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RADIO WORLD

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The First National Radio Weekly

646th Consecutive Issue—13th Year

SHORT-WAVE SWITCH TYPE COIL SYSTEM

(See Page 3)

SHORT WAVE—RADIO EQUIPMENT—SERVICE LEADERS

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THIRTEENTH YEAR

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1.6 to 27 Megacycle Coverage

With a Coil-Switch Assembly, Using 0.00014 Mfd. —Winding Data Given

By Herman Bernard

THE manufacturers of commercial receivers for covering a wide band of frequencies use a coil switch system practically exclusively. The improved switching systems as yet are not available to the experimental class. With the exception of a coil-switch assembly for a converter, and one for a regenerative set, there has been practically nothing obtainable. Moreover, many would like to wind their own coils, and little data on this have been published.

In the course of experimental work preparatory to the commercial production of a switch-type coil assembly, certain facts were ascertained that the experimental public should welcome.

The first piece of news to impart is that the capacity of switches generally obtainable is large. This is not a disadvantage, since the capacity is not within the close inductive field, but one must allow for about 30 mmfd.

That fact came to light surprisingly when a condenser of 80 mmfd. that had tuned over a bit more than 2-to-1 frequency ratio in a station finder, where there was no switching, seemed to shrink before the eyes to a ratio of 1.3-to-1.

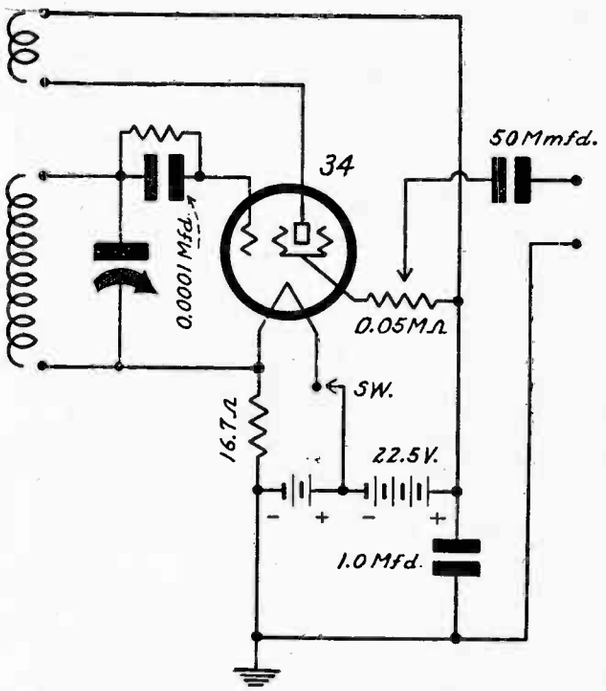
Effect of Switch

Hence the trouble will show up as something almost unaccountable if one uses a 0.00014 mfd. condenser for tuning, which is the popular capacity in conjunction with plug-in coils, and then reverts to a switch assembly with the same condenser. There will be an awkward disarrangement of bands covered, with abundant missout, and a serious displacement of frequencies to lower values (higher waves).

Being forewarned about this, however, and in the light of what is to follow, there is no cause whatever for anybody going astray.

Several of the finest types of switches were tried, all with about the same result. In fact, taking the switches made by Oak Manufacturing Company, Yaxley, Central Radio Corporation and Eby (new model, single deck), one could be used instead of another without upsetting the frequencies in any way that would prevent sufficient overlap, or serious displacement of bands. The type of switch represented by the products of the three manufacturers first mentioned is becoming almost standard and represents very low contact resistance, positive contact of a definitive nature and long life. Eby's switch was too new to afford time to test for these factors.

Besides receiver use, the coil system outlined is applicable to an oscillator used as beat-note station-finer. The 30 or 34 tube may be used, but not the 32, which has a higher inter-electrode capacity that would require different inductances. The minus and plus terminals of coils may be permanently connected.



Factors About Coils

It has been the custom to use coils wound on a rather large diameter, but there is no necessity for this, as about as good coils for high frequencies can be wound on a small diameter. Also, the smaller the diameter, the smaller the distributed capacity, and in a coil distributed capacity represents quite a loss, because of the location of the capacity in a strong magnetic field, that is, amid the densest flux. The goodness of the coil depends somewhat on the size of the wire diameter and on the proportion of the length of the winding to the diameter. In general, the form diameter alone need be considered, and the intention is to have the ratio somewhere around 2.5-to-1, where the diameter is the larger factor.

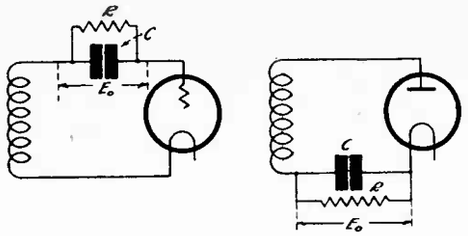
Wide variations from this are permissible, as the amount of inductance obtainable from a given amount of wire is not lessened considerably if the diameter and the length of the winding are about equal, and even if the length has to be larger than the diameter, as it must be for some coils, for wide frequency coverage, using small diameters, this condition of greater length than diameter prevails only for the largest and perhaps second largest coils, and for regenerative purposes the tickler can be somewhat enlarged to take care of this.

R-F Resistance Counts

All factors concerning inductance may be considered as related to the radio-frequency resistance. This holds true of the shape factor, or ratio of diameter to axial length of the winding, as well as to the size of the wire diameter and distributed capacity. But

(Continued on next page)

The leak-condenser detector at left for short-wave purposes would have values of 25,000 ohms for R, about 20 mmfd. for C. For lower frequencies and diode detection R would be 500,000 ohms and C 20 mmfd.



(Continued from preceding page)

as regeneration represents negative resistance, if there is regeneration, under the conditions of its existence and use, the resistance factor need not be given much consideration. However, the negative value present when there is regeneration should be sufficiently negative so that a slight load will not stop regeneration. What is a slight load is a matter of measurement, and a measurement few have the apparatus to make, but a substitute test is the simple: the load must not be so great as to stop regeneration. Remember that for high frequencies, say, 20 mgc, an antenna two feet long is an appreciable load, and it is perhaps wise not to use an antenna much longer than that for such frequencies. A series antenna condenser has the effect of lengthening and shortening the antenna, one condenser setting compared to another, and therefore should be included, unless there is a different fixed condenser for each band, or separate antenna primaries. The qualifications merely state that the load should not be too great and enumerates two methods of safeguarding against excess. For 20 mgc. up 5 mmfd. is enough series capacity.

The coils under consideration were used in a two-tube short-wave battery set, 30 regenerative detector and 30 audio amplifier, an audio transformer between the tubes.

The diameter tubing was ½ inch, and both solid bakelite and solid hard rubber were used.

Coil-Winding Data

It has been stated that the switch capacity is high. Therefore though 2.3 may be the ratio with 0.00014 mfd. condenser for tuning, without switching, the contraction is to 1.5 for this capacity, when using a switch.

If the same 2.3 ratio is to be maintained the tuning capacity would have to be around 0.00025 mfd. However, since the ratio contraction is an advantage, in that the equivalent of semi-bandspread over all the tuning is accomplished, and only an extra coil required, five instead of four coils, the 0.00014 mfd. condenser was retained.

The coils wound on ½-inch diameter were as follows, ascending order of numbers representing ascending order of frequencies:

Coil No. 1. Secondary 92 turns of No. 32 single-silk-covered wire, close-wound. Tickler wound over secondary, wire insulation the only separation, 42 turns of No. 32 single-silk-covered wire. Frequencies covered, 1,660 to 2,600 kc.

Coil No. 2. Secondary, 50 turns of No. 32 single-silk-covered wire, close-wound. Tickler wound over secondary as before, 20 turns No. 32 single-silk-covered wire. Frequencies covered, 2,500 to 4,480 kc.

Coil No. 3. Secondary, 30 turns No. 22 enamel, spaced between turns the thickness of the diameter of No. 32 single-silk-covered wire. Tickler interwound in center of secondary, 20 turns No. 32 single-silk-covered wire. Frequencies covered, 4,436 to 7,500 kc.

Coil No. 4. Secondary 19 turns of No. 18 enamel, turns spaced the diameter of No. 32 single-silk-covered wire. Tickler 14 turns of No. 32 single-silk-covered wire, interwound with secondary. Frequencies covered, 7,500 to 12,240 kc.

Coil No. 5. Secondary, 8 turns of No. 18 enamel wire, spaced the diameter of No. 32 single-silk-covered wire. Tickler, 6 turns of No. 32 single-silk-covered wire, interwound with secondary. Frequencies covered, 12,000 to 19,200 kc.

Coil No. 6. Secondary, 4 turns of No. 18 enamel wire, spaced the diameter of No. 32 single-silk-covered wire. Tickler, 5 turns of No. 32 single-silk-covered wire, interwound with secondary. Frequencies covered, 17,000 to 27,200 kc.

Constructional Details

Five coils would be used normally, as around 20 mgc represents the highest frequency in which there is any popular interest, especially as at the frequencies of the sixth coil the distances covered are rather small, from a transmission-and-reception viewpoint, because of the vagaries of wave behavior in that region. However, even the smallest coil—the sixth—did oscillate. There was considerable trouble about this until interwinding ticklers with secondaries was tried. This proved the cure-all. Or at least the cure. Dead spots have to be considered.

But before taking up dead spots, it might be well to define what is meant by interwinding the tickler with the secondary (the tickler being considered the primary, for antenna was coupled to the grid through a small condenser each time). Such winding does not mean that the two wires have to be put on at once. The secondary may be wound as usual, and if done by hand, for the two larger sizes of wire, there will not be enough tightness to prevent putting the tickler in between. So the tickler is put on after the secondary is completed.

A hole right through the coil form will anchor each secondary terminal and obviate the use of coil dope. While the better grades of dope do little harm, and sometimes enable the practical attainment of a fixed inductance, it was found that the oscillation intensity declined when any dope was used. This may be due to the dope having a higher dielectric constant than air, hence increasing the coil's distributed capacity, or equivalent radio-frequency resistance.

A thin strip of gelatin tape over the tickler will hold the tickler wires in place sufficiently.

If any dope is used it should be put on as if it were a strip along the tickler, and thus not fill up all the spaces between the secondary windings, or cover the total secondary.

Coils Supported on Switch

The form diameter was drilled and tapped at both ends, at center, for 6/32, so that a bolt could hold a lug at each end. The lug at one end was used for grid connection, the other for plate, the remaining the tickler return to audio load being part of the switching, while the free end of the secondary was grounded.

The lugs at the ends of the 2-inch long forms were used for soldering to switch tabs, therefore the coils were supported on the switch, but being very light, did not "embarrass" the switch in any way whatever.

There were some dead spots encountered in the fifth and sixth coils. The cause was traced to the largest coil, No. 1. The technical explanation was not satisfactorily complete. Of course the large coil acted or was caused to act as an absorption circuit. Therefore a shorting switch was used, and when the large coil was cut out, the dead spots ended, in the region where they had existed, near the higher frequencies of tuning each coil. However, for a short stretch over lower frequencies in these two bands, the very shorting that ended the previous dead spots developed new ones. So the large coil alone is not exclusively the cause. The shorting switch was put on the front panel, and closed or opened as circumstances required, pending a really satisfactory solution, accompanied by a scientific allocation of the cause.

Just a Little Speculation

If a little theory or speculation is not amiss, it may be pointed out that the switch used was constructed as follows: At front there was a metal place, through which protruded the main shaft. There were two crosspiece bars that held three deck insulators in place, as well as giving support to the front metal plate and to a companion metal plate at rear. Now, if we trace the path we find, starting at front, that we meet a conductive piece of material, the metal plate, and going along one side traverse the conductive supporting bar at right, come to the metal end plate, go to the left and come forward along the other cross-piece to the starting point. We have just described a complete conductive path, representing really a short-circuited turn. Therefore the dead spots may be due to the effect of the closed loop. This turn might act as a coupler from a high-frequency coil to the lowest-frequency coil, and closing the switch would alter the impedance of this coupling turn, while opening it would restore the original impedance, and for some high frequencies one impedance caused the trap conditions and for other high frequencies the other impedance did so. The problem is being worked on, especially on the basis of using an insulating piece instead of the metal plate at rear, and possibly also an insulating piece at front, though that should not be necessary, as one insulated interruption stops the short-circuited-turn effect.

Circuit Details

The circuit used 90 volts of B battery, and 4.5 volts of C battery for the A supply, the filaments being connected in series, without limiting resistor, none being needed. Negative of battery was connected to negative of detector filament, grid of detector returned to negative filament, negative filament of the audio tube connected to positive filament of the detector, and positive filament of the audio tube to A plus. The audio grid return was made to negative of C battery the A supply, for the 2.25-volt negative bias thus afforded, utilizing the drop in the detector filament. For B current conservation a 1.5-volt dry cell may be used for extra bias (total, 3.75 volts), with negative to grid return of audio tube, positive to A minus at battery.

The grid leak used was 25,000 ohms and the grid condenser was 0.00025 mfd. The grid capacity may be reduced to as low as 80 mmfd. As it is lowered the frequency ratio goes up a little. While in some instances this ratio in actual practice was a bit under 1.5 for the lower frequencies, it rose to 1.5 and even to 1.6 for higher frequencies. This increased ratio is due to the lessened distributed capacity, account of spacing, to the smaller capacity between tickler and secondary due to fewer turns, and to the increased capacity of the tuning condenser. That is, the tuning condenser capacity is not a constant for all frequencies, but changes with frequencies a bit. In fact, this holds for any capacities in r-f circuits, and includes grid condenser. The explanation follows:

Assume that the condenser is being worked at an infinite frequency. That means that the duration of the charge is infinite. Therefore the capacity of the condenser is constantly in service in a charged state. As the frequency is lowered, the condenser discharges less rapidly, for the frequency is a measure of the rate of discharge. Thus the condenser at the highest frequencies approaches its geometrical capacity, which is that capacity due to the construction of the

(Continued on page 12)

Prepare Your Receiver for Doublet Use

By Andy Blake

MOST receivers have an antenna and a ground post. Some have two points for the antenna, that is, for long antenna and for short antenna, besides ground post. But this long-short-antenna idea got out of favor so soon as the remote cutoff tubes were introduced, as the real reason for the changeover from long to short antenna was to get rid of cross-modulation.

Now sets are being equipped with two antenna connections for a different purpose, and also with a ground post. The primary of an input transformer from aerial is left open in the set, instead of one end being permanently grounded. Thus a dipole antenna can be connected to these free antenna posts. The dipole is the doublet, consisting of a horizontal stretch of wire interrupted at center by an insulator, the transmission line leadin being connected to the extremes of the insulator. The transmission line usually consists of two wires crossed several times on the way down, using transposition blocks. The wires should not touch.

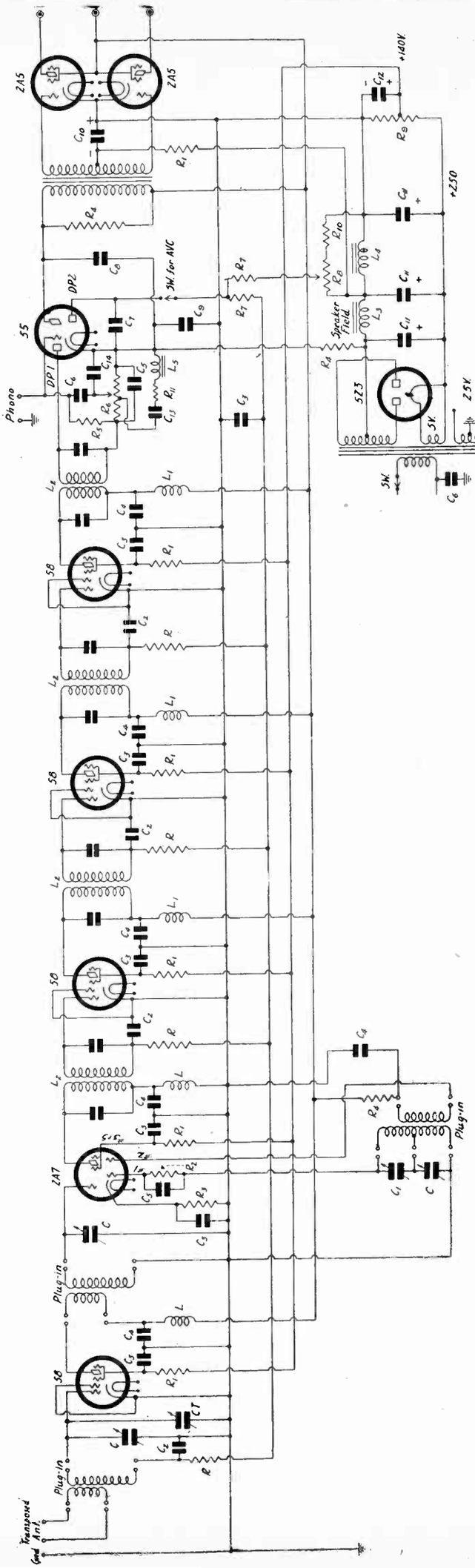
Doublet Outlet Installation

Any existing receiver may have the doublet outlets installed without trouble. The primary of the antenna coil must have the two ends freed, hence ground is disconnected from one end of this winding. Then two insulated posts on the chassis are used for antenna connections of doublet, these posts connecting to the free ends of the primary. The third post is grounded to chassis, and not used with a doublet. For use of the standard antenna, or Marconi type as it is called, meaning a grounded antenna system, a short-circuiting strap is connected between ground post and one of the antenna posts. Then the other antenna post is used as actual antenna input.

In constructing receivers, especially those, like the nine-tube all-wave set diagramed herewith, it is well to provide the outlets for doublet connection. The doublet becomes really useful on short waves, so even if the receiver covers only short waves, that is, omits the broadcast band, the conversion to the newer method may be followed.

Reason for T. R. F.

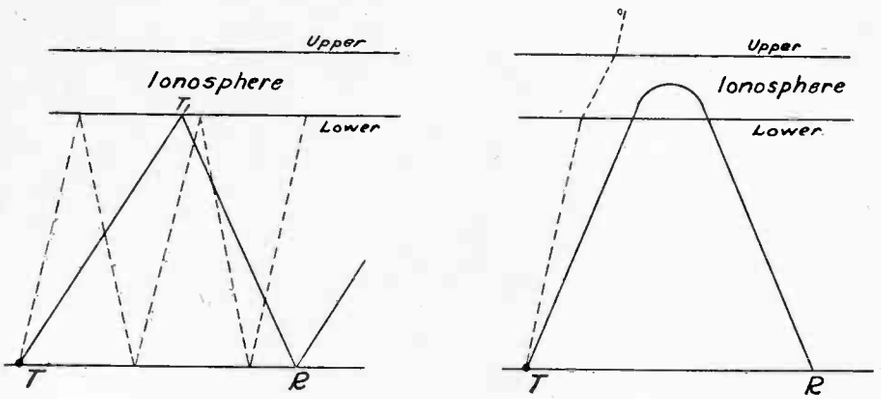
This circuit has a stage of tuned-radio-frequency amplification ahead of the mixer. The purpose of this stage is to enable the use of an antenna with considerable pickup, without trouble from images. The image interference trouble may be encountered without such a t-r-f stage because the selection ahead of the modulator is not good enough to wipe out the second response possible from a single oscillator frequency. Thus, if the i.f. is 465 kc the usual way of getting a signal is to have the oscillator frequency higher than the signal by 465 kc. To bring in 10,000 kc, for instance, the oscillator would be at 10,465 kc. The difference is the i.f. But a signal of 10,930 kc could come in, also, indeed simultaneously as interference. This is the image. It may be a real station or just noise. It is simply a case of the carrier frequency being higher (instead of lower) than the i.f. by the 465 kc. Hence the image is removed from the intended signal-carrier by twice the i.f. From 10,930 subtract 10,000, and the difference is 930 or 2x465.



A 9-tube all-wave receiver, equipped for doublet antenna. The receiver alone is grounded when the doublet is used. From the doublet comes the transmission line, connected to both "ant." posts.

Whatever Goes Up Doesn't Necessarily Come Down

By Harvey Sampson



At left, a carrier from transmitter T strikes the lower stratum of the ionosphere and is reflected back to earth (solid line), while if the frequency of transmission were lower the angle of reflection to receiver R might be sharper, as shown in the dotted line. At right, a carrier that penetrates the lower stratum a bit, then is sent back, and also (dashed line) a part of the wave that may not return to earth at all.

MANY persons must have noticed that on short waves there is scarcely any difference in signal strength whether a ground is used on the set or not, although in the broadcast band there is usually quite an increase of intensity when ground is connected. What is the reason?

It is quite evident from the foregoing that something must be conducted along the ground path in the broadcast band. This is quite so. There is a ground component of the radiated wave, and while it may not quite travel through the ground in the strict sense, it travels along the ground, or close to the ground. This wave is sometimes referred to as being earth-bound.

Augmentation Effected

So when we connect ground and find that the strength of the signal increases, we are pretty safe in assuming that there is a ground wave and that we have captured some of it, so that the other part of the wave is augmented, and therefore is put into the set.

It is possible, especially for considerable distance lying between transmitter and receiver, that the two components of the wave do not arrive at exactly the same time. Then we have fading. It may not be true that this disparity between arrival of ground and sky waves is the sole cause of fading, because even sky waves may arrive out of step, one part lagging behind another, but this is a duplication of the same principle, anyway.

It Has Been Confirmed

The sky wave is the one that is sent skyward. The Kennelly-Heaviside layer is an ionized region that obstructs the passage of radio waves. Its more technical name to-day is "ionosphere." Formerly it was believed that there was one layer. Later it was thought there were two layers. Now it is known that there are several layers.

Both Kennelly and Heaviside—Kennelly in the United States, Heaviside in Great Britain—expounded the ideas of the ionosphere at about the same time. They arrived at their conclusions independently. Yet it is a strange fact that, although these two men who gave to radio the idea of this layer, an idea that at first was not completely accepted by any means, speculated on the existence not of one layer but of a series of layers. They were right.

Later scientists confirmed this absolutely, and now the heights of the respective layers in regard to different frequencies are measured day to day.

It can be seen from the diagram at left that if a wave is sent from the transmitter T and picked up by the receiver R, that instead of travelling in a direct route from transmitter to receiver the wave goes skyward, hits the layer it first encounters, and is reflected back. The distance on the ground between T and R may be represented by absence of reception, or great diminution of reception, and would be referred to as the skip distance. There may not be total skippage.

The ground wave at short waves is soon dissipated, so not much account need be paid to it. As for the sky wave, however, it must be considered as striking the lower level of the ionosphere and the upper level, postulating two levels for convenience. Since frequency has a great deal to do with the angle of reflection, one frequency of transmission may come down sooner, as represented by the dotted line, the skip distance being shorter, hence the frequency is lower. Higher frequencies have higher skip distances. This accounts in part for the great distances traversed, or the DX records on high frequencies, until the frequencies get to be so high that there isn't much reflection from the layer, hence transmission is limited practically to the distance of vision. For this reason these "ultra" frequencies are called quasi-optical.

Measured Daily

Now, it may be true that a single frequency will strike the lower level of the ionosphere and instead of being immediately reflected back actually penetrates into the stratum until the obstruction becomes so great that the bent formation shown at right may be deemed to exist, and besides some part of the wave may continue on until it reaches another layer, from which it may not return at all, or, if it does return, it may come back, and likely would, at a differene time than the other component. There is a lag. It is also called a phase difference. It is another possible cause of fading, since the signal-carrier is divided into two parts, that is, the sky wave alone is so divided, and each part may arrive at the receiving point at a different time, or there may be periodic changes of time arrival, so that when the two arrive in step the signal is inordinately large, and when the two are completely out of step there is nothing heard, one cancelling the other. This is more fading, perhaps the worst type.

So those who imagine that a carrier sent out by a station from its transmitter travels a direct route will have to amend their belief to conform to the accepted theory. It is a theory but also a fact, because it has been fully confirmed. Science Service makes daily records of the layer heights, for particular frequencies, and the same sort of measurements are made by other scientific institutions, and notes compared. In this way a great body of technique is being built up about the isonosphere concerning which so many were reluctant to say a kind word only a few years ago.

New WOR Antenna First "Array" for Broadcasts

Ground was broken for the new WOR 50,000-watt transmitter at Carteret, N. J. Employment of a crew of sixty mechanics and technicians for construction, under direction of J. R. Poppele, chief engineer of WOR, enables the plant to be ready to go on the air toward the end of November. Engineering surveys concluded after months of research indicate that the $300,000 station will have three times greater coverage of large population areas.

The site, adjacent to the Rahway River, is twelve miles from Newark, and eighteen miles from Columbus Circle, New York.

Besides having ten times greater power than the one now in use, the new station will incorporate latest engineering features developed by the Bell Laboratories, manufacturers of the apparatus.

Will Have S-W Sender

The building, a one-story structure 60 feet by 66 feet, will house in addition the 5,000-watt set now in use, for auxiliary purposes, airway radio-beacons and a short-wave transmitter. The motors, transformers, pumps, machine shop and heating plant will be in the basement.

Two radio towers, each 385 feet high, form what is known as a "three-array" antenna system, a new development having its first application in other than short-wave transmission at this time. One tower is located in Carteret and the other in Woodbridge. They will be equipped with special lights approved by the Department of Commerce to guide aviators. On the roof of the building is to be an electric sign, visible for miles, also to guide fliers, bearing the letter, "WOR, Carteret, N. J.," and an arrow pointing due north.

Occupies 34 Acres

The entire plant, including aerial and ground installations, will occupy thirty-four acres. The network of ground wires alone will cover ten acres and will consist of more than thirty-five miles of copper, part of which will be laid in the Rahway River by hydraulic process.

Dead Spots That Are Due to Oscillation Stoppage

*[In last week's issue the author pointed out that dead spots are due to absorption. The actual cause may take various forms, and he discussed antenna resistance, limiting wire-wound resistors, coils unintentionally in fields of other coils, shorting of unused coils, and inadequate bypassing. The following information concludes the author's suggestions on dead-spot remedies.—*EDITOR.]

By Leon H. Husband

IF a local oscillator in a superheterodyne stops oscillating, as it may over some part of the tuning, there is a dead-spot area on the dial. This, too, may be classified as a form of absorption, because something acts as a deterring load on the oscillator to take the oscillation away from it, so to speak. Two common experiences are that the oscillator stops oscillating near the low-frequency end of the tuning, when most of the capacity is in circuit, or that it stops near the high-frequency end. The reasons are different.

If there is no oscillation at the low-frequency end of tuning the first suspicion is that there are not enough turns on the tickler, or the tickler is not close enough to the secondary. For pretty high frequencies of tuning it is usual to interwind the tickler with the secondary, and this process may be introduced to provide the remedy.

Oscillation Stoppage

If there are too many tickler turns oscillation might tend to stop at the high-frequency end, because the tickler then acts as a choke, but this condition seldom is encountered unless there are more tickler turns than secondary turns. If the grid condenser is too low, or, for a low grid condenser capacity, the grid leak is too high, oscillation may stop practically entirely, or if some is present, it is at the low frequencies.

The grid leak requires important consideration because the power to run the leak, to draw a motor parallel, is taken from the cathode emission. Therefore the higher the leak, the greater the power taken by the leak. In general, the higher the leak in a detector, the higher the sensitivity, because then small input changes produce large voltage differences across the leak due to grid current. But this ceases to hold after the leak has become too large in a regenerative detector circuit, or oscillator, because the regeneration may fail in spots, or become unduly weak. A balance has to be struck.

If any method of stabilization of frequency or amplitude is to be introduced, such as using a much smaller grid condenser than normally, then the leak would have to be lower than usual, say, 25,000 ohms or so. In feeble oscillators of the battery type the intensity of the oscillation may be actually increased when the leak is lower than usual, despite the seemingly contradictory fact that in detector circuits the sensitivity is higher the higher the leak.

Grid Blocking

Too large a grid leak may cause dead spots in an unexpected manner. Every one who has experimented much with oscillating circuits covering high frequencies knows that as the frequencies become higher and higher, due to tuning, if the leak is of high resistance, a point is reached where a squawk is heard in the phones, if phones are connected to the oscillator. This kills reception, of course. If the phones are elsewhere, and the squawk is not heard as such, nevertheless the condition that causes it remains, and if the oscillator is the local one of a superheterodyne, nothing is heard, except some form of interference or noise. The reason is that the plate current is nearly cut off, the tube resistance becomes extremely high, and the leak provides a companiately high resistance with a condenser across it, combining in such a way as to produce an audio multivibrator. This is absorption of the natural regeneration by the spurious oscillation caused by too high a leak. It is a form of distortion also describable as more than 100 per cent modulation.

Super-Regeneration

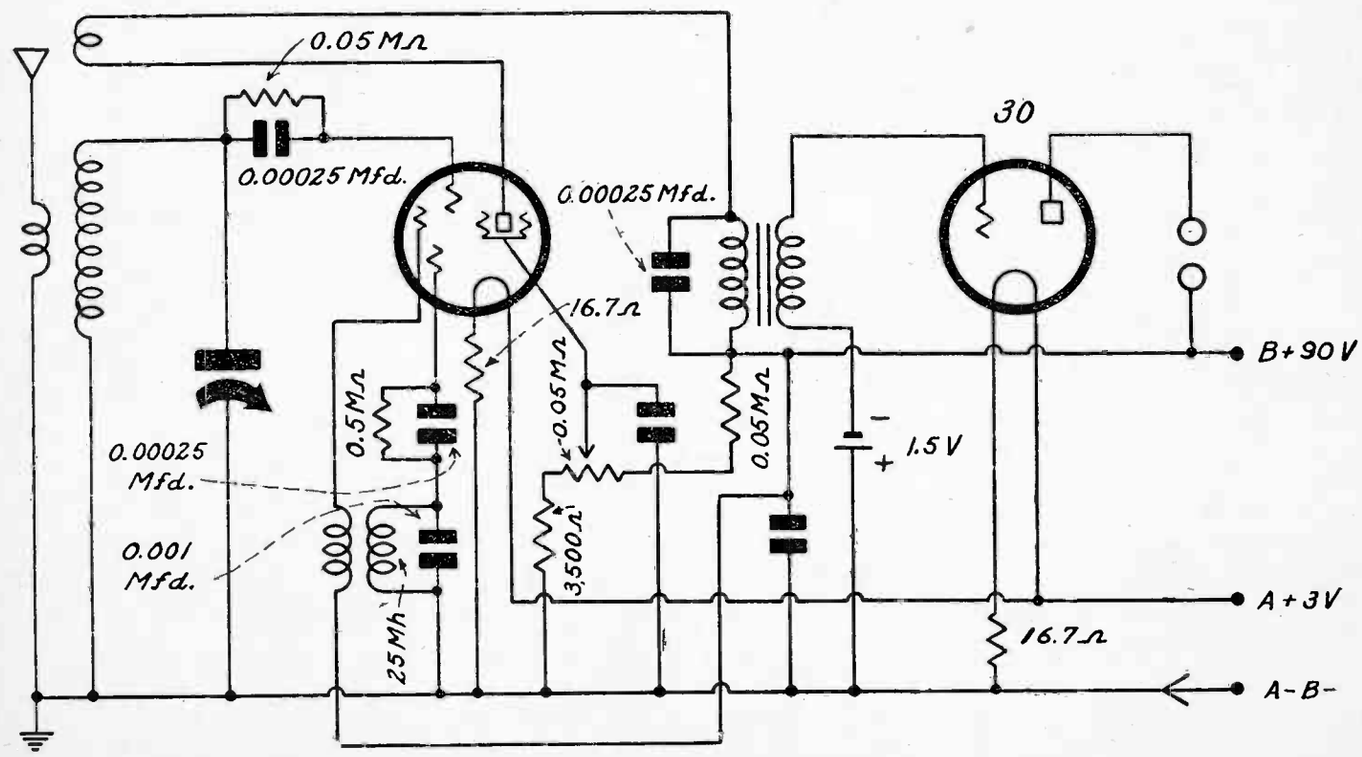
In the diagram herewith of a two-tube battery-operated short-wave set super-regeneration is introduced. The pentode of the tube is used as a regenerative device in the usual way. The triode is made to oscillate at a frequency just higher than audibility. The mixing takes place in the usual electron-coupled manner.

The grid next to the left-hand filament (negative) is the control grid of the triode, in which are leak and condenser properly selected for the frequency of around 30 kc. The tuned winding has an inductance of 25 millihenries. The plate winding is about half that inductance. Normally these would be honeycomb coils of 1,300 and 800 turns, respectively, about ½ inch apart.

The Grid That Counts

The grid that would tend to block is the one in the pentode, but to avoid this possibility the leak resistance is only 50,000 ohms, and the grid condenser is 0.00025 mfd. or may be less, even to 0.00005 mfd. (50 mmfd.).

A super-regenerator is good only for high frequencies. It is used for 10 mgc up. The circuit tunes much more broadly, due to the interruption of the high-frequency regeneration by the low-frequency modulation. But the sensitivity is very high. The spillover or saturation condition of the tube is scarcely ever reached, so the effective feedback is heightened considerably.



The new 1C6 tube (left) used as super-regenerative detector, with the auxiliary oscillation voltage introduced in the triode section. Since this tube has twice the transconductance of the 1A6, which it otherwise resembles, it has some use for the extremely high frequencies, provided the regenerative coupling is strong at the carrier frequency.

A Short-Wave Super Into Whicl

Some Pointers on Practising Economy As Well As M

By Leo

HERE is a short-wave super that can be put together with many parts the intended constructor probably has on hand. Those who want to go a bit farther in selecting parts of greater purpose may do so, following suggestions to be given. At all hazards, a sensitive and selective circuit will result.

The circuit is so arranged that standard plug-in coils may be used. Ordinarily the oscillator secondary would require smaller inductance. But if a small manual trimmer is put across the modulator secondary, the winding that is associated with the antenna primary, the same purpose will be served, because the modulator frequency is lowered in respect to the oscillator frquency by the correct amount, through manual adjustment of the front-panel-controlled small parallel condenser. Thus calibration is not disturbed, because the frequency of response does not depend on the modulator tuning. Selectivity and sensitivity are heightened by such tuning, but frequency-determination in the main part of the set is not affected.

Doctoring Two Coils

This method of using equal coils dispenses with the necessity of doctoring up the plug-in cells, though any who have a test oscillator may, at their discretion, remove secondary turns from the oscillator coils for the first and second bands (starting from lowest-frequency coil), until just a bit too little wire is taken off when the manual trimmer on the oscillator is set at minimum capacity. A modulated oscillator is needed for this purpose, if an output meter is to be the indicator. If the oscillator is not modulated, put a milliammeter in the diode circuit of the 55, beween center tap of the secondary feeding that diode, and the resistor network connection below.

The 2A7 is used as the pentagrid converter tube. There is a biasing resistor of 250 ohms, and this is practically standard, but it has been found that greater sensitivity develops if the resistor is made less, that is, the negative bias is reduced. This reduction practice in general is not so suitable for broadcast reception, as it is desirable to maintain a pretty good bias because quite a signal intensity may be laid down at the control grid of this tube in a broadcast super, especially one with t.r.f. ahead. However, in short-wave practice the signal intensities laid down are no way comparable to those in the broadcast band, and reduction of the bias to capitalize on the intensity gain is highly acceptable.

Antenna Condenser

No series condenser is shown in the antenna circuit, because this being a sensitive set, it is practical to work it with a very short aerial. In fact, it is better to have a short one than a long one. Any who desire to attach their regular outdoor antennas should use an antenna series capacity of the variable type, say, 20 to 30 mmfd. maximum, insulated, of course, from any metal chassis.

The mixer tube has the plate return of the intermediate primary connected to the plate of the oscillator coil, as this has been found to render the oscillator a little more stable. Between the control grid of the oscillator (Grid No. 1) and the stator of the oscillator tuning condenser there is a conductive connection shown which should be interrupted by a grid condenser, and the value of this will have to be obtained experimentally. Perhaps the best method is to use the smallest coils, and put in a capacity that is large enough to permit oscillation, but not a whit larger. An air-dielectric condenser may be used, or if the familiar small variable type is not at hand, no doubt you can make a condenser by using pieces of metal and spacing them on an insulator. Two metal pieces may be bent to right angles so they may be supported on the base. If a commercial condenser is to be used, one of 50 mmfd. would be more than ample, and the general value used will lie perhaps around 25 mmfd.

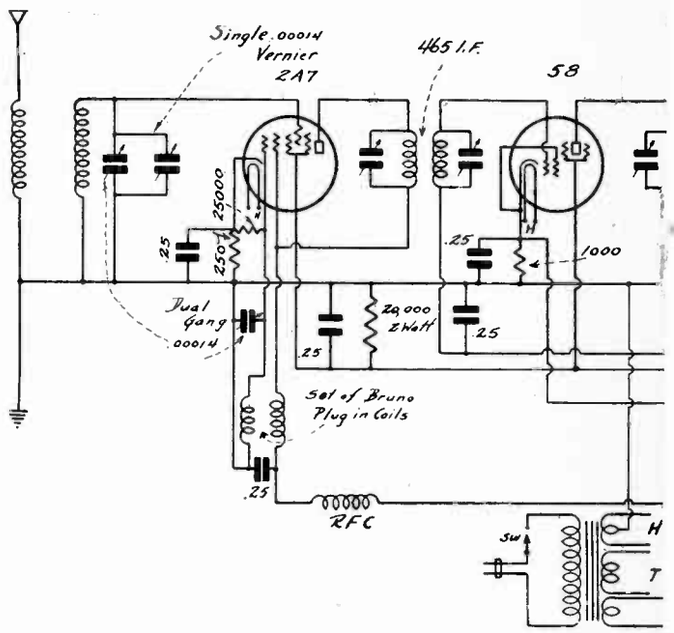


Diagram of a short-wave superheterodyne, the parts the home or shop. There are two stages of i.f. at 465 fier, and pentode output tube at 5 watts,

Quiet I. F.

The 0.00014 mfd. condenser across the modulator secondary is ganged with an identical capacity condenser across the oscillator, as noted on the diagram, and as many have just such a dual condenser, and perhaps even the plug-in coils, a good start will be made with these parts.

There are two stages of intermediate-frequency amplification. It is all right to use that much amplification provided that the tendency of the intermediate channel to oscillate is kept well in check. There is no reason to doubt that the method shown, of using a high negative bias on the intermediate tubes, is one aimed at economy. Note that the resistor specified is 1,000 ohms.

If one desires to improve the sensitivity without causing any injury to any part of the performance, he may reduce this resistor to some value around 150 to 200 ohms or so (not critical) and put across the lower resistor instead of 0.25 mfd. a bypass capacity of at least 2.0 mfd.

The common current in the tube's positive-voltaged elements flows through the cathode circuit, hence this is a point where feedback tendency has to be watched closely, and particularly when two tubes are so connected. One additional suggestion to remedy oscillation is to reverse the connections to the primary or secondary (not both windings) of the first intermediate transformer, in addition to the large bypass capacity being inserted across the newly-selected lower biasing resistor. When this capacity is so large, r-f choke and bypass condenser in the plate legs are not necessary, perhaps, but nearly always are included by those who don't mind extending themselves a bit in the construction of a receiver.

Full-Wave Detection

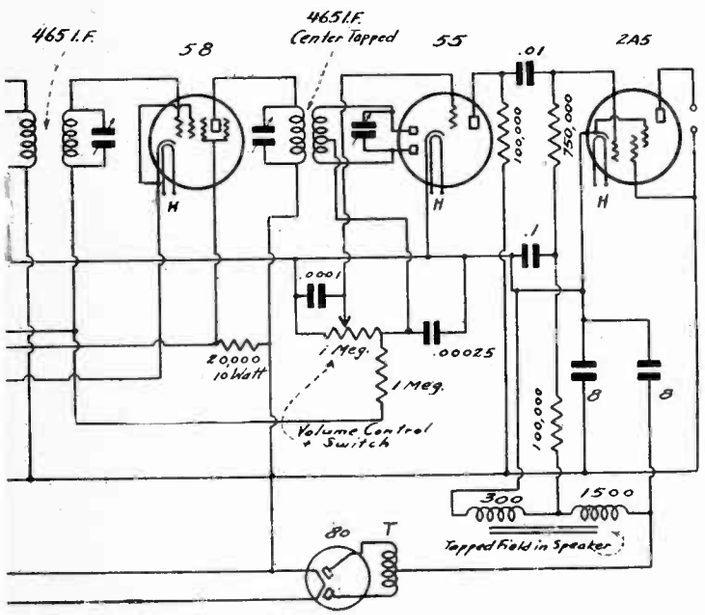
Now, to go from the intermediate level to the audio level. The secondary of the third intermediate transformer is center-tapped. The extremes of this winding go to the respective diode plates of the 55. The center tap is led through a 1-meg. resistance to ground. This resistance has a movable arm, hence is a potentiometer, and the arm goes to the control grid of the amplifier part of the tube, that is, triode. This amplifier is pretty much the same as the 56.

It will be noticed that full-wave detection is used. This is a smooth and quality method. It does, however, reduce the rectified voltage approximately by 50 per cent. That is, the amount of voltage put into the triode amplifier, or first audio tube, which is in the 55, is half of what it would be were half-wave rectification

h May Be Put Many Spare Parts

More Extended Methods for Pepping Up Performance

M. Trask



for which may be largely withdrawn from spares about kc, full-wave diode detection, diode-biased triode ampli- total distortion not more than 7 per cent.

used. However, there are two interesting considerations: first, that it is very easy to put into the triode more than it will stand without saturation and, second, that no more should be put into it than will cause it to load up the power tube it feeds.

Input Requirement

Since the power tube is a 2A5, which may be operated at around 16.5 volts negative bias, not more than that amount of a-c signal voltage should be put into the power tube, of course; hence, if the 56 has an amplification factor of only 4 in association with the load conditions, the input to the triode of the 55 should not exceed 4 volts. Now, this is such a low-voltage requirement, and so easily met, that it is quite all right to use full-wave rectification in the 55 as plenty will be delivered to the power tube.

It may strike some as strange that the protection of the power tube input is mentioned, when the volume control is a means of adjusting the input to the triode of the 55, hence governs the situation seemingly completely. But not so completely as you might imagine. One reason is that for very low values of resistance between arm and ground the tone quality is not good, because the diode requires a certain minimum value of effective load to avoid curvature of the characteristic. That is, a diode has a practically straight-line curve, when the input signal voltage is plotted against the rectified voltage, but the load has to be a pretty good sized resistance. Just what that value is would have to be determined experimentally, but it seems from casual observation to be around 50,000 ohms. Hence the circuit is designed so that the complete sweep of the volume control arm is never used, but more than three-quarters is.

A Smaller Bypass Capacity

Also, many operate sets with the volume full-on, and tune from station to station that way, "going fishing," as the saying is. When that is done the circuit surely should be safeguarded against overload of any of the tubes, because the resultant sounds heard when passing over strong stations are an irritating form of distortion.

The condenser across the utilized part of the load resistance—that is, between arm and ground—is shown as 0.0001 mfd., as this is normally about the lowest value of fixed condenser a fellow has around the house or shop. A smaller value would better protect the higher audio frequencies. Due to the high resistance possibly in circuit—it may be the full 1,000,000 ohms—this capacity may be safely reduced to 20 mmfd., a value used in some commercial receivers of the better class when the load resistance is only half of that shown here.

Not all of the rectified voltage taken off the diode is put into the triode of the 55 in any instance, as there is a limiting fixed resistance of 1.0 meg. also, across which is a 0.00025 mfd. condenser that eliminates most of the signal from this portion of the resistor network. This capacity may be increased almost at will.

The 55 is therefore used as a full-wave diode rectifier and a diode-biased triode audio amplifier. Note there is a driver stage for the 2A5, and it is associated with the 55 triode.

55 Plate Circuit

In the plate circuit of the 55 is a load resistor of 100,000 ohms. If hum is experienced, this often may be reduced greatly, or eliminated, by using two resistors of 100,000 ohms in series, and by putting from joint to ground a condenser of 1.0 mfd. or higher capacity, even an electrolytic of 8 mfd. This would constitute a resistor-capacity filter circuit as a fitting companion to the similar filter in the succeeding grid circuit of the power tube, where the capacity value is lower.

The B supply choke is the speaker field. The total field resistance is 1,800 ohms. The tap is at 300 ohms. To this tap the grid return of the power tube is led. Normally the current through the choke will be 60 milliamperes, therefore a negative bias of around 18 volts will be present. This is all right. The power output will be around 5 watts at a total distortion of a little less than 7 per cent.

The dynamic speaker's output transformer will have primary connected to the blank speaker points at right.

Values not given on the diagram or otherwise presented include the following: power transformer, 50-watt rating; RFC, a radio-frequency choke of 10 millihenries or more; H the 2.5-volt winding on power transformer, center of which winding is grounded; T is the high-voltage B winding for rectifier, shown twice, the connections being at lower right; the 5-volt filament winding for the rectifier is shown directly connected.

Short Waves to Unite Byrd and Kent Near Earth's Opposite Poles

Rockwell Kent, noted New York artist and writer, who together with his thirteen-year-old son, Gordon, plans to spend the next two years in the Eskimo village of Igdlossuit, will receive his "mail" from home via short waves broadcast from W2XAF, the General Electric station at Schenectady.

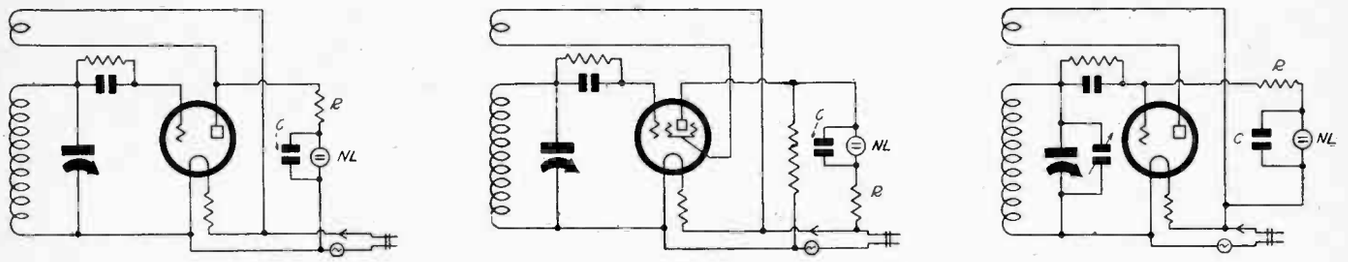
Igdlossuit is on the island of Ubekjent, 600 miles within the Arctic circle, and is nearly as close to the North Pole as Admiral Byrd and his men are to the South Pole. This unique situation has led to plans for a series of radio broadcasts, beginning on September 23rd, directed simultaneously to the two Americans who are, in the matter of latitude, farthest apart. The first half hour will be devoted to Admiral Byrd, in latitude 78 degrees south; the second half hour to Rockwell Kent in latitude 75 degrees, north.

To receive these radio messages, Mr. Kent will use a receiving instrument of the same type as that used by Admiral Byrd, except that his set will be battery operated.

The radio program on September 23rd will inaugurate a semi-monthly short-wave "radio mail bag," for which Mrs. Kent will be chief "letter writer." Mr. Kent's friends and associates, among the artists and writers, will also participate. The broadcast is scheduled over a coast-to-coast NBC network, from 12:00 to 12:30 p. m. Eastern Daylight Time, and will follow the Byrd program, which lasts from 11:30 to 12:00. Mrs. Kent's personal talk to her Arctic family and the radio mail bag to the Byrd Expedition will be sent out immediately after the network broadcasts, by short wave only.

Spare Parts Used for Constructing Oscillator

By Rodney Bullard



The 30 tube used as oscillator at left. The 34 at center has the screen as effective plate for feedback. At right the circuit at left is duplicated but the neon modulator is coupled to the grid instead of to the plate.

MANY persons have parts around the home workshop for building a test oscillator or signal generator. Especially there are usually some 0.0005 mfd. tuning condensers that seemed to have been extremely useful in days gone by but for which apparently there isn't so much demand now. Or a 0.0005 mfd. condenser, even one of especially good make, can be picked up for about $1 for the same reason of lessened demand and relegation to "bargain basement" or odds-and-ends counters of stores.

With this condenser, a suitable coil, a leak, grid condenser, socket, dial and tube the signal generator can be built. It is practical to have it in a wooden box, or a coffee can repainted for the gala occasion, or to build it in with some other test equipment.

Connections Outlined

Some directions will be given for constructing it, using the tuned-grid type oscillator, that is, familiarly tuned grid with inductively-coupled tickler. A 30-tube, if used as oscillator, may be applied to "universal" use—a.c., d.c. or batteries, 90-120 volts—if a limiting resistor of 10 watts, 1,700 ohms is used. Connect this between one side of the a-c cable cord and positive filament. Connect other side of the cable cord to negative filament. Connect the plate return to the side of the line carrying the resistor, but on the line side, not on the positive filament side, of the resistor. The rest of the connections are familiar to most readers.

The first consideration is the coil. The required inductance for reaching 166.7 kc, which will be the low extreme, is 1,800 microhenries. A two-winding honeycomb coil is used, the tickler not being critical, but about half the size of the secondary, and about ¾ inch away. If a transformer of this type is on hand, or, if not, one of too much secondary may be bought in a store, and if the coil is wound on a ⅜-inch diameter bobbin with 1-inch diameter bottom flange, the coil usually will be only so large as to project about 1/16 inch outside of the 1-inch diameter. Commercial coils of the right type are obtainable. Information concerning them may be procured by addressing Trade Editor, RADIO WORLD, 145 West 45th Street, New York, N. Y.

The frequency range will be from 166.7 to 650 kc, or almost 4 to 1, which is to be expected from a 0.0005 mfd. condenser.

Intermediates or Fundamentals

If this condenser, as suspected, is of the straight-line capacity type, then there will be crowding at the higher frequencies, but since the range is so much more than actually needed, the most serious part of this crowded region is not used, and the tuning is from 166.7 to 500 kc, or on a 3-to-1 frequency basis. Notice that the intermediate frequencies all are encompassed by fundamentals. It will be confirmed later that the broadcast band is completely taken care of, using only the third harmonic. Some boasting is done on occasion of systems that use only the fourth harmonic, but here is one using the third!

The broadcast band is encompassed by 540 to 1,600 kc, and the extreme fundamentals are 540/3 and 1,600/3, or 180 and 533.3 kc.

Using a dial representing numbers, 0-100, with 0 as minimum capacity and 100 as maximum capacity, with a straight-line capacity condenser, here is an idea of the dial settings:

100 = 166.6 kc
50 = 187.5 kc
25 = 227.5 kc
0 = 650 kc

With these facts as guide you can calibrate the dial on the basis of broadcasting stations and a receiver, the oscillator beating with the carriers, oscillator frequencies represented by one-third of the broadcasting station frequencies. You would use rather low frequency stations, but would not get quite enough points, so after getting a dozen or so as stated, use a high-frequency station in the broadcast band, dividing the station frequency by 4, 5, 6, 7 etc., and being guided as to correct interpretation by the recordings already made.

That is, you have a sense of direction already, and you know that higher frequencies compared to any recorded will be represented by smaller capacity in use (lower numerical dial settings) and therefore frequencies of the fundamental not very far from ones known may be ascertained. There will be still something missing in the low-frequency portion, but this problem is solved when the few low-frequency points are recorded on graph paper (plotting paper or cross-section paper it is also called) and then the even divisions are obtainable: 550, 600, 650 kc etc. as well as 170, 180, 190 kc etc.

Frequency Calibrated Scale

It is even possible to purchase frequency-calibrated dials, but these come with special coils and a special tuning condenser, as the calibration holds only when the same condenser and coil are used.

The oscillator will be modulated by hum on a-c use, but not modulated on d-c or battery use unless some special means are provided for this. A neon tube will do the trick, as explained in last week's issue (August 4th). Any small neon tube is satisfactory, even the type so small as not to require a socket.

The oscillator will couple to any set automatically, because the cable acts as an aerial, and the receiver antenna picks up this radiation. This is a good means of coupling, as there is no detuning. However, when intermediate channels are to be peaked, since automatic coupling would provide spurious responses, and perhaps result in confusion, simply remove the aerial from the receiver, and then there will be no coupling to the radio-frequency input. As an extra precaution the set's local oscillator, in a super, may be shorted when intermediate channels are being peaked.

With a calibrated dial of commercial type it is practical to have an accuracy of 1 per cent., which is considerable accuracy in an instrument that can be built of parts costing around $3.

Marconi Device Guides Ships Through Any Fog

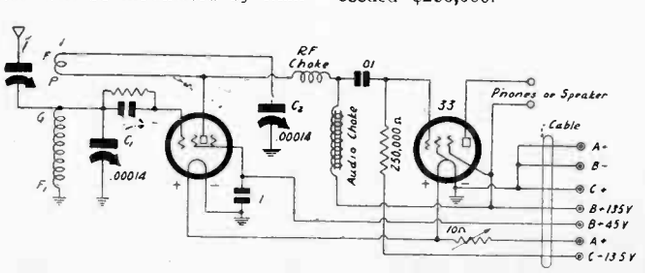
Using an ultra wave for transmission and reception, Guglielmo Marconi has developed a direction-finder for ships that enables them to navigate precisely in a fog. He tested the method in Italian waters recently, using his yacht, Elettra, and impressed Italian officials and engineers.

At about the same time, in this country, scientists working in conjunction with Massachusetts Institute of Technology announced and demonstrated a chemical means of dispelling fog.

RCA and Cunningham Now Consigning Tubes

Radio folk take it as a sign of returning prosperity that the demand that there be no more new tubes during the period of the depression has subsided.

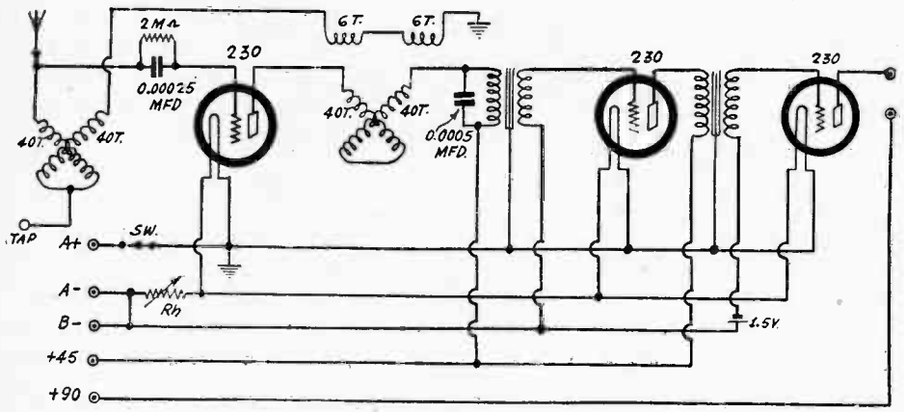
Be that as it may, RCA Radiotron Co., Inc., and E. T. Cunningham, Inc., have gone on a tube consignment basis for dealers. Checks representing repurchased tubes, sent to dealers, are said to have exceeded $250,000.



The same principle of steadying the amplitude during regeneration may be applied to a plug-in coil system, for short waves, though the grid condenser capacity would have to be somewhat higher.

Signal Strength Boosted By Using a Variometer

By Jasper Brooks



A regenerative detector for broadcast reception, using two home-made variometers. Directions for making these variometers are contained in the text. The circuit works a speaker in great style, for the voltage gain using the variometer is high. However, selectivity is not very good.

HOW long has it been since you've heard about variometers and any sets using them? Quite a while, no doubt. There was one fact undeniably related to variometers. They did lay down a husky signal. True, the selectivity was not as high as with condenser-tuned circuits, but the volume was much higher. herefore those who are not so determined on very high selectivity, but do want that great wallop, may obtain it by following the diagram.

One variometer is in the antenna circuit, with part of the winding carried over to the second variometer in the plate circuit, for inductive relationship. Then the second variometer is turned for regeneration control.

The two sections of the variometers consist of 40 turns each of No. 22 wire, any insulation, one on a form 3 inches in diameter, the other on a form small enough to turn inside the other. The two windings in the antenna coil are joined and one free end connected to antenna, other extreme terminal to the pick-up coil on the next variometer, which is made the same way, except that over each half of the inductance, that is, over the winding on each form, are put 6 turns, one end connected to the first variometer, other end to ground. The purpose of leaving the tap free on the antenna coil is to be able to shift the frequency range, as variometers do not have the tuning range that usual condensers have in broadcast practice.

Following the regenerative detector are two stages of transformer-coupled audio-frequency amplification. All three tubes are 30's. The rheostat may be 10 ohms, if A plus is equal to 3 volts. If A plus is 6 volts then a limiting resistor of 4 ohms is used and then a series rheostat of 10 ohms.

If you have some spare time and want to verify the intensity of the signal strength, build this little receiver, and within the stated limitations, it will give you quite a kick.

Boston to Install Two-Way Ultra-Wave Police Radio

Schenectady, N. Y.

Bad news for lawbreakers was broadcast here as engineers of the General Electric Company demonstrated a mobile two-way radio system developed for use by the Boston police department. Timothy A. J. Hayes, head of the police signal department of Boston, inspected the prowl car, with its provisions for carrying on a conversation with headquarters while traversing city streets.

Modified forms of short-wave radio communication have been utilized for some time by state and local law enforcement agencies, but heretofore no practical system has been evolved which would enable officers to converse freely with precincts and headquarters while actually cruising their district.

The car equipped for the demonstration bore no telltale evidences of special equipment, such as a protruding "fish-pole" antenna. The transmitter was installed in the rear trunk of the light sedan. A French-type telephone was installed in a convenient spot on the instrument panel, where it could be used by the passenger, or even the driver, if necessary. When the car was called by headquarters and the instrument was lifted from its hook, the transmitter, on a different wave length, began to function immediately. From this point on the procedure was as simple as in a telephone conversation.

The transmitter was located in one of the General Electric buildings, and an office was turned over to the visitors to serve as "headquarters." From this point it was possible to carry on a running conversation with the cruising car as it drove about the city.

A temporary one-way system operating on medium high frequency has already been installed in Boston for police use. Later this will be replaced with the new ultra-high frequency system. Only one precinct will be equipped with two-way communication at first, but it is planned to change over the other precincts with additional equipment as the system becomes adjusted to operating conditions in Boston.

Will Equip 14 to 18 More

The first Boston installation of two-way communication will be made in the ninth division, composing part of Roxbury, and eventually 15 of the 19 divisions will be so equipped. The plan was worked out by Police Commissioner Eugene C. Hultman in cooperation with consulting engineers. The Boston transmitter will be located at headquarters, and will be connected with precinct or division houses by telephone line. Car transmitters in different divisions will have different frequencies, but the receivers of all cars will be tuned to the headquarters frequency. The receivers in the division houses will be tuned to the car transmitters in their respective divisions.

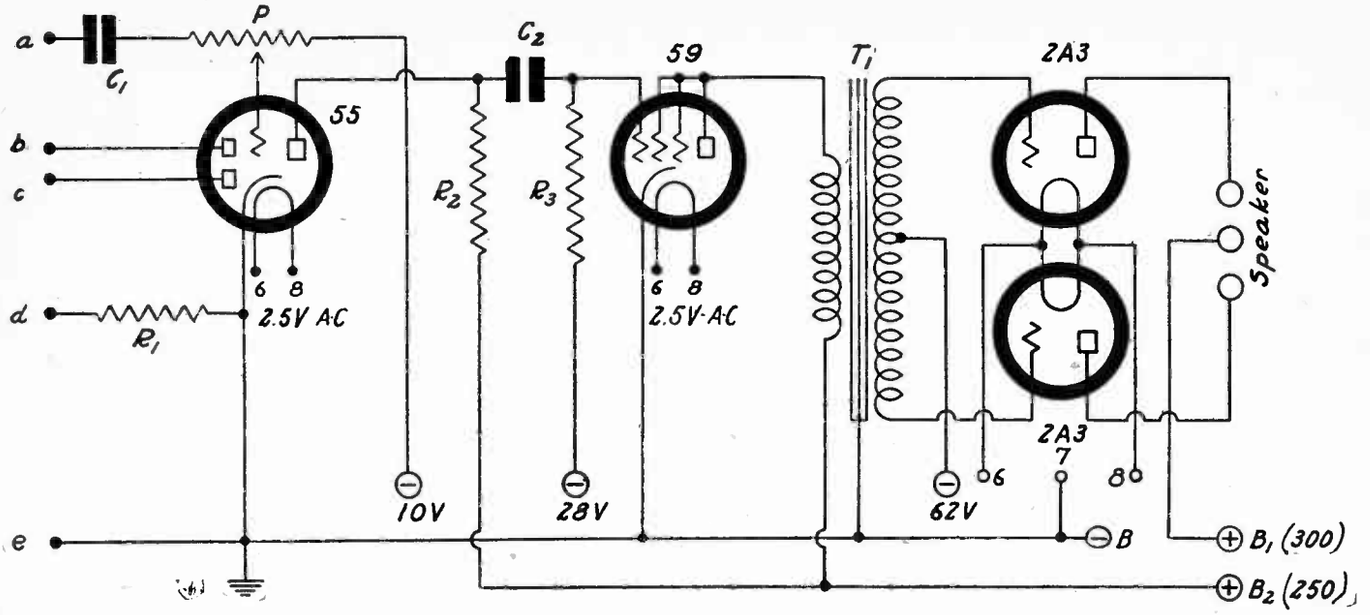
In the case of division houses that are located remotely from the center of the division, a special pick-up receiver on the other side of the division will be installed, and this will be connected to the division station by telephone line.

The use of conventional medium high frequencies for police service has been clearly demonstrated for several years, and there are at present nearly 200 of these systems in operation. Medium high frequencies, however, have certain drawbacks — the bands are crowded, there is interference particularly at night, and the antenna installations are comparatively awkward and expensive. They do not lend themselves to two-way communication, which most police officials consider desirable.

The communication range of ultra-high frequency equipment, such as that planned for Boston, is normally limited to a few miles, and increasing the power of the transmitters beyond a certain value does not extend this range, since the signal is propagated somewhat as a beam of light and is projected off into space a few miles from the transmitter as a result of the earth's curvature. Where greater coverage is required in connection with county and state police work, a medium high frequency system must be utilized.

The Range Question

The same question of coverage always arises with commercial use of ultra frequencies. The demand for greater coverage than vision distances may exist, and while in police work a lower frequency answers the purpose, in ship-guiding devices, as Marconi's new one designed for navigation in a fog, the limitation has to be accepted for what it is, and the complete range of effectiveness therefore is not attained.



An audio channel for a high-powered receiver. The input may be from a tuner that has a detector in it, or the detector in the above diagram may be used.

An Audio Amplifier for High-Powered Set

The audio channel of a high-powered receiver may be constructed along the lines shown. The detector is included, and is a diode, the intermediate transformer being connected to b and c, with return to R1. If the detector in this design is not to be used, the output of the detector in a tuner would be connected to the stopping condenser C1. The connection d is for the center tap of the i-f transformer, or, if full-wave detection is not to be used, b and c are joined, and the untapped secondary of the i-f transformer is connected to the bc joint and to d.

R1 is the load resistance of the diode and is usually 500,000 ohms. R2 may be 250,000 ohms, R3 something in the order of megohms, not higher than consistent with absence of motorboating, however.

The 59 is used as a triode to drive the push-pull 2A3 tubes. However, a 56 may be used instead, as it will load up the output also. The bias voltages are designated.

If it is desired to increase sensitivity the bias on the triode of the 55 may be reduced to 6 volts.

Note that a separate filament winding is used for the 2A3's.

New Studios Leased As KDKA Expands

KDKA, Pittsburgh, is to have the most modern type of studio equipment installed in a new studio plant in the Grant Building. KDKA will occupy the entire third floor.

The Westinghouse Electric and Manufacturing Company and the National Broadcasting Company are cooperating to make the new KDKA studios one of the finest broadcasting plants in America. The present plans call for six studios, each of the largest of which will be adequate to accommodate a huge symphony orchestra. Two other studios will be large enough for small musical ensembles; another will be designed primarily for speakers, and the sixth for electrical transcriptions. The studio space will be air-conditioned, thoroughly soundproofed and acoustically treated to insure proper broadcasting conditions.

Frequency Ratio Increases Tuning To Lower Waves

(*Continued from page 4*)

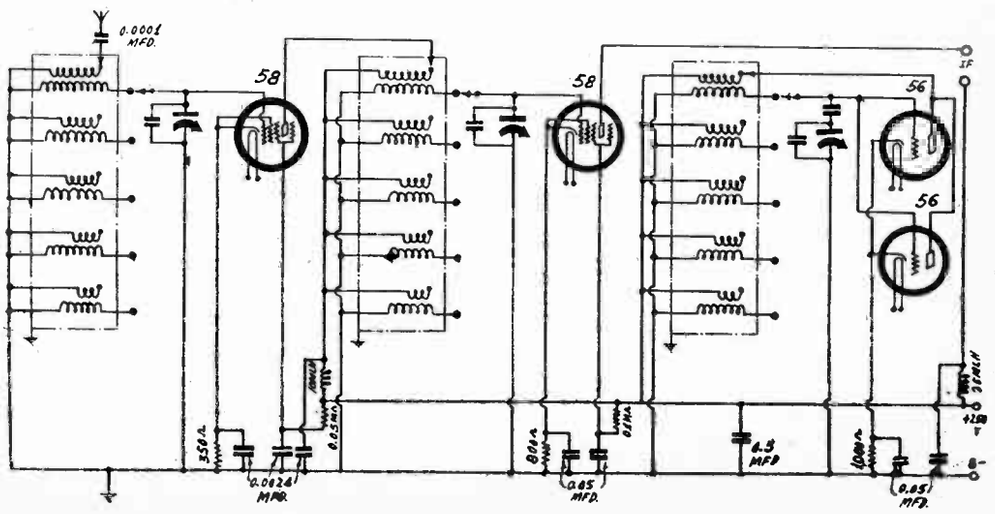
condenser itself. All multi-frequency systems tried by the author developed the phenomenon of increasing frequency ratio with increase of frequency. Of course the change is small, but not so small as to pass unnoticed or, indeed, to be neglected in coil design. The data just given for winding coils is consistent with the observance of the changing capacity conditions.

The finished coil-switch assembly actually used had five coils, disposed about the switch sections in circular formation, and were left "open," not shielded, as shielding has no advantage in such a regenerative hookup like this. The series antenna variable condenser was 20 mmfd. maximum. Any of the small short-wave condensers (midgets and juniors) may be reduced to a sufficiently low capacity by removing all but two stator plates and one rotor plate.

A further report on experimental progress with switch-type coils is in preparation.

Use of Tube Shields

Tube shields that connect by flexible lug to cathode should be used only in grounded-cathode circuits.



The coil system expounded may be used in the mixer of a superheterodyne such as shown, although the values of oscillator inductance and series padding condenser are not given in the text. The data for the 30 tube apply to the 34 and to the 58 and 78, also 56 and 76, but not to the 24, 35 and 32, or other tubes without suppressor element.

Summer Sales Good; Big Rise Due in Fall

INTEREST in radios has reached the highest pitch in several years, and some retailers describe current demand as measuring up to that when satisfactory sets were first so widely distributed back in 1924. Instead of the usual Summer lull, the trend of sales continues steadily upward, although at a slower rate than during the first six months of the year. Wholesale and retail volume during the first six months rose 50 to 75 per cent above the level reached during the comparative months of 1933, and with some of the large distributors the increase ran as high as 100 to 150 per cent for several of the nationally-known sets.

This substantial gain is not attributable to the stimulus of low prices, as prices have held steady, but almost entirely to the widening popularity of radio, aided by the constant improvement in the entertainment provided by broadcasting companies, the achievement of manufacturers in bringing the short-wave sets within the reach of the average buyer, and the possibility of enjoying satisfactory programs throughout the entire twenty-four hours of the day.

25 to 40% Sales Rise Expected

Based on the advanced inquiries for new merchandise, volume during the second six months of the current year will run ahead of the comparative figures for 1933 by 25 to 40 per cent, despite the smaller returns from the drought-stricken areas, as retailers in all parts of the country are expecting demand to swing abruptly upward, as soon as the new models will have been displayed. This will bring sales for 1934 to a conservatively-estimated total of 4,550,000 sets, as compared with the record of the peak year of 1929, when 4,438,000 sets were sold, with a retail value of $592,068,000, less tubes. Sales of automobile radio sets alone are expected to run to 750,000 units.

Radio wholesalers are operating under the General Wholesaling Code and the supplementary Radio Wholesaling Code. It is expected that the Radio Wholesale Code Authority will be functioning in all detail soon, which will lead to the elimination of some of the encumbering excrescences which have been retarding the progress of the trade, according to a survey of the radio industry, which has just been completed by Dun & Bradstreet, Inc.

Profits Replace Deficits

In an Analysis of the 1933 operating averages of 229 retailers of radios, made by the statistical department of Dun & Bradstreet, Inc., it was found that a net profit was made by 142 concerns, or 62.01 per cent of the total number.

One of the most encouraging features of the current demand is the decided trend toward sets of the better grades. This is indicated by the fact that the average unit sales price is being raised steadily. The interest shown last year in sets which would pick up police staions rapidly is switching to those that will pick up foreign stations. The manufacturers are meeting this demand by producing moderate-priced sets that are able to deliver foreign reception satisfactorily. The all-wave sets, along with automobile radios have served chiefly to bolster volume thus far this year, although since the early part of June there has been a decided increase in the sales of portable sets.

Volume of sales during June and July in some of the Eastern States fell below the comparative totals of 1933, but in the Southwestern, Middle Western, and South Atlantic States, gains of 15 to 20 per cent were reported generally for these two months. In the Pacific Coast States, the strike of the longshoremen, which started early in May and was not settled until the middle of July, brought sales practically to a standstill in the major distributing centers.

Fewest Failures

Based on the trend during the past six months, the smallest number of failures in the history of the industry is to be recorded for 1934. Thus far, firms have been going into bankruptcy at the rate of 3 a month, whereas in 1933, the monthly average was 11. With the exception of the failure of one large wholesaler in January for more than $1,000,000, the involved liabilities of the defaulting firms have been small, the total for the 20 failures for the first six months amounting to only $1,465,906.

Complete Price Protection Afforded to Tube Dealers

Complete dealer protection against price decline has been announced as a new basic policy by National Union Radio Corporation of New York. This announcement followed notice of reduction of tube prices, some prices down 50 per cent on slow-moving tubes. Even some of the most popular tubes were affected. (See page 16.)

National Union's move is a radical departure from the previous price decline policy which only gave three weeks protection to the dealer on his shelf stock. The new complete protection plan has no time limitation whatsoever and affords to National Union service-dealers complete insurance against loss on all shelf stock inventory at the time of any decline in radio tube list prices.

Combination Resistors Announced by Atlas Co.

The Atlas Resistor Company, 423 Broome Street, New York City, announces Catalog Number 4, covering wire-wound tubular resistors.

Among the new features is a line of pigtail resistors, which come complete with lug as well, in both 5 and 10-watt ratings. Of small dimensions, they can readily take the place of carbon resistors between 5 and 25,000 ohms.

Another item is the combination resistor. Manufactured in stock form in 3 and 10-watt ratings, these units are composed of sections of like ohmages. The 3-watt form consists of five individual resistors of identical ohmages and the 10-watt stick has three individual units. The principal use of these resistors is for making up odd-sized ohmages.

Navy Guns' Effect on Radio Parts Studied

As guests of the Navy Department, three engineers from the Radio Division of the Westinghouse Company at Chicopee Falls, Mass, are spending six days at sea on the Battleship Texas studying the effects of gun fire on delicate radio parts, in connection with manufacturing for the Navy.

PHILADELPHIA SHOW IN OCTOBER

The Seventh Annual Philadelphia Electric and Radio Show will be held October 8th to 13th. Most exhibit spaces in the Philadelphia Municipal Auditorium have already been sold.

Last year more than 100,000 visitors inspected the products of the industry at the show.

Industry Would Quit Electrical Code for One Entirely Its Own

Washington.

Radio Manufacturers' Association, Inc., has petitioned the National Recovery Administration for withdrawal of the radio industry from the electrical code and establishment of a separate radio code.

It is claimed the radio industry, now doing $200,000,000 annual retail business, with between 40,000 and 50,000 employes, is a "distinct industry," that the association is truly representative of the industry and capable of administering a separate code and that good reasons for such individual code exist.

New Firm Started by Former T.C.A. Officers

The Triumph Manufacturing Company, 4017 West Lake Street, Chicago, announces its formation. It produces a brand of radio devices and test equipment. Heading the company is J. J. McCarthy, formerly vice-president, treasurer and works manager of Transformer Corporation of America. E. J. Doyle, previously secretary and chief engineer of T. C. A., will direct engineering research and design. R. D. MacGregor, formerly sales engineer and service manager of the same company will handle merchandising.

The products include the Model 100 Signal Generator, resistor-capacitor indicator, short-wave antenna, a multimeter with a wide range of operation, a tube tester, vacuum tube voltmeter, and an impedance bridge which tests condensers and coils on fundamental values. Other radio, electrical and mechanical devices are in development.

National Union Offers Oscillator to Tube Sellers

A new all-wave oscillator developed by Wireless Egert Engineering Company, of New York, has been made available to service dealers by National Union Radio Corporation.

The features of the new instrument include direct reading on fundamentals, full frequency coverage with a range of 14 to 3,000 meters (100 to 21,600 kc.) attenuation at highest frequencies, frequency stability, and accuracy with dial readings.

H. A. Hutchins, National Union's general sales manager, stated that this oscillator was added to the National Union free shop equipment line because of the necessity of having an oscillator for servicing modern all-wave sets.

HARVEY AMPLIFIER REDESIGNED

Harvey Sampson, proprietor of Harvey's Radio Shop, 105 West Forty-third Street, New York City, has residesigned his portable public address system, and encased it in a finely-finished metal cabinet. Variety of microphone selection is afforded, but he reports that the general trend is toward the crystal microphone. Due to the low sensitivity of this faithful pickup device the audio amplifier had to be redesigned for much greater sensitivity.

LOUIS LAGER STARTS COMPANY

Prompt Radio Service Company, under the direction and ownership of Louis Lager, well-known for the past twelve years in the Cortlandt Street district of New York City, has started a mail order business at 130 Cedar Street. A floor space of 60,000 square feet is being occupied.

Radio University

Clean Beats

IS IT POSSIBLE to get clean beats when using a.c. on the plate of a test oscillator? I am informed that at the higher frequency settings of the tuning condenser there will be raucous growling replacing the clean beats desired, although at lower frequencies the sharp results are attainable.—J. W. D.

It is entirely possible to get clean beats at all settings, provided also that the coil is not too close to any metal. If the coil is shielded, be sure to have the shield separated from the nearest winding by certainly no less than the diameter of the coil itself. This holds even if the coil is a honeycomb, as it is likely to be for the low frequencies desired for intermediate use. The reason for stressing this fact is that the means of obtaining clean beats at the higher frequencies of tuning depend on the value of grid condenser. This capacity has to be extremely small, hence no abnormal losses are tolerable, since then the tube won't oscillate with a very small grid condenser. This condenser may be made up of hookup wire braided for about a total length of 3 inches, being snipped, and two side-by-side extremes of bared leads used for connection across the series grid leak of 200,000 ohms. This capacity will be ample, and there may be a bit of growling still, but the wire is unravelled at the free end until the growl totally disappears. The amount to take off is critical. Stop when results are satisfactory. Recheck by turning the oscillator on several times, after the tube has cooled, to be certain that the oscillator starts oscillating the moment the switch is turned on. This is a test that the circuit losses are not too large. Do not make the test when the tube is hot to begin with. The small capacity cuts down the oscillation intensity, otherwise high, at the high-frequency end, and keeps the operation well on the safe side of saturation. Also this is a measure of frequency stabilization, automatically included, since such stability may be expressed as constant amplitude of oscillation, or steadiness of plate current through the range of tuning. This method never before has been outlined this way, so far as we know, and we commend it to your respectful attention.

* * *

Method Explained

WILL YOU KINDLY tell me the system of harmonic counting that has been given some notice recently? I never heard of this before.—O. K. L.

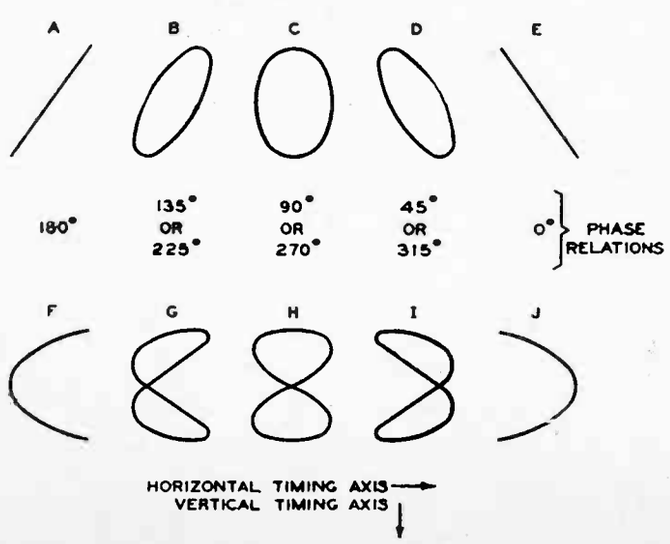
The system, as used in a station finder, consists of operating the station finder as an oscillator over a given range, say, 500 to 1,000 kc, whereby the fundamental and the second harmonics may be used for the broadcast band and then some, without any further exposition required. For harmonics of the highest fundamental, that is, 2,000, 3,000, 4,000 kc up, the station-finder is set at 1,000 kc fundamental, generates harmonics, and a receiver being measured is made to pick up an harmonic. Thus the unknown is a multiple of 1,000 kc. What multiple? If the unknown is 1,000 kc, then two beats are obtained, one from 1,000 kc, the other from 500 kc, therefore using 1,000 kc as the starting point on the station finder, turn the finder dial until another beat is heard, then if this is at 500 kc the unknown is 1,000. Hence on the finder, in the megacycle range, a point corresponding to 500 is marked 1, meaning the unknown is 1,000 kc. From the foregoing the formula can be worked out. The fundamental used was 1,000 kc to start with, and this is always true, as harmonics of that are being measured. The second response in the unmolested receiver was at 500 kc, or 1,000/2. Each low-frequency point for the second succeeding response is the unknown divided by n + 1, where n is the harmonic order of 1,000 kc. Thus for 2,000 kc, divide 1,000 into 2,000, answer is 2. The next higher harmonic order for the response 2 + 1, hence 3 is the factor. Divide 2,000 by 3, and the fundamental point used is 667 kc, marked 2,000 kc or 2 mgc. For 3,000 kc unknown, 3,000/1,000 = 3, plus 1, equals 4. Divide 3,000 by 4 to get the fundamental location, or 750 kc, marked 3 mgc. Thus the harmonics are counted in stages of 1 mgc until 10 mgc, when crowding sets in, and larger jumps are made. The frequencies may be integrated by noting where an unknown comes in at even megacycles, and turning the oscillator to some fundamental related harmonically to the desired frequency, noting the frequency direction. This is the method of the Bernard automatic electric harmonic counter.

* * *

The 2A7 Mixer

DO YOU CONSIDER the 2A7 particularly good for a short-wave mixer? What about the degree of coupling?—K. H.

For an all-wave receiver the tube, in our estimation, is satisfactory, but for more discriminating use on short waves we believe that the coupling is too strong, and moreover that the tube is subject to some forms of erratic behavior, such as the strong impulse of a carrier "pulling" the oscillator, a form of locking, and also we point to the strength of the harmonics. Use of two separate tubes is probably preferable.



Ten patterns for ten different voltages or currents, as disclosed in phase analysis with an oscillograph tube.

Compression Condensers

IN SHORT-WAVE PRACTICE compression type of trimmers for parallel adjustments are condemned, as the condensers will not hold their settings, yet these very same condensers are in general use in commercial receivers at high-frequency levels, air-dielectric in the intermediates.—A. L.

This is due to cost, no doubt, as a set having a couple of dozen trimmers of various types would become rather expensive, and besides grow to undesired physical size, if each condenser were of the air-dielectric type. Nevertheless what you say is true, the compression type condenser changes its capacity due to jar and to meteorological conditions. That is one reason that even commercial all-wave receivers hold their frequency calibration well on the broadcast band, but on short waves are not so accurate, because of shift. Also, the oscillator "drift" or change in frequency causes an upset of the coincidence of calibration to responsive frequency. Unless a special corrective is applied, this drift will be severe. It has been met with considerably in the 2A7 and 6A7 tubes, which are commonly used in sets because of the wiring simplicity and reduction of stray pickup. The air-dielectric intermediates are inconsistent with compression type condensers at high frequencies, as i.f. changes matter little compared to oscillator drift and r-f peaking.

* * *

How Many Controls?

HOW MANY controls should a receiver have? Do you think three are enough, including volume control and tone control?—G. C.

The set should have as many controls as are necessary to produce the type of results that the user requires and pays for. Ganging in practical, so the main tuning control proper may be reduced to one. If a volume control and a tone control are used, the total is 3. If there is regeneration the total becomes 4, and with a beat oscillator, the switch for this makes 5, for the switch should be rated as a control. For nice adjustments some parallel small capacity may be needed, bringing the total to 6, and if a series antenna condenser is used, and one is advisable, the total is 7. In a coil switch assembly or plug-in coils add one more, total, 8. Perhaps we had better stop there.

* * *

Lissajou's Figures

WHAT ARE Lissajou's Figures? Can you show some, please?—K. L.

The Figures represent oscillograph readings, that is, tell what is taking place, in the form of patterns. Ten patterns are shown for different phase relations of a voltage as indicated. The horizontal and vertical time axes are indicated by arrows.

* * *

Grid-Dip Tester

YOU DO NOT show the grid-dip oscillator or wavemeter in your columns. Is there any reason for this?—J. V.

We do not favor the grid-dip meter, as the power taken by the measured circuit is too great, compared to the small grid-circuit power, and of course there is detuning. It would be preferable to have the coupling in the plate circuit, or in one of the extra grid circuits of a super-control tube, for then the coupling would be reduced. Of course the sensitivity is also reduced, and a more sensitive meter might be required, but if the purpose is accurate measurement, the test should be made in the most accurate way.

* * *

Signal Generator Suggestion

HAVE YOU ANY suggestions for an accurate signal generator? By accuracy I mean accuracy, and include frequency stability, etc.—J. H.

Using low frequencies is in general more favorable to accuracy, and the harmonics will give a good response. As a suggestion, try a stabilized radio-frequency beat oscillator, fixed frequency of oscillation just above the highest desired to be measured, the variable oscillator covering from the highest to be measured to one-half that fre-

quency, a 2-to-1 frequency ratio. Then have one or two fixed-frequency oscillators, say, 50 kc and 100 kc, or, if closer than 50 kc separation is needed, use a lower fixed-frequency for a low-frequency oscillator. With the beat oscillator the general frequency location may be determined and with the low-frequency fixed oscillators, one used at a time, the harmonic order can be determined by reference.

* * *

Self-Shielding Tubes

WHAT ARE the self-shielding tubes?—R. E.

These are tubes on the outside of which a metal deposit is sprayed, and a conductive loop connection is made to ground potential. The object is to avoid the use of an individual tube shield. Also space economy is effectuated.

* * *

Non-Polarized Electrolytics

WHAT ARE the non-polarized electrolytic condensers, and how are they made?—T. R.

The ordinary electrolytic condenser is polarized, meaning it can be connected suitably only in one direction. In an a-c set the direction is fixed. In a d-c or universal set connection may be made in one or the other direction, and often a mistaken direction ruins the electrolytic. Both aluminum foils comprising the electrodes of the non-polarized condenser are formed, thus it makes no difference which direction the connection is made. In general, the cost of the non-polarized type is about twice that of the polarized type, due to the each foil acting as a condenser and both foils being in series.

* * *

Microphonic Detector

WHAT IS the cause of microphonic effects in a detector tube, and how can they be remedied?—J. M. C.

The cause is the vibration of elements in the tube. There should be no microphonic effects in latest tubes, unless the detector is of an unusually sensitive type and is in an external field, whereby it becomes modulated. If replacing the detector tube does not cure the trouble, shield the tube well, and even weight it down. Steel wool stuffed inside of the shield, between the outside tube wall and the inside shield wall, often helps. Cushioning the detector socket, or mounting it on springs, is another remedy.

* * *

Use of Battery Tubes

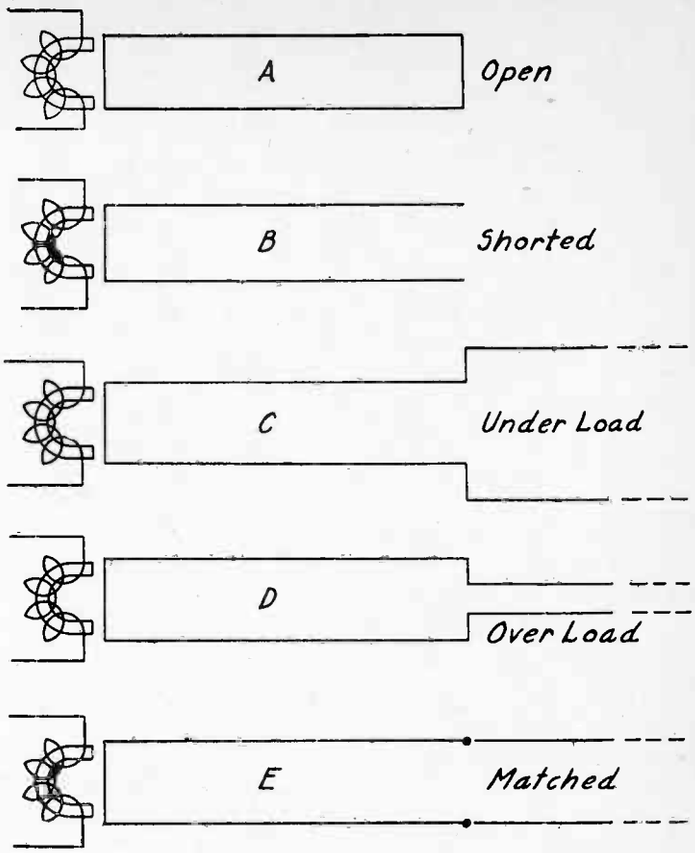
KINDLY TELL ME whether it is better to use parallel batteries for a battery set's filament, or have filaments and pilot lamp in series, and use a higher voltage?—K. J.

If 2-volt tubes are used, it is well to remember that these are not recommended for series operation of filaments, possibly because the plate currents of series tubes combine with the plate current in the first tube toward negative to cause that one tube to carry in the filament leg the sum of the plate currents. But for few tubes this should not be serious. The battery voltage being constant, the rating is in terms of current, and therefore it is well to confine the current to as low a limit as practical. Hence four dry cells that would operate three tubes with filaments in series would not last as long if the same cells were used in parallel, with filaments in parallel, because with the series method the current is the same for any number of tubes as for one tube, and by the parallel method the current is the sum of the currents drawn by the filaments. A pilot lamp should be in series in a battery set, unless a storage battery is used, as the lamp may draw considerable current. There are special 2-volt, 60-ma pilot lamps, but otherwise the lowest current of pilot lamps is 150 ma. This is a lot. Even the No. 6 dry cell, the large round one, is rated at only 250 milliamperes, so there'd be leeway for only 100 ma if the pilot lamp were accommodated with 150 ma.

Matching

WILL YOU PLEASE inform me which is better, to have too high an impedance load or too low an impedance load, in the absence of possibility of matching? Kindly explain what matching is.—T. W. D.

It is hard to make a choice between two shortcomings. Why it is not practical to attain matching we do not know. Which is worse, a counterfeit ten-dollar bill or two counterfeit five-dollar bills? Is there any choice? The same viewpoint may be applied in answering your question. The object of a transmission line is to transmit all of the energy from the source to the destination. Practically this can not be accomplished, perhaps, but so nearly all may be communicated that matching, or a proper transmission line with proper termination, is the equivalent of conduction without loss. It is the lowest low-loss system in radio, excepting perhaps some special transformers, which have efficiencies greater than 99 per cent. The electromagnets at left in the illustration constitute the source of energy. The communication is to be made to the destinations at right. The closed terminal behaves like an open circuit, as nothing reaches the destination. The open terminal behaves like a short, as the total voltage drop is zero at the output. If the load is too small, it is like pumping water through a filled small pipe into an empty large pipe connected to it, the large pipe being underloaded and waste resulting. By underload, there is waste by stifling, as the energy is caused to back up against the source and become congested. Technically, this is referred to as reflection. The full benefit is achieved only when the line is matched, and this requires proper termination.



Representation of mismatching and matching of impedances, using as connecting medium a transmission line, which means a line free of losses.

* * *

Coil Location

CAN YOU GIVE a suggestion for the location of coils in an all-wave receiver?—R. D.

If the set is of the simple regenerative detector type the coils may be wound on small diameters and be mounted on the coil switch. For a larger set the coils may be put under the tuning condenser, that is, beneath the chassis. Complete shielding of the coils may not be necessary, part-shielding due to the presence of grounded metal partitions being used in numerous receivers. The leads to the switch should be as short as practical and the shortest ones should be for the highest-frequency coils.

* * *

The Traditional Circuit

KINDLY TELL ME why the conventional, traditional and ever-present one-tube short-wave regenerative detector circuit is shown and discussed so much. Once in a while an audio tube is added, but the detector remains the same.—J. R. W.

The regenerative detector with a step of audio makes a splendid shortwave set, and the reason it is shown and discussed so often (or without audio) is that it has stood the test of time. Usually the tickler is fixed and the regeneration is controlled by a throttle condenser, connected from return of the plate coil to ground, a choke leading from the stator of this control to the audio channel. This feedback condenser method is silent, whereas resistor feedback may at times become noisy, if high-resistance rheostats or potentiometers (non-wire-wound) are used. There should be no objection to the dissemination of all available information on so worthwhile a circuit.

* * *

Reason for Different Loads

IN THE SPECIFICATIONS for load conditions for optimum output of power tubes, consideration is paid to the bias method, as well as to the amount of bias, in determining the stated ohms load. For fixed bias it is one thing, for self-bias it is another, and there is some difference due also to the amount of bias by either method. Why is this?—K. H.

The ohms load specified in each instance is that which makes the output coupling look to the plate circuit of the tube as a pure resistance, or as nearly so as possible, and thus afford the greatest output with minimum distortion over the widest range of audio frequencies. The ohms load change due to bias is due to the same reason that the tube current changes with bias, that is, the different plate resistance.

WORTH THINKING OVER

YOU JUST CAN'T STOP those television enthusiasts. Recently we were told that a certain concern was ready to market television sets in the autumn. There was quite a hullabaloo in the daily papers about the matter. Then when RADIO WORLD, *not in a doubting Thomas frame of mind but willing to be convinced, tried to get real facts at first hand there was much hesitancy on the part of those concerned and it all ended with a declaration that nothing further would be forthcoming until the autumn.*

What's the betting that this concern will be within miles of getting out a commercially successful television set this year?

PRICES DOWN ON 61 TUBES; ONLY 13 STAND

Reductions of list prices applying to 61 types of tubes are announced. The reductions range from $2.50 to 5c. Of the popular tubes the 30 is reduced from $1.30 to 80c, the 56 from $1.20 to 75c, the 57 from $1.65 to $1.10, the 58 from $1.60 to $1.10, the 78 from $1.80 to $1.20, the 2A3 from $2.25 to $1.75, the 2A5 and 2A6 from $1.60 to $1.10, the 2A7 from $2.20 to $1.30, the 25Z5 from $2.00 to $1.60. Thirteen were not reduced. The list follows, with type, old price, new price and reduction:

Type	Old Price	New Price	Reduction
00A	$4.00	$2.00	$2.00
01A	.60	.60	...
1	1.50	1.30	.20
1-v	1.25	1.00	.25
10	5.00	2.50	2.50
11	3.00	3.00	...
12	3.00	3.00	...
112A	1.30	.90	.40
19	1.50	1.20	.30
20	3.00	1.50	1.50
22	2.00	1.50	.50
24A	1.20	1.10	.10
26	.65	.65	...
27	.70	.70	...
30	1.30	.80	.50
31	1.30	.80	.50
32	1.90	1.40	.50
33	2.10	1.40	.70
34	2.15	1.50	.65
35	1.30	1.10	.20
36	1.50	1.10	.40
37	1.20	.85	.35
38	1.45	1.10	.35
39-44	1.50	1.20	.30
40	2.00	.80	1.20
41	1.60	1.10	.50
42	1.60	1.20	.40
43	2.50	1.25	1.25
45	.75	.75	...
46	1.55	1.20	.35
47	1.30	1.30	...
48	3.00	3.00	...
49	1.70	1.10	.60
50	4.00	2.50	1.50
53	1.80	1.35	.45
55	1.60	1.10	.50
56	1.20	.75	.45
57	1.65	1.10	.55
58	1.65	1.10	.55
59	2.00	1.60	.40
71A	.75	.70	.05
75	1.60	1.10	.50
76	1.20	.90	.30
77	1.80	1.20	.60
78	1.80	1.20	.60
79	2.60	1.30	1.30
80	.70	.70	...
81	3.50	2.50	1.00
82	1.20	.90	.30
83	1.55	1.10	.45
84	1.75	1.30	.45
85	1.60	1.10	.50
89	1.80	1.20	.60
V99	2.25	1.25	1.00
X99	1.50	1.00	.50
1A6	1.75	1.50	.25
1C6	1.60	1.60	...
2A3	2.25	1.75	.50
2A5	1.60	1.10	.50
2A6	1.60	1.10	.50
2A7	2.20	1.30	.90
6A4	1.60	1.40	.20
6A7	2.20	1.30	.90
2B7	2.00	1.50	.50
6B7	2.00	1.40	.60
6C6	1.25	1.10	.15
6D6	1.25	1.10	.15
6F7	1.80	1.60	.20
5Z3	1.50	1.20	.30
12Z3	1.20	1.10	.10
25Z5	2.00	1.60	.40
874	4.90	4.90	...
876	6.70	6.70	...
886	6.75	6.75	...

Station Sparks

By Alice Remsen

IT'S GETTING TO BE A HABIT—bringing broadcasts from the Pacific Coast; another one has made its appearance over a nation-wide NBC network—Tom Coakley, youthful dance band conductor, now presents his band direct from the Palace Hotel, San Francisco, through WEAF and network twice weekly, Thursdays at 6:00 p.m. and Saturdays at 6:30. . . . Jack Benny and Frank Parker are back in New York, after making a motion picture in Hollywood. . . . The rise of Danny Malone, young British Broadcasting star, who is to do a series of programs over NBC, reads like a fairy story. Young Malone was a dockhand, out of a job and penniless. In a desperate attempt to earn a few pennies for food, Malone went to a West End music hall in London and sang to the crowd standing in line for tickets; in the parlance of the profession, he did a "busking" turn. By one of those tricks of fate which prove that the age of romance is not yet dead, one of the listeners in the queue was Basil Charles Dean, well-known theatrical manager, the boy's voice impressed Dean, who obtained an audition for him with the BBC; next day the boy was on the air, made an overnight hit, and is famous today; all this in the space of a few months. Sounds too good to be true, doesn't it? . . .

The Landt Trio and White have a new commercial series. Each Monday, Wednesday and Friday over WEAF, at 6:15 p.m. under the sponsorship of the Parmalee Taxicab Company. . . . Nancy Garner, cousin of Vice-President Garner, is back in New York and may be heard occasionally on the Morning Parade over a WEAF-NBC hook-up. . . . A series of "family musicales," presenting high spots in the development of vocal and orchestral music, has been inaugurated by Claudine MacDonald in the Women's Radio Review over an NBC-WEAF network, each Wednesday at 3:30 p.m. These musical history broadcasts will continue for an indefinite period. . . . Barry McKinley, whose right name, by the way, is Maurie Neuman, amuses the production men at NBC by doing ventriloquism at odd moments during rehearsals. . . . Rosaline Greene, who is the "speaking ghost" for Mary Lou on the Showboat program, recently celebrated her 2,000th air-performance. She has never missed a performance in her entire career. . . . A new program, scheduled to make its air debut on August 12th, features Jeannie Lang and Buddy Rogers; 9:00 to 9:30 each Sunday, over a WABC-Columbia network; sponsored by Ward Baking Company. . . . Esther Velas and her concert ensemble are now heard over the CBS network each Tuesday and Saturday at 1:30 p.m. . . .

Still another West Coast revue is being relayed to the East; this time it's "Hi-Jinks," featuring Johnny Murray as master of ceremonies, directing his own band, and bringing to the microphone well-known west coast radio stars through Station KHJ, Los Angeles, each Sunday at midnight over a WABC-Columbia network. . . . Tito Guizar, the Mexican troubadour, and the Brillo Harps, a modern syncopated harp ensemble, will again be heard over the WABC-Columbia network every Sunday at 12:30 p.m. starting on October 7th; the series will be sponsored as before by the Brillo Manufacturing Company. . . . They all do it—whenever a man finds he has too much money he usually starts a racing stable; it's happened this time to Bing Crosby; two blooded horses for Bing are on their way from Ireland to California; another good way to get rid of extra cash is to sponsor a fighter; Bing is doing that, too; he bought an interest in Freddie Steele, a Tacoma boxer, last month. . . .

George B. Storer, president of the American Broadcasting System, announces the appointment of Burt McMurtrie as director of program operations of the ABS network. Mr. McMurtrie was formerly director of the commercial program department of the Columbia Broadcasting System. . . . Cupid has been busy at the ABS studios; Ethel Sommerville, show girl in Billy Rose's Casino de Paree Revue, and Roger Krupp, New York announcer of the ABS-WMCA network, will wed shortly; and Roy Shelley, the original "Barnacle Bill" of the air, and one of the regular features of WMCA, announces that he and his secretary, Julia Kurtz, will walk up the primrose pathway together very soon. Here's good luck to them!

A THOUGHT FOR THE WEEK

THE NEW FEDERAL COMMUNICATIONS COMMISSION is no sooner in office and ready to take up its somewhat difficult duties than a certain, though small, part of the public begins chatting more or less convincingly about censorship. Most of our American citizenry does not want censorship of any kind. And yet it must be admitted that the recent sharp criticism by various creeds of motion picture practices has not made the public as resentful as the screen people had hoped.

Now, if the rank and file of radio will absorb something from the screen situation they need not worry very much. RADIO WORLD *has always believed that censorship is not good Americanism, but it also believes that the best way to impress this on the country at large is to take pains to see that nothing is said or done over the radio that would give even the censorious zealots an opportunity to talk about censors and get anybody to listen to them. Remove the cause and there is no effect. Even the screen folk are beginning to believe that there is something worth thinking about in that theory.*

Rockefeller Center Now More Than 80% Rented

The six buildings now standing in Rockefeller Center are more than 80 per cent. rented.

This announcement was made by Rockefeller Center, Inc., as its first general public statement of the extent to which space in the new mid-city business development has been leased.

The first of the six structures was ready for occupancy late in 1932 and the latest was opened in the autumn of 1933. The 70-story RCA Building, with more floor space than any other office building in the world, received its first tenants shortly over a year ago.

"The fulfilment to date of Rockefeller Center's renting program has several satisfying features," said Hugh S. Robertson, the managing agent in direct charge of rental activities. "Such gratifying rental progress could never have been made if American business were suffering from any fundamental malady, as rental activity is a direct barometer."