

BELL SYSTEM PRACTICES
Station Installation and Maintenance

SECTION C54.105
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Standard

AMPLIFIER EQUIPMENT FOR DEAF SUBSCRIBERS MAINTENANCE

1. GENERAL

1.01 This section includes maintenance information relating to the key, amplifier, and associated dry batteries used at stations where amplification is required to aid partially deaf persons in the use of the telephone. General maintenance instructions covering the remaining station equipment are included in Divisions C30 and C60.

2. TESTS AND INSPECTIONS

Tests of Dry Cells

2.01 When stations equipped with deaf set apparatus are visited for any purpose and also at the time of installation of portable amplifier equipment, all associated dry cell batteries which have previously been in use should be tested. Dry batteries in portable amplifiers should be tested prior to each installation on a subscriber's premises. New dry cells need not be tested at time of battery installation.

2.02 **Tests of Blue Bell Dry Cells:** Test 3-cell group filament battery, using a 35 battery gauge with stem depressed having in series with the gauge a resistance of 1.6 ohms. For this purpose a 1AJ or 18CW resistance may be used. If after one minute the gauge reads below the highest mark on the scale, all cells of the group should be replaced. This highest mark corresponds to a battery potential of 1.13 volts under operating conditions. When testing single cell filament battery, proceed in the same way but omit the 1.6 ohms resistance. (If more convenient these tests may be made by using the 3-volt scale of a 280 type Weston voltmeter, or similar instrument. In this case connect the meter across the battery and operate the amplifier for one minute. If the meter reading falls below 1.13 volts, replace the battery.)

2.03 **Tests of Plate Supply Dry Batteries:** Test each block separately, using a 35 gauge (stem normal) in series with 80 ohms. For this purpose use an 18K resistance and test the

entire block from negative terminal to the 22-1/2 volt terminal. If within an interval of 5 seconds the gauge reading falls below the lowest scale division which is marked "One Cell Pole Changer and Coin Box Service," the block should be replaced. In this case replace also the other two blocks. (If more convenient, this test may be made by using the 30-volt scale of a 280 type Weston voltmeter, or similar instrument. With the amplifier in operation, connect the meter across each block in succession. If any block gives a reading of less than 15 volts replace all three blocks. The 15-volt cutoff point under the conditions of test corresponds to 17 volts under actual service conditions.

Station Equipment Exclusive of Amplifier

2.04 When stations equipped with deaf set apparatus are visited, make the usual tests and inspection as at stations not so equipped. The amplifier is made inoperative during these tests by turning the 272C key to the "Off" position. In the case of stations having sidetone equipment, if during the transmission test the test deskman reports low talking volume, or low receiving volume is noted, check to see that recommendations included in the section covering connections of apparatus for deaf subscribers have been followed correctly as regards the use of the "Sidetone Reduction Connection." Replace defective receivers, transmitters or cords and clear any other troubles found in the subscriber set, desk stand, hand telephone set or associated wiring in the same manner as at an ordinary station. In case trouble is located in the key, refer to paragraphs 4.04 to 4.07.

2.05 **Howling Test:** At new installations and whenever hand set transmitters or receivers or complete hand sets are changed, before making other tests test the hand set for freedom from a tendency to howl. To make this test call the P.B.X. or central office, or dial zero. Say to the operator "I am testing this telephone, close listening key and leave the cord up." When this circuit condition has been obtained, turn the amplifier "On," and set the volume switch for full gain (terminal designated "Loud"). Hold the hand set close to a sound reflecting surface, such as the flat top of a table or desk, and attempt to make the set howl by tapping the transmitter lightly with a pencil. If the set shows a tendency to howl, tighten the receiver and transmitter to the handle, if loose, also reclamp the receiver by loosening the cap, moving the diaphragm slightly and retightening the cap. Then repeat the test. If howling recurs, reverse the connections at terminals 3 and 4 of the amplifier. If howling still recurs, replace the receiver or entire handset.

Deaf Set Equipment

2.06 After performing the tests of the above paragraphs and clearing any troubles found, set the 272C key in the "On" position and the volume switch on the lowest step (farthest step from that marked "Loud"). Call the test desk again, unless the connection previously made has been held. While the test deskman talks in an even tone of voice, switch the amplifier "Off" and "On" several times, comparing the received volume. Then advance the volume switch one step at a time to the "Loud" position. With the switch in its lowest position, the received volume should be approximately the same whether the amplifier is "Off" or "On." With the amplifier "On" the volume should increase with each step of advance.

3. TROUBLE LOCATING METHODS

Station Equipment Exclusive of Deaf Set Apparatus

3.01 Methods of locating trouble in the subscriber set, the hand set or desk stand and the associated wiring and cords, are the same as at ordinary stations having the same class of service. While testing for trouble in this part of the station equipment, place the key controlling the amplifier in the "Off" position.

Deaf Set Equipment

3.02 **General:** If, with the amplifier "On," the equipment does not function properly, and the batteries are new or have been checked in accordance with paragraphs 2.02 and 2.03 and found in good condition, depress and release the switchhook or plunger several times and observe to see that the relay operates and releases. With the receiver or hand set off the switchhook or mounting, the relay should be operated, the filament circuit closed and the vacuum tube should glow. If the relay fails to operate properly, follow instructions of paragraph 3.04. In case the vacuum tube does not glow when the relay is up, test it as covered in paragraph 3.05. Inspect the wiring and parts of the 6013A or 6013B key in accordance with paragraphs 4.04 to 4.07.

3.03 When work is being done on the amplifier or associated wiring which involves risk of fuse operation or damage to the vacuum tube, remove the fuse from the fuse block in the battery box.

3.04 **Relay:** In case of trouble with the relay, inspect for obvious mechanical or wiring defects and see that the contacts are clean and that the relay is in correct mechanical adjustment. If the relay requires cleaning or readjustment refer to paragraphs 4.02 and 4.03.

3.05 **Vacuum Tube:** The vacuum tube deteriorates gradually while in service and in time, depending on the extent of use, the amplifier may fail to give a sufficient increase in volume. With the volume switch on its lowest step, check to see if lower volume is obtained with the amplifier "On" than with it "Off." If so the vacuum tube should in general be replaced. In case, however, the plate or filament batteries were found close to their cutoff points when tested as covered in paragraphs 2.02 and 2.03, replace the batteries and repeat the test of this paragraph.

3.06 If the tube does not glow when the receiver or hand set is off the hook or mounting, the amplifier "On" and the relay operated as covered in paragraph 3.02, remove it from the socket and test the filament circuit of the tube, using one Blue Bell dry cell as shown in Fig. 1.

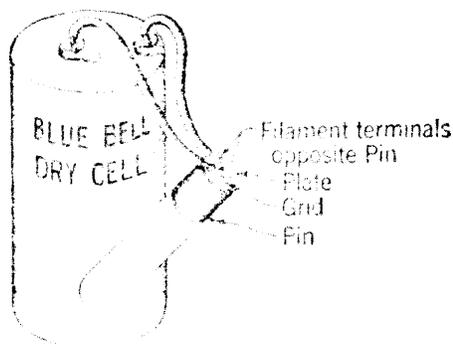


Fig. 1.

If the tube does not glow when tested in this manner, it is defective and replacement is necessary. If, however, the above test does not indicate that the tube is defective, test with a head receiver to determine whether there is battery on the filament and plate terminals of the tube socket (with the relay in its operated position and the fuse in place in the battery box). Should it be found that with the relay operated no battery is on these terminals of the socket, the amplifier should be replaced (unless there is some obvious defect such as an open connection at one of the terminals).

4. APPARATUS REQUIREMENTS AND ADJUSTING PROCEDURES

Station Equipment Exclusive of Deaf Set Apparatus

4.01 Apparatus requirements and adjusting procedures for subscriber sets, desk stands and hand telephone sets used at stations having amplifier equipment are in general the same as at ordinary stations.

Deaf Set Equipment

4.02 **Relay:** For apparatus requirements and adjusting procedures covering the B type relay used in the amplifier, refer to Bell System Practices—Private Branch Exchange Installation and Maintenance. In that series, Section B460.005 covers cleaning procedures and Section B461.002 covers the general requirements and methods of adjustment.

4.03 The specific adjustment requirements of the relay used in the deaf set amplifier are as follows:

Mechanical Adjustments

Armature travel	.030" maximum
Contact follow	.005" minimum
Contact separation	.005" "

Current Flow Adjustment Without Soak

	Test Values	Readjust Values
Release on	.005 amp.	.006 amp.
Operate on	.022 "	.019 "

Key

4.04 The 6013A key as well as the 6013B key consists of a 272C key, a 146E switch and the associated resistances, wiring and terminals.

4.05 **272C Key:** For apparatus requirements and adjusting procedures covering the 272C key, refer to Bell System Practices—Private Branch Exchange Installation and Maintenance. Cleaning procedures for key contacts are covered in Section B432.005 and the apparatus requirements of and adjusting procedures for 272 type keys are covered in Section B432.013.

4.06 **146E Switch:** Dirty 146E switches should be cleaned, using a #7 sash tool and the contacts rubbed with a cloth per KS-2423. Where contacts are tarnished they should be cleaned by using a 265B contact burisher between the contact arm and each contact in turn. If the contacts are so badly worn or corroded that this procedure does not clean them sufficiently to insure freedom from trouble or if the contact pressure is light or the moving parts are loose, replace the 6013A or 6013B key and return the defective one for repair.

4.07 For wiring diagrams of the 6013A and 6013B keys refer to figures in the section covering connections of deaf set equipment.