

NATIONAL RADIO NEWS



IN THIS ISSUE

Armstrong's Frequency Modulation System
Working Your Way Up in Radio
Alumni Association News

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YESTERDAY *and* TOMORROW

I have just celebrated another birthday. Somehow, however, this birthday means more to me than all the others. Possibly it is the idea of being half a century old—possibly it is because I have looked forward for so long to reaching this mature age of fifty—I can't really say. But anyway, let's talk about birthdays today.

I look upon each birthday as a stopping place in my journey through life, at which I can forget about the pleasures and problems of the present.

I reminisce, letting memory-pictures flash before my eyes. Childhood memories—dimmed by time but still the pleasantest of them all. The struggles and triumphs of getting started in business—my entry into Radio with Mr. Smith twenty-five years ago, to form the National Radio Institute—the amazingly rapid growth of this new industry—the thousands of ambitious men “J. E.” and I trained for good jobs, starting back in crystal set days and going through the years in turn to battery radios, superhets, all-electric sets, all-wave radios, push-button tuning, and now to television and frequency modulation. As these pictures flash endlessly across my mind, I unconsciously murmur again those immortal words of Longfellow, “Life is real, life is earnest”

I look ahead to many tomorrows equally as full of living as the yesterdays—to being fatigued from hard work which I enjoy doing—to more of that happiness which comes from giving others, both younger and older, a helping hand on their journeys through life. And finally, I look forward to watching even greater developments than I have already witnessed in this modern miracle called Radio.

E. R. HAAS,
Vice President.

Major Armstrong's Frequency Modulation System

By PAUL H. THOMSEN,

N. R. I. Communications Consultant



Paul H. Thomsen

MAJOR Armstrong is well known to many of you, as he was instrumental in developing several important circuits and theories in the radio field. He saw overseas service in 1917, at which time he developed the well-known super-heterodyne receiver circuit for the detection of weak radio signals. He also developed the tuned-grid, tuned-plate oscillator circuit about which most of you have studied, and the super-regenerative detector circuit. During the past few years, Major Armstrong has been actively engaged as Professor of Electrical Engineering at Columbia University in New York City. And now he is in the news as inventor and developer of a practical system of frequency modulation which shows promise of revolutionizing radio broadcasting. His system is now being tried out in the field by radio engineers who have had years of experience in handling radio equipment.

Even if the results of these frequency modulation experiments prove entirely satisfactory, no immediate changes will be made in the present broadcasting set-up. The experimental tests will last several years, and even with unanimous approval of the new broadcasting system it would then take about ten years for a complete change-over. In other words, it is my opinion that we can expect at least ten more years of regular amplitude-modulated service in the present broadcast band. Like telecasts, frequency-modulated broadcasts are assigned to the ultra-high-frequency channels. Signals do not travel long distances at these frequencies. The expected maximum service range of a frequency-modulated receiver is expected to be within a radius of 50 to 100 miles. All these facts mean that

neither frequency modulation nor television can be used by the public as an excuse for deferring the purchase of a new broadcast receiver. Even in those few localities where the new services are now in operation, regular services will continue and will present such high-quality programs that it would be folly to neglect them in preference to experimental new broadcasts.

Review of Amplitude Modulation

With a simple oscillator circuit like that in Fig. 1A, the intensity of the signal radiated by the antenna will be dependent upon the plate voltage (assuming the antenna tap on coil L has been properly set). Let this no-modulation carrier signal intensity be equal to that shown in Fig. 1B. Now, if we vary the plate voltage from zero to two times the no-modulation value, we will have the condition corresponding to 100% modulation of the amplitude of the carrier, as shown in Fig. 1C. If we vary the plate voltage at an audio frequency rate, side bands will be produced, one above and the other below the carrier frequency. The difference between a side frequency and the carrier frequency at any instant will be equal to the audio frequency in cycles per second. This is amplitude modulation.

Frequency Modulation

If we connected a condenser microphone CM in parallel with condenser C in Fig. 1A, giving the arrangement of Fig. 2A, and kept the plate supply voltage constant, it would be possible to vary the generated radio frequency developed in accordance with the audio frequency sounds acting upon the diaphragm of the microphone. (The

capacity of a condenser microphone varies with the intensity of the sound waves acting on it; this varying capacity shunted across condenser C in the oscillator tuned circuit, causes the frequency of oscillation to vary). The amplitude of the radio frequency carrier would remain at a given value as shown in Fig. 2B, while for one audio frequency cycle of a pure tone, the fre-

quency might vary in the manner shown in Fig. 2C. By selecting a condenser microphone which will vary this frequency 100 kc. above and 100 kc. below the 50-mc. carrier frequency for the loudest sound to be broadcast, we will have the variations in transmitter frequency shown by points 7 and 9. For weaker sounds, the frequency deviations will be less than 100 kc.

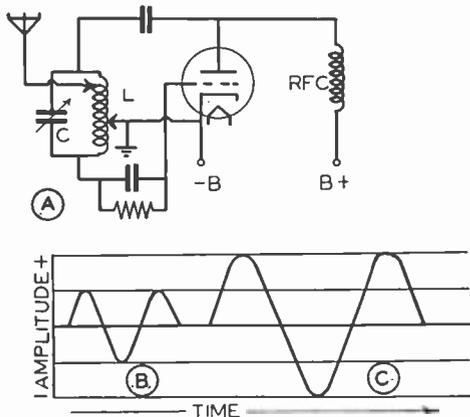


FIGURE 1

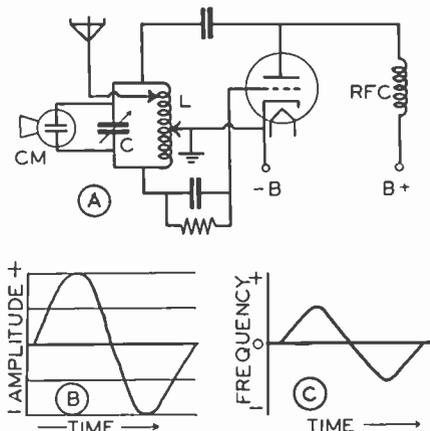


FIGURE 2

quency might vary in the manner shown in Fig. 2C.

The deviation of the carrier frequency at any instant from the no-modulation carrier value is proportional to the amplitude of the sound wave, while the number of cycles of variation in frequency (the time required for the carrier frequency to swing above the normal value, return to the normal value, swing below the normal value and return to the normal frequency value again to complete a cycle) corresponds to the frequency of the sound waves. The maximum deviation in the oscillator frequency is by design made to correspond to the loudest sound to be transmitted.

In order to keep distortion at a minimum, it is essential that the receiving apparatus for a frequency-modulated signal be designed to accept a given band width. The L-C ratio of the circuit in Fig. 2A is adjusted so that the normal capacity changes of the condenser microphone will cause the carrier frequency to vary over this same given band width.

A careful study of Fig. 3 will disclose a number of important characteristics of a frequency-modulated signal. Assume that the carrier of the transmitter is operating on 50 megacycles and has a given intensity, as indicated by point

Further examination of Fig. 3 will disclose that points 2, 4, 6, 8 and 10 are equally spaced; this means that the a.f. signal is constant in frequency (is a tone). Since points 7 and 9 are farther away from line A-B than points 3 and 5, we know also that the intensity of the a.f. signal is changing (the sound is of varying rather than constant loudness).

Now note that points 10, 12, 14, 16, 18, 20 and 22 are equally spaced. This, you will remember, indicates a fixed sound frequency; since these points are closer together than points 2, 4, 6, 8 and 10, the sound frequency is *higher* in the middle part of Fig. 3. Points 11, 13, 15, 17, 19 and 21 are all the same distance from line A-B, indicating constant amplitude. The wide separation of points 22, 24 and 26 indicates that the A.F. signal here is lower than in either of the other cases; the amplitude of the sound signal as represented by points 23 and 25 is the same as for the sound signal between points 10 and 22.

We thus see how variations in the amplitude and frequency of a sound can change the transmitter *frequency*. With the signal emitted by the transmitter varying only in frequency, a special type of receiver with a special detector circuit will be necessary for proper reproduction of the a.f. signal.

One of the simplest frequency discriminator arrangements is an L-C tuned circuit as shown in Fig. 1A. The response characteristic of this resonant circuit is shown in Fig. 4B. By adjusting the value of C in the circuit so the no-modulation signal frequency of the transmitter falls on either point 2 or 5, it is possible to make the output voltage E change in proportion to variations in transmitter frequency. The carrier frequency will swing between points 1 and 3 for operating point 2, and between points 4 and 6 for operating point 5. The resulting r.f. output voltage must be passed through a detector in order to secure the desired audio frequency output.

Special Problems

The simple frequency modulation system just described is workable, but is not practical for commercial use. It would be very difficult to use a condenser microphone for frequency modulation of a 50,000-watt transmitter, for a dangerously high voltage would exist across the microphone plates.

It would also be difficult to adjust the resonant circuit to the proper point on the response curve slope and it would be impossible to secure the ideal condition where only changes in frequency affect the a.f. output. With the simple circuit of Fig. 4, a rise or a drop in the r.f. signal intensity would cause a proportional rise or drop in the volume at the receiver loudspeaker. These are just a few of the problems associated with the transmission of frequency-modulated signals.

Frequency Modulation Receiver

The General Electric model GM-125 frequency modulation receiver employs 12 conventional tubes, and is capable of giving very realistic fidelity. Excellent low-frequency reproduction is possible, as the output stage consists of two types 6L6G tubes connected in a typical phase inverter arrangement which is capable of developing 12 watts of undistorted power. This power is fed to a 10-inch electrodynamic loudspeaker which is placed in a large cabinet.

The tuning range of the receiver is from 37 to 44 megacycles. The receiver circuit is extremely conventional, being a superheterodyne with four transformer-coupled i.f. amplifier stages having an i.f. value of 3000 kc. and a band width of 300 kc. The preselector stage is designed to operate from a twisted two-wire transmission line connected to a simple horizontal di-pole antenna. The receiver circuit is conventional up to the grid circuit of the last i.f. stage, which operates as a limiter.

The Limiter Stage

In the limiter circuit shown in Fig. 5, the primary of the final i.f. transformer T7 is shunted by resistor R14, having a resistance of 15,000 ohms, in order to increase the band width to 300 kc. The third i.f. stage employs self bias, but the other i.f. stages receive their a.v.c voltage from the left-hand end of R13. Note that the limiter stage has low plate and screen grid voltages, and that bias for this tube is obtained from the self-rectified grid current flowing through R15, a 330,000-ohm

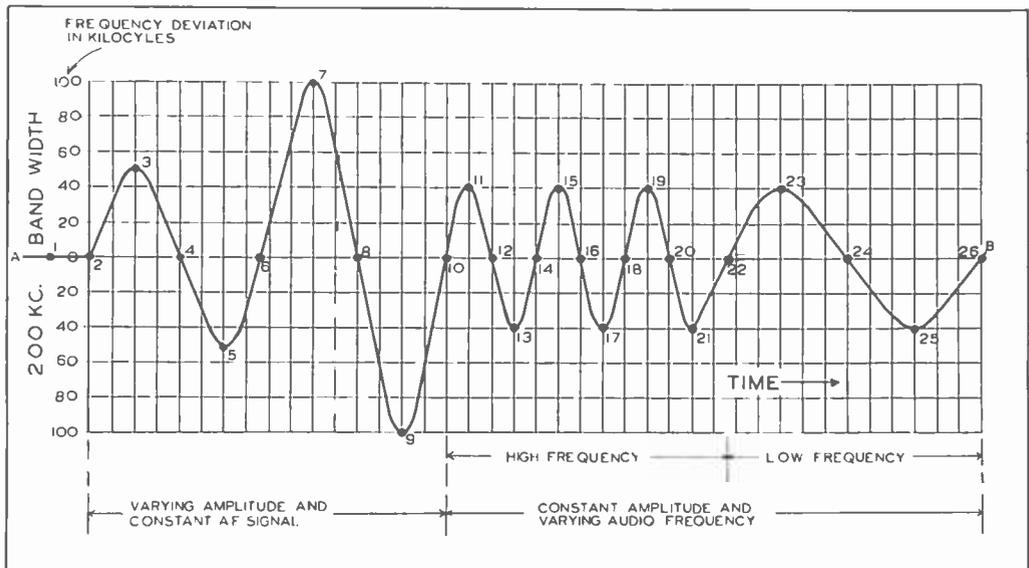


FIGURE 3

resistor shunted by C40, a 220-mmfd. mica condenser. By employing self-bias in this manner, the gain of this stage as well as that of all other a.v.c.-controlled stages will vary with the intensity of the signal received; a strong incoming signal develops a high negative bias and reduces the gain while a weak signal produces very little bias and thus gives maximum gain. This means that the output signal of the limiter tube will have essentially constant voltage despite wide variations in input signal intensity. The limiter thus assists the demodulator and discriminator trans-

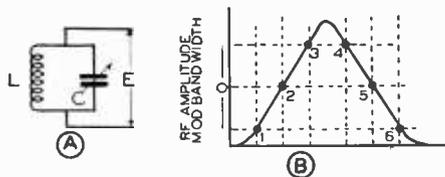


FIGURE 4

former TS in developing a voltage which is dependent entirely upon the frequency of the incoming signal.

The Demodulator

The discriminator circuit will cause the demodulator to operate from the balanced condition of zero a.f. output voltage through both positive and negative peaks of the a.f. component as the frequency of the i.f. voltage swings above and below the no-modulation value. Let us see how the demodulator circuit can produce a voltage which is directly proportional to the swings in the frequency of the incoming signal.

In the input circuit of the discriminator is parallel resonant circuit C50-P1, which serves as the plate load for the 6SJ7 limiter tube and is inductively coupled to series resonant circuit L1-L2-C51. Both of these resonant circuits are tuned exactly to the 3000-ke. i.f. value. The coil in the series resonant circuit is split into two sections of equal size, L1 and L2, and the plate (high r.f. terminal) of the parallel resonant circuit is connected to the common terminal of both of these coils through d.c. blocking condenser C41.

The demodulator tube is a type 6116 double diode, with the plate of each diode section connected to one terminal of the series resonant circuit. The cathodes are connected together through equal-value resistors, R18 and R19, shunted by by-pass condensers, C18 and C19. One cathode is grounded directly, hence both cathodes of this tube are at r.f. ground potential.

Current flowing through the coil of the parallel resonant circuit, induces a voltage in secondary coil L1-L2. This voltage acts in series with L1, L2 and C51 of the series resonant circuit,

causing a current to flow through the two coil sections. This current develops an I.F. voltage e1 across coil section L1, and a voltage e2 across coil section L2. For any condition of the incoming i.f. carrier signal voltage e1 and e2 will always be equal in magnitude.

We can now see that i.f. voltage e1 acts in series with the i.f. voltage induced in P2. The resulting rectified electron current i1 flows through R18, developing across this resistor a d.c. voltage having the polarity indicated in Fig. 5. Likewise, the voltage developed across L2 will act upon diode section D2 in series with the voltage at P2, and i2 will produce a voltage across R19 with the polarity shown.

Since we are working with a.c. voltages in this discriminator circuit, phase must be taken into account when we determine the combined effects of the voltages across L1 and L2 or the voltages across R18 and R19.

No-Modulation Condition. When the a.c. voltages across L1 and L2 have the same phase relationship with the voltage at P2, the net voltages acting upon diode sections D1 and D2 will be equal in magnitude; equal values of rectified current will then flow through the two resistors, making the d.c. voltage drop across R18 equal to that across R19. The net d.c. voltage produced across these two resistors (between point X and ground) will then be zero, since these voltage drops are of opposite polarity; this a.f. output voltage will therefore be zero. This is the condition of the circuit when there is no modulation.

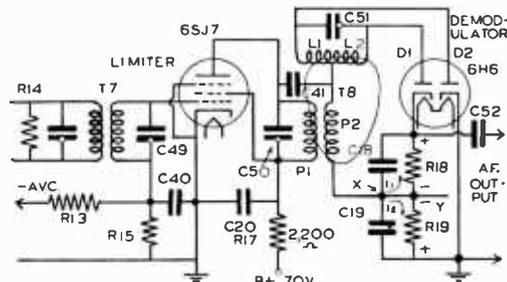
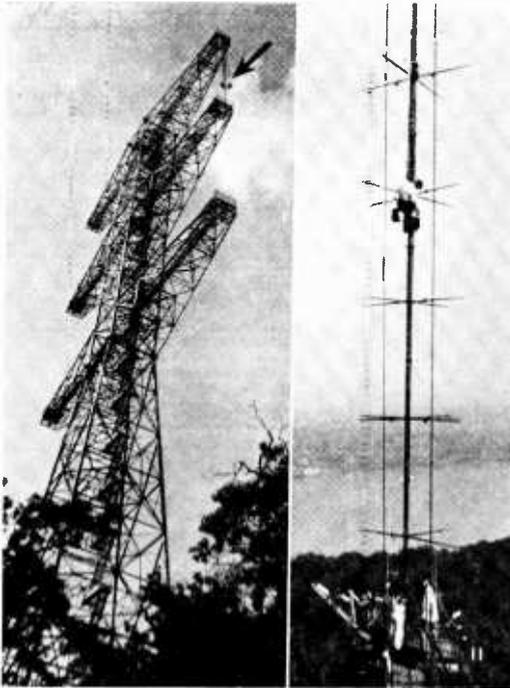


FIGURE 5

Circuit Conditions With Modulation. When the frequency of the transmitter is varied, the carrier signal in the i.f. amplifier of the receiver will also vary, and will no longer be equal to the resonant frequency of the tuned circuit in the discriminator. The voltages across L1 and L2 will no longer have the same phase relationship, and consequently the a.c. voltages acting upon the diode sections will be different in magnitude. Unequal rectified currents through R18 and R19 produce unequal voltage drops which, when combined,



Courtesy, Major E. H. Armstrong

Left: This 400-foot high steel tower at Alpine, New Jersey is used by Major Armstrong for supporting the transmitting antennas used during experimental frequency-modulated broadcasts from his own station W2XMN. The arrow points to special turn-stile transmitting antenna, which is being adjusted by men suspended in boatswain's chairs.

Right: Close-up view of the turn-stile antenna which is supported between the right ends of the top and center cross-arms on the tower. There are two groups of horizontal di-pole antennas, supported by the common wood mast shown in this photo and fed from opposite ends of the mast.

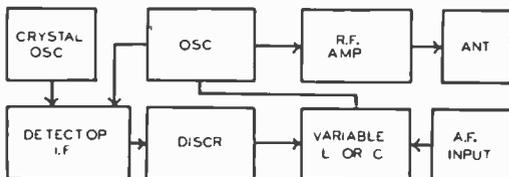


FIGURE 6A

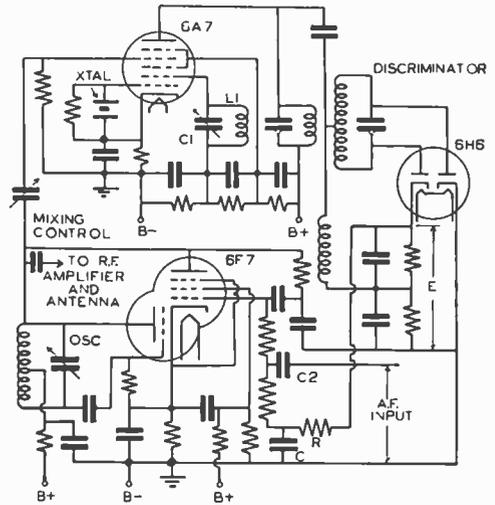


FIGURE 6B

leave an a.f. voltage, the intensity of which depends upon the audio frequency rate at which the transmitter carrier frequency is changing.

The action of the discriminator system depends upon phase relationships much like those existing in the a.f.c. system of a radio receiver. An increase in the i.f. amplifier signal frequency will produce either a positive or a negative peak of the a.f. signal; the reverse holds true for a decrease in the frequency of the signal passed by the I.F. amplifier.

It is possible to receive amplitude-modulated signals on a receiver designed for frequency-modulated signals by making several simple circuit changes. The audio signal is obtained from point Y in Fig. 5 instead of from the cathode of D1. The limiter tube may be provided with self bias by inserting a resistor and r.f. by-pass condenser, so this tube will not draw grid current. Then, too, the gain of the receiver should be controlled automatically by obtaining the a.v.c. voltage from point X.

In case the receiver does not have enough selectivity, it will be desirable to insert a highly selective circuit at the input of the receiver. The selectivity of the receiver may also be increased by rotating a gang switch which removes the 15,000-ohm primary shunts.

Simplified Frequency-Modulated Transmitter

Frequency-modulated signals can easily be developed with the transmitter arrangement shown in Fig. 6A. The output signals of a crystal oscillator and a conventional feed-back oscillator are both fed through the first detector into a

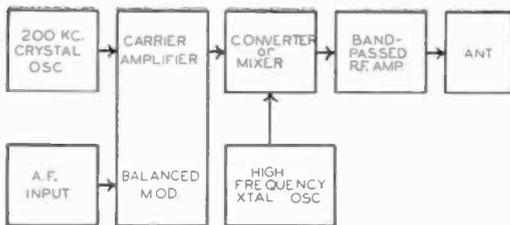


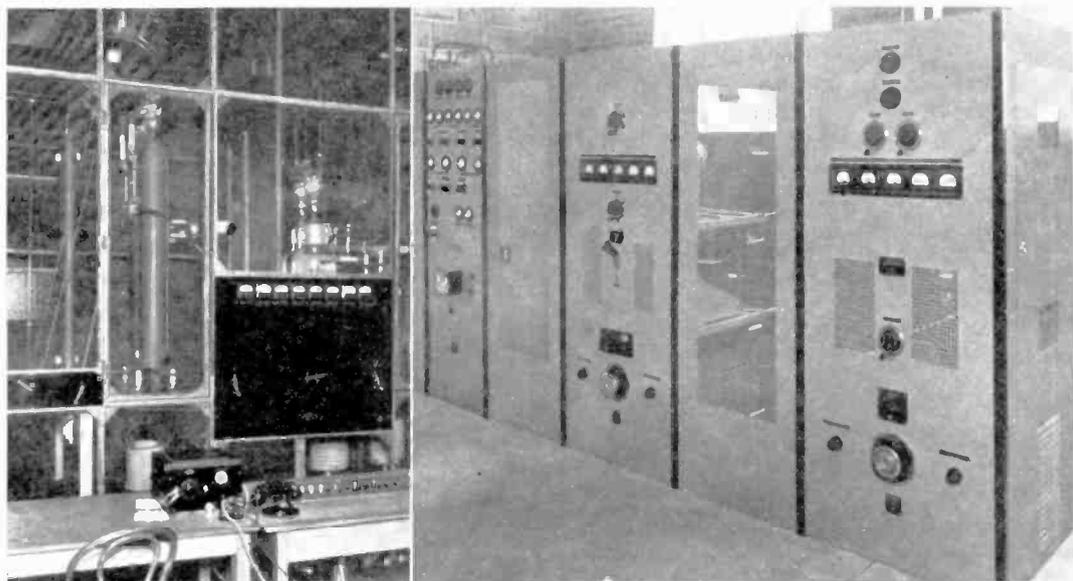
FIGURE 7A

10,000-kc.-i.f. amplifier. This means that there must be a frequency difference of 10,000 kc. between the frequencies of the crystal oscillator and the regular oscillator. The output of the first detector contains a discriminator circuit similar to that employed in a broadcast band receiver having automatic frequency control. The output of this circuit is in turn fed into a tube acting as a variable inductance or capacitance (also used in a typical a.f.c. circuit). This tube is connected in shunt with the resonant circuit of the oscillator. By making the discriminator have a long time constant, it is possible to control the frequency of the i.f. signal (the beat frequency) even though this frequency is being varied at an a.f. rate above and below the frequency to which the discriminator circuit is tuned.

The simplified circuit of a workable frequency-modulated transmitter is shown in Fig. 6B. The first two elements of the 6A7 type tube are in the crystal oscillator circuit, while the triode section of the type 6F7 tube is the conventional feed-back oscillator, the frequency of which is modulated by the pentode section. The beat frequency signal produced by interaction between the two oscillator sections is fed into the a.f.c. discriminator circuit employing a type 6H6 tube. The d.c. control voltage developed at the output of the discriminator is fed through the long time delay R-C network to the control grid of the pentode section of the type 6F7 tube. Note that the a.f. modulating voltage is fed through C2, so that the oscillator control section will vary the frequency of the oscillator. The output of the oscillator is then fed into a number of r.f. amplifiers which are properly band passed and coupled to the antenna.

Transmitter

The frequency-modulated transmitter developed by Major Armstrong and now in use at experimental station W2XMN in Alpine, N. J., is very stable and does not rely on the stability of a discriminator circuit. Its operation is somewhat difficult to understand, however, since a form of phase modulation is introduced. In simple terms, the system consists of the sections shown in Fig. 7A. The carrier amplifier unit with



Courtesy, Major E. H. Armstrong

Left: High-power P. A. stages, P. A. stages and control desk of Major Armstrong's frequency-modulated radio station, W2XMN.

Right: Low-power intermediate stages.

first r.f. amplifier. Therefore, the resultant voltage developed by these tubes will lead or lag the no-modulation voltage by 90° when they are mixed. It is this phase shift which gives us the form of frequency modulation developed by Major Armstrong.

Static-Free Reception

Newspapers and magazines have given considerable publicity to the static-free and noise-free characteristics of programs received from Major Armstrong's frequency-modulated station. A review of the characteristics of a frequency-modulated receiver will show why this is true. First of all, we know that only changes in the *frequency* of the transmitter can produce a change in the receiver output. The limiter tube helps in reducing the noise level. The discriminator circuit remains balanced even when fed with an r.f. voltage covering the entire band width passed by the i.f. amplifier, as long as the r.f. voltages are equal in intensity at all frequencies. Lightning and interference crashes thus produce no discriminator output voltages, since the r.f. noise pulses are of equal intensity throughout the entire band (they having no particular resonant frequency). Only a noise having a stronger r.f. pulse at one end of the band than at the other will affect the receiver, and this pulse must be strong enough to over-load the limiter tube circuit before it can be heard.

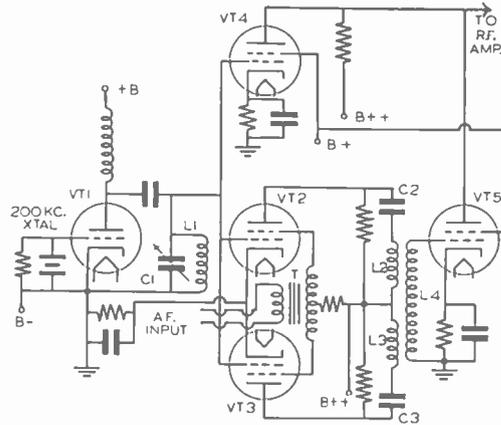


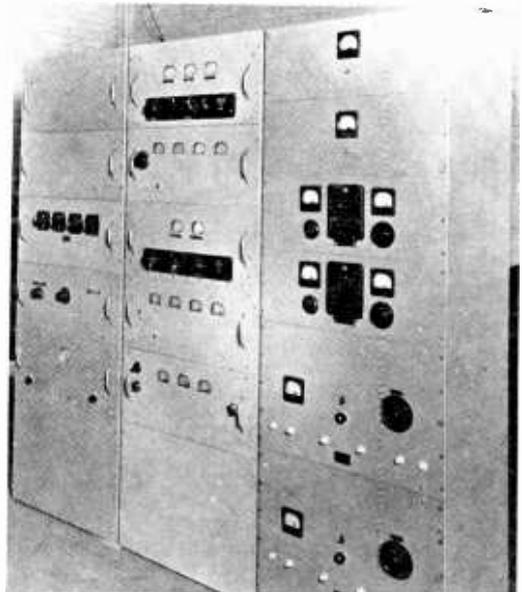
FIGURE 7B

its balanced modulator is the only unconventional device in the system. In this unit, a number of changes take place. First, the sidebands of an amplitude-modulated signal are removed and these side bands are shifted 90° in phase. The carrier voltage is then combined with these shifted sidebands, giving the desired frequency-modulated wave. A simplified circuit of the first few stages of this transmitter is shown in Fig. 7B.

Tube VT1 in Fig. 7B is the crystal oscillator. The voltage developed across plate tuned circuit L1-C1 of the oscillator is fed to the grid of the single amplifier tube VT4 (known as the carrier amplifier) and to the grids of the balanced modulator tubes VT2 and VT3. The plate circuits of these tubes are made non-reactive by adjusting series condensers C2 and C3 to balance out the inductive reactances of L2 and L3 respectively.

Since the grids of tubes VT2 and VT3 are fed in phase, and since these tubes have non-reactive plate loads, the flux produced by coils L2 and L3 will be zero when the screen grid voltages of these tubes are equal. This is the condition for zero voltage across modulation transformer T.

When the screen grid voltages of tubes VT2 and VT3 are alternately made positive and negative, r.f. current is permitted to pass through non-reactive sections C2-L2 and L3-C3, producing a change in the flux through common coupling coil L4. Since coil L4 has a natural resonant frequency which is high in comparison to the frequency of the crystal oscillator, this coil will cause an additional phase shift of 90° , adding to the 180° shift introduced by the balanced modulator tubes. The total shift in the signals applied to tubes VT4 and VT5 is thus 270° . The plate circuits of these tubes are in parallel, feeding through a resistive load to the grid of the



Courtesy, Major E. H. Armstrong

Modulator units at W2XMN, Alpine, New Jersey.



Courtesy, General Electric Co.

This General Electric model HM-136 console radio receiver gives reception of frequency-modulated broadcasts along with conventional three-band all-wave reception. Instruments in a symphony orchestra which ordinarily defy lifelike reproduction, such as the tambourine, cymbal and triangle, are reproduced with amazing clarity and faithfulness by this receiver. Or the front cover of this issue is shown a companion table model (HM80), designed only for frequency modulation reception over the range from 39 to 44 megacycles.

In addition to the foregoing advantages for frequency-modulated signals, a further reduction in noise is obtained by holding the transmitter power constant. The frequency-modulated signal is therefore always at a peak, and is able to over-ride noise signals which would normally be audible in an amplitude-modulated signal of the same carrier power level. It is natural to assume that a lower noise level will mean a wider volume range of broadcasting.

—————n r i—————

Extracts from Reports on Relief Cases

These people are extremely cultured. Something should be done about their condition.

—————n r i—————

Man has diabetes and is insulated twice a day.

—————n r i—————

Couple's only source of income is four boarders, all out of work. They owe \$600.

Man aggressive . . . has nine children.

—————n r i—————

Applicant's wife is making little garments through the kindness of a neighbor.

—————n r i—————

Nice quiet family. Dorothy has been out since July.

—————n r i—————

Applicant and wife are illegally separated.

—————n r i—————

Roomer pays no board, as he usually acts as god-father.

—————n r i—————

Woman and house neat but bare.

—————n r i—————

Woman has ulcer on her stomach.

—————n r i—————

Man supported parents before marriage.

—————n r i—————

Woman has no job to be mentioned.

—————n r i—————

Couple breaking up home; friends helping.

—————n r i—————

Milk needed for the baby, and father is unable to supply it.

—————n r i—————

Until a year ago this applicant delivered ice and was a man of affairs.

—————n r i—————

Man recently had operation but is able to hold any position he assumes.

—————n r i—————

Sophie is married to a sailor and his whereabouts are unknown.

—————n r i—————

Woman says they are a delicate family and must have steamed apartment with eggs and oranges.

—————n r i—————

Applicant has one child, Lillian, who is three months old and owes twelve months rent.

—————n r i—————

Saw woman. She had twelve children. Husband is a veteran.

—————n r i—————

Woman in a quarry; too old to marry, too young for pension.

—————n r i—————

This family seems to be just sitting around waiting for grandmother to get old enough for pension.

—————n r i—————

Woman says husband has illness that sounds like arithmetic. I think she means arthritis.

—————n r i—————

Woman says no matter which way she looks at it, she has nothing.

—————n r i—————

Woman was deserted five years ago. Had it broadcast over the radio.

The Laboratory Page

By GEORGE J. ROHRICH

The purpose of this department is to furnish supplemental experiments to students who have completed their Home Laboratory Course, but who wish additional laboratory experience. You are not required to perform these experiments, but you will gain increased knowledge by doing so.

Most of the material required will be that received as part of the Laboratory Course. Any other material necessary can be purchased very reasonably and will constitute an investment rather than an expense, as it will serve as replacements in service work or be useful in your shop later.



George J. Rohrich, Engineer
in Charge N. R. I. Laboratory

THE PROPERTIES OF A HEADPHONE

Metal wires, metal sheets, insulators, magnets and chemicals seldom reveal *peculiarities* when used alone. However, by arranging these materials in specific ways they do reveal certain *peculiarities*. These *peculiarities* are called *properties*.

Careful observations over periods of many years in the various laboratories throughout the world has made it possible to reveal and then use the many *properties* of materials for almost unlimited purposes.

The experiments you conduct in the Laboratory Course are intended to reveal to you many of the more common *peculiarities* of materials found in electric circuits which have been arranged in specific ways for use in radio communication and television.

Specific arrangement and combination of various materials produces devices which are named condensers, coils, resistors, rectifiers, electric meters, vacuum tubes, electric cells, and electric current generators. Each of these devices seldom reveals its various *peculiarities* when used alone. However, by assembling these devices in pairs or other combinations we are permitted *sometimes* to observe *the effects of some of the properties*. Rearrangement and addition of parts *sometimes* reveals new *properties*, additional *properties*, or lack of the original *properties*. These facts are brought out in the experiments.

Proper observation of the final property or properties pointed out in each experiment will depend upon individual properties being retained

in each one of the parts being used in combination. This fact should be obvious yet remembered at all times especially when running into trouble. What may look like trouble often is caused by an oversight of a previous explanation which appeared of minor importance, or which appeared self evident at the time it was read.

Experience shows that most troubles encountered while progressing from one experiment to the next one are caused by a *single* defect, or a *single* misadjustment. Therefore, if you fail to make an observation as outlined, simply suspect that *one* of the parts used in the combination has lost *one* of its *peculiarities*.

Your problem now resolves itself to locating this *single* defect. You *usually* check for the defect by noting if the questionable part produces the particular property in which you are interested. However, you *often* find it inconvenient to do this. Lack of needed additional devices for adequate observation is generally responsible. Then you check for another property commonly associated with the questionable device, preferably using a combination of least additional parts.

Let us put all of this to practical use in studying the headphone, identified as Item, 2. We shall start by observing *its most common properties* pointed out in various experiments.

1. It produces sound while being *contacted* to a dry cell. (Exp. 1.)
2. It produces no sound when *securely* fastened to a dry cell. (Exp. 1.)

(Next page, please)

The Laboratory Page (Continued from page 11)

3. It produces sound while being *removed* from a dry cell. (Exp. 1.)
4. Its diaphragm *clings* to its magnet, even when held upside down. (Exp. 10.)
5. It causes milliammeter needle to move when diaphragm is moved, while it is connected to a meter. (Exp. 10.)
6. It generates an electric current when diaphragm is moved. (Exp. 10, 28 and 29.)
7. Its coils permit current to flow through them. (Exp. 1 and 11 and Report Statement 2.)
8. Short-circuiting its coils permits greater current to flow in a series circuit. (Report Statement No. 2.)
9. Its coils have about 1200 ohms resistance. (Report Statement No. 11.)
10. It produces a buzzing sound when low frequency oscillating or alternating current flows through it. (Exp. 28.)
11. It produces no sound when rectified high frequency unmodulated currents flow through it. (Exp. 32.)
12. It produces sound when rectified high frequency modulated currents flow through it. (Exp. 31.)
13. It serves to indicate when A. C. voltages are balanced, as well as unbalanced. (Exp. 30.)
14. It serves as a microphone. (Exp. 28 and 29.)
15. It serves as a device for reproducing voice and music. (Exp. 47, 48, 49, 50.)

Here you have a list which serves as a guide in determining if a headphone is partly defective or defective entirely. In addition you may observe additional properties, or the lack of these by rearrangement within a circuit. For example, Experiment No. 29 fails in some instances, even when everything appears to check satisfactorily. Here you may find the headphone fails to serve as a microphone, yet individual tests show that it has every other property given in the list including working as a microphone in Experiment No. 28. Such was the problem presented recently in one request for aid in locating the source of trouble.

The request was accompanied by a letter of detailed explanation covering all of the observations made. This letter pointed out one fact in addition to those covered—the diaphragm would cling to its magnets, while the tube was out of the arrangement used in Exp. 29 although the diaphragm failed to do so while the tube was in use. This simple observation of changed properties permitted us to supply the right procedure for overcoming the trouble. We explained that reversing the connections to the headphone would clear up the trouble.

The reason that this simple procedure will clear up the trouble is that reversing the connections

will reverse the direction of current flowing through the coils in the headphone.

The amount and the original direction of current flow happened to produce magnetism which exactly *neutralized* the magnetism supplied by the magnets. The reversed direction produced magnetism which *aided* the original, regardless of the amount of current.

Another recent request for aid in locating the source of trouble in Experiment No. 28 and 29 was accompanied by the disclosure that no sound was heard while the headphone terminals were *being contacted* to a dry cell, yet a sound was heard while *being removed*. Reasoning the cause responsible for these properties, it was evident that the diaphragm was not permitted to move inward. We suggested that a piece of dirt between the diaphragm and pole pieces was responsible. A following reply from the student advised he found a slight inward dent in the diaphragm and that proper action was obtained by reversing the diaphragm so the dent faced outward.

There are other instances where failure of the headphone to serve as a microphone in Experiments 28 and 29 has been traced to equally simple faults with correspondingly simple remedies. Several cases of failure were traced to the cover being unscrewed just enough where the permanent magnet caused the diaphragm to adhere to the pole pieces of the magnet, thereby eliminating the required space between the pole pieces and the diaphragm so the diaphragm couldn't vibrate. Simply screwing the cover on tightly corrected the trouble. This placed a tension on the edges of the diaphragm, sufficient to raise it from the pole pieces so it could vibrate.

In other instances the diaphragm was bowed in, even when the cover was screwed on tight. Here it was necessary to unscrew the cover and turn the diaphragm over so it bowed outward, thereby correcting the space when the cover was put on.

Summarizing the entire discussion given here on a simple thing like a headphone reveals that similar procedures should be followed in studying other devices for running down their troubles. The various parts used in the experiments are used over and over again. Observe the various properties which you encounter. Use these observations to test a suspected part. You will surely determine for yourself where trouble is located. However, if you cannot solve a problem yourself, request help but do so while giving *complete details* of each and every property you do observe along with those you do not observe. What appears insignificant often helps us best.



RADIO-TRICIAN

REG. U.S. PAT. OFF.

Service Sheet

Compiled Solely for Students and Graduates

NATIONAL RADIO INSTITUTE, WASHINGTON, D. C.

SENTINEL MODEL 163UL

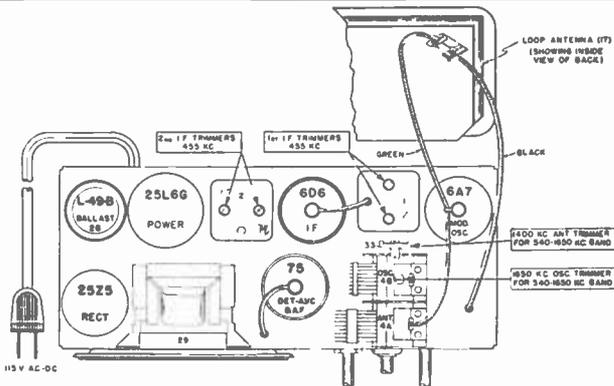
Alignment Procedure In Tabulated Form

IMPORTANT: BEFORE ALIGNING, PLACE LOOP ANTENNA IN SAME APPROXIMATE POSITION IT WILL BE IN WHEN SET IS IN CABINET AND BACK ATTACHED.

When adjusting 1650 K.C. oscillator trimmer and 1400 K.C. antenna trimmer, couple test oscillator to set loop by placing lead from high side of test oscillator on top of or near set loop. Be sure that neither the loop or test oscillator lead moves during alignment.

DO NOT ATTACH LOW SIDE OF TEST OSCILLATOR TO RECEIVER—LEAVE UNCONNECTED.

TEST OSCILLATOR				
Set receiver dial to:	Adjust test oscillator frequency to:	Use dummy antenna in series with output of test oscillator consisting of:	Attach output of test oscillator to:	Refer to parts layout diagram for location of trimmers mentioned below—and:
Any point where no interfering signal is received	455 K. C.	.02 MFD condenser	High side to grid terminal of 6A7 tube DO NOT REMOVE CAP.	Adjust each of the second I. F. transformer trimmers for maximum output—then adjust each of the first I. F. trimmers for maximum output.
Exactly (1) 1650 K. C.	Exactly 1650 K. C.	None	Lay lead on top of or close to loop	Adjust 1650 K. C. oscillator trimmer for maximum output.
Approx. (2) 1400 K. C.	Exactly 1400 K. C.	None	Lay lead on top of or close to loop	Adjust 1400 K. C. antenna trimmer for maximum output.



Readers who file Service Data in separate binders remove page carefully, trim on dotted line for same size as data published heretofore.

Novel Radio Items

—BY L. J. MARKUS—

Loudspeakers Are Brewery Guides!

Marine horns installed at strategic points in the Milwaukee factory of the Schlitz Brewing Co. blare forth stage-by-stage descriptions of brewing processes as tourists walk past. Transcriptions and amplifier systems are used, with loudspeakers in the brewing house, racking house, engine room, sternewirt and bottling house. Previously, guides were unable to make themselves heard above the noise of machinery.

— n r i —

Television Tube Has Two Screens!

Two-way television communication with a single cathode ray tube at each station is disclosed in a patent recently granted to Allen B. DuMont. A photo-sensitive pick-up screen and fluorescent viewing screen are mounted side by side in the tube and are served by a common electron beam. The beam is on one screen for sending, and is switched over to the other manually or electrically for receiving. Simultaneous two-way telephone operation in which persons can see each other while one or both are talking is also possible; in this case, a revolving switch alternates the beam rapidly between sending and receiving positions.

Telephone Disguises Radio Set!

A New York business man has had his table model radio receiver connected to a rebuilt desk telephone, so he can listen to news reports without disturbing others. Visitors think he is merely waiting for a long-distance phone call.

— n r i —

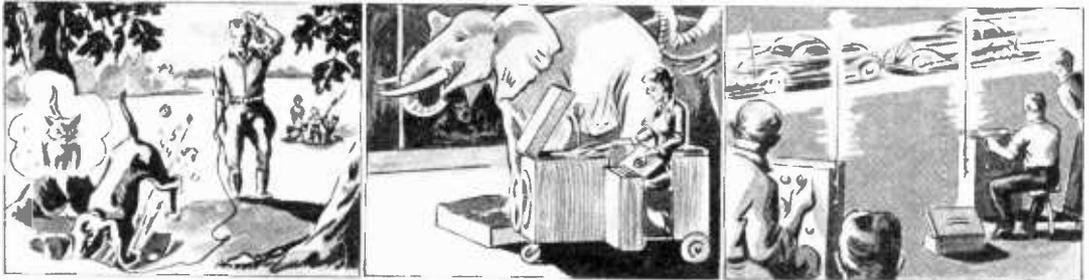
WMAL Lost Only 265 Seconds In 1938!

A time-off-the-air record of only 265 seconds out of 6,900 hours of broadcasting during 1938 brought to Radio Station WMAL in Washington, D. C., the General Electric Plaque awarded annually to the NBC station having the best time record. The air time was lost through failures lasting only a few seconds each; the longest was 50 seconds.

— n r i —

Spy Hides Radio Station In Coffin!

Greek police entered a church in Athens, Greece, opened a coffin supposed to contain the body of the wife of a Greek-Italian architect, and found instead a high-power radio transmitter. The owner of the radio equipment was located and arrested as a spy.



CAT AND DOG CABLE TESTER!

The ability of a dog to locate a cat by smell alone was utilized by British radio engineers to locate leaks in the 16-mile long gas-filled coaxial cable which is buried three feet underground and feeds into the new trans-Atlantic radiotelephone receiving station near Rochester, England. A gas smelling of cats was introduced into the tubing, and a Labrador retriever was taken along the route of the cable. Fourteen times the dog started digging, and each time a leak was found. This method eliminated digging up the entire cable.

MUSEUM PRODUCES ANIMAL

SOUNDS! Visitors to the American Museum of Natural History in New York can hear sounds which are characteristic of the various stuffed animals on display. Recordings of actual animal sounds, native chants, dances and native music are played on a modern electric phonograph mounted on a movable truck having a built-in seat for the operator. Each exhibit has its own sound program. A microphone for announcements is located alongside the operator, and the loudspeaker is on a separate stand placed near the exhibit.

RADIO MAKES CARS CRASH!

Radio remote control was used at a British automobile factory to compare the accident-resisting qualities of two types of automobile bodies. After the cars were started up, the drivers jumped out, and radio remote control was used to bring the cars up to top speed and crash them together practically head-on. The effect of the crash on each car body was then photographed and studied. Two short-wave transmitters were used, one for each car; a radio receiver in each car controlled a motor geared to the steering wheel.

WORKING YOUR WAY UP IN RADIO

By JOSEPH KAUFMAN

N. R. I. Director of Education



Joseph Kaufman

TO be successful in a radio career, you must plan your steps to the desired goal carefully, shrewdly, and with determination. Each forward step should be executed at exactly the right time; haste may lead to failure, and few of us can keep up our enthusiasm after a long series of failures. Naturally, there will be a few failures and setbacks in your career, but these failures will actually be assets if you recognize and profit by the mistakes which caused them.

Since radio is a highly scientific subject, basic training in fundamental ideas is of great importance. Since the operation and servicing of radio equipment is a specialized art, the practical phases of radio must also be mastered. Finally, these two requirements must be fortified with enough experience to make any radio technique a rational procedure for you. N. R. I. has dedicated its entire resources and energy to teaching you the science and art of radio; your enrollment in this course is a definite and necessary step in making your way up in radio.

As you proceed with your N. R. I. training, do not become impatient. I know there is that "itch" to service receivers right from the start—that urge to get your hands on the controls of a radio transmitter and tune it up, but be patient. Master those essential fundamentals first, so you'll know what you're doing.

It requires very little training to test every tube, part or connection in a defective receiver when hunting for a defect, but if you know how the receiver should operate, know what defects cause certain effects, and know how to make simple and conclusive defect-isolating tests, you can find the trouble without having to guess and try. No sensible serviceman or transmitter

operator would touch an adjustment or control unless he knew exactly what effect that control had on the circuit. Here again, a basic understanding of the subject instills confidence and develops expertness.

Everywhere I go, among radio engineers, parts manufacturers, test equipment makers, and skilled technicians, I hear this same thing:

"The trouble with the average untrained radio men today is that they don't know their fundamentals. Give them something new, and they are lost. These men keep asking for detailed instructions and step-by-step alignment procedures, yet they wouldn't need any instructions if they knew how the circuits or systems work." But these same experts have only praises for N. R. I.-trained men.

Don't stop studying when you finish your N. R. I. training. We revise our course regularly to keep it right in step with new radio developments, and you must revise your knowledge regularly, too. Upon graduation join the N. R. I. Alumni Association, and get the benefit of the new lessons which are sent to its members. Join your local radio organizations, and attend the lectures. Subscribe to radio magazines and journals, and study carefully those articles which cover your occupation or that branch of radio which you next plan to enter. Once you master your N. R. I. course, these lectures and articles will be easy to understand.

One Gateway to Success is Through Servicing

Very few of us have rich relatives who will support us indefinitely until we land a radio job, or will set us up in business and supply the cash until the business is established. In America, fortunately, success can be achieved by ability alone, without initial capital. Success is always sweeter when it comes after a long, hard fight against financial and other obstacles.

Since almost everyone has need for some income while training for a career, to support himself, his family or contribute to the family budget, I am going to consider the road to success as it must be for those with limited capital. Thousands of Americans have succeeded by traveling this road; you can, too, if you are determined.

This brings us to spare time radio servicing. Once you learn to service radio receivers, you

should plan to earn extra money by spare-time radio servicing even if you eventually are going into the communications field.

We at N. R. I. realize that you cannot learn to fix all types of radio receivers merely by reading our lessons. You need actual experience, too, and we tell you how to get it right in your own home. In fact, we even supply you with the testing equipment needed for this essential phase of your training. This plan is a part of your course and is fully outlined in the instructions which accompany the N. R. I. 1175A All-Purpose Tester, as well as in the Practical Job Sheets.

I like the N. R. I. plan far better than any apprenticeship to a radio technician, for it is a speedy, carefully-planned experience-getting procedure which covers all phases of practical work. A technician hires assistants to do certain routine jobs, and only in extremely rare cases will a technician make any attempt to teach an apprentice to become a competitor. Even if a technician were sincere in his desire to give true apprenticeship training, what guarantee do you have that this particular technician is a good teacher?

If you are one of the great majority of N. R. I. students who hold regular jobs and are using spare time to train yourself for a career in radio, apprenticeship to a radio technician is out of the question anyway. The N. R. I. plan is just the thing for you, as it is arranged specifically for spare-time training. And don't rush through this practical part of your training; follow it through carefully, slowly, and thoroughly. Soon you will have enough confidence to service other people's receivers and charge for your work.

The earning of extra money in radio is an accomplishment which marks the first financial return from your investment in a radio training. Let this money help to pay for your training, then invest succeeding earnings in your business.

If your goal is a full-time radio business, invest your earnings in advertising, a workbench, more tools and servicing instruments, and spare radio parts. Establish yourself with a local radio parts distributor, and get him to extend you credit. Naturally, you will be allowed only a limited amount of credit at first. Buy *only what you actually need, and pay all bills promptly when due*, so your distributor will gradually boost your credit rating. Once your credit is established at one place, you will find it far easier to get credit at other firms. Credit allows you to handle more business than your own capital will permit, for sometimes weeks or months may elapse before your customers pay for the parts you bought for their sets. Every business needs credit if it is to expand rapidly, so begin building up your credit rating in your locality

right from the start, and never let anything impair this rating. Honesty pays in the long run, every time and everywhere.

Hang on to your regular job, and do this extra radio work in spare time. Yes, I know all this means long hours of work, depriving you of a certain amount of recreation, entertainment and contact with your family and friends, but one of the requirements of success is a willingness to sacrifice the present for the future.

Still keeping that full-time business in mind, advertise your services in the neighborhood you plan to serve. Keep your name before possible customers as much as possible. Build up a reputation for fairness and good work. Never antagonize a single person if you possibly can avoid it, for one talkative disgruntled customer can counteract many dollars worth of your advertising.

Eventually, the volume of work coming in will reach the point where you are no longer able to handle it even by working every evening and week-ends. Then is the time to drop that regular job, and devote full time to your servicing business. It takes courage to do this, I admit, but nothing ventured, nothing gained. Just be sure that the increase in business is permanent and not merely a temporary rush. If the amount of work has been increasing steadily, and there is every expectation that it will continue increasing, you are ready for a fulltime business.

Don't Go Wild

You are in business for yourself at last. You begin dreaming of a big store with your name above it in neon lights, and customers continually walking in and out. Take it easy, now, for this is one of the most critical stages in your entire radio career. There'll be plenty of salesmen around trying to sell you almost everything under the sun. They'll actually be offering you things on credit now, too—but keep your head and use that hard-earned cash and credit of yours conservatively for a while. You're not ready yet for an elaborate store.

Always remember that you are in the radio servicing business. People call you when their radio set needs fixing because you have done good work for them before, or have been recommended by a satisfied customer. A big store front may look good to you, but it won't bring in enough extra servicing jobs at this stage in your career to warrant its cost. If you buy anything, get an automobile or small delivery truck and have your business ad painted on it by a commercial sign painter, so you can pick up and deliver radio sets, and at the same time make a good impression on your customers and their neighbors.

Of course, you've got to have a place in which

to work, and it must be good enough to withstand the inspection of your customers. Look around you. Consider the garage, the basement, or even a spare room on the main floor of your house.

Doctors and dentists often have their offices in their homes, in the first room off the front entrance, or in a portion of the basement which has been completely finished and made accessible by a front or side door. The doctor hangs up his "shingle" above the entrance to the office, and possibly illuminates it modestly at night. If a neighborhood medical service is his goal, he never thinks of getting a costly downtown office.

What's good enough for the family doctor, should be equally satisfactory for the Radiotrician. A service shop in your own home is definitely economical; a member of your family can take care of telephone calls while you are out on jobs, and can even take care of the accounts for you, too. Members of your family have an interest in your welfare, and will gladly help if you give them half a chance. Don't be too proud to accept assistance at the start.

If there is no room at all in the house or in the basement, you've got to rent a room elsewhere for your business. A side-street location is good enough for straight servicing. Only when you plan to become a merchant, selling radio receivers, electric lamps and accessories, refrigerators, toasters and other electrical appliances should a main-street store ever enter your mind. Even then, I would first start on a side street, where the store rent is more moderate.

Expand Your Services

Now and then a man tells me that his town could hardly support a full-time radio service business, and yet he wants to start up a radio business of his own. Here is where it is necessary to expand your services so they cover a larger territory and a greater variety of jobs.

Give particular attention to people living outside of your own town, on farms or in smaller adjacent communities. Let them know you will make regular trips into their territory. Remember that you have an electrical training and can take care of electric fence units, farm electric plants, home appliances and other electrical equipment on the farm. You'll be stumped now and then by a purely electrical job, but you can always take these to the nearest distributor and watch an experienced serviceman do the work. You may not make any money on that call but you'll have learned how to handle future jobs like it. Get all the books and reference material you can on these electrical sidelines, and study them until you have a general knowledge of all possible types of jobs.

The servicing of home and auto radios is only one branch of radio. Your town or city may have need for public address systems. Install and service these systems, and rent them out. Start cautiously; if the territory permits, you may eventually find that this branch alone can provide full-time work for you.

Recording studios pay in some places. Keep your eyes open for an opportunity to introduce a studio, but remember that it takes considerable capital to start up properly in this field. And watch the growth of electronic controls; some day these may mean a full-time occupation for you.

The Road to an Operator's Job

So you want to become an operator. Fine, but Uncle Sam says you must first prove to him that you can qualify. This involves taking and passing an examination which tests your technical knowledge of radio and your familiarity with radio laws. Let us at N. R. I. help you to prepare for this exam; tell us which type of operator's license you plan to get, so we can send material which will help you study for it. It is not unusual for a man to fail the first time, but you are allowed to take the examination again after a short period of time for additional study.

But getting a license is not getting a job. Select the communication service in which you are most interested, and let the companies which hire operators know that you are looking for a job. The new and expanding fields such as aviation and police radio offer the best opportunity.

Don't sit back and wait for a job to materialize, though. You have learned to do spare-time radio service work, so earn what extra money you can in this work, and use this money for building a ham (amateur radio) station. After all, a ham station is really a small edition of any commercial station. Erect, rebuild, tune up and operate the station, not for the sport of making contacts, but for the actual experience and operating skill it can give you. In this way you will be using to the very best advantage the time during which you are waiting for an operator's assignment.

Get acquainted with the operators at your local broadcast, aviation and police radio stations. More than likely some of these men will also be hams, so you can contact them via radio as well as by personal visits. Once you get acquainted and have proved your technical ability to these men, they will be on the look-out for possible jobs, and will tip you off when a vacancy occurs in the operating staff or when a new station is being erected somewhere. In other words, keep plugging until you land the job you want, instead of sitting back and waiting impatiently for a job to be handed to you.



RADIO-TRICIAN

REG. U.S. PAT. OFF.

Service Sheet

Compiled Solely for Students and Graduates

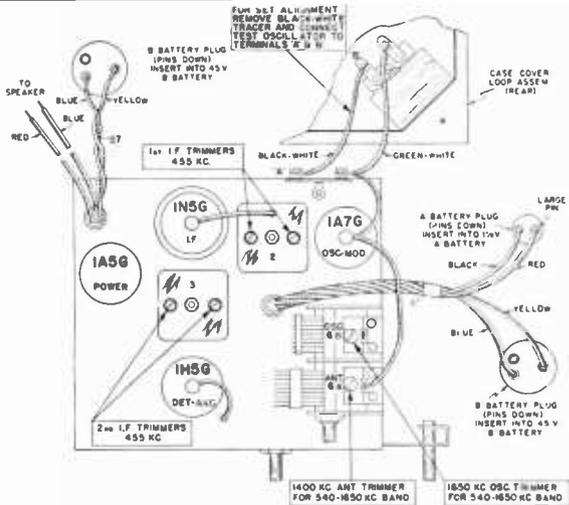
NATIONAL RADIO INSTITUTE, WASHINGTON, D. C.

SENTINEL MODEL 178BL Alignment Procedure In Tabulated Form

BEFORE ALIGNING, PLACE LOOP ANTENNA AND "A" AND "B" BATTERIES IN SAME APPROXIMATE POSITION THAT THEY WILL BE IN WHEN SET IS IN CABINET AND BACK CLOSED.

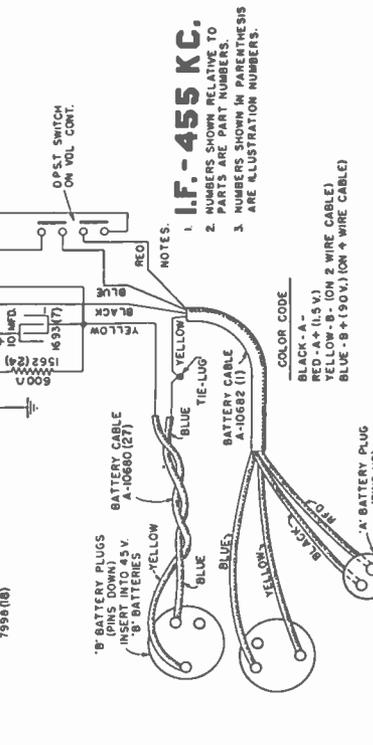
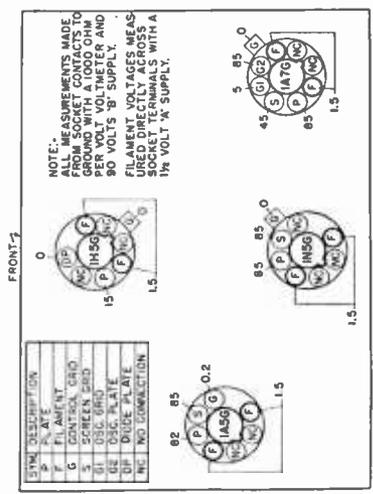
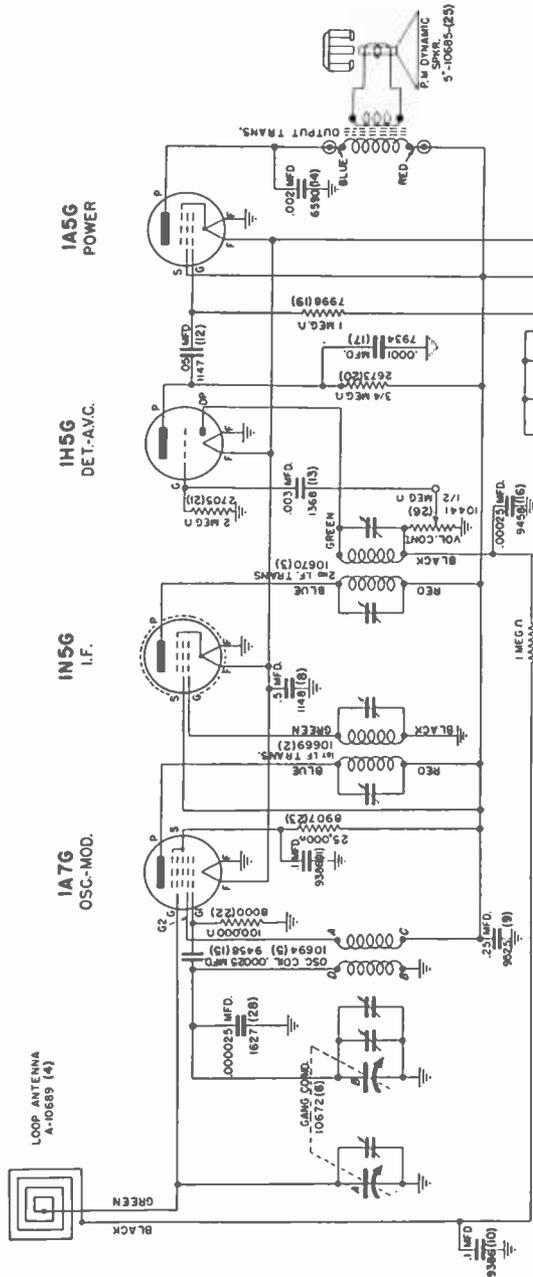
When adjusting 1650 kilocycle oscillator trimmer and 1400 kilocycle antenna trimmer, place test oscillator in series with set loop by:

1. Remove black with white tracer wire used to connect loop antenna to chassis.
2. Attach test oscillator to terminals marked "A" and "B" on parts layout diagram.



TEST OSCILLATOR				
Set receiver dial to:	Adjust test oscillator frequency to:	Use dummy antenna in series with output of test oscillator consisting of:	Attach output of test oscillator to:	Refer to parts layout diagram for location of trimmers mentioned below—and:
Any point where no interfering signal is received	455 K. C.	.02 MFD condenser	High side to grid terminal of 1A7G tube Low side to chassis DO NOT REMOVE CAP.	Adjust each of the second I. F. transformer trimmers for maximum output—then adjust each of the first I. F. trimmers for maximum output.
Exactly (1) 1650 K. C.	Exactly 1650 K. C.	None	Attach in series with "A" and "B" Loop Terminals	Adjust 1650 K. C. oscillator trimmer for maximum output.
Approx. (2) 1400 K. C.	Exactly 1400 K. C.	None	Attach in series with "A" and "B" Loop Terminals	Adjust 1400 K. C. antenna trimmer for maximum output.

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VOLTAGE TABLE
(BOTTOM VIEW OF CHASSIS)



The Service Forum

Conducted by

J. B. Straughn, N. R. I. Service Consultant

Send in your service notes. We will re-word them for publication. To qualify your note for the NEWS you must have observed the same trouble on two or more identical receivers.

MOTOROLA ELECTRIC AUTOMATIC TUNER MOTOR DOES NOT RUN

These tuners were used in Models 9-49, 9-69, 15-F, 20-T, 21-L, 22-S, 24-K and 25-N. Motor contacts in control head not closing; Open the control head and inspect the motor contacts. If the gap is too great, contact will not be made when the button is pressed. Adjust by bending carefully.

Poor contact at push-button plug: Inspect the contacts between the plug and the receptacle on the chassis.

Open circuit in motor: Check all connections to motor and check motor winding for continuity.

Motor brushes not making contact: Check contact between brushes and commutator; clean dirty commutator, with carbon tetrachloride.

Low battery voltage: A weak or defective battery in the car would not deliver sufficient voltage to run the motor.

Flexible tuning shaft binds: Binding in the flexible tuning shaft places an additional load on the motor; if this load is too great, it will prevent the motor from turning the mechanism.

Magnet fails to release: If the magnet which has previously been energized, fails to release the latch bar for any reason, the motor cannot turn the mechanism.

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MOTOROLA ELECTRIC AUTOMATIC TUNER MECHANISM RUNS SLUGGISHLY

This tuner is used in Models 9-49, 9-69, 15-F, 20-T, 21-L, 22-S, 24-K and 25-N. Low battery voltage: A weak or defective battery will not deliver sufficient voltage to turn the motor at normal speed.

High resistance contact in control head: High resistance at the push-button contacts will cause a voltage drop which will prevent the motor from turning at normal speed.

Poor contact between push-button plug and receptacle: This will also result in a voltage drop, and lessened motor power.

Binding in tuning shaft: Binding in the flexible tuning shaft will place an additional load on the motor which can slow it down, considerably; install tuning shaft with minimum amount of bending and check alignment where the tuning shaft enters the receiver housing.

Gears not properly meshed: Check all gears in assembly for binding due to improper meshing.

Defective motor: Replace.

-----n r i-----

MOTOROLA ELECTRIC AUTOMATIC TUNER MOTOR FAILS TO REVERSE

This tuner is used in Models 9-49, 9-69, 15-F, 20-P, 21-L, 22-S, 24-K and 25-N. Reversing switch not properly adjusted.

Open circuit in motor: If one side of motor circuit is open, motor will run in one direction only.

Open magnet winding: An open magnet will not pull latch down; consequently will not cause motor switch to reverse.

Latch bar spring too tight: If the latch bars operate under too much tension the magnet may not be able to pull the latch down.

-----n r i-----

MOTOROLA ELECTRIC AUTOMATIC TUNER FAILS TO RETAIN ORIGINAL SETTING

This tuner is used in Models 9-49, 9-69, 15-F, 20-T, 21-L, 22-S, 24-K and 25-N. Latch rings not locked securely: The locking screw must be pulled down securely, otherwise, the shock of the sudden stopping will tend to slide the rings away from the original setting.

Original setting not accurate: Resetting of magnets may be necessary after several days' use, during which time the mechanism goes through a "shaking down" process.

(Page 25, Please)



N.R.I. ALUMNI NEWS

Earl R. Bennett President
Clarence Stokes, C. B. Morehead Vice-Pres.
Allen McCluskey, F. E. Oliver Vice-Pres.
Earl Merryman Secretary
Louis L. Menne Executive-Secretary

NOMINATIONS FOR 1940

WE have heard a great deal about the election year of 1940. Who will be the presidential candidates? What will be their platforms? These are questions of national interest.

But there is an interesting campaign all our own which will get our attention first. This campaign is on right now, and you are asked to cast your vote to nominate candidates for all offices in the N.R.I. Alumni Association for the year of 1940.

In addition to selecting candidates for national offices in the Alumni Association we have another important matter to decide this year. It is the question whether our Constitution should be amended to limit the term of office for the President of the N.R.I. Alumni Association to one year. You are urgently asked to cast your vote on this question because it is a matter of much importance and must be decided by majority rule.

The proposition, summed up briefly, is this: it is a genuine honor to be elected President of this organization with more than three thousand members, principally in the United States and Canada, but located in all parts of the world. Many of our members, by their zeal and loyalty to the Association, are suitably qualified to hold the office of President. Therefore, to allow this honor to come to a greater number of men it is proposed that the President shall not be a candidate to succeed himself.

In fact, Pete Dunn of Baltimore very graciously declined to be a candidate last year in order that someone else might be elected to the presidency. Pete had served four consecutive terms. He felt that, inasmuch as, there could be no active campaign on the part of any candidate, members would continue to vote for him indefinitely be-

cause they were not familiar with the names and work of other deserving men. Pete Dunn put the welfare of the N.R.I. Alumni Association above any personal ambitions which is indeed the true fraternal spirit. It should be mentioned in passing that Baltimore Chapter immediately put Pete back to work by electing him Chairman of their Local—a real honor in itself.

Earl Bennett, who succeeded Pete Dunn as President for 1939, has done a marvelous job. Together with C. B. Morehead, one of our Vice-Presidents, he made a two thousand mile trip by automobile, combining a vacation with duty. Earl spent three days in Washington at Headquarters discussing Alumni Association matters for the benefit of members at large. He also visited several Chapters and his inspirational talks will long be remembered by those who heard him. Earl Bennett is another man who firmly believes the proposal to limit the Presidency of the N.R.I. Alumni Association to a term of one year should be adopted. It was Earl who originally advocated this same policy for the office of Chairman of Chicago Chapter.

Let it be understood, however, that it is not the intent of this amendment to disqualify any man to again be a candidate at some future time. It is only intended that the President shall not serve two consecutive years. He may, after a lapse of one or more years, again be a candidate for any office within the organization.

The proposed amendment applies only to the office of President of the N.R.I. Alumni Association. Moreover, it has nothing whatever to do with Local Chapters. They make their own rules and regulations, subject, of course, to the Constitution of the N.R.I. Alumni Association.

Vice-Presidents may be candidates to succeed themselves. It is believed that the new President each year will, for the most part, be selected from among the Vice-Presidents. Assuming, for example, that the candidates for President would be selected from among the Vice-Presidents, both would thus be honored. One eventually would be elected President, the other would be retired from office with the proud distinction that he had been a candidate for the highest office within the gift of this organization. By this procedure vacancies would be created for two new Vice-Presidents, bringing to us new energy and greater opportunity for service from our membership.

That, fellow members, explains the purpose of the proposed amendment to the Constitution. You will find a ballot on page 29 to use in casting your vote for or against its adoption. Also on page 29 of this issue is a list of the officers who are serving the Alumni Association during the year of 1939. After you have marked your ballot on the proposed amendment please be sure to use the opposite side (page 30) to mark your choice for candidates for office to serve during the year of 1940.

In order that you may have the names and locations of good men who are well qualified to serve the Alumni Association the following list is given as an aid to you. There are many other deserving men. Do not hesitate to vote for someone not included in our present roster of officers or in this list, if you prefer him as your candidate.

The two men having the highest number of votes for each office will be declared nominated and the final run-off—the election—will be conducted in the next issue of the News.

Any member of the N.R.I. Alumni Association, in good standing, may be a candidate. Please give the city and state of your selections to prevent misunderstanding. Use ballot on pages 29 and 30.

Carl E. Slater, Coolidge, Ariz.
 Karl Kelly, Magnolia, Ark.
 R. H. Rood, Los Angeles, Calif.
 Dr. Geo. B. Thompson, Los Angeles, Calif.
 C. H. Woodruff, Olive, Calif.
 John R. Kelley, Denver, Colo.
 M. E. Perkins, Bristol, Conn.
 George W. Howell, Wilmington, Dela.
 F. G. Kahlert, Washington, D. C.
 D. L. Hash, Washington, D. C.
 J. W. Nally, Washington, D. C.
 W. A. Bunch, Miami, Fla.
 S. H. Daniels, Orlando, Fla.
 A. E. Rudolph, Dalton, Ga.
 Oliver B. Hill, Moscow, Idaho
 Edward Sorg, Chicago, Ill.
 B. A. Stalcup, Mounds, Ill.

J. Verlin Hunt, Richmond, Ind.
 Leonard E. Close, Mt. Pleasant, Iowa
 Harry Laborde, Perry, Iowa
 William B. Martin, Kansas City, Kans.
 Karl Souenbergl, Cloverport, Ky.
 O. M. Davidson, Jr., Ged. La.
 Robert Beaulle, Lewiston, Maine
 W. W. Jensen, Baltimore, Md.
 J. B. Gough, Baltimore, Md.
 I. A. Willett, Baltimore, Md.
 Omer Lapointe, Salem, Mass.
 Rex. B. Smith, Sault Ste. Marie, Mich.
 J. Stanish, Detroit, Mich.
 A. H. Ketelhut, Benton Harbor, Mich.
 Jorgen R. Martinson, Minneapolis, Minn.
 E. J. Bentz, Pass Christian, Miss.
 Claude West, St. Louis, Mo.
 G. W. Ball, Moccasin, Mont.
 P. F. Carlson, Omaha, Nebr.
 C. D. Parker, Lovelock, Neb.
 E. Everett Darby, Woodsville, N. H.
 John Stein, Union City, N. J.
 Wm. Prescott, Rochelle, N. J.
 James E. Graham, Carlsbad, N. M.
 T. J. Telaak, Buffalo, N. Y.
 A. E. Stock, Brooklyn, N. Y.
 Glenn A. Williams, Cuba, N. Y.
 L. J. Kumert, Middle Village, N. Y.
 Charles W. Dussing, Syracuse, N. Y.
 Alison A. Lomax, Spencer, N. C.
 Arvid Bye, Spring Brook, N. D.
 Frank Moore, Portsmouth, Ohio
 C. A. Drotleff, Youngstown, Ohio
 F. L. Cheney, Chickasha, Okla.
 Henry W. Freeman, Portland, Ore.
 Charles J. Fehn, Philadelphia, Penna.
 Clyde D. Kiebach, Reading, Penna.
 Karl R. Smalley, Cranston, R. I.
 Noel J. Lawson, Aberdeen, S. Dak.
 W. P. Brownlow, Johnson City, Tenn.
 J. E. Collins, Paris, Tenn.
 M. C. Rhynes, Gonzales, Tex.
 R. L. Southworth, Wichita Falls, Tex.
 L. H. Watkins, Ogden, Utah
 D. A. Skelly, Burlington, Vt.
 T. J. Bowman, Altavista, Va.
 Harry W. Merchant, Arlington, Va.
 J. Walton Colvin, Orange, Va.
 R. F. Keil, Seattle, Wash.
 R. A. Heise, Wheeling, W. Va.
 William Wiesmann, Ft. Atkinson, Wis.
 M. L. Githens, Rawlins, Wyo.
 Alvin L. Campbell, Burdett, Alta., Canada
 E. H. Fawcett, Ladner, B. C., Canada
 John J. Cain, Vancouver, B. C., Canada
 Henry H. Sutton, Flin Flon, Man., Canada
 G. S. McLean, Winnipeg, Man., Canada
 H. V. Baxter, St. John, N. B., Canada
 D. J. Dunlop, Pictou, N. S., Canada
 C. M. G. Smith, Barrie, Ont., Canada
 G. C. Gunning, Smiths Falls, Ont., Canada
 B. Edwards, Montreal, P. Q., Canada
 E. Bergeron, Sherbrooke, P. Q., Canada
 J. W. Meadwell, Saskatoon, Sask., Canada



Here and There Among Alumni Members

Our genial Vice-President C. B. Morehead got all prettied up to attend a luncheon with J. E. Smith and Earl Bennett, when the Chicago boys visited Headquarters recently. Then Morehead discovered he didn't have a coat with him—forgot it when he left Chicago. At least he didn't say the wind blew it away as Straughn did when he lost his hat returning from a meeting at Baltimore.

What are things coming to anyway! We expect next to have someone tell us he lost his shirt.

The new owners of Station WFAS, White Plains, N. Y., have appointed our graduate, Frank A. Seitz as Vice-President and Director of the corporation in addition to being in complete charge of the station's operations.

Mr. and Mrs. G. H. da Costa of Kobe, Japan, announced the engagement of their daughter, Miss Gloria Hortensia da Costa, to Ian C. Kinnes, Radio Engineer, also of Kobe. Kinnes has gone a long way up the ladder since completing his N.R.I. course.

We are very sorry to know that Leo T. Fay of Salem, Mass., is still seriously handicapped as a result of an auto accident some eighteen months ago. He was badly hurt and his recovery is slow.

J. R. McCue of St. Paul, Minn., formerly was a professional entertainer. He studied Radio for a hobby. Right now he is experimenting in connection with several new inventions.

Alice Bennett and Letha Morehead, wives of the President and Vice-President of the N.R.I. Alumni Association spent several interesting days visiting historical spots in and near Washington, while their husbands were conferring at Headquarters. Real boosters for the N.R.I. A.A., these girls.

Speaking of boosters let's give a cheer for Mrs. Dave Blackwell of Skillman, N. J., who regularly makes the hundred mile round trip with Dave so that he can keep up his good attendance record at meetings of the Philadelphia-Camden Chapter in Philadelphia. Mrs. Blackwell takes in a picture show while Dave is at the meeting.

You may remember the picture shown on page 30 in the previous issue of the NEWS. It was taken at a party sponsored by Chicago Chapter. Menne asked Morehead who the chap was who had his arm around the pretty girl. Morehead replied,

"I don't know the fellow, but the girl is my wife." Oh, oh!

T. B. Herndon of Mansfield, La., sends us a fine picture of his modern establishment. Soon after graduating he started in a very modest way, to build up the business which is now incorporated for \$50,000 with Herndon as President.

One of our members mentioned he has four children. Said he: "youngest is 5 years, *lodest*, 13 years." Actually he meant "oldest" but "loudest" probably wasn't far wrong. And more power to them!

Bernard H. Masters writes that he has been working as commercial Radio-telegraph operator in the Merchant Marine at Annapolis, Md.

Lloyd H. Alberga of Jamaica, B. W. I., says the island is overrun with bicycle riders. To avoid hitting one he had to run his Ford right smack into a tram car. Bingo! One hundred bucks damages.

William J. Etoarski of Baltimore is working in one of the power transmission stations of the Consolidated Power Company where he is being groomed to become an operator of one of their stations.

Frank D. Cadden is interested in organizing a Local Chapter of the N.R.I. Alumni Association, in San Francisco. Wouldn't it be swell to start it while the Golden Gate Exposition is in progress?

Charles B. Hurd until recently was in the employ of the U. S. Forest Service as operator and now is operator at Station KUEC, San Luis, Calif.

Help! Help! Send in your personal items for this page.

Arthur D. Clark of Maspeth, N. Y., is operator for Radio Wire Television, Inc. He is getting a big kick out of this work.

A. de Boutkovsky, graduate living in Helsingfors, Finland, writes to inform us the P. A. installation for 1940 Olympic games is being handled by his employers.

From the Journal of Technical Employees we learn our good friend Serge De Somov of New York, lost all of his fishing tackle when someone broke into his shack at the shore.

Charles L. Keck has a swell job as Assistant to the President of Pollock Stores, Fort Smith, Ark. They have branches in Arkansas, Kansas and Oklahoma.

The Service Forum (Continued from page 21)

Electrical drift: This is usually the result of a great change in temperature. Automatic compensation is provided in the circuit to take care of the normal operating temperature range so before making original setting, turn the set on and permit it to play long enough to arrive at a constant operating temperature. In zero weather do not expect the set to tune "on the nose" until after a constant temperature has been reached. In severe cases of electrical drift occurring at normal operating temperature, change the compensating condenser.

—————*n r i*—————

EMERSON MODELS REMOVING CHASSIS 5A AND 6A FROM CABINET

In removing the chassis from the housing you must first unsolder the speaker and tone control leads as well as the bonding between the variable condenser and the case.

—————*n r i*—————

EMERSON MODEL II-5

HUM

If the filter condensers and tubes are in good condition carefully examine the ballast resistor and check for leakage between the various taps and ground. This unit is covered with asbestos and is protected with a metal sheath. If leakage is found insulate the sheath from the chassis or install a new part.

—————*n r i*—————

EMERSON MODEL DS-5

DISTORTION

Check the .25 megohm carbon resistor which connects to the grounded side of the speaker field. An open in this resistor will apply excess bias to the control grid of the 47 type tube thus causing the distortion. The resistor connects to the other side of the field through another resistor, the two acting together as a voltage divider of the speaker field voltage. If the grids of the 47 become red, the trouble is due to a positive control grid bias caused by leakage in the coupling condenser connected to the control grid. Another condenser rated at 600 volts should be installed.

—————*n r i*—————

EMERSON MODEL V-4

WEAK

If the receiver works fairly well on higher frequencies but is very weak on the lower end of the band, check the antenna pick-up coil. Move the coil either up or down over the secondary of the first tuned R.F. stage and re-align the antenna and interstage trimmer condensers. When the sensitivity is satisfactory, cement the antenna pick-up coil in its new position.

—————*n r i*—————

RADIOLA MODEL 60

WEAK

If the receiver seems to be aligned properly and the operating voltages are normal, check for an open in the antenna coil.

STROMBERG CARLSON MODELS 130 AND 140

WEAK

This is generally not due to a receiver defect but to improper adjustment of the sensitivity control located on the back of the chassis. The purpose of this control is to limit local signals, thus preventing overloading and distortion. For increased sensitivity, turn the knob in a clockwise direction.

—————*n r i*—————

STROMBERG CARLSON MODEL 846-A

WEAK

Carefully check the antenna coil and if open replace it. Also check the resistance of the sensitivity control as it may have changed in value.

—————*n r i*—————

STEWART WARNER MODELS 1251 AND 1259

NOISE

This is often due to a partial open inside the .02 mfd. metal case condenser connected between the line and the chassis. The lug is often pulled loose by the line cord. Install a new condenser and adjust the knot in the cord to prevent any pull from being placed on the new condenser.

—————*n r i*—————

MAJESTIC MODEL 650

NOISE

This is generally due to a partial open in the primary of one of the I.F. transformers. With the set turned off check the transformer windings with an ohmmeter and also measure the plate to chassis voltage with a voltmeter. Any variation in meter reading indicates a transformer defect.

—————*n r i*—————

EMERSON MODEL DS-5

WEAK

This condition accompanied by distortion may be due to a change in value of the 100,000 ohm plate resistor of the 21B7 type tube. If the plate voltage of this tube is low, check the resistor and replace it if it has changed in value.

—————*n r i*—————

DE FOREST CROSLEY MODEL 707

INTERMITTENT

This is due to opening up of the detector plate choke. If you cannot secure a duplicate replacement, a value between 10 and 20 millihenries will give satisfactory results.

—————*n r i*—————

PHILCO MODEL 70-A

NOISE

Noise accompanied by weak or no reception is generally due to a partial open in the primary of the output transformer. With the receiver turned off check the transformer winding with an ohmmeter. Any variation in the resistance value after the meter needle has come to the final stop indicates that the winding is defective and a new transformer must be installed.

BALTIMORE CHAPTER GIVES A PARTY

Earl R. Bennett, President and C. B. Morehead, Vice President, N. R. I. Alumni Association are royally entertained



The arrangements for the party were ably handled by the officers of Baltimore Chapter, who are shown here with some of their out-of-town guests. Reading from left to right (standing) E. O. E. Gralley, Acting Secretary, E. W. Gosnell, Librarian, W. W. Jensen, Vice-Chairman, G. D. Parlett, Sgt.-at-Arms, W. B. Giese, Asst. Secretary-Treasurer, C. Hachemeister, Publicity Manager. (Seated) J. E. Smith, President, N. R. I., P. J. Dunn, Chairman, Earl R. Bennett, President, C. B. Morehead, Vice-President, L. L. Menne, Executive Secretary, N. R. I. Alumni Association.

The camera man was a little out of focus, but he managed to get at least half of the group of those who attended the party, in this picture. Notice the orchestra, will you! These Baltimore fellows have plenty of pep and initiative and do things up right. Between renditions by the orchestra there was other special music, through a P. A. System. This picture was made late in the evening after J. E. Smith, Joseph Kaufman, C. B. Straughn, and George Rohrich from Headquarters had left to make the long trip back to Washington. But the Baltimore members were in no hurry to break up. It was a great party.



President of N. R. I. Alumni Association Visits Headquarters

RECENTLY I had the pleasure of visiting the National Radio Institute in Washington, D. C. Accompanied by C. B. Morehead, Vice-President of the Alumni Association I also attended some Local N.R.I. A.A. Chapter meetings.

Right now, I wish to thank J. E. Smith, E. R. Haas, J. A. Dowie, Joseph Kaufman, L. L. Menne and all other members of the Institute, as well as the officers and members of the various Chapters that I visited, for their swell welcome. Never in my life have I been treated more cordially. Among the Chapters, I wish especially to thank Pete Dunn of Baltimore and Charles Fehn of Philadelphia-Camden Chapters.

Having never previously visited the National Radio Institute I had a rather vague idea of just what kind of place it is. I had pictured a group of offices clustered together somewhere on the umpteenth floor of some office building tucked away among a multitude of other office buildings all just alike. Imagine my surprise (and secret pride) upon discovering that the National Radio Institute is housed in its own modern three story fire proof air conditioned building. The building is surrounded by shade trees and lawns. The lighting is of the latest indirect type. The place was a humming bee-hive of industry. Where I had expected a maximum of perhaps twenty-five or thirty employees, I discovered that there are at least a hundred and perhaps more.

In the mailing department I found the very latest equipment. Machines that address, fold, enclose in envelopes and stamp, all in one operation. And as if this isn't enough, they then proceed to tie the envelopes in neat bundles so Uncle Sam's mail department will find them easier to handle! In this department I also found a complete printing plant.

However, the most interesting department to me, was the laboratory. I stayed there so long that I am sure Mr. Straughn, who showed me through, took an inventory as soon as I left.

The Instruction, Consultation, Student Service,

Graduate Service, Stenographic, Publicity, Purchasing and other Departments are all conducted most efficiently and with interesting equipment. The school is strictly modern in every respect.

I spent some time with Executive Secretary Menne who showed me how records of the Alumni Association are kept. He showed me that each member is more than just a name—an individual card record is kept for each. This record is cross-sectioned geographically and chronologically—that is, by city and state, and by date of membership and expiration. I was impressed with the elaborate system for keeping records which is set up at Headquarters. Much credit is due Margaret Mantel, Secretary to Mr. Menne, who keeps most of the records. Margaret impresses you at once as a thoroughly efficient secretary.



One of my most treasured snap-shots. It was taken just as we were about to step into our car to continue our journey after four interesting days in Washington. Cecil Morehead at the left, Mrs. Letha Morehead, Mrs. Alice Bennett and yours truly, Earl Bennett, with Mr. Smith figuratively and otherwise the center of attraction.

The hospitality of the staff members at the Institute will long be remembered. After a complete tour of N.R.I. it was only natural that we should wish to see something of the city. Guided by Mr. Smith and Mr. Menne we drove to Arlington Cemetery, where we saw the impressive Tomb of the Unknown Soldier. Here we also visited the Amphitheatre, from which our Presidents of these good old United States address the Nation on Armistice Day and on other occasions. At Arlington we also saw the home of General Robert E. Lee.

We drove along the beautiful Memorial Drive to Mt. Vernon, a distance of about twelve miles. Here we saw the home of George Washington on the bank of the historic Potomac River. Here also is the tomb of George and Martha Washington, as well as other members of the Washington family. The grounds are beautiful. I shall always carry with me a vivid picture of Mt. Vernon. I have always wanted to see it—I shall never forget it.

I wish it were possible for every member to visit Washington and the Institute. They would leave the city filled with patriotic pride—and proud of their Alma Mater, too.

Fraternally yours, EARL R. BENNETT.

Baltimore Chapter

We were honored by a visit from Earl Bennett and C. B. Morehead, President and Vice-President of the N.R.I. Alumni Association, Mr. Smith, President of N.R.I. and a number of our friends from N.R.I.

Earl Bennett made a peach of a talk. He has been a member of the Alumni Association for ten years and it is doubtful if ever anyone was more enthusiastic over his membership.

Mr. J. E. Smith also made a stirring appeal for a closer spirit of cooperation in all business and a greater measure of good fellowship through organizations such as ours. Other talks were made by Joseph Kaufman, C. B. Straughn, George Rohrich, L. L. Menne, John Gough, W. W. Jensen and E. O. E. Gralley.

The meeting was ably conducted by our effervescent Chairman, Pete Dunn, who gave deserving credit to all of our Officers who had worked hard to take care of the arrangements.

Refreshments were served. We had music of several sorts—and it was plenty good. This was one of our social meetings which we hold every now and then. We have some good business programs lined up for the next several meetings and those who attend will get some real practical Radio information which they can later cash-in on.

E. O. E. Gralley, Acting Secretary.



Clarence Stokes of Philadelphia, Vice-President of N. R. I. Alumni Association and one of the foremost candidates for President in 1940, is a real live wire. He operates the Philcam Radio Sales and Service Co. of Philadelphia, but finds time also to go on the air several times a week with this fine group of entertainers. Stokes is known as "Uncle Chris" to his Radio audience.

Page Twenty-eight

Philadelphia-Camden Chapter

Now that summer is over we are again holding regular meetings on the first and third Thursday of the month. On September 7 Chairman Charles Fehn led a discussion on circuit of G. E. Model G61, a three band receiver with automatic tuning.

On September 21 John Biaselli spoke on the subject of Television. For October we have good programs scheduled. One of these meetings we expect to be conducted by a technical speaker from Washington headquarters.

President Bennett and Vice-President Morehead dropped in on us for a visit. They were accompanied by L. L. Menne, Executive Secretary. At this particular meeting Dave Blackwell led the discussion. Our members were very glad to have Bennett, Morehead and Menne present although our Officers are sorry a scheduled meeting for Bennett elsewhere made it uncertain as to just when Bennett and Morehead could see us and as a result no time was allowed for preparations such as we should like to have made.



Earl Bennett, C. B. Morehead and L. L. Menne visit Philadelphia-Camden Chapter.

Dave Blackwell has been elected Vice-Chairman and John Biaselli was made Secretary to serve the balance of this year.

Norman Kraft, Harold Strawn both of Perkasie, Penna., and Joseph Adamo of Philadelphia are recent new members. They received a most cordial welcome.

President Bennett, after his return home, wrote Chairman Fehn congratulating our Chapter for its fine spirit and particularly for the fine attendance record of our members in spite of long distances traveled by many of them.

Meetings are held at 4711 Longshore Street, first and third Thursday at 8:30 P.M.

JOHN BIASELLI, Secretary.

Directory of Officers

(To Serve Until January, 1940)

President—Earl Bennett, Evanston, Ill.

Vice-Presidents—

Clarence Stokes, Philadelphia, Pa.
F. E. Oliver, Detroit, Mich.
Allen McCluskey, Birmingham, Ala.
C. B. Morehead, Chicago, Ill.

Secretary—Earl Merryman, Washington, D. C.

Executive Secretary—L. L. Menne, National Headquarters, Washington, D. C.

————— *n r i* —————

Chairmen of Chapters

Edward Sorg, Chicago Chapter, 6501 S. Harvard Ave., Chicago, Ill.

Peter J. Dunn, Baltimore Chapter, 713 N. Fulton Ave., Baltimore, Md.

Alfred E. Stock, New York Chapter, 650 Ocean Ave., Brooklyn, N. Y.

John Stanish, Detroit Chapter, 12551 Camden Ave., Detroit, Mich.

Charles J. Fehn, Philadelphia-Camden Chapter, 3411 Helen St., Philadelphia, Penna.

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Directory of Chapters

Baltimore—I. A. Willett, Secretary, 2411 Armah Ave., Baltimore, Md. Meet at Fishpaw's Hall, Baltimore and Gilmore Sts., first and third Tuesday of each month.

Philadelphia-Camden — John Biaselli, Secretary, 1309 Siegel St., Philadelphia, Pa. Meet at Longshore Radio Service, 4711 Longshore St., Tacony, Philadelphia, first and third Thursday of each month.

New York—L. J. Kumert, Secretary, 66-11 74th St., Middle Village, L. I., N. Y. Meet at Damazeks Manor, 12 St. Marks Pl., New York City, first and third Thursday of each month.

Chicago—Richard Cordero, Secretary, 3315 E. 89th St., S. Chicago, Ill. Meet at Eckert Park Field House, 1400 W. Chicago Ave., first and third Thursday of each month.

Detroit—F. E. Oliver, Secretary, 3999 Bedford Rd., Detroit, Mich. Meet at 10 Lawrence Ave., at Woodward, second and fourth Friday of each month.

Ballot for Amendment to the Constitution of the Alumni Association of the National Radio Institute

All Alumni Association Members are requested to fill in this ballot and return it promptly to National Headquarters. You are to vote on the proposed amendment to the Constitution of the Alumni Association of the National Radio Institute (which appears below), and also for your candidates to hold national offices during 1940 (using the ballot on the reverse side).

Be sure to vote on the following amendment, proposed for Section 4, Article IV of the Constitution of the Alumni Association of the National Radio Institute.

The term of office for the President shall be limited to one year, provided however, that he may again be eligible for this office after a lapse of one year, and provided further, that, when not a candidate for President, he may be a candidate for any other office. This limitation is to apply only to the office of President of the Alumni Association of the National Radio Institute. All other officers may be candidates to succeed themselves or for any elective office in the National organization.

Do you vote for the adoption of the above amendment to the Constitution of the Alumni Association of the National Radio Institute:

Yes

No

Your signature

City State

(over)

This ballot must reach Headquarters in Washington, D. C., on or before November 1, 1939. Address it to L. L. Menne, Executive Secretary, N.R.I. Alumni Association, 16th and U Sts., N.W., Washington, D. C.

CUT OR TEAR CAREFULLY ALONG THIS LINE

Nomination Ballot

L. L. MENNE, *Executive Secretary*,
N. R. I. Alumni Association,
16th and You Sts., N. W.
Washington, D. C.

I am submitting this Nomination Ballot for my choice of candidates for the coming election. The men below are those whom I would like to see elected as officers for the year 1940.

MY CHOICE FOR PRESIDENT IS

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

MY CHOICE FOR FOUR VICE-PRESIDENTS IS

1.
City..... State.....

2.
City..... State.....

3.
City..... State.....

4.
City..... State.....

MY CHOICE FOR SECRETARY IS

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

MY CHOICE FOR EXECUTIVE SECRETARY IS

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

Chicago Chapter

At our meetings we get right down to actual work of repairing sets. This practice has met with great favor on the part of our members.

Chairman Ed Sorg has also introduced a question box for present day topics. Questions are answered with blackboard illustrations to simplify their understanding.

We continue the practice of bringing receivers to the meetings for servicing. This gives our members an opportunity to get actual practice on some of the most interesting problems. Chairman Sorg is a firm believer in plenty of action at our meetings consisting principally of practical work.

Sorg has been a fine leader and you fellows who find excuses to pass up these meetings are missing something really worthwhile.

RICHARD CORBERO, Secretary.

— n r i —

Detroit Chapter

We suspended meetings during the summer months. We are now back on regular schedule with two meetings a month, on the second and fourth Friday. Our meeting place, as usual, is at 10 Lawrence Avenue, at Woodward.

Chairman John Stanish is prepared to give us some interesting programs this fall and winter. Stanish is very anxious to have all members present at every meeting. Students and graduates from this area, who are not Chapter members, are cordially welcome as guests.

We are installing some new test equipment at our meeting place. This equipment is demonstrated for the benefit of our members and guests. Can you afford to miss that?

Our Chairman is giving a lot of time and energy toward helping our members. All we need to do is to support Stanish by regular attendance—he will give us plenty of action.

Our library includes Riders Manuals, as well as many new text books and diagrams. These are for the benefit of our members.

Refreshments were served at the close of our first fall meeting. We had a splendid attendance.

We regret to report that one of our most regular members, William Wallace, lost his life in a traffic accident. Mr. Wallace was extremely popular with the boys and will be sadly missed. Our deepest sympathy is extended to the members of his family.

F. EARL OLIVER, Secretary.



A Perfect Humdinger

Wow! That last Electronics, Inc. was the best story I've read yet. Most interestingly told. I devoured everything and then chewed it up all over again. I must say I learned a few things about television. The projected picture on a smoke screen was a perfect humdinger.

J. H. UNFERFATE,
Cleveland, Ohio.

— n r i —

Chinese Radio Authority is N. R. I. Graduate

I've discovered that one of the best known Radio men in China is an N.R.I. graduate. He is the founder of the "Amateurs Home Ltd.," the best Radio manufacturing concern in China; owner and operator of station XIIIIS, Shanghai; Chief Editor of one of the very few Chinese Radio magazines, "The China Radio"; and author of many Radio books in Chinese. His name is T. K. Su, graduate of seventeen years ago.

K. H. OWYANG,
Peking, China.

— n r i —

News Can't Be Imitated

NATIONAL RADIO NEWS is received regularly and please accept my thanks for the very interesting information it contains. NATIONAL RADIO NEWS is always the fine inimitable periodical which our Association can be proud of.

MARCEL SERRE,
Ismailia, Egypt.

— n r i —

Not Unless You Are Incorporated

I read the story, "Electronics, Inc." I enjoyed it. I expect to open a shop upon completion of my course, I would like to name my service shop "Electrons, Inc." Do you suppose I would be permitted to use this name?

W. E. LYONS,
Oklahoma City, Okla.

Another Boost for Jay and Ozzie

Immediately after receiving the August-September issue of N. R. NEWS I started to look for Jay and Ozzie (Electronics, Inc.). I read it over three times. I find Electronics, Inc. very educational as well as interesting. I also enjoyed reading Mr. Kaufman's "Bird's Eye View of a Modern Television Receiver."

MANUEL C. LOPES, JR.,
Taunton, Mass.

— n r i —

What We Like to Hear

I surely enjoy NATIONAL RADIO NEWS. It is a great help in keeping me posted on the improvements of the new Radio circuits. Thanks a lot for its improvement for each year, too. I want to congratulate you and your staff for your twenty-five years of success.

LLOYD EVELAND,
Braman, Okla.

— n r i —

Appreciates Service After Graduating

I certainly appreciate the fine service rendered by the Alumni Association, as it means a lot to us graduates to feel our school still takes a lot of interest in us, years after we have graduated. So it's thanks again, and the best of luck to you all.

T. J. HEINO,
Keewatin, Minn.

— n r i —

Anniversary Congratulations Continue to Come

I would also like to express my congratulations to the N.R.I. and its staff on its twenty-fifth anniversary. I am proud to be a part of this wonderful institute and its Alumni. I also enjoy reading the N. R. NEWS, and I think there is none better.

DAN DROEMER,
Giddings, Texas.

New York Chapter

We have started off our fall season with a bang. Summer and vacations over, cool evenings in prospect, we are all anxious to get down to business again.

On September 21 (as this issue goes to press) we have one of our big meetings scheduled. Mr. Joseph Kaufman, N.R.I. Director of Education, will address us. Mr. L. L. Menne will be with us and we also expect Mr. J. E. Smith to be present, unless he should be unavoidably detained at a meeting of the Institute of Radio Engineers, also scheduled for this date.

We look for an attendance of more than one hundred at this first important fall meeting. A complete report will be made in the next issue of the News.

Mr. Straughn, N.R.I. Service Consultant will address us at some meeting in the near future. Other good speakers have been lined up. Every meeting of New York Chapter promises good things, so make your plans now to set aside the first and third Thursday of each month to attend these meetings. Chairman Alfred E. Stock is working hard to give us result-producing meetings and all he asks is regular attendance on the part of our members to help him carry on the work. N.R.I. students and graduates in the New York Metropolitan area, who are not members of our Chapter, are cordially invited to attend our meetings as guests.

Our meeting place, as usual, is Damanzek's Manor, 12 St. Marks Pl., New York City. Come to our meetings—you will receive a warm welcome here.

L. J. KUNERT, Secretary.

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Additions to N. R. I. Ham List

W5IDZ—Cecil Miller—Sherman, Texas.
 W4GEY—W. R. Atkinson—Atlanta, Ga.
 VE3BAQ—J. E. Brunel—Ramsayville, Ont.,
 Canada
 W9QLG—Art Leitner—Cannelton, Ind.
 W9BLE—Richard H. Bush—Louisville, Ky.
 W8RGZ—J. Robert Boggs—Dormont, Penna.
 ZL4GJ—C. Bowie—Otago, New Zealand.
 W6RGG—James M. Nichols—Douglas, Ariz.
 VE2QM—Michael Burns, Jr.—Montreal, Que.,
 Canada.
 N8REP—Thomas J. Wilson—Moundsville, W.
 Va.
 W9QVT—William Locke—Beulah, Wyo.
 W3BRZ—Elmer K. Denlinger—Lancaster,
 Penna.
 W9CRE—Milton V. Brown—Industrial City,
 Mo.
 W1GCB—Charles W. Lyford—Presque Isle, Me.
 W4GBQ—Otis R. Holmes—Talladega, Ala.
 W4GB0—George Fitzgerald—Memphis, Tenn.
 W1MEW—Antonio Gallonio—Providence, R. I.
 W6EBL—F. E. Robinson—Oakland, Calif.

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FROM N.R.I. TRAINING HEADQUARTERS

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