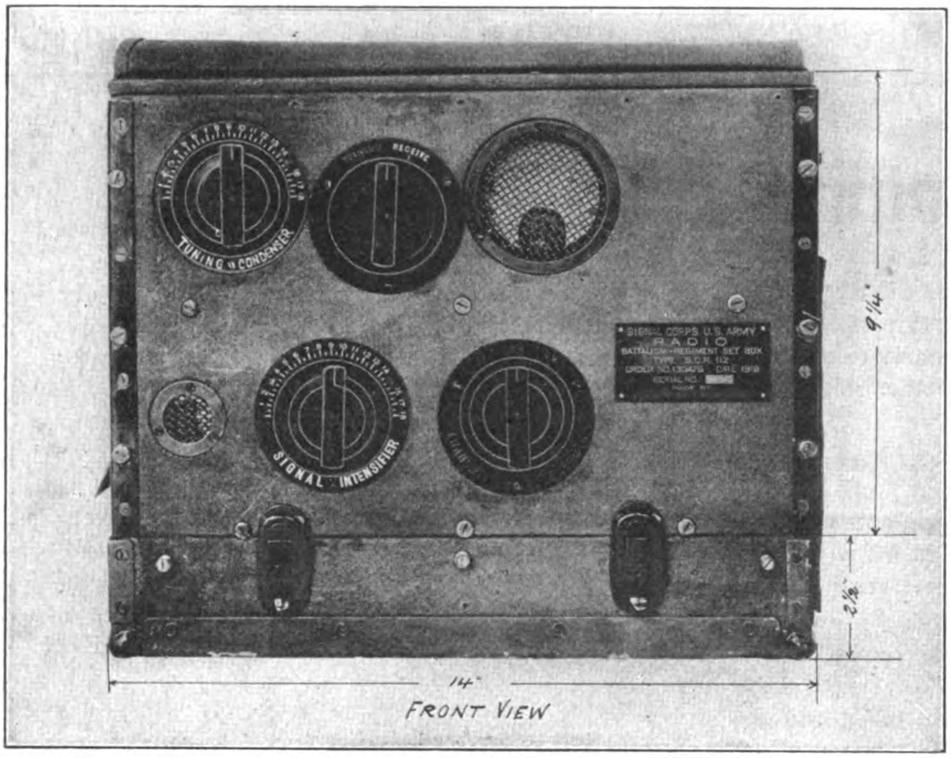
The Priess Loop Set

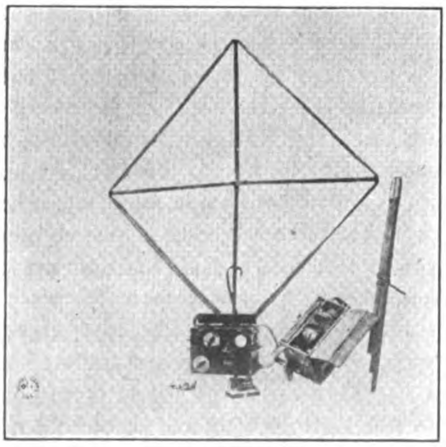
I. Why and How the Portable Loop Set Was Developed

By WALTER J. HENRY*

ON a certain day about the middle of June, 1918, a telegraph wire which formed part of the ground telegraphy system, developed by the French Signal Corps, and in use in the A. E. F. at that time, suffered, during a single barrage at Soissons, 350 shell breaks on a length of 1,000 yards. About that time the long drawn-out trench warfare was abandoned in favor of open tactics, and the constantly shifting movement of men, machines and artillery proved extremely detrimental by causing havoc with ground communication systems. It became practically impossible to maintain telegraph wires forward of regiment as was found out by a certain signal officer who laid eight parallel lines between two points to insure the working of at least one line. As the engagement developed he saw, much to his horror, one of their own tanks pressing relentlessly forward on a zig-zag course across his eight lines. The wires were, of course, ground into an unrecognizable mass of copper. Resort was necessarily made to runners, but the appalling losses and the uncertainty of message delivery rendered this method of communication disheartening, to say the least.



The Priess Transmitter and Receiver Combined in a Single Unit for Communicating on Three Wavelengths, Using the Same Loop for Transmission and Reception, and Operating from a Ten-Volt Storage Battery.



Showing the Complete Loop Set Connected Up Ready for Use.

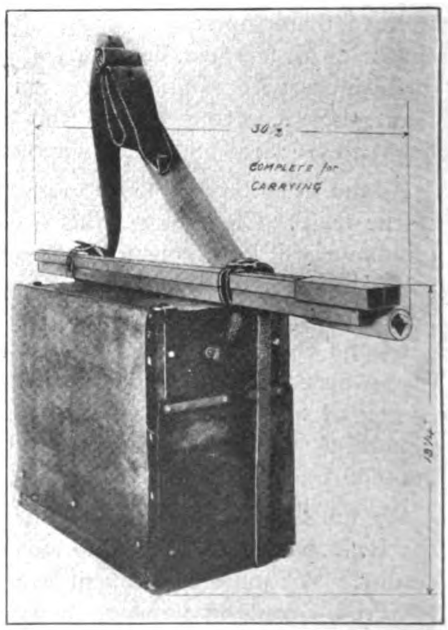
An increasing number of incidents of this kind made it rapidly evident that the direction and co-ordination of front-line troops must take place through the medium of a compact, portable and shell proof radio set. The now famous incident of the "lost battalion" also indicated the extreme desirability of a radio direction finder. The problem was placed before Lieut. William H. Priess,† who was in charge of the A. E. F. field radio forward of brigade. Lieut. Priess recognized that a successful system along the lines desired must necessarily be based upon the direction finder loop patented by Mr. Greenleaf W. Pickard in 1908. He proposed to design a set that could be easily carried by one man and which could be completely contained within a dugout or shell hole. The British had already experimented to some extent with a loop one meter square but had used this only for transmission, supplementing it with the usual type of wire antenna with a 2-Step Amplifier for receiving. The British equipment could hardly be called successful, however, inasmuch as the range was only about 1,600 yards and the system was complicated by the necessity of using four separate and different units for each wavelength. Lieut. Priess decided to attempt the construction of a *single unit capable of two-way communication on three wavelengths, using the same loop for transmission and reception, and operating from a small ten-volt storage battery.*

While many officers favored an undamped system of transmission, Lieut. Priess pointed out that "reception of undampened waves of these high frequencies by any of the familiar heterodyne circuits is an impractical proposition for field service, as the swaying of note due to normal minute changes in the receiving and transmitting antenna incident to operation, will be sufficiently great to cause the heterodyne frequency to swing through to inaudible frequencies." He also reasoned correctly that, "It is a fallacy to claim secrecy for a system that involves as much difficulty for your own reception as it does for the enemy. The importance of the secrecy factor varies directly as the military importance of the communication to the first line. First line communication has simply a local and immediate importance such as the direction of a local barrage and the reporting of battalion positions. It must, however, be 100% reliable as other wire communication alternatives are entirely absent here in an engagement. Code sending is used in all cases and it is adequate secrecy, since the information has lost its value to the enemy, by the time he has succeeded in having it decoded by his intelligence system."

For this reason and because of the greater ruggedness and reliability of spark apparatus Lieut. Priess decided to use a dampt system. By July 14, 1918, two sets had been developed by salvaging parts from available radio equipment, and combining and co-ordinating these units and other available facilities as Yankee ingenuity dictated. For example, the bakelite dilecto used was sawed from the panel of a $1,600 airplane transmitter that had proven too excessive in power for army use. The buzzer was the donation of the French Signal Corps, who in turn had more or less politely requisitioned it from the Boches, who had specialized in buzzer manufacture.

The two sets were first tested at Chatillons being placed above ground and five kilometers apart. Excellent results were obtained. The wavelengths used varied *from 66 to 180 meters.* Similar tests were made with one set in a dugout with about ten feet of earth and stone separating it

(*Continued on page 308*)



The Set Dissembled and Packed for Carrying.

* Sales Manager, Wireless Specialty Apparatus Co

† Chief Engineer, Wireless Specialty Apparatus Co.

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By WALTER J. HENRY

(*Continued from page* 270)

from the open air. Both sets were then placed in dugouts about 10 feet underground and 400 yards apart. Excellent audibility was obtained with only a portion of the available energy, and in addition it was found that the loops radiated sharply.

General E. Russell, Chief Signal Officer of the A. E. F., became interested in this new development and ordered the two sets taken to the front for trial. Reliable communication was shown between sets, in dugouts separated 6 kilometers, when using only 30 watts (with locked key). At 12 kilometers, with one set in a dugout and the other on the ground, good communication was established with the same power. Upon the enthusiastic recommendations of Capt. Robert Loghry, Chief Radio Officer of our army in the field at the time, and both the French and American Signal staffs, General Russell decided to base his entire front-line communication system on the Priess Loop Set. His plans called for the production of 6,000 of these sets by July 1, 1919, deliveries to be at the rate of 1,000 per month, beginning January, 1919.

Lieut. Priess was then sent to the United States to supervise the initial production of these sets and fifty-two days after his arrival three models had been constructed and were tested before General Squier and a number of Staff officers. Contiguously with the manufacture of the three model sets, the design and manufacture of tools for building the sets on the required production basis was carried on. The completed set weighed only 28 pounds including all the transmitting and receiving apparatus, the loop antenna, compass, telephones, tools and spares. The sets showed that with two or three sets above ground reliable communication was possible over a distance of thirteen miles.

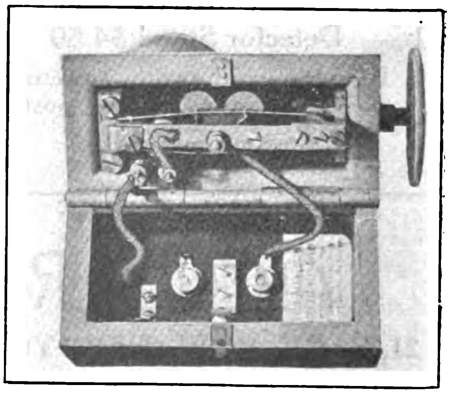
The description of the transmitter in detail with wiring diagram will be given in the January issue of RADIO AMATEUR NEWS.

Photographs courtesy of the Wireless Specialty Apparatus Co.

German Radio War Instruments

(*Continued from page* 271)

in the diagram has a diameter of 1½ inches. This makes possible a finer adjustment of the tension vibrator wire. The stationary contact at the top is mounted on a stiff spring which is raised or lowered roughly by the set screw at the right. The precise adjustment of this contact is obtained by the movement of the large knob at the bottom. A stiff silver wire may be used for the vibrator contact. This wire is mounted diagonally on the thin sheet iron armature by fastening with solder at each end.



A German Buzzer Which Gives a Beautiful 600 Cycle Note.

The Priess Loop Set

Part II. THE TRANSMITTER

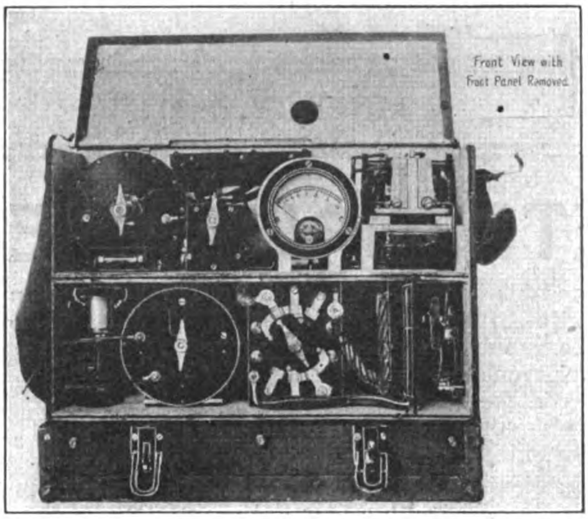
By WALTER J. HENRY*

THE transmitter section of the Priess Loop Set consists of a quenched spark, two circuit system. It is excited by an improved design of the German 500 cycle buzzer transformer which in turn is operated by a 10 volt, 25 ampere hour storage battery. Inductively coupled to the primary circuit is a loop circuit consisting of a coupling coil in series with a mica condenser and the loop. To provide vernier tuning and to take care of small variations that might occur during the use of a temporary mast and loop support when the regular one is lost or broken, a small oil condenser is placed in parallel with the mica condenser. In general, the Priess Loop follows the original Pickard Loop in respect of the multiple turns in the circuit and of the condenser for tuning. A point of special interest to amateurs in this equipment is the fact that the three wavelengths provided are all under 200 meters, viz., 110, 123, and 140 meters. Another interesting feature is the connection in parallel of the three loop turns, this being done to obtain a minimum low resistance in the loop circuit.

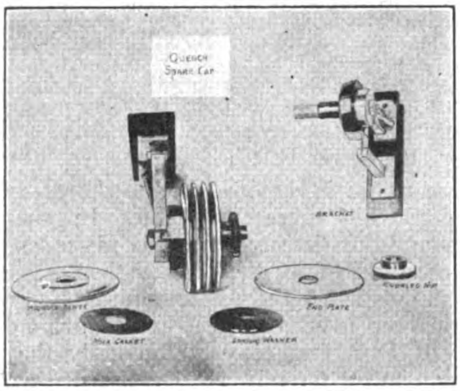
The circuit of the transmitter is shown in the accompanying diagram. The beauty of this set for field use is the feature of minimum adjustment. Choice of any one of the three wavelengths is permitted by a single switch which simultaneously shifts the capacity in both circuits to the proper amount. Then when any vernier tuning is necessary it is accomplisht, as explained before, by the variable oil condenser.

In the front view of the set with the panel removed the transmitting units are located as follows: In the upper compartment from right to left is shown the buzzer, spark gap, loop ammeter, the transmit-receiver switch, and the variable oil condenser. The lower compartment contains from right to left the key, the primary coil, the loop coupling coil, the primary and secondary mica condensers with the switch for varying simultaneously the primary and secondary capacities for obtaining the three previously mentioned wavelengths.

The buzzer transformer is of special interest and will be described separately in a following article. The spark gap is of the open quenched type, consisting of four solid silver plates separated by nine inch mica gaskets. The open type of gap was chosen for this set as it permits of easy repair in the field to broken gaskets, and also permits the operator to view his gap in operation and so detect a failure in the gaskets.



Front View of the Priess Loop Transmitter With the Front Panel Removed.



The Quench Gap Used in the Priess Sets.

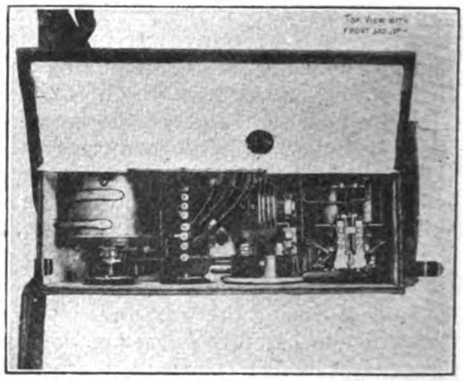
The antenna current is registered on a Weston 0-10 ammeter, and for locked key operation is approximately proportioned to the battery current, to be exact, 10 amperes antenna current for 9 amperes battery current and 6 amperes antenna current for 5 amperes battery current.

On the transmit side the transmit-receive switch connects the storage battery in series with the buzzer transformer thru a six ohm resistance shunt around the key. The object of this shunt is twofold: First to prevent sparking at the key during transmission; and secondly, to allow the flow of sufficient current from the battery to keep the vibrator of the buzzer running in the pauses between the transmission of dots and dashes and so eliminate the sticking of the buzzer contacts.

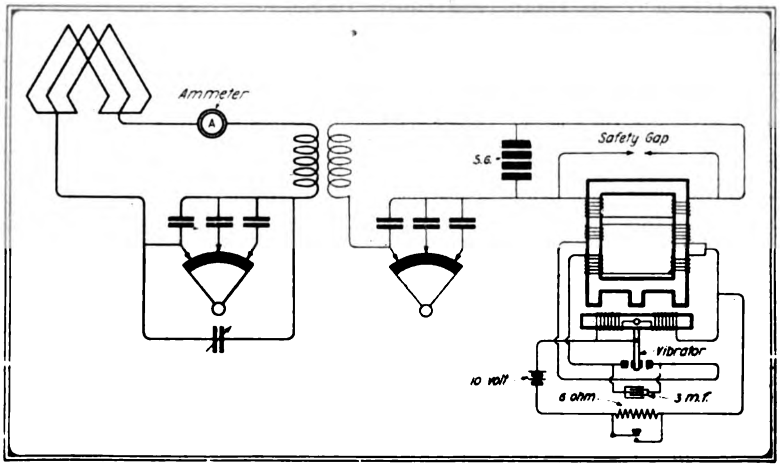
The primary coupling coil is wound as a square flat spiral of four turns and adjusted so that the wavelengths for any one of the condenser settings is correct. The conductor used in this coil is 3/16" copper braid over a jute center with cotton braid and rubber covering. The secondary coupling coil consists of one and one-half turns of conductor made up of four No. 18 lamp cords connected in parallel.

The Variable Oil Condenser. This condenser has a capacity of .0004 mfds. It is of the usual semi-circular plate construction. The oil used in this condenser is a Standard Oil Company product known as Actol. This condenser has an expansion chamber consisting of a tube of small cross section led down from the top of the condenser case into a tube of large cross section which bends up to the top of the condenser case. In the top of the large tube is a very fine air hole. The pressure both inside and outside of the condenser is maintained the same by means of this air hole. The expansion chamber functions as follows: Should any air be present in the chamber and the temperature increase, the air is forced out thru the small cross section tube and bubbles up thru the oil in the larger cross section tube, until all the air has been expelled, whereupon oil follows along thru the narrow cross section tube. Upon cooling, oil only is suckt back until the air chamber is empty, whereupon air follows. An expansion chamber of this type with the condensers properly filled initially, will keep the condenser can always loaded with oil and expel the air automatically. The gasket between the insulating condenser cover and the can, is made of varnished cambric cloth which is clampt into place with the varnish moist. Upon drying, a satisfactory oil tight joint is secured. The shaft of the movable system projects thru the insulating cover and the stuffing box. Packing used in this stuffing box is leather, placed in the box dry. This

(Continued on page 386)



Here the Top View With the Front Lid Raised Is Shown.



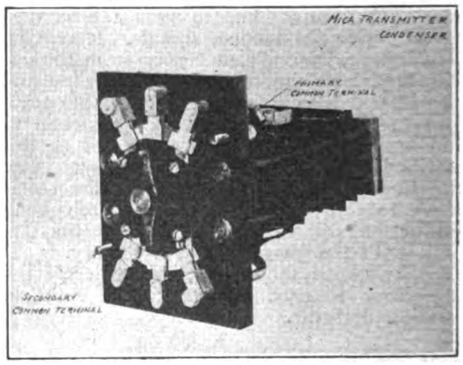
Wiring Diagram of the Complete Set. Note the Double Action of the Vibrator, Also the Method of Changing the Wavelengths.

*Sales Manager, Wireless Specialty Apparatus Co.

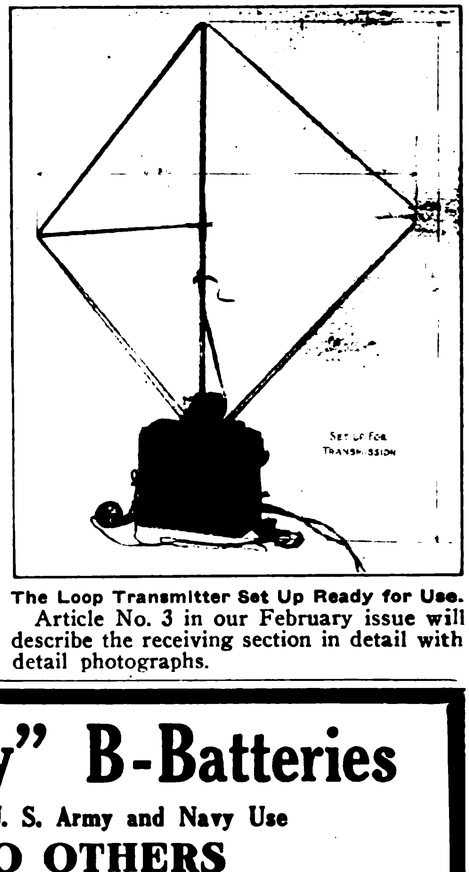
The Priess Loop Set

(Continued from page 334)

packing swells when oil reaches it, thus effecting a tight joint. The stuffing box is adjustable. The condenser will withstand 4,400 volts effective.—(Photographs by courtesy of Wireless Specialty Apparatus Co.)



Here Is Shown the Mica Transmitting Condenser of the Priess Set. Note the Switch Arrangement.



The Loop Transmitter Set Up Ready for Use.

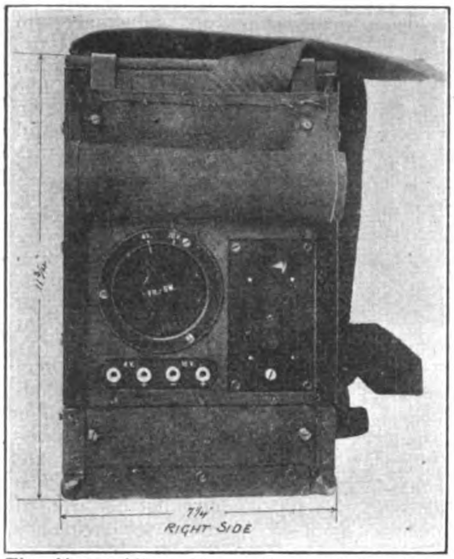
Article No. 3 in our February issue will describe the receiving section in detail with detail photographs.

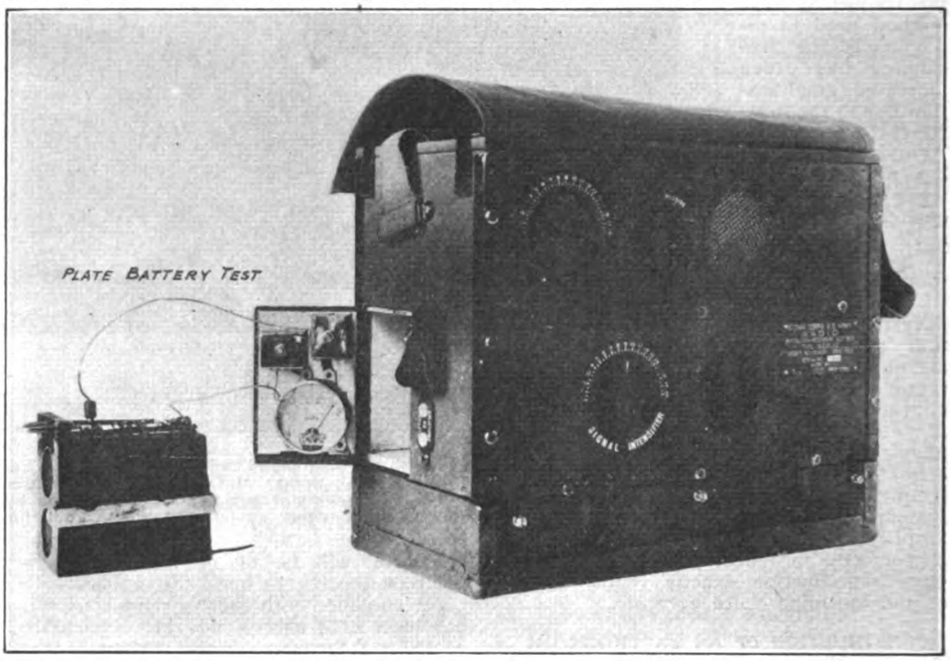
The Priess Loop Set

Part III. THE RECEIVER

By WALTER J. HENRY*

THE receiver section of the Priess Loop Set consists of two turns in the loop, series connected, and placed across the vernier oil condenser described in article No. 2. It is interesting to note here that this same oil condenser is used in both the transmitting and receiving circuits. A vacuum tube is used as a detector, and the circuits are so arranged that this tube may pass from the detecting to the oscillating stage and operate at the extremely sensitive intermediate or regenerative point. This is accomplisht by connecting one side of the third turn of the loop with the plate of the vacuum tube, and the other side to the filament of the tube thru a forty-volt dry battery and the telephones. Around the telephones and plate battery is placed a variable air condenser for adjusting the coupling between the plate and antenna circuits. For very small valves of capacity the tube acts as a detector and for large valves as an oscillator. Intermediate valves are used in normal receiving.

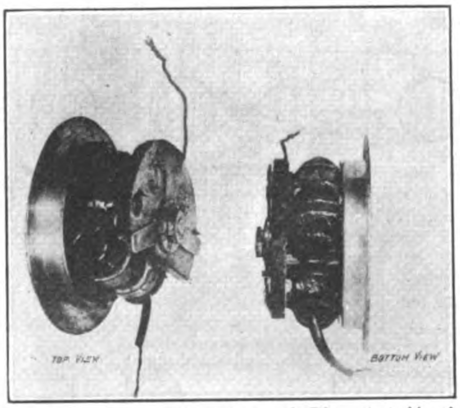




The Upper View Shows the End Construction of the Priess Loop Set. Note the Filament Switch, Also the Jacks for the Battery Connection. At the Right Is Shown the Complete Set. On the Open Panel is Mounted a Voltmeter for Testing the Plate Battery.

The transmit-receive switch used in this set is worthy of note. While it is similar to the usual multipole double throw switch in that it has a low resistance and is positive in its operation, it differs in the mechanical method used for its operation and is also contained dustproof. On receiving it connects the two rear turns of the loop in series across the oil condenser, and the loop turns in proper connection with the vacuum tube. It also connects the storage battery in series with the filament of the tube.

On the right hand side of the set is a filament switch directly over the jacks for connecting four-volt and ten-volt batteries. The idea here is to conserve the power of the ten-volt battery by using a four-volt battery for the tube on operation. Under normal operation the set is on the receiving setting so that it is only necessary to have four volts for lighting the tube filament. During an advance when the set is being carried forward the four-volt battery is left behind and the ten-volt battery then serves as a source of current for both transmitting and receiving. The switch is mounted on an asbestos board and cuts in a 6.2 ohm resistance when using the 10-volt source and a 1.15 ohm resistance when using four volts. The switch is designed so that the heat produced in the resistance is transmitted directly to the front plate and may be made to serve as warmer for an operator's fingers in the winter time by closing down the flap which covers the right hand side of the box. Heat is not transmitted into the box, to any great extent because of the heating insulation provided by the asbestos board. The set is so designed that in normal operation, that is when it is operating in the "receive" position, 100 hours life will be obtained using a four-volt, 100-ampere hour, lead battery.



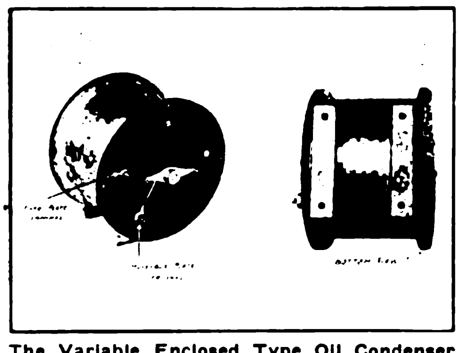
Here Is Shown the Type of Rheostat Used for Controlling the Filament Current.

The rotary switch at the lower left of the panel marked "Signal Intensifier" controls the adjustment of a variable air condenser with plates cut the same as those used in the oil condenser. This condenser is contained in an aluminum dust-proof case with a maximum capacity of .0006 mfds. The function of this condenser is to control the regenerative action of the receiver for obtaining maximum regenerative amplification on reception.

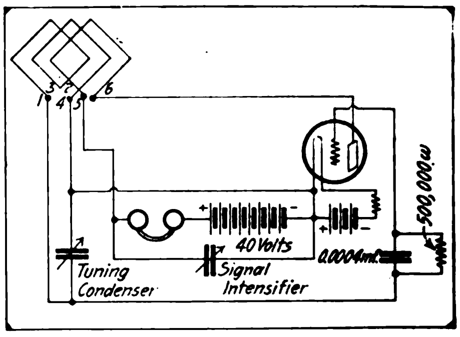
The grid condenser is the small unit mounted in front of the oil condenser, and having a capacity of .004 mfds. The grid leak has a resistance of 500,000 ohms, and consists of a strip of fibrous material coated with a carbon ink. The vacuum tube employed was a Western Electric V.T. 1 tube with an oxide coated filament.

The plate battery consisted of two standard Signal Corps 20-volt batteries connected in series and mounted in a special aluminum container designed to combine maximum strength with maximum weight. In case of emergency an external 20-volt battery may be plugged into the set. Inasmuch as the standard Signal Corps 20-volt battery was somewhat unreliable it was necessary to provide a voltmeter for checking up this battery from time to time. A voltmeter was therefore mounted on the battery compartment door

(*Continued on page 436*)



The Variable Enclosed Type Oil Condenser Is Used in Both the Transmitting and Receiving Circuit.



This Is the Circuit Used in the Receiver. Note That the Tuning Is Accomplisht by the Variable Tuning Condenser.

*Sales Manager, Wireless Specialty Apparatus Co.

The Priess Loop Set Part III.

(Continued from page 406)

for the convenient reading of plate battery voltage. The voltmeter is provided with spring type leads. A spare 20-volt battery is carried in the spare parts compartment.

(Article No. 4 in this series will describe special features of the Priess Loop Set including the Buzzer Transformer, the Regenerative Receiver and the Loop.)

ARC TRANSMITTER.

Often experimenters desire a makeshift arc in experimenting with the various form of arc circuits for transmitters. Here is an arc, which altho it does not give as good results as the cooled arc,, it is efficient enough to transmit fairly well.

An old motion picture lamp house was secured for practically nothing and used for the arc. The lamp house should be secured to some stationary base or support other than the original sliding support provided. If the lamp house does not have a red aperture thru which to view the adjustment of the arc, it should be provided with one made by the experimenter, as it is really essential in order to protect the eyes and to adjust the arc to the best position.

When operating the arc on a 110 v. current, the amperage should be limited to 5 amps. and the voltage cut down to 60 v. by means of a simple water rheostat, or by a choke coil. The latter is more efficient and should be used if possible.

If the arc is to be used on the above current, (110 v. 5 amp.) smaller carbons than are regularly used in the motion picture projectors should be used, for the larger carbons are usually operated on a current of about 20-30 amps.

Contributed by PHILIP A. WALL.

GRAINING FORMICA AND BAKELITE.

Appearance counts a great deal in the makeup of a set. A cabinet that looks good is pretty sure to work well and one of the first things that anyone notices is the panel on front of the cabinet. You can add much to the general appearance of the panel by graining it. As most of us use Bakelite, I will only refer to it, altho the same procedure is followed in graining Formica.

First square up your piece of Bakelite. Place it on a flat surface and nail two thin strips of wood at the rear and in front of the panel to secure it. Procure a piece of emery cloth or sandpaper of medium roughness and fasten it to a block of wood. In rubbing the panel care should be taken to go only in one direction; that is *straight away from you*. Also be careful to have the motion of your hand parallel to the sides of the panel.

When you have sandpapered the panel until no trace of the original surface is left; clean it off with a soft cloth. Apply a film of machine oil, and with a finer grade of emery cloth or sandpaper rub the panel until the oil disappears. A very fine finish can be had by applying another film of oil and sandpapering it down. Finish off by rubbing the panel vigorously with the soft cloth. The grain can be varied by using different grades of emery cloth.

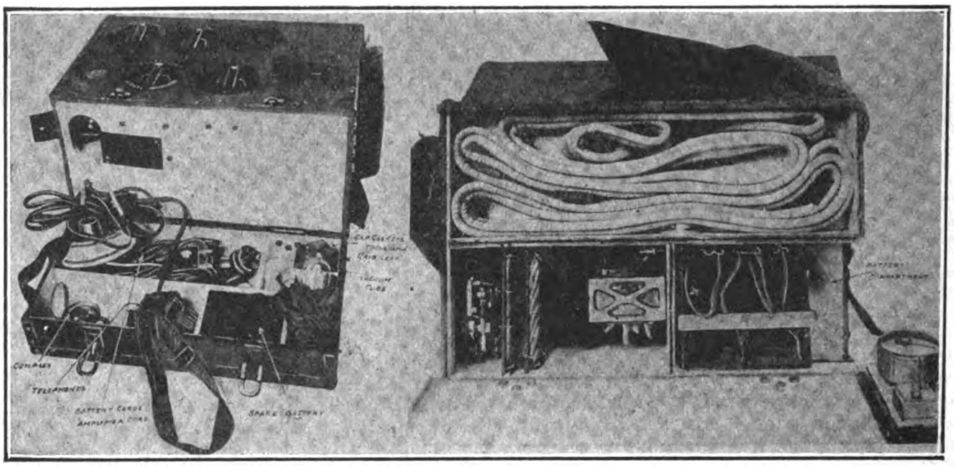
If the above directions are carefully followed the usually cheap gloss will give way to a finish that will satisfy the most exacting amateur.

Contributed by NAT. LAUBERMAN.

The Priess Loop Set Part IV.—Special Features.

By WALTER J. HENRY*

THE feature of the Priess Loop Set that is perhaps of most interest to radio experimenters is the buzzer transformer used in transmitting. This unit as it stands or with various modifications offers great possibilities to the experimenter whose source of power is limited to batteries or a direct current line. This buzzer is a modified and improved form of the German buzzer captured by the French Signal Corps. The wiring hook-up is shown in the complete transmitting wiring diagram shown in Part II. in the January issue of the RADIO AMATEUR NEWS.



To the Left of the Above Photograph Shows the One Section of the Loop Containing All Spare Parts and Accessories, While to the Right Shows the Section of the Loop Containing the Main Parts of the Set. As May be Noted the Frame Work Collapses and Loop Folds Into a Special Compartment.

This buzzer operates by means of a 10 volt storage battery which draws from 50 to 100 watts on locked key, depending upon the thickness of the gaskets used in the spark gap, and the state of charge or discharge of the storage battery. It transforms the ten volts D. C., to 3000 volts 500 cycles, with an overall efficiency of approximately 65%. The buzzer operates on the principle of radio frequency quenching at the break. The three microfarad condenser in the base of the buzzer, is connected across the outer contracts of the break and is charged to double the D. C. voltage when the D. C. current has built up to its maximum value, previous to breaking at the contacts. When the D. C. current reaches the value causing a break at the contacts an arc is drawn following the movable contact until it strikes the opposite fixed contact. At this point, the condenser discharges with its current opposite to the arc current. When the two currents become equal, the arc is extinguished. The time required for the two currents, i. e., arc current and condenser current, to become equal depends upon the natural period, the capacity and the resistance of the condenser circuit. The radio frequency quenching circuit includes the condenser and the leads to this condenser. The gap length in operation is but a few mils.

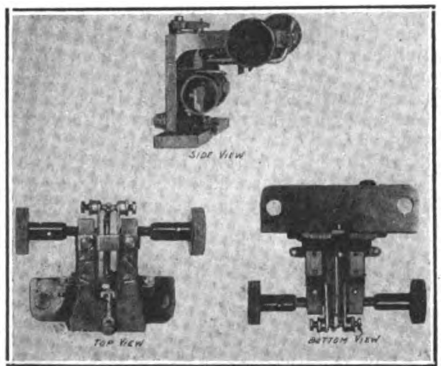
The buzzer contacts may require touching up after six months' service. A fine file and a fine emery cloth are provided to square them off, and spare outside contacts are provided for replacement. The contacts are of platinum iridium alloy and should not be filed unnecessarily.

When adjusting buzzer, the antenna switch is kept in off-position and side contacts are adjusted so that the armature floats freely between them with a gap on each side wide enough to slip in one thickness of paper.

Two small key wrenches are provided in the spare part compartment for the contacts and lock nuts. After the contacts are properly set, the knurled screws are locked by tightening the vertical hex bolts just in front of them.

The loop used in this set is of special interest. It takes the form of a square, one meter on each side. The frame work collapses and the loop folds into a special compartment.

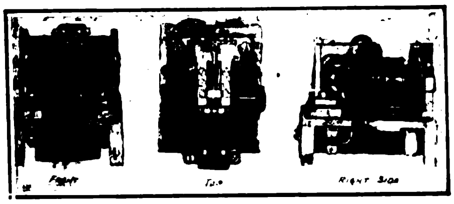
The loop is built of three turns of conductor. The conductor for each turn is made up of 3/16" diameter copper braid (8x24xNo. 38) over a jute center, with cotton braid and rubber covering. Three of these conductors are then sewed into balloon cloth with a separation of 1⅛" between the centers. This provides a well insulated loop capable of operation in rainy weather. Insulation on transmission is not necessary as the potential gradient is along the length of the loop. However, on reception insulation is very necessary as the potential gradient is transverse.



This Photograph Represents Three Different Views of the Buzzer Contacts and Vibrator.

The Priess Loop Set, in addition to providing a compact means of communication, may also be used as a direction finder in locating enemy signal stations.

A compass is provided in the lower compartment for the rough orientation of the loop. A loop transmitter and receiver system transmits a maximum when the planes of both loops are parallel and lay in the line connecting the two sets. Within the distance of a few wave-lengths the orientation of the transmitter is important. At a considerable number of wave-lengths away, however, the importance of the orientation of the transmitter is not as great. The radiation acts similar to a search-light beam of light in a fog. Near the source, the directive effect is great. At great distances from the source, the directive effect becomes less marked. In all cases, orientation of the receiver follows a definite law. Neither the minimum nor the maximum are sharp for the received system provided in this set as the loop used is unbalanced. That is to say, the capacity to ground on one side of the loop, figured from the terminals of the tuning condenser, is greater than the capacity to ground on the other side of the loop, figuring from the other terminal of the tuning condenser. The compass is equipt with radiolite north and south points, so that orientation may be made in the dark.



Reading From Left to Right the Above Three Cuts Represent the Front, Top and Right Side View of the Buzzer Used With the Priess Set.

The radiation of the Priess Loop Set is very sharply tuned, the decrement being less than .02.

Below is a table of actual results obtained in transmitting on an official test:

Wave Length	*Meters*	*Volts*	*Input Amps.*	*Watts*	*Radia'n Amps.*
Long Wave...	137.3	9.2	9.5	87.3	9.6
Medium Wave	123.0	9.4	9.0	84.6	8.4
Short Wave...	108.0	9.5	9.25	87.9	7.7

(The fifth and last article in this series describing the operation of the Priess Loop Set under actual warfare conditions will appear in the May issue of the Amateur Radio News.)

APPLICATION OF THE RADIO COMPASS TO NAVIGATION.

Two Methods: The application of the radio compass to navigation can be accomplisht by two distinct methods; the radio compass apparatus can be installed ashore or on board ship. We shall review the advantages and disadvantages of these two systems:

FIRST: RADIO COMPASS SHORE—ADVANTAGES.

This method has the advantage of requiring a limited number of installations; for example, twenty radio compasses spaced along the coast of France and Algeria supply approaching ships useful information concerning their position. The personnel for the operation of these stations can be *highly specialized and permanent.*

The installation of the apparatus can be more easily accomplisht than aboard ship. No consideration intervenes to limit their dimensions and weight.

DISADVANTAGES.

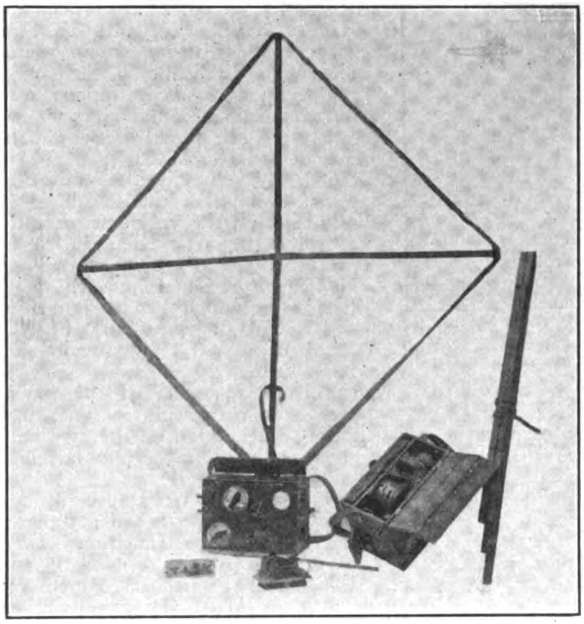
It is difficult to locate radio compass stations in certain localities so that they will give exact bearings; this is the case where the coast line is very irregular or too stiff; a certain length of time often intervenes between the time when the ship needs the bearing and receives it. This is the case

(Continued on page 576)

* Sales Manager, Wireless Specialty Apparatus Co.

The Priess Loop Set Method of Operation

By WALTER J. HENRY*



This Is a Photograph of The Priess Loop Set Which Proved of Considerable Advantage Under Warfare Conditions. The Loop As Shown Is of a Collapsible Make-up So That It May Be Neatly Folded and Packed In One of the Compartments In the box Shown.

THE proof of the radio set is in the operating. Now that we have thoroly described the reasons and conditions that caused the development of the Priess Loop Set, and the actual design and construction of the equipment itself, let us see how the set operates under actual field warfare conditions.

It is of prime importance that all communication equipment be capable of working in an army network, that is to say, the system must be so co-ordinated that perfectly interlocking communication free from interference is obtained under all conditions.

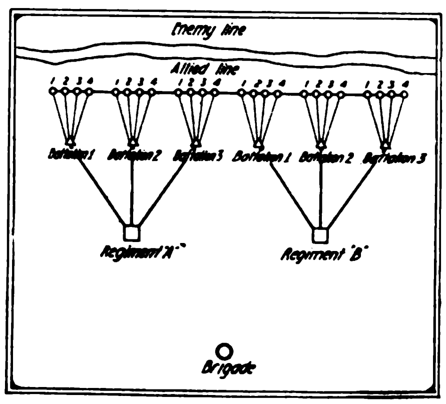
This is illustrated by the diagram showing an element of an army in the field. A division consists of two infantry brigades and an artillery brigade. Each infantry brigade is composed of two regiments of three battalions each. Each battalion consists of four companies. The bulk of the troops are of course in the companies. The positions, battalion, regiment and brigade are merely locations for the various tactical control staffs, the battalion post being commanded by a major, the regiment by a colonel, and the brigade by a brigadier-general. The division is of course commanded by a major-general.

The need for constant and reliable communication between the various companies, battalions and regiments is of course fundamental and vital. For example, it is important that a battalion be in communication with its four companies and at the same time its regiment.

The network diagram shows a brigade having two regiments A and B. Each regiment consists in turn, of three battalions numbered 1, 2, and 3. Continuing, each battalion consists of four companies 1, 2, 3, and 4. Now each company, battalion and regiment has a loop set. At first thought one wonders how interference can possibly be avoided with so many sets working in so small an area. With the same number of amateur stations crowded into the same area there would certainly be a wonderful time! Amateur organization is developing, however, and in this method of radio operation in the army the amateur may well find some valuable suggestions which can be worked out to the general satisfaction of all.

It will be remembered that it was pointed out in the first article of this series that the loop set was provided with three wavelengths, namely, 110, 123, and 140 meters. This system of wavelengths plus the very directional effect of the loop is the secret of non-interference on the battlefield. Specifically this works out as follows: Battalion 1 and all its companies operate on the short wavelength, Battalion 2 and its companies work on the medium wavelength, while Battalion 3 and its companies work, of course, on the long wavelength. This means that the adjacent battalions and companies of a contacting regiment operate on the maximum difference of wavelength.

In actual operation all sets are normally on the receiving position. Location and condition reports are constantly traveling rearward while orders for maneuvers originate in the rear and are promulgated forward. For example, if Company 2 of the 2nd Battalion of Regiment A encounters stiff resistance and wishes a barrage, this would be transmitted back to Battalion 2 on the medium wavelength. Battalion 2 would call Regiment A, and transmit this information with recommendation likewise on the medium wavelength. In this case none of the companies of the other battalions of Regiment A would hear this communication because of the difference in wavelength. The other Companies in Battalion 2 would not hear the communication because of their orientation. The second battalion of adjacent regiments would likewise not hear the communication because of the distance of separation. In the reverse case, if Regiment A wished to communicate with Battalion 2 it would transmit on the medium wavelength, Battalion 2 being normally on the position of receiving medium wavelength would be the only battalion to receive this communication.



This Diagram Illustrates the Elements of An Army In the Field Where This Remarkable Loop Set Effected Reliable Communication Between Companies, Battalions, and Regiments.

The further advantage possest by the set is that in cases of attack the battalion is located very close to the company, and communication officially routed thru the battalion forward or rearward is heard at both ends without passing thru the battalion, so that preparation may be made to execute an order before the order has actually arrived.

The extremely sensitive directional effect in transmission and reception of sets in close proximity makes it possible to operate adjacent sets without any interference. The property of directional reception over any distance possest by this apparatus permits location by any two stations of any "lost" outfit equipt with this set.

In order to check the satisfactory network operation of the Priess Loop Set it was tested before the General Staff of the U. S. Army in the United States and met with their approval for this type of work for warfare similar to the World War.

* *Sales manager Wireless Specialty Apparatus Co.*

WAKE UP, AMERICA!

A recent announcement from Washington reports that the Bureau of Foreign and Domestic Commerce has received advices to the effect that manufacturers of German radio apparatus are making all efforts to dominate the wireless situation in South America, and judging from the vim and vigor they are displaying, are making considerable headway.

This evidently indicates that unless American manufacturers of radio apparatus take immediate action to get into this field, the Germans will soon have a monopoly on supplying all manner of equipment in Central and South America. Wake up manufacturers! We address this in particular to the large interests who have the capital and facilities for foreign propaganda. It is true that we are at present suffering with a spell of under-production, but this will not always be the case, therefore, we should look out for the future, as in a few years manufacturing conditions in this country will probably be normal and many will be seeking foreign outlet. Prepare now; "lay your pipes" today!—P. H. B.

With This Final Installment, We Present a Snapshot of Lieut. W. H. Priess, USA, Whose Energetic Work Made This Efficient Loop Set Possible.