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NOTE ON THE PORTABLE RADIO STATIONS

MODEL T.M. 1916.

Translated from the French

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NOTE ON THE PORTABLE RADIO STATIONS.

MODEL T.M. 1916.

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NOTE ON THE PORTABLE RADIO STATIONS

MODEL T.M. 1916.

I - General Characteristics.

1. The portable stations are intended to be placed as near the front as possible, and in the immediate vicinity of the firing line, in order to allow liaison (transmission only) with a point situated behind the lines and where a receiving station similar to the artillery receiving stations is erected.

The equipment and design of these stations has been especially studied, so that they may be easily transported, and rapidly and easily erected, relatively not very visible, and easily operated under all circumstances. Consequently, as a result of these conditions, the stations are not very powerful and, on account of the accumulators, cannot work for a very long period. They shall be used only for very short messages.

2. The portable radio stations Model T.M. 1916 belong to the direct excitation type, of 50 watts power.

An induction coil fed by a 10 volt, 5 ampere, storage battery, or sometimes by a hand generator, supplies power thru the primary to the secondary, antenna and earth.

The primary current is interrupted either (Model No. 1) by a vibrating sending key of the model used on aeroplanes, or (Model No. 2 and 3) by a breaking device operated electromagnetically by the core of the induction coil.

The antenna is a low, directive antenna supported by special supports at a height of about 3 feet above the ground; its length may be 75 to 120 feet according to the wave length desired.

The frequency of the note emitted is about 90 vibrations per second with the No. 1 station, 140 per second with No. 2 and 180 per second with No. 3, so that it is easy to distinguish the 3 sounds.

The transmission limits of this set, with a receiving station similar to those used by the artillery, is, in certain regions, about 2½ miles. It may be considerably increased, if the antenna be placed higher.

The whole of the station is made up into 3 loads of about 32 lbs. each, and arranged to be easily transported.

The first is the box containing the receiving station.
The second is the box containing the battery.

The third contains the material for antenna and ground connection.

In addition, each station is provided with a certain number of accessories, i.e., a second battery and a second set of ground connections.

If the station is to receive the current from a generator this machine constitutes the second load instead of the battery.

DESCRIPTION OF THE EQUIPMENT

A Station set Model No. 1.

3. The station set Model No. 1 is composed of equipment similar to that of the sending equipment of the aeroplanes with a vibrating sending key. The different parts have only been grouped in a different manner.

The station set is composed of:

A vibrating sending key, a coil with a spark gap, three condensers, a rheostat, an ammeter, a plug, two contact sockets and plugs for the ground connection and antenna.

The breaking device of the primary circuit of the coil is composed of a vibrating spring similar to the call system of the telephone stations model 1907. It receives an impulse when the key is closed in order to send a signal; it vibrates when the key closes the primary circuit and continues to vibrate for about 3 seconds, interrupting the current 90 times per second.

When the signal is completed, the key stops the vibrating spring and, at the same time, breaks the primary circuit.

The coil is an ordinary type induction coil, its primary may easily carry a current of 6 or 7 amperes, the average current is about 5 amperes.

The spark gap is of the eccentric type, copper tube and brass plate, the tube being connected with the antenna.

The condensers are shunted and connected to the key terminals. They are for the purpose of suppressing the spark at the break.

The rheostat is used to maintain the current at approximately five amperes.

The connection for the primary circuit is a double contact socket - In case this should be out of order, two terminals on the box are provided with milled nuts, to which the conductors may be directly attached. One terminal is connected to the primary of the coil and the other to the ammeter.

There are two other contact sockets for the ground connection and the antenna. The ground connection is made with a bare wire and the antenna connection with a heavily insulated wire.

The equipment has been specially arranged so that every part remains covered when in use. The knob of the key and the ammeter only are visible: a small window allows the spark gap to be observed.

The tuning is previously made by opening the door placed on the front panel. The apparatus may be operated in the rain without need of special protection.

The adjustment of the various parts is described in Par. 10 and instructions for adjusting the vibrator are posted inside the box.

The box is placed in a case which allows it to be carried on the back, it may be left in the case when working.

STATION SETS, MODELS NO. 2 AND NO. 3.

4. The station sets, Model No. 2 and No. 3, are very similar to No. 1. The main difference is that the breaking of the primary circuit is not produced by a vibrating spring worked by the key, but by a vibrating breaking device magnetically operated by the core of the coil.

Each set contains:

A key, an induction coil with a breaking device and spark gap, one or several condensers, an ammeter, a contact socket with a plug (No. 2) or bars (No. 3), plugs for the ground connection and the antenna.

Models No. 2 and 3 have no rheostat. The key of Model No. 2 is an ordinary key. For adjustment of the key lever and spring they must be taken out of the box. For this purpose, take off the knob and its rod by unscrewing the nut placed at the bottom; take off the key by unscrewing the rods which fix it to the connection blocks.

The key of model No. 3 acts like the plunger of a pump; its play is regulated by screwing the contact carrier tight with the screw ring; the spring is regulated by changing the position of the stop ring on the rod.

The coils are of the same model as the induction coils; the breaking devices do not need a special description. The other parts are similar to that of Model No. 1.

All of the different parts are accessible, especially in No. 3. In this set the main panel, on which the apparatus is mounted, may be removed by removing the screws from the side panels of the box.

The method of adjustment is explained in Par. 11. The adjustment of the breaking device is shown inside the box. A case is furnished with each box.

EQUIPMENT FOR GROUND CONNECTION AND ANTENNA.

5. The antenna equipment is composed of two supports and a certain length of wire (wound on a reel).

Both arms of the supports are constructed so that they may be folded up for transportation; the upper section is provided with an insulator to which the antenna is fixed by means of a snap-hook; the pull of the wire is balanced by stretching a stay wire by means of a span pole and stretcher.

The connection between the antenna and the leading in wire is obtained by twisting both wires together or by means of a Jack and plug.

The ground connection consists of a strip of wire mesh, soft enough to make good contact with the ground; it is provided with two terminals for the purpose of connecting to the wire coming from the station. A small metal peg, will allow improvement of the ground connection.

Each station is provided with two sets of antenna and ground connection material (one as spare).

III. - ADJUSTMENT OF THE EQUIPMENT.

9. The adjustment of the equipment (except that of the spark gap, and of the rheostat of set No.1) must be previously made. This adjustment is very stable and would be very difficult to make under fire of the enemy.

The adjustments necessary are the following:

The adjustment of the breaking device, the adjustment of the antenna, the adjustment of the rheostat (Mode 1 only) the adjustment of the spark gap.

a - Adjustment of the Breaking device. (1)

1st - Station Model No.1 with vibrating sending key.

10. The upper stop of the key must be so adjusted that, when the key is slowly raised, the magnet which is on the top part of it, attracts the contact of the vibrating blade, which was formerly immovable, about a millimeter before the key touches the platinum contact.

The lower stop which limits the working of the key, must be so adjusted so that when the key is slowly depressed, the contact of the vibrating blade leaves the magnet of the key about 1 millimeter before the key touches the platinum contact.

When the blade is normal, the magnet should not make contact with the blade. The platinum contacts on either side of the vibrating blade should each be about 1 millimeter away from the magnet contacts.

When they are too near, the coil does not produce any spark or gives an irregular spark. The spark at the breaking point is not completed when the vibrating blade, which has just left one contact, touches the other. This does not allow a complete interruption of the current.

Should the contacts be too far apart, the series of sparks induced in the secondary coil does not last sufficiently long. It ceases as soon as the amplitude of the oscillations of the vibrating blade is insufficient to cause it to touch the contacts.

The spring of the key must have the proper tension so that the key will return rapidly to its normal position in order that the operation will be complete even though the key lever has considerable play.

(1) As the secondary current has great influence on the operation of the breaking device, it is necessary to adjust it when the station is connected to the antenna.

2nd - Station Model No. 2

11. The breaking device must be adjusted so that the average current flowing through the coil amounts to about 5 amperes, the frequency of the interruptions being about 140 per minute.

The adjusting parts are: the stop screw of the blade and the platinum tipped screw.

To obtain the necessary frequency, which is rather high for this type of breaking device, the play of the blade must not be too great.

This adjustment may be made in the following manner:

The stop screw must first be screwed tight and then unscrewed $3/4$ of a revolution; adjust the platinum tipped screw so that a current of about 5 amperes is obtained; then adjust the stop screw in order to get the desired frequency, and, if necessary, adjust the platinum tipped screw again; the adjustment is obtained by alternate adjustment of these two screws.

3rd - Station Model No. 3.

12. The only part of the breaking device which it is necessary to adjust in the No. 3 station, is the platinum tipped screw. This is operated by a large milled fibre knob and a lock nut fitted with a milled ebonite knob, this allows the platinum tipped screw to be properly adjusted (it must be turned from right to left till it touches the head of the screw.)

The platinum tipped screw must be adjusted so that when the coil is connected to a 10 volt battery, the ammeter will indicate about 3 amperes.

The breaking device must be set into motion as soon as the coil is connected, care must be taken that the distance between the core and the blade is not more than 1 or 2 millimeters. The screw which secures the core, is placed on the left flange of the coil and must be blocked.

b - Adjustment of the Antenna.

13. The length of the antenna wire must be adjusted to one of three lengths 25, 30 or 35 meters corresponding to the approximate wave-lengths desired 100 - 120-150 meters.

c - Adjustment of the rheostat.

14. In the No.1 station Model the rheostat must be adjusted to allow a current of 5 amperes to flow through the apparatus.

In case it should be necessary to change the power, an average current of 3 to 6 amperes may be obtained by use of the rheostat.

When the current for the station is supplied by a hand generator, the rheostat must be short circuited in order not to overload the dynamo.

d - Adjustment of the spark gap.

15. Try to get the longest spark the coil will give. This test must be made with the average antenna, after it has been unwound and insulated from the ground. Under these conditions the spark is not very regular. Reduce the sparking distance in order to obtain a regular spark. The sparking distance will then be about $2/3$ of the maximum sparking distance.

IV - WORKING OF THE STATION.

Transportation of the station.

16. The minimum personnel required to transport the station is 3 men.

The first one, who is in charge of the party, carries the station box on his back and sometimes the accessory bag on his belt.

The second, carries the battery on his shoulder by means of a belt.

The third one carries, over his shoulder, the bag containing the different parts of the antenna.

Other men will carry, if necessary, the spare parts (battery and antenna).

No special precaution is necessary while transporting the different parts of the station, except for the battery which must not be upset.

WORK OF THE OPERATORS

SETTING UP OF THE STATION

17. After they have arrived at the appointed place, the first radio operator opens the case and takes out the wires that are inside.

He connects the station set to the battery which the second man has placed on the ground. On account of the ammeter in the circuit, he takes care that the polarity of the wiring is not reversed.

He makes the ground and antenna connections by means of the plugs and fastens the ground connection cable to the terminal of the strip of wire mesh which is buried if possible.

As soon as the antenna is set right, he adjusts the rheostat (if it is a Model No.1) and the spark-gap, and closes the door of the box.

As the antenna is to be stretched in the opposite direction to the antenna of the corresponding receiving station, radio operator No.1 indicates the direction to his aids by using, if necessary, the compass placed in the case containing the accessories.

18. Radio Operator No.2 places the battery near the station box.

He helps operator No.3 get a support and hammer out of the case, he then sets the pole by means of the hammer, at the place indicated by the man in charge, and then sets up the support.

He afterwards stretches the strip of wire mesh in the direction of the antenna, burying it, if practicable, and connects the leading in wire to the antenna, as near as possible to the insulator he lays the wire on the support.

19. Radio operator No.3 removes the antenna material from its case. He fastens the end of the antenna to the insulator of the support, which has been placed by radio operator No.2 and takes the reel in his left hand; in his right hand he carries the second support and the hammer.

He walks in the direction indicated by the man in charge and unrolls the antenna wire; when he gets to the end, he sets the second support up after having fastened the antenna to it, sets the pole and stretches the antenna.

He then brings the hammer and reel back to the station.

TRANSMISSION

20. Radio Operator No.1 operates the station and sends the telegrams.

When working with Set No.1 he must take care to work slowly and press fully on the key. In case the key does not go straight up and down to its extreme positions, the set will not operate.

The key must not be closed when the vibrating blade (which does not vibrate more than 30 seconds) has ceased vibrating; otherwise there would be in the primary coil a current double the average, which would not be giving a spark.

In such a case the pointer of the ammeter moves entirely across the dial.

With the station sets No.2 and No.3, the operator must work slowly, working the key to its extreme positions thru a distance of 1 millimeter.

While working, always look at the ammeter; it must always work properly; the operation of the spark gap may be seen thru the window.

The 2nd Radio operator, writes the messages in the sending book and takes the place of the first one, if necessary.

The 3rd radio operator watches the antenna and repairs it, if necessary.

TAKING DOWN THE STATION

21. The 3 men reverse the order of the operations described above.

V. COMPOSITION AND DIVISION OF THE LOAD OF A PORTABLE STATION.

22. Each station is composed of:

1 station box, 1 accumulator battery, 1 set of ground and antenna connection material, 1 case (accessories and spare parts), 1 spare accumulator battery, 1 spare set of ground and antenna connection material.

(A) STATION BOX

MODEL NO.1	MODEL NO.2	MODEL NO.3
1 bag	1 bag	1 bag
1 box containing:	1 box containing:	1 box containing:
1 vibrating key	1 vibrating key	1 vibrating key
1 coil	1 coil with breaking device	1 coil with breaking device
1 spark gap	1 spark gap	1 spark gap
3 condensers	1 condenser	6 condensers
1 rheostat	1 contact stud	2 contact studs
1 contact stud	1 ammeter	1 ammeter
1 ammeter	1 contact stud for ground connection	1 screw driver
1 contact stud for ground connection	1 spanner wrench	1 spanner wrench
1 double ended spanner wrench	1 brace screw driver	$\frac{1}{4}$ emery cloth
1 brace screw driver	$\frac{1}{4}$ emery cloth	1 sending book with pencil and cover
$\frac{1}{4}$ emery cloth	1 sending book with pencil and cover	1 cable for the battery
1 sending book with pencil and cover	1 cable for the battery	1 wire and plug for the antenna
1 cable for the battery	1 wire and plug for the antenna	1 wire and plug for the ground connection
1 wire and plug for the antenna	1 wire and plug for the ground connection	
1 wire and plug for the ground connection		

(B) ACCUMULATOR BATTERY

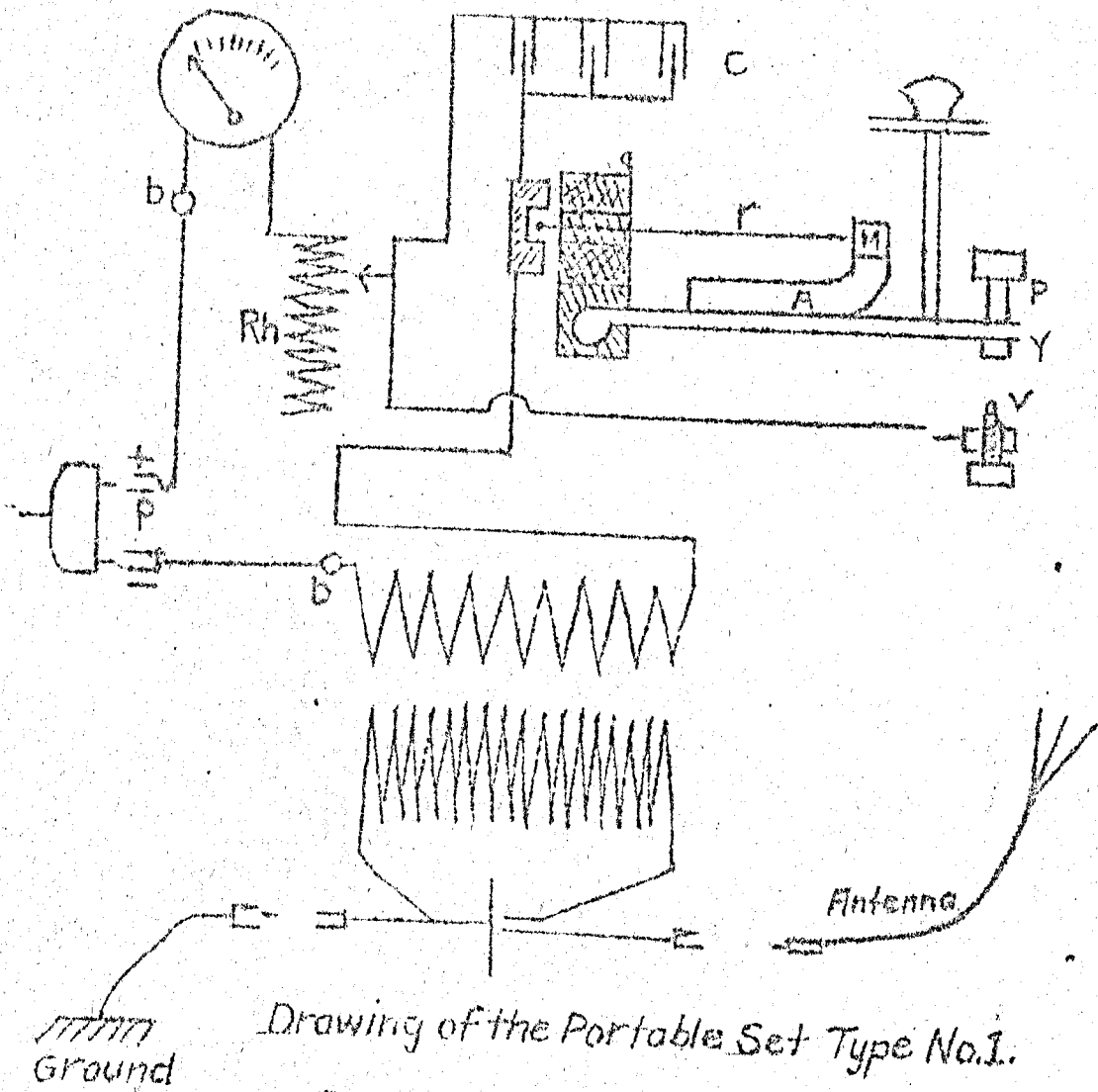
The 10 volt, 20 ampere hour accumulator battery is in a box fitted with a bolt for transport.

(C) EQUIPMENT FOR ANTENNA AND GROUND CONNECTION.

- 1 bag
- 2 supports, each composed of
 - 1 wooden A frame
 - 1 guy wire
 - 1 anchor rod
 - 1 insulator
- 1 antenna wire on a reel with handle
- 1 ground connection
- 1 rod for ground connection
- 1 hammer

(D) ACCESSORIES AND SPARE PARTS

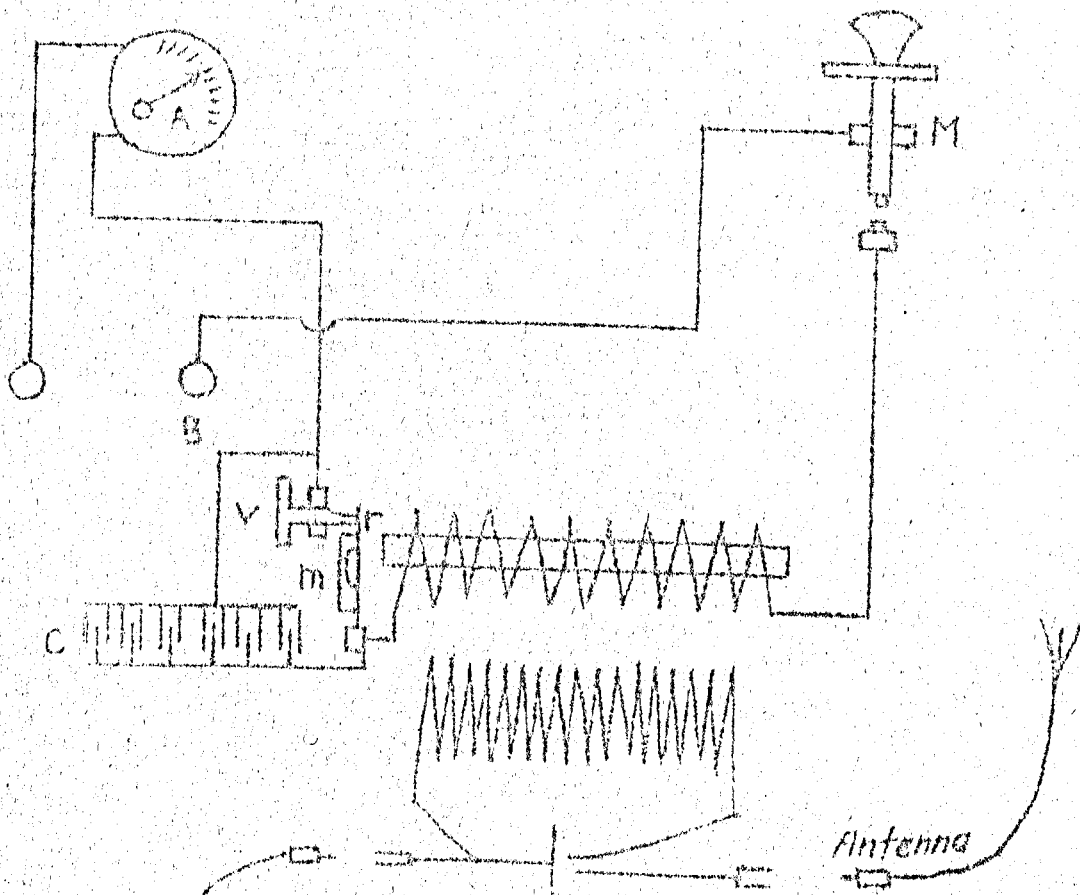
- 1 bag for accessories
- 1 small pliers
- 1 screw driver for each of the stations
- 1 fine file
- 1 note book
- 2 pencils
- 1 notes on portable stations
- 1 voltmeter in a case
- 1 compass in a case
- 1 leading-in wire with plug for the antenna
- 1 leading-in wire with plug for the ground connection
- 1 cable for accumulators



Drawing of the Portable Set Type No. I.

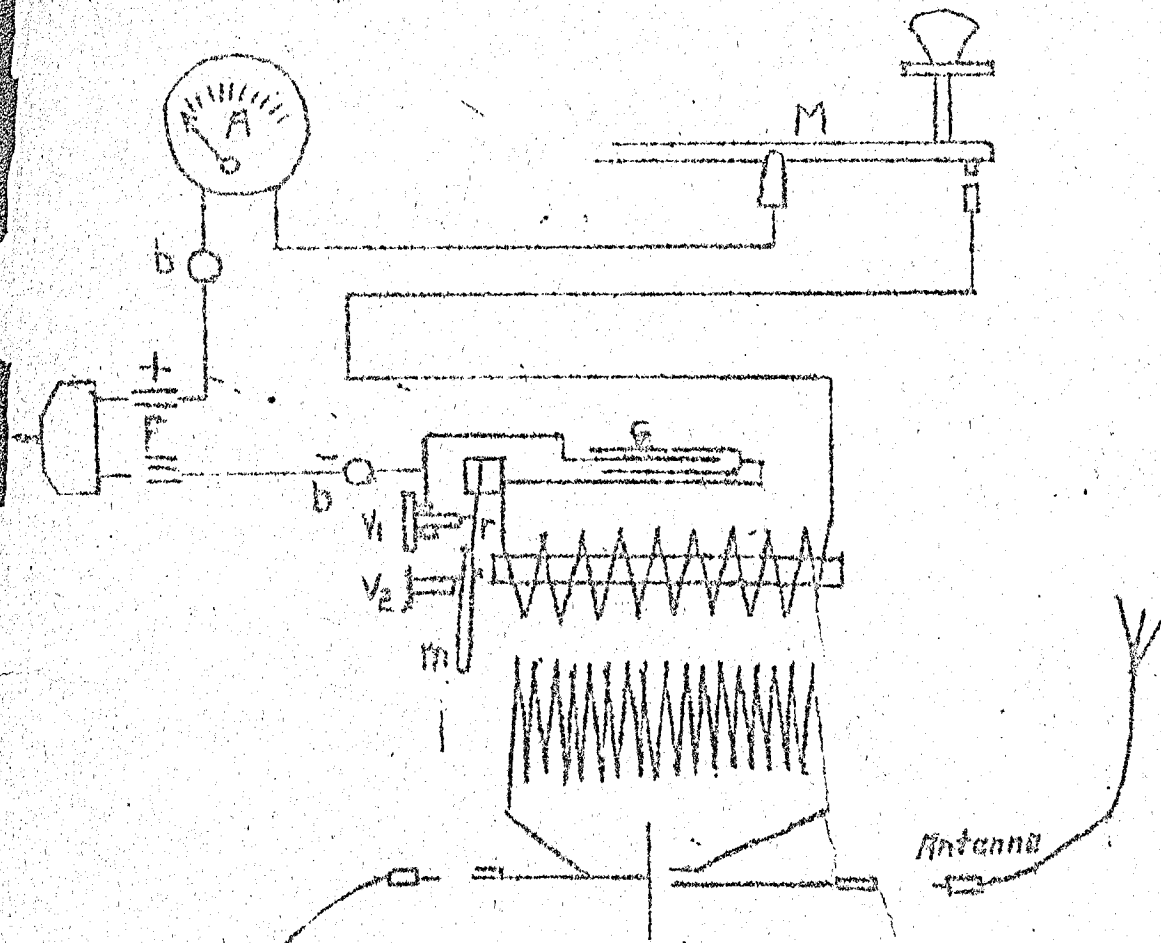
- P-Terminal
- Rh-Rheostat
- e-Recess Block
- C-Condensers.
- b-Milled knobs for substitution to Terminal
- r-Spring with platinum contacts.
- v-Platinum Contacts.
- p-Insulated bar rest.
- A-Magnet.
- M-Counter weight.

Diagram of The Portable Station No. 3.



- A - Ammeter
- B - Power Terminals
- C - Condenser
- M - Key
- Ground
- M - Back Stop
- Y - Platinumized Spring
- V - Screw with Platinum point.

Diagram of Portable Station No. 2.



Ground

V1 - Screw with Platinum point.

V2 - Stop screw of the vibrating break.

B - Terminals attached to the contact sockets.

M - Key.

P - Contact Sockets.

R - Plotitized spring.

m - Vibrating break.

A - Ammeter.

C - Condenser.