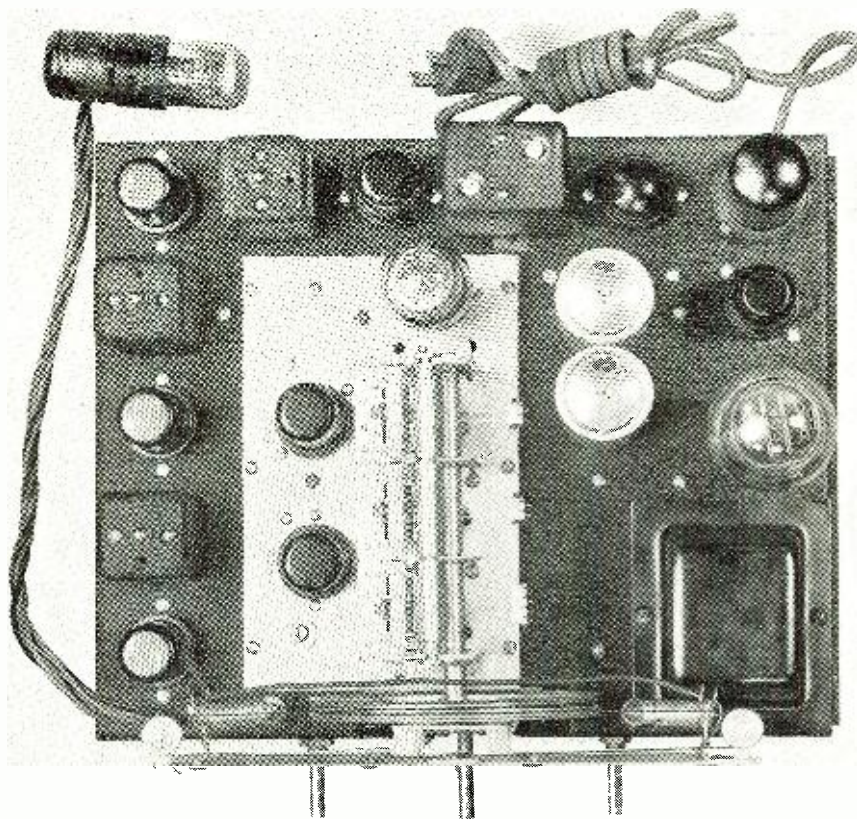
Since, as stated above, the first requirement for the elimination of interference is that the receiver should not respond to amplitude variations, a portion of the receiver must be designed to reproduce every signal at the same level.

Referring to Fig. 2, a portion of the diagram is labeled "Limiter." It is the function of this tube to deliver all signals (above a certain minimum level) to the detector *at the same level*. It is this tube that "cuts off" (so to speak) all static, or similar impulses.

Those experimenters who have used Automatic Noise Suppressors will have some idea of how this tube works, but in the case of the A.N.S., the problem was to cut off only those interference peaks that *exceeded* the modulation peaks. When the interference was of the ignition noise type, considerable improvement could be made by the use of the A.N.S., but when this was of a continual grinding type of noise, only a little louder than the desired signal, the A.N.S. would hardly begin to suppress the noise before it would seriously distort the signal.

In the Frequency Modulation Receptor, the Limiter tube does not have to distinguish between the difference in signal strength of the desired program and an undesired interfering noise; its function is to deliver everything, signal and noise, to the detector at the same level. Harmonic distortion of the signal is of no consequence.

In order to be most positive about delivering all signals at the same level, the d.c. voltages applied to the *Limiter* tube are such that the tube overloads easily, and an AVC circuit operated by this tube is designed to *keep it overloaded* as long as the signal is above a certain low level. Since very few AVC circuits hold the output of an amplifier to a sufficiently uniform level to suppress all amplitude modulation and static pulses (even amplified AVC



Top view of the frequency modulation receptor of commercial make. Note that it is not very much different from the ordinary radio superheterodyne receiver.

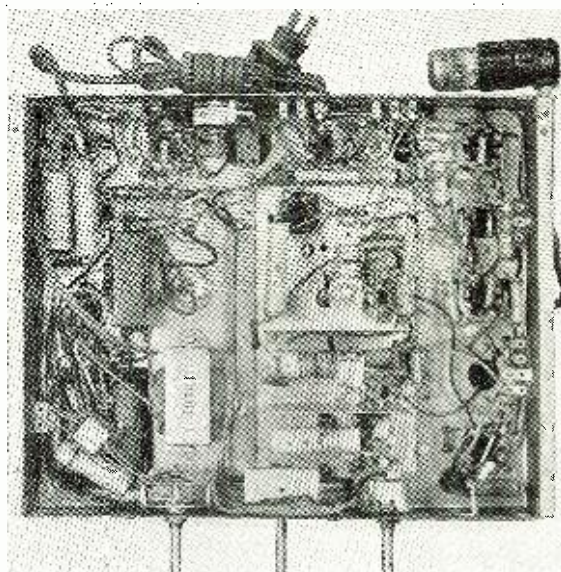
systems), the overload condition is selected for the Limiter tube. When once the tube reaches its *full* output it can not give more output regardless of how much more signal is applied to its grid. The one point that must be guarded against in the design of the Limiter is to see that the output of the overloaded tube does not *decrease* as the input signal is *increased*.

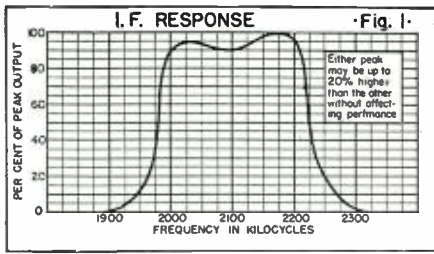
By means of this overload characteristic, all signals come out of the Limiter tube at the same level. Consequently, if a broadcast signal using the conventional (Amplitude) type of modulation is tuned in on a receiver designed for Frequency Modulation, the "Limiter Tube" completely and thoroughly spoils the program. The problem then to find means for passing a signal through the "Limiter Tube" without having it garbled and distorted. If the conventional (Amplitude) type of modulation is ruined by the "Limiter Tube" it is obvious that some other type of modulation must be employed.

Since the frequency of the signal is not changed by passing through the "Limiter Tube," a type of signal is transmitted in which sound-pressure va-

riations in front of the microphone are translated into *frequency variations* in the transmitted carrier. After hearing of crystal control for the frequency of transmitters for so many years, and hearing boasts about frequency stability within one or two cycles per million, the idea of working with a signal whose frequency is intentionally made to shift as much as 75 kc. (75,000 cycles) to either side of its nominal frequency is nothing short of revolutionary, but it is the basic

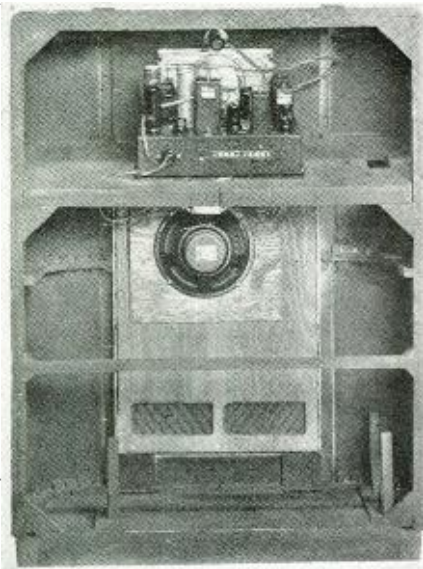
The underchassis view indicates that as in all uhf work, the leads must be short.





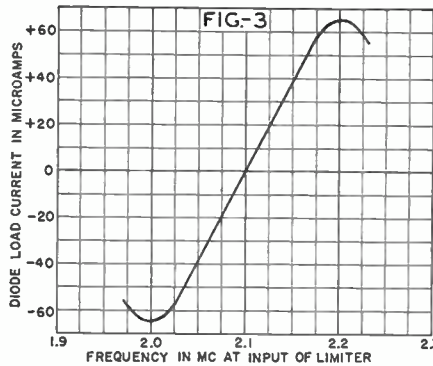
idea of a frequency-modulated signal, and is the characteristic of the signal from which this type of broadcasting takes its name.

In the receiver, the signal fed into the Limiter tube varies in frequency and may vary also in amplitude because of fading. The signal coming out of the "Limiter Tube" varies only in frequency but has constant voltage.



The frequency modulation receptor installed in a fine large console.

Since all detectors converting i.f. signals into audio signals are devices that work solely through voltage variations, some device is necessary to convert the frequency variation of the signal back to voltage variations so that the detector may have a voltage variation to rectify.



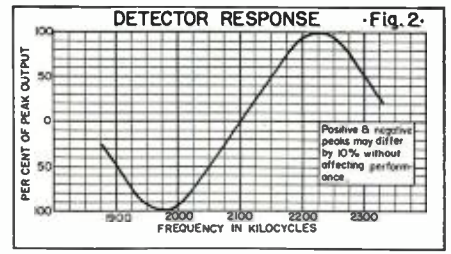
The transformer connecting the plate of the "Limiter Tube" to the diode is the device which performs this function. In fact, it is like the discriminator transformer used in sets employing A.F.C. (Automatic Frequency Control), but it is working at a higher frequency (2100 kc.) than the conventional A.F.C. transformer and accommodates a wider frequency variation.

It is the characteristic of this circuit that, at the frequency to which both primary and secondary are tuned, no voltage is developed across the diode load resistors but, as the frequency departs from exact resonance in one direction, a positive voltage is developed across the load resistors while, if the frequency departs from exact resonance in the opposite direction, a negative voltage increases. This transformer, together with the double-diode detector, converts frequency variations back into audio voltage variations, which are amplified in the normal manner and reproduced by a conventional loudspeaker.

Limiter AVC

An examination of the circuit feeding the grid of the "Limiter Tube" will show a striking similarity to the conventional diode AVC circuit with the exception that, in place of a diode at the high-potential end of the i.f. transformer secondary, the grid of the 1852 tube is used.

Those familiar with diode AVC action will realize that this grid must draw grid current in order for the



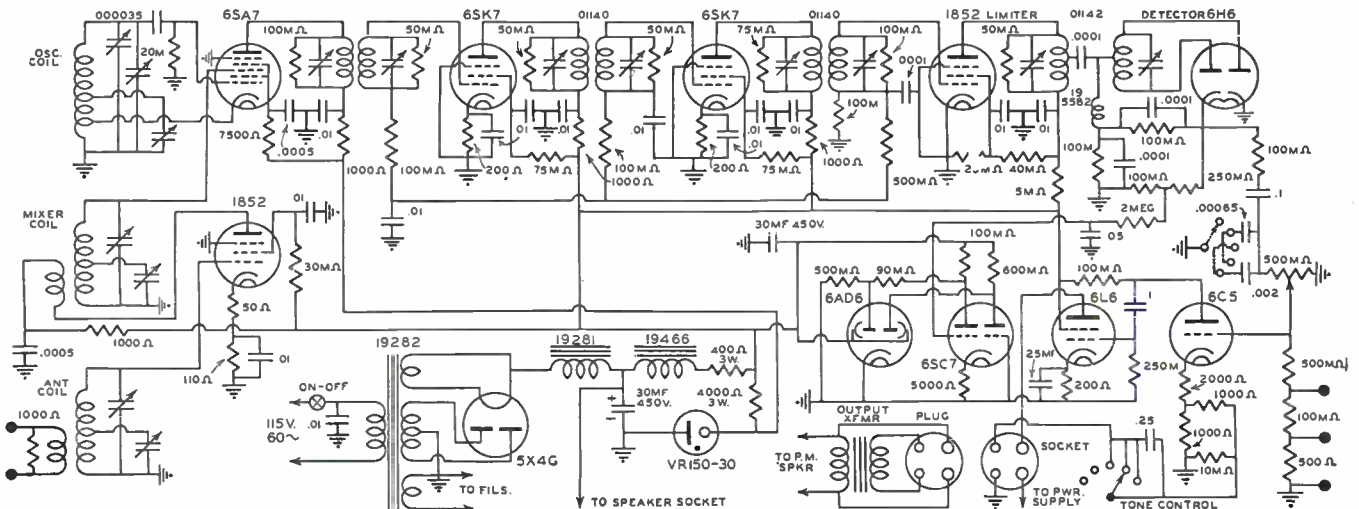
AVC voltage to be developed. At first glance it might seem peculiar to allow this grid to draw current since such action in a normal receiver would result in considerable distortion, but it must be remembered that amplitude variations do not accompany the carrier in a frequency-modulated signal, and therefore, amplitude distortion in this part of the receiver is entirely permissible. From the low-potential end of this transformer secondary, a conventional circuit of AVC resistors and condensers connects to the preceding amplifier tubes to regulate the gain of the i.f. amplifier to an amount that will keep the "Limiter Tube" overloaded as described in a preceding section.

Characteristics of the Signal

It has been said in many places in the preceding part of this article that the principal difference between this signal and the conventional broadcasting signal is that the program material is transmitted by variations in frequency instead of by variations in amplitude. It has not been brought out in so many words until now, however, that the loudness of any particular tone in the program is proportional to the amount of the frequency shift.

In other words, during a pause in the program, that is, a moment of silence, the carrier is fixed in frequency, and as modulation is applied, increasing from a whisper up to full volume, the amount of carrier shift increases from zero up to a maximum of 75 kc. (according to present standards of operation.) The frequency of the audio note corresponds to the number of

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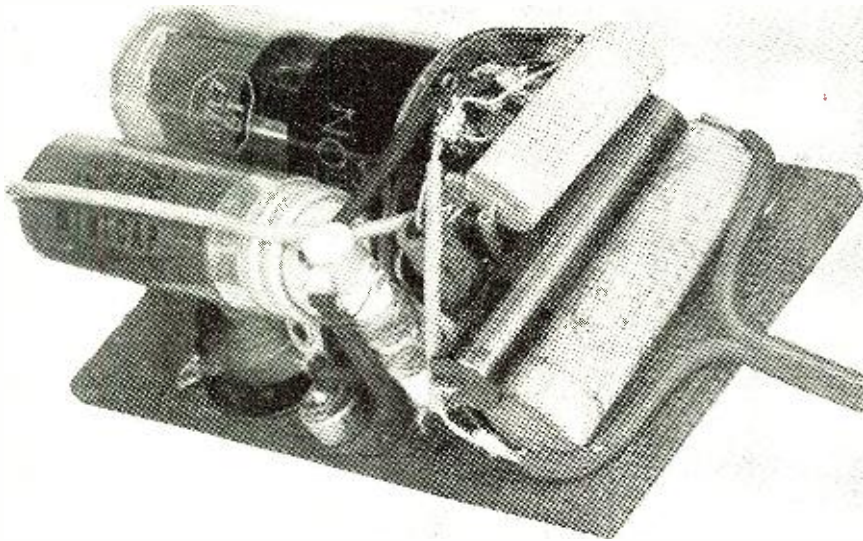


IMPROVED PHONO OSCILLATOR

by

Lewis VanArsdale, Jr.
W8QZR

Cleveland, Ohio



This compact oscillator together with a radio set makes a good phonograph.

The latest improvements in the phono oscillator field. The author describes a one-tube home-built unit that works well

URING the past few months many excellent circuits have appeared demonstrating means whereby the output of a phonograph pickup could be used to modulate a low-power oscillator and tuned to one end of the broadcast band enabling records to be played through any radio without a direct wire connection. However, the circuit herein described is so simplified and possesses such excellent operating characteristics that an additional discourse on the subject seems adequately justified.

The complete unit utilizes only one tube, a type 117L7GT, this tube performing the functions of rectifier, oscillator, and modulator. The heater of this tube is designed to be connected directly across the 115 volt a.c. or d.c. line, ideally suiting it for this unit.

As can be seen in the schematic diagram, the oscillator itself is of the *Hartley* variety utilizing the screen grid, plate, and cathode of the tetrode section of the tube as the oscillatory elements. The output of the phonograph pickup is fed to the control grid of the 117L7GT to modulate the r.f. carrier generated in the oscillator

tube. This method of modulation has proven to be exceptionally fine because not only is a fairly high percentage of modulation possible using the output of any regular crystal pickup, but frequency modulation is practically eliminated.

A high-C tuned circuit in the oscillator is, of course, very desirable also to keep the frequency as stable as possible. The constants mentioned herein are intended for use at the high-frequency end of the broadcast band. Attention should also be called to the large r.f. choke in the grid lead (30 m.h.) as this is *very* necessary in order to keep any trace of radio-frequency out of the pickup and connecting leads.

All parts used in the circuit are entirely conventional with the possible exception of the inductance used in the oscillator. This inductance may be wound in any desired manner as long as it tunes to the desired frequency with the trimmer condenser adjusted as close to maximum capacity as possible. In the particular unit shown in the photograph, this inductance was made by jumble-winding 80 turns of No. 32 D.S.C. wire on a ¼" ceramic

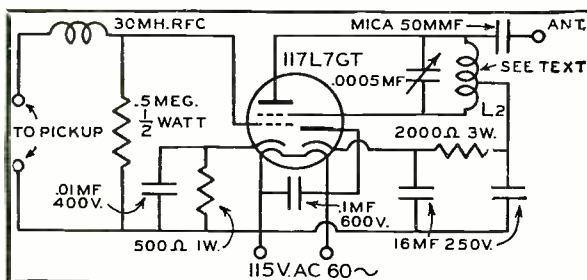
core salvaged from a burned-out r.f. choke. The tap should be brought out from the center of the winding which would be, in this case, at the 40th turn.

The unit is built complete in itself as it was desired to have it in such a form that it could be readily transferred from one record player to another. This does not necessarily illustrate the most convenient way to construct the unit since in many cases, it will be found much easier to simply attach the components inside the case of the record player and connect them in the usual fashion. The unit shown in the photographs does, however, show how compact the construction may be made if desirable since it is completely housed in a case measuring only 4½" x 2½" x 2". Only one precaution is necessary in wiring the circuit—all leads carrying line voltage should be kept as far away as possible from the aforementioned center-tapped inductance otherwise hum may be noticed on the carrier of the oscillator.

It will be noted that no provision for a volume control is shown in the diagram as most record players have one already built in. If, however, the pickup being used does not utilize such a control, the value of the control grid resistor should be reduced from ½ megohm to some value between 50,000 ohms and 150,000 ohms, otherwise excessive modulation and distortion may be noticed. The largest value that still permits good quality reproduction on loud passages will be found the most satisfactory.

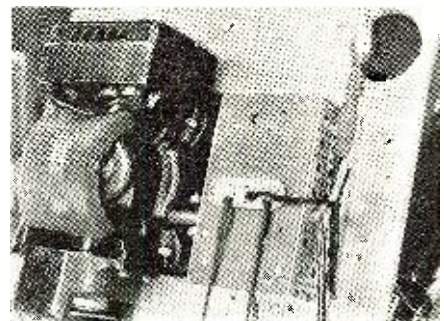
In placing the oscillator in operation the receiver is set somewhere around 1500 kc. where no station can be heard, then the trimmer condenser

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core salvaged from a burned-out r.f. choke. The tap should be brought out from the center of the winding which would be, in this case, at the 40th turn.

The unit is built complete in itself as it was desired to have it in such a form that it could be readily transferred from



The oscillator installed under a regular turntable ready to play.



The units come apart, and yet the whole can be transported as one complete radio station.

The 1940 COMPLETELY PORTABLE QRR RIG

by

Oliver Read, W9ETI

Technical Editor, RADIO NEWS

The annual version of Mr. Read's fine portable station. This makes the third year that we have run this type rig

MUCH has been written on various types of portable equipment of many varieties. Past experience with different units has pointed out that each particular one could have been improved by simply adding one or more features. This had been done in previous models with some success; but the final equipment did not represent the ultimate in performance due to the over-crowding of the added parts or changes which upset the original adjustments of the transmitter or receiver.

Many different models of portable rigs have been built, designed around the Portable Radio Station that appeared in the June 1938 issue of RADIO NEWS. An improved model was described in a later issue, June 1939, and offered additional features not contained in the original model. To be truly universal in application, one cannot overlook any one feature which might be needed for a typical emergency setup and a careful study was

made in order to determine just what was needed to design a portable truly suited for this work.

The writer introduced an "add-a-unit" version of portable gear at the *ARRL Convention* in Chicago in 1938 which offered definite advantages to the operator as far as portability and ease of assembly were concerned. Although these individual units could be considered as separate assemblies, their application was limited by lack of provisions for bandswitching. The reason for this feature being omitted was the factor that ultra-compact coil assemblies, midget i.f. transformers, and the like were not then commercially available.

In order to achieve compactness in design, it is necessary that the component parts be small physically. The manufacturers have cooperated in past months by designing their parts to fit into the battery operated portables now so commonly used. The tube manufacturers have also brought out

new types that have been especially created for these sets. They are very much smaller than those previously used and permit a lot more receiver to be built into a given space than heretofore.

The QRR station to be described contains many features found only in fixed stations, or in commercially built units. The principal of these are: operation on as many bands as possible at high efficiency, ease of operation, speed in handling traffic, universal power supply, independently powered receiver, antenna matching network, push-to-talk control, and any other device which will permit the operator to serve in emergency with maximum effectiveness.

The Transmitter Unit

Careful forethought will make it possible to include a complete 5-band transmitter and modulator on one chassis which measures 9½" wide, 6" deep, and 2" high. This includes all of the coils and parts needed to com-

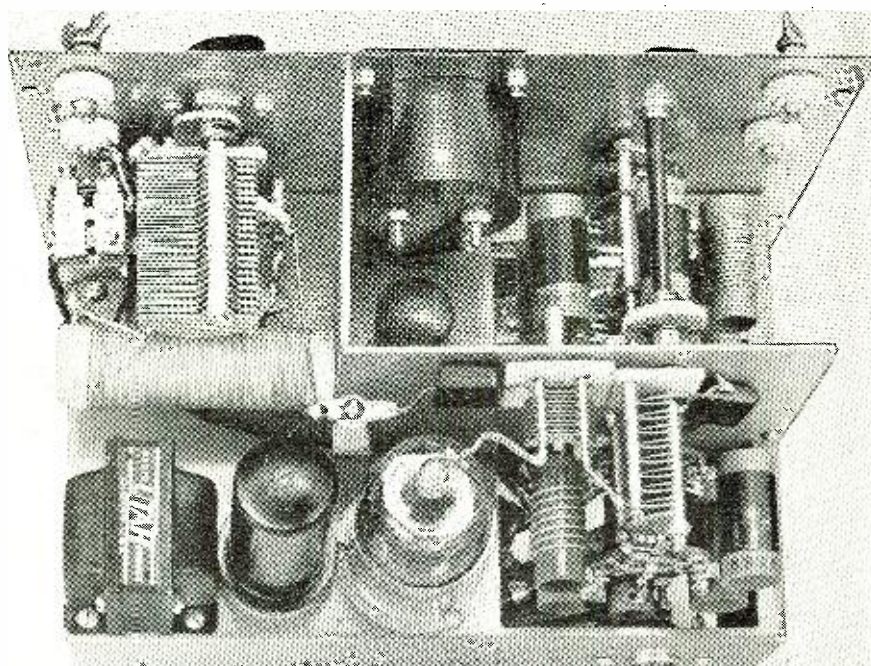
plete the unit. The use of commercially available coil assemblies simplifies the mounting procedure and adds to the efficiency of the rig. Coils are pre-designed with the proper Q for operation in the tube circuits, and consist of two tuners ganged by means of a flexible coupling as shown in the illustration. One group is mounted so that the "common" connecting terminal is under the chassis where a short lead can be made to the oscillator plate; while the other "back assembly" is just the reverse, that is, with the "common" lugs up. This is done to keep all leads as short as possible where one tube is of the single-ended type and the other with its plate connection made to a top cap.

An aluminum baffle is cut from scrap material and measures 6" wide and 5½" high. A center hole to clear the shaft, and two mounting holes on 1⅝" centers are drilled to pass the long bolts holding the coil assemblies. A simpler method would be to use the coil assemblies as two independent units. They will then be single-hole mounted. This latter method will require a bit more room back of the panel. All coils which are not in use are shorted automatically and do not absorb r.f. energy one from another. Thus, a common fault found in most compact transmitters and receivers, is eliminated.

The two gangs are set so that the 10 meter coil on one unit will track with the same coil on the other. The amplifier tank condensers are mounted on the baffle directly over the coil assembly as shown, while the by-pass condenser is mounted right at the switch lug for most effective performance. Note that the oscillator and amplifier sections are carefully shielded so that no coupling will take place and upset the circuit or cause it to become unstable. The baffle is cut to fit around the chassis in such a manner that it can be extended right down to the bottom edge for complete shielding.

Another piece of aluminum is cut to fit between the baffle and the front panel to isolate the oscillator from the antenna circuit further. The three crystals are mounted under the chassis on another strip of metal and are located within the oscillator compartment. We felt that an emergency rig should be equipped with crystals that can be left intact. The chance for leaving them behind is thus eliminated and the rig is ready at a moment's notice for service.

Three crystals are used to cover the 5 bands used in conjunction with a regenerative oscillator circuit. The tube will oscillate either on crystal fundamental or on the second harmonic. A separate selector switch is provided for the three crystals so that a choice can be made independently of the coil switch. One of the nice features of this arrangement is that the amplifier is always tuned to the oscillator frequency and never operates as a doubler.



The transmitter has been carefully designed from the viewpoint of efficient and continuous service in the field. Note the "Collins" pie network (L) included also.

The oscillator tube, type RCA 6V6 is mounted directly back of the meter. Sufficient output is had to drive the final from the oscillator when using a ten meter crystal. Three will be needed—a 160 meter rock for 160 and 80 meters, a 40 for 40 cw and 20 meter phone, and a 10 meter crystal for that band. Note that the crystal circuit returns to ground through a .00015 mf. condenser. The value is rather critical for certain crystals and some cut-and-try might be required to get the crystals to take off when they are used in doubler operation. A padder of 100-400 mmf. could be substituted for the .00015 mfd. mica condenser for easy adjustment.

The modulator tube, type RCA 6L6 is mounted along with the mike transformer where it is out of the way from the r.f. sections. This operates in *class A* and is set for maximum output from a single-button microphone. The distortion is slightly higher than that used in ordinary applications, but at voice frequencies which are very complex, we need not be concerned. Getting the most from the tube in order to eliminate a driver is more important for *QRR* work. The remaining space above the chassis is taken up by the antenna matching network. This is a single-ended type of *pi* network and will load almost any type of antenna, including an 8 ft. fishpole as used normally on this rig.

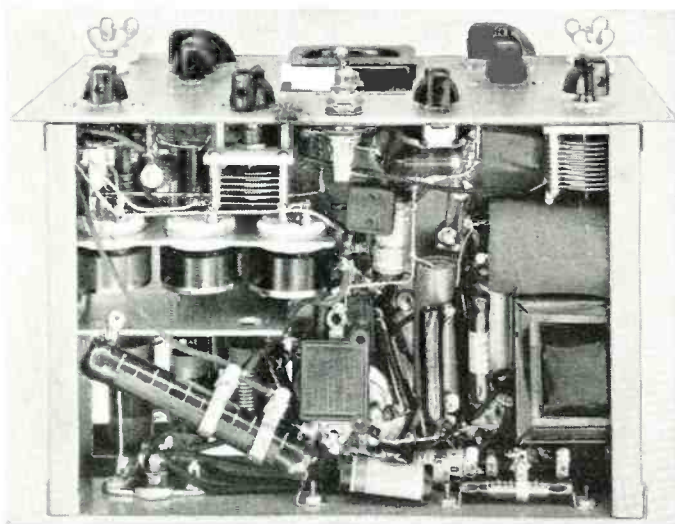
A switch is provided to short out the unused portion of the loading coil. Previous experience with various networks showed that for all adjustments, the network should be cut-out of circuit for initial adjustments of the amplifier. Tuning of the network is comparatively simple. With the shorting switch set to the "off" position, the amplifier tank is tuned to resonance in

the usual manner. Further adjusting of this tank should *not* be done while adjusting the antenna network.

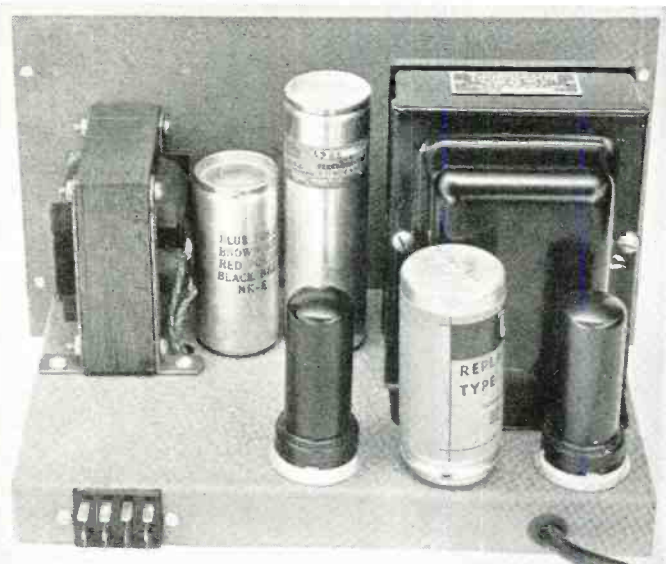
Vary the positions of the shorting switch and tune the two condensers to bring up the load on the amplifier as indicated on the milliammeter (toggle switch in proper position. The condenser nearest the output tank coil is tuned to *minimum* current and indicates resonance of the circuit. The one at the antenna is adjusted to either increase or to decrease the effective loading of the antenna. Keep the resonating condenser at the resonant dip point at all times. Proper loading of the antenna will be indicated when the plate current reaches a minimum value of 60 ma.

Push-to-talk operation can best be appreciated by those who have engaged in *QRR* service. A midget three-way mike jack is used which includes the extra connection needed for the relay circuit. The *Guardian* relay has its coil designed for either 6v. a.c. or d.c. operation. This is accomplished by inserting a resistance of 4 ohms in series with the coil as shown. A shunt condenser of 1000 mf. is placed across the resistor to pass as much a.c. component as possible. The relay is double-pole-double-throw. One section transfers the antenna from "send" to "receive," while the other controls the plate supply to the transmitter.

Wing nuts are provided on the panel and are used to mount a fish pole antenna. The ones on the left hand side are dummies and serve to balance the appearance of the unit. The controls line up as follows: top left—*amp. plate tank*; top right—*ant. condenser*; middle left—*coil selector switch*; middle right—*pi-network switch*; bottom left—*crystal switch, oscillator tank condenser, mike and key jacks, audio gain*



Transmitter underchassis view, above, and power supply chassis to right.



control and ant. resonating condenser.

Receiver Unit

The weakest link in an emergency unit is usually the receiver—unless a commercially built job is carried along for reception. The answer is found in the following: most amateurs are prone to build portables with plug-in coils. These are up to 2½" in diameter and are crowded into the assembly where instability results. They do not include a stage of r.f. ahead of the mixer tube because it is "too much work." Also, they leave out means for increasing the overall sensitivity of the receiver.

They omit any provision for increasing the selectivity of the set, either by adding a crystal filter or by using regeneration in the i.f. amplifier. These are, of course, found in the commercial receivers. By including an r.f. stage plus the addition of i.f. regeneration, the gain was materially increased and the performance compares with many sets that are three or four times larger in actual size.

There are many times in *QRR* work where the storage battery supplying power is used for long periods in the

receive position. If this battery is called upon to keep a vibrator running continuously, the life of both the battery and the vibrator will be lessened. Dry batteries are the answer to economical operation and also gives the storage battery time to recuperate between transmissions.

Half the battle is won if we can obtain a coil and switch assembly that has been completely wired. Such is the replacement for the *Howard* models 437 or 438 coil assemblies which the author used. These are equipped with the necessary baffle shields between sections, have all the padders and trimmers pre-mounted and wired, and the entire unit ready for installation into the receiver chassis. A large cut-out is made in the chassis so that the assembly will fit down into the space provided. The remaining depth is taken by the output tube, the second detector, second i.f. transformer, and the i.f. tube as shown. The first i.f. transformer is located directly back of the three-

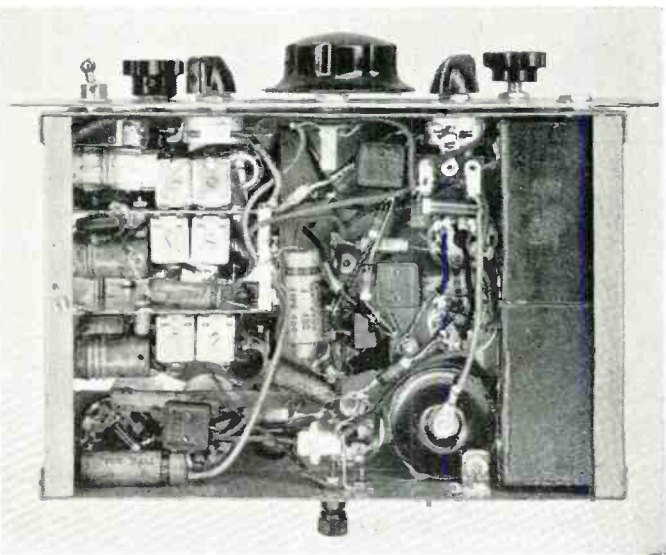
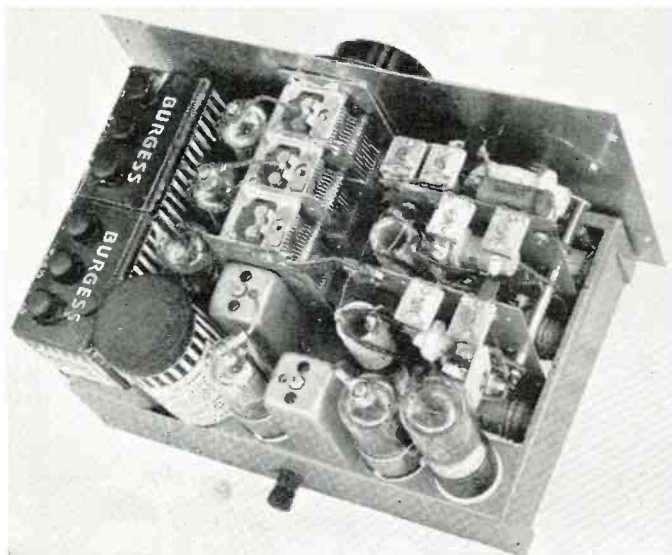
gang tuning condenser, while the remainder of the tubes can be seen between the variable and the two B batteries.

A round hole is cut from the chassis to allow the dry cell to be inverted with the terminals at the bottom. Also cut out the end of the chassis so that the two B batteries may be under-slung beneath as a means of saving considerable space.

The trimmers may be seen by referring to the illustrations. These are conveniently arranged for easy access to the builder. The r.f. choke is shown directly back of the antenna terminal. This choke is shunted with a carbon resistor of 10,000 ohms and is essential for proper operation of the receiver if oscillation is to be maintained on all bands. The remaining parts need no explanation and their placements are not critical.

The chassis is the same size as that used for the other two units, namely 9½"x6"x2". The entire receiver is thus constructed on one deck—batteries and all and meets the requirements of a *QRR* set to the letter. Regeneration is had by connecting a short lead

The receiver chassis, top and bottom views show the compact wiring.



to the plate pin of the IN5GT i.f. tube and running it up along the glass as shown. This provides a coupling from plate-to-grid and regeneration results when the bias is adjusted with the 5,000 ohm potentiometer to reduce the bias on the tube, resulting in increased gain and to the point where feedback will cause the circuit to become regenerative.

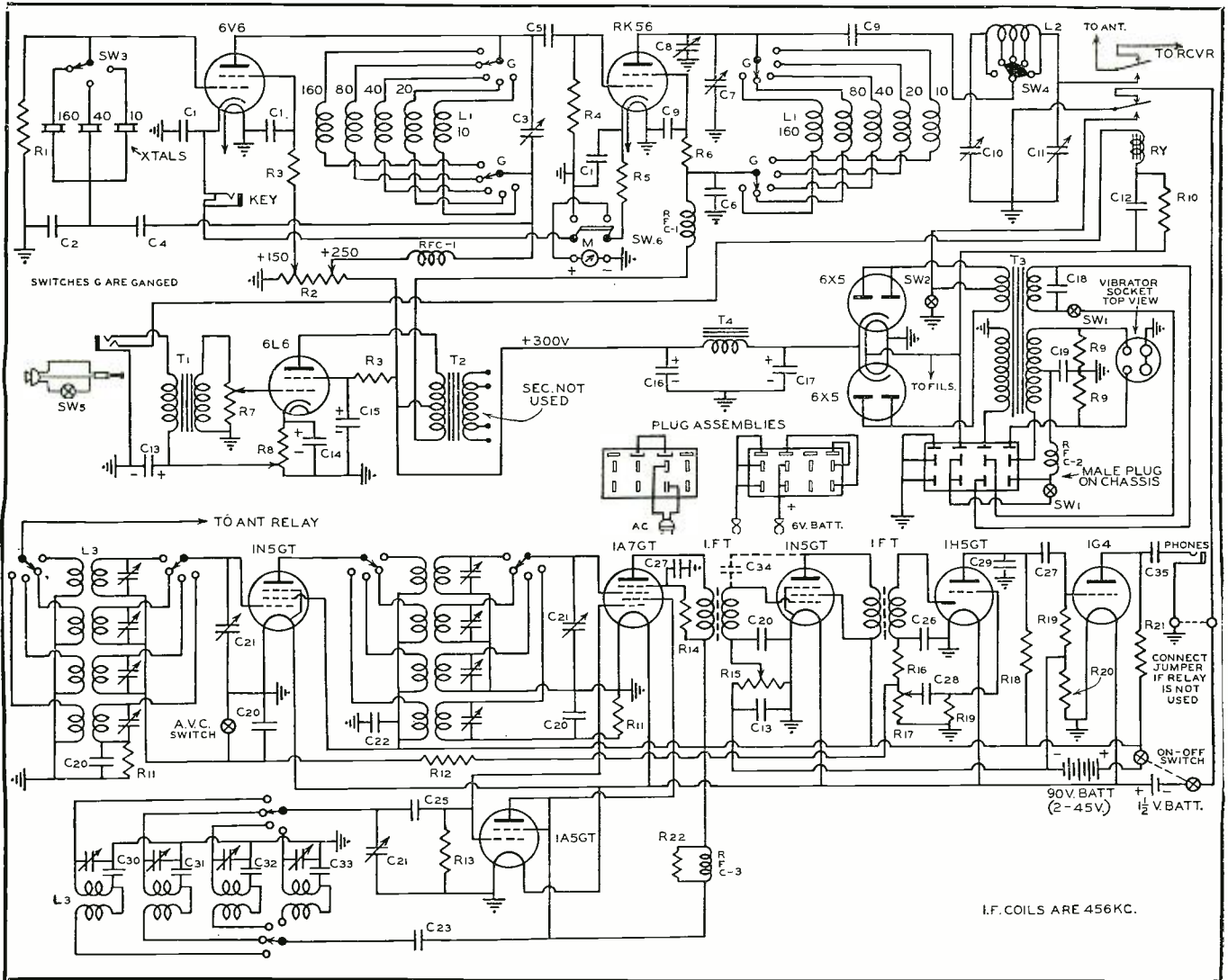
Alignment of the coils should be done with a service oscillator for best results. Lacking this, the builder can adjust the trimmers for maximum

noise level. Four coils cover all frequencies from 550 kc. to 42 mc. The first position covers the standard broadcast band, the second the 160 and 80 meter bands, the third the 20 and 40 meter bands, while the higher frequencies including 10 are covered on the fourth. Band-spread may be added if desired, or an excellent vernier provided by wrapping a dial cable around the center tuning dial knob and then by taking a turn or two around the shaft on the upper left-hand knob.

This method is used in order to con-

serve the space required by the band-spread feature and works very well. The receiver is sensitive enough to bring in many Europeans with plenty of volume to spare. The life of the batteries is aided by using the antenna relay to cut the receiver supply completely while transmitting. Therein lies one very good reason for using filament type tubes in the receiver, namely that both plate and filaments may be turned on at the same time without the necessity of keeping the

(Concluded on page 53)



- R₁—100,000 ohms, 2 w. Aerovox
- R₂—25,000 ohms, 50 w.; two sliders, Ohmite
- R₃—10,000 ohms, 10 w. Ward-Leonard
- R₄—50,000 ohms, 1 w. Aerovox
- R₅—250 ohms, 10 w. Ward-Leonard
- R₆—15,000 ohms, 10 w. Ward-Leonard
- R₇—500,000 ohms. Mallory
- R₈—300 ohms, 10 w. Ward-Leonard
- R₉—100 ohms, 2 w. Aerovox
- R₁₀—4 ohms, 10 w. Ward-Leonard
- R₁₁—10,000 ohms, 1 w. Aerovox
- R₁₂—3 megohms, 1/2 w. Aerovox
- R₁₃—30,000 ohms, 1/2 w. Aerovox
- R₁₄—75,000 ohms, 1/2 w. Aerovox
- R₁₅—5,000 ohms, Mallory
- R₁₆—100,000 ohms, 1/2 w. Aerovox
- R₁₇—500,000 ohms, Mallory
- R₁₈—60,000 ohms, 1/2 w. Aerovox
- R₁₉—1 megohm, 1/2 w. Aerovox
- R₂₀—500 ohms, 1 w. Aerovox
- R₂₁—50,000 ohms, 1/2 w. Aerovox
- R₂₂—10,000 ohms, 1 w. Aerovox
- C₁—.01 mf. 600 v. mica. Aerovox
- C₂—.00015 mf. mica. Aerovox
- C₃—75 mmf. var. Cardwell Trim-Aire
- C₄—.002 mf. 600 v. mica. Aerovox
- C₅—25-100 mmf. midget. Hammarlund

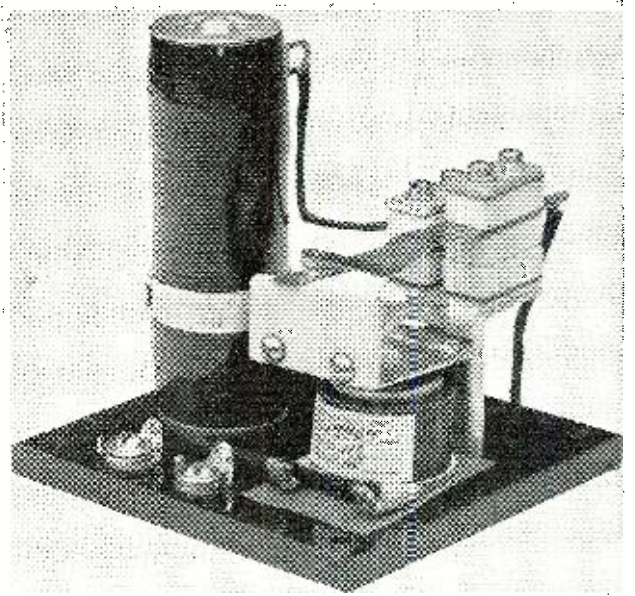
- C₆—.005 mf. 600 v. mica, "in coil assembly"
- C₇—50 mmf. Cardwell "double spaced"
- C₈—25 mmf. "fixed air or variable"
- C₉—.002 mf. 1,000 v. mica. Aerovox
- C₁₀—140 mmf. Cardwell Trim-Aire
- C₁₁—365 mmf. var. Bud.
- C₁₂—1,000 v. 15 v. electro. Mallory FP
- C₁₃—10 mf. 25 v. electro. Aerovox
- C₁₄—20 mf. 50 v. electro. Aerovox
- C₁₅—8 mf. 450 v. electro. Aerovox
- C₁₆—16 mf. 450 v. electro. Aerovox
- C₁₇—8 mf. 600 v. electro. Aerovox
- C₁₈—.06 or .1 mf. tubular. Aerovox
- C₁₉—.5 mf. 600 v. tubular. Aerovox
- C₂₀—.05 mf. "in coil assembly"
- C₂₁—.0004 mf. three gang variable. Meissner
- C₂₂—8 mf. 300 v. electro. Aerovox
- C₂₃—35 mmf. 600 v. mica. Aerovox
- C₂₄—15 mmf. midget padder. Meissner
- C₂₅—.002 mf. 400 v. tubular. Aerovox
- C₂₆—.0001 mf. 400 v. mica. Aerovox
- C₂₇—.02 mf. tubular. Aerovox
- C₂₈—.01 mf. 600 v. tubular. Aerovox
- C₂₉—.0005 mf. mica. Aerovox
- C₃₀—510 mmf. padder, "in coil assembly"
- C₃₁—.0015 mmf. padder, "in coil assembly"
- C₃₂—.004 mf. padder, "in coil assembly"

- C₃₃—.0009 mf. padder, "in coil assembly"
- C₃₄—See text
- C₃₅—25 mf. tubular. Aerovox
- RFC₁—2.5 mhy. r.f. choke. Millen
- RFC₂—40 turns no. 14 c. 5/8" dia. in two layers
- RFC₃—Howard No. 002 replacement
- L₁—Browning 5P coil and switch assembly. See text
- L₂—45 turns No. 24 dcc, 1" dia. Tap at 10-15-25-30th turns
- L₃—Howard model 438 replacement complete coil assembly
- Ry—DPDT 6 v. AC-DC relay. No. 22031. Guardian
- T₁—Mike-to-grid. Utah 7804
- T₂—PP output. "Sec. not used." Stancor A2312
- T₃—Universal plate, 120 v. ac.—6 v. ac. Thordarson T49C91
- M—0-100 DCM-A. Triplett
- V—Replacement vibrator. Utah NP 48
- SW₁—DPST Toggle switch. Cutler-Hammer. Heavy duty.
- SW₂—SPST Toggle switch. Cutler-Hammer
- SW₃—SP-3 position switch. Centralab
- SW₄—SP-6 position shorting switch. Centralab
- SW₅—Push-to-talk switch on microphone
- SW₆—DPDT toggle switch. Cutler-Hammer
- IFT—456 KC Iron Core

SAVE A LIFE WITH A SAFETY RELAY

by JONATHAN B. QUASS
Washington, D. C.

Sure fire death lurks in every transmitter in its filter condensers. Here is how to avoid your electrocution



This little gadget may yet save your life! Easy and cheap to build, it's worth while insurance.

MOST amateurs are thoroughly familiar with the fact that in their transmitter lurks death. Death by *electrocution*. In fact, they are ever so close to this state of affairs that they have become calloused to the high-voltage and treat it with a faint tinge of contempt. "We have bleeders," "We have everything under a chassis," "We always turn off the power before we make adjustments." These are common statements, and are wholly indicative of the light regard with which the Hams hold their own lives.

But deep in the rig lies a curious phenomena. The chance of electrocution from a "dead" power-supply by virtue of the charge remaining in the filter condensers, one which is generally conceded technically, but rarely, if ever, protected against. What if the bleeder should open—and they do do that when overloaded for long periods of time? Then the condensers have no means of discharging their lethal juice to ground and immunizing themselves as a death-dealing chain-lightning agent. Several deaths have already been reported as a result of getting across a 2 to 4 mfd. filter condenser in

the ordinary 1,000—2,000-volt supply.

Now, as in most things electrical, there is not any need for these unwilling and most time sad deaths, if only an instrument is included in the rig which "kills" the condenser charge *before it can kill you*. The author has built the one described here for little money, and the resulting insurance is far cheaper than the actuary figures for a man his age.

One sure-fire way of discharging the filter condensers is to *short* the terminals *directly*. Of course, the operator cannot be expected to do this every time some adjustment is to be made and some automatic means is desirable from the convenience angle. A very simple solution has been found in a relay which connects across the primary of the plate transformer. The relay coil itself will then be energized every time the plate transformer is placed in operation.

Heavy-duty contacts are used which are *normally* in a *closed* position, wired in series with a 500-ohm resistor across the output of the filter supply. These effectively short the supply and discharge the accumulated energy the moment primary voltage is removed

from the plate transformer. A 50-watt vitreous enameled resistor is connected in series with the contacts so that sparking at this point be reduced to a minimum.

Insulation becomes very important to eliminate all possibility of the high voltage breaking down to the chassis. This is accomplished by mounting the entire assembly on a bakelite base that measures $3\frac{1}{4}$ " square and should be at least $\frac{1}{8}$ " thick. The $\frac{3}{16}$ " stock, commonly used is even better and is recommended. Four mounting holes are drilled in the corners as shown. Terminals should be provided so that direct wiring to the contacts will not be needed. Danger of the leads from pulling loose will then be minimized.

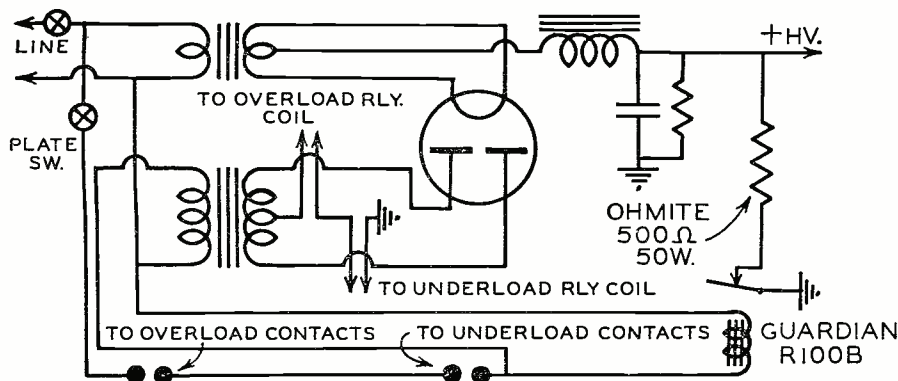
In order for this type of relay to operate properly on all transmitters, *ALSiMAG* insulation is used in conjunction with large heavy-duty contacts of silver.

These are necessary to insure trouble-free operation at all times and to prevent burning and sticking of the contacts. The relay coil is designed for 90-120 volts a.c. 60 cycle, which will handle any type of transmitter installation normally used.

Note that the contacts are *closed* at all times that the plate transformer is "off." These are opened the instant the primary voltage is applied and the circuit then functions in a normal manner. This new method of protection to the operator is most effective where a bleeder resistor is not used. Some amateurs leave the bleeder out of their rigs as an economy measure, to raise the voltage slightly, or to reduce the overall drain on the supply. Although this is bad practice, it is being done.

This procedure is hard on the filter condensers and rectifier tubes, leaves them with a charge, causes undue

(Concluded on page 53)





by **LEE WARD**
Service Manager, San Francisco, California

Some new ideas and the now famous Ward's awards are this month's topics

How's Your Latin?

THE local power company maintains an "electric house," a model - - home put together to demonstrate how great a number of household requirements may be satisfied by electricity. Transformer electricity, not the box kind.

In the garden were illuminated flower beds; in the kitchen drain, a motor-driven garbage chopper; and in the library, recessed fluorescent lamps. Everything, in fact, except electric chairs.

Puzzling was the wooden bas-relief presenting the phrase *Totus, teres, ac rotundus*. An attendant who was probably more diplomat than linguist, told me it was an old Latin warning: "Never plug an a.c. midget into a d.c. outlet."

Clapograph

A DANCING contest was held in Chicago's *Madison Athletic Club*; the winners were to be designated by spot acclaim.

Ten couples were chosen for the finals. The mc. held his hand over the heads of each couple. As read on a meter, the height of applause was to determine placement.

At this point, a meter dial was projected on a curtain. As each burst of applause rose and fell, the shadow of a huge needle followed it up and down. The audience, with no instruction, knew what was being done: the meter, usually read by a single amplifier attendant, was being displayed in order that the voters were also judges!

Works out nicely because it avoids all suspicion of human bias or error. Misunderstanding often results when audience, listening to its own applause, tries to judge by *duration*, rather than *peaks*, of its own noise.

With the visible-meter method, the audience reads only the highest amplitude of each peak. When seven of ten contestants are eliminated in the first round, the audience knows it immediately, and shifts their votes on the final round to one couple of the remaining three. In this way, the entire crowd

votes for one of the finalists, instead of dropping out after they see they have been backing a loser.

The device seemed so novel I told my espionage staff to learn the inside details.

The idea was put into use by the *Atruetone Laboratories*, the three servicemen-owners of which specialize in p-a systems. The equipment is simple and cheap: a floodlamp, lens case, and an output meter with inverted mechanism; in short, nothing but a variation of the old magic lantern principle.

The boys tell me many persons in their audiences make inquiry after each contest. By coincidence, one of them is at hand to answer questions and pass out business cards.

A very good technical and psychological stunt, and an excellent one to promote future business. If enough of you write in to say you're interested, I'll give construction details.

Customer Counsel

URIEL J. THERIOT of New Orleans illustrates one of his biggest servicing squawks with the account of an annoying call:

He was requested to attend a *Transitone 5*, which he found spread out on

the customer's kitchen table. All cables had been cut. A similarly misused *Mallory* eliminator with a missing condenser completed the picture.

The customer admitted he had "tinkered with it a little" before asking for professional help, but demanded the work be finished in a hurry. Theriot, working before the customer, got the job for \$7.50; traced and replaced all the shielded leads, and then came across a defective tube. The customer refused to pay for it, even after he heard the set play satisfactorily when a good one was used.

Theriot, in disgust, picked up his instruments and tools; willing to give the job up as a loss. But when he reached for his tube and condenser, the customer said that any parts he had put into the set must be left there! Theriot barely got out of the house without injury; he had his tube and condenser, but his work had gone for nothing.

He says if he comes across a similar case in the future, he'll quote \$32.50: \$7.50 for the work, and \$25 for showing the customer how to get away with murder. Then, if the customer agrees, he will sell him a new set for \$29.95!

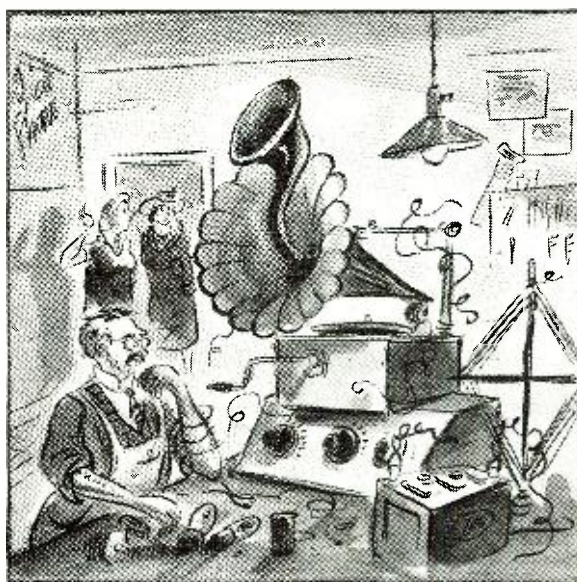
While I can sympathize with UJT in his bitterness, it doesn't seem that his method takes care of the repair business that lies between \$7.50 and \$32.50. What expedient would *you* suggest?

Mrs. E. Serensen of Van Nest, N. Y., writes to explain why women do not like to call servicemen:

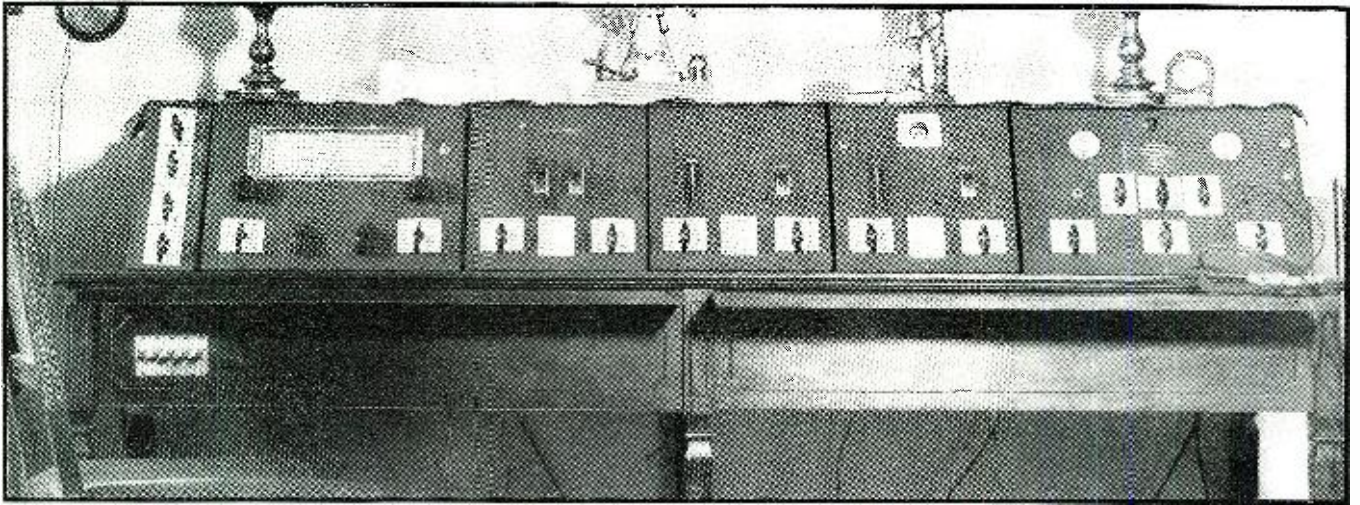
"The customer knows that tightening a screw or fixing a loose bulb brings an enormous charge, so we keep away from repairmen and find a [second-rate mechanic] who is ready to operate and who does surprisingly well. If this method fails, we call in a serviceman. But we don't trust him; we feel we are being overcharged."

Well, that has the ring of truth, whether we like it or not. A business twenty years old should have more of a tradition than one which condemns its better members to continual suspicion.

(Concluded on page 56)



"You've heard of those phonograph-radio combinations? Well, John is building his own!"



Another picture of the set which the author has been describing for the last three lessons. Looks nice, doesn't it?

Modernizing Old Receivers

by **CHARLES R. LEUTZ**

Glendale, L. I., N. Y.

PART 3

In this section the author takes up the installation of various latest additions which will make the old set equal the latest model

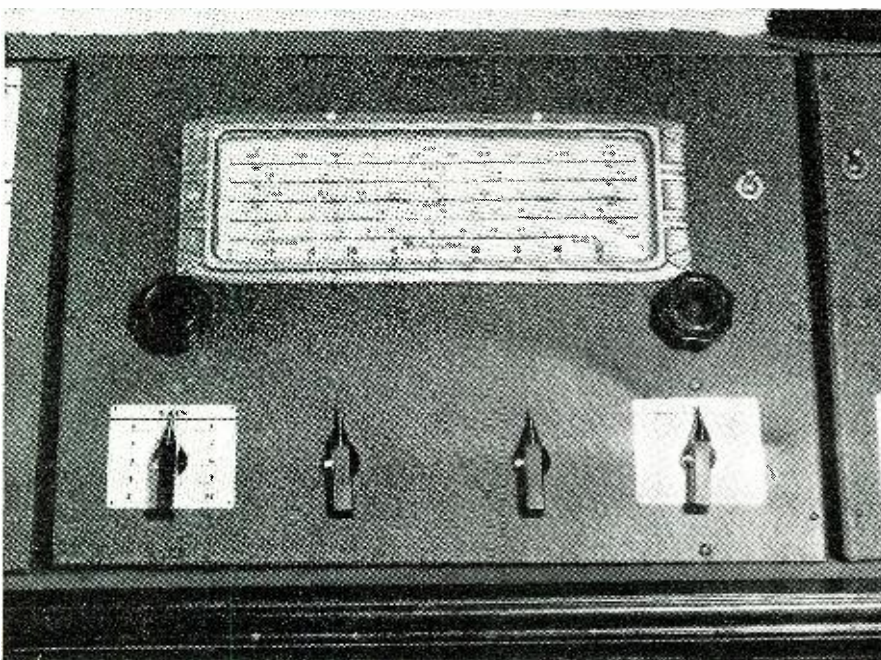
SUPER-HETERODYNE receivers provide a fertile field for prospective modernizing jobs. Many different models, some only a year or two old, can be improved substantially in several different ways. This situation is not entirely the fault of the receiver designers, but generally speaking, is due to the fact that most radio receivers in recent years have been built to a price.

In selecting an automobile, or any complicated mechanical or electrical device, an intelligent buyer considers the cost per hour or per year of service, not just the initial cost. As an example, buyer "A" purchases a "priced" receiver at an initial cost of \$100 and, over a period two years, expends an additional \$100 for service. On the other hand buyer "B" pays \$200 for a receiver which operates satisfactorily over a two-year period without any service costs. Both have spent the same amount of money. "A" with an original expenditure of \$100 is limited to a mediocre receiver, capable of only fair performance and subject to frequent service difficulties. Buyer "B," having paid more in the first place is able to secure a receiver capable of very satisfactory performance and free from any breakdowns.

The same situation exists in the service field, a customer has his receiver repaired two or three times at a price by incompetent hands and finally has to pay a fair price to have the job done right by an experienced technician who has the necessary equipment.

In quoting on service or modernizing

The tuner assembly built around a commercially available r. f. unit.



jobs, the above point of initial cost versus final cost should be clearly presented, offering the customer an opportunity to have the work done right in the first place at a fair figure.

Many low cost super-heterodyne receivers can be readily altered, at a reasonable cost, to give tremendously improved performance. One of the best times to sell this idea is when such sets are brought in for service.

The overall performance of any super-heterodyne receiver is directly limited by the ability and effectiveness of the first r.f. stage or stages. Right at this point there is usually room for improvement. For the broadcast band, the existing antenna transformer and radio frequency transformer may be of poor design, resulting in high gain but with poor image ratio. In such cases, the high gain is usually confined to one small section of the tuning range, and, both low gain and poor image ratio is found over the balance of the tuning range.

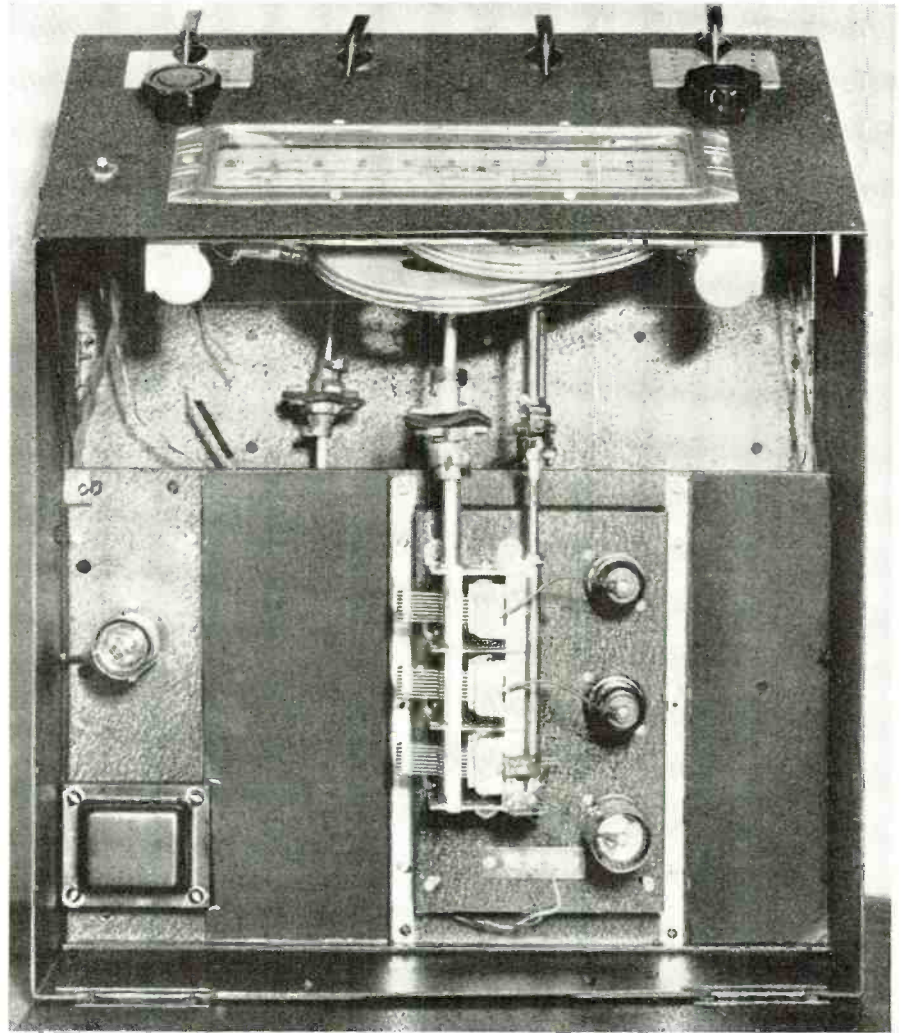
The antenna transformer and radio frequency transformer can be readily replaced by efficient units of the "iron core" type, which if properly designed, will give an excellent image ratio, fair gain, nearly uniform gain over the entire tuning range and the necessary "band pass" for good quality reproduction. For the broadcast band such transformers should always be of the high impedance, primary coupled type, where a small amount of high impedance capacity coupling has been added. Such a transformer will meet the above mentioned performance requirements.

For short-wave bands, gain is more essential than image ratio and low impedance primary coupled transformers may be used. For broadcast band receivers, the first r.f. amplifier tube may be a single end super-control, remote cut-off pentode such as the 6SK7. For all wave receivers, the 1853/6AB7 television tube can be used for the first r.f., automatically providing increased selectivity, sensitivity, gain and stability for that stage. The 1853 also has very favorable noise characteristics. Accordingly, when using the 1853 for the direct r.f., less i.r.f. amplification is required and some improvement of signal-to-noise ratio is secured.

Figs. 11 and 12 show the proper application of the 1853 as the direct radio frequency amplifier. Note should be made of the unconventional method of by-passing the cathode bias resistors. For simplicity, the diagram only shows one band of the switching system.

Incidentally, the 1853 is an excellent oscillator for a separately excited mixer and this application is shown in Fig. 11.

Receivers having a simple converter circuit (oscillator-mixer in one tube), can be invariably improved by changing to a circuit calling for a mixer and separate oscillator. This is especially true in the case of all-wave receivers. Both the 6K8 and 6AS7 (or equivalents) make excellent mixer tubes,



Looking into the tuner assembly. Note that the wiring is all beneath the chassis and that the clean lines are suggestive of the very latest in 1940 radio superhet receivers.

offering relatively high conversion gain and uniform operation.

By maintaining the oscillator plate and screen at constant voltage, a regulator tube, as shown in Fig. 12 is used and the circuit is practically free from frequency drift.

Standard antenna transformers, r.f. transformers and oscillator coils are available in a wide selection of types and sizes for long-wave, broadcast, short-wave, and ultra short-wave bands. Combined with the necessary ganged band switch, customers may be offered numerous frequency coverage combinations.

Modernizing work is greatly simplified if the customer will accept a frequency coverage obtained with a standard 4- or 5-band multi-wave tuning assembly. Fig. 13 shows a standard unit of this type, consisting of the band switch and all antenna, r.f. and oscillator coils which is available factory wired and pre-aligned.

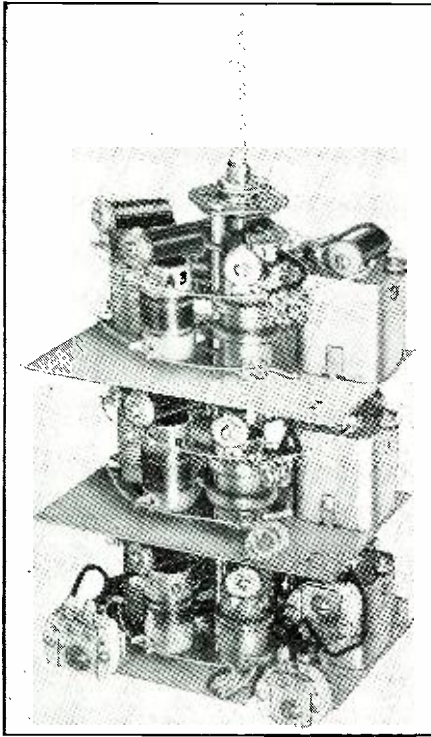
Fig. 14 illustrates an application of this standard coil and switch assembly used in an r.f. mixer and oscillator (all-wave) unit designed for use with the TRF receiver previously described. When using this super-heterodyne tun-

ing unit, the TRF set provides the i.f. amplifier, second detector, audio and power audio amplifiers to complete the system.

The schematic wiring diagram of the complete super-heterodyne tuning unit is shown in Fig. 12, the set-up consisting of an 1853 r.f. stage, 6K8 mixer and 6J7G oscillator. The voltage regulator is a VR 150-30 and the rectifier for the small built-in power supply a 5W4G. [The VR150-30 sets the voltage at 150 where the current does not exceed 30 ma.—Ed.]

A master switch connects either an antenna or doublet to the super-heterodyne tuner or direct to the TRF set, as required. When using the super-heterodyne tuner, the TRF stages are switched to a fixed position of 456 kc., by switches which connect small silver mica condensers in parallel to the variable tuning condensers.

The TRF receiver is used exclusively for high fidelity broadcast band reception when adjacent channel interference can be eliminated external to the receiver. For broadcast band reception requiring a higher degree of selectivity, the super-heterodyne tuner is switched into action. With the latter



This is the commercial coil assembly installed in the "oldtime" radio.

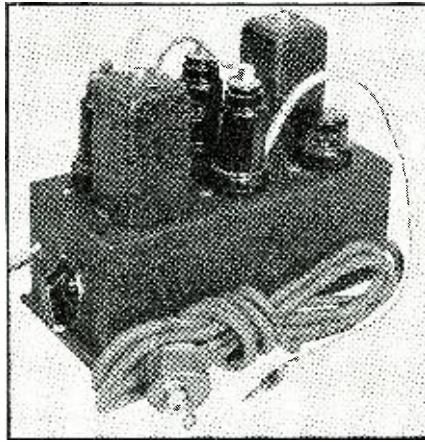
arrangement, there are three intermediate r.f. stages in the circuit, providing more gain than can be used under average conditions.

While the above installation is strictly a "den" set, occupying a relatively large space and having numerous controls for full flexibility, the idea of duplex operation changing from TRF to super-heterodyne has real future possibilities and, of course, can be adapted to more compact arrangements with fewer controls.

In the present arrangement the i.f. transformers are only single tuned on the secondary. Where a higher degree of intermediate radio frequency selectivity may be required, for example for communication purposes, fixed condensers with trimmers can also be switched in across the primaries of the r.f. transformers, or provision made to switch in a crystal filter.

The super-heterodyne tuner described above may also be used to modernize a super-heterodyne receiver which may be deficient in image ratio, uniform gain-or-signal-to-noise ratio. It can also be used to provide 5-band, all-wave coverage in existing sets having only one-, two- or three-bands. Accordingly a list of parts is given for this assembly and if it is used in connection with an existing receiver, the cabinet will of course not be required. The separate power pack may also be eliminated if the receiver being modernized has the power pack altered to supply the necessary filament, plate and screen voltages. The voltage regulator tube should be retained in the circuit in any event.

Intermediate radio frequency amplifiers furnish the next point for possible improvements. Existing i.f. trans-



A commercial form of "noise silencer" which can be used with results.

formers, when properly aligned, may prove to be too selective, excluding the possibility of good quality reproduction. On the other hand, the transformers, when aligned, may be too broad, resulting in insufficient intermediate radio frequency selectivity.

Standard high-grade "iron core" i.f. transformers are available in a wide selection of characteristics. New units can be selected to secure practically any reasonable degree of selectivity and overall gain desired. The best and most flexible arrangement calls for the use of "iron core" i.f. units of the "band expanding" type, having three coupling positions, controlled by a switch. The "broad" position or minimum selectivity allows high fidelity reproduction when adjacent channel interference can be eliminated external to the receiver. The "medium" or "sharp" positions, the latter providing maximum selectivity, are used to eliminate adjacent channel interference, when necessary, within the receiver, with a corresponding sacrifice of quality of reproduction.

The i.f. transformers should be high grade in all respects, the windings hermetically sealed and the trimmers strictly low loss and capable of permanent adjustment.

The i.f. circuit using "band expanding" units is shown schematically in

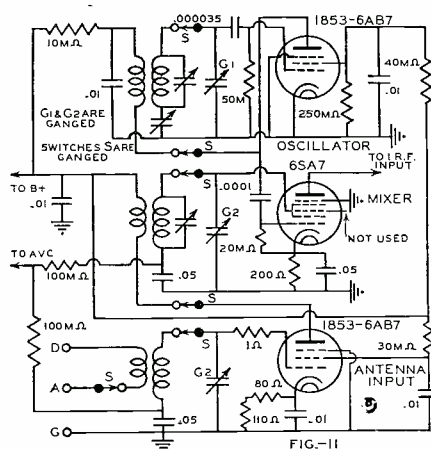
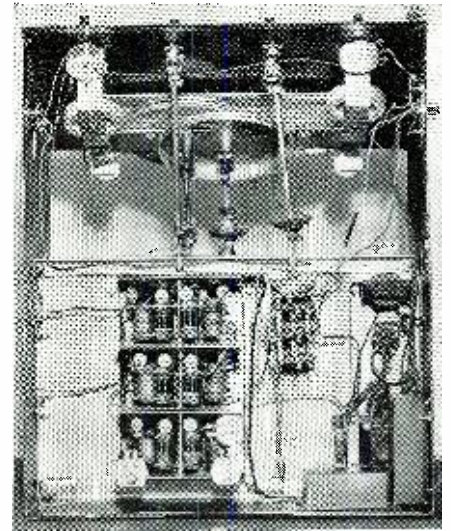


Figure 11 described by the author.



Showing how simple the wiring will be when the set has been converted.

Fig. 15 and note should be made that the last stage is not controlled by the AVC system. This is an important feature because the diode detector must be capable of working at high levels. With the diode and its load resistance properly adjusted for strict linear rectification and with high signal levels, the AVC ordinarily applied to the last stage prevents it from supplying sufficient power output to completely drive the diode circuit where distortion would result.

By diverting only a small amount of AVC to the last i.f. or better, no AVC to this stage, this common source of distortion is eliminated and a more favorable adjustment of the diode load conditions becomes possible. In Fig. 15, the dotted lines show a supplementary method of volume control, wherein the 200,000-ohm diode resistor becomes a potentiometer. The 500,000-ohm audio volume control can then be connected to any portion of the first mentioned potentiometer. Gain is sacrificed but usually can be spared and this method permits maintaining a more satisfactory relation of the a.c. impedance to the d.c. resistance in the diode circuit for most settings.

The importance of eliminating as much noise as possible outside of the receiver has been previously discussed. However, where a sensitive receiver is operated relatively close to automobile highways, considerable ignition interference is bound to be present when tuning the high frequency bands. This is one type of interference that can be effectively reduced or eliminated by a noise silencer circuit. Fig. 16 gives the schematic wiring diagram of a very convenient method of adapting a Lamb noise silencer to any super-heterodyne receiver. [Other simpler types may also be used.—Ed.] Fig. 16A shows the completed unit. The tubes are in series and filament current is taken from the a.c. line through a line cord resistor. The plate and screen

voltages are taken from the receiver's power supply.

The silencer unit connects in place of the last i.f. tube in the super-heterodyne receiver, this being removed permanently. Referring to the schematic diagram, the grid clip formerly connecting to the last i.f. tube connects to lead No. 1 or the grid of the 6K7 in the silencer. Lead No. 3, the output of the silencer, plugs into the plate terminal of the receiver's empty socket (last i.f. stage). The gain in the silencer more than compensates for the loss. Lead No. 2 connects the chassis of the silencer to the receiver chassis. Lead No. 4 is connected to a well-filtered point on the receiver power supply giving 180 to 250 volts. The transformers T-1 and T-2 must be designed for the same intermediate frequency as that in the receiver being altered. Ordinary i.f. transformers are not entirely satisfactory for this application and care should be taken to secure units designed for the *Lamb* circuit. All noise limiting circuits have their limitations but this circuit will be found extremely useful in eliminating automobile ignition and other abrupt high intensity disturbances. [Noise pulses of long duration cannot be effectively removed by this means.—Ed.]

In the average super-heterodyne audio system, plenty of opportunities are invariably found for substantial improvements in several directions. High gain resistance coupled pentode audio amplifier stages are a common source of distortion and should be eliminated. The requirements for a receiver audio system should not be confused with the requirements for public address service. The PA amplifier must be extremely flexible, suited for microphone, record or radio input operated under all kinds of different pickup and reproduction conditions. Therefore, the PA amplifier must have compensators to alter the amplifier performance curve to suit the conditions encountered.

However, in the case of a radio receiver operated in average residential style, and assuming the radio frequency and detector circuits are properly designed, the construction of an excellent audio system to match is greatly simplified. Fig. 17 gives the schematic wiring diagram of a simple but exceptionally good audio amplifier for small sets, consisting of a 6C8G first audio and phase inverter and two 6V6G output tubes in push-pull operation. With Class AB operation, self biased, the output available is approximately 8 to 13 watts.

A very efficient and stable amplifier, capable of real high fidelity reproduction is shown schematically in Fig. 18, consisting of an initial audio stage (6C5), an interstage (2-6C5) push-pull amplifier and the output stage (26L6G) in push-pull and with inverse feedback applied to reduce frequency distortion to a minimum. Provided high quality, low ratio transformers are used for T-1, T-2 and T-3, the performance approaches that of a direct coupled amplifier and with infinitely greater stability. T-2 must have a split secondary in order to connect the inverse feedback components. Operated in Class A, this amplifier will provide an output of at least 12 watts. Adjusted for Class AB1 operation, the possible output is approximately 24 to 30 watts or the system can be adjusted for any intermediate position between Class A and AB1 to suit individual preference. This amplifier feeding a high-grade electrodynamic speaker used under favorable acoustical environment is capable or reproduction free from any noticeable distortion and closely approaching realism.

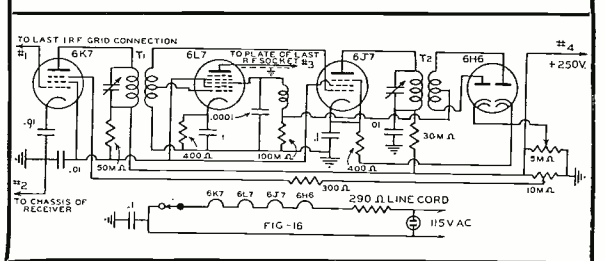
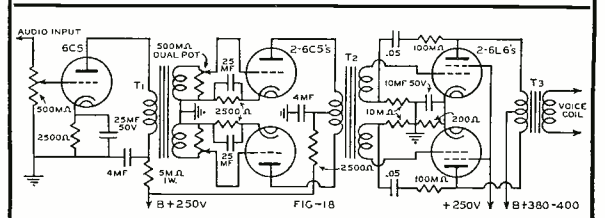
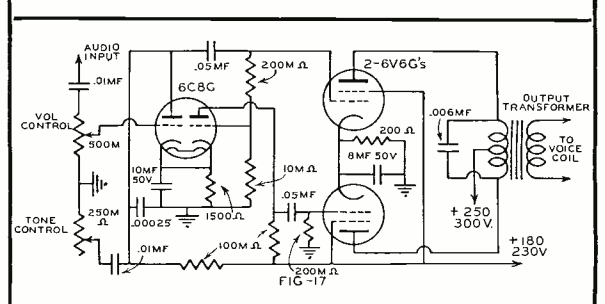
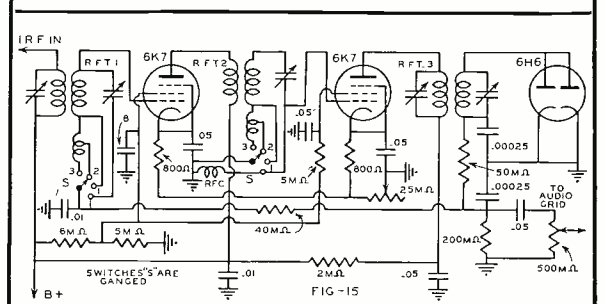
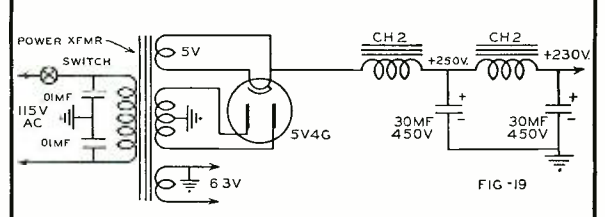
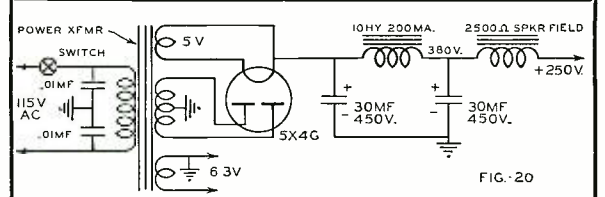
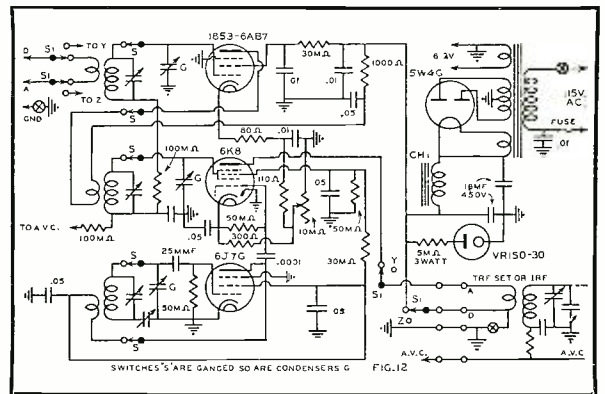
By including gain controls for both the first audio stage and the interstage tubes (a dual unit), the total gain required can be divided between these stages without overloading either one, an important feature.

Where cost is not a first consideration, standard transformers can be obtained which will definitely show a uniform response of from 30 cycles to 20,000 cycles. At a lower cost, good transformers can be secured which will cover 60 cycles to 8500 cycles with practically uniform response. [The RN amplifier is ideally suited to the purpose.—Ed.]

The proper loud speaker, or speakers, for modernizing jobs can be selected from a wide variety of different types and sizes available. The possible improvement at this point is only limited by the customer's willingness to pay, remembering that a heavy duty, high efficiency and high fidelity electrodynamic speaker can cost up to a hundred dollars alone.

Unfortunately, at the present stage of the art, no uniform standards, ratings or methods of comparing dynamic speakers have been generally accepted. The choice between a permanent magnet field or an electrodynamic field depends wholly upon the possibility of using the latter as the filter choke in the associated power supply.

(Concluded on page 51)



Serviceman's Experiences

by LEE SHELDON

Chicago, Illinois

Never,—no never,—knock a competitor! It might be you!

"WORD has come to me," Al remarked, "that you have been making cracks to one of our customers about the way our nearest colleague conducts his business."

"It was justified," I replied. "Remember when we sold Peterson his *Stewart-Warner*? After I delivered the set I spent two hours putting up an outside antenna. Two weeks later one of the boys from *Redoubtable Radio Repairs* sold them one of their fancy duplex spiderwebs."

"And?" my partner prompted.

"Our aerial was replaced by *Redoubtable's*," I explained. "Naturally, the next time I met Mrs. Peterson, I told her ours was better."

"Mistake number one," Al remarked. "No customer likes to be told he's been gyped. Go on."

"Well," I admitted, "I probably added a few personal comments, just to stress the point I was making—but I did it only to defend the professional honor of *Salutary Sales & Service!*"

"Every time a tradesman knocks a competitor, the customer wonders what's wrong with the knocker," Al remarked unpleasantly. "Did the Petersons let you put an antenna back?"

"No," I replied, "but—"

"Then they knew ours wasn't as good," Al interrupted. "Did they appear convinced you were telling the truth, and that you had their interests at heart?"

"Not exactly," I conceded. "Just the same I had to—"

"You've lost a customer," my partner declared. "Might as well scratch Peterson off the books."

"Well, what of it?" I demanded, "I did my best to keep them!"

"Bum policy," Al continued, "to admit you're afraid of a competitor. There are two ways in which you can distinguish between your work and a competitor's: you can belittle his, or point out the good points of yours. Give the fellow who hires you credit for a little common sense. If your work is better than the next fellow's, the customer will soon find it out. Next time you feel a rush of slander coming on, expend your energy by doing a better job!"

"You're all wrong," I shot back. "I know how to handle our customers, and I'll tell them whatever I please."

"Sometimes," Al said, "I think it's too free!"

All this happened a couple of months ago. One morning last week, after I had almost forgotten the argument, I came into the shop late. Al wasn't there. I unlocked the door and went back to the desk.

Whenever there are five or six calls on the blotter, I pick the first-floor customers first. Why is it set owners with the heaviest chassis live on the third and fourth floors, so that you nearly tear your arms out of their sockets jackassing the job up and down stairs?

Second-floor customers have table models; first-floor, midgets; and the fellow in the basement usually carries a portable. But the top-floor tenant has a massive old *Sparton* or *Stromberg*. This is a certainty if the apartment has no elevator.

I used to sort out calls alphabet-

ically, until we began to get complaints of delay from a bachelor named Yussef. Then, for a while I answered calls in the order of their appearance, but only until I realized "guarantee" customers were more prompt in asking for service than the "pay" owners.

So now I take first-floor customers first. It's tough enough contending with Ohm's law on a call without having to go ten rounds with the law of gravity.

Peterson's name was on the list! I knew Al must have felt funny when they came back into the fold, because it meant he had been wrong about my tactics. They live on the ground floor, and I rushed to the house very happily.

Mrs. Peterson led me to the *S-W* and sat down in the room while I worked. I saw someone else had been at the set—the chassis had been left unbolted, and the bottom cover was laying against the speaker.

A fellow doesn't have to be in the repair business very long before he knows how to size up a situation like that. Although the set was still within our guarantee period, they had called in someone else when it broke down. I hoped it had been *Redoubtable!* Then, after the new serviceman had quoted a price, an argument began, and he was ordered from the house. Boy!—I had Al just where I wanted him. I'd teach the Petersons a lesson, too.

"Someone has put two different tubes in this set!" I said, using the surprised manner of the Third Little Bear. "See how old they are, Mrs. Peterson. Look at the fungus on the bases. Apparently they are discards of the early experimental days at Menlo Park. They should be in a museum—not a radio!"

Gosh, it was fun. I laid it on thick, happily thinking how devastating my remarks were to *Redoubtable's* reputation. I turned the tuning chassis over on the floor, and saw a temporary bypass had been wired in.

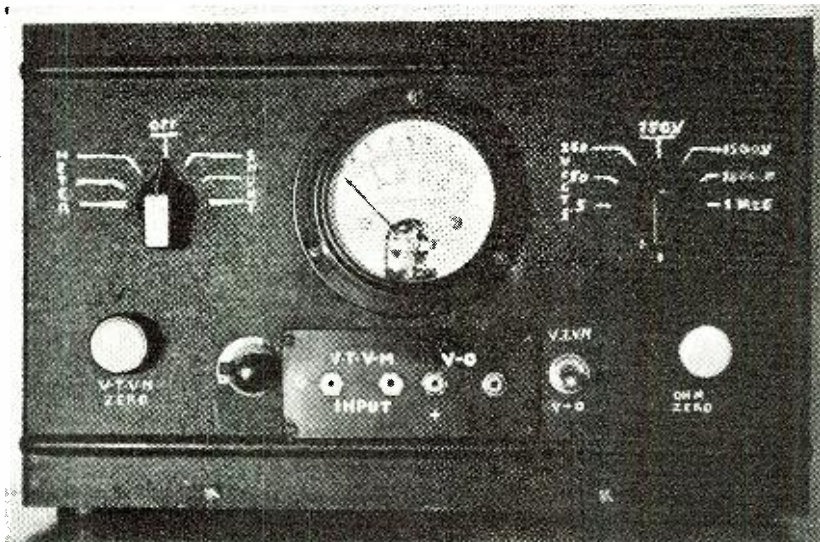
"Great heavens!" I shouted, covering my eyes with one hand, as if the sight was too much for my ethical nature. "This is terrible! See that condenser? Why—if you hadn't called me right away, you might have blown out the power transformer! No one but a bricklayer—a second-rate one—could have bungled so badly. Even the soldering is terrible! Mrs. Peterson—tell me—did you ask for a radio man, or a plumber?"

"A radio man," she replied, "but one
(Continued on page 65)

TOO MUCH OF A GOOD THING!



Modified Vacuum Tube Voltmeter



Extremely professional in appearance is this home built rig.

by

Glen Province
ex-W5CGP

Jonesboro, Arkansas

Always a valuable instrument,
there is sense in building a
vacuum-tube voltmeter for the
service bench or the ham shack

THIS, I believe, will be one of the most used testers in the shop, it being a vacuum tube voltmeter, thousand-ohm per volt, voltmeter and ohmmeter, capable of measuring up to one megohm resistance. One good use of the vacuum tube voltmeter, which will save time, money and nerves, is in setting push buttons on the new sets, just clip the grid lead of the VTVM to one of i.f. leads in the radio, preferable on the second i.f. transformer and clip other lead to chassis and tune for maximum deflection.

Naturally, it can be used to check AVC, AFC voltages and for checking output. The volt ohmmeter portion is designed for speed, there being only two tip jacks for voltage and current measurements, but be careful you don't measure voltage with the ohm or milliammeter. I disregarded the internal resistance of the meter because I had a wide selection of resistors to choose from and all these vary to some extent. I chose the ones that gave the correct readings.

The meter resistance can be disregarded altogether without causing too much inaccuracy. The meter scale is marked for 5-250-750 volts. By adding a cipher to the 5-volt scale it can be used for the 50-volt range and for the 1500-volt range use the 750-volt scale, doubling the reading. The volt-ohm tap switch is a *Yaxley*, 12 point single circuit, non-shorting, using 7 points for the volts and ohms and 1 for the milliamper range and have it on the bottom to itself to protect it from accidental misuse.

The case is an old B-eliminator case off of an *Apex* radio. It is 10 $\frac{3}{4}$ " long, 4 $\frac{1}{8}$ " in width and 6 $\frac{3}{4}$ " deep. The hole in which the meter is mounted is 2 $\frac{1}{2}$ " in diameter, the exact center of hole being 5 $\frac{3}{8}$ " from the ends of the case,

2 $\frac{1}{2}$ " from the top, 4 $\frac{3}{16}$ " from the bottom.

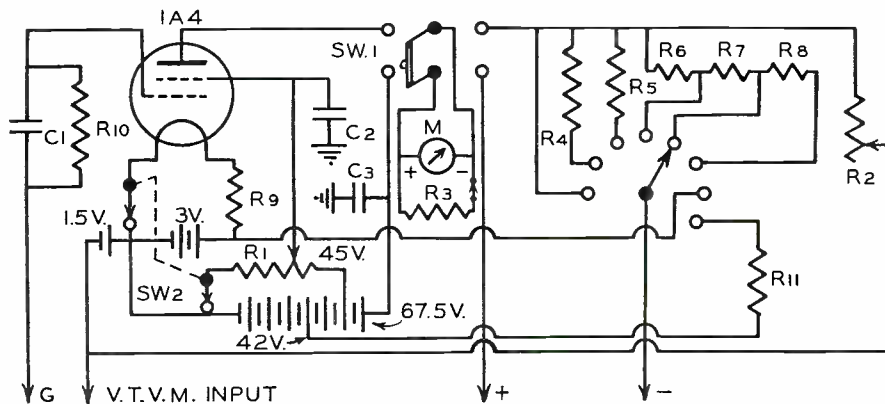
The volt-ohm tap switch on the right hand side is 2" from end of case, 2 $\frac{1}{2}$ " from the top. The meter shunt is on the left side and has the same measurements as the tap switch. The zero adjuster for the ohmmeter circuit is on the right side, 1 $\frac{1}{2}$ " from the end of case and 2 $\frac{1}{2}$ " from the bottom. The VTVM zero adjuster is on left side and has the same measurements as ohm, zero adjuster.

In the center of the panel under the meter is the hard rubber tip jack panel which is 3 $\frac{3}{8}$ " long, 1 $\frac{1}{2}$ " in width and is mounted in a hole cut in the case, 3 inches long and 1 $\frac{1}{4}$ " wide. At the right end of the tip jack panel is the double pole, double throw meter switch, 3 $\frac{3}{16}$ " from end of case and 1 $\frac{7}{8}$ " from the bottom.

On the left end is the on-and-off switch, salvaged off an old battery set used as a double-pole-single-throw to cut the filament and VTVM zero adjuster out of the circuit when not in use.

On the inside of the case in the right hand corner, two *Burgess* 22 $\frac{1}{2}$ -volt B batteries setting lengthwise, held in place by metal brackets bolted on the back. In the left hand corner is another 22 $\frac{1}{2}$ -volt B battery standing on end with three 1 $\frac{1}{2}$ -volt flashlight batteries on top. Slightly to the left of the meter and next to the C battery is the tube and directly behind the meter, bolted to the back of the case, is a bakelite strip for the resistors. The meter shunt has a switch built on back and has to be turned off for all voltage and ohm measurements.

-30-

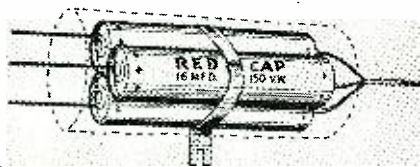


C₁—0.005 mf. mica—Solar
C₂, C₃—.05 mf. tubular—Aerovox
R₁—50,000 ohms, 1 w.—Centralab
R₂—5,000 ohms adj. wire-wound—Ohmite
R₃—225 ohms adj. wire-wound—Ohmite
R₄—5,000 ohms, 1 w.—Centralab
R₅—50,000 ohms, 1 w.—Centralab
R₆—250,000 ohms, 1 w.—Centralab

R₇—500,000 ohms, 1 w.—Centralab
R₈—750,000 ohms, 1 w.—Centralab
R₉—2 ohms, wire-wound—Ohmite
R₁₀—2 megohms, 1/4 w.—Centralab
R₁₁—28,000 ohms, 1 w.—Centralab
M—0-100 DCMA—Beede
SW₁—DPDT toggle switch—H. & H.
SW₂—DPST toggle switch—H. & H.

What's NEW in Radio

In the belief that electrolytic capacitors designed only for radio service work can be made more useful than older standard types, new Red-Caps have been given the radio trade by *Solar Manufacturing Corporation* of Bayonne, New Jersey. A list of only 12 ratings are so made that they cover the majority of filter block repair requirements. Lengths are uniform, but diameters are much less than heretofore offered. This new idea



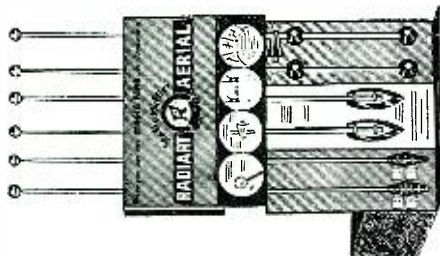
means that several units strapped together occupy no more space than the original filter. Service men can in this way make their own filters, saving much time and expense usually incurred by hunting for exact replacements. Only a small inventory need be carried to take care of average repair jobs.

Red-Caps are sealed in metal tubes and rated to withstand extreme surges. They are in the low price class to leave wide profit margins for servicemen.

Amplex Engineering, Inc., New Castle, Ind., announces a new heavy-duty rotary beam mechanism. The unit stands 16" high and weighs approximately 30 lbs., less motor. The double worm gear reduction is housed in a cast aluminum housing set on a cadmium plated steel base. The drive shaft is 3½" in diameter and is cast integral with the rotary plate. Power required is ¼ h.p. reversible motor.

An important feature of *Radiart's* 1940 side cowl aerials is the new easy plug-in connector which incorporates several unique features.

The insulator can be tightened anywhere along the aerial rod with the fingers. No tools are needed. The advantage of this is that it permits easy one-man installation, since the service man can locate the insulator at the exact point where the hole is drilled



in the body and tighten the insulator without tools and then proceed with the rest of the installation.

The lead-in is of the plug-in type, inserted after the aerial is completely installed. This greatly simplifies the installation procedure and cuts the installation time materially.

Another feature of this new assembly is that threads of the pull-up unit are entirely metal to metal and are vibration proof. There is no fear of threads tearing out from vibration as is the case when the plastic is threaded.

A further feature is that the installation eliminates shorts, since it is entirely metal to metal through the body.

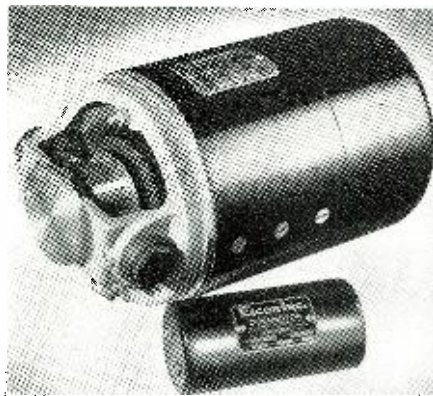
This new connector is the result of years of engineering study and collaboration with leading car and radio manufacturers, and it should eliminate many of the installation and service troubles, which were prevalent in other types of connectors.

The new, complete line of precision-built Dynamotors by *Eicor, Inc.*, Chicago, offers a

wide range of sizes from the smallest of them all to the largest required.

These new dynamotors are ideal power supply for Aircraft, Police, Marine, and Amateur Transmitters and Receivers.

Modern, compact design and extra-sturdy construction provide smooth, continuous per-



formance and long operating life—even when used under severe 24-hour per day working conditions. Extremely light in weight per watt output. Low starting current.

Eicor, Inc. also manufactures a complete line of Convertors, Generators, Motors and Alternators. For details write to *Eicor, Inc.*, 515 S. Laflin Street, Chicago, U.S.A.

A new handy, cable-type transformer to match 35-50 and 200-250 ohm low-impedance dynamic microphones (or lines) to high-impedance amplifier input is now offered by *Shure Brothers Microphone Headquarters*, Chicago.

This new A86A Transformer makes it convenient to run long microphone lines from low-impedance microphone to high-impedance amplifier. Together with a low-impedance microphone, the A86A enables sound men to solve quickly on the spot practically every dynamic microphone installation regardless of line length or type of amplifier input.

The A86A Transformer may be located in any convenient place within 25 ft. of the amplifier. The small, compact, sturdy, tubular case is magnetically shielded. Cast end-covers are removable for access to the terminals. Compression fittings seal-in microphone and amplifier cables. Removable rubber rings prevent marring floor or furniture in temporary installations. A clamp fitting is provided for permanent installation. Complete with 7 ft. single-conductor cable for connection to amplifier, which may be extended to a recommended maximum length of approximately 25 ft. Finished in chrome and morocco gray. Case diameter, 1½"; length (not including compression fittings), 2⅞". Net weight 1 lb.

The number of *Westinghouse* radio receivers sold in 1939 exceeded 1938 by well



over 100% and had we been able to get mer-

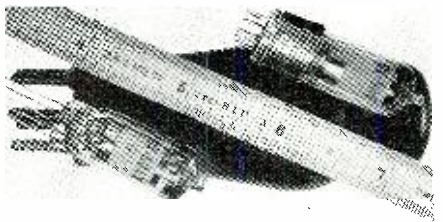
chandise, another 40% would have been added to that, say the manufacturers.

And now, for the first time—pending the arrival of a complete new 1941 line—*Westinghouse* announces for January three new models to carry on the volume and the popularity so well established in 1939.

WR-173 illustrated is an improved model of the former WR-166 series. To be eventually produced in four colors, it features an improved speaker, built-in loop antenna, an entirely new dial and 2 double-purpose tubes giving the set 7-tube performance.

WR-272-L incorporates a loop for use on 2 bands, 2 double-purpose tubes, push button tuning and a host of other technical advantages. The cabinet has sparkling eye-appeal with its hand-rubbed walnut and zebra woods combined in a new treatment.

Four tiny filament type pentodes are available for use in wearable hearing aids. Have been introduced by the *Raytheon Production Corporation*, 55 Chapel St., Newton, Mass. The filament drain, 33 ma. 1.25 volts, is low enough to make standard flashlight cells



economical sources of filament power. All types are available either with miniature bases or with tinned copper leads for direct soldering. The tinned lead tubes are only 1½" long and ¼" in diameter. The based construction is 1¾" long and 9/16" in diameter. The amplifier tube is of a special low microphonic design. Although bias improves operation, the tubes will all operate at low distortion with zero bias.

Engineering data sheets are available from the manufacturer. These include curves of output and harmonic distortion as a function of load resistance and grid bias.

To furnish broadcasting stations with a satisfactory means of monitoring both AM and FM broadcasts with exceptional fidelity, *Stromberg-Carlson* has introduced the No. 35 Monitor Speaker, equipped with the Labyrinth and Carpinchoc Leather Speakers in the new Coaxial Dual design.

"It is designed especially to reproduce a wider frequency range with less variation in response and with greater angular coverage than monitoring speakers hitherto available at reasonable cost. The useful response range is from below 65 cycles to above 10,000 cycles, and the sound distribution is essentially uniform over an angle of 100 degrees. This wide angular response is a consequence of the small size of the high frequency cone (only 2½ inches in diameter), and is secured without the aid of deflecting vanes or similar devices which generally produce a very irregular distribution of the sound," according to Radio Sales Manager Fred N. Anibal. "It reproduces AM programs with greater fidelity, and is essential to capture the increased realism of FM broadcasts," he said.

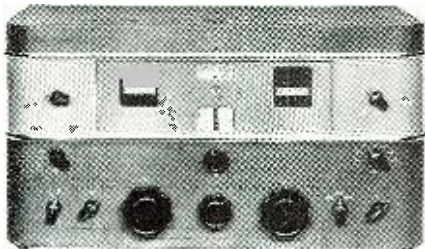
"Three exclusive Stromberg-Carlson features make this possible," he declared. "First, the patented Labyrinth that assures fundamental bass notes often lost and that eliminates cavity resonance in the enclosing cabinet. Second, the Carpinchoc Leather Cone Edge Supports used in both the high and the low frequency speakers to suppress cone resonance and provide a smooth response. Third, the nested, coaxial arrangement of the high frequency speaker within the hollow of the cone of the low frequency speaker closely simulates a single sound source. This feature provides much more natural reproduction than would be possible

with the usual separated mounting of the speakers.

"The Labyrinth in this Stromberg-Carlson reproducer in effect multiplies the baffle area available for the speaker. In addition, the long tube of the Labyrinth properly loads the speaker for most effective operation," he explained.

A new medium-priced radio receiver designed to provide maximum performance for amateur radio communication, as well as for general use wherever a radio receiver is required for distance reception, has been announced by the *RCA Manufacturing Company*.

Designated as "General Purpose Communication Receiver Model AR-77," the new instrument has a built-in power supply, variable selectivity crystal filter and tubes. An



eight-inch permanent magnet dynamic loudspeaker giving an unusually high degree of sensitivity and faithfulness of reproduction, and housed in a metal cabinet to harmonize with the receiver.

The AR-77 has three outstanding new features: polystyrene insulation, which contributes to improved reception by keeping circuit losses at a minimum; "stay put" tuning, which insures against bothersome frequency drift, due to temperature; and negative feedback (applied at will by a special switch) which provides better audio fidelity by smoothing out and extending the audio response.

Another important feature is a new calibration of the two illuminated tuning dials, so the operator can tell at a glance to what part of the radio spectrum the receiver is tuned. Only the calibration of the range in use is visible. Apertures in the slide shutters installed in the dial openings move up or down with the setting of the range switch.

In addition, the bandspread calibrations have been extended to nearly the full rotation of the dial for the 10, 20, 40 and 80-meter amateur bands, making "split-kilocycle" readings possible.

Selectivity is variable in six steps employing an efficient I-F crystal filter circuit. The average sensitivity throughout the tuning range is about two microvolts for 2-to-1 signal-to-noise ratio. An optimum balance between maximum sensitivity and minimum circuit noise has been chosen to render the greatest possible usable sensitivity for weak signals.

An improved "noise limiter" circuit has been devised for making signals intelligible through local auto ignition and certain other types of electrical interference. The limiter has a variable adjustment, making it possible to attain a setting to gain maximum reduction of interference.

The tuning controls are designed to permit long periods of operation without muscular, optical or nervous fatigue. The most frequently used controls have been placed within easy reach along the lower edge of the panel, with the standby and audio volume controls placed at the ends.

The metal cabinet is 20 1/4" wide, 10 1/2" high and 11 3/8" deep, and is shaped with curved vertical corners. All dial scale openings are grouped together on a recessed sub-panel behind an unbreakable window. The top is flat and free from projections, so that other equipment may be placed there if desired. A hinged lid permits easy access to the interior. A removable bottom cover eliminates the need of removing the chassis for alignment or servicing.

A streamlined battery radio which brings to the farm remarkable short-wave and

American program reception, has just been announced by the *RCA Manufacturing Company*.

The instrument is an adaptation of a famous model which RCA Victor developed several months ago for the world export market, where selectivity and sensitivity are of prime importance. It employs radical new circuit designs to achieve its unusually fine performance.

This new radio, Model 4QB, is a three-band instrument designed to "bring in" foreign and American stations, as well as Police, Amateur, and Aviation broadcasts. It is also easily convertible to AC operation

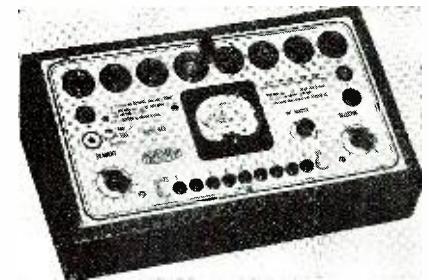


which is frequently necessary when a rural area is electrified. It is housed in a modern streamlined plastic cabinet, with big, colorful, glass dial set at a convenient angle to permit full vision while tuning.

The chassis is treated to resist changes in temperature and humidity, assuring long life and protection against "de-tuning" while in use. New RCA Victor low-drain tubes are used to reduce battery drain and give long battery life.

Power is supplied from one 1 1/2 volt "A" battery, and two 45-volt "B" batteries. Battery cables for either a single battery pack or individual "A" and "B" batteries are provided. The instrument has a big "permanent magnet" loudspeaker and a provision for Victrola attachment when converted to AC operation.

Triumph Model 443 Tube Tester. Latest economy design checks all tubes from old types WX12 and O1A to new 117 volt filaments including gas rectifiers, bantam juniors, new miniatures, magic eyes, cathode ray, ballast tubes, and every type of small base pilot lights. Three inch meter. Push



button operation, automatic release. High sensitivity shorts tests. Unusually compact—weighs only 8 pounds. Dimensions 14" x 7 1/2" x 4". Attractive ivory panel, black embossed designations, black wrinkle metal case, instructions permanently engraved on panel. *Triumph Mfg. Co.*, 4017-19 W. Lake St., Chicago, Illinois.

Allied Radio Corporation, Chicago, has just placed on the market a new *Knight 4 Tube 1.4 volt miniature portable*, Model A10730. This new compact receiver is built into an unbreakable bakelite case measuring only 8 1/4" x 5" x 4 1/4". The camera-shaped case has sleek black lines set off by handsome chromium trimmings and may be carried by an over-the-shoulder strap or by a handle which is fixed to the top. The whole set weighs only five pounds.

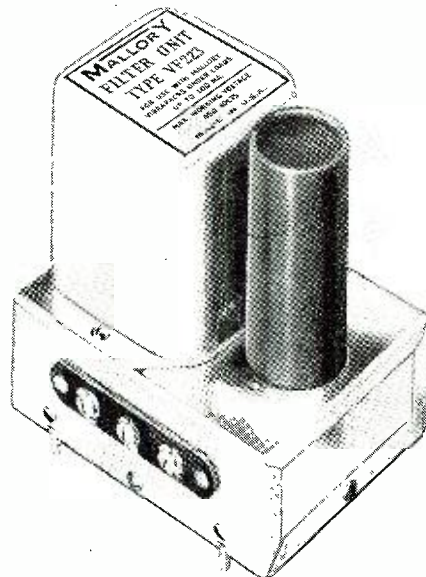
The new *Knight Camera Portable* uses four of the newest low-drain multi-purpose type tubes in a Superhet circuit—licensed by RCA. Tuning range is on the standard Broadcast band from 535 to 1720 K. C.

Other features include full-vision molded dial; A.V.C.; full 4-inch P.M. Dynamic Speaker; provision for headphones for private listening. This set uses three ordinary flashlight cells for "A" supply and 1-45 Volt "B." "A" gives 25 hours of service; "B" gives 50 hours. An extra set of batteries are available anywhere at low cost.

The new 1.4 volt Camera Portable Superhet is a feature of *Allied Radio Corporation*, Chicago, Illinois.

A new audio or hum filter unit, the *Mallory VF-223*, is now available for use with all single unit Mallory Vibrapacks. It was designed especially for application where voltage regulation is important, as in Class "B" Audio Amplification; or where the utmost in hum suppression is required as in high gain audio amplifiers.

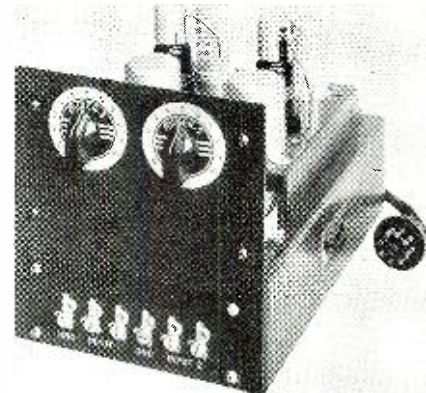
The filter condenser is a three-section Mallory FPT-390, of 15-15-10 mfd. capacity. 450 working volts. The two 15 mfd. sec-



tions are used with the choke to form a conventional pi-section filter, while the third 10 mfd. section connects to a separate terminal so that, if desired, a filtered intermediate output voltage may be obtained. The filter choke is rated at 100 m.a. and has a d.c. resistance of only 90 ohms, resulting in a minimum of voltage drop.

Three new units for use in sound amplification and reproducing systems—a 25-watt amplifier, a two-position "mixer," and a 20-watt loudspeaker mechanism—have been announced by the *RCA Commercial Sound Section*.

The new 25-watt amplifier (Model MI-12205) has a number of improvements, from



higher performance characteristics to modern case styling. Advances in circuit design have achieved reduced hum. Provision for using and "mixing" up to four microphones is included.

Operation of the amplifier is made easier

by a new design of control knobs to conform with the natural contour of the hand. Other new features: automatic bass compensation for recorded music reproduction; power cord and plug included; Underwriters approval; carrying handles for easy portability. The MI-12205 is available for two types of power supply: 105-125 volt, 50-60 cycles; and 110-220 volt, 25-60 cycle.

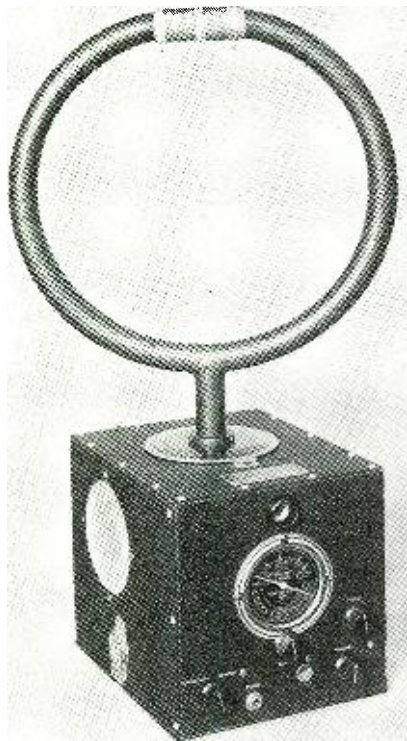
The new two-position mixer (Model MI-12208) illustrated was designed primarily for use with the new amplifier when additional mixer inputs are necessary, but has applications with many other types of amplifying apparatus as well. Skillfully engineered, the mixer is an extremely useful accessory in controlling the input from two microphones to attain proper tonal balance.

The new 20-watt loudspeaker mechanism (MI-9430A) is an 8-inch cone, permanent field type similar to the one developed for the electric Storytone Piano (Voiced by RCA Victor), and the famous RCA Proscenium Loudspeaker.

The mechanism is being made available as a separate unit for use where conditions require a large, flat baffle area. It has a flanged bell which permits it to be attached to a small diameter opening in a wall or baffle. The acoustic throat which has been designed for this equipment makes possible an even distribution of high frequencies throughout the distribution angle of the baffle.

Best known as builders of precision direction finders and 2-way radio telephone equipment for the United States Coast Guard, the United States Navy and the large commercial steamship lines for over ten years, the *Airplane and Marine Direction Finder Corp.* of Clearfield, Pa., now puts this valuable experience at the disposal of the private boat owner as well.

Illustrated above is the Amdico Model KI Direction Finder—so small and light, yet so



rugged and sturdy—that it is ideally suited not only to pleasure craft but to airplane use as well. Tuning all coastal and airplane beacon stations, it also covers the broadcast band in its continuous frequency range of 200 to 1500 kc. Weighing but 26 pounds complete with dependable dynamotor (not vibrator) power supply, the size is only 8 $\frac{1}{4}$ " high, 8" wide and 9 $\frac{1}{4}$ " deep. Three types of loop antenna are available—the one illustrated which rotates to give bearing line directly on top of the cabinet, a second type also 14 $\frac{1}{2}$ " in diameter for mounting outside the metallic cabin with rotation by an inside hand-wheel with bearing scale, and

a streamlined remotely mounted loop for minimum wind resistance in an airplane.

All power is taken by two wires easily attached to the ship's 6 or 12 volt engine storage battery, and is transformed to the voltages required by the 6 $\frac{1}{2}$ " x 5 $\frac{3}{8}$ " x 2 $\frac{3}{8}$ " dynamotor power supply and noise filter which completes the KI.

An efficient and sensitive loud-speaker is built with the D/F case, which with headphone jack gives complete aural indication of operation. Also built in is the exclusive AMDICO "Electro-Ray" visual indicator—so accurate as to allow the veriest novice to take bearings on nearby or distant radio stations to one-half degree on the compass card.

The use of dynamotor rather than cheaper vibrator power supply is typical of design and construction built to give dependable service at sea. All of Amdico's experience in building equipment for the U. S. government has gone into the KI Direction Finder—complete assurance of dependable, accurate service.

It is also stated that by May, AMDICO will offer 2-way radio telephones of quite unusual and compact design to boat owners. Construction will be, "Navy Standard," yet prices likewise surprisingly reasonable for truly precision equipments.

Allied Radio Corporation, Chicago, has just placed on the market a new KNIGHT low-cost Postable one-unit Sound System—The "Speed-master," Model A12255. This unique system, a recent development in the Sound Equipment field, consists of Amplifier, Speaker, Microphone, and lighted Tilt-Top



Reading Table—all built into one case. No setting up is necessary. The unit is completely assembled, ready for use, when plugged into any A.C. outlet.

The new Knight "Speechmaster" incorporates such features as: 14 watts usable power output (also available in 7-watt size); inverse feedback; phono connection; separate microphone and phone volume controls in a mixer circuit; Bass-Treble Tone Control; speaker selector and provision for additional speakers. The microphone is of the unidirectional design, reducing feedback, and allowing freedom of movement to the speaker. The carrying case housing the "Speechmaster" is attractive and compact, measuring only 18" x 17" x 13 $\frac{1}{4}$ ".

This one-unit portable sound system design is the answer to a wide demand by lecturers and speakers, and will be an excellent unit for use in the approaching election campaigns.

The Knight "Speechmaster" is available from ALLIED Radio Corp., 833 West Jackson Boulevard, Chicago, Ill.

A new and extremely compact 25-watt marine radiophone for use on small commercial and pleasure boats is the Model HT-8 announced by *Hallcrafters, Inc.* It provides for 2-way communication with other boats, land telephone and Coast Guard stations, adding materially to the convenience and safety of boat operation.

Any one of five crystal-controlled transmitting frequencies is instantly selected by a

rotary switch on the panel and another switch gives an instant choice of five corresponding receiving frequencies plus an extra weather report channel. All transmitter and receiver circuits are internally pre-tuned during installation of the equipment thus reducing subsequent operation to the utmost simplicity.

The transmitter and 7-tube superheterodyne receiver are enclosed in a single compact cabinet designed either for table or bulkhead mounting. The power supply is a separate unit and connects to the main unit by plug and cable. Power is drawn from the boat's battery but by inter-changing one plug provision is made for operation from any 110-volt a.c. line. This universal fea-



ture avoids unnecessary battery drain while operating at a dock, etc.

Removal of the handset from its hook automatically switches the receiver output from the built-in loudspeaker to the handset. A "push-to-talk" button on the handset performs all transmit-receive switching operations during actual communication. The panel meter and its switch provide a continuous check on transmitter operation and modulation.

The receiver includes a stage of tuned pre-selection, quiet AVC and numerous other refinements which make it precisely suited to this type of service.

The new 1940 line of ATR Replacement Vibrators for auto and farm radios has just been announced by the *American Television & Radio Co.*, 300 East Fourth Street, St. Paul, Minnesota.

Among other features, these Vibrators have large oversized 3/16" diameter Tungsten Contacts having Full Wiping Action,

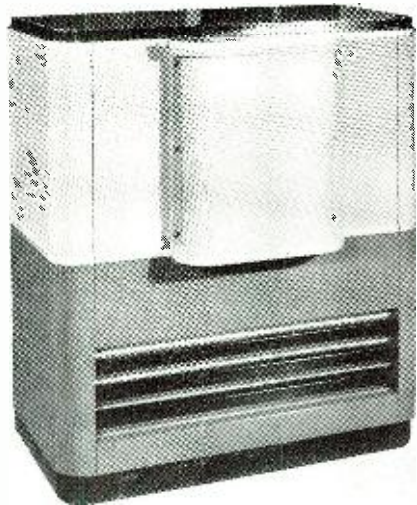


Perforated Reed of highest quality Swedish Spring Steel, Highly Efficient Magnetic Circuit with formed base, Mica and Metal Stack Spacers with two-bolt construction, Extra Flexible Leads with tinned clamp supports, and highest precision construction and workmanship, with a manufacturing tolerance on practically all parts within .0005" of an inch.

These Vibrators are fully covered in the new ATR 1940 sixteen-page Vibrator Guide just released, which is available free of charge direct from the manufacturer.

A new monitoring loudspeaker employing a newly-designed permanent magnet mechanism and housed in a modernistic cabinet which permits an unusually wide angle of sound distribution has been announced by the *RCA Manufacturing Company*.

The loudspeaker (Model 64-B) is designed primarily for broadcast control room monitoring, but its superior reproducing qualities make it ideally suited for many other appli-



cations where high quality is of prime importance, such as audition rooms, public rooms, offices, etc.

RCA's well known double voice coil speaker mechanism has been combined with a folded horn cabinet to produce what is probably the widest frequency response band ever obtained in such a small speaker unit. All the frequencies between 60 and 10,000 cycles are faithfully reproduced with exceedingly low distortion through this co-ordinated design of speaker cabinet.

Cabinet resonance or "boom" is completely eliminated by means of a folded horn and, because the back is closed, the instrument may be placed against a wall without affecting the performance. Cabinet construction using heavy, seasoned wood with rigid reinforcing prevents vibration buzz. The functional cabinet construction blends harmoniously with practically every interior decorative scheme and is available with black, amber-grey and walnut finishes.

An unusual feature of the 64-B is its wide angle of sound distribution. Diffusing vanes are located in front of the cone and effectively spread the high frequency radiation over a 100 degree arc at 10,000 cycles. Thus it is possible to enjoy high fidelity reproduction in other parts of the room, and not just directly in front of the speaker.

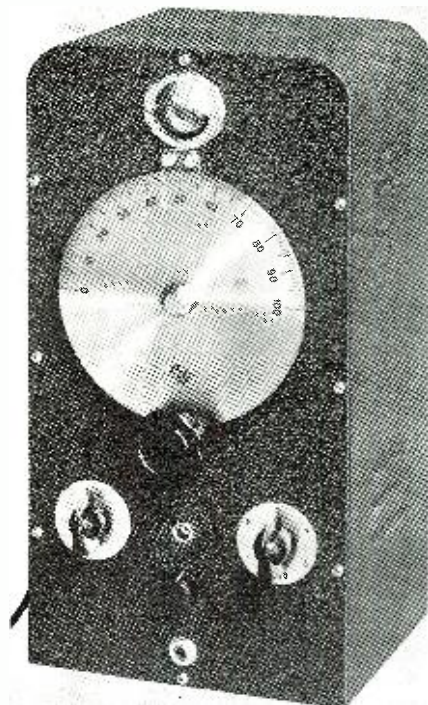
The speaker mechanism is equipped with a permanent magnet field which requires no power supply. The highest quality magnet material and a careful pole piece design permits the use of a permanent magnet without loss of efficiency or power handling capability.

The unusually high sensitivity of the 64-B provides much more acoustic volume with lower amplifier power than is generally obtained in ordinary speaker design. The 64-B is rated at 10 watts and has a 15 ohm input impedance.

Browning Laboratories, Inc., 750 Main St., Winchester, Mass., announce The Type S-1 Frequency Monitor, designed for accurately checking frequencies in any three bands (50 to 1000 Kc. wide depending on location in spectrum) from 1.5 to 60. Mc. A 100 Kc. crystal is used as a secondary standard. Its frequency may be checked readily against the National Bureau of Standards' station WWV or any reliable broadcast station operating on a multiple of 100 Kc.

Very stable electron-coupled oscillators are used to cover a band of frequencies from 50 to 1000 Kc. wide. The required frequencies are included in these narrow bands. A $5\frac{1}{2}$ " vernier drive dial is attached to the condenser controlling the variable oscillator,

and an accurate calibration of this dial given. The circuit is so designed that at least two points on any band may be checked against



the 100 Kc. crystal oscillator. Slight adjustments of the variable oscillator by means of a front panel control are made when necessary, so that the calibration of the variable oscillator is at all times reliable. The specified frequencies are clearly indicated on the calibration curve and their dial settings given.

To facilitate zero beat adjustments, a tuning eye is employed. When exact zero beat is obtained, the eye opens. Either side of zero beat, the eye "flutters" at the beat note rate. A phone jack is provided so that zero beat may be indicated aurally as well as visually. The tuning eye is employed both in checking the variable oscillator against the 100 Kc. crystal and the transmitter against the variable oscillator. It may be used also to check transmitter frequency deviation. Checks on the transmitter frequency may be made very rapidly, the average time required being less than a minute.

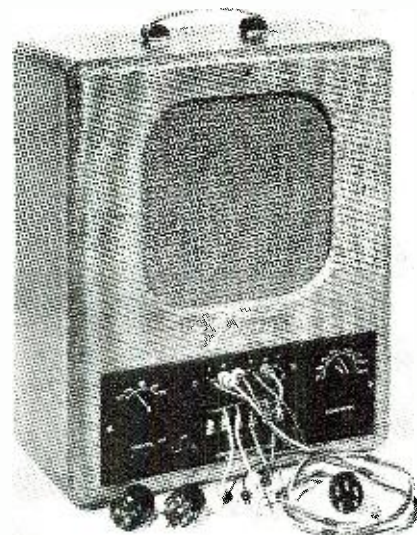
The highest order of stability is obtained by voltage regulation. With a room temperature change of 10°F either side of the temperature at which the crystal is accurately set, the resulting frequency error in crystal frequency will be .005%. The time taken to reach operating temperature is about one hour. Means are provided for changing the crystal frequency slightly so that this frequency may be at any time adjusted to at least 50 parts in 5,000,000 against the National Bureau of Standards' Station WWV by the zero beat method.

According to Hal Blakeslee, in Charge of Merchandising for the Parts and Tubes Division of the *Zenith Radio Corporation* the company has just announced two new devices for dealer and distributor service use that heretofore have not been available.

The first of these devices is a dry battery pack tester and noise detector which is described as being a precision instrument especially designed to check all types of dry batteries and packs. The tester supplies correct loads for each type of battery, thus permitting tests under actual operating conditions, even though the battery is apart from the radio proper. A special noise test device is incorporated for the quick detection of noisy unsuitable batteries or packs.

The second device is a Zenith universal test speaker which, according to Mr. Blakeslee, is so designed as to operate with practically any make or age of receiver and permit the thorough sound checking of any

chassis brought into the dealer's store without the necessity of bringing the actual radio speaker along. The resistance of the field substitute is variable between 275 and 3000



ohms. This portable testing device will also eliminate the need of a dealer investing in several different speakers for test purposes only.

The Fidelitone phonograph needle has been developed after careful research by the *Permo Products Corporation*, and the requirements for an ideal home needle were kept in mind in bringing out this needle.

The point of the needle is tipped with an alloy of precious metals made from the



group of the elements of Rhodium, Ruthenium and Osmium. The inherent characteristics of this alloy provide a self-lubricating effect which does not wear record grooves in either nitrate type records, commercially pressed shellac or vinylite transcription records.

The needle is so designed that a minimum of record surface noise or scratch is reproduced, yet the characteristics of the needle are such that full range reproduction is had throughout its life, which is approximately fifty hours' service on standard 10" commercial shellac records.

Another product, the new *Permo Point* home recording needle, is made by electrically welding a special alloy to specially drawn shank material, resulting in a very rugged and sturdy product which will withstand considerable abuse, yet provide exceptionally long life, with an exceedingly low surface or background noise.

This new cutting needle will fit all standard recording machines, and will be found particularly useful on home type recording machine, where ordinary steel needles wear quickly, and where sapphire needles are not generally used because of their delicate construction.

Unlike steel needles, the new *Permo* cutting needle is made with uniform radius to cut standard size record grooves. This means better recordings and better fidelity on playback.

The *Browning Laboratories*, Winchester, Mass. has recently announced various component parts for receiving Major Armstrong's wide band frequency modulation method of static-free transmission. Special broadband 3 Mc. IF and detection transformers are available as well as a special high frequency tuner. A completely wired and aligned adapter is in production which may

(Continued on page 62)

"REMOTES"

THIS IS THE PLACE WHERE THE READER CAN EXPRESS HIS VIEWS ON ELECTRONIC CIRCUITS.

WE have always been of the opinion that the radio industry would benefit by an easy exchange of ideas between Engineers and Experimenters, Hams and Shortwave Listeners. The rub was how to do it. The result of much thought on the subject is this new department. Make it yours. If you find a new circuit that works just simply swell; if you have an improvement on some idea or circuit that has appeared in RADIO NEWS; if you have a different way of doing some electrical thing, please send along your information. The best suggestions will be used; and, of course, paid for at our usual rates. From time to time, we, too, may find some improvements on our own circuits. When we do they will be set forth here. We hope that his new feature will meet with your approval, and that you, our readers, will get as much from it as we hope to be able to. We do not consider ourselves infallible, and would certainly be as eager to find some new way of accomplishing some of our radio feats, as would any died-in-the-wool engineer.
The Editors.

Refer to: The Unicontrol 5-Band Transmitter, RADIO NEWS, March, 1940; April, 1940.

Some of our readers have noticed that the adjustment of the "Unicontrol-5" is rather difficult because of the small amount of drive available from the 14 and 28 megacycle quartz plates and the oscillator circuit shown. There are several ways in which this may be overcome.

Firstly, the straight oscillator circuit using the RCA 1610 tube or the RCA 6J5G, or the RCA 6V6 may be entirely discarded. Then the Jones regenerative circuit, described many times in RADIO and in other publications may be substituted. Here again the circuit is rather tricky. The results will greatly depend on the relative values of the feedback and coupling condensers. The feedback condenser is that one between the "cold" end of the crystal and the ground. We found that a mica padder condenser of the value 220 mfd. gave a sufficient range, while the coupling condenser was held at 0.001 mfd. It seems that the oscillator circuit must be very heavily loaded by the coupling condenser while the feedback condenser was kept low in order that the crystal current be kept at the lowest possible value.

Trouble will also be found on the 28 MC rock if a bulb fuse is inserted in series with the crystal. It may prevent oscillation. It should be removed. Another occurrence which must be guarded against is harmonic self oscillation. Use an absorption wave meter to determine that your crystal oscillator is on the proper frequency.

In tuning the oscillator, start with the 28 MC band and work down. The adjustment for the 10 meter band will nearly always be found to be satisfactory for 160 meters.

Refer to: The Unicontrol 5-Band Transmitter, RADIO NEWS, March, 1940; April, 1940.

I do not think that the main features of rapid bandswitching and non-tuning, during or after switching, of this unit would be destroyed if another control were included. So I have re-named the transmitter the "Duo-Control 5-Band Transmitter." In all respects the final amplifier is exactly like the one described in the issues mentioned above. . . . I have, however, changed the oscillator to a straight 6V6 with four crystals.

One each for 160 M. and 80 M, while I have two 40 M rocks. These last two serve me for 20 M and 10 M fone as well as 40 M cw. My circuit is the tried and true RCA 6V6 oscillator followed by a RCA 6N7G doubler. The RCA 6N7G is only used in the 20 and 10 meter bands while the grid of the RCA 828 picks off the proper frequencies from the RCA 6V6 for the other bands. A three gang 5 position switch is introduced into the circuit instead of the Shalleross first (crystal) switch. The shaft of this switch is projected directly under the modulation meter, and topped off with a very small pointer knob. The switch changes the frequency and cuts the RCA 6N7G sections in and out of the circuit. When not in use the RCA 6N7G is prevented from running away by the use of a cathode resistor plus the grounding of the grid. I did not need any further coils since those shown in the original diagram were sufficient, the one 40 M tank serving for that frequency as well as the fundamental tank for the 20 and 10 meter doublers. Only the 7 MC crystal is shifted to conform with frequency regulations. The amount saved in the purchase of one less Shalleross switch more than stands the ex-

pense of the extra Mallory switch and the extra RCA 6N7G.

By RAYMOND B. FRANK, W9JU,
Chicago, Illinois.

Refer to: The Unicontrol 5-Band Transmitter, RADIO NEWS, March, 1940; April, 1940.

I suggest that the 0-300 MA Triplett meter used in the modulation high voltage lead be discarded and that a 0-500 MA Triplett meter be used in its place. This will prevent a sticking meter and make the usable swing of the meter stay within those limits where the accuracy of the meter is the highest.

Another thing that has occurred to me, is that the ham fraternity probably will not understand why the modulation meter will read backwards during the tune-up process. This is due to the magnetic interference caused by the metal panel, and can be disregarded. Of course such backwards reading should not be confused with a reversed meter. The way that you can tell the one from the other, is that a reversed meter will read correctly when the polarity of the connections are again reversed; while a meter whose armature is being affected by the metal panel will read backwards regardless of how connected, and regardless whether or not the circuit through the meter is complete.

By A. B. CAVENDISH,
Savannah, Georgia.



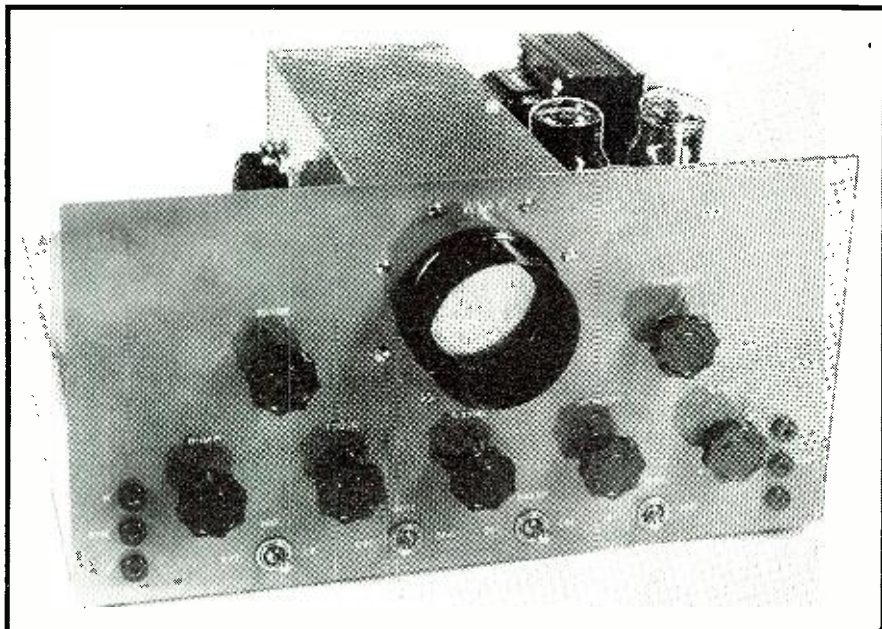
"Would it be asking too much to have you put down that magazine and send an SOS?"

Refer to: What's a Radio Engineer? RADIO NEWS, March, 1940.

The short article, "what is a Radio Engineer?", which appeared in the March issue of RADIO NEWS evokes considerable thought because the question, "What Constitutes a ——— Engineer?", arises not only in the broad field of electronics but also in several other fields of endeavor.

It has been my observation that many young graduates of engineering or technical schools, armed with their diplomas and the feeling that they are at long last *engineers*, still have far to go before they reach that status. A doctor calls his jobs "cases" but, as is known very well,

(Continued on page 50)



As neat a homebuilt unit as one could desire is this oscilloscope.

terminals in the most efficient electrical positions.

Description

The RCA 902 two-inch cathode ray tube was chosen because of its small size, low cost, fine definition, and good sensitivity and because the pattern it produces is large enough to be clearly visible. For small-sized oscilloscopes, this tube was considered superior in many respects to the 913 one-inch type. When operated at an anode voltage of 600, the 902 has a horizontal deflection sensitivity of 0.19 mm/volt d.c.; vertical sensitivity of 0.22 mm/volt d.c.

The instrument occupies a 13" x 10" x 3" chassis and 7" x 13" front panel. As Figure 1 shows, it is not a great deal larger than a midjet broadcast receiver, although sufficient room has been allowed in the chassis and panel layout. Chassis and cabinet are made of 0.060-inch thick steel with spot-welded corners; but $\frac{1}{16}$ -inch aluminum was chosen for the front panel, since this material engraves sharply, while engraving on steel left untouched rusts and when clear lacquered soon grows dull.

The scope is entirely self-contained, having power supply, sweep oscillator, horizontal amplifier, and vertical amplifier built in. Controls, input terminals, and switches are mounted symmetrically on the front panel in positions which permit the utmost ease of manipulation, whether one- or two-handed, and afford short leads. The various toggle switches are spaced evenly along the lower edge of the panel with three signal input jacks vertically on each side. Pointer-type knobs are used on the various potentiometers, and insulated banana jacks for the input terminals. The four "high" jacks are colored red for easy identification, while the two common (grounded) ones, lowermost on each side, are black. Clear engraving marks each control, switch, and terminal to prevent confusion.

Continuously variable controls, double-action switches, and liberal input terminals permit the operator to secure (1) adequate separate arrangements of the internal stages, (2) smooth control of input signal amplitudes, sweep frequency and sweep frequency voltage amplitude, intensity, focus, and synchronizing voltage; (3) to center the electron beam or to shift its position horizontally or vertically by any desired amount, (4) to select the exact sweep frequency required, and (5) to observe a single signal or to compare two signals fed into separate input jacks.

The only control potentiometers not mounted on the front panel are the two beam-centering controls, which are mounted on the sides of the 902 shield box since once they are set for a particular cathode ray tube, they do

Build this Modern OSCILLOSCOPE

by RUFUS P. TURNER, W1AY-WIXDF

Cambridge, Massachusetts

Bringing the most modern circuit to the experimenter, this oscilloscope should be a real addition to the work-shop. It's easy to build

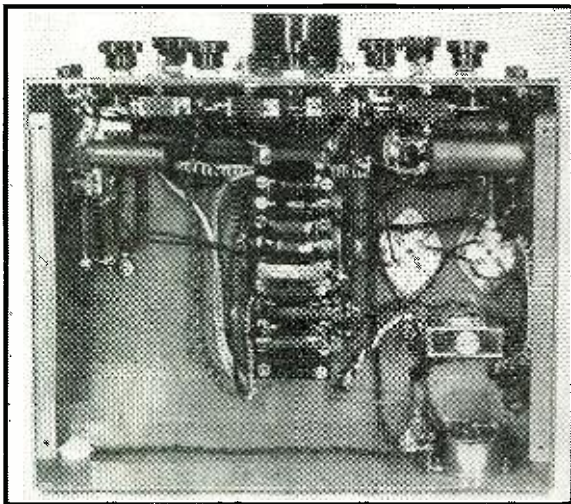
WHEN we decided to build an oscilloscope, we had some unequivocal things in mind. The instrument had to be compact, portable, and self-contained and cost a reasonable amount. It had to be so fitted that any of the super-critical engineering analyses possible with this type of instrument might be made as readily and completely as the simple measurements common to amateur transmitting and radio service. In short, we required that it possess all of the desirable features of its expensive big brothers. And, very important to us, we desired that our scope be so fool-proof and free of bugs that it might easily be copied by a reader and our results duplicated.

The instruments described in previous constructional articles were meritorious but in general they failed to satisfy *all* requirements. Nor have the results claimed by the authors usually been readily duplicated, as observation of some of the copied models

revealed. Consequently, it was decided to start from scratch, adding and subtracting, selecting and rejecting as would be seen fit.

The original demands were stubbornly adhered to, with the result that the maximum of utility and stability has been obtained in the completed instrument. It is described here with the satisfaction that no harassing problems are being passed along to the reader. Supplementary design and layout work and pernickity compensations will not be required in order to duplicate the success achieved in this model.

Sufficient access is provided to the various internal circuits, through input terminals and switching, to broaden the utility of the scope. Manipulation is easy because the controls and terminals have been arranged within easy reach in logical positions on the front panel, and maximum stability has been achieved by placing these controls, switches, and



An underchassis view of the oscilloscope showing the excellent layout and smooth wiring job.

which the pattern is observed. A steel bottom plate with rubber feet is screwed to the bottom of the chassis to complete the enclosure and shielding of the unit.

Color scheme, if any, is largely a matter of choice with the individual builder. However, this particular instrument is finished in a satin gray baked lacquer, a color which blends handsomely with the glossy black knobs, the red lines on their transparent celluloid pointers, the glossy black hood, the red and black jacks, and the bright chrome switches.

Mechanical and Electrical Features

There have been incorporated into this instrument several unique and distinctive mechanical and electrical features which will be noted separately.

The 902 is completely enclosed in a 9" x 3½" x 3½" steel shield box held to the front panel by six 6-32 screws supported from the rear portion of the chassis by two short lengths of ½-inch diameter iron pipe. These pipes are threaded at each end and securely fastened with nuts to the shield box and chassis. The a.c. leads from the 902 pass through the chassis through one of these pipes; the d.c. leads through the other. The top of the shield box is removable, being held by six self-tapping screws spaced along the top and the two front-panel screws directly above the hood.

Toward the rear of the shield box and inside the latter is a steel "back plate" 37/16" square arranged to slide back and forth in the shield box to allow removal of the 902 tube and to take care of the variable length in which this tube is supplied. (77/16" plus or minus 3/16".) Once set in the correct position for a particular tube, the back plate is locked in place by thumb screws which extend through the box and thread into the folded lips of the back plate. One-inch horizontal slots 7/32" wide cut along the center line on each side of the shield box clear the thumb screws which ride in the slots as the back plate slides. C1, C2, C3, R29, and R30 are mounted on the rear of the back plate.

The 902 is inserted into a special octal socket mounted in the center of the back plate. This is an Amphenol ACS8 "above surface" socket consisting of a bakelite socket held in a mountable aluminum shell. The retaining lock notch is clipped off to make the socket rotatable in the shell for correcting the horizontal cathode ray trace. After this clipping, the socket is still gripped firmly enough to stay put, but at the same time it may be rotated easily without damaging the tube. Leads from the socket terminals are fed through knockouts in

the shell. The resistors R1 and R2 are mounted inside the shell directly between socket terminals.

The hood-screen assembly is improvised from a two-inch *Triplet* bakelite meter case and a pruned coil shield. The business end of the 902 rests in the behind-panel portion of this assembly.

In the construction of the hood assembly, the zero adjuster screw mounting is ground down even with the inner circumference of the meter case and a new glass minus the screw hole substituted for the regular "crystal." The graph screen is 115/16" in diameter and is ruled on transparent celluloid by tracing over a piece of suitable coordinate paper with India ink in a draftsman's ruling pen. If the reader desires, he may duplicate the screen directly by tracing the pattern on heavy transparent celluloid.

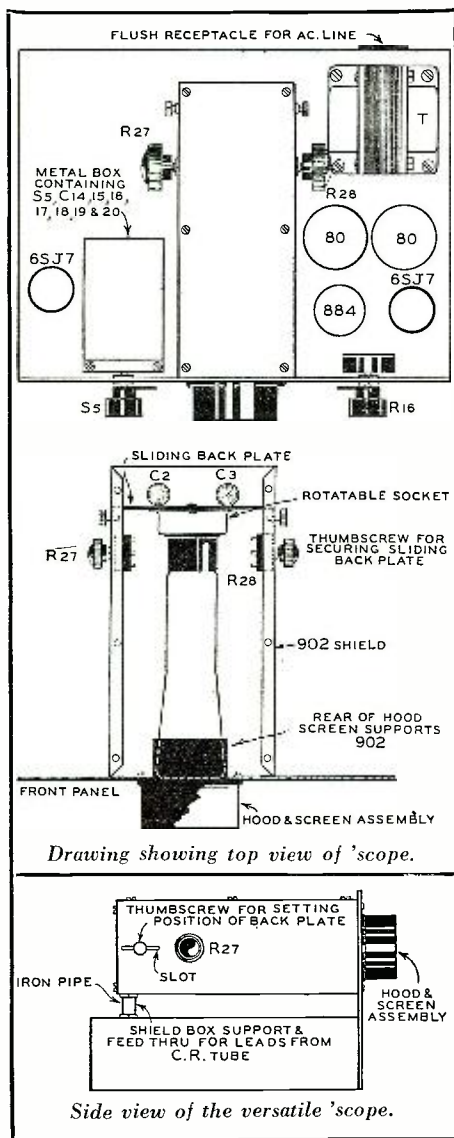
The screen is inserted into the meter case, inked surface to the glass, and is held firmly by the regular glass-retaining ring. The light hood is cut from a 2½-inch diameter coil shield and is one inch in height. It is provided with three spade screws, riveted 120 geometric degrees apart around its circumference so that they may pass directly through the regular meter mounting holes to hold the entire assembly to the front panel. The hood is given a baked black lacquer finish—glossy outside for appearance and dull inside to kill reflections from outside sources and from the oscilloscope pattern.

Horizontal and vertical beam-centering potentiometers, R27 and R28 are mounted to the rear along the sides of the 902 shield box. These controls were placed inside the cabinet, rather than on the front panel, since once they are set they rarely require readjustment unless the 902 tube is replaced. These controls are very positive in their action, enabling the electron beam to be displaced to any position on or off the screen or to be brought to exact center.

The lower row of potentiometers and switches and all six of the input jacks pass through the panel and chassis, placing these components below chassis. All jacks except the two marked C are insulated from both chassis and panel; and although the two C jacks pass through in contact with both, they are bonded internally and grounded to one point on the chassis.

Contrary to the usual scheme followed by some commercial oscilloscope builders of providing only one ground terminal, two grounded jacks have been included, one on each side of the panel, to obviate the necessity of running a common jumper between separate sources used to supply horizontal and vertical deflecting voltages.

Probably the most important electrical consideration in a self-contained oscilloscope is the power transformer. No concessions may be made in regard to this part. It *must* be a transformer designed particularly for this purpose. Midget broadcast receiver transform-



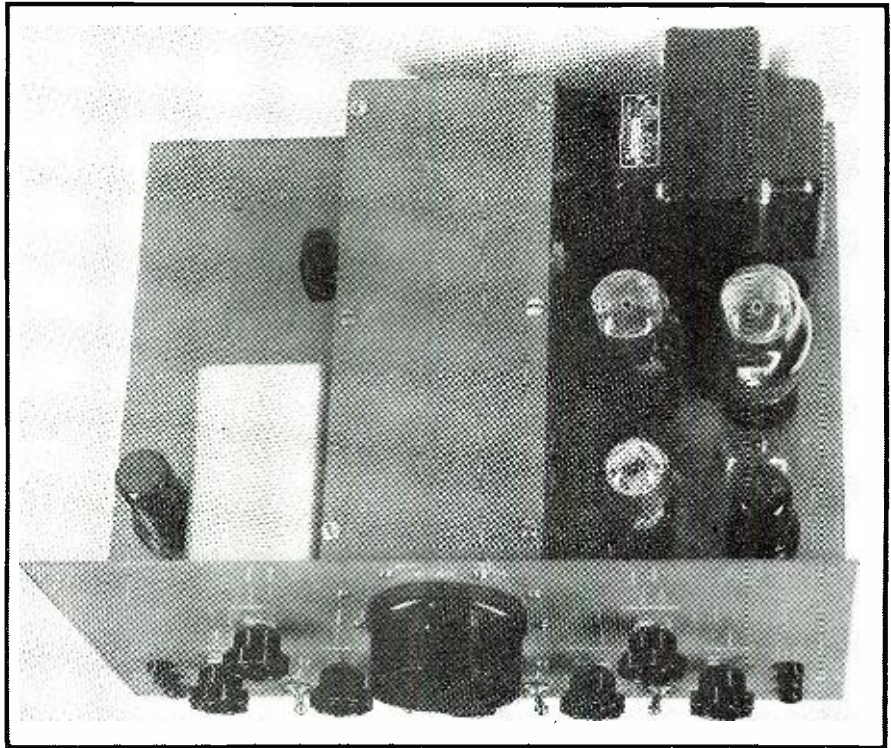
Drawing showing top view of 'scope.

Side view of the versatile 'scope.

not ordinarily require further adjustment.

The screen of the cathode ray tube occupies the upper portion of the panel and is provided with a hood to cut down disturbing outside light and a conventional graph screen through

The layout of parts is clearly shown in this picture of the 'scope's top.



ers, which, unfortunately, find their way into most of the home-made oscilloscopes, simply are unsuitable, as their magnetic fields are strong and extended and are bound to distort the pattern and introduce other hum troubles. Special oscilloscope transformers, like the *Stancor P6130* used in this instrument, have low flux density and correspondingly low and restricted hum fields. The transformer is a small-sized job, measuring only approximately $3\frac{1}{4}$ " on each side. It is rugged, inexpensive, and designed to the application. It is conspicuous beside the 902 shield box. The core, it will be noticed, extends from front to back and the transformer must so be mounted in duplicate models.

As an asset to portability, the a.c. cord has been made removable. An *Amphenol 61-F10* flush receptacle is mounted at the rear of the chassis and the companion 61-M10 plug attached to the line cord.

The "canning" of the major components of the sweep circuit is another special electro-mechanical feature of this oscilloscope. The eight-point rotary switch, S5, together with condensers C14 to C20, are mounted in a "square" aluminum shield can, $4" \times 2\frac{3}{8}" \times 2"$, mounted directly to the rear of the switch and behind the front panel. It is clearly visible in the front and top photographs. In most scopes, these condensers take up an unnecessary amount of room and present an unsightly appearance, being of varied size. Arranged as indicated, however, the condensers and their switch are placed neatly out of sight, shielded, and short leads provided to the switch contacts.

It will be noted that the "vertical" toggle switch, S2 is a double-pole, double-throw type. This selection enables amplified or direct input to be obtained through a single vertical input jack and completely removes the vertical amplifier from the circuit when direct input is required. Thus, it becomes unnecessary to provide separate amplified and direct vertical input jacks, which require that the signal lead be interchanged between the two, often a dangerous operation.

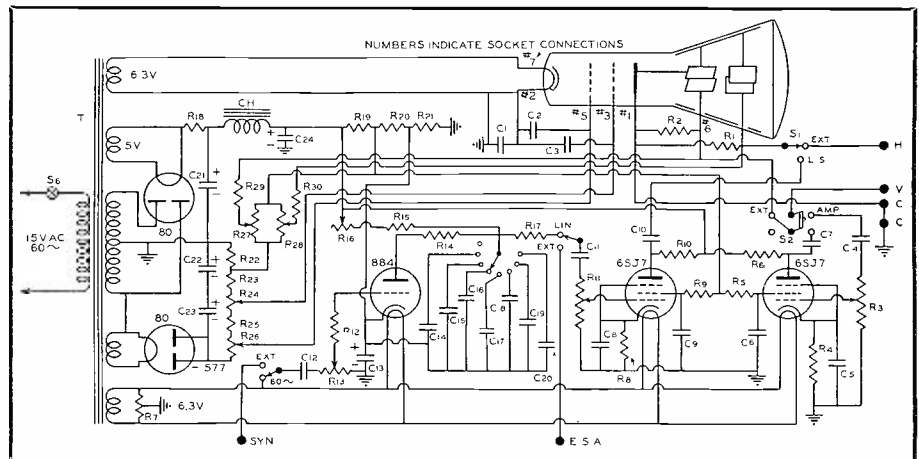
6SJ7 tubes were chosen for the high-gain horizontal and vertical amplifiers, since their single-ended construction eliminates the customary long tube-top grid lead which is so susceptible to hum pickup in oscilloscopes. At the same time, short, direct leads are made possible from the socket grid contacts to the gain control potentiometers, R3 and R11, mounted nearby on the front panel. The reader is cautioned that the base connections of the 6SJ7 do not correspond to those of the 6J7, consequently, they have been numbered in the circuit diagram.

The midget filter choke, CH, is mounted below the chassis close to the rectifier tube sockets where it may be

seen directly to the rear of the a.c. receptacle.

The resistors R14, R15, R18, R19, R20, R21, R22, R23, and R25 are

mounted on a pillar-supported bakelite panel seen in the center of the chassis. The five midget tubular elec-
(Continued on page 44)



- R₁—2 megohms $\frac{1}{2}$ w., I. R. C.
 R₂—2 megohms $\frac{1}{2}$ w., I. R. C.
 R₃—0.5-megohm (vertical amplifier), I. R. C.
 R₄—1,000 ohms $\frac{1}{2}$ w., I. R. C.
 R₅—0.2 megohm $\frac{1}{2}$ w., I. R. C.
 R₆—0.1 megohm 1 w., I. R. C.
 R₇—60 ohms wirewound center-tapped, I. R. C.
 R₈—1,000 ohms $\frac{1}{2}$ w., I. R. C.
 R₉—0.2 megohm $\frac{1}{2}$ w., I. R. C.
 R₁₀—0.1 megohm 1 w., I. R. C.
 R₁₁—0.5-megohm (horizontal amplifier), I. R. C.
 R₁₂—25,000 ohms $\frac{1}{2}$ w., I. R. C.
 R₁₃—0.25-megohm (synchronization), I. R. C.
 R₁₄—500 ohms $\frac{1}{2}$ w., I. R. C.
 R₁₅—0.3 megohm $\frac{1}{2}$ w., I. R. C.
 R₁₆—2-megohm (fine sweep-frequency), I. R. C.
 R₁₇—1 megohm $\frac{1}{2}$ w., I. R. C.
 R₁₈—10,000 ohms 5 w., I. R. C.
 R₁₉—15,000 ohms 2 w., I. R. C.
 R₂₀—20,000 ohms 5 w., I. R. C.
 R₂₁—650 ohms $\frac{1}{2}$ w., I. R. C.
 R₂₂—50,000 ohms 1 w., I. R. C.
 R₂₃—50,000 ohms 1 w., I. R. C.
 R₂₄—30,000-ohm (focus control), I. R. C.
 R₂₅—15,000 ohms $\frac{1}{2}$ w., I. R. C.
 R₂₆—20,000-ohm (intensity control), I. R. C.
 R₂₇—2-megohm (horizontal beam-centering), I. R. C.
 R₂₈—2-megohm (vertical beam-centering), I. R. C.
 R₂₉—2 megohms $\frac{1}{2}$ w., I. R. C.
 R₃₀—2 megohms $\frac{1}{2}$ w., I. R. C.
 C₁—0.1 mfd. 600-v. tubular, Aerovox
 C₂—0.1 mfd. 400-v. tubular, Aerovox

- C₃—0.1 mfd. 400-v. tubular, Aerovox
 C₄—0.5 mfd. 600-v. tubular, Aerovox
 C₅—0.003 mfd. postage stamp mica
 C₆—0.25 mfd. 250-v. tubular, Aerovox
 C₇—0.25 mfd. 600-v. tubular, Aerovox
 C₈—0.003 mfd. postage stamp mica
 C₉—0.25 mfd. 250-v. tubular, Aerovox
 C₁₀—0.25 mfd. 600-v. tubular, Aerovox
 C₁₁—0.5 mfd. 600-v. tubular, Aerovox
 C₁₂—0.25 mfd. 250-v. tubular, Aerovox
 C₁₃—25 mfd. 50-v. midget electro., Aerovox
 C₁₄—0.0008 mfd. 500-v. mica
 C₁₅—0.002 mfd. 500-v. mica
 C₁₆—0.005 mfd. 500-v. mica
 C₁₇—0.015 mfd. 500-v. mica
 C₁₈—0.05 mfd. 500-v. tubular, Aerovox
 C₁₉—0.15 mfd. 500-v. tubular, Aerovox
 C₂₀—0.25 mfd. 600-v. tubular, Aerovox
 C₂₁—8 mfd. 475-v. (working) electro.
 C₂₂—8 mfd. 475-v. (working) electro.
 C₂₃—8 mfd. 475-v. (working) electro.
 C₂₄—8 mfd. 475-v. (working) electro.
 T—Stancor P-6130 oscilloscope transformer
 CH—25-henry 50 m. a. midget filter choke
 S₁—s.p.d.t. (horizontal plate switch), H. & H.
 S₂—d.p.d.t. (vertical plate switch), H. & H.
 S₃—s.p.d.t. (sweep selector switch), H. & H.
 S₄—s.p.d.t. (synchronization switch), H. & H.
 S₅—8-point rotary switch (sweep-frequency range selector), Centralab
 S₆—s.p.s.t. volume control type switch (a.c. on-off switch mounted on back of potentiometer R26), H. & H.



Phillips-W2SC



Talley-W2PF-WLNA



Zeh Bauck W8QMR-WLNN

Part of the 2nd Corps AARS network.



Raser W3ZI-WLNE

HAM CHATTER

AMERICAN RADIO-OP CROSSES UP GERMAN PRIZE CREW CITY OF FLINT OPERATOR IN DARING STUNT

Norfolk, Va. (SPECIAL to RADIO NEWS): Bill Schuss, former Chief Radio Officer of the S.S. *City of Flint*, is a quiet spoken unobtrusive man. In addition to this, he is an expert radio operator and one who possesses all of the necessary courage with which the average New England sea dog is equipped. When the *City of Flint* was stopped at 4:30 P.M., October 9, 1939, 450 miles east of Cape Race, Newfoundland, by the Nazi sea raider "Deutschland," and that battleship broke out a three-flag hoist ordering the *Flint* not to use her radio. Schuss did exactly as he was ordered. As he figured it, he would not use it but he sure did "fix it."

The raider put two German radio operators aboard, both of whom were non-technical and unfamiliar with American radio operation. "My job was to instruct them in the use of our radio equipment," said Schuss, "and while so doing, I shifted the tank coil clips to a point where I judged we should be transmitting on about 1200

miles, but only the ghost of Marconi could answer on what wave length we were."

"Unfortunately," continued Schuss, in an ironical vein, "the Germans could not contact their submarine escort, cruiser, or Radio Station D.A.V. In answer to their repeated requests, as to what might be wrong, I would point to the radiation meter and indicate in sign language that there should be enough power to work anybody."

"It was only when the German Commander became suspicious," continued Schuss, "and worried that he was not getting into communication with his units that we put into Norway for orders. The Commander did not understand the workings of our radio, nor were the German operators able to explain to him why, with 6 amperes of radiation showing on the meter, we were unable to contact the Russian station UDK, which was only about 20 miles away. The German chief radioman called me in and said, 'We are only a few miles from UDK, is it not strange that he does not answer?'. I saw that the jig was up and said, 'Why, you must be having trouble with your transmitter,' and there was nothing else for me to do but to reach behind the panel and return the clips to their original position, which had been previously marked by Mr. Wilson of the Mackay Company at Norfolk. These switches are used to set the grid and tank inductances to the proper frequencies."

"The German radio operator looked kind of sheepishly at me when he contacted UDK with the first call. What could he have done? To have exposed me, could only have served to admit his own ignorance. After awhile, we smoked a cigarette and then he asked me, 'Is it all right?' and I assured him that it was. He looked very worried and appeared to be in deep thought."

In changing the clips, Schuss has done a very daring and courageous thing by risking immediate death if he had been discovered. He prevented the sea-raider's boarding party from contacting its units, at the same time keeping the British advised of the location of the *City of Flint*. When this was pointed out to Schuss, he is said to have replied, "Oh Hell, that ain't nothin'."

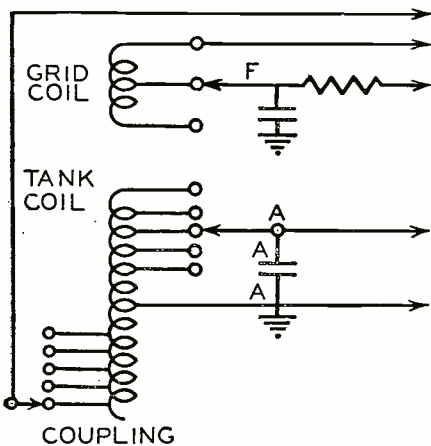
A HAM was up for initiation in his local ham club. "What would you do," he was asked, "if you were miles away from any power lines; if you were standing in water up to your chin; if this club was depending on you to get the QRR stuff through?"

"I'd resign, 'n go swimmin'." was the unexpected answer.

P.S. He got in the club.

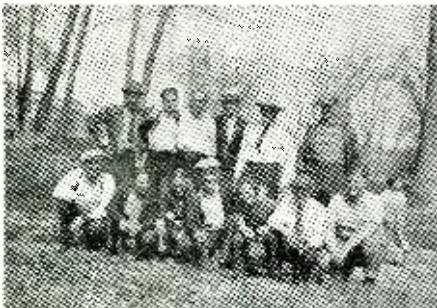
SOME of the amateurs are really thinking of voting for Gracie Allen for President. They say they always wanted a ham for president anyway. (No offense, Gracie, it's all in fun!)

A HAM is a man who is much too tired to make dinner, put the cat out, wind the clock or bank the furnace, but who can operate his gear for 689.3 consecutive hours at a time without eating, sleeping or, for that matter, changing his clothes.



A diagram of the coils on which Bill Schuss did his "dirty" work.

meters, which would be the wave length covered by all British patrol boats. I then brought the antenna coupling into exact resonance, and the radiation jumped to about 6 amperes which pleased the German operators no end. They figured they had enough power to work 2,000



The Laurel, Montana, hamfest.



The National Radio Club's meeting.



An after-the-war-started GM6WD QSL.



Hamstation es op K4ENT.



British SWL. Official BRS 1449.



The very well-known W9QVA es rig.

to a new QTH and is back on the air again, operating all bands, fone and c.w.

W9QGU is too busy with Junior College work to be on the air much, but gets on occasionally.

Another distinguished member of the I.A.B.C. is Byron Jeffrey, W9UDR. Jeff is state president of the Iowa Junior Chamber of Commerce. Unfortunately, his work doesn't allow much time for ham radio.

W9MXX is a school teacher and is rebuilding to get back on the air soon.

Now that W9LAC has a new Class A ticket he is scratching the few remaining hairs on his head trying to figure out a beam for both 20 and 10. He keeps regular skeds with his brother, W6REI, in Los Angeles. Doc is running about 200 watts to a T55 final and really puts out a swell sig. He also has a small QRR rig on 160 fone and can't figure out why the BCL's complain that BC station WHO always interferes with him, hi, hi!

W9GKN is on every Wednesday and over the weekends when he is home from work as a truck driver. He delivers Armour's hams. Ham for a ham.

W9ETS watches the thermometer for the wx bureau and is building a new rig.

W9NUQ has a new HQ-120X and a new Stancor 60-P and is all set to work things and stuff in a big way, as soon as he can get up a suitable antenna.

W9GWD is active on 160 fone and has a fb QRR rig that really sounds swell.

W9BHW is another 160 fone man and works most of his dx in the wee small hours after he gets home from work.

W9DVP moved to a new QTH but hasn't gotten on the air yet. He will rebuild to work c.w. on all bands.

W9RZV built a stancor 20-P rig and works 160 fone and c.w., and 80 and 40 c.w. He is planning on a new receiver.

W9HQO celebrated becoming a ham by getting the mumps the next day. He is OK again now and has finished building for 160 and 80.

W9CTQ works 20 fone with a swell layout including a rotary 8JK beam and works lots of dx.

W9PHA did very well in the Iowa 160 c.w. Party. He worked coast to coast with 18 watts and was even accused by a certain W8 station of QRMing WIAW!!

W9FZE is going up for a class A ticket and expects to have a new rig with PP 35Ts ready by then. He is a Morse operator.

W9VEQ is off the air temporarily.

W9WMP finally got that QSL from Nevada and is WAS now. Paul is planning a new ECO exciter.

W9ALC sticks to c.w. on 80 and 40. Ask him why he isn't on 160 fone any more?

W9QOQ is rebuilding a new band-switching exciter unit which should be pretty snazzy.

W9HIM is a new ham in Fort Madison, Iowa, and is working c.w.

W9PBV is waiting for REA out his way to get on the air with a real rig.

W9FSH moved and has some nice towers at the new QTH. He operates on 75 fone.

W9KYR rebuilt and has a nice rig on 160, 80 and 75. He has a new Howard receiver.

That about winds it up from here, except for W9QVA. I operate mostly on 40 but try 160 and 80 a little. Have been on the air 2 years and am WAS and have had about 1500QSO's. I am running 77 watts input to a T40 final.

THE gang at Tu-Boro Radio Club in Woodhaven, L.I., bought a flock of xtals recently for spot frequency operation on 3813 kc. The net meets regularly every Sunday at 11 a.m., E.S.T. with W2HBO as net control station. Informal skeds are kept during the week at 7:15 p.m. The purpose of the net is to improve the operating procedure while using break-in; to help improve the code speed

of the slower members and to maintain a means of communication in case of an emergency. The most consistent members on the net the past month were: W2APM, W2BOT, W2BYE, W2CTP, W2HBO, W2HHW, W2KYV, W2LJF.

W2HBO took part in the Feb. ARRL 1.75 mc. W.U.S. contest working thirty-two stns in thirteen different states, using c.w. only, to get a score of 416 points. The rig used was a 6J5G xtal osc and a 6L6 amp with 20 watts input. A W4 in Fla. and a W9 in Iowa were his best "dx," altho all districts were heard on c.w. as condx were swell.

"Nemo" W2HPB is a pretty sick feller in the Jamaica Hospital. The gang wish him a quick recovery.

W2LEJ can be heard every nite on forty pushing 1fc via the Forty Tfc System.

Wonder where ole "Iron Hat" W2AVI is hiding out—he can't be digging for clams these snowy daze.

W2APM is doing some listening on 2 1/2 lately and he said that he may try his luck on the band if there are enough local boys on to work.

W2BGD took his net 20A down from the shelf and is blasting thru on 75 fone much to the delight (?) of the local gang on 80 c.w.

W2BVE is busy getting the bugs out of the new modulator he just completed and will soon be heard on ten and twenty meter fone. He is also cramming for a second class radio fone ticket in his spare time.

W2MJJ said he got a report from a W1 that his note sounded like two spoons being knocked together, during a recent QSO on 80 c.w.

W2LG opr on the tanker W. C. Fairbanks plying between Houston and Gulf ole Marcus Hook, Pa., sez that the local boys have been putting nice sigs thru on 80 c.w. while he was in the Gulf on his last trip. W2MT, W2HHW, W2HBO, W2APM, W2HVD, W2LJF were the best of those heard.

W2GIP is knocking 'em dead on 80 c.w. with a 211E in the final after a long layoff.

W2KYV working nites now but manages to get a few QSO's in now and then. He just received an ORS appointment.

[Sent in by W2HBO, Tex OM, Ed.]



"I'm very sorry, Madam, but I cannot QSO your OM because another medium is using the same wavelength."

SPEJNA of Detroit comes thru with— Michigan's 8 Loud Tootin' Ham doesn't get on the air to chew the ole rag with the locals like he used to many moon ago. All Emil does is sit by the rig with the filaments on, and as soon as he hears some corny dx, he flips the sw and starts callin' the supposed dx.

Ole Carl, 8 French Girls Undies, has much rumpus with neighbors because of too much bel. Carl gets his 2c worth in on 160 when the bel stations pause for identification.

W8GHV a very prominent beam builder and dx man of the higher frequencies, was sure scared if his beams stayed up in a wind storm Detroit had one Sunday p.m. Next morn GHV drove around town to see if his beams were up, down or blown away. Sure enough they were up.

George SOGV will stay hooked up all nite with a fellow ham if a YL is on other end.

After Rudy STYJ got through showing an swl his Xmitter, Rudy got hooked up with WSSZE and the swl told SZE his handle & hello. When SZE came back he called the swl by his full name and asked him a few things SZE wasn't supposed to know, boy! The swl nearly fell off the stool and did his face light up! "Who is this guy that knows everything about me?" asked the swl. As it turned out SZE graduated with said swl. Hi!

Jim WSNFR, Hy WSMET, and Emil WSLTH all have their own opinions as to how the Great Lakes Fone Association should be run. Why should the swls have to pay 1/4 of a \$ for each & every meeting attended? All right then, so we ain't needed.

Smuthy, SAIZ, the big radio man of Dearborn Police, who dies muddy holes for the Dept, has a radio club for the hams, a school for cops who are after the 2nd class ticket, and also a school for swls who yearn to become hams.

Once Smuthy had a pee-wee job that had a funnel with a hose at one end that led to the mike. One day his jr. op got a pea shooter and was shooting into the funnel, and one got stuck in the hose. It took AIZ a long time before he discovered why he wasn't getting out so good.

Very new Bill SUHQ bought WSSEC's 160 job, and does it sound slick since Bill put a xtal mike to it. With the green backs Rudy got for waid mess he is building a big 1/4 K job.

Rudy WSSEC is the all around hobby man. During the winter months he is heard gasing on 160, this causes the ice to melt and the weather gets warmer, then he starts patching up his ole tug boat which he drives up & down Detroit River. On hot Sunday afternoons he plays a mean game of horse-shoes. In Autumn he does his own decorating in the operating room, and to top this all he works on a lathe in some wood shop. Boy!

It is very hard to keep tabs on Joe, W8UAS of Sleepy Hollow. He changes from 160 to 40 to 80-10 to 20 so fast, why he can't even sit on one end of a band too long. For the short time he has been on the air he has done all right for himself. Watch those 6L6's, Joe.

It seems that many boys are trading in their old heaps, and home made receivers for the new commercial jobs. Mac 80TE had an old heap and UAS had a home made super bloop, now both have a Skyriider Defiant.

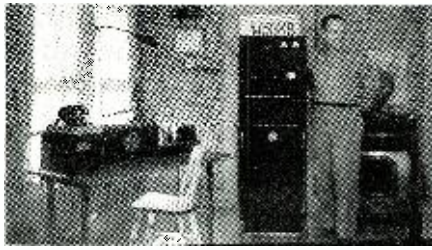
On 2 1/2 we have Dave TKC, John SAM, John TIR and others of Dearborn. Doc WO, Steve ROR, and Bob TBS of Ecorse, these boys should get together and form a 2 1/2 club.

Some long winded boys that don't live in Chicago are Bill WSHX, Bill SLOH, Hy SMET, Emil SLTH, Mac 80TE, Rudy SSEC and Smuthy SAIZ who left HO and went down where the high powered boys are on 75.

W8NIT at Walled Lake has a recording outfit, which he likes to record the boys' voices. Most of them don't recognize their own voices when played back at them.



Hamop W7FTA es his hamstation.



225 lbs. of Hamop W5DKB es his rig.



The very neat Hamstation W6GCM.

SEZ Bob Kurth—"Bob" W5IRP, yours truly, will soon be on air on 160 meters phone.
 "Sol" W5GBU added power to rig on 160 phone. Expects to run about 500 watts.
 "Lee" W5HYH has finished building his phone transmitter and is heard on 160 phone.
 "Ben" W51NV actually getting out of town with his 160 phone xmitr. He has been on 40 c.w.
 Reagan Hutson is expecting his license any day now. He is going on the 160 meter phone.
 W5IRP, W5GBU and Reagan and sometimes W51NV, talk over W5GBU. We are on almost every night on 1950 so some of you buzzards give us a call.

FROM the mail bag: de WSLAU.
 Dear Sir: One of our old-timers here celebrated 20 years of ham radio recently. His call W881 Geo. (Pat) Murphy. His activity dates way bk to spark days of 1919. Pat has worked some 90 or more countries and he makes 'em all set up and take notice. W8JOU of Elyria, Ohio, is going to get hitched soon.

Dear Ed: Why don't somebody invent a gadget that fits over a ham's head and automatically eggs him when he gabs too much? They could call it Automatic Voice Control (A.V.C.). It might help some of these long-winded geezers to shorten their transmissions. Sgd., J. Comella, Chicago, Ill.

Not so very long ago I was listening to some South American "Hams." All I could hear was the calls, namely CO2JH, XK4DK, CE1AO, and CX3CA. I am not a "Ham" but expect to be one this summer. W4ATO in Albany, Ga., has a nice station. His name is Johnny Davis. His X'mitter uses (4) 203A and puts out 125 watts. W4GHW in Damascus has a nice signal, his brother W4FRF has a station. There are no hams in Bainbridge, Georgia. I live only 30 miles from W4GHW. Sgd., John Warren.

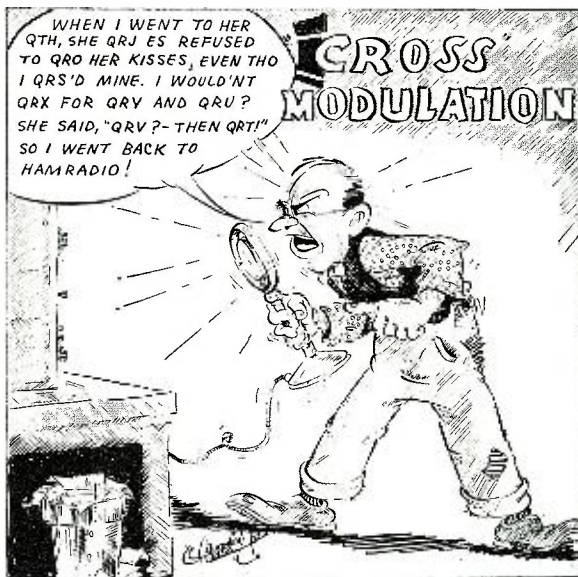
Dear O. M.: This is advance information on the Buffalo Hamfest for your Ham Chatter column. This Hamfest is to be held at the Hotel Buffalo on April 6, 1940, by the Kenmore Buffalo Tonowanda Radio Club. The officers include Carl Ericson, W8NWH, president; E. Don Burlingame, W8LQC, secretary, and Al Abruffa, W8NNP, treasurer. The speaker will be John Kraus, W8JK, who will give a demonstration and talk on antennas. The main door prize is to be a 150-T. From Buffalo on Ham news is 2 1/2 meters. Most of the 160 boys are down there and the band is becoming quite crowded hi hi, even q.r.m. Some of the calls are W8QEE, W8SBI, W8PCZ, W8SU, W8UDD, W8SBN, W8PCM, W8SOK, W8NWH. The latter station has a marker transmitter on so that receivers can be calibrated. This is on from 6 to 9 p.m., daily. W8RV is planning another Marker station on the top of the Hotel Statler and because of its height will put a good signal around town. The fellows up here have a contest on 2 1/2 meters extending to June 1st. The 5 meter club and the K.B.T. Club are co-operating in this effort. It is a D.X. contest. The station which works the farthest with the least amount of power will be the winner. The latest fad on 160 up here is balloon antennas on 160 and 75. W8OSV has had spectacular success with his having worked all districts with low power on 160. On 75, W8OZR has been putting out a good signal from up here. The main disadvantage to this type of antenna is the neighbor's kids. W8OZR's came down all of a sudden, the victim of a B.B. gun. W8TBD's was broken by snowballs while laying on the roof. These antennas have all been 160 meter half wave verticals. Since I have not seen much from this neck of the woods I thought I would drop you a line and let you know what is happening up here. Sgd., W8SSS. *True, Ed.*

JAMAICA JOE'S Gossip:
 W2KIK, of local radio store, is building hi power transmitter of 600 watts input on 80-40-20 c.w.
 W2LGI is plenty serious about a certain Y1.
 W2MJE intends increasing pur of his 160 mtr fone wid pair of T55's.
 W2MAL, W2LWA, W2MDC, W2CZX.

W2MAO can be heard chewing the fat on 160 F together.
 W2MAL cuts fat in butcher shop during day and chews fat during nite on 160 F.
 W2MDC gets home from work in wee hours of morning and wrks fb dx on 160 F.
 W2MHE has found employment and contemplates larger powered rig.
 Two popular local swls, Wink and Teddy, have recently found employment. Congratulations, boys!
 W2LUN now heard on 160 F after short absence.
 W2LSF of Rockaway Beach has received his Class "A" endorsement and will operate 75 F in addition to his A.E.N. and ragchewing activities on 160 F.
 W2KXY is attending MIT.
 W2CZX repaired his Class "B" transformer and is on 160 F.
 W2DJU will soon be heard on 160 F. from Jamaica Vocational High School.
 An swl friend of W2LIM's (the one with the \$11), passed his code exam and is awaiting news from Washington.
 W2MBQ is looking towards ten meters.
 W2DGG is now proud papa of a baby boy.
 W2KOR is interested in the 160 mtr. c.w. band. Ditto W2KYV.

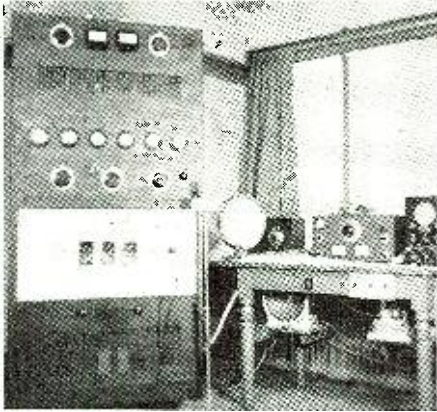
FROM Robert A. Gregory—W7HPH:
 W7HOV has a new antenna tower up. Using a half wave doublet. Will soon have a real Ham installation. More power to you, Bill.
 W7GPM has been going to town on 10 meters but still is a dyed in the wool 160 fan.
 W7CMD, his XYL W7HGQ and W7GPM visited W7HPH and helped iron out the last of the bugs in the transmitter. Thanks a lot gang, and come again.
 W7CMD and XYL W7HGQ have a swell ham set up, with three different finals, remote control and all. Will be seeing you on 80 meters soon, Eddie. I hope. Hi. Hi.
 W7GQB was paid a visit recently. Has a nice ham shack in basement. And a swell looking rig. Be seeing you, Herb.

W. H. McFARLAND writes:
 W60PM on 2 1/2 meters with a pair of 35 TGs, short line oscillator using at present 60 watts input.
 W6MFS is the proud father of a Y1 op—congrats, old man.
 W6CPY is also the proud father of twins. And boy! Oh, boy! There're both junior ops. Hi—congrats, old man.
 W6MAK reports 2 1/2 meters a real good band. He is running about 140 watts.

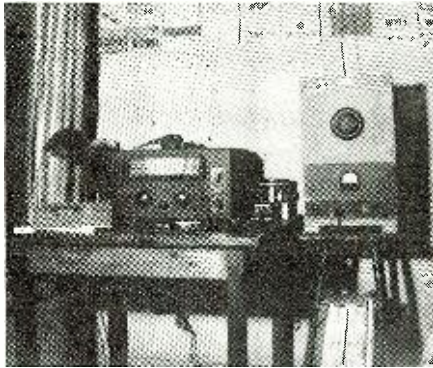


Look out fellers the famous Scotchman, W6-FDO; spent money left and right the other day. Two-bits here and two-bits there. Total 30 cents.
 W6CL and his gang have some real good meetings on Thursday evenings. Speakers, demonstrations of equipment are on their program. Fb Bert.
 W6PRZ got himself a job in Hollywood. No, no, folks. Not a movie star.
 W6Nant (?) is very busy fixing things around his new home and states he will be on the air soon.
 W6AXQ in Montebello sure has a very f.b. shark and plenty of room for antennas.
 W6CRL reports he will be on 40 meters c.w. soon.
 W6EJZ says if you keep the center in the middle, the outside won't touch the edge. Is that so, Charlie?
 W6OEF, when getting a few r.f. burns, starts singing "Three Little Fishies." Why?
 The Communications Division of the California Forestry Medical Corps had a big turnout on the last few meetings.
 W6IOA will be on the air again soon. Hurry up, Louise. Will be glad to hear your voice again.
 On the night of the Contest, stations from Oregon, Colorado, New Mexico, Texas and Arizona came in R8 to 9 on 160 meters around 9:30 P.S.T.
 Roy Hartshorn says, "Well, I guess I will go down soon and get me a ham ticket." Good luck, Roy!
 W6PDB on 10 meters sure gets out f.b. heard talking to a South American.
 W6ODY will also be on the air soon. Ten meters and maybe forty. He is generally in his workshop making a lot of useful gadgets.
 The question is what has become of all the old hams? [They became crotchety Editors! Ed.]

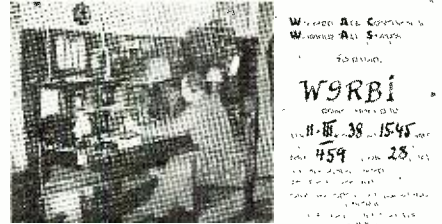
SEEMS like there is very little ham gossip of W8 stations in your "FB" column. So I am taking it upon myself to do something about it. Here goes—
 W8EYS, "Snuffy" Harlow, one of the Eng. at WWSW, is now a proud pappy of 7 lb. baby girl. And can be heard popping off buttons of his vest on 75 M. Congrats, Ray.
 W8SGV, Cuddy, Pa., has been receiving FB 10 M QSL's, but—he's never wrkd 10. Seems like someones bootlegging his call.
 W8RZC, by name of little Abner, on "Lonesome Polecat Ridge," still claims to be the Kingpin of 1947 kc., despite the fact that W8TAP, W8ETX, W8OMY, and W8TGM have all taken him to the "cleansers."
 W8RXT, still bragging about his new Silver-tone Series 3 Receiver, and how it pulls the DX in.
 W8QFL is building a new 1/2 KW job for fone and c.w., and will probably have it completed by the time you read this.
 W8OLX, was offered FB Radio Job in So. America but turned it down on account of XYL and Jr. op.
 W8HYV, says he hasn't slept more than 5 to 6 hours a nite for the past 20 or more years.
 W8TTZ, Gene just put in a new filter in the P.S. and improved his signal—100%. (Sgd.) Zerimbla Zimmerman.
 W9ERW promised to get us a picture of "Esmeralda" and rest of local gang for future issue of RADIO NEWS—maybe "Esmeralda" will evoke sum interest, all same as K60JI. Hi. Harold is still messing wid his cathode modulated 201A and some of us hear him fairly good.
 Spent part of my "luggable" operation and time with my aviator friend Fred Sears, at Broken Bow and am afraid we'll have us another ham or two there in time as Fred and his good-biscuit making YF "Jo" are infected a trifle wid ham fever.



Pre-war hamstation VE3AFD.



Small, powerful Hamstation W2HBO.



OE3AH

OE3AH's rather rare QSL card.

W9WRY quietly slipped across to Broken Bow and gathered up W9IRZ and myself and xmtr es next morning we proceeded to string of YLC along and after we told him I was at WRY's he still wouldn't believe it, but he finally came out on a visit to see us as well as WRY's new vibrapak rig he had not previously given the once over. In afternoon with help of W9IDR and W9IDO we ganged up on W9QWD—quit wiping dishes—es strung him along before he tumbled we were in neighborhood; as well as the "Sleeping beauty" W9QZQ who woke up in time to get in on last end of that session. Next night open-house was at W9YLC's with QWD and FXN es YF BJU putting in appearance. IRZ es I went home with FXN's es spent next few days wid them when I took partly down wid bad cold so IRZ had plenty time to heat up the soldering iron and renovate FXN's rig. Took the 6L6 final out of the Utah rig and inserted a 2L0 es nw reports R 4 FB loud sig es less "harmonics"—6L6 was terrible it way. My brother W9TTF cum met us part way, es W9IDR was here to take W9IRZ back home, so it ended a vy enjoyable trip of visiting despite my getting the "good" cold.

"Harmonics" always remind me of a BC experience abt 12 years ago when I was "general nuisance" around a BC stn the Boss owned at the time. One day the BC friend of the chief op's came rushing in to tell him he must be off-wave as he had heard him up towards the low freq end of the BC band (think we were on 1010 kcs at the time) so op checked and found the old self-excited boiler was still put. He told the BC friend he must have heard a "harmonic" and this the BC promptly contradicted saying "Twernt neither no 'harmonic', it was a whole darned orchestra, he had heard up there." Hi, Hi.

Nice visit wid Alice W9LIR YF of W9FBD—9 ferocious bull dogs—when they visited W9BMA in KC, MO, by us fm W9FXN's.

If you awl hear us snicker'n a bit, midtude-be we just heard as we often do, the ham in north end of "White Spot" who spends several minutes calling "CQ, vy, vy short" es then likely never goes back to the 3-6 uninitiated hams who call him, but comes back on calling another long-winded CQ for a "short" QSO. Used to be, any of us, could make him hear, but those days apparently are gone forever—(tho, sum hopes as notice his ears are washed out enuf t' he hears a certain YL OK even when her sig is plenty weak for rest of us. Hi. These old baldheaded Romeo's! 73, de W 9 Beautiful Day Outside.

DEAR EDITOR: I'm a pretty tired lil' ol' ham as I sit me down to wear out my pants while writing this month's spam; for, I bn out amongst 'em—visitin' hams, mainly the "Razzberry Gang", the past 2-3 weeks. Ended up by takin' on a bit of a cold with slight fever—my efficiency was rather poor wid the increased temp on my "plate". Hi.

According to my ears, RADIO NEWS reached all time high fm comment heard wid t' pix of K60JL's QSL. Yep, YLS, it seamz, as how, if U wanna make the front kiver of the ham mass; U'll hafta have a near PDC note or borry Sally's bubble.

Us "Razzberries" are seriously thinkin' of findin' us a vy pretty "cowgirl" es dressin' her up in "northwest wind and bunch grass" and if we are shy of bunch-grass, we still have plenty of northwest wind. So, "Hi-waah-yuh" U R gonna hv competitsh in QSLs!

Seriously, tho, I hope you readers did not skip the bottom half of column 1 page 32 March issue, as that simple treatise on hams and war, was so dog-gone straight-to-the-point it is to be desired the lesson therein continue to be passed around and thereby lessen the chances of we humans being tossed around as playthings of Mars. My sincere and heartfelt congratulations to the fellow who wrote that short skit. . . . In-

ternational politics, are simply a proportionately amplified growth of local dirty-politics, or state or national jealousies and bickering—yet, we, the people, are the ones who are expected to "key the emma-gees".

XE2FC Tampico was heard on 160F wid a Q3-4 R3-7 sig thru quite a bit of QRN one nite fm 8:30-9:35 p.m. MST goin' mainly W5's. Roberto was using T40's in his PA.

Cud hear W9QXC here OK on 160F but the nearby station he was trying to wrk cudn't hear him, so he had to go back to his usual 75 F. "Red" also uses 20F wid V beam es duz OK on DX. He tells me of W9GQH whom many of you recall when Fritz was so active on old 85 meter fone band es sum on 75F, is now working for state and at Pierre but inactive.

W9GQH's brother Carl, W9DJN is still in Hawaii at Pearl Harbor working for Uncle Sam, but fingers to cum back home sn.

W9LWS and also W9TXB have been heard here wid 2nd 160 CW sigs.

Heard a W5 telling another ham that his idea of a cure for "BCL trouble" was a full-wave antenna 500 feet long on 160F. Said W5 said it solved the problem for him. W9YLC told me he was gonna try it, so when he has had time to check it out, we'll report on results Frank has wid that "brainstorm." Know "loading" short ants, gives stronger local coverage es less sig at a DX, in most cases, so it may be a longer-than-long ant is solution many hams seek. Realize, space, wud b hard to find.

Heard W6RQX Winslow, Ariz on his 2nd nite on 160F—betw'n the WAS boys have rode him hard by time this is in print.

Milo must be getting "spring fever" as hear of W5EAK sayin' he'd soon be headin' north wid South Dakota way to sow his spring wheat—dunno about any wild oats on Milo's part; for that we'll hafta ask his "P.S." (pvt sec'y) Opal his YF.

Had a vy FB QSO on 75F "early one mawnin'" wid "Bob" the "half good enuf" op of W9HGE. "Bob" sez, in summer time he traipses around the country seein' what he can see and has visited most of the states he QSO's. He now has 110V AC due to REA lines, but in earlier days struggled along wid batteries, motor gens, etc. Refuses to buy any new parts he can get along widout, es sez his outfit was a bunch of junked recrs, etc so he must be a good op. Noticed every time he called CQ he got plenty of raises.

Got in a big round-table on low-freq end of 75 and found out the newly christened W7HWD of Livingstone, Mont was the former W9PZU who was finding a different set up in QRM there to what he had experienced wid same xtals in Minnesota.

W9WGT—the world's greatest lover, or worst say living as the BCL's wud prefer it,—has bn doin' OK on 75F. He had a visitin' BCL who tried to play checkers wid another feller in Norfolk, but the Norfolk OM gave him quite a trimming t' Sunday p.m.

Adeline W9AUD informs me her uncle is W9QVJ so she shud be a cousin of W9RDT who is QVJ's son. Adeline and a cousin by name of Genevieve used to be a singing team—and a good one that was quite popular thru KMMJ, but Genevieve broke up team by marryin' and moving away. 7173 kcs is her present freq.

W9EYB—eight young babies—grabbed up fm 9 watt portable GA6 es visited W9FMW in where we had nice visit wid him on 160F. But, W9HRR same QRA as EYB has sure been keepin' his 6L6 final hot last 2 weeks since he got going full blast on 160F—Fred ops from boarding school at Rosebud reservation. Few new beginners manage to put out such a nice sig as Fred did. We "Razzberries" marvel at his politeness and consideration for others. Glad to have you with us Fred.

Our "Razzberry" bunch are somewhat self-policing as let one of the bunch pipe up with a poor sig and the rest are on his or her neck about it. Apparently, our utter abandon and good humored lambasting method of rascawing is the envy of those on edges outside our regular circle for many mention hearing us and that they would like in and we always include all we can rather up and manage to hear. Most of the bunch runs from 2-35 watts—that would be considered "portable rig" by many.

W9WDO was the call Don Woods, Rolli's "tired-man" drew, so Don shud have the right answer when he comes back to any YL who calls him this Leap Year. While I was visiting Don on my trip I got a raise out of W9DO in Chi on

20, thus making it BDO thru IDO wrking DO—how will that "DO"? Hi.
W9IDR is still making the power company happy wid many hours of operating on 160F, 80 es on 20CW first afternoon on 20t all districts except W3 es 5, es finished wid K6BZD. Rolli will be on wid higher power by time you read this.

WIJOM reports on the W 1's:
LEM the "Long Eared Monkey" on 2 1/2 LDD has wrked 123 stations (deleting 12 bootlegs) on 2 1/2 in the Boston area. Charlie holds the record for most stations contacted not only locally but in all the U. S., according to the local hams. JTG doing swell in the UHF contest. Charlie's outfit consists of HK-24's PP TPTG wid abt 120 watts input, HY615 super regen revr and a matched impedance ant. He plans to be on 5 and 1 1/2 shortly wid the same outfit. Other favorites in the contest are SS, DEK, JQA, and HXP.

IHA is on 1 1/4 wid a small rig and having a lot of fun playing arid wid match-stick antennas. In order to stimulate activity on the band the 2 1/2 meter hams have organized an Emergency net. The net meets every 15th of the month. Its purpose is to be ready at any time wid portable equip in event of disaster or national emergency to relay local traffic so as to relieve the lower freqs fm QRM on incoming and outgoing msg's. KSA who is not supposed to be superstitious asked for number 13, when nos. were passed out, hi hi.

New stations on the band are LBG, LEM, MBS, LEA, JIX, MJT, and LHZ. Overhead LHZ re-enacting a Wild West show he had seen a few hours previously that evening. It was better than the real thing. Hi hi. If any of u fellows missed the fun on New Years nite ur worries r over. Get the soldering iron out and some other junk and go down on 2 1/2. It's all there, even the shooting.

LPX recently heard abt the bad BCL conditions on 2 1/2. Cy is now planning a 2 1/2 meter rig and is going to take advantage of these condns in an effort to gain the acquaintance of several YL's in the same apartment house that have been giving him the "hi hat." Best of luck Cy, and ask her if she has a sister.

LID "Lovely Indian Dame" who can usually be found on 20 es w, wid abt 200 wts, came down on ten fone the other day. Bill was trying out "low level modulation" for a while, but it was so low u cudn't get what he was saying, so he's up on 20 agn pounding brass. KTG will shortly move QTH to Cambridge, Mass., and will be sporting a nice new tower.

PR is new on ten fone. Herb is running 30 wts to 6L6's and has a Nat PB-7 revr. His QTH is Newton, across the street from Boston College. Herb is so close to LEU who is also on 10, that he can see Pete's rotary and feel the RF.

GOU has never missed a day on ten since April, 1938. Ernie has had 1 1/2 years over 2,000 fone QSO's on ten. These contacts have ranged from portable submarine stations (pre-
(Pse Qsy to page 42)



W7FHC has one of those super f.b. QTH's in Luther, Mont., which we dream about nights.



WIJOM's 2nd op.

TECHNICAL BOOK & BULLETIN REVIEW

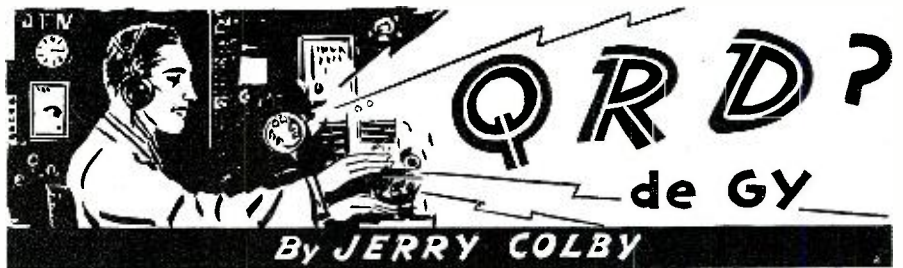
TELEVISION, THE ELECTRONICS OF IMAGE TRANSMISSION, by V. K. Sworykin, E.E., Ph.D. and G. A. Morton, Ph.D., published by *John Wiley & Sons, Inc.*, N. Y. C. 631 pp. \$6.00. The first part of the text is devoted to a consideration of the fundamental physical phenomena involved in television, that is, emission of electrons, fluorescence, electron optics, etc. Part II deals broadly with the field of television as a whole, taking up the relationship between the physical system and the quality of the picture, the principles of ultra-high-frequency transmission and reception of television signals, and the more important methods of pickup and reproduction of images. There follows in Part III an analysis of the components of the electronic television system based upon the storage principle, treating in turn the Iconoscope, Kinescope, electron gun and associated circuits, together with a description of the television transmitter and receiver. The concluding part of the book is devoted to a description of a working television system, as exemplified by the equipment used in the RCA-NBC television project.

For the benefit of students and others having access to laboratories, the description of the preparation of Iconoscopes, Kinescopes, electron guns, etc., has been made sufficiently complete to permit the construction of working models of these devices in an elementary form. Such experience in the experimental technique involved should be of no little value to those preparing to enter the fields of electronic or television research.

No single volume can hope to cover completely a field as broad as the one in question. The authors in compiling the subject matter were faced with the necessity of leaving out a great deal which is both interesting and important, and of emphasizing certain phases at the expense of others. Because of this, the story of the growth of television has been omitted, reference being made to earlier developments only when they help to clarify present problems. Furthermore, greater stress has been laid upon the electronic television systems employing the storage principle than upon non-storage systems.

THE OSCILLATOR AT WORK, by John F. Rider, published by *John F. Rider*, 404 Fourth Ave., N. Y. C. 243 pp. \$1.50. Oscillators you now use, and those you may use in the future, are described in this book. How they work, and how you can make them work for you to make radio servicing simpler and better are clearly explained in these pages. This is a prac-

(Continued on page 57)



ARTA Local 7 is doing some tall re-joining over the signing of a new agreement with the steam schooners *Arcadia*, *Watsonville* and the *Eureka*, which provides for \$150 per month and \$1.25 an hour overtime with a stipulation that there must be at least two hours of overtime per day for the men. By common arithmetic this will total a per monthly rate of about \$200. . . . And whilst the old-timers in the backroom are moaning about the "good ol' days" they might be reminded that \$65 was the tops in the "good ol' days." The collection of \$324 for overtime labor by the radiops on the round-the-world *S.S. Pres. Polk* didn't cause any dampening of the spirits. This, according to Sec. Jordan, is an alltime high. Congratulations!

THERE seems to be an exceptionally low beach list on both coasts due to good shipping conditions, in spite of the recent selling wave of American ships to foreigners. But this does not mean that it will remain so for long. We interject this last sentence quickly so that radiops beached in the hinterlands should not get the idea that they'll be snapped into a berth immediately upon reporting to either coast. The reason is simply that men with berths today might be beached tomorrow. There are a dozen cases of radiops booked to sail on a ship one day, who find themselves berthless the next day because of its sale to a foreign company. A very recent case is that of the *S.S. Point Arena*. The radiop aboard her was suddenly told that she had been sold to the Greek government, and he would have to obtain permission from the State and Navy departments to work aboard her. After quite some effort he was given the OK, only to find that she had been sold again, this time to the French government. He is today on the beach awaiting another assignment. So it goes, here today and gone tomorrow, or vice versa, but anyway, it's a helluvanote, no. Swane and Hoyt sold out their entire fleet of a dozen vessels and now 'tis rumored that the Luckenback outfit has been offered a cool 15 million for their tonnage from Great Britain.

A RECORD of some kind has been hung up by Brother Kosick who has been holding down the berth on the *S.S. El Capitan* for over 11 years. During this time he has been traveling from the Arctic Ocean, down the West Coast to the East, and back again. He finds that his new 200W crystal controlled RCA Xmitr has it all over the old 1 kw. spark with which he used to bark out at all and sundry. He remembers the time when the old ship tried to "take a short cut through Mexico" one fine hurricane day. But she managed to hold together in one piece until she was pulled back into deep water again. However, there's one piece of apparatus that's been getting his goat, and that is the Auto Alarm. He has been averaging two false alarms a month since it was installed. "And when you jump out of the bunk at 3 a.m.,

stumble and stub your toes, fall over everything while searching for the light switch, only to find that low voltage caused it to go off, well, you can't be blamed for cussing the darn rig."

THE noted world-wanderer Simon Golden, one of the original ARTA men, has been having a hectic time these last few years. He was assigned to the Tuna-clipper *Santa Cruz* where his wanderlust seemed to have been smothered by the contemplation of the huge tunas. But this was only wishful hoping, because upon arrival at Puente Arenas, Costa Rica, Golden betook himself to the mountain regions surrounding that beautiful port. He left the ship flat to search for nothing less than gold. He must have believed the boys when they said, "Thar's gold in them thar hills." And Brother Golden returned later a sadder but wiser man. He was reinstated on the *Santa Cruz*, only to wander again after a few days. This time he hurt his foot and is now convalescing in a hospital. Which goes to prove what?

THE MATSON LINES are contemplating the placing of a 4th man aboard their vessels to save the overtime money which was agreed upon with the ARTA. This, of course, puts another man to work, but the ARTA says that it still won't do away with the overtime pay because this 4th man will act like a Chief Opr. abstracting messages, handling the money and aiding in the repairs. Well, it's OK, any way you look at it!

WELL, the ACA convention will hold its meetings in Chicago on April 1st and we understand there may be some drastic changes made in the Constitution. For one thing they are contemplating the reorganization of the Marine Locals set-up whereby all the locals will be banded together into one national local or, at most, three separate locals, East Coast, West Coast and Gulf. Of course, it can easily be seen that expenses would be cut down to a minimum, fewer salaried secretaries, fewer offices, etc., but would it be as efficient or as easily accessible to the members as the various small local offices are today? We await the changes with interest.

BROTHER BOLVING (CJ) sez here's a glamour-remover that's tops: Quote —Just finished abstracting tfc on *WDCP-AA* No. 5 for last month . . . hvy passenger season all over now so this is just the company biz tfc . . . 161 msgs handled, 6,670 words. This in addition to regular duties which means 79 Interchange reports (15 copies hammered out all at once (our mills don't last long). 79 seal reports (seal numbers obtained by some fast footwork while cars are being run aboard) 40 manifest freight reports; 79 passenger reports which have to be made out even tho' no

(Continued on page 66)

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SERVICEMEN'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.

FADA 70, 71, 72

- No reception . . . 1) short-circuited by-pass condenser located under variable condenser in shield can
2) open-circuited resistors in series with the plate voltage supplied to r-f coils
- Intermittent reception . . . 1) broken leads on loop antenna
- No reception . . . open resistor in power pack

FADA 211 AC-DC

- Inoperative receiver (all tubes check O.K.) . . . 1) 190-ohm (metal-tube style) ballast resistor "open"

FADA 761, 762, 764, 766

- Fading, 1) open-circuiting r-f cathode
Intermittent reception . . . 1) by-pass condenser
2) open-circuiting r-f plate by-pass condenser
3) open-circuiting 0.5-mfd. screen by-pass condenser
- Oscillation, . . . 1) open-circuiting screen bleeder resistor connected from detector screen to chassis. This is a 125,000-ohm ½-watt carbon unit. Replace with metalized type unit
2) This same resistor changed to higher value. Replace with metalized type unit

FAIRBANKS-MORSE CONSOLE MODELS

- Reverberation, 1) insert ¼-in. rubber grommets in the screw holes of the metal "tone-projector" baffle at the points where the speaker is bolted to it

FAIRBANKS-MORSE 9A

- Oscillation 1) add 100-ohm resistor in the grid circuit of the 6C5G oscillator tube in early-run receivers to prevent parasitic oscillations

FAIRBANKS-MORSE 12A

- Increasing sensitivity on the ultra-high frequency band . . . 1) change the 50-mmf. condenser No. 33 to a 100-mmf. unit. This is in the grid circuit of the 6C5G oscillator

FAIRBANKS-MORSE 42, 42T-5B

- To lengthen . . . 1) locate and remove the 20,000-ohm ¼-watt resistor that is connected from minus 16½ volts C direct to ground. Leave it out of the circuit.

FAIRBANKS-MORSE 238-T32

- Noisy reception 1) vibrator unit mounted too tightly to chassis. Remount it, using two screws and insert ½-inch pieces of sponge rubber between each metal washer under the screw head, and the chassis

FEDERAL RECEIVERS (using types 201-A, 222 and 226 tubes)

- Type 'BA receiver 1) replace with a type 5Z3 rectifier tube. Reconnect the high-voltage leads to the grid and plate terminals on the tube socket and provide a 5-volt filament voltage by a step-down transformer or possibly by winding an additional secondary on the power transformer core. The positive lead is taken from one of the filament terminals.

FIRESTONE 1322 Auto Radio

- Speaker rattle 1) loose solder in speaker
Microphonics . . . 1) loosen rubber washers holding condensers
2) tighten all nuts and screws
"Metal-case . . . 1) loosen "Parker-Talon" buzz," screws, take cover off.
Rattle . . . bend, and replace

FIRESTONE (STEWART-WARNER) R-1431 Chassis R-143 Auto Radio

- Inoperative (vibrator may make loud mechanical hum) . . . 1) voltage readings across plate-cathode circuits of rectifier tube, but none across plates. Test for "shorted" 0.01-mfd. 1500-volt condenser across power transformer secondary (cond. is located on top of the transformer)
Ignition interference 1) If a dash control is used, and ignition interference is experienced, connect a short "bond" from the end of the

shielding which covers the pilot light lead to the control proper. Bond all cables and tubes which enter from the motor compartment, to "ground"

FIRST NATIONAL 10, 20, 20-B

- Oscillation 1) check all r-f by-pass condensers
2) check volume control
3) check detector output filter
4) reduce the screen voltages by connecting the volume control to the extra tap provided on the voltage divider
5) shorten all control-grid leads as much as possible to prevent interaction
6) try increasing the resistance values of the r-f bias resistors if necessary
- Hum 1) if all parts and tubes check O.K., remove the lead between the first filter condenser and the high-potential end of the voltage divider. Connect it to the junction of the choke and the speaker field. By-pass the voltage divider with a 1-mfd. 300-volt condenser

FORD III Auto Radio

- Weak at high-frequency end . . . 1) replace the 8,000-ohm cathode resistor in the '38 autodyne circuit with a new resistor of 6,000 ohms.

FORD 1935 Auto Radio

- Intermittent reception . . . 1) header speaker cone leads short-circuiting to steel spring support
Low volume

FORD-MAJESTIC Auto Radios

- Inoperative, 1) "leaky" or "shorted" 0.01-mfd. 1,000-volt vibrator condenser (at side of transformer) connected across the power transformer secondary. Replace with a 0.01-mfd. 1,600-volt condenser. Insulate the case with tape. Can containing transformer, rectifier tube

and vibrator unit easily removed by unscrewing nut and lock-washer holding down unit and lifting it out

Before replacing, check contacts for burned wires. Excessive current often melts the solder and burns the two vibrator wires

- File the points, resolder and remount
2) if the filter has blown, replace with a dual 4-4-6 or 4-8 dual unit as the capacity value is not critical
3) defective type 6Y5 rectifier tube. Replace with type 84 tube, changing socket to five-pin type and discarding wire connected to spray shield

4) if screen voltage is absent, remove speaker and plate cover to right of speaker

- Intermittent reception while riding, (performs O. K. on bench) . . . 1) intermittent short-circuiting of tube caps to shields. Insulate the tops by means of paper or cardboard discs

Excessive noise 1) connect a 0.25- or 0.5-mfd. low voltage paper condenser across rectifier filament

- 2) check vibrator, or replace
Persistent motor noise even when antenna is disconnected from receiver . . . 1) interference getting through louvers in back of receiver case. Cut a piece of copper screen same size as back of chassis, and fasten to case over louvers with self-tapping screws holding the case together

Control-cable . . . 1) fish a No. 10 spring-steel piano wire through from the control-head end of the sleeve. This replaces the original stranded cable which frays and breaks

FORD-MAJESTIC I18 Auto Radio

Fuse blows 1) lug on the pilot-light socket "grounded"

Reception cuts off (especially at low-frequency end of dial) . . . 1) replace the '6A7 tube—some have a tendency to stop oscillating at the lower frequencies

Double-hump tuning, Distortion . . . 1) 30,000-ohm filter resistor in AVC circuit in the grid-return of the '6E7 r-f tube "grounded". Bend its leads so it clears the chassis

FORD-PHILCO 1934 Auto Radio

- Intermittent volume accompanied by sharp "click" . . . 1) wires to terminals on inside of i-f coils touching rivets of trimmers and changing condenser capacities. Rearrange the leads. Realign at 260 kc i-f

Loud vibrator buzz . . . 1) if buzz stops when '75 second detector tube is removed, check the shaft-collar holding the volume control to the case. It should "ground" well to the case. Solder a short piece of bonding braid from the "low" end of the volume control to the case

FORD-PHILCO 1935 Auto Radio

- Intermittent reception (tubes O.K.) . . . 1) tap and wiggle the 0.01-mfd. condenser connected to volume control. If faulty, replace

FORD-PHILCO 1936 Auto Radio

- Intermittent reception (tubes check O.K.) . . . 1) tap and wiggle the 0.01-mfd. condenser connected to volume control. If faulty, replace

Hum (loud and deep) 1) check all filter condensers
2) if filter condensers check O. K., check the 0.25-mfd. condenser in the grid return of output tube for "open" condition

- Volume decreases when volume control is turned "on" full, Distortion . . . 1) secondary winding of second i-f transformer "open"

FORD-PHILCO 1937 Auto Radio

- Ignition interference . . . 1) the shield of the lead-in is soldered to a lug riveted to the can of the coupling transformer (located behind the header board). This riveted connection is often unsatisfactory. Solder the shield directly to the can

2) male end of antenna lead making poor contact in receiver socket. Solder short, heavy braid to shield on male cap and fasten securely under edge of junction box after scraping off the paint

3) if some noise still persists, bond the middle screw on receiver cover to dash, also to emergency brake bracket screw

4) if noise still persists, connect another by-pass condenser to the ignition switch

—grounding it to the radio receiver case. Leave the original ignition-switch condenser in place also

FORD-PHILCO FT-9

- Loud "squawks" when driving over rough roads . . . 1) first check vibrator when driving
2) check the condenser with a good condenser checker. Usually one of the 0.25-n fd. condensers (one of the part No. 30-4374 unit) causes trouble. In this case replace the entire block.

FORD-PHILCO N Auto Radio

- Inoperative, (tubes and voltages test O.K.) . . . 1) padding condenser soldering lugs on tuning condenser frame puncturing through insulating paper glued to can of fixed condenser beneath, thereby grounding out the i-f. Bend the lugs up and slip a heavy piece of insulating fibre under them

FORD-PHILCO F-1440

- Inoperative, Intermittent reception . . . 1) check resistors Nos. 10 and 15 (refer to schematic diagram for this receiver). Due to the position of these resistors at the 78 tube socket, a "short" or "intermittent short" often occurs at one end of their wiring leads. It is well also to remove one lead from resistor No. 15, cover it with spaghetti, and resolder it in place

FORDSON F, FX, X, 46, 52

- Inoperative . . . 1) antenna coil burned out. Connect a 0.001- to 0.1-mfd. 400-volt condenser (determine best capacity to use by trial) in series with the antenna lead. Realign the receiver
2) check the antenna for possible "grounds"

(Continued on page 65)

MANUFACTURERS' SERVICE

A RADIO NEWS READERS' SERVICE

RESISTANCE STANDARDS, Bulletin No. 146-1 describes Shallcross Resistance Standards, Decade Boxes, and special parts for electrical measurement. Other bulletins issued by *Shallcross Mfg. Co.*, Collingdale, Pa., are: BRIDGES—Bulletin No. 146-2. The *Shallcross Manufacturing Company* in recent years has developed a number of unique bridges. These are listed in this new bulletin. They are convenient for measuring d.c. resistance, high and low resistance, conductivity, and many other special problems. TEST SETS AND SPECIAL APPARATUS—Bulletin No. 146-3—announces a large number of test sets and special apparatus used in all sorts of electrical measuring, particularly in different phases of industrial work, electrical laboratories, etc. Free. (RADIO NEWS No. 5-100.)

AUDIOGRAPH SOUND CATALOG, issued by *John Meck Industries*, is now off the press. The complete new low priced Audiograph Sound equipment line is described in a new catalog just offered by *John Meck Industries*, whose address is Randolph at Elizabeth Street, Chicago, Illinois. Included in the models listed are the highly popular mobile types for operation on both 6v battery and 110v power lines. All models are licensed by ERPI. The catalog also lists many sound accessories; such as microphones, speakers, record players, etc. A copy of the Audiograph catalog will be sent on request to the manufacturer, mentioning this publication. Free. (RADIO NEWS, No. 5-101.)

STEATITE and ULTRA-STEATITE, a new 24-page indexed booklet just issued by *General Ceramics Company*, 30 Rockefeller Plaza, New York, is now available. Complete data on Steatite and Ultra-Steatite low-loss insulators, coil forms, bases, etc., is contained. Special application to ultra high frequency circuits, for which Ultra-Steatite was originally developed, are discussed. Special sizes and shapes of either Steatite or Ultra-Steatite, glazed or unglazed, can be supplied in any form that can be produced by pressing, extruding, casting, or machining. Material in the catalog covers mechanical tolerances, dielectric factors, electrical stability, etc. Copies of this booklet are free on request. Ask for Catalog 1000 or (RADIO NEWS No. 5-102.)

REPLACEMENT TRANSFORMER ENCYCLOPEDIA AND SERVICE GUIDE, the new *Thordarson Replacement Transformer Encyclopedia and Service Guide No. 352-E* is just off the

press. Published by *Thordarson*, the originator of replacement transformer encyclopedias, it lists the proper replacement for the power transformer, first filter choke, second filter choke, first audio transformer, second audio transformer and output transformer in thousands of radio receivers. Included is the Service Guide covering timely technical and sales subjects for better servicing. This book is being distributed free by leading Parts Distributors, or can be obtained by writing direct to the *Thordarson Electric Manufacturing Company*, 500 West Huron Street, Chicago Ill. (RADIO NEWS, No. 5-103.)

PLUG-IN RESISTOR TUBE REPLACEMENT MANUAL, available in the *Clarostat Plug-In Resistor Tube Service Manual*. This manual contains 32 pages of plug-in resistor tube listings; arranged by respective sets and resistor type numbers, and again as a numerical listing of all types with corresponding Clarostat standard and Clarostat universal types, and all essential data such as number of 6.3 and 25 v. tubes, total voltage drop, number of pilot shunts, current in m.a., number of pilot lamps and type numbers of same, wiring code, base wiring, type of base, and base wiring pin numbers. Copy of manual may be had by sending 15 cents in coin or stamps to *Clarostat Mfg. Co., Inc.*, 285-7 North Sixth St., Brooklyn, N. Y. (RADIO NEWS, No. 5-104.)

CROWE NAMEPLATE & MANUFACTURING CO. have printed two new catalog sheets covering the latest panel kits for auto radios. Bulletin No. 235, superseding No. 220 covers units especially designed for the *Philco* line of sets. All of these AR-4, AR-5, and AR-9 models are supplied with new-type control heads that fit into the instrument panel of 1940 cars when used with Crowe "C" Series panel kits. Other kits listed and illustrated are: Model "B" and Model "A." These are designed to specifically match all of the newer cars now on the market. Bulletin No. 232 describes their Remote Controls for automobile radios. (RADIO NEWS, No. 5-107.)

MALLORY-YAXLEY 1940 CATALOG, published by the *P. R. Mallory & Co.*, Indianapolis, Ind., contains a complete listing of their many products. These include standard replacement controls, midget replacement controls, rheostats, potentiometers, attenuators, hamswitches, push-button selector switches, all-wave switches, special switches, jacks, plugs, cable connectors, markers, terminal strips, knobs,

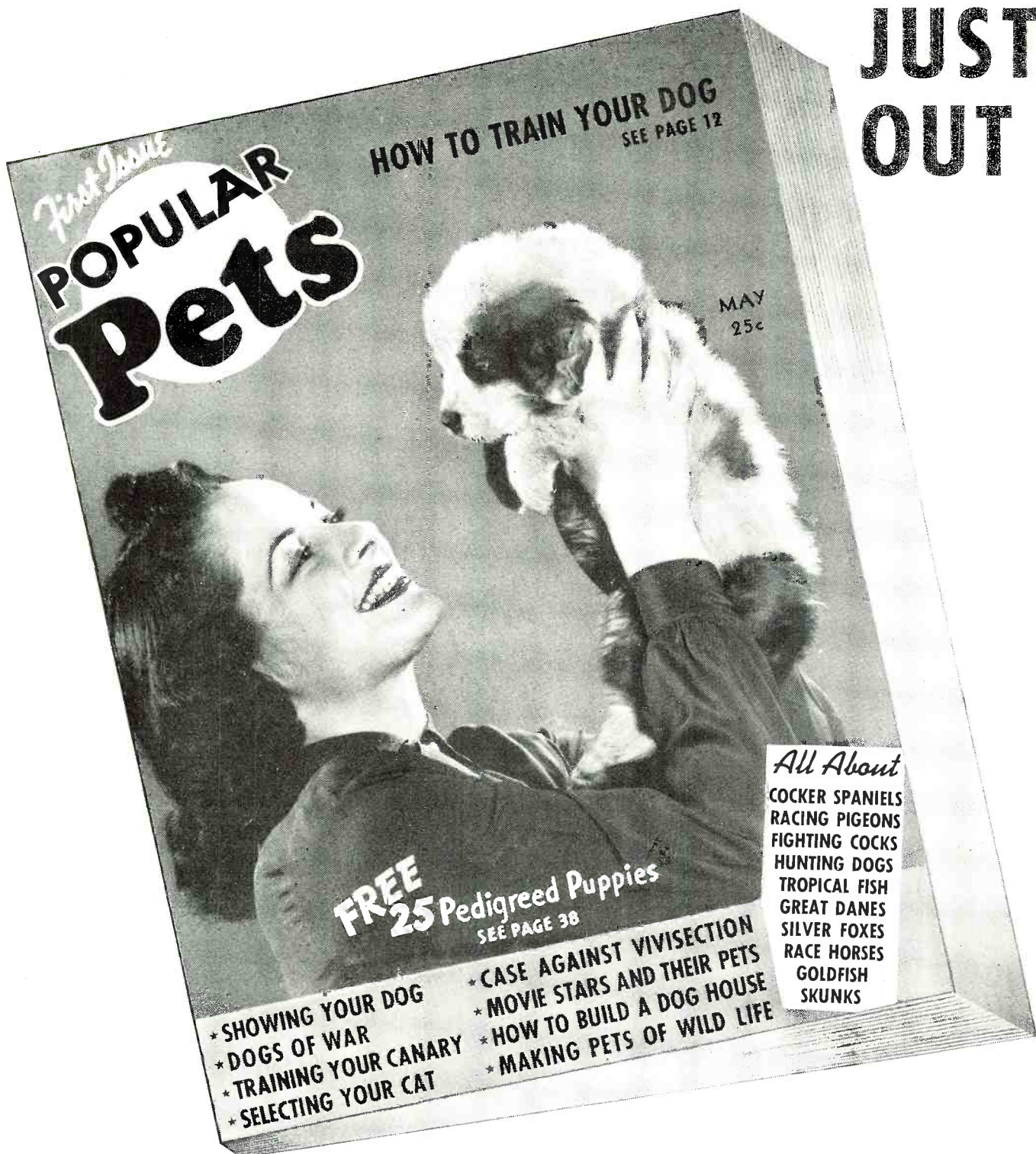
nuts, washers, screws, grommets, dial lights, panel lights, jewels, bulbs, vitreous enameled resistors, adjustable resistors, all forms of wet and dry electrolytic condensers, standard capacitors, replacement condensers, transmitting and automotive condensers, new television condensers, micas, vibrators, vibrapacks, battery chargers, and grid-bias-cells. Free. (RADIO NEWS, No. 5-105.)

SUPPLEMENT No. 5 to the 3rd addition of the MALLORY YAXLEY RADIO SERVICE ENCYCLOPEDIA, published by the *P. R. Mallory & Co.*, Indianapolis, Ind., is now available. This deals with Phono-radio Service data. Several popular record changers are completely illustrated with photos to show the actual working parts of the equipment. Complete service data is given and correct adjustments stated in clear terms. Of further interest is the chapter devoted to Crystal pickup installations. The Terminal impedance of crystal pickups and its effect on response is carefully explained. Equalizing, ever important in any installation, is covered, together with a special section devoted entirely to the now commonly used wireless record players. Price on application. (RADIO NEWS, No. 5-106.)

PERMO POINT Phonograph Needs. A catalog by *Permo Products Corporation*, 6415 Ravenswood Ave., Chicago, Ill., describes a complete line of high grade needles for all applications in both the recording of plastic and cellulose type discs as well as special types for the playing-back of these and ordinary commercial discs with maximum fidelity. Five types are described; a standard *elliptical* needle, designed for use with automatic record changers, the *microspect* needle, also designed for coin-operated machines is capable of over 2,000 playings. The *Fidelitone* is recommended for home record players where surface noise should be kept to a minimum. The *Transcrip-tone* needle is especially suited to high-fidelity play-back, as it is capable of response to as high as 10,000 cycles. The *Permo recording* needle has characteristics best suited for use in instantaneous recording where a quiet cut must be made for satisfactory results. Its cutting ability approaches that of the commonly used sapphires. Free. (RADIO NEWS, No. 5-108.)

INTRODUCING a new service to RADIO NEWS readers. Each month we will print short reviews of the leading manufacturers' literature. Under
(Continued on page 64)

JUST OUT



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- * DOGS OF WAR
- * TRAINING YOUR CANARY
- * SELECTING YOUR CAT
- * CASE AGAINST VIVISECTION
- * MOVIE STARS AND THEIR PETS
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Hamchatter

(Continued from page 37)

sumably running 700 wts to a beam) to chats wid yls when the Xyl is visiting. hi hi Ernie.

LYH burnt some holes in his TZ20s in the final and bot some new TZ40s. Guy gave the old tubes to LO to use to devorate the shack. LO is now using the tubes on 10, and pushing into them 750 vltz at 230 mls. We recently received notification from the FCCC of BCL interference. Having recently cleaned up all the BCI I was very surprised to get the complaint. Upon investigation found that the BCL had heard our sig two times covering the entire broadcast band. Also when the rcvr was turned off and plug pulled out she said our signal was still coming in, and the only way she cud eliminate the interference was to take the rcvr into the rear of the house. After carrying on several tests found that no such condition prevailed. Puzzled I sat down to write the customary letter to the FCC on my findings. On reference to my log found that on the days which the BCL heard my sig I had not been on the air. In a complete for abt the situation. I asked the 2ed op to try and help dope out the trouble. He sn brought forth the answer. On the days when we were heard we had been testing out a new P.A. system in the back yard and being hams kept calling CQ into the mic and signing our call which she heard and thought was coming from her radio. Hmmm!

New recruits on ten: MKM, MIG, MJE, MKV, BZI, UX, MFY, MBE, MBK, LOK, KNW, ARY, and JUZ.

JIS has been sick and now is recuperating. How abt dropping Charlie a line fellows.

HDJ has purchased an S-20 R for his summer camp.

DNL has a new Triplet Mod Monitor and thinks its fb.

FVO on 75 heard LUB, an old time 75 meter ham who just got a new call. Oily told LUB to come back on the band, LUB did. U can find him on FVO's freq. hi hi.

While playing around the shack the other day I discovered how to make an inexpensive variable crystal. Place a xtal (preferably a Bliley wid no drift) between two pieces of fine sandpaper, between xtal and paper insert iron filings on both sides. Then attach wires to several filings.

When the old QRM gets too tough on ur freq. all u hve to do is to give the rack a kick for a 5 kc. shift, or for 10 to 15 kc. shake the rack. 3GGS port in Cambridge is attending Harvard. His outfit on ten is 60 wts to 6L6's and 6L6's in class B.

KPX on leave from Coast Guard Academy. JWV from these parts is now located in Elgin, Ill. His new call is 9EWD.

KC4USC can be heard on 7005 kc. and has a lot of traffic that he is trying to get rid of. But due to the ECO's jumping on his freq in an effort to get in contact wid him, he has been living little or no luck. He tells us that they are going to be down there quite some time and u will hve plenty of time to get him.

KC4USB is on ten and wrking the W5's. Their sigs arn't vry strong so u better tune slow wid the BFO or u'll miss them.

HWV has pulled apart his ten meter rig and left the band for 2 1/2 meters. He is using long lines to 811's.

MIG will have an XYL instead of a YL by May 31. (And Nick was a nice fella. Too bad.) One of the new local hams tells us that his chief reason for getting his ticket was becuz it was the only way he cud talk to a friend of his, who also is a ham, while his kid sister was on the telephone.

BDM's XYL says that she knew that the yls cud talk, but she says, "when the hams start chewing the fat, they chew it lean." Ain't it the truth.

LYH is going to put in 75T's shortly in place of his TZ40's, and he is dreaming of a Mims Twin 3 in the near future.

WV has one of those new Browning Freq meters. Miles has rebuilt his 80 meter rig and is vry active.

GFW wked N.H. using an ordinary 40 meter zepp, and got the rept that he was the loudest Boston Station ever heard there. (I've got a crd from the same state Rudy es my rept is 5-9—on u beat it?)

LLD is on 75 fone wid a pr of 809's in pp. wid cathode mod. rcvr. SX16. He is attending Atlantic Union College, where he is operating the station.

DNL—FIB—FH were in a 3 way. DNL gve the following rept: FIB was Q-5 S-6 or R-9 plus. FH was 23 db above S-9 or 23 db above 100 microvolts. Or in ordinary ham language Bob explains that FH's signal was 1,000 times stronger than FIB!

KF6AFG is on 20, his Qth is Canton Ilse.

XU8MC on 20, but always messed wid cw. LEC-LMB-KSA and other helpful (?) hams visited BDM, an old timer who was bitten by the bug again, to iron out some trouble JOE was having wid his outfit. From the sound of Joe's sig I think they succeeded. KBN "The Voice of Northeastern", is the club station of the Northeastern University Radio Association. The station which was built by the members operates from 10 to 160 wid a full KW input on fone and c. w. The rcvr is a Super Pro which certainly drags the sigs in. The only difficulty is the electric interference on the higher freqs, but the QRN will sn be cleared up wid the help of several professors who are members.

WV is looking for a pr RK-25's. How abt it? For u fellas that need Zone 23, look for AC4JS abt 7:45 p.m. on 14350, also PY7VB a little lower.

Heard 5HQF portable marine on the S.S. Merwynore, coming into Boston harbor for a five day stay. We've been following the Chief from Portland, Oregon until he docked in the bay. On his boat he had 5 million ft. of lumber that was stacked 12 ft off the deck. Chief always puts in a swell sig. His rig is 70 wts to 6L6's and a HQ-120X wid a 8K that was grounding on the steel deck. The last time he was in town LMB and LBU paid Chief a visit, they were so sure that the 90ftx4ft hard wood beams was just what they needed for their beams. The Chief put a few of the mates on watch while the boys were up wid 5HQF this summer when he is on vacation touring the states wid a prt mobile affair. Glad to hear IPA back on the air. "Hi Wes, the freq is 29.068." CFI on 160, and as he puts it, "wid a full KW." LKG running only 15 wats to a HY-61 on 160 fone is giving some of the hi power boys a little competition. Best DX is Neb. (Es I do mean Ole. "one sissie" wish I cud go up there but I spouse u hrd abt my BCL.

If u hear a racket some Saturday evenings, don't bother to pull in the Citizen's Alarm, because it will probably be JKR, IYU, and JLC. These fellas get together every Sat. nite at one of the groups homes for a rag chew. (?) All the stations have been/or are President of the Brockton Radio Club. They are known as the "PP's" or "Past President Club." P. S. JKR still wants to ask what Confucius said. . . . Why don't ya ask SI, he knows all.

Better put ur prefix "W" before u sign ur call fellas, even when wrking the station across the street. Gess u know by now that pink don't go so well on the wall among the pretty colored QSL's (and pictures). During one of the Round Robins on 10 the other nite, AJA mad such a lengthy transmission that CIB, the next station to transmit, had several glasses of water etc. look a shwe and bath and still had plenty time to catch a couple of winks before it was his turn. Who can beat that one? MME of Hull is a new ham on ten. Ruddy altho he only got his ticket a few days ago is known as a real old time rag-chewer, which are vry scarce on the bands of late. Ruddy has a new Skydrer SX-23 rcvr. His rig uses T-55's and a 3 el rotary. Welcome into the Ham Fraternity Ruddy, and the best of luck.

When some of u need a little extra dough for a new piece of equipment, why don't u do what AJA and DNL do. DNL has rigged out his car in such a manner that the slightest jar on any part of the car by any other auto, the doors instantly fly open and the seats lift up and toss the occupants in the driver's position (DNL) and the one next to him usually AJA, out into the street. If there happens to be another ham in the rear, Bob has fixed it so they too can cash in on the crash. The sides open up and they too hop out and lie in the middle of the street. If the affair looks good enough to Bob to sue the other car, he gives them the high sign to wait for medical assistance. If the collision doesn't look worth bothering wid, they get up off the ground, help put the car together agn and proceed on their way. So as there won't be any misunderstanding on the way the money will be divided DNL has printed up some contracts which he has the occupants of the car sign before they undertake a ride. Bob is vry reasonable abt the thing, he goes 50-50. (The way he has the car outfitted we think that the insurance Co.'s wud cut out better if they bot Bob a Kw rig.

WBZ a local BCL sta is erecting an UHF sta at Hull, Mass. The trans. is a hi-powered RCA rig.

I T CAN'T happen here—but it did! A few Sundays ago New York City's WEAF was heard signing at the end of a program. A brief moment later an excited voice broke in with "Correction please WJZ". Just how the mix up happened we don't know, but no doubt the FCC was quite startled to hear such a large frequency shift. Wonder if they got a pink ticket.

20 Meter DX has been on the up-grade for the past few weeks. HE5PA in Port-au-Prince, Haiti, was heard complaining about the cold down there i.e. 70°.

HK8CC pounds through on about 14100 phone. He is using 200 wats input in Bogota.

HA9Q and LY1J keep Europe on in the phone bands. 7MC doesn't produce much although K5.ED (7093, T9) and KP6ROY (7170, T9) are worth going after.

EK1AF in Tangier still pounds through every day. Jose is running 500 wats into a two element rotary and uses an SX17 receiver.

OQ5AY and OQ51M are active in the Congo on 14MC. with OQ5AB turning the trick on ten.

If you need Asia for a phone WAC XU1B, XUSKJ, XUMMX, and a few other assorted XUs are coming through in the early a.m. on the East Coast. 80 meters has produced XEJAC (phone) and CM6AD and CM6RC on c. w.

It isn't necessary to know the Cuban frequencies as long as you know their notes. K4FKC, W3HDQ/K4 and several YV's are also active on 80.

W8NCJ took advantage of W2IOP's EL2M offer and Ray now has 46 countries confirmed. Using 100 wats he has done vry well for himself, holding WAC, WAS, and WBE certificates.

W4DUG is at the Southern Florida Fair. Among traffic originating there was one for Kay Kyser from Hal Kemp.

W2IOP finally got on phone and his second CQ was answered by W9FHH on c.w.!

W2OT's rotary is finished at last, except for the gears which stripped yesterday.

The radio family, W2JDG, W2JZX, and W2LJJ are all rebuilding their equipment.

W2LEL has a transceiver that he takes out on his dates to impress the YL's. We can't decide whether that "impress" business is on the level or he just can't get away from ham radio.

W2JRG turns out to be a real old timer who got back into the game. Guy started in ham radio when he was 9 years old. Pre-war (World War 1) calls were GS, 2XS, 2AKA. Back on the air since 1936 he is busy keeping East New York Section on the air in the various ARRL contests.

W2KIK is still serving the trade at Jamaica.

W2MNR manages to work out with E9 reports in Nebraska and the deep South using 26 wats on 160 meter phone. Joe also has a marine mobile aboard the yacht "Iegie."

W2GSC may be heard on 2 1/2 with a transceiver.

W6QQL came East for a visit and it was our pleasure to have a long talk with George. We sort-of pumped W6QQL, who is one of Nevada's most active stations, on operating conditions in that second-hams paradise. It is much easier for a Nevada station to CQDX since almost every DX station needs that state for WAS. It can be said without any hesitation that Nevada stations get the highest percentage of QSL's received by any W. W6QQL uses a pair of T40's into a three element rotary on 10 and 20 phone and c. w. However a 450T is going into the final shortly. Just in case you need Nevada for WAS don't write W6QQL for a schedule because the number of such requests received makes it impossible to oblige. However, George does QSL 100% even if it takes time to keep up with the voluminous mail.

More dirt about "The" state. Boulder City, with a population of 3,000 has 22 hams, of which the following are active, c. w.: W6QQL, W6QQB; W6RJI; W6PWE; W6POD; W6HJZ; W6QQU; W6RWX; W6RCQ; W6BVZ; W6MRT; W6QME; Phone: W6GSB; W6OTU; W6QXH; and W6QLD. At this point it is correct to say you'd never know they are active if you're trying to work Nevada for WAS.

In Reno W6CW and W6FUG are among those active. Most of the boys are connected with the Los Angeles Bureau of Power and Light, or Edison.

W6RWX and W6RCQ are MD's; W6RJI is an invalid who has come a long way in the short time he has been on the air and is vry active. No doubt almost all of the Nevada hams can relate some mighty good stories about stations after them for WAS.

W6QQL has a handbook, some neckties, and other miscellaneous gadgets received as bribes. Quite a few of the gang have received telegrams, and all of them have the pick of the stuff coming back to their calls.

W2KBX is a flyer for TWA and holds pre-arranged skeds with various hams on the ground on his route between New York and Chicago. They use a flashlight and Bill uses the landing or navigation lights of the plane. So if you want to work Heaven just let W2KBX know. Bill has held a call in every call area except the seventh.

W2MET's 6L6 is really going to town, but the new rig is on its way at last. W8SVB is operating portable in Wilmington, Del. W3GMY is putting in phone for the benefit of the YL. et al. (Like some W2 we know.)

W3BZE reports he and the Richmond crowd near died when the temperature dropped to 7 below "Down where the South begins."

W2JNO is sporting a new portable for 2 1/2 in his auto. Best DX so far is the first district.

The recent blizzard that swept the Eastern portion of the country saw all emergency nets standing by. The boys on the end of the NY-LL net were using their emergency gear soon after power failed, but fortunately no actual emergency arose.

The Frankford Radio Club of Philadelphia was a bit upset by our remarks that the majority of them were newcomers and hence super-active. A poll showed 50% of the gang are holders of their ticket for a length of time, putting them in the OM class. At any rate they're

(Pse QSY to page 57)



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Oscilloscope

(Concluded from page 33)

trolitic filter condensers, C21 to C24, are mounted directly beneath this panel.

The on-off a.c. line switch, S6, is mounted on the rear of the beam intensity control potentiometer, R26. This arrangement protects the 902 screen from severe burns ordinarily occasioned by switching on the instrument when R26 has inadvertently been set for maximum brilliance.

Construction Hints

While not readily visible in the photographs, rigid mountings are provided for all condensers and resistors, and duplicators of this instrument should take pains to include this refinement. The liberal use of insulated lug terminal strips for mounting both condensers and resistors is strongly advised. Likewise, in instances where leads must run over an appreciable distance, it is recommended that cable clamps (or, in their stead, curved soldering lugs) bind them securely to the chassis.

Solid mechanical construction must be employed throughout. The oscilloscope must be ruggedly built, even though it will be handled carefully in use. Neither chassis nor panel should be capable of any appreciable motion.

Conscious effort must be made to keep all leads carrying a.c. well separated from those conducting d.c. The tube heater leads must be twisted into pairs and fastened firmly to chassis. All leads must be as short and direct as practicable, with the admitted exception that those which pass down through the pipes of the 902 shield box must necessarily be long enough to allow the back plate to slide freely and the 902 socket to be rotated.

Good quality shield braid, grounded at both ends of its length, must cover leads from the vertical and horizontal plates of the 902 (socket terminals 4 and 6), the control electrode (socket terminal 5), from the V and H jacks to the switches S1 and S2 and from

these switches to the potentiometers R3 and R11, and from these potentiometers to the 6SJ7 grid terminals (socket terminals 4). It would be an added precaution to enclose all of the signal input jacks in back-of-panel shield cans, although this refinement was not included in the model shown here.

The chassis and 902 shield box must be subjected to a thorough demagnetizing process before the instrument is considered completed, since only a trace of permanent magnetism is needed to produce undesired deflection of the electron beam, resulting in distortion of the pattern.

After inserting the 902 tube into its socket for the first time, the tube and socket should be so rotated that an imaginary line passing through socket terminals 3 and 7 is horizontal. The horizontal trace produced on the screen when the scope is then placed in operation should be true horizontal, or very nearly so. The fine correction which very likely will be necessary may then be made by further rotation of the tube by the required small amount in the proper direction.

Operation

While it is not the purpose of this article to discuss the theory of the cathode ray oscilloscope, that matter having been covered quite completely in other issues, it is in order that a brief description be given of the operating combinations possible with this particular instrument.

Signal voltages to be observed are generally applied to the vertical plates of the cathode ray tube, either directly or through the vertical amplifier. The two signal leads are accordingly connected, one to the V jack; the other to a C jack. If direct input is desired, the vertical switch, S2, is thrown to EXT. If it is desired to amplify the signal before applying it to the vertical plates, S2 is thrown to AMP and the vertical gain control potentiometer, R3, adjusted to give the signal pattern the desired height on the screen.

If a linear time base is required, such as for observation of the actual

wave form of the applied signal, it may be supplied by the internal 884 sweep oscillator which feeds the horizontal plates through the horizontal amplifier. To secure this operation, switch S3 is thrown to LIN, switch S1 to LS, and the horizontal gain control potentiometer, R11, adjusted to give the signal pattern the desired width on the screen. The proper sweep frequency is obtained by setting S5 (the coarse frequency adjuster) to the approximate frequency and varying frequency adjustment potentiometer, R16, until the exact frequency is obtained. It will be noted that one point on the frequency range switch, S5, is not connected. The sweep circuit will not oscillate in this position and may thus be switched off when not needed.

If it is desired to synchronize the sweep oscillator with some external signal generator, the synchronization selector switch, S4, is thrown to EXT, the generator connected between jacks SYN and C, and the synchronization control potentiometer, R13, adjusted to secure a perfectly stationary pattern on the screen. If, on the other hand, it is desired to synchronize with 60 cycles a.c., S4 is thrown to 60 ~ and R13 adjusted as previously described. The synchronization in this oscilloscope is very positive in its action, definitely *locking* the pattern, which may even be a single cycle, on the screen as long as it is desired that the picture remain stationary.

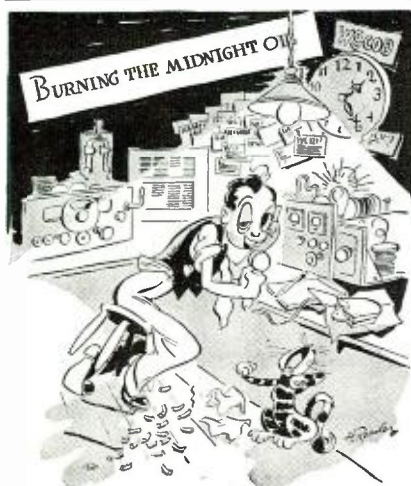
If a linear time base is not required, but the signal is to be swept by an external oscillator or comparable device, S3 is thrown to ESA (external sweep amplifier) and the external source connected to jacks ESA and C.

In some applications, it is desired to impress a signal upon the horizontal plates of the 902. To secure a direct connection between the signal source and the horizontal plates, the signal is fed into jacks H and C and switch S1 thrown to EXT. Amplification of the horizontal input may be obtained by throwing S1 to LS, S3 to EXT, and applying the signal to jacks ESA and C.

Other applications and manipulations will become apparent at once as the builder's knowledge of oscilloscope adaptations progresses. It is recommended that the various papers be read as they appear on the subject of oscillography and that Rider's *Cathode Ray Tube at Work* be studied seriously.

The complete radio man cannot sacrifice this versatile and immensely useful modern tool, as it definitely opens new and challenging avenues for good work and interesting and enlightening investigations.

In conclusion, the writer joins the tube manufacturer in warning the builder that cathode ray oscilloscopes are operated at potentials that are dangerous. Be careful, since points that are normally low potential in more familiar circuits are apt to turn up dangerously high in the scope. It will be noted that high voltage coupling condensers have been included.



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The C. Q.'s have died down . . . too tired to Q. S. L. . . . but Old Man Centralab never bats an eye. Day in and day out this old owl is "wising up" to new developments in the business. In ham shacks . . . on serv-

ice benches . . . and in the laboratories . . . the word "CENTRALAB" continues to stand for dependability . . . quality . . . and performance. Day or night . . . play safe with Centralab!

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Volume Controls
Fixed Resistors
Ceramic Capacitors
Wave Band Switches

F. M. Receptor
(Concluded from page 12)

times per second that the carrier shifts from its lowest frequency to its highest frequency and back.

The frequencies utilized at the present time for this type of program lie between 39 megacycles and 44 megacycles. Those familiar with television performance will recognize that these frequencies give reliable performance only slightly beyond the optical horizon but in certain cases travel very long distances. These long-distance transmissions can not be relied upon to be consistent, however.

In the Frequency Modulated Receiver, a stage of r.f. amplification, easily identified in the circuit diagram, has been employed to give high sensitivity and signal-to-noise-ratio and to provide a much better image-ratio than could be obtained without its use. As in television receivers, the r.f. amplifier tube employed is an 1852 giving very high gain, but because the pass band, 150 kc., is much narrower than the 2 to 3 megacycle pass band of a television receiver, it is not necessary to broaden the r.f. circuits by connecting resistances across them as in the case of television r.f. circuits.

There is an interesting point in the circuit diagram to observe in the cathode circuit of the r.f. amplifier. There are two resistances in series, one of which is 110 ohms, bypassed to ground in the normal manner, but the other resistor is *not* bypassed. This un-bypassed resistor introduces some degeneration into this stage and stabilizes the action of the tube. It also reduces the effect of the plate on the grid circuit and reduces the loading of the grid. If the tube had its entire cathode resistor bypassed, it would act as a resistance shunted across the tuned circuit, a phenomenon associated only with operation at very high frequencies.

The circuit of the i.f. amplifier looks very much like a television amplifier circuit, inasmuch, as all transformers have resistors connected across both windings. This is done to smooth out the humps in the tuning curve after the transformers have been "overcoupled" to give the width of band pass necessary for proper operation.

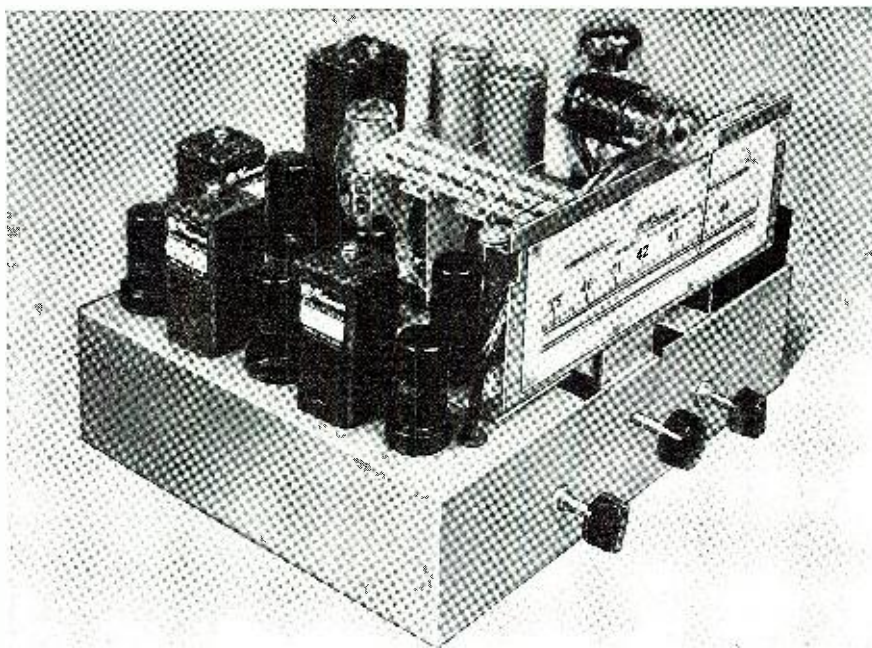
Because of the number of stages used to obtain the selectivity characteristics desired, it is not necessary to use tubes with extremely high gain. The tubes used are therefore, not television amplifier tubes, but tubes more commonly used in normal receiver design, type 6SK7. These tubes perform much like the more common 6K7 but have a little more gain, and have the convenience of the single-ended construction with no grid cap on top. As explained in a preceding section, the gain of the amplifier is controlled automatically by voltage fed back from the "Limiter Tube" for that purpose.

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illator and first detector) is a type 6SA7, noted for its freedom from oscillator frequency shift. The feedback necessary to make the tube oscillate is obtained by connecting the cathode to a tap on the tuned circuit. It is a peculiarity of this tube that the lead from the cathode of the tube to the tap on the coil must be *very* short when working at high frequencies.

Since the proper functioning of the detector circuit requires the mid-frequency of the i.f. system to remain tuned to the center of the i.f. response curve, every effort has been made to prevent drift in any of the important circuits.

Although it is most convenient to align the receiver with a frequency-modulated oscillator, a satisfactory job can also be done with an accurately-calibrated signal generator or oscillator covering a range in the vicinity of 2.1 mc. The object of alignment is to adjust the i.f. trimmers so that the i.f. system has a pass band from 2.0 to 2.2 mc., and then to adjust the detector coil to cover exactly the same band.

Proceed as follows:

1. Disconnect the mixer coil, the center coil on the r.f. assembly from terminal No. 8, control grid, of the 6SA7 tube. This is point "C" on the circuit diagram.

2. Connect the "hot" output terminal of the generator or oscillator to this grid, and the ground terminal to the chassis.

3. Connect a 0-50 or 0-200 microammeter in series with the ground end of the 100,000 ohm resistor R1 which connects the black wire from the 3rd i.f. coil to ground. This will measure the grid current of the 1852 "Limiter Tube." Thirty to 100 microammeters is all that should be expected at this point. If an Analyst or electronic voltmeter is available, it can be connected directly to the grid return lead (black wire) of the same transformer without disconnecting the resistor. This measures the Limiter grid bias voltage. A reading of 3 to 10 volts should be considered normal.

4. Set the oscillator at 2,175 kc. and align the i.f. trimmers for maximum response. Then go over all trimmers and tighten (turn clock-wise) them very closely until, on each trimmer, a barely perceptible decrease in Limiter grid current or bias voltage is noted. Then adjust the oscillator dial to 2,025 kc. The grid current (or voltage) should be approximately the same as at 2,175 kc. If it is not, adjust the i.f. trimmers for maximum response, leaving them in the *loosest* position which will give this response. Then repeat the previous adjustment at 2,175 kc. The output should remain nearly the same when tuning between the two frequencies, and should begin to decrease on each side of the two frequencies. The approximate i.f. response curve is shown in Fig. 1.

5. Remove the microammeter and re-connect the 100,000-ohm resistor as it was before.

6. Connect the microammeter in se-

ries with the ground end of the 100,000-ohm resistor, R2, which joins the 2-megohm resistor in the detector load circuit to ground. A high impedance electronic voltmeter, such as that in the Analyst or similar device, can be connected between the junction of the 100,000-ohm and the 2-megohm resistor and ground. (Point B.) This measures the detector output current or voltage.

7. Adjust the test oscillator to 2,200 kc. Adjust both trimmers on the detector coil (01142) for a peak. Re-adjust the oscillator to 2,000 kc. Reverse the connections to the microammeter or electronic voltmeter or read reversed voltages. Again adjust the two trimmers for a peak, turning them only a small amount one way or the other. Then slowly tune the oscillator to 2,100 kc.; the detector-output current or voltage should decrease. Carefully re-adjust the trimmer nearest the 6H6 tube until the current or voltage is zero. An insulated screwdriver is essential; this is an extremely important operation. Turning the oscillator dial one way should make the voltage positive and the other way negative. Again set the oscillator to 2,200 kc. and adjust the trimmer nearest the 1852 tube for a peak. Repeat the previous operation of centering the zero reading on 2,100 kc. as was done with the other trimmer. This completes the alignment of the i.f. channel. Re-connect the 100,000-ohm load resistor R2 to restore the circuit to its original condition. An approximate detector response curve is shown in Fig. 2.

8. Re-connect the control grid of the 6SA7 to the mixer coil and disconnect the generator from this point. (Point C.)

9. Connect an antenna to the Receptor and again prepare to measure the Limiter grid current or voltage.

10. Set the dial of the Receptor to the frequency of any F-M transmitter that is within receiving range. The oscillator trimmer is the small variable condenser, provided with a screwdriver adjustment, on the sub-chassis near the dial. This should be adjusted so that the received signal produces a current or voltage reading on the Limiter grid. Then adjust the trimmers on the mixer and antenna coils for maximum reading at the Limiter grid.

These trimmers should align rather loosely. If they are tightened so that the frequency of the r.f. circuit equals the oscillator frequency, spurious oscillations and responses are produced. The oscillator frequency is normally 2,100 kc. lower than the signal frequency. When the above adjustments are completed and the 100,000-ohm Limiter grid load resistor is again grounded, the Receptor has been aligned. Do not attempt to operate the Receptor without an antenna.

Inverse Feedback Amplifier

Some receivers, like the one shown, are manufactured as a self-powered tuner to be used with an external amplifier. Such an amplifier may be a regular public-address unit. —50—

War Comes to the Serviceman

(Concluded from page 8)

despatched wrapped up in several thicknesses of paper in order to meet urgent demands. Naturally, transit damage was abnormal but now that the initial period of change from peace to wartime conditions is passing the situation is improving as supplies of various materials are filtering through again and we are getting proficient in driving about and handling articles in darkness.

A type of complaint which gave us a great deal of trouble took the form of the sudden inability to receive French stations. A popular transmission well received in England was *Radio International* on 212 meters. It broadcast sponsored programs supported by English manufacturers of popular merchandise and was a favorite morning transmission to which many housewives tuned-in before our own *B.B.C.* started its early morning program of light music.

This is a telephone conversation concerning the trouble.

"Is that 'Radio Service Limited?' This is Mrs. Jones speaking. Please send a man around as soon as possible as my radio has stopped."

"We're sorry to hear that, Mrs. Jones. What happened exactly. Have the dial lamps gone out? Is there any noise at all from the set?"

"The wavescan in the front is lit up but I can't get *Radio International*. My husband left it tuned in for me and it suddenly cut right out. I've tried turning the volume control up but that only makes a rushing noise come out of the loud-speaker. I am sure I've done nothing wrong with the set."

"That's all right, Mrs. Jones. *Radio International*, you said? Just hold the line a moment while I check up the station on a radio here. (Slight pause.) You're quite right, Mrs. Jones. You can't get *Radio International*. Neither can we! It's off the air just now and so are other French stations. Probably an air-raid precaution in their neighborhood. . . . That's all right, Mrs. Jones, no trouble at all."

And that really is the cause of the trouble. When enemy aircraft are reported over France, the French broadcast stations are closed down to prevent their transmissions being used by the D.F. equipment on the enemy planes for navigation purposes.

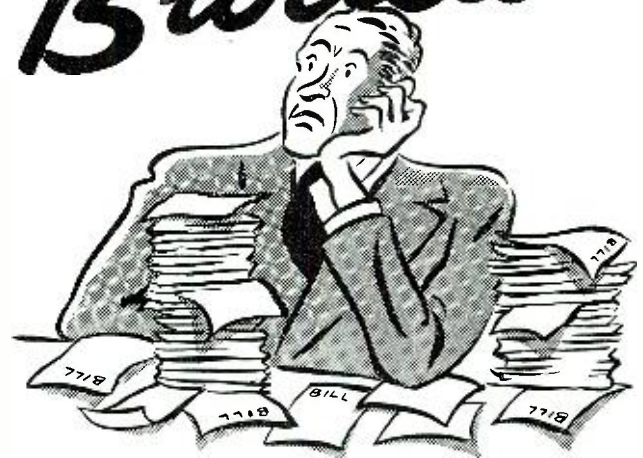
We had the same problem to tackle with regard to enemy planes approaching our island shores but we have solved it in a different way.

[Here the censor has cut a whole page and a half from the manuscript. The information, however, we have, and this is it. As previously described in *RADIO NEWS*, April, 1940, issue on page 55, the British system was worked out by Sir Noel Ashbridge, Chief Engineer of the British Broadcasting Company. Originally it has been Sir Samuel Hoare who had inquired in the House of Commons what, if anything, was being done to circumvent German bombers from using the B.C.C.'s broadcasts as a homing beam on which to ride right into London. The system is this. All, or at best most of the British broadcasters are operating on the same wavelength. The stations are scattered throughout the Isles. From time to time, and in accordance with a mystical schedule known only to Sir Ashbridge, transmissions are switched from one station to another. Since the majority of the receivers have excellent A.V.C. circuits, there are only 20% of the listeners who notice any substantial change in the volume received. By not knowing exactly where the stations are located, and by having them switched often, the Germans would be hard-pressed to ride any one "beam." Another reason given by Sir Ashbridge for continuing the broadcasts even though the Germans were approaching the City of London, was that were the broadcasts to be cut off, this alone would serve as a warning to the bombers that they were approaching their destination accurately. It is said that no warning whatsoever is given via the radio that an air raid is in progress so as to complete the possible deception of the enemy.—Ed.]

There has been brisk trade in battery receivers both with regard to sales and service. Many private persons as well as utility corporations bought battery receivers—mostly portables—as stand-by receivers in case failure of the electricity supply deprived them of the use of mains operated equipment. Many old battery receivers have been unearthed from the junk pile and fitted out with new batteries and valves to give a further period of unexpected ties have also brought about a big rise usefulness.

Evacuation and transport difficulties have also brought about a big rise
(Please turn the page)

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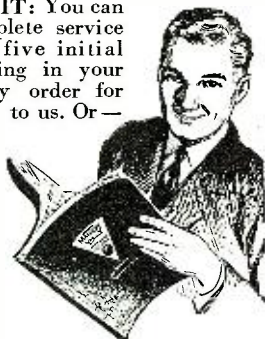


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in service work. Some people are leaving towns for the country while others, because of petrol rationing or other reasons, are coming into towns to be nearer their work. Many take or bring their radios with them and want advice as to whether they are suitable for the mains supply of the district or perhaps the receivers have been damaged in transit. In this country we still have large areas served by old electricity supplies which are not standard 230-volt, 50-cycle stuff. Many cases can be dealt with by a simple adjustment to the mains transformer and motor connections or replacements of these components where mains supply periodically enters into the problem.

Other cases are not so easy, such as a.c. receivers brought into d.c. areas and vice versa. Where large and expensive equipments are concerned the supply or hire of a suitable rotary converter may be considered, but it is generally more beneficial to all concerned in the case of radio receivers and medium priced radiogramophones to recommend the purchase of a new instrument. If the client thinks that his future movements are still uncertain the valuable features of a.c.-d.c. instruments are stressed.

The servicing position in the trade is aggravated by the petrol rationing scheme and the serious reduction in the ranks of young service engineers due to the calling up of them for war duties. This has seriously affected many firms. Radio, very much a young man's game and although radio servicing is on the list of "reserved occupations," it is at present only such to men over thirty years of age. Quite apart from men lost, due to conscription, great numbers of older men were called up at the very outbreak of the war because they were ex-naval, military or air force reserves or belonged to voluntary organizations such as the *Civilian Wireless Reserve* or *Territorials*, which were at once established on a war basis and the personnel distributed amongst the fighting forces.

Consequently, there is a large demand for service engineers over thirty and a small boom in the sale of text books on radio servicing which are being bought by salesmen, managers and shop owners who had allowed their technical knowledge to get rusty but who are now trying to fill the breach in the ranks of the service engineers.

Bomb Detectors and Air Raid Precaution Sentinels

The necessity for keeping a constant watch for air raid warnings has given birth to many schemes whereby Public Address equipment may be used to minimize the number of personnel required for watching purposes or in small business organizations and large domestic buildings to entirely dispense with a watcher. All these schemes provide work for radio and Public Address engineers if they are awake to the possibilities.

As an example of the type of installation required we may cite the case of an extensive factory comprising many

multi-storied buildings covering several acres of land. Such an establishment will have its own *Air Raid Precaution* control center situated in a well-protected location with telephone communication to all subsidiary branches of the service such as *Fire Fighting, Rescue, Demolition, Gas-Decontamination Squads*, etc. In addition, communication is maintained to various exposed watching points whose duty is to report back any information concerning bombs falling in their vicinity and to give particulars as to what has happened—*High Explosives, Gas or Incendiary Bombs*—so that the control center can send the appropriate squad to deal with the emergency. In addition to the *A.R.P.* personnel there are military units with the latest type of machine guns to deal with low-flying aerial attacks, but these units do not come into our present considerations.

Now, in the event of an air raid warning being sounded, the employees of the factory will all be marched away to their shelters and the *A.R.P.* personnel will take up their action stations. Vast areas of the factory buildings will be entirely vacated and the watchers in their heavily sandbagged watching posts can only see whole buildings through specially arranged slits between the sandbags. To watch a building adequately, at least four posts are required, one for each side of the building and, in the case of incendiary bombs, nothing may be seen from the ground level until the bomb has had ample time to ignite the room or workshop in which it has come to rest—generally in the top story and quite likely in the very middle of the building for perversity's sake. Consequently, the watcher can only give the alarm from his outdoor, ground level watching post when the glow of the fire is visible which will not be until a really big fire is under way, especially if the raid is after dark and all windows, etc. are blacked out in accordance with regulations.

Public Address equipment, however, enable this watching staff to be considerably reduced in the following manner. In a well-protected watching post (even in the *A.R.P.* control center itself, where convenient) an equipment is installed which comprises in one unit a pre-determined number of amplifiers. The input to each amplifier or channel is connected to one, or a group, in parallel, of microphones situated in the building to be watched. For example, one group may be in the west wing, another in the east wing and so on. The output from each amplifier channel is fed to headphones worn by the "watchers" who report immediately they hear the fall of a bomb. The nature of the noise will enable them to decide what type of bomb is to be dealt with.

The floor area which can be effectively served by a single microphone depends to some extent upon local conditions, but an area of 10,000 square feet may be satisfactorily served in quiet conditions if the area

is roughly square, or rectangular with up to 3-to-1 ratio of length to width. Irregular, or long, narrow areas, tend to reduce the area per microphone, and involve the location of microphones at points to suit the general shape of the area.

The microphones should be suspended at about the center of the area to be served, at a height of eight to ten feet from the floor.

The microphones are of high output carbon granule type and are polarized by the six-volt accumulator which supplies all the current required by the equipment, the requisite anode potential being obtained by means of a vibrator and transformer.

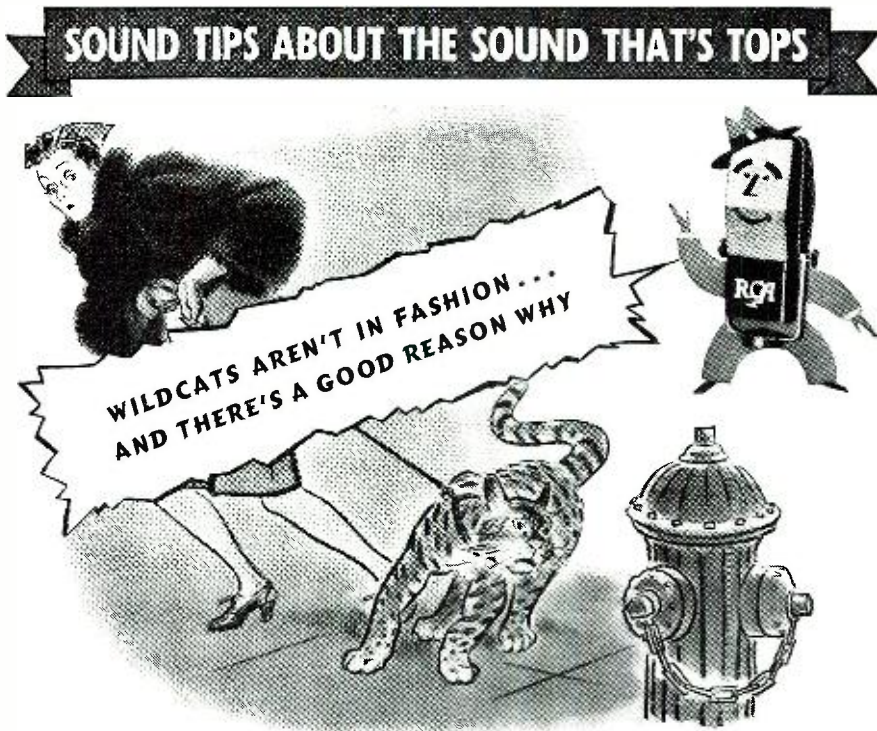
In some installations a directional type of microphone is located on the roof of the building, the microphone being directed toward the nearest police station or other center in which air-raid sirens are installed. The sound is thus picked up, amplified and distributed through the building at a sound level which more than overcomes the background noise.

This scheme is also valuable in its use during a raid as it enables the "gas" and "raiders-past" signals to be relayed to dugouts and underground shelters from which external sounds are quite often precluded by the constructional precaution taken against gas and blast from *High Explosive* bombs.

For domestic use, a small portable unit operated from dry batteries may be taken by the evacuating persons into their shelter, the microphone being left outside while one of the party listens at the headphones within the shelter for any further signals. You see, we don't don our gas masks and bolt for our private dugouts at the first sound of the warbling siren note. We just see that we have our gas masks handy and any other items we may want in our shelter (hot tea, cigarettes, etc.) and await developments. If the raid comes our way and things appear lively then we make for our dugout, but we still do not put on our respirators. Should gas bombs be dropped by the raiding aircraft, then the air raid wardens go through the streets sounding their large rattles which is the signal for us to put on our gas masks. It is then that most care must be taken over the receipt of audible signals as even if the raiders have passed we must not proceed out of shelters or take off our respirators until we hear the ringing of the wardens' hand bells which signifies that there is no longer any danger from gas and that streets, walls, etc. splashed by liquid gas have been decontaminated and rendered harmless.

Factory Time-Keeping Installations

Owing to the fact that air raid warnings and "raiders-past" signals are given by sirens and whistles it is contrary to *A.R.P.* regulations to sound factory hooters, sirens, klaxons, etc. for timekeeping purposes and other methods of notifying commencing and "knocking off" times have had to be introduced. A typical rack equipment



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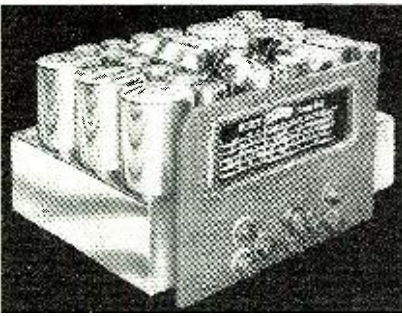
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which solves this problem is shown in the accompanying illustration. It comprises a 20-watt amplifier incorporating suitable faders, input switching etc., a set of tubular bells, and a turntable with pickup and groove selection device. Provision is also made for the connection and control of a microphone input for announcements.

With such an equipment it is possible to give time signals by means of the tubular bells, provide music for the workers (a very beneficial provision, especially for night shift workers on repetitive operation) and to make emergency announcements when necessary. The sound from the bells, by the way, is picked up by an in-built microphone, the output from which is fed into the amplifier through the usual control switches and faders.

Many factories are having installations of this nature and there is plenty of work for firms who can supply and fit such equipment. Army camps (of the wooden hutment type), canteens, A.R.P. establishments all provide business for the go-ahead P.A. and service man and quite a lot of private radio sales can be picked up when such jobs are being proceeded with. Hospitals, large private houses and mansions also provide opportunities for the Public Address radio engineer-cum-salesman. Many large residences are being given over to hospital or other work and an installation of suitable equipment to supply headphone listening points at bedsides is not a difficult proposition to put over.

So, you see, the war has not completely eliminated the civilian radio engineer but has provided him with many new and interesting jobs which are a welcome relief to normal design and servicing routine and which will keep him in contact with technical progress until better days dawn again.

—50—

"Remotes"

(Continued from page 30)

an engineer calls his, "problems." Therefore, one of the most important things a young engineer has to learn in the beginning is to look at each job as a *problem*, the solution of which he must find. Unfortunately, they are not all solved by using equations.

An engineer is known as such not only by what he does but by *how he does it*. If a radio serviceman and a radio engineer were both given the same *simple* fault to locate in a strange or unfamiliar radio set, very likely the serviceman would find the trouble before the engineer would. But if they were both given a very *tricky* problem involving the location and correction of a fault in a set, I expect the engineer would "arrive" considerably ahead of the serviceman. Making the "engineering approach" to a problem is sometimes a bit slow because it requires (1) formulating a statement of the problem; (2) ascertaining all pertinent information; (3) deducing the solution of the problem. It is, however, an absolutely sure method which must be followed when all cut-and-try methods have refused to disclose the answer.

During this past week in the laboratory where I am employed, I observed an excellent example of this contrast between the

serviceman and the engineer. A well-trained serviceman employed by a large telegraph company dropped in to inspect a piece of special test-equipment which had been repaired by an engineer who did not even know how to use the test-equipment. The two men used different vocabularies in referring to the performance of the apparatus, and the serviceman did not have any knowledge of the circuit changes which were initiated as he skillfully manipulated the various switches on the panel of the test-set. Both men agreed that the apparatus was functioning perfectly but they had totally different reasons for thinking so.

If the serviceman is trained in the skillful handling of the test-equipment which engineers have designed to do his jobs quickly and accurately, if he has a knowledge of the physical layout of various sets and of their common faults and some business acumen—then he fills, with the necessary and sufficient qualities, a well-defined and important position in the radio industry. He will not be replaced by an engineer and he should not betray a lack of confidence in his own rightful status by calling himself an engineer.

In a more unified industry, where all the necessary functions are controlled by one company, the engineers are assigned to their tasks of designing, testing, etc., while the service- and repairmen are assigned to their important functions. Both jobs have equal dignity and the servicemen are not frowned upon because they are not called that vague and overworked term—engineers.

By J. A. FIZZELL,
 Supervisor, Engineering Dept.,
 Illinois Testing Laboratories, Inc., Chicago.

Refer to: Full Range Amplifier, RADIO NEWS, Feb., 1940, page 24

Several readers have written in to our editorial department requesting an explanation as to the function of R3 on the diagram. Note that this resistor is in series with R5 to ground. The amount of bias appearing at the cathode of the second section of the 6F8G will depend upon the voltage drop through this resistor. Actually—this section is biased to almost cutoff to reduce the gain of this section. The amplitude of the bass frequencies normally exceeds that of the higher frequencies, and in order to limit them to a practical value, the gain is reduced at this point. This resistor could be a variable potentiometer used as a rheostat for accurate adjustment, although the value given has been found most satisfactory for this stage.

Refer to: A Simple VTVM, RADIO NEWS, Jan., 1940

The connections on SW1 are incomplete. This is a double-pole-double-throw toggle switch, connected in a similar manner to that of the other erroneously marked SW1. To be correct—the first switch on the left hand side should be shown with two switch blades that could either be closed to the right or to the left. These were omitted from the drawing. The switch on the right is correctly diagrammed.

Debunking T 'n H Pads

A cloud of mystery seems to surround these two versatile gadgets to some of our readers. To clarify their use, let us take an ordinary voltage control (potentiometer) and connect it in an audio-gain circuit. The resistance across the line will remain fixed in value as far as the *input* is concerned. The resistance appearing at the output will depend upon the position of the slider and, the more this resistance is from ground-to-grid, the more audio will appear at the output. A T pad behaves in a like

manner except that a series resistance is introduced so that, regardless of the slider setting, resistance will either be added or subtracted to present a fixed value to both *input and output* at one and the same time. Both the series and shunt resistance is variable, they being controlled by the same shaft. The H pad goes one step further—a series resistance is introduced in both legs of the line. These are in addition to the regular shunt resistance across the line.

-50-

Modernizing Receivers

(Concluded from page 23)

Where Class B operation may be used in the output amplifier a high resistance filter choke is objectionable. However, for Class A to AB1 operation a filter choke resistance of 1800 to 2500 ohms, as required, is no objection. In the diagram, Fig. 18, a speaker field of 2500 ohms is just right to drop the main supply of 400 volts to 250 volts for the 6L6G screen grids and the balance of the receiver tubes, using the condenser input filter circuit shown.

Where exceptionally smooth power supply regulation is essential, for communication type receivers or for receivers using Class B output stages, a choke input filter circuit is preferred and Fig. 19 shows a typical circuit. Low resistance filter chokes are necessary and accordingly a permanent magnet speaker must be used. It must be remembered that unless the power supply regulation is good, distortion will be present in both r.f. and i.r.f. stages as well as in the audio amplifiers.

Present speaker power ratings are more or less arbitrary and the figure given may be true for one frequency or small range of audio frequencies but hardly suited for greatest speaker response range. The rating may be considered as the ability to dissipate a certain number of watts in heat, for sustained operation with average varying frequencies. The speaker's efficiency or ability to convert electrical energy to sound is also very important. High efficiency in a speaker is desirable because it reduces the power requirement from the output tubes and the high efficiency speaker can also be expected to be more exempt from distortion. Small diameter speakers are more subject to distortion than speakers of relatively large diameter when used in conventional baffle systems.

Good quality speakers now available are capable of covering from 60 cycles to about 5500 cycles in a satisfactory manner while hi-fidelity models can be expected to cover up to about 9000 cycles and down to possibly as low as 30 cycles. The possibility of including the bass reflex feature, even though a separate speaker cabinet may be necessary, should be considered.

-50-

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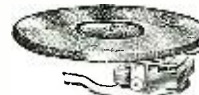
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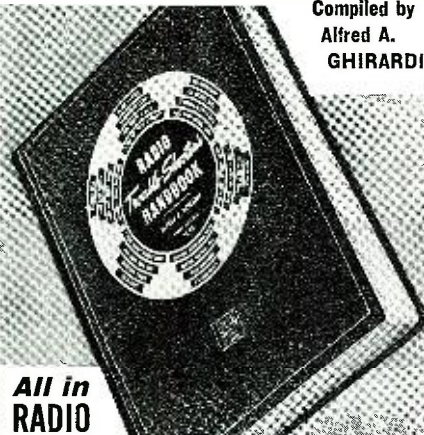
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RADIO PHYSICS COURSE

by Alfred A. Ghirardi

(Continued from April issue)

The thoriated tungsten filament is really a tungsten filament having thorium distributed throughout its mass, and a very thin layer of the metal thorium on its surface. The tungsten serves merely to heat the thorium and to renew the thorium layer as it is used up, the electron emission coming wholly from the thorium layer. The raw filament wire is made of tungsten impregnated with from one-half to one per cent of thorium oxide and some carbon. (Tungsten is the metal also used for the filaments of incandescent lamp bulbs because of its ability to withstand high temperature without melting.)

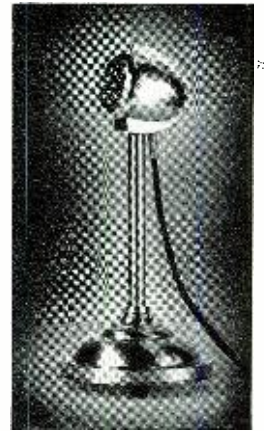
When such a filament is heated, two important actions take place. As the temperature is increased to about 2,500 degrees Centigrade, some of the thorium oxide is reduced to metallic thorium, and then this gradually works its way to the surface of the filament. At this temperature, the thorium which diffuses to the surface of the filament vaporizes immediately, leaving only pure tungsten at the surface. If the temperature is then lowered to about 1,800 degrees Centigrade for a few minutes, the thorium wanders or diffuses through the filament and when it reaches the surface (provided the vacuum is about perfect) remains there and gradually forms a layer of metallic thorium atoms which never exceeds a single atom in depth. It is this almost inconceivably thin layer which increases the emission over a hundred thousand times. When more thorium atoms work their way to the surface and come up under other thorium atoms already there, the latter at once evaporate, thus maintaining the layer only one atom thick. If the temperature is raised a few hundred degrees, the metallic thorium is formed from the oxide more rapidly and comes to the surface more abundantly, but it does not stay on the surface. It evaporates at once, leaving a tungsten surface.

This film is very sensitive and must not be heated to too high a temperature, or it will evaporate. It is necessary to operate such a filament within a narrow range of temperature close to 1,700 degrees Centigrade, where the ratio of evaporation is small and the temperature is high enough for the thorium to diffuse gradually to the surface and continually replenish the layer as it is used up by the normal operation of the tube. In the UX-201-A tube which uses this type of filament for instance, this condition obtains approximately when five volts is applied to the filament, sending a current of 0.25 amperes through it.

The electron emission of tubes employing this type of filament depends upon the presence of a thin layer of thorium atoms on the outer surface of the filament.

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Safety Relay

(Concluded from page 18)

sparkling of relay or switch contacts, and is not recommended. It is far more satisfactory to spend the small extra amount needed for the *safety relay* and thereby increase the life of the equipment than to leave it out.

Use a separate relay for each high-voltage supply. If underload or overload relays are used—be sure to connect the *safety relay* in the same lead.

Remember that cheap insurance like this is far better than a dead Ham.

-50-

Q R R Rig

(Concluded from page 17)

filaments on at all times.

The dry cell has an operating life of approximately 15 hours minimum which represents quite a stretch when on location. It is a simple matter to install a new one and several may be carried as spares. The B batteries will operate at good efficiency for approximately 42 hours. These, too, are easily replaced.

Automatic volume control is desirable in any modern receiver and has been included in this set. The RCA tube lineup is as follows: 1N5GT r.f., 1A7GT mixer, 1A5GT oscillator, 1N5GT i.f., 1H5GT second det., and 1G4G output. A separate beat oscillator was not included—the regeneration of the i.f. being sufficient for c.w. reception. A low drain triode is used in place of a conventional pentode for headphone reception, no speaker being used to conserve both space and battery power. Past experience in *QRR* service showed phones more desirable than a speaker; and this, too, was considered.

The small i.f. transformers are of the iron-core variety, and are used in many a.c.-d.c. b.c. superhets. They take up no more room than the tube and are efficient enough to provide plenty of gain in the i.f. stage. The antenna is connected to the relay in the transmitter deck.

Previous models built made use of two separate supplies—a conventional 120 v. a.c. pack and genemotor. While the motor generator is recommended whenever class B modulation is used, it was not required for this unit. A saving in space is obtained by the use of a *universal* transformer type of supply. Two primary windings are used, one for 6 v. input from the vibrator, and the other from 110 v. a.c.

Choice of one over the other is made by means of a plug-and-socket arrangement. When the line plug is connected to the unit all connections are made automatically for normal operation from the line. When the battery connection is made the supply operates as a vibrator supply and the tubes operate directly from 6v. d.c. Extra room is available on this chassis to store a microphone, both cable as-

semblies, a spare vibrator, etc.

Hash filters are provided to prevent interference to other receivers that may be operated in the vicinity, although they are not needed for this particular installation. The values of all condensers are rather critical and should be duplicated for best results. A manually-operated switch is included so that the transmitter may be operated without the push-to-talk feature when desired or when a microphone is used that has no switch.

Conclusion

Each metal box is identical in size. The ones actually used were made to order, but many similar types are to be found on the market that will serve the purpose just as well. They

are all equipped with standard trunk hasps so that all sections may be carried as one unit or used separately as wanted. Normally the bottom unit containing the power supply is detached when set up and placed in operation so that the receiver controls will be within easy reach of the operator.

If care is exercised in both construction and in adjusting the transmitter and receiver circuits, *QRR* communication can be carried out with speed and reliability. This unit has worked to both coasts using but an 8 in. vertical fish pole antenna, and even on the lower frequencies gives a good account of itself with consistent performance.

-50-

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GUARDIAN ELECTRIC

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Within Earshot (Concluded from page 4)

ing inside of you, and you thought of all the others who should know about your ideas, and who didn't.

What we are getting at is this. We agree with you that you should let the fraternity know of your ideas. One of the ways in which the technique of radio will advance is by the full exchange of ideas. Toward that goal, we have started a wholly new department with this issue to run as long as there is a demand for it. You will find it under the heading of "Remotes," and in it will be found any suggestions about radio, whether such suggestions are made by a reader or one of our authors. Our usual rates will be paid for those ideas which are published. Here, then, is your chance. If you believe that you can out-design our engineers and authors, send in your plans, and if they are good, they'll appear in "Remotes." Come, now, who'll be the first?

* * *

ASIDE to KBW: (Apologies to Walt Winchell) Orchids to you, sir, on your super-swell editorial in the recent (February) issue of Questee!

* * *

WE HAVE always made it a policy of filing all communications which are unsigned in the wastebasket, believing that a person who sends in an anonymous letter does not deserve the courtesy of a reply. Occasionally, we relax that rule,—especially where the problem involved might be one of universal interest.

A few issues back we said that the FCC regulations did not require the use of a "crystal oscillator—power amplifier" type of transmitter for hams, also that the use of a modulated oscillator was, and still is, perfectly legal. Our mail brings us an unsigned letter requesting a retraction and enclosing a clipping from the ARRL License Handbook purporting to show (1) that a modulated oscillator is illegal, and (2) making the statement that "these (the ARRL Handbook statements) are FCC statements." Well, here is why we don't answer anonymous letters, generally.

In the first place, and keeping good faith with the hams, the American Radio Relay League's excellent publication from which the anonymous person clipped the pages, does not state that its questions are FCC license questions. The ARRL License Manual says that the questions are "have been carefully prepared as representative of the actual questions asked by the authorities . . ." The questions are therefore not the actual FCC questions, nor are the answers the FCC answers. A call to the local RI's office will suffice to convince the most skeptical that the FCC issues neither questions nor answers to ham exams, only the commercial ones.

Now, for the matter of a modulated oscillator 'phone rig. There is nothing

in the FCC regulations which prohibit the use of a modulated oscillator, as long as the end result is not frequency modulations of the carrier. Our authority is the regulations themselves. Check if you want to. Call the RI's office, and he will tell you the same thing. The only thing that the FCC goes by, is the signal radiated on the air. If that is frequency modulated and below 2½ meters (for the ham) it is illegal, even if you place a string of buffers from here to the Coast between the crystal oscillator and the final amplifier. For that matter, there is nothing in the FCC regulations requiring a broadcast station to use a crystal oscillator, nor even a buffer, if—and it's a big if—you can radiate an rf signal that does not frequency modulate.

There will be some that will argue that an oscillator can not be modulated without frequency modulation. May we answer, "Ever hear about suppressor modulation of a crystal oscillator?" Many of these have appeared in Questee, and all were perfectly legal. Same applies to a plate modulated oscillator. They're legal too, if they do not frequency modulate.

* * *

WELL, well and again well! So the hams have, at long last, a champion. To be sure, this Lochinvar came a-riding just a mite too late, and did not come to rescue the ham ultra-high frequency operator. But he did come. We refer to Mr. Allen B. DuMont's recent warning note sounded on the subject of diathermy machine interference. For years the ham fraternity has had its u-h-f reception utterly ruined by the contraptions whenever the radio receiver was located near a doctor's office within whose

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walls short-wave therapeutics was practiced. Long and loud did the amateurs wail. But to no avail. The doctors could not be "sold a bill of goods" to shield their diathermy rooms, or to have radio engineers do what was necessary to reduce, if not eliminate, the interference.

But with the more wide-spread use of television . . . ah, there was a difference! As Mr. DuMont has so ably stated, "We (meaning the television receiver manufacturers) cannot afford to sit by and have our very livelihood threatened, nor can we see the greatest entertainment means of our people wiped out."

So strong is diathermy interference, says Mr. DuMont, that there are unimpeachable records of European reception of American diathermy machines, as well as San Francisco reception of New York machines. Since the FCC claims to have no jurisdiction over diathermy, it not being used for "communications" purposes, the problem has not yet been solved by any legal action.

We respectfully suggest that the *American Medical Association* look into this matter, before the politicians put through some sort of a bill which, by placing the machines under government regulation and restriction, might thereby stultify the progress which the doctors might make towards valuable discoveries concerning the healing powers of short-wave therapy. We believe that with the proper cooperation the problem can be solved successfully, to the best interests of all, and that without regimentation. Of one thing the doctors should be certain, that they do not underestimate the Power of the People should any one of their entertainment fields—especially a "free" one—be invaded or made less enjoyable by virtue of the doctors' culpability. Attack the free entertainment of the people, and you are sure of trouble—plenty of trouble.

* * *

RAISED Eye-Brow Dept.: We received a letter plus a manuscript from an irate author of the far west the other day. He was utterly against a third term for our President. What he proposed was this. Everybody who had similar ideas was to build up an oscillator (for which he enclosed a complete set of plans) and jam out whatever station Mr. Roosevelt used whenever he fire-side chatted. Because the idea is illegal, and the motive certainly not of a high plane, we declined with our usual form letter. Imagine our surprise when he wrote again calling our attention to the fact that we were most *unpatriotic* in denying him his right to fight the President!

* * *

IN ANY Hamshack:—Then I called CQ just once and a ZD came back with an R9 report . . . I don't believe in grid mils. All I want is output. . . . Just put a new condenser in the circuit and it will work . . . Beams? Phooey! I gotta better back wave than a front

one. . . . He couldn't fool me, I knew he was a RI. Sure, pal, I told him off. Whadda I want with a rig anyhow? Did I burn them up with my code right in the middle of their QSO. . . . Talk about low power, you ain't heard anything yet. I gotta WAC with less than a tenth of a watt input. The certificate? Oh, I got that around somewhere. . . . So I told the landlord I was licensed by the government and he couldn't do a thing about it. You know what he did? He got the cops who told me to keep my windows shut at night, or else . . .

* * *

WHICH just about winds up the column for the month. Except for one thing we wish to pass on to you. When a lady told the late Will Rogers that she deplored the type of programs which were being dished up for public consumption, saying they annoyed her very much, he is said to have replied:

"Madam, I am sorry that I cannot sympathize with anyone too lazy to twirl a knob."

Thanks for reading. KAK.

Camera Radio
(Concluded from page 9)

radio frequency impulses into the audio section of the circuit. A .0001 mfd. fixed mica condenser is utilized to bypass the stray r.f. to the ground. A .1 mfd. condenser of paper type is similarly employed to by-pass the radio frequencies from screen grid to ground.

Only two of the lugs on the potentiometer are soldered. The center lug, which connects with the sliding arm of the device, ties into the screen and suppressor grids of the 6J7 tube. The left-hand lug, looking at the potentiometer from the back with lugs turned downward, fastens to the positive "B" battery tap.

Resistance coupling is used in the set. Much of the "fringe howl" commonly found in regenerative receivers is eliminated.

The fixed carbon resistor in the plate circuit of the 6J7 has a value of .25 megohm.

The interstage coupling condenser is an .01 mfd., paper type.

Self-bias on the 6F6 tube is accomplished through a 400-ohm wirewound resistor.

The switch is connected in the ground lead to break both "A" and "B" battery circuits.

If headphones of the crystal type are used, a .1 fixed condenser should be inserted in the lead between positive "B" and phones, to keep the direct current off the headset. This is not necessary when a speaker is used for reproduction.

One midget "B" battery supplies the plate potential. The only battery that will fit into the base has a rating of 190 milliampere hours. Six volts "A" battery potential is taken from four flashlight cells, hooked in series. They fit into the removable front of the

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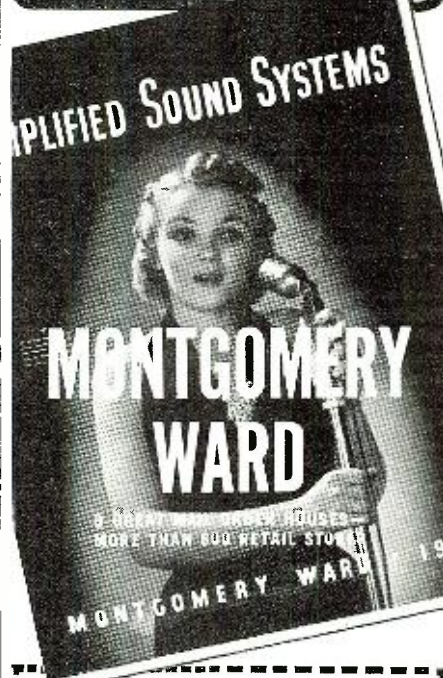
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camera case, around the speaker.

The human body is used as an aerial for the set, when it is desired to have it operate as it is carried along. The set is capable of real DX performance when used with a high antenna and a good ground.

Ease of operation is one of the outstanding features of the camera radio. The tuning condenser is revolved until a whistle is heard. Then the volume control is turned backward until the whistle fades out and the station is audible.

Parts List

Case from an old box camera, 116 size or larger.
Two metal tubes, 6J7 and 6F6.
Rigid metal subpanel, 2" by 4".
50,000 ohm potentiometer with switch on back.
140 mfd. tuning condenser, midget type.
Bakelite coil form 1 1/4" diameter, 2 1/2" long.
1/4 lb. No. 34 enameled copper magnet wire.
Two resistors, carbon type, pigtail leads, 1 meg.
One carbon resistor, 1/2 watt, .25 megohm.
One 400 ohm wirewound resistor, 1 watt.
Two .0001 mfd. grid condenser, mica type.
One .1 mfd. fixed condenser, paper type.
One .01 mfd. fixed condenser, paper type.
One metal tube grid cap.
Two octal sockets, wafar type, narrow mounting.
Headphones, or 3-inch magnetic speaker.
Hook-up wire, solder, small bolts.
Four round flashlight cells, 1 1/2 volts.
One midget 45 volt, 190 milliamp. hr. battery.
Two tuning knobs.

Bench Notes

(Concluded from page 19)

There are many cases where repair work is waiting to be done, and money waiting to be paid for it on one side of the street; on the other is an idle serviceman, sitting in his store because the customer would rather pay a man without a store. This discouraging stalemate cannot be dismissed by saying the customer's attitude is unfair. How can we make it fair? How may we counteract damaging thoughts among those who should be paying our salaries?

There must be some way out. Set owners want their sets fixed properly, and servicemen are ready to do the work. What keeps them apart?

Address complaints and suggestions to Lee Ward's *Customer Counsel*, care of RADIO NEWS. In formulating a set of practicable working rules, the views of both store owner and set owner must be considered. If you are either, your comment is invited.

"Store" Accounts

JOHAN J. PINE, of South Bend, Indiana, has augmented his service business with the repair work of a department store, and asks advice.

The most important feature of a "store" account is, of course, the prices to be charged. As long as there are differences between servicemen, costs, and customers, there will never be an inviolate price list. For this reason, I hesitate to give advice. There are, however, a few generalities which may be offered.

A flat time rate protects the repairman against a disruptive flood of "guarantee" calls.

In determining your hourly rate, estimate your costs carefully: time, car, shop. The total might be surprisingly large, but add profit, and be sure you get enough to protect yourself against the expenses you cannot prophesy. (Next column, please)

Collect from the store owner regularly, promptly, and as frequently as possible. This will minimize bookkeeping—in itself an expense—and will reduce the possibility of errors that comes with lengthy accounts.

If parts are supplied, have the bills sent to the store owner. Why invest your money in another man's business?

Sometimes, despite the most conscientious preparations, "store" accounts don't work out satisfactorily. The serviceman finds that, although his work increases, his profit doesn't. The store owner is not satisfied to have an outsider represent him, and possibly jeopardize future sales in other departments. The customer resents having a strange repairman answer even the "guarantee" calls if he didn't meet him when the set was purchased.

The complications involved in the simplest customer-serviceman relation are enough to tax the average talent to its limit. The intrusion of a third party in the form of a store owner forces the serviceman into a double life. At noon the serviceman is working for one of his own customers; at two p.m. he has to change whiskers and pretend he is working for another store. The set owner often senses something unusual, and tries to play the repairman against the store owner.

"Store" accounts are worth-while if both selling parties remain level-headed in the face of customer conflict. It's contrary to human nature for a store owner not to blame a repairman for customer dissatisfaction; and it's almost impossible for a repairman to treat another man's customer as well as his own.

Hope I've helped you, John—good luck!

Ward's Awards

REPAIRMAN'S Riddle No. 4 guided many a good technician to thought along lines of customer contact.

"If," I asked, "your customer was a mechanic, and he complained because he was being charged as much for labor as for parts, what explanation would you make?"

Many entrants chose a "smart" answer rather than one which would convince the customer or humor him. The proper answer would cinch the job, and leave the customer with the feeling he was justified in paying a 50% installation fee. Since he was a mechanic, it should have been easy to convince him any laborer is worthy of his hire. Despite this, many contestants submitted rebuttal so offensive that, in the average customer's house, it would have led to immediate defenestration.

When dealing with a prospective client, truth is not sufficient justification for a sharp reply. A harsh answer turneth away business. And prizes!

The Winnahs!

JACK TOWNE of 1519 California St., Redding, Calif., takes first prize, a 0-1 milliammeter. Second prize, Ghirardi's *Radio Trouble Shooter's Handbook*, was earned by James Harilld Hood of 37 Club Drive, Green-

ville, South Carolina. Third, fourth and fifth places were ably filled by L. L. Whittemore, 320 N. Skinker Blvd., St. Louis, Mo.; V. V. Vaught, 114 West Nineteenth Ave., Pine Bluff, Ark.; and T. Wakimoto of Hilo, Hawaii.

Runners up: Harry L. Hanson, Jr., 931 N. Van Buren St., Milwaukee, Wis.; Budrow Radio Service, 3901 S. Fitzhugh Ave., Dallas, Texas; Peter C. Jones of Brown's Radio Service, Henderson, Ky.; George Cipriani, 416 Wood St., Greensburg, Pa.; and W. Cummings of 1413 Federal St., Pittsburgh. Congratulations!

Competition was tough, so don't be discouraged if you didn't place. Repairman's Riddle No. 6 appears in the next issue—so keep the ol' soldering-iron hot!

-30-

Book Review

(Continued from page 38)

tical book for practical servicemen. Therefore, you will find that theoretical discussions are presented in the simplest terms, without reference to involved mathematical equations. The introductory chapters show how various oscillator circuits function and methods which are used to improve their performance. Many newer and less familiar oscillators, as well as the more standard types, are described in detail. These chapters are followed by descriptions of the r.f. and a.f. oscil-

lators used as signal sources. Here are not only the more common types used in radio servicing but also the more complex types used as laboratory signal sources. Complete circuit diagrams with parts values are given for representative commercial r.f. and a.f. oscillators, including laboratory-type signal generators. The concluding chapters cover applications of the test oscillator in radio servicing, and in addition tell you how to check test oscillators of every type and what to do to correct faults which may develop. Much information is given in these chapters which will enable you to get the utmost out of such instruments in practical radio servicing. The special tests, which modern receiver service data make desirable, are described in detail.

-50-

Hamehatter

(Concluded from page 42)

still tons when it comes to club activity! W2JCC on the Hudson River, 100 miles north of NY uses a 53X into a 2A3 final with 25 watts input. W2MDQ of L.L. NY, has one of those "dream" line-ups. Pete uses a Meissner Signal Shifter into an 807, which drives a pair of 813's on ten meter phone. Receiver is an HQ120X and a three element rotary finishes the layout in style. W2JKQ the 20 meter phone man is the brother of WMDQ. W9ZAR is out for the Nebraska stop on TL E. CETAH is heard on 28 MC. phone in the early afternoon. W-LLD is kept busy trying out phone and with the NCR. All amateurs are cautioned by the ARRL not to work any DX in Europe, and particularly those signing belligerent calls.

BY John D. Clark: Again this month, our log of Trans-Pacific DX on the ham bands has been definitely limited, and will probably continue to be so for the duration of the European war. Many countries, not yet entangled in the war, have permitted a somewhat limited restoration of ham activities. These nations have taken this action to partially countermand the general ban issued several months ago.

Australia and New Zealand are still silent, and so far as we know no VK or ZL stations have been definitely reported since the first of the year. Although we miss the hundreds of friendly phones from "down under," the ardent DXer still appreciates the cleared channels which greatly facilitate reception of other South Pacific and Oriental transmitters.

The general ban on amateur stations throughout the British Empire is supposed to include Ceylon and Hongkong. Nevertheless VS6AG (Hongkong) was reported twice on about 13.69 meg. and VS7RG (Ceylon) was logged on 14.01 meg. VS7AK, VS7RA, and YU2FQ are reported by one listener on the low frequency end of the 20 meter band, but no confirmation has been received on these calls. Last month, and again this month, one fan's log includes XZ2DX of Burma. Has anyone else heard this one lately?

PK stations have become more numerous than last month, but still seem to be far below normal. It is still not known definitely whether a partial or complete ban was ordered in the East Indies. If, as was originally reported, a British ban was placed on stations in this region, a great many hams are still ignoring it.

PK1MX (14.33 meg.) and PK1OG (14.18 meg.) have been quite active during the past thirty days. PK1RI (14.03) meg. after being unreported for a month, again figures as one of the strongest PK transmitters, with PK3WI (14.05 meg.) running a close second. PK3BD (14.07 meg.) and PK1AF (14.05 meg.) are being logged in the Hawaiian Islands, but were not heard in America.

PK4KS (reported on 14.04, 14.09, and 14.20 meg.) is the leading representative of Sumatra. PK4BR (14.02 meg.) and PK4RM (14.01 meg.) have also been heard, but neither can compare with the excellent volume of PK4KS.

Dutch East Indies stations may be heard best on the LF side of the 20 meter band between 6 and 7:30 a.m. Under extremely favorable conditions reception is also possible on 10 meters, but so far as we know there are only a few PK transmitters using this band at the present time.

XU8RB again tops the Chinese hams for regularity and signal strength. It has been reported by innumerable listeners on frequencies varying from 14.00 to 14.11 meg. XU6KL (14.04 meg.) continues to run a close second and may be heard almost every morning.

Don't overlook XU1B of Canton. With the exception of XU8RB and XU6KL, this station is still one of the strongest Chinese transmitters to

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Why Many Radio Technicians Make \$30, \$40, \$50 A Week Radio broadcasting stations employ engineers, operators, technicians, inspectors, foremen, servicemen in good-paying jobs. Radio jobbers, dealers, employ installation and service men. Many Radio Technicians open their own Radio sales and repair businesses and make \$30, \$40, \$50 a week. Others hold their regular jobs and make \$5 to \$10 a week during Radium in spare time. Automobile, police, aviation, commercial Radio, loudspeaker systems, electronic devices, are other fields offering opportunities for which N. R. I. gives the required knowledge of Radio. Television promises to open good jobs soon.

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be heard in this country. As a matter of fact several listeners rate it "tops." Working on an announced frequency of 14.134 meg., it still seems to be the only active XU1 on the air at the present time.

XU2 stations still seem to be off the air because of present war-time circumstances existing in Tientsin and Peiping. XU2MC, being operated by an American, may be heard occasionally on 14.34 meg., using c.w.

XU7HV, located in Foochow, was logged by several listeners this month on about 14.07 meg., and a newcomer, XU7HY (also located in Foochow) has been reported on almost the same frequency.

The only other Chinese hams to find their way into the log this month are XU8ZA (14.12 meg.), XUSMY (14.04 meg.), XU4BC (14.14 meg.), XUSRM (14.15 meg.), and XUSET (14.09 meg.). All have been reported between 4 and 8 a.m.

Strangely enough, very few Japanese stations have been reported during the past 30 days.

J7CC, located in Sapporo, is the only new and previously unreported transmitter. It works on approximately 14.00 meg.

J5CW (14.095), J7CB (14.08 meg.), J7CR (14.01 meg.), J8CI (14.02 meg.), and J2KG (14.09 meg.) are still on the air quite regularly, but are no longer classed as DX.

A number of unidentified Nippouese are again on 40 meters using the native tongue, but never seem to announce in English.

Approximately 5 a.m. is the best hour to pick up 20 and 40 meter Japanese phones, but a few reports indicate that several are audible irregularly near midnight.

Once again The Philippines are responsible for by far the longest list of trans-Pacific hams. No less than twenty-four stations in the Islands have been logged in this country during the past thirty days, most of them between 5 and 8 a.m.

The most reliable include KA1LZ (14.17 meg.), KA1ME (14.18 meg.), KA1AP (14.14 meg.), KA1CS (14.13 meg.), KA1CW (14.07 meg.), and KA1AF (14.13 meg.). Reports on these have been far too numerous to mention, and several are on the air almost daily.

Other KA1's include KA1BB (14.265 meg.), KA1HS (14.05 meg.), KA1JP (14.233 meg.), KA1LB (14.14 meg.), KA1AG (14.14 meg.), KA1GC (14.18 meg.), and KA1QA (14.14 meg.). Most of these are somewhat weaker and reported only irregularly.

KA7EP is still rated as one of the best and most reliable of the Philippine hams. It has been heard this month on frequencies varying between 14.12 and 14.15 meg., and may be logged with tremendous volume when working W6's near 6:30 a.m.

The remainder of the Philippine log includes KA4LH (14.13 meg.), KA1PH (14.18 meg.), KA1AK (14.14 meg.), KA1MM (14.125 meg.), KA1SL (14.11 meg.), KA4BNH (14.08 meg.), KA3RA (14.14 meg.), KA1OZ (14.14 meg.), KA1ER (14.08 meg.), and KA3KK (14.28 meg.).

KA stations may also be heard occasionally on both 40 and 10 meters. 40 meter stations are usually audible near 6 a.m., but 10 meter transmitters seem to reach this country best near 6 p.m. KA1LZ and KA1ME, both using 28.38 meg., are still the most reliable high frequency hams.

The complete absence of Australian and New Zealand phones on the 20 meter band has made it comparatively simple to log several Philippine stations near 11 p.m., as well as in the early a.m.

Hawaiian phones have become far too numerous to mention in full. Some of the most reliable 20 meter transmitters include A. W. Greenlee's K6NYD, George Hammond's K6LCV (14.235 meg.), K6PTV (14.195 meg.), K6LKN (14.30 meg.), K6OI (14.15 meg.), K6OPW (14.23 meg.), and K6MVA (14.165 meg.).

Newcomers to the general 20 meter log this month: K6OXJ (14.305 meg.), K6BNR (14.25 meg.), K6PIT (14.256 meg.), K6PAD (14.255 meg.), K6PUL (14.240 meg.), and K6OKR (14.225 meg.).

Most Hawaiians may be logged between 5 and 9 p.m., on the 20 meter band, although an occasional one has been heard as late as 11 p.m.

On 10 meters, K6MNV operated by Kenneth Bryan, has been the most active and is being received in all parts of the Pacific Coast with excellent volume. Other 10 meter Hawaiians include K6QMA, K6GLZ, and K6RDB.

Canton Isle . . . Henry Lee's KF6JEG has been on the air quite often lately, and is heard most regularly on a frequency of approximately 14.28 meg. near 3:30 or 4 p.m.

Puerto Rico . . . K4DSE, located in Rio Piedras, is reported by two listeners on 14.235 meg. near 5 a.m.

Guam . . . Bill Harrison's KB6OCL, and another station believed to be KB6ILT are the only Guam stations to figure in the log this month.

Sarawak . . . Although a war-time ban is supposed to exist in Sarawak, VS5BE has been reported by several fans on about 14.1 meg. near 6 a.m., irregularly.

Nepal . . . Not an amateur station, but operating very close to the amateur bands, is "Radio Katmandu," located in Nepal (between Northern Tibet and India). Here is a FB DX "catch." It is working on 14.78 meg. and has been logged near 7 p.m. and again near 1 a.m., asking for reports from overseas listeners.

“LE RELIABLE” Keith Mathis proposes: W4GNU, Jacksonville Florida is operating on 160 with power of 62 watts. Ben says that his is an ideal location being twelve and one-half miles from center of business district. W4FUP, after having been on 20 and 40 c.w. is now on 160 at Marietta, Ga. He is getting electrical engineering degree at Georgia Tech. W4GCP is new ham at Montezuma and will be

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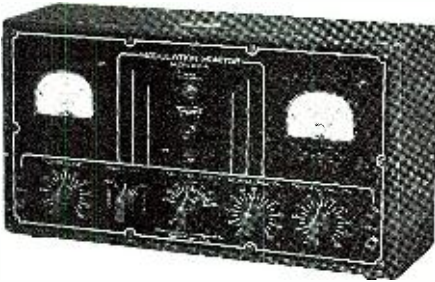
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on 10 and 160 with FB new rig. Wesley says he will enjoy a rag chew at any time. Now all we have to do is to get his *BY* subscription and he will be a died in the wool ham.

W4FRF has fine ten meter rig in his car and says that it is nice to ride along and gas with the ten gang.

W4ATO of Albany, Ga., says that we have neglected him and is on 75 meter phone. John is a serviceman and made our heart happy with a copy of our favorite on his service bench. Hi.

W4EDW at Dothan, Ala., is on 10 meter phone. Briggs sends his regards to the 160 gang.

The writer recently had an encounter with influenza and emerged the winner. [Well alright! Dig, dig, dig! Ed.]

W4CJE has fine Collins rig and works with BC station in Tallahassee Fla.

From the title of Winchell to *Never Say Die* after all my fine feathered friend is indeed a compliment. Thanks. [You sed it, sport! Ed.]

W4FQV in Rocky Mount, N. C., is planning a new set up for KW running pair of 810's in final. Hopes to finish it in future.

W4FKT is getting set for DX contest with new high powered rig for 20, 40 and 80 c.w. This Burlington, N. C., station also puts out a swell signal on 160 phone. Thanks for card fellows and lets have more news of your activities.

W4EBT at Perry, Fla., is active on 160 phone with FB rig on 1860 kilocycles and always ready for a rag chew.

W4GDD is new comer on 160 at Dothan, Ala., with PP 6L6's in final and has a new Defiant receiver.

W4AUD an ole timer at Union Springs, Tenn., is putting out a swell signal on 75 meter phone.

W4GBA at Clarksville, Ga., has a swell signal on 160 phone.

W4ENN at Memphis, Tenn., is very active on 160 at present time with a very nice signal.

W4EXN is batting a nice average on 40 c.w. Ditto W4ETD.

And W4DWE, W4FRE & W4BOW.

W9QEA wants to go to Miami and the writer wants to see Television so why can't we get together on this. Hi. Sorter swap around and then both of us will be satisfied.

W4EQS at Marion, Ala., has a FB 250 watt on 160. Leroy says that he can run 300 watts with it.

W4DPX at Montgomery, Ala., says that every time a train runs by his house that the smoke from its smokestack puts a charge of static electricity into his transmitting antenna. He says that some guys don't believe it. Hi.

W4FGL at Bessemer, Ala., is on 160 meter phone. Also W4GLP es W4EEZ.

W4FUM, Montgomery, Ala., has a FB KW on ten and reports that it really gets the DX.

W4PEB Macon, Ga., is a newcomer on 160 meter phone with a medium power rig.

W4GHP is now active on 40 meter c.w.

W4IR the ole man of the famous "Dixie Squinch OWL" whose witty writing is reknown from coast to coast recently highly complimented the Georgia Army Amateur net for their fine work during Albany, Ga., disaster. "Pop" has certainly done fine work in keeping the nets running in the 4th choir area.

W4GPS, formerly of Key West, Fla., has become a Georgia cracker by virtue of moving to Cordele where he plans to be on 40 meter c.w.

W4EVT in Valdosta although a new ham on one sixty gave much service in recent Albany disaster by handling many messages. A swell fellow.

W4FDJ at Lyons Georgia says that he got enough traffic during the emergency to keep him very busy and that he was glad to help out.

Mr. Fleming a serviceman in Albany rendered much service to us in our emergency set up and he is *BY* conscious now. Hi.

W4GEL Hol Willie at Damascus says that he surely lived up to the name and his traffic total was up into the hundreds. Willie really did a swell job.

W4GEO rendered much service in Atlanta and his messages to WSB there were much appreciated by the people of Albany. Hamdom is swell when we have fellows like this.

Also in Atlanta, W4FWD served as another outlet there and did a swell job.

W4EFD and W4DPX in Montgomery, Ala. rendered their services.

W4GAA at Tallahassee, Fla., was of much aid using ten meters whenever possible to facilitate distance traffic.

W4FRF brought over ten portable rig in car and used it in contacting us whenever possible.

W4FCW got off several messages on ten and got answers back in hurry and in addition done swell job in Albany hospitals. He is a Doctor and a fine ham.

W4GFP also at Cordele was on the job and was of immense help.

Southern hamdom as a whole really cooperated in this emergency work and once again amateur radio did a swell job and southern press really did a good job of letting the public know it.

W4EPP the ole Ala kilowatt is really active at present time on one sixty.

W4GHK at Savannah is on one sixty and also is operating on 40 c.w.

W4DIA a railroader operated his 40 meter rig during Albany disaster and did fine work.

W4ATO also of Albany cooperated with the gang and worked 75 whenever he could.

W4EZU at Evans, Ga., recently had an encounter with Flu but is once again active.

Atlanta Journal had a two column spread with pictures of Amateur radio at work doing disaster emergency work. One thing that we suggest to fellows that know a emergency exists is to stay off the air on bands that are being used



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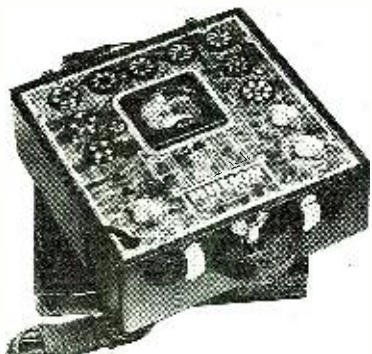
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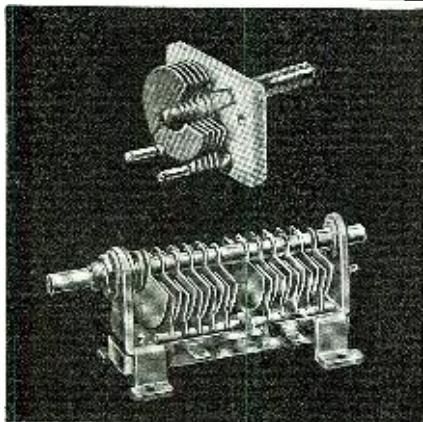
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until the work is over. Using low power with a generator doing work of this kind means that just a little arm will take the sig right out of the picture and that doesn't do any good to the people that are in trouble.

QRM from the 5th district by Windy Bill who never worked and never will. Windy Bill who is now running 500 watts to one of W9ETI's Utah Xmitters is located in Baton Rouge, La. on the banks of the beautiful mighty muddy Miss. river; down in the swamps, marshes, and canebrakes of Dixie where it never rains it never snows; it never gets cold; and the wind never blows; where the sugarcane is sweet but the women are sweeter; the grass is green and the people are greener; the swindler's paradise where the politicians are getting richer and the poor people are getting children. W5HMV is known as a southern planter due to the fact he is caretaker of a stone orchard (cemetery) and tho things are pretty dead there has never been any complaints. [Hoooooooooy! Ed.]

W5HCE has changed his Qth to Baton Rouge and is on 160 fone wid 4 watts (W5HMV's 1846 crystal hi.)

W5HXX is back on air wid a FB signal. W5GEF believe it or not is going at long last to get on 160 fone.

W5GEB and W5HCE work 10 on partnerships.

W5GDA says he is going to break down and modulate soon.

W4AV/5 is loading up and working out FB on a 10 meter vertical on 160 fone. Wilbur thinks he's got something, hi.

W4BGO/5 is thinking of modulating 2 KW. Ben is widely known as the Pride of Plaquemine.

W5FVK Skinny Allan has sold his rig to W511R.

W511R has sold W5FVK's rig to W5GAL. (GAL kept it.)

W5BJZ is having ant. trouble.

W5AFW is now on 75 fone and is looking forward to having a ragchew wid his bosom pal W5DAN.

W5DAN is now back in McComb, Miss. (what's the matter Curley, they could not take it in Jackson.)

W5GKO has really been busy in Jackson, Miss. W5CQJ is throwing it out on 75.

W5ISC es W5IPZ are two new and charming additions to the 160 fone band in New Orleans. Shirley es Pearl are running 500 watts and really put out a swell signal. (Hello girls)

W5EKV says he is going to get his cathode modulated rig to working as efficiently on 160 as it does on 10 or die trying. (Where shall I send the flower Dick?)

W5FOF wants it understood that Ark. is in the U.S.A. and you won't be breaking any neutral law when you work him.

W5HMV had the very amusing? experience of being picked up on one of those fancy guitars with an audio amplifier. It seems that the fellow was playing on his guitar abt two blocks away with the guitar started to call CQ searing the fellow out of abt a year's growth.

W51KB has put up a new ant. and is really getting out now.

W5GIZ still refuses to get on 160 again. W5BUK es W5DAQ hv held regular skeds for over 4 years.

W5FSI es his 75 net meet every Sun. at 8:30 a.m.

W51BO in Biloxi, Miss. runs 10 watts on 160 es gets out swell.

W5GQP es W5FIZ are active on the Gulf coast.

W5AXS is very active after a long lay-off on 75 fone.

W5HVI used to pound brass on a ship. W5BD has a new ant.

W51OD really puts out a sig. on 1925. W51GW is another Utah ham on 160.

W5WN is nw 70 years young and still going strong. Henry says he is good for 70 more.

W5FDC has changed his Qth again having moved to Sulpher, La.

W5HRC is a commuter btwn Baton Rouge es New Orleans.

W5HLZ paid a nice visit to W5HMV. W5DRR is back on 160 after a long stay on 75.

W5HUY is back wid the gang.

W5HMV holds a very swell sked wid T13AV of Costa Rica every Sunday making it possible for his brother who goes to L.S.U. to talk to his folks back home. He said it keeps him from being so homesick; which makes Windy Bill feel like a Boy Scout.

A DIRECTOR FOR THE CENTRAL DIVISION

As all ticket hams in the Central Division know, it won't be long until we will be called upon to nominate, and later elect, a Director to represent us on the Board of the American Radio Relay League. It should be easy enough to find a number of men that will meet the requirements of the League for a Director, but at the last election, our present Director, (and we think he is the best Director that we have ever had) was held over, because the requirements of the League had not been met in the nomination of other candidates.

As the result of a number of so-called "jam sessions" a number of other amateurs and myself have agreed that the League requirements are possibly the least important of all the qualifications our next Director should possess.

Our next Director should have Amateur Radio in his heart, and be without a personal axe to grind, and not be nominated or elected because he has an FB signal on the air or because he happens to be a good back slapper, and is willing to hold up one side of a bar and buy drinks for the boys.

He should be a man that is willing to find

out what the gang of his Division want, and then attempt to accomplish as much of it as is humanly possible. He must be able to think on his feet, be even mannered, and not lose his temper. (unless he wishes to). He must be sincere and his sincerity of purpose must be evident to, and felt by, the other Directors. He must be able to cultivate a broad viewpoint. He must be educated, and be able to catch on quick, so the other Directors will not have to use words of one syllable or draw pictures for him. He must be a smart politician, and be able to do a subtle job of horse-trading, without admitting it. Because of these necessary qualifications he must be a man of mature years, and not accept the nomination, or Directorship for his personal glorification, because we doubt if there is much blaring of trumpets or beating of drums at a Directors' meeting.

Our next Director must be financially fixed, and so employed that he will be free to attend the Directors' Meetings, and the various other meetings in the District that the Director should attend. He must have correspondence facilities to take care of the very large amount of correspondence that he will naturally be called upon to take care of.

The election in this District is this fall. Where Oh Where can we find such a man. When any of you do find him, for Heaven's sake, let's all get behind him and support him to a man. The big job for us, as amateurs, is to find the man to support. (Sgd.) W9V SX.

IAM Chatter from the King of Happiness, and out in good old Missouri, where the snow is deep and getting deeper.

Sorry to report the death of our good friend who was a shut-in like ourselves, W9FBM of Kansas City, Kansas. A fine chap, and we had many nice QSO's with John's.

The 10 meter band seems to be trying to come back into its own again. Was open yesterday for about six hours. A new Hawaii station on this band is W1GUU operating portable over there at the present time.

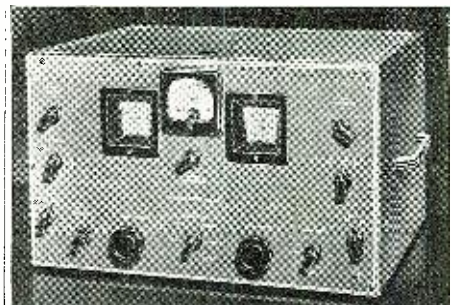
Best DX right now is a Mexican station on the 160 meter band. XE2FC may be heard with a nice sig about 1780 kc. There's rumor of a K6 on 160 about 1835 kc. but I haven't heard that one yet.

The 5th district is pounding in and also the 8's are causing lots of QRM on 160 meters. A few nice ones are W8TUK, W8NIP, W8S JX, W8TLC, W8RZO, W8OGC, W8RTE, W5ITZ, W5GFM, W4GJV, W3GCD.

If you like to argue with a charming gal watch 1860 kc. for Jessie, 5HWK. A swell sig, a swell QSO.

W9ZKC's RXL (Ernie) has her own ticket now the call is W9GXM, welcome to 160 meters Ernie.

W9BIQ has a new Howard receiver, and does



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he like it, boy I'll say. Now he can even hear me, Hi.

I worked a real flea power station this week, W9DRT 135 miles from here, running only two watts from 6 volt storage battery, on phone at 4 p.m., on 160 meters. Let's see you beat that one, fellows.

W9EAN of Garden Grove, Ia. recently was a W8 of Detroit. Welcome to the middle west, Jack. You have an PB sig. into Unionville.

W9HRC one of our local boys attending the State University at Columbia, Mo. finally broke the ice and is the first station there to get on 160 meters. We handle lots of traffic through there, and "Sparks" is one swell guy. The BGL's haven't found him as of yet. Hi.

W5BEA of Texas causes plenty of trouble up here with his 40 watts, nice going pal.

W9TGI is having lots of fun on 75 meters now, works a lot of cross band with the boys on 160 meters. Bill has a new rig with T40's in final too.

W9MEI is trying low power on 75 meters as he is in the country, depending on batteries.

W9OOL has pulled the big (9B) rig from the garage, and does that 900 watts sound swell. Oh, Boy!

W9JYW is putting out a real sig with a new top end Vertical.

W9LMI has a big mystery. Frank puts up a V beam headed West, but sets R9 reports from east coast, it doesn't work west at all. I told him to throw the Old Crow out the window and really point that beam west. Hi Frank.

W9MHF has a new mike and really has some real quality, and a nice sig in here.

W9QMG has a new sky wire up and is really getting the DX.

W9HXG is a new ham on 160 meters and those 100 this really have a wallop. Greetings OM.

W9FYM just came up on the good old 160 meter band and Charlie is a real fellow, another shut-in with the old chin up at all times.

W9EHY is putting out a swell sig on 10 meters and also on 160. Nice going, John. I enjoyed your recent visit very much.

W9EPI's wife and boy, are recovering their health and enjoying the visit in Calif. Guess that sunshine out there does some good Hi.

(To ye Ed: Boy you should of heard my XYL when she saw the nice photo next to mine in last month's issue. Just wait till she

sees you. Hi.) [It's pretty OK wid us. Ed.] Lots of luck and DX fellows. Give me a call some time on 1866 kc. or 28544 kc.

SOO SITTIE 9's by Don (W7HBO/9) Stewart: Hr is sum news from Soo Sittie.

"On the banks of the Muddy Missouri," 9BDO left 84 hams out In his "colyum," so hr we shout!

I mean us 84 others, who In some small way have activities too.

9's GPB, FZO es GWT also are 10m bounds.

White UPX, UZZ, TJA & I are in 20m bounds.

'Course sum of us work all bands, Fone & cw, the way it stands.

Some of the boys are rebuilding To put their rigs in btr repair.

Let's hope when they are finished, They don't have 50 parts to spare!

Now QDP, BZO, FNF, etc., are on the air

With a decided forty meter flair, While on 80 cw, we find

Sum others who can't be left behind. 90LL has on his lip—a brand.

Done by a soldering iron in a YL hand, The Tri State Ham Club was recently started

(Becuz of dis-ension a few yrs ago, it had parted.)

Now agn we sit in solemn contemplation.

Cussing and discussing the ham situation.

Oh, yes, 160 I almost forgot. Is a most favorable spot—

For VGT, QYV es others, (By the way, BZO & GWT are brothers.)

There are some on whom I have nothing at all.

But soon W7HBO will have a W9 call, So in an early issue, I hope

To visit sum more fellows & get more dope.

ED (Michigan City) Lewis says:

Who said I died? Did anyone ask for me while I was gone? What with being elected Master of my Lodge and having our third YL

just before Christmas, I have been so busy a couple contris were missed. And no cracks about Eddie Cantor, either. But what happens to a reporter isn't supposed to be news.

Andy W9HDB and Howard W9DPL of Valparaiso, Ind., report a very live ham club there with 18 to 25 hams out for every meeting.

There are 15 licensed amateurs in that fair city, not including the many licensed students from all over the country attending Dodge school.

Club meetings are alternated at members' homes every other Tuesday. Visitors from surrounding towns are usually present which is evidence

that the meetings are interesting. If you would like to attend drop Andy a card care of the post office. He'll let you know where the next meeting will be held.

Cliff W9BQQ, Arzyle, Wis., wants to know if he can get a write-up in *Ham Chatter*. Sure nuf, Cliff. (I know u wuz kiddin'.) Sorri I didn't get the dope on ur rig. You had our mouths drippin' with that lecture on Wisconsin cheese. Hope your experiments with loops pan out OK.

W9WLH, the dog food exporter at Ottumwa, Ia., will also be scanning the HC colyum. That round table really turned out to be sumpin', eh, Boyd?

We finally got sum dope on two hitherto unreported Michigan City hams, Vic Christman and Joe Palfi. W9WLU is rebuilding fer c.w. on all bands. Vic holds a commercial ticket and has been too busy lookin' fer a job to do much work on the rib. He has applications in at a large number of stations. W9MMM is working on 20 after being off the air for a while.

Joe is also building an 80 meter rig and had special cabinets built at the factory where he is employed. Tell us more about em, Joe, maybe some of the boys will want to give you an order.

That previous item about W9AEO didn't praise Ted's rig enuf! Ted is really snaggin' em on 160. Even with the sky wire on the ground he got a Q5R8 report from Wisconsin! And when bigger and better round tables are formed, Ted will be Master of Ceremonies. In the short time he has been on the air he has worked 40 states on 160. Oh, well, I guess you can do it if you work nights and work dx in the early morn after you get home.

There seems to be a large crop of embryotic hams in Michigan City this winter. The High School radio club started with 20 and still has 8 starters. That's about the usual percentage of starters and finishers. We oldsters (?) have our occasional classes under the tutelage of one of the hams. W9MMM and one of the boys are building an ultra ultra c-a code teacher that will do everything except A-3 emission.

Michigan City lies in a strategic position for uhf relay work to Chicago and across Lake Michigan from points east and north in Indiana and Michigan. I've often wondered why some of the boys don't build rigs for 5 and higher. Maybe it will be up to some of the neophytes.

If that Doughty Reporter (your words, Mister Editor, not mine), Keith Mathis, will furnish me with the Gary QTH of ex-W1FVO I will take a run over to give him the official welcome to this neck of the woods. Maybe he can tell me how Keith does it. [G. A.—I.R.X. Ed.]

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What's New in Radio

(Concluded from page 29)

be plugged into the phonograph jack of any receiver.

The Browning Laboratories' bulletin 105-A lists the components and includes a circuit wiring diagram of a complete receiver.

The Board of Directors of *Harvey Radio Laboratories, Inc.*, 25 Thorndike Street, Cambridge, Massachusetts, is pleased to announce the election of Frank Lyman, Jr., as president, succeeding J. B. Parker. Mr. Lyman, as treasurer of the organization, has directed the engineering and financial policies for the past year.

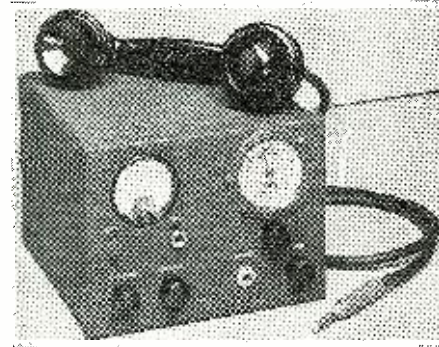
Other changes include the election of J. S. Lyman as vice-president succeeding C. A. Harvey who recently resigned.

At the same time, it was announced that Ralph A. Vacca, the firm's project engineer since 1936, has been named chief engineer. H. R. Hinckley has been appointed marine sales manager.

High frequency communications equipment and systems developed by *Harvey Radio Laboratories, Inc.*, include amateur, marine, aircraft, police, military and government equipment which have found an increasing number of buyers, both domestic and export, during the last year.

In connection with the changes in management, engineering and financial structure of the organization, *Harvey Radio Laboratories* also announces a number of new developments in communications equipment, which are the product of several years of research and testing.

Among the new products of especial interest to readers of this publication is the Harvey IMP transmitter-receiver shown herewith for plane installation. Designed

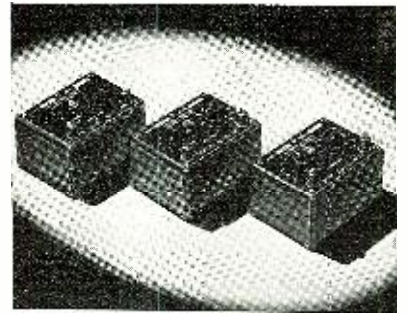


particularly for private plane operation, this brand new development of *Harvey Radio Laboratories* contains an extremely sensitive 5-tube receiver, including one multi-purpose tube, which gives it the effectiveness of a 7-tube receiver. The receiver is for use on aviation beacon bands. The transmitter is for use on 3105 kilocycles. Exceptionally small and compact for so effective a combination transmitter-receiver.

The IMP marks the first entry of *Harvey Radio Laboratories* into the production of equipment for plane installation, although Harvey ground station equipment is now being used by various airlines including Boston and Maine Airways and Pennsylvania Central Airlines.

Laboratories and service shops which pride themselves on the precision and completeness of their equipment will find interest in the new series of compact capacitor decade boxes introduced by *Cornell-Dubilier*. Each of these boxes is only 3½ x 5 x 3 inches in size yet provides a wide variety of capacity standards. The CDA-5 box, for instance, provides values of .0001 to .011 mfd. in steps of .0001 mfd. or a total of 100 different capacity combinations through the medium of its two 10-position switches. The Model CDB-5 is similar except that its range is .01 to 1.1 mfd. The CDC-5 with a range of 1.0 to 10.0 mfd. has a single switch which provides steps of 1 mfd. These boxes may be used singly or in

combination. The three in combination provide a range of .0001 to 11.1 mfd. in steps of .0001—100,000 different capacitor values. Each switch position is directly calibrated in mfd. and these values are accurate with-



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In addition each box is accompanied by an individual chart giving the exact values for each switch position and this chart may be used where the utmost precision is required. Model CDB-3 and CDC-3 boxes are also available. Those are similar to the CDB-5 and CDC-5 models except that they provide the narrower tolerance of 3%.
 All units are housed in walnut Bakelite cases with etched metal panels. Each is equipped with two insulated Bakelite binding post terminals which insure secure connections. Rated voltages are 220 a.c. and 600 d.c.

Cornell-Dubiler offers transmitter manufacturers and Hams a complete variety of

mica capacitors for low-power transmitter applications in the Types 4 and 9 Moulded Mica units. Not only are these capacitors especially designed to meet the rigid electrical requirements of this service, but various mounts and accessories have also been made available to provide the utmost convenience in application.

The type 4 units are rectangular in shape with projecting ears at the lower corners drilled to provide insulated mounting, and with conventional heavy gauge soldering lugs. The Type 9 are hexagonal with tapped metal bushings moulded into the bakelite to provide screw connection terminals. Both types are available for dc working voltages of 600, 1200 and 2500 and in a wide variety of capacities ranging from .00005 to .03 for the Type 4 and to .06 for the Type 9.

Special impregnation provides high capacity stability under widely varying conditions of atmospheric pressure and temperature. India mica of gauged thickness offers uniformly high voltage breakdown and low power factor. The moulded Bakelite lends mechanical strength, high moisture proofing and insulation resistance of 20,000 megohms per unit. Absence of magnetic materials reduces losses at all frequencies.

Included among the accessories are detachable metal terminal brackets to fit standard meter terminals for r. f. by-pass purposes and which provide extremely low contact resistance. Isolantite mounting insulators, etc.

The Turner Co. of Cedar Rapids, Iowa, is meeting the demand for a low cost Crystal Microphone, with the new Turner R22X, just put on the market. This microphone is identical in performance with the Turner 22X, but does not have the swivel and cable coupler, thus affording a saving to the buyer.

The R22X is streamline in design, with a range of 30-7000 cycles, and a level of -52DB. The 8 foot cable furnished with R22X can be changed without opening the microphone, and each mike is packed with wiring diagrams and a chamoisette mike pouch.

The R22X has a built-in diaphragm guard which protects the cartridge which is also inertia mounted to absorb mechanical shocks and prevent breakage. The crystal is impregnated against moisture, and the unit has an automatic barometric compensator. The large capacity crystal permits long lines with minimum loss of level. R22X is finished in full satin chrome, and with 8 ft. cable, sells at \$14.95 list.

The Desk Stand, T1, designed to complete a matching desk set, is 9" high, with base of 5 1/2" diameter, and 3 rubber feet to keep it from tipping or sliding.

An improved and very compact Wireless Phonograph Oscillator (Cat. No. WO-6) has recently been announced by Bud Radio, Inc., of Cleveland, Ohio. This unit is primarily intended to adapt standard wired Record Players for wireless operation with a minimum of effort and expense. Being very small in size (4 1/2" x 2 1/2" x 2") the Oscillator may be attached inside the case of most Record Players thereby eliminating the usual nuisance of unsightly external apparatus and wiring.

The improved circuit incorporated in the Bud WO-6 Oscillator utilizes only one tube, and its excellent stability makes possible unusually fine quality reproduction. The unit operates from either 115 volts A.C. or D.C. and is very easily installed according to furnished instructions. By equipping a Record Player with this Oscillator, records may be played through any radio receiver at distances up to 50 or 75 feet.

Complete information on this and other Bud items may be secured by writing the manufacturer.

The Sky Pilot World Clock, popular for many years has been reduced in price and now sells for \$4.95.

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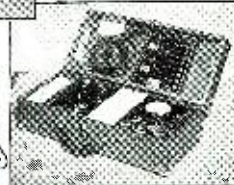
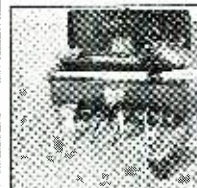


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Private Radio Service Not in Public Interest

The Federal Communications Commission is receiving an increasing number of requests for authorizations permitting the use of radio for communications between offices and automobiles. While such service would be a private convenience, it has not been shown to be in the public interest to grant such restricted facilities.

There have been many requests for such service on behalf of business concerns and individuals, but in no case within the continental United States has a station of this class been authorized except for emergency radio communications involving the safety of life and property, in which cases the facilities are required to be available to the general public for emergency communication.

The limitations on the number of frequencies available for assignment to important and necessary services in which public welfare is directly concerned has prevented the allocation of frequencies to a service purely private in character. Applications for all types of radio communication services must meet the statutory requirements of "public interest, convenience or necessity."

In 1934 the Commission denied the application of a private enterprise in New York City for a radio communication system to communicate with taxicabs. Similar action was taken with respect to an application for a doctors' calling service.

More recently the Commission warned both a street railway company and a light and power system about using special emergency facilities for dispatching purposes. In doing so it pointed out that special emergency stations may be used only during an emergency

-30-

Mfg.'s Literature

(Concluded from page 40)

each review will appear a reference number (for instance, the Meck Catalog number this month is, RADIO NEWS No. 5-101). All you have to do is to fill out the coupon at the end of the page indicating by number the catalogs you wish to receive, and we will do the rest. There is no charge, unless the review says that there is, and then that is charged by the manufacturer, not us. Each coupon is good for the time limit stated thereon, and no guarantee is made by us that the manufacturer will send out catalogs to all who ask for them, though they usually have done so in the past. We merely forward your request to them.

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MISCELLANEOUS

PHONOGRAPH Records—Twelve, \$1.00. Paramount, F-358 East Market, Wilkes-Barre, Pa.

Case Histories

(Continued from page 39)

FREED MB-9, 99

Fading 1) vibration or tapping causes the 0.02-mfd. coupling condenser between the '55 and '56 tubes to "short". Replace it

FREED-EISEMANN NR-55, NR-56

Inoperative ... 1) faulty 4,700-ohm large yellow carbon resistor. Any 5,000-ohm 5-watt resistor may be used as a replacement

FREED-EISEMANN NR-60

Noisy reception 1) corroded variometer tap switch
2) loose carbon element of volume control

FREED-EISEMANN NR-65, NR-78, NR-79

Inoperative ... 1) faulty 4,700-ohm large yellow carbon resistor. Any 5,000-ohm 5-watt resistor may be used as a replacement
Intermittent re- 1) corroded connection beneath caption, rubber insulation at terminal of 500-ohm, 1-watt fixed bias resistor connected in series with the volume control, causing the resistance to vary from 500- to 25,000-ohms when the chassis heats up. Re-

place with new unit
Hum 1) open-circuited type '27 tube heater center-tap-to-ground lead. Resolder the connection

FREED-EISEMANN NR-80

Fading, 1) faulty volume control—replace it
Noise 2) defective tubes—check all tubes
3) poorly-soldered joints. Go over all joints with hot soldering iron

No control of volume 1) volume control contact arm not engaging resistor strip
Hum, 1) hum controls shorting to chassis

Also same case histories as listed for Freed Eiseemann NR-85

FREED-EISEMANN NR-85

Noisy volume control 1) connect a 2,000- or 3,000-ohm potentiometer across the antenna choke, enclosing the leads in grounded shielding
2) adjust the third neutralizing condenser to a point at about 150 kc. just below oscillation

FREED-EISEMANN NR-95

Low volume 1) defective dynamic speaker field supply filter condenser or rectifier tube

JESSE FRENCH MODEL G

Weak reception 1) check the 1.0-megohm resistor in the detector screen grid lead. Replace. (This resistor frequently goes bad and a voltage analysis may not indicate trouble)

FRESHMAN EQUAPHASE

Oscillation 1) equalizing condensers incorrectly adjusted
Broad tuning 1) equalizing condensers incorrectly adjusted
Inoperative 1) trimmer condenser stator plate or lug shorting to chassis
2) hum control contact arm not making contact to resistance

FRESHMAN EQUAPHASE 6608

No plate volt- 1) open resistors in power pack age
No bias on type 71A tube 1) open-circuited resistors in power pack
Inoperative 1) open-circuited resistors in power pack
Weak reception 1) open-circuited 300-ohm equalizing resistor
Fading 1) defective volume control
Critical volume control 1) connect a jumper from the filament end of the control to the arm, or "ground" to chassis
Fluctuating volume 1) defective volume control

FRESHMAN N

Inoperative 1) loose terminals on power pack connection strip
Fading, 1) loose terminals on power pack connection strip
No control of volume 2) replace volume control

Serviceman's Experiences

(Concluded from page 24)

never knows, does one?"
"Was he wearing boxing gloves?" I asked, with unveiled sarcasm.

She gave me a heavy-lidded smile. "Can you fix it?"

"Of course I can," I replied, "but you must realize that, under these conditions, I have to charge for my work even though the set would have been under the guarantee if no one else had tampered with it. It's no small task, getting this thing back to normal."

"Mmmm," she commented. After all, what else could she say?

I itemized my bill. "Twelve fifty," I announced. "and I'll have to take it to the shop."

"Is it really serious?" she asked, obviously worried. "It still plays, you know, and I'd like to hear the Soapsie-Woapsie program tonight."

"Very serious," I assured her. "I'll wait until tomorrow; but if you play it before Salutory Sales & Service grants its official okay, you do so at your own risk. If you tune in a powerful station, don't stand in front of the speaker!"

(Please turn the page)

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New 1940 public address amplifiers from 5 to 100 watts. Complete P. A. Systems for permanent, Mobile and Portable use.

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Extra profits for you! Standard Brand Electric Irons, Stoves, Heaters, Percolators, Waffle Irons, Vacuum Cleaners, Trains, Clocks, Mixers, etc., at lowest prices!

FREE Mail Coupon

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Send the 1940 Radolek Radio Profit Guide FREE.

Name
Address

Serviceman? Dealer? Experimenter?



ACTUAL SIZE
450-450-25
volt unit
10-10-25mf.ds.

★ Yur darn tootin'—these jobs may all look alike but there can be a heap of difference beneath the label, can, base.

While achieving reasonable compactness and low price, AEROVOX Series F prongbase midgets contain a standard AEROVOX dry electrolytic section with approximately twice the foil area for given capacity and voltage, to insure long, dependable life. Nothing vital subtracted to meet any size or price. No ultra etching or tricky foil. No skimping on separators.

A nice choice of popular working voltages and capacities, in single and combination units.

Ask for CATALOG . . .

★ More pages, more items, more choice—the new 1940 Catalog is the best yet. Ask local jobber for copy—or write us direct. And ask your jobber to show you any AEROVOX condensers you may require.



I had her, all right. When I got back to the shop, I walked in rubbing my hands, all set to give Al the business.

I expected him to be mad when I told him what had happened, but I didn't expect him to give an imitation of Dr. Jekyll turning into Mr. Hyde.

"You fool!" he shouted, "Your tongue is too far from your brain!"

I stepped back in surprise. "Now, now—" I pacified, "Don't—"

"It was I who fixed up Peterson's set temporarily last night. You were supposed to call with a permanent replacement today, and install it free. The ordinary serviceman is content to lose a customer once," he continued, "but you have to lose him twice before you're satisfied!"

"Why didn't you tell me?" I demanded. "And don't yell like that—I can get them back by explaining my mistake. I'll go right over and finish the work."

As I pulled up before the Peterson home, my heart dropped so far I could feel it hit my stomach. A serviceman was throwing a Stewart-Warner chassis into the back of his truck. As he swung arrogantly around from the curb, I read *Redoubtable Radio Repairs, Inc.* on the side-panel.

If there's a feeling more miserable than that, I hope I never have it.

—30—

Phono Oscillator

(Concluded from page 13)

of the oscillator is adjusted until the carrier is heard on the receiver. It will usually be found that two or three feet of wire attached to the antenna post of the oscillator will give it more than sufficient signal strength in most radio receivers located up to 25 or 30 feet from the record player. This wire can be conveniently concealed inside the case of the record player along with the oscillator itself. If it is desired to operate the player at greater distances from the radio, provision should be made for attaching a longer antenna to the oscillator externally.

After the signal has been set at the desired spot on the receiver dial, a record should be played and the receiver tuned to the point where the reproduction is best. It will usually be found desirable to re-adjust the receiver slightly after 10 or 15 minutes operation because of possible drift in the oscillator and receiver.

In addition to its usefulness in connection with record players, this circuit may be readily used to convert any radio into a Public Address System by utilizing a high-gain microphone in place of the usual pickup. Particularly good results have been obtained by using one of the new inexpensive 4" high-impedance crystal speakers as a microphone although a small p.m. dynamic speaker or even a carbon microphone with a suitable matching transformer would undoubtedly work well. The latter will require a small C battery in addition.

—30—

QRD?

(Concluded from page 38)

passengers are aboard; about half a dozen broken seal reports; two payrolls; 1 recapitulation report (cash collected); 1 abstract of radio tlc; 16 canal reports (trips thru Sturgeon Bay Canal) this in addition to selling tickets to the passengers. Unquote. Well, at least you don't have to wonder how you're going to spend your leisure!

FOR the benefit of others we note this one from a reader. Quote. I am writing you to ask if there is any possible way of contacting my YL by radio? She lives in Hastings, Sussex, England. I think there are some hams there but I don't know whether they have shut down or not. I get mail from her but it takes a month to get here. Unquote. Hams in belligerent countries are not being permitted to operate as heretofore. We have been informed of this by local hams who previously had schedules with these countries. Sorry, but you'll have to use the mails!

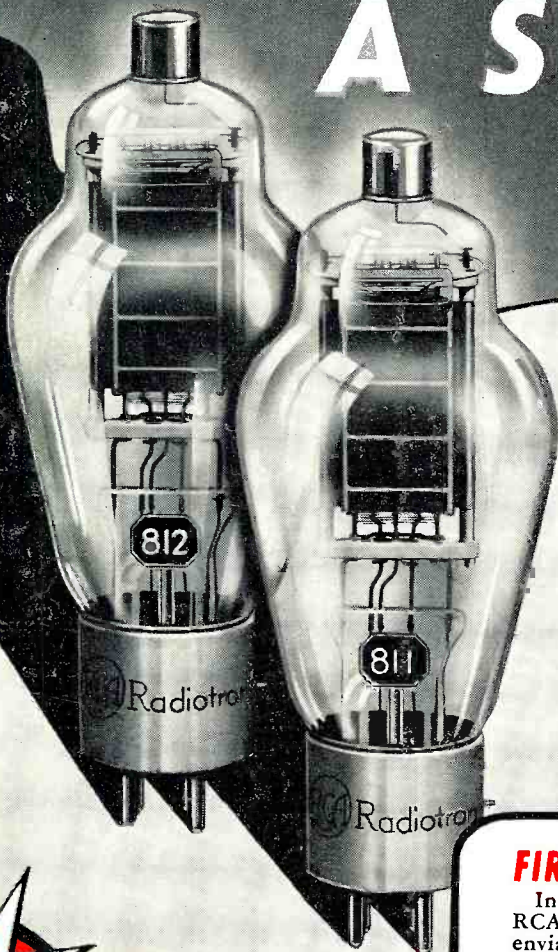
BROTHERS Bill Schuss and C. W. Faust, radiops on the headlined *City of Flint*, returned to these shores thankful that they had ended a perilous voyage. Although the trip from Russia to Norway while in charge of the German prize crew was electric-packed with tense moments, the highlight of it all was when the German Lieutenant in charge told the assembled crew, "we are in charge of this ship. We have plenty of hand grenades. You know what they can do. You are going to work as we tell you to. If any one of you doesn't want to work, let him step forward now or forever hold his peace." And no one stepped forward. We can congratulate Schuss and Faust, not only upon having had this experience, but on having it and being alive to talk about it. That is what counts!

DISTURBING conditions have been caused by the present overseas conflict and the possibility of drastic measures likely to be taken by the *Maritime Commission*, plus the known desire of the public for a West Coast shipping peace, has caused the ARTA to negotiate and conceive a "Five-year Peace Pact" with five west coast shipping organizations, which include the Coastwise Lines. There were many substantial gains, as well as a \$25 per month increase in wages, but the important features of these peace pacts are no lockouts, no breaking of contracts when respecting picket lines of other organizations and no necessity of bargaining for fundamental agreements each year. There was stipulated that in the event a higher scale of pay is arrived at in a new general agreement with other operators of offshore vessels, said scale shall automatically apply to the agreements under discussion. Nice going, say we. Which means a breathing spell for a longer period than heretofore.

AND so, me hearties, we come to the end of another chapter with the hope that we-all shall never take part in the shindig that is now blasting our European neighbors. We can all do our part in thinking peace and talking peace . . . so with 73 . . . ge . . . GY.

—30—

A SMASH HIT!



RCA-811 • RCA-812

High-mu Triode Medium-mu Triode

Plate voltage 1500 V.

Plate input 225 W.

Plate dissipation 55 W.

Amateur Net \$3⁵⁰ each

Above ratings are the new RCA ICAS Ratings (Intermittent Commercial and Amateur Service). Write for bulletin.

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Think of it! . . . 240 watts phone output with two \$3.50 tubes! Yet this is only one of the many amazing possibilities of these remarkable tubes.

FIRST WITH ZIRCONIUM-COATED ANODE . . .

Runs cleaner and cooler at full ratings. Gives instantaneous protection against gassing on overloads.

FIRST WITH MICANOL BASE

New low-loss type. Has excellent insulation qualities at high frequencies, together with low moisture-absorption characteristics.

FIRST IN VALUE

Watt for watt, dollar for dollar, RCA-811's and RCA-812's establish new highs for dependable economy.



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Get your copies of RCA HAM TIPS for October and November, 1939. In these issues are a wealth of circuit and other practical information on many different applications of these record-breaking new RCA Tubes. The November, 1939 issue includes a constructional article on a 450-Watt 807/push-pull 812 CW Rig in which the total cost of the r-f tubes is only \$11.50. The same rig, plate modulated, delivers a 240-watt carrier. Copies are obtainable free through RCA distributors or from the Commercial Engineering Section, RCA Mfg. Co., Inc., Harrison, N. J.



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