

# Grebe Radios Set-up & Operating Instructions

This 64 page manual covers the set-up and operations of the Grebe CR3, CR5, CR8, CR9 Receivers, the RORD Detector and Two Stage Amplifier, RORK Two Stage Amplifier and the RORN Turned Radio Amplifier.

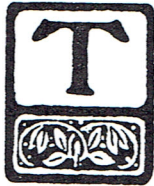
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CR-3 RORD

CR-8 RORK

RORN p47

## INTRODUCTION



THIS Booklet is intended as a guide to the proper installation and operation of Grebe Radio instruments.

In the succeeding pages we have described the auxiliary apparatus needed with each of our instruments. This has been followed by suggestions for the proper installation of antenna and receiving equipment illustrated with sketches where necessary. General instructions are given for the operation of the two types of receiving circuits, as well as specific directions covering each of the units.

Circuit diagrams, wave-length charts and calibration curves will be found for each instrument and every effort has been made to present the subject in a brief yet thorough manner.

One copy of this Instruction book is supplied without charge with each instrument. Additional copies may be obtained from Grebe Radio dealers at a charge of 25 cents each.

**A. H. GREBE & CO.**

INCORPORATED

RICHMOND HILL

NEW YORK

## AUXILIARY APPARATUS

The following accessories are required with the Type CR-5 and Type CR-8 Receivers:—

- 1.—Detector Vacuum Tube.
- 2.—Filament Lighting Battery.
- 3.—Plate Battery.
- 4.—Telephone Head-set.

The filament lighting battery is preferably a six-volt storage battery with a capacity of about 40 Ampere Hours.

The plate battery should be a unit arranged with taps for varying the voltage from  $16\frac{1}{2}$  to  $22\frac{1}{2}$ . If a detector tube which requires more than  $22\frac{1}{2}$  Volts has been selected, an additional  $22\frac{1}{2}$ -Volt unit is required. The larger size plate battery is to be preferred, as its life is much longer than that of the smaller type and it is not likely to give trouble on account of inter-cell chemical action.

A good pair of telephones must be used, if the maximum results are to be obtained from the receiver.

For the CR-9 Receiver or the "CR-5-RORK," "CR-8-RORK," "CR-3-RORD" combinations the following additional equipment must be supplied.

- 1.—Two amplifier vacuum tubes.
- 2.—Two 22½-Volt Plate battery units.

With these receiving combinations, three vacuum tubes must be supplied with filament lighting current and it is therefore advisable to use a storage battery having a capacity of 80-100 Ampere Hours.

Where the signals are to be made audible to a number of persons at one time, a loud speaking device may be connected in circuit as shown in the diagrams.

The tools and supplies listed below will be found useful in making proper installation of the radio station:

- 1 6-inch side cutting pliers.
- 1 4-inch slim screw-driver.
- 1 8-inch medium screw-driver.
- 1 hand-drill—3/16" chuck.
- 1 each of Nos. 33, 27, 18 and 14 twist drills.
- 1 small alcohol blow torch.
- 1/2 lb. strip solder.
- 1 small can soldering paste.
- 25 feet No. 14 rubber covered wire.
- 15 feet No. 18 duplex lamp cord.

## VACUUM TUBES

### DETECTOR TUBES:

The type of tube now in most general use is classed as a soft or gas content tube and requires a critical adjustment of both plate voltage and filament current. They are extremely sensitive when properly adjusted. The variation of the filament current is accomplished by means of a rheostat placed in series with the filament lighting battery. In the Grebe Receivers and Amplifiers this rheostat is calibrated in ohms and may be readily reset after the proper position has once been determined. The plate voltage is variable in steps of  $1\frac{1}{2}$  Volts by attaching the positive plate battery lead from the receiver to the proper terminal of a variable plate battery. This position must be found by experiment. The majority of detector tubes operate on voltages between  $16\frac{1}{2}$  and  $22\frac{1}{2}$ , and this range is covered by the variations provided on the various types of plate batteries.

### AMPLIFIER TUBES:

Amplifier tubes are not critical in adjustment when compared with detector tubes and they will

operate successfully on plate voltages of 40 to 80 Volts. Where a detector and two-stage amplifier combination is used, three  $22\frac{1}{2}$  Volt units may be connected in series and connections to the receiver are made in a manner which permits the use of the full voltage on the amplifier tubes while a variable portion of the same battery is used for the detector tubes. Where extremely loud signals are desired plate voltages of 100 or over may be used without damaging the amplifier tubes but the use of this voltage increases tube noises and is therefore not desirable when receiving signals with the telephone head-set.

The new type of low filament current Vacuum Tubes may be used in the usual manner. When used as amplifiers a plate voltage of 45 to 90 volts may be used. The proper Rheostat setting will be found between 4 and 5 ohms, and in no case would the filament be operated with less resistance in circuit. These new Tubes have not yet been developed to a degree where they are equal to the gas-content type, but they will operate as detectors on a plate voltage between 22 1-2 and 45 volts. A Grid Leak must be used for proper results. A pair of Grid Leak supporting clips are attached to the detector socket for this purpose.

Dry cells may be used for lighting the filaments, the proper number depending upon the voltage rating of the tube i. e. one dry cell may be used to operate the 1 1-2 volt tube, two dry cells may be used to operate the 3 volt tube, and three or four dry cells may be used to operate the 5 volt tube.

## ANTENNA AND GROUND SYSTEM

The essentials of a good antenna are height, proper physical dimensions, isolation from surrounding objects, effective insulation and good construction.

In planning the antenna it must be remembered that its physical dimensions bear a certain definite relation to the wave-lengths to be received. While an antenna designed for 200 metre reception will give good results on all wave-lengths up to 3,000 metres, an antenna designed for 3,000 metres cannot be successfully used for receiving 200 metre wave-lengths. It is therefore necessary to construct the antenna for the shortest wave-length to be used.

The Grebe Short-wave and Intermediate-wave receivers have a lower limit of 150 metres, and the best antenna for this wave-length will ordinarily be 100 feet in length, measured from the instrument to the farthest end.

Hard drawn copper wire, No. 12 or 14 B & S Gauge, is satisfactory for antenna construction; however, stranded silicon bronze wire is more durable and will stand greater strains. For ordinary receiving purposes one wire is sufficient, but a four-wire antenna is recommended. The

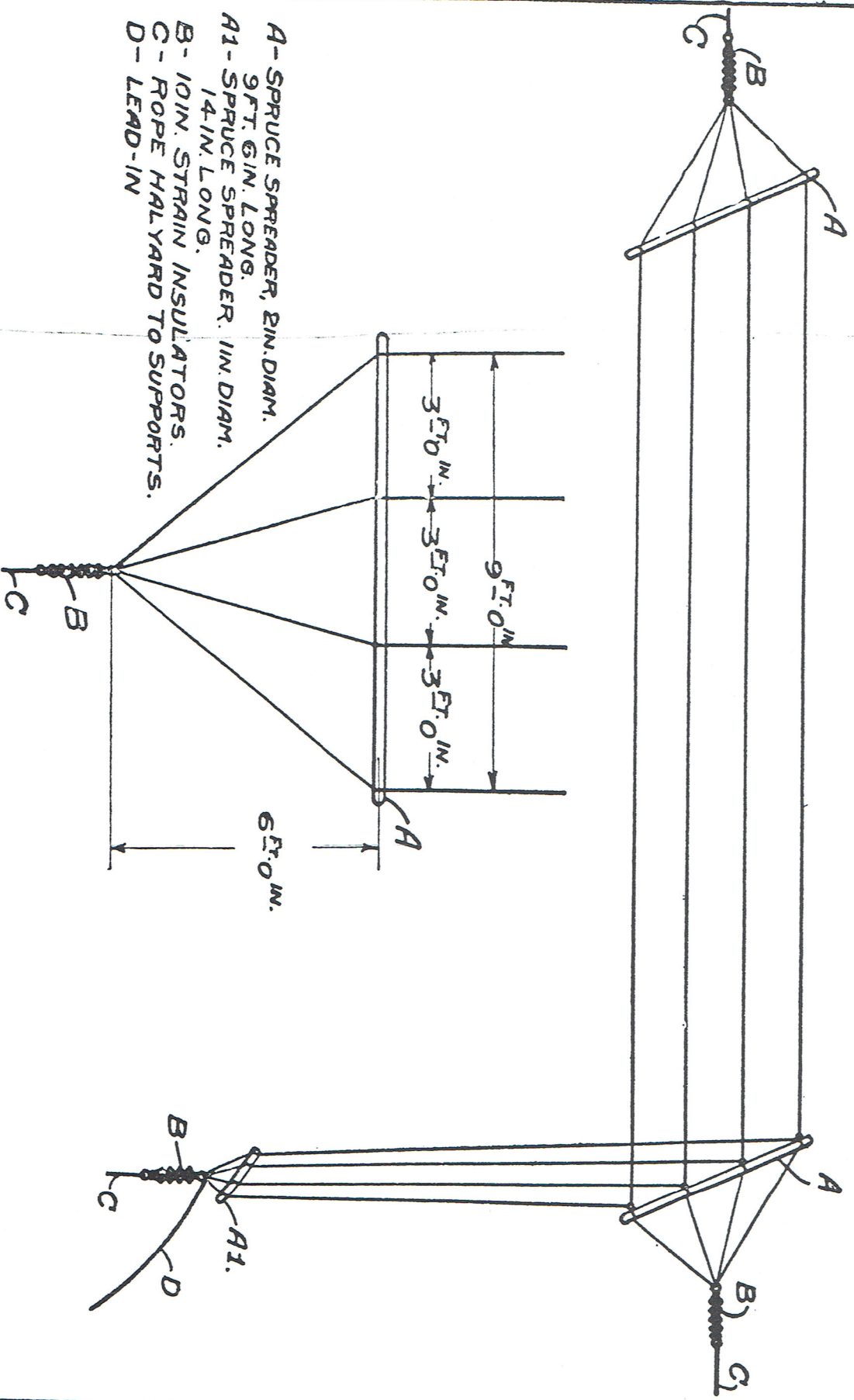
spreaders for separating the wires at the ends may be made of any light wood, such as spruce. The lead-in wires should be attached to each of the horizontal wires, either at the end or at the exact centre and they may be separated by a small spreader, located at the lower end near the lightning switch. Where space is limited, a single lead-in wire may be used. Great care should be exercised in making connections and where it is necessary to join wires they should be soldered together.

One large insulator, placed between the bridle and the point of support is sufficient. Better insulation is obtained by this method than results from individually insulating each wire from the spreader. See subsequent pages for details of antenna construction.

The Fire Underwriters require the installation of a lightning switch or protective device and this should be done as a precautionary measure. The approved type of lightning switch is a single-pole, double-throw, 600 volt, 100 ampere, knife switch, mounted on a composition base. Lightning switches are required to be mounted on the outside of the building and the ground connection may be made to an iron pipe driven several feet into the ground. This connection should be made with weather proof copper wire, No. 6 B & S or larger.



# CONVENTIONAL TYPE of ANTENNA CONSTRUCTION



Where only receiving apparatus is to be used, lightning protection may be obtained by the use of a vacuum-gap protective device. This device should be installed in place of the lightning switch and should be permanently connected to both the antenna and ground wires.

The effectiveness of the antenna system depends largely upon the character of the ground connection. The most practical ground connection is the water supply system. Where this is not available, pipes connected with the heating or gas systems may be used. Ground clamps, for attaching the ground wire from the receiver to the pipes, are obtainable at any electrical supply house. The pipe should be carefully scraped to remove all paint or corrosion before attaching the clamp.

Where the above mentioned means of ground connection are not available, wires or plates may be buried in the earth and connected to the apparatus. Such wires or plates should include an area of at least thirty square feet. The ground connection used for the lightning switch is not sufficient for this use but the buried wires or plates may, however, be used for the lightning switch ground. A counterpoise consisting of at least the same number of wires as are used in the antenna may be suspended beneath the antenna and used in place of a ground connection for the receiving apparatus.

## INSTALLATION OF APPARATUS

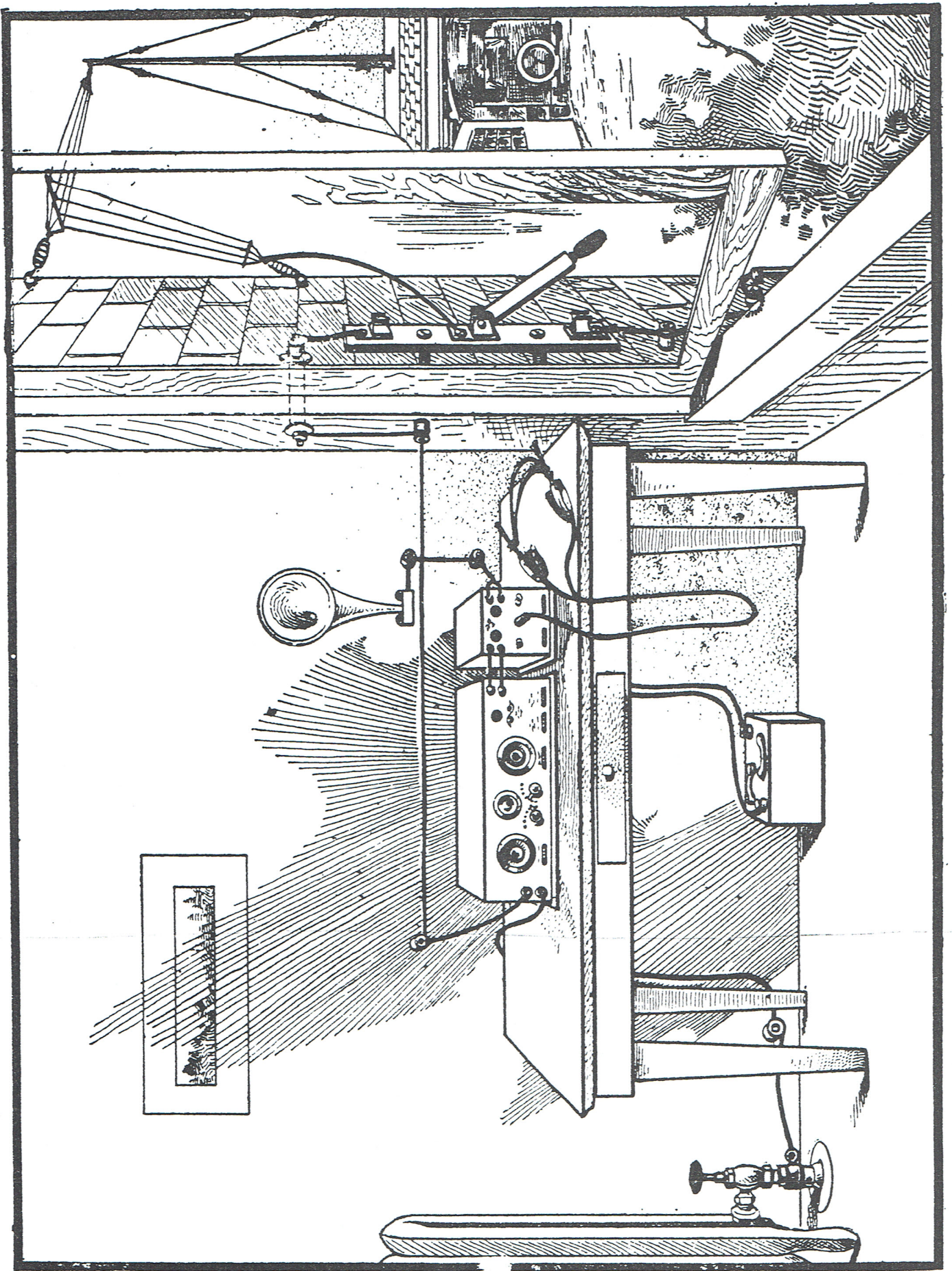
The apparatus should be so placed as to permit of the shortest possible leads from the receiver to the point where the antenna lead-in enters the building. Sufficient space should be provided between the instruments and the edge of the desk or table to allow the operator to rest his forearms when adjusting the controls.

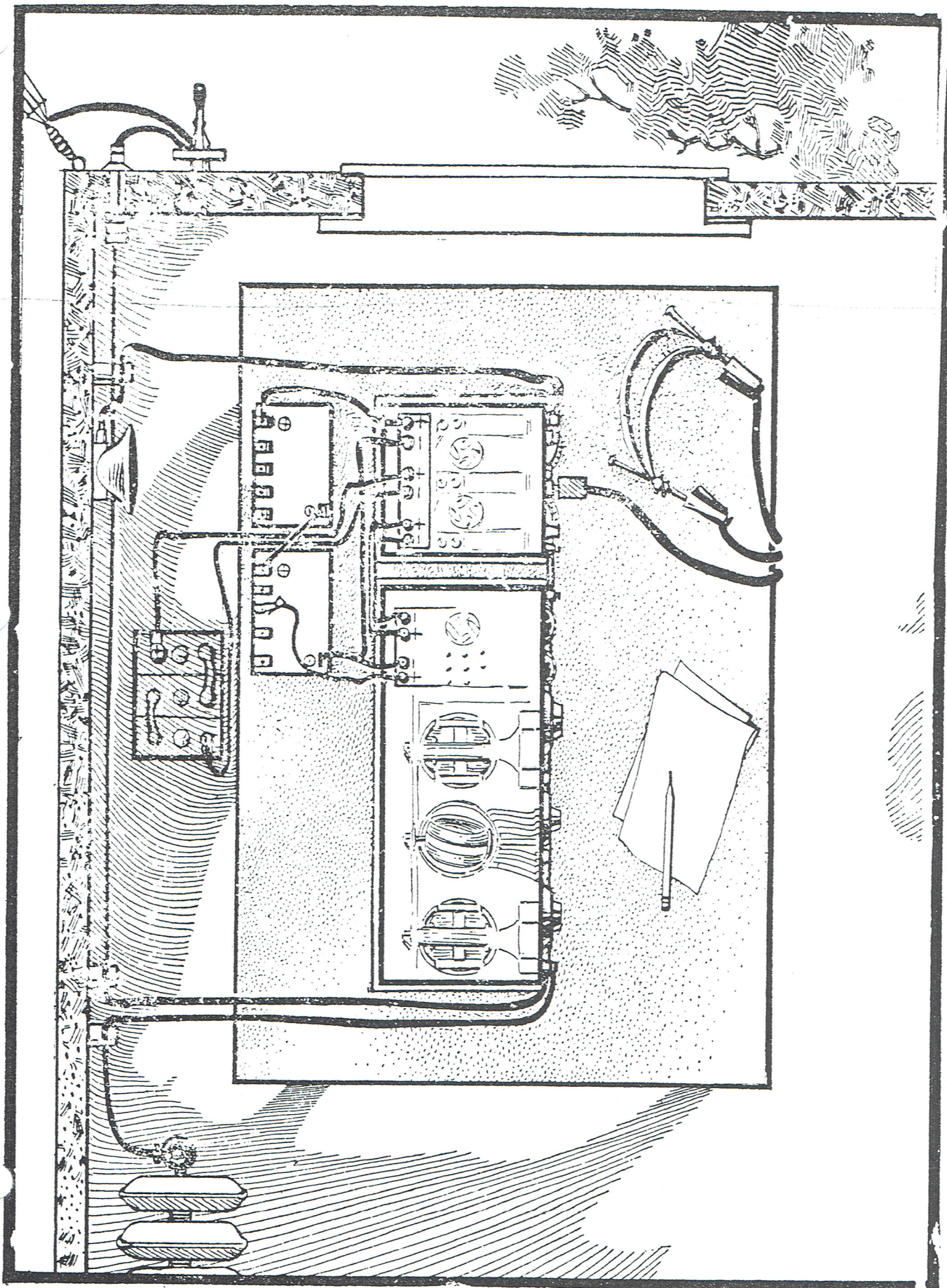
The antenna lead from the lightning switch should pass through the wall within a porcelain tube or special lead-in insulator, and if not insulated itself should be supported away from the walls by means of small wall insulators. The ground connection lead does not require any special insulation; ordinary No. 14 rubber covered copper wire is well adapted for this purpose.

Vacuum tubes should not be put into place until it has been ascertained that all battery connections have been correctly made. This will avoid the accidental destruction of the tubes.

The filament lighting battery may be placed on the floor directly beneath the apparatus and the wires connecting this battery with the instrument should be at least No. 14 B & S copper wire; properly insulated.

The plate batteries will be most accessible if





placed directly in back of the receiver so that the wires leading therefrom may be readily passed through the holes in the cabinet provided for that purpose. Where detectors and amplifiers are used together, "Eureka" clips may be used to change from one battery connection to another.

Where the CR-5 or CR-8 Receivers are used alone, the telephone tips are directly connected to the terminals marked "OUTPUT" and where the CR-9 Receiver or the various Receiver-Amplifier Combinations are used the telephone tips will be connected to the special telephone plug.

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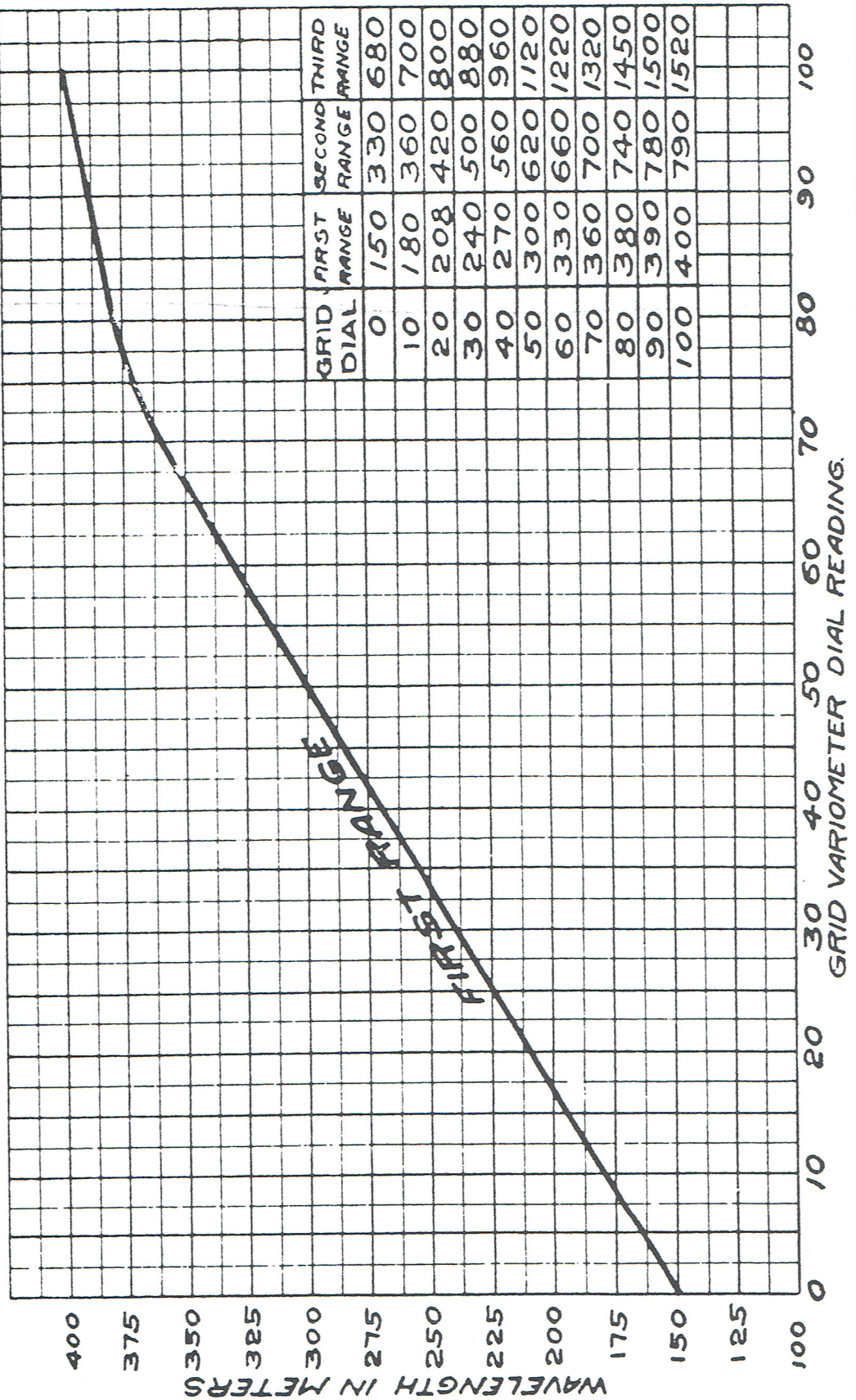
## TUNING METHOD FOR THREE CIRCUIT RECEIVERS TYPES CR-3 and CR-8

While excellent results may be obtained with approximate adjustments, the additional effort required for careful tuning is justified by the greatly improved reception, and in order to obtain maximum signals it is necessary to tune each of the three circuits to the wave-length of the desired signal. In all, there are five separate adjustments to be made.

- 1.—Primary circuit (Antenna Inductance).
- 2.—Secondary circuit (Grid Variometer).

# WAVELENGTH CURVE FOR GREBE SHORT-WAVE REGENERATIVE RECEIVER TYPE CR-8, & CR-3.

THIS CHART APPLIES TO TYPE CR-8 RECEIVER, SERIAL NOS. 101 TO 287 INCLUSIVE  
CR-3 RECEIVER, SERIAL NOS. 101 TO 132 INCLUSIVE.



**WAVELENGTH CURVE  
FOR  
GREBE SHORT-WAVE REGENERATIVE RECEIVER.  
TYPE CR-8 & CR-3.**

THIS CHART APPLIES TO TYPE CR-8 RECEIVERS BEGINNING WITH SERIAL NO. 4-01.

