A. T. & T. Co.'s
Specifications 4448 March, 1925

STATIONS
APPARATUS FOR DEAF
SUBSCRIBERS

Contents **Page**

DETAILED TABLE OF CONTENTS

STATION APPARATUS

1. The following apparatus is required by these specifications:

Amplifiers:

#23-A AMPLIFIER

A single stage vacuum tube amplifier contained in a metal subscriber set box. Cover of set is fastened by a special screw which requires the #110 tool for its operation. The vacuum tube is not furnished as part of the amplifier.

#27-A AMPLIFIER

Portable self-contained amplifier set, consisting of #23-A amplifier and #6013-A key in wooden cabinet which has space for batteries and a desk stand. The vacuum tube, batteries and desk stand are not furnished as part of the amplifier.

Battery Boxes:

#2-A BATTERY BOX

Metal box for holding 4 Blue Bell dry cells. Used at local battery stations for holding transmitter battery.

#9-A BATTERY BOX

Wooden box arranged to hold 3 Blue Bell dry cells and 3 #766 Eveready dry batteries. Contains a #55-A fuse mounted on a #9-A fuse block.

Batteries:

BLUE BELL DRY CELL

For vacuum tube filament current supply of #23-A and #27-A amplifiers.

#763 EVEREADY DRY BATTERY

A 22½ volt battery for vacuum tube plate current supply in #27-A amplifier.

#766 EVEREADY DRY BATTERY

A 22½ volt battery for vacuum tube plate current supply in #23-A amplifier at permanent installations.

Cords:

#287 CORD

Six conductor desk stand cord for use with amplifiers at machine switching local battery talking stations.

#355 CORD

Five conductor desk stand cord for use with amplifiers at common battery manual and magneto stations. Part of #881 cord.

#355-B CORD

Five conductor desk stand cord for use with amplifiers at machine switching, common battery talking stations. Part of #692-B and #729-B cords.

#547 CORD

Transmitter cord for use with manual desk stand. Two cords required for each stand. Part of #881 cord.

#547-B CORD

Transmitter cord for use with machine switching desk stand. Two cords required for each stand. Part of #692-B and #729-B cords.

#549 CORD

Receiver cord for manual desk stands. Part of #881 cord.

#549-B CORD

Receiver cord for machine switching desk stands. Part of #692-B and #729-B cords.

#550 CORD

Three conductor cord for connecting #27-A amplifier to subscriber set.

#551 CORD

Four conductor desk stand cord for use at stations with double head receivers.

#595-B CORD

Dial cord for use with machine switching desk stand equipped with dial. Part of #692-B cord.

#692-B CORD

Combination cord for #50-CN desk stand equipped with dial. Consists of—

1 #355-B cord
2 #547-B "
1 #549-B "
1 #595-B "

#696 CORD

Double head receiver cord for use with two #528 receivers.

#729-B CORD

Combination cord for use with #50-CN desk stand equipped with apparatus blank. Consists of—

1 #355-B cord
2 #547-B "
1 #549-B "

#881 CORD

Combination cord for #40-CN desk stand. Consists of—

1 #547 cord
*1 #548 "
1 #549 "
1 #355 "

*Two #547 cords will later be used.

Desk Stands:

#40-CN DESK STAND

Used with amplifiers at manual stations.

#50-CN DESK STAND

Used with amplifiers at machine switching stations. May also be used (with apparatus blank) in accordance with supplemental instructions at manual stations soon to be changed to machine switching.

Fuse:

#55-A FUSE

Tubular glass enclosed fuse for use in 67.5 volt battery circuit in #9-A battery box. Continuous current capacity 0.4 ampere.

Fuse Block:

#9-A FUSE BLOCK

Porcelain block provided with clips for holding #55-A fuse.

Head Band:

#1-B HEAD BAND

Head band used with two #528 receivers.

Key:

#6002-B KEY

A mounted two-position locking lever key making and breaking two sets of contacts. Used at double head receiver installations.

#6013-A KEY

Wooden box containing a #272-C key for switching the #23-A amplifier in and out of circuit and a 6-step potentiometer for regulating the volume of amplified speech delivered by the amplifier.

Receiver:

#144 RECEIVER

Used at all amplifier installations.

#528 RECEIVER

Used at double head receiver installations.

Transmitters:

#323 TRANSMITTER

Used at all amplifier installations not requiring the #337 transmitter.

#337 TRANSMITTER

Used at certain amplifier installations as required by station zoning instructions.

Vacuum Tube:

#215-A VACUUM TUBE (Type N)

Small thermionic vacuum tube used in #23-A amplifier.

GENERAL

2. These specifications cover the installation and maintenance of apparatus to aid subscribers with impaired hearing in the use of the telephone. For those subscribers who require a greater volume of sound than the normal ear requires it is usually possible to give assistance by means of double head receivers (two #528 receivers) or by means of an amplifier. Where the subscriber's hearing is only slightly impaired the double head receivers may be all that is necessary. In cases where the double receivers do not give sufficient volume or the subscriber does not wish to use double receivers, the amplifier should give satisfactory results except in those cases (which are believed to be relatively few) where the subscriber cannot be helped by increased volume of sound.

In order that the suitability of the amplifier may be determined in each case it has been arranged in portable form (#27-A amplifier) for trial purposes, as well as a form suitable for permanent installation (#23-A amplifier), where trial of the portable set has shown that the amplifier is satisfactory. The method of making the trial installation with the #27-A amplifier, i.e., whether at the station or the commercial office, shall be in accordance with local instructions.

This apparatus is to be furnished only to subscribers with impaired hearing. Therefore, when installations of head receivers and amplifiers are made their use will have been approved by the representative of the telephone company appointed to handle this matter.

Under these specifications amplifiers may be used only at desk stand installations. Therefore, where the #23-A amplifier is desired at a station equipped with a wall set, it will be necessary to replace the wall set with a desk stand.

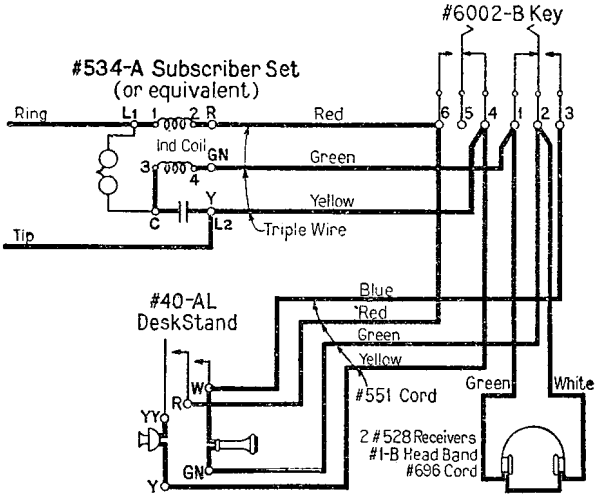
Stations for which no connections are given require special treatment. Installations at such stations should be referred to the Engineering Department.

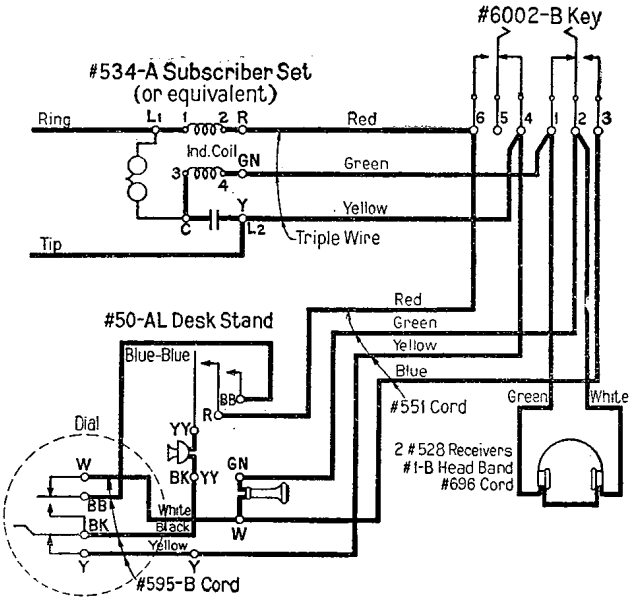
DOUBLE HEAD RECEIVER INSTALLATIONS

3. Locating Apparatus. Locate #6002-B key within easy reach of the user (at desk installations usually on left side of desk).

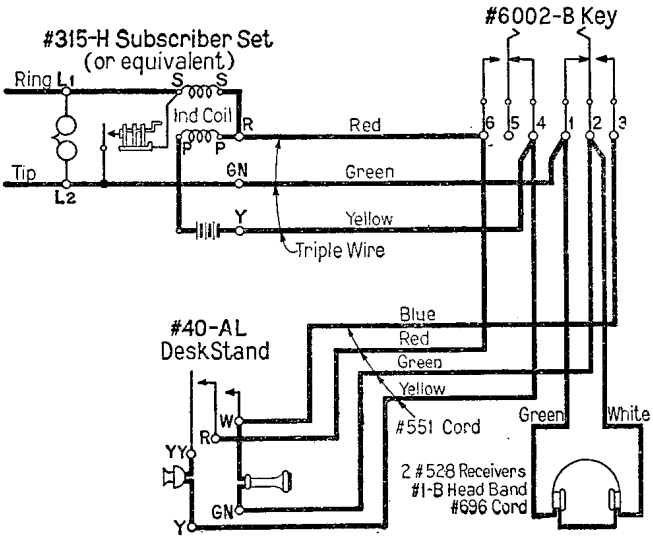
4. Station Connections. Direct line and P.B.X. extension station connections are shown. For party line installations standard apparatus and connections for that type of service should be used. **On loops under 90 ohms** connect for side tone reduction in accordance with approved practice.

Common Battery Manual Stations



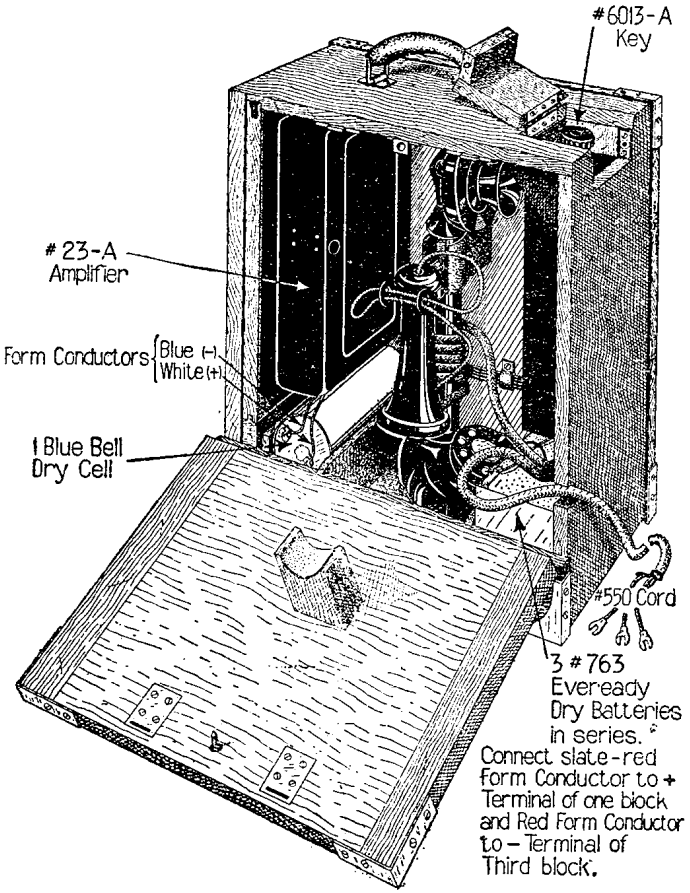


Magneto Stations



TEMPORARY AMPLIFIER INSTALLATIONS

5. #27-A Amplifier.

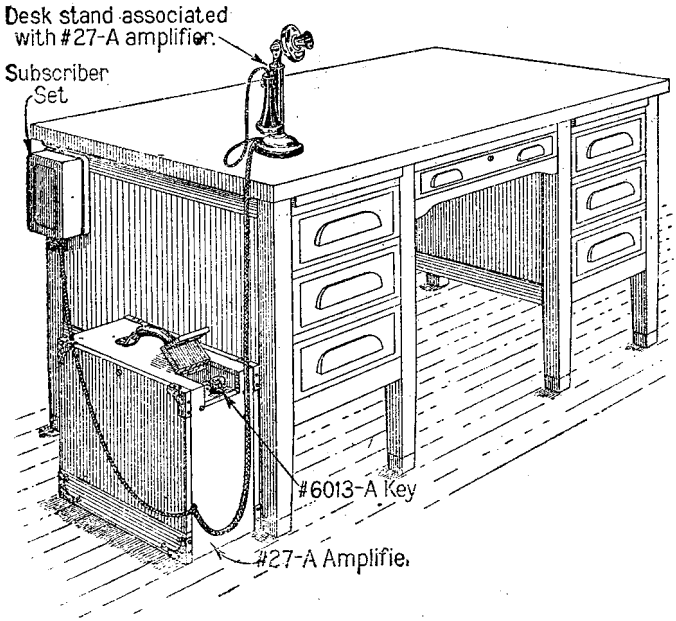


Equip #27-A amplifier with desk stand, vacuum tube and filament and plate dry cell batteries to make it ready for service. A #40-CN desk stand is required for manual stations and a #50-CN desk stand for machine switching stations.

Also, in the case of machine switching local battery talking stations, the #355-B cord will be replaced by a #287 cord. The amplifier, key and batteries are connected by a wiring form. The circuit of the #27-A amplifier is the same as that given in Section 11 for the various stations except that the #55-A fuse is omitted and three #763 Eveready batteries and one Blue Bell dry cell are used. Test the complete set in accordance with Section 13 prior to trial by subscriber, being sure that batteries and vacuum tube are in good condition.

6. Installation of Apparatus.

Typical Installation of #27-A Amplifier

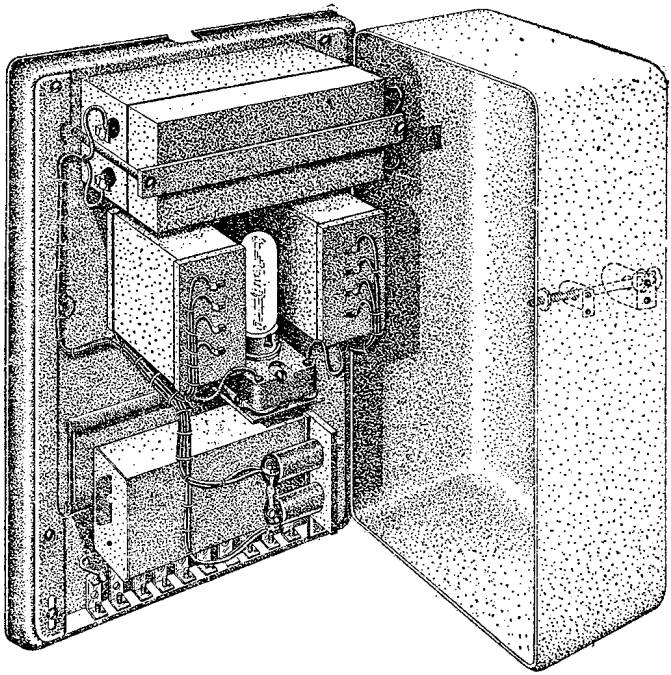


Place the #27-A amplifier beside desk so that the #6013-A key is within reach of the user. Disconnect existing desk stand and connect #550 cord of the #27-A amplifier to the subscriber set or connecting block. Store disconnected desk stand and cord in #27-A amplifier.

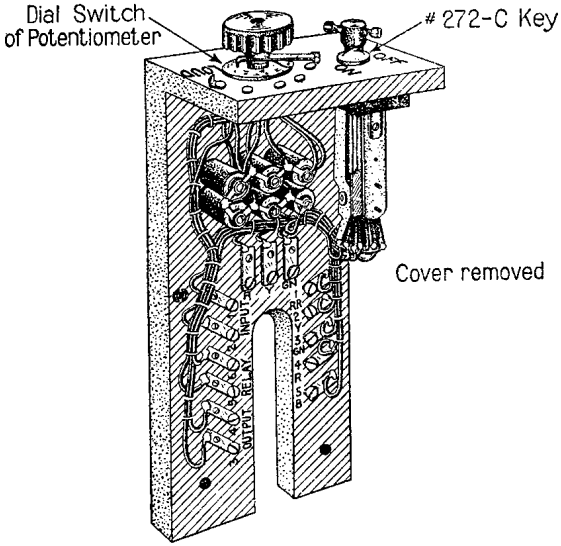
7. Tests and Instructions to Subscribers. Test with test desk in accordance with instructions given in Section 13. Explain operation of set to subscriber as given in Section 15.

PERMANENT AMPLIFIER INSTALLATIONS

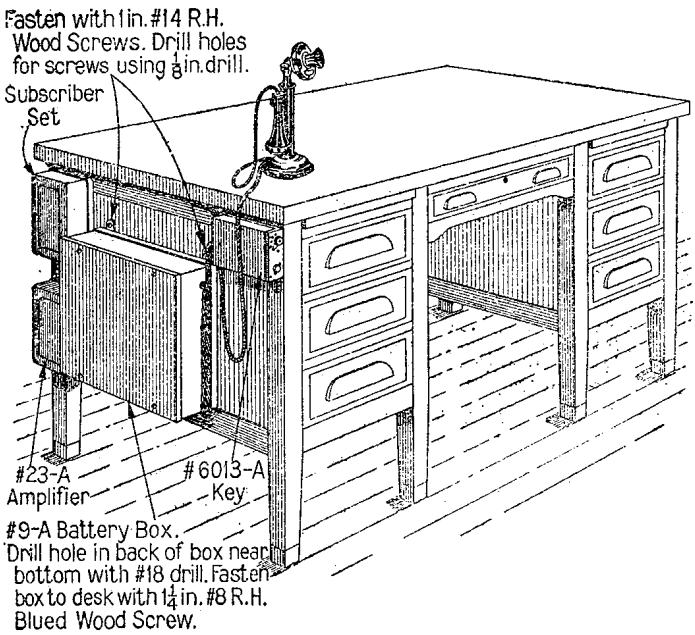
8. #23-A Amplifier.



9. #6013-A Key.



Typical Installation of #23-A Amplifier



The preferable location for the battery box is shown above. If not practicable to locate as shown, see that battery box is not placed near radiators or where it is likely to be wet with water used in cleaning floors. Avoid long leads (more than 12 feet) between subscriber set, amplifier and battery box which might cause interference with proper operation of the equipment.

11. Station Connections. Direct line and P.B.X. extension stations (except #1 Residence System and #2 P.B.X.) are shown. For party line stations standard apparatus and connections for that type of service should be used.

The #323 transmitter is required at all amplifier installations excepting those stations at which, in accordance with station zoning instructions, the #337 transmitter is used. The #144 receiver is also required at all amplifier installations.

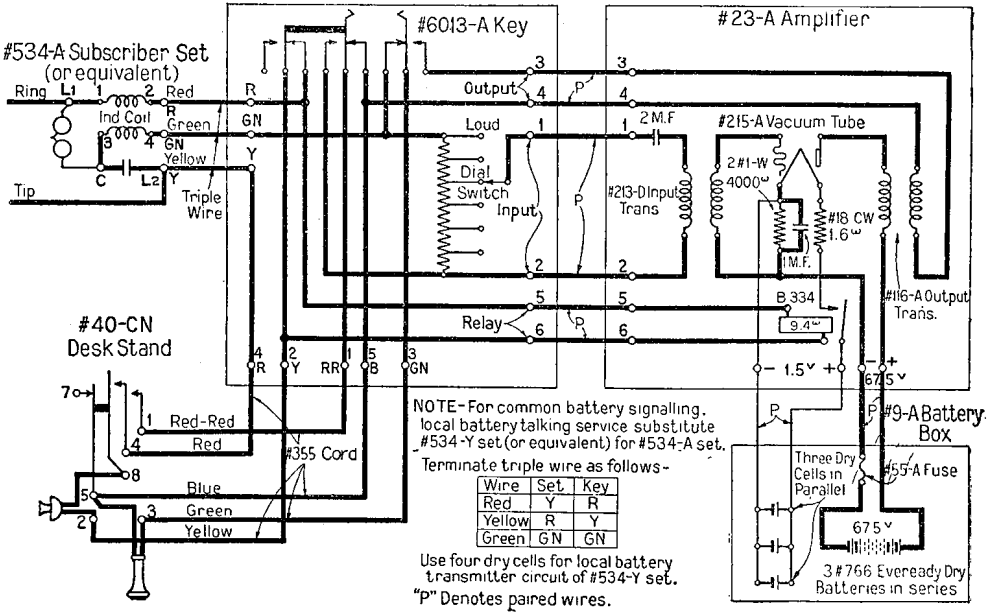
The side tone reduction circuit is necessary at common battery amplifier stations (not including local battery talking) on loops under 180 ohms when the #323 transmitter is used and under 300 ohms when the #337 transmitter is used. Other stations require the standard circuit. The wiring of the #6013-A key has been arranged to provide the side tone reduction circuit when the key and subscriber set are connected as shown on pages 19 and 20. For standard circuit terminate triple wire at subscriber set as follows:

Red Conductor on "Y" Terminal
Yellow Conductor on "R" Terminal
Green Conductor on "GN" Terminal

The B334 relay of the amplifier adds 9.4 ohms to the normal loop resistance. Where the amplifier is to be installed on a P.B.X. extension and the combined resistance of the loop and relay exceeds the established limiting loop value, it will be necessary to provide a line relay at the P.B.X. in accordance with approved practice. In the case of a very long loop it may be necessary to use long line equipment to obtain proper P.B.X. supervision. Cases of this kind requiring special consideration should be referred to the Engineering Department.

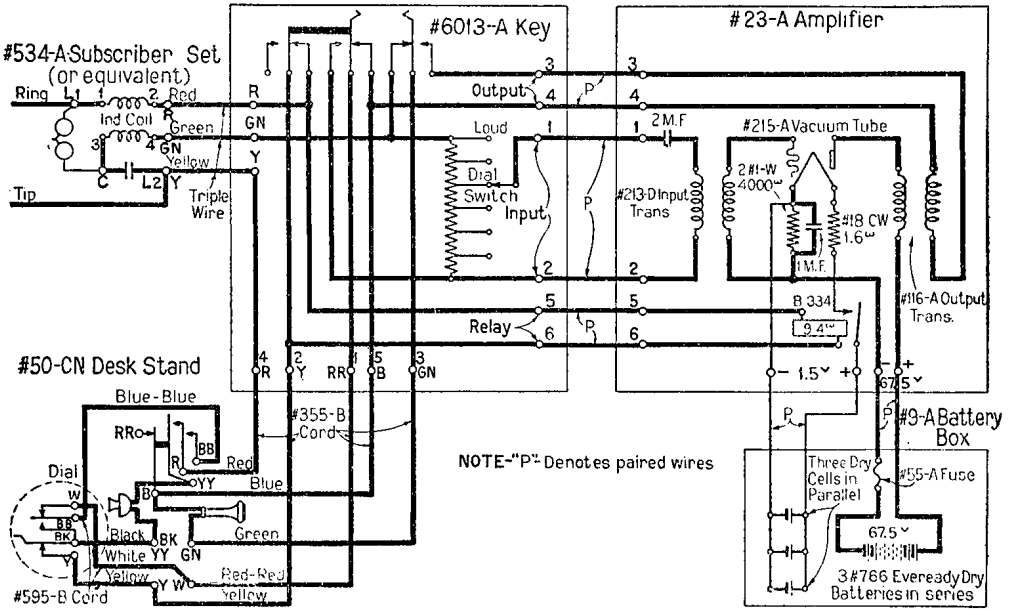
Check all connections on desk stand rack to see that cords are properly terminated.

Common Battery Manual Stations
(Including Local Battery Talking)



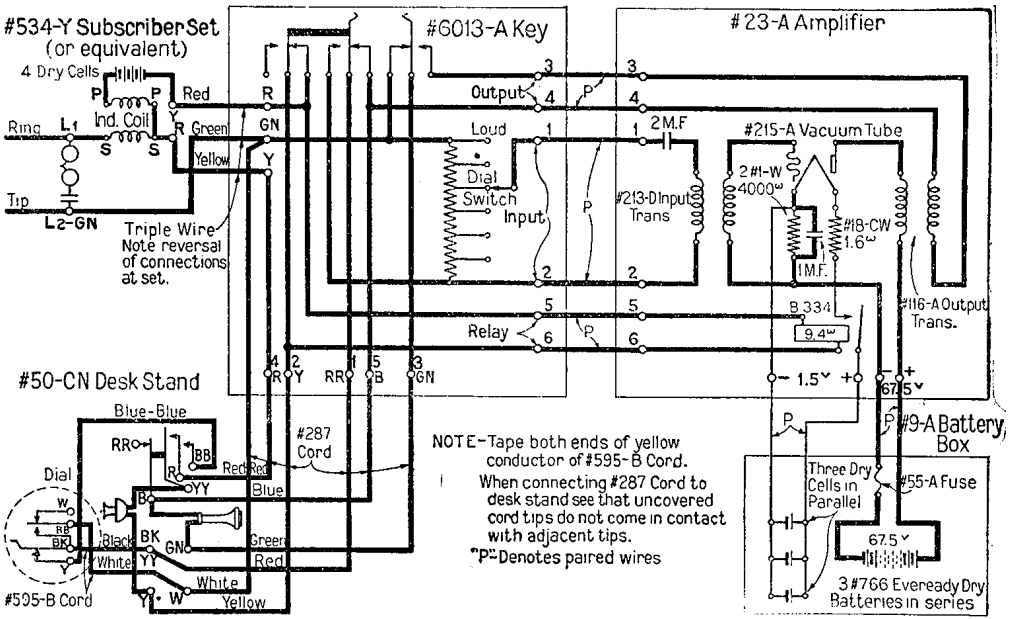
Wire	Set	Key
Red	Y	R
Yellow	R	Y
Green	GN	GN

Machine Switching Stations
(Common Battery Talking)

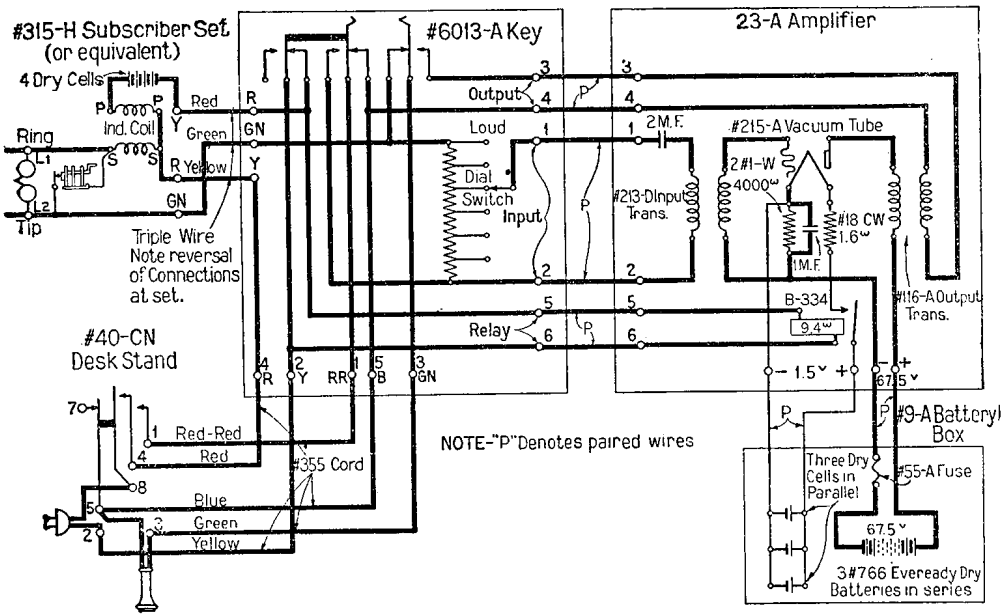


Machine Switching Stations

(Local Battery Talking)

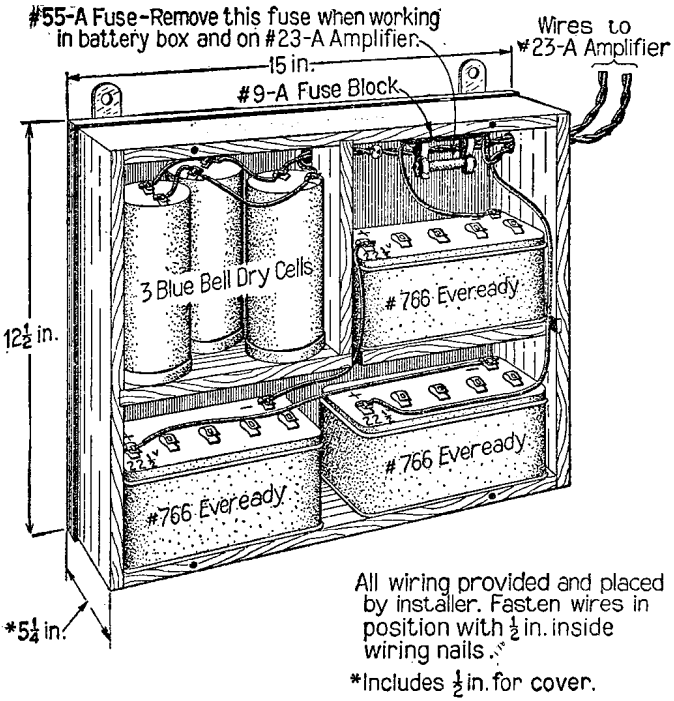


Magneto Stations



12. Installing Batteries.

#9-A Battery Box—Cover Removed



Mark date of installation on batteries.

13. Tests. When the installation is completed or trouble is reported make the following tests:

Test with test desk for proper operation of subscriber set with and without amplifier (by turning #272-C key) and make sure that with amplifier "Off" volume in receiver is normal for subscriber set and that outgoing transmission is of proper volume as reported by test desk. Then with dial switch set to give lowest volume, switch amplifier On and Off, while test desk counts in even tone of voice, making sure that volume in receiver is approximately the same under both conditions. Next have test desk continue counting while with key "On" dial switch is advanced through each step on dial. Make sure that volume increases with each step advance.

If set does not function properly, check connections given in Section 11. With receiver off hook and talking battery on line see that relay closes filament circuit. Check batteries to see that limits specified in Section 21 are met. If relay does not operate properly, follow instructions in Section 18. If batteries do not meet the requirements of Section 21, replace defective units with good ones. If filament of vacuum tube does not glow with receiver off the hook and key "On" and connections have been checked and contacts on tube are clean, follow tests in Section 19. If after being checked as above the amplifier still fails to function properly, amplifier or key or both shall be replaced by new apparatus.

STATION WIRING

14. Install station wiring according to separate specifications covering STATION WIRING.

INSTRUCTIONS TO SUBSCRIBERS

15. Instruct deaf subscriber that key should be turned to "On" when he is to use set and to "Off" when set is to be used by a person with normal hearing. Explain operation of dial switch to increase and decrease volume and make suitable tests with subscriber so that he will thoroughly understand the operation of the amplifier set. Point out to subscriber that lowest amplification consistent with good hearing is desirable.

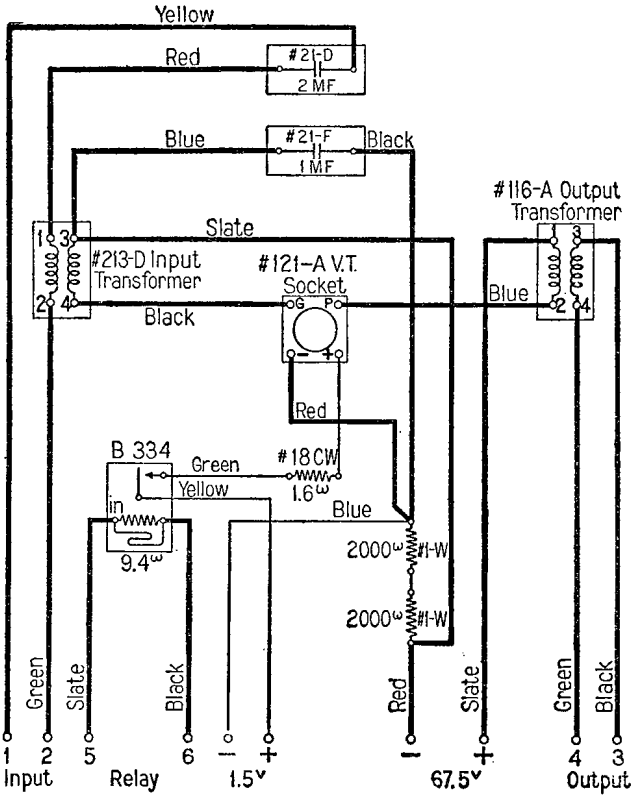
STATION MAINTENANCE

16. General. For locating trouble at amplifier stations see Section 13. The #23-A amplifier and #6013-A key should be returned to the storeroom for repairs if trouble is located in the coils, condensers, resistances, etc. Remove #55-A fuse when working in battery box or on #23-A amplifier to avoid possibility of blowing fuse.

Troubles in receivers, transmitters, cords, ringers, dials, etc., should be taken care of in accordance with approved practices.

17. #23-A Amplifier.

Wiring of #23-A Amplifier



18. Testing and Adjusting B334 Relay. In case of trouble with relay inspect for obvious mechanical or wiring defects and make sure that it is properly adjusted and cleaned in accordance with requirements for this type of relay as covered by approved practices. Test and (if necessary) readjust relay mechanically to armature travel .013" minimum, contact follow .005" minimum and contact separation .005" minimum. Test relay with current flow test set (in accordance with approved practice), using following values:

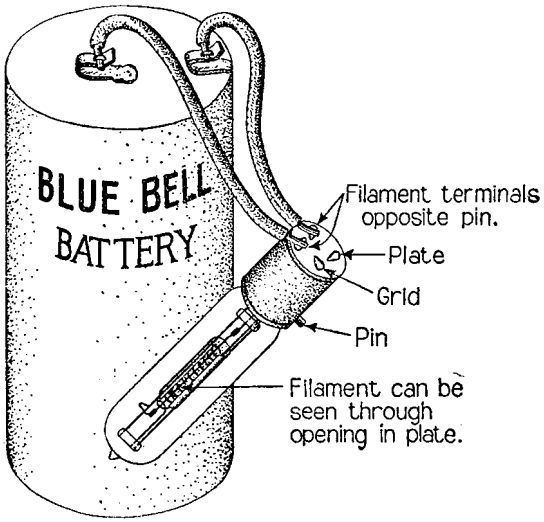
Test Values.	Without soak.
	Release on .005 amp.
	Operate on .022 amp.
Readjust Values.	Without soak.
	Release on .006 amp.
	Operate on .019 amp.

19. Vacuum Tube Renewals and Tests. The vacuum tube is subject to deterioration in service due mainly to the loss of active filament material. Therefore, in time, depending upon the extent of use, the amplifier may fail to give the required increase in volume.

Should the amplifier with potentiometer set on lowest step of dial switch and key "On" give lower volume in #144 receiver than is obtained with the key "Off" and filament or plate batteries tests only slightly above their cutoff points (as specified in Section 21), replace weak battery with new battery. If volume delivered by amplifier still remains below normal, replace (in accordance with local routine) vacuum tube by new tube.

If at time of installation of amplifier or when a new vacuum tube is used to replace old tube, the equipment does not operate satisfactorily (the batteries having been tested in accordance with Section 21) the following test shall be made to determine as far as possible whether the trouble is in the tube or in the circuit of the amplifier or key:

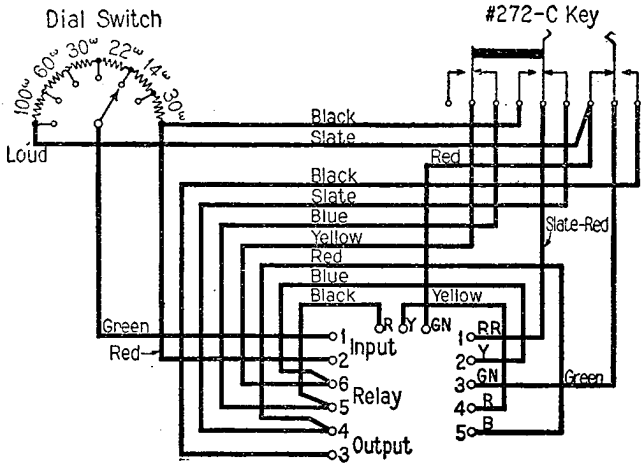
(1) See if tube glows.
(2) If tube does not glow remove tube from the socket and
(3) See that contacts on base of tube are clean and
(4) Test tube filament as below.



(5) If filament does not glow on above test, replace tube by new tube.
(6) If filament glows, when test (4) is made and does not glow when tube is placed in socket, test shall be made with head receiver or voltmeter across the filament terminals of the tube socket (with relay in operated position) to determine that battery is on these terminals. If necessary, adjust socket contacts.
(7) If there is no battery on filament contacts of socket the trouble (unless there is some obvious defect such as an open connection at one of the terminals of the amplifier) probably cannot be corrected at the station and the amplifier should be replaced by a new one.

20. #6013-A Key.

Wiring of #6013-A Key



Inspect wiring and parts. If potentiometer studs make poor contact with switch blade on account of being dirty, clean contacts.

21. Batteries—Renewals and Tests. Dry batteries require periodic replacement. The dry batteries used with the #23-A amplifier should be renewed every 6 months unless otherwise required by conditions or local instructions. Connect and mark new batteries as given in Section 12. Batteries used in #27-A amplifier may require more frequent renewal, depending upon the amount of its use.

Blue Bell Dry Cells. Test the 3 cell group with #35 battery gauge (with stem of gauge depressed) in series with 1.6 ohms (#1-AJ or #18-CW resistance). If after one minute gauge reads below highest mark on scale, all cells of the group should be replaced. The highest mark on the gauge corresponds to a battery potential of 1.13 volts under amplifier operating conditions. If battery gauge is not available, test may be made with voltmeter (3 volt scale of No. 280 type Weston or similar meter) connected across the group of cells. If after one minute meter reads below 1.13 volts, replace all cells of the group.

#763 and #766 Eveready Dry Batteries. Test each block separately with #35 gauge (stem of gauge raised) in series with 80 ohms (#18-K resistance) across negative and 22½ volt terminals. If after 5 seconds gauge reads below lowest mark on scale (marked "One Cell Pole Changer and Coin Box Service") the block should be replaced. This cutoff point under the conditions of the test corresponds to 17 volts under actual amplifier service conditions. If battery gauge is not available, test may be made with voltmeter (30 volt scale of No. 280 type Weston or similar meter). With amplifier in operation connect meter across each block in succession. If any block gives a reading of less than 15 volts it should be replaced. The 15 volt indication on the #280 type meter corresponds to 17 volts under actual amplifier service conditions.

REFERENCE SPECIFICATIONS

22. The following handbook specifications are referred to herein and installers and repairmen should have these specifications (including any supplement thereto) for use in connection with this work.

STATION WIRING