

service from the amplifier, it is recommended that spare No. 205D Vacuum Tubes be kept on hand.

2. If both vacuum tubes fail to light, examine the power-supply cord, make sure that the connections to the plug and switch are tight and that all switches in the power supply are turned on. The power-supply cord may be ordered as a No. M2M Cord equipped with switch and plugs.
3. If the amplifier fails to operate after replacement of the No. 205D Vacuum Tubes, and the filaments of the vacuum tubes are operating at their normal brilliancy, the operator should not, in general, try to correct the trouble himself, but should obtain the services of the nearest distributor.

Information for ordering other apparatus units in the No. 6052A Amplifier is given in Figure 40.

#### No. 6040A AMPLIFIER

The No. 6040A Amplifier consists of a No. 40A Amplifier and two No. 205D Vacuum Tubes. It is a single-stage amplifier and will operate only on a power supply of 105 to 120 volts, 20 to 40 cycles, alternating current. The power consumption is approximately 40 watts. No batteries are required for its operation.

The method of connection and operation of this amplifier and associated apparatus is exactly the same as described above for the No. 6052A Amplifier. It differs from the No. 6052A Amplifier only in that the No. 90B Repeating Coil is replaced by a No. 306A

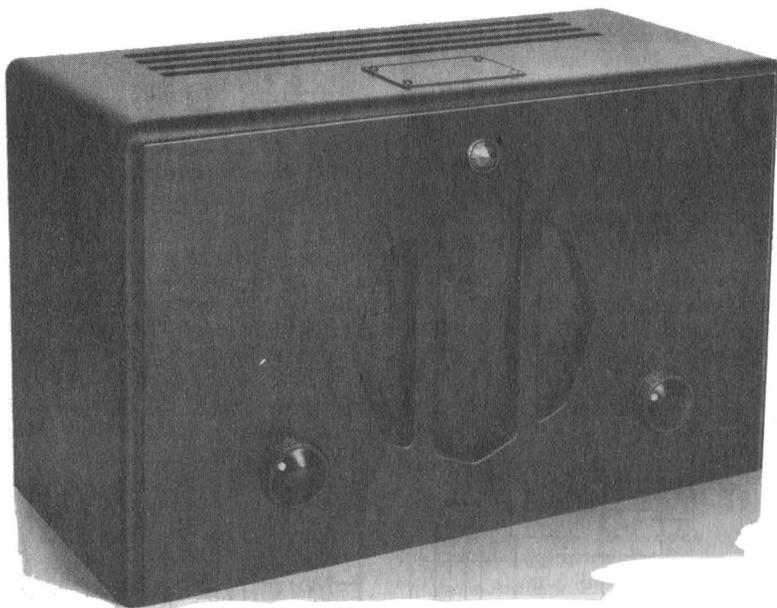
Transformer so as to give satisfactory operation on 20 to 40 cycles.

#### No. 100E LOUD SPEAKER SET

The No. 100E Loud Speaker Set (Figure 43) consists of a two-stage resistance-coupled amplifier and a Jensen midget speaker mounted in a walnut finished cabinet. The approximate overall dimensions are  $11\frac{1}{2}$  inches long by 7 inches high by  $5\frac{1}{2}$  inches deep. The gain of the amplifier when operating from an impedance of 300 to 600 ohms is approximately 60 db.

The set will operate on a power supply of 105-125 volt, 25-60 cycle alternating current or on a power supply of 105-125 volt direct current. It is necessary to pole the power cord correctly when connecting the No. 100E Loud Speaker to a direct current source. It is also desirable to pole the cord when using an alternating current source, since the noise with one polarity connection is generally less than with the opposite polarity connection. The power consumption is approximately 60 watts.

The power switch (right-hand knob) has three positions. In the first or off position (maximum counter-clockwise) the power supply is open. In the second position the power circuit is closed and sufficient current is provided to maintain the tube heating elements at a temperature where response may be obtained quickly from the amplifier when desired without shortening the life of the tubes. Also in the second position the signal lamp will light up with moderate brightness and the amplifier output is short circuited



*Figure 43—No. 100E Loud Speaker Set*

to prevent any response. In the third position, the heating elements of the tubes receive full current, the signal lamp assumes full brightness, the short circuit is removed from the output of the amplifier and the set is ready for operation.

The set may be put in operation if desired by turning the control knob directly to the third position; in this case approximately one minute will be required for the tube elements to heat up. The time required for the tubes to heat to operating temperature after switching from the second to the third position is less than five seconds, provided the set has been in the standby

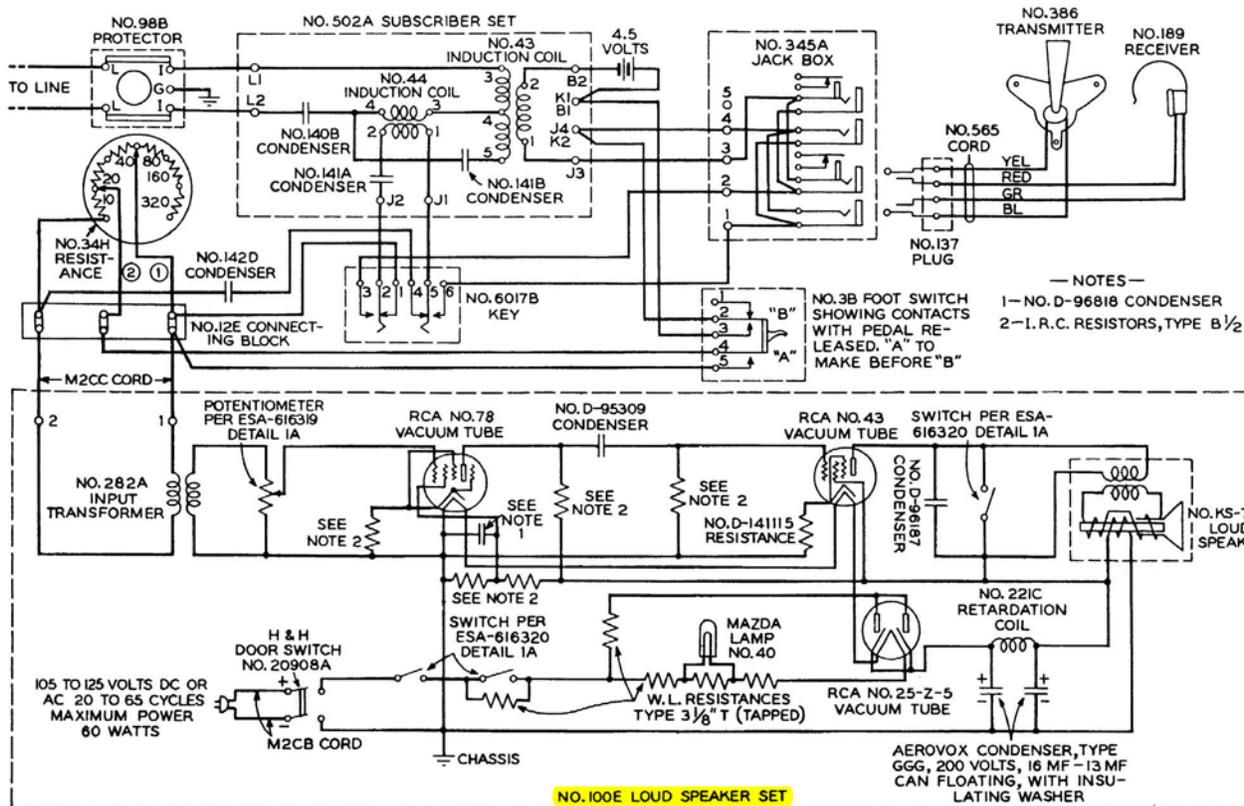
(second position) for sufficient time.

The left-hand control knob may be used to increase or decrease the volume of the output of the set.

#### CONNECTIONS AT DISPATCHER'S STATION

The No. 100E Loud Speaker Set, the No. 34H Resistance, No. 142D Condenser, No. 12E Connecting Block and the No. 6017B Key should be connected with the usual telephone equipment at the dispatcher's station as shown in Figure 44. The amplifier is connected in the balanced side of the No. 502A Subscriber Set in place

Figure 44—Schematic Circuit of No. 100E Loud Speaker Set and  
Dispatcher's Station Telephone Equipment



of the No. 189 Receiver and a switch is provided so that either amplifier or receiver may be used.

The No. 142D Condenser (0.05 mf) reduces the thumps in the loud speaker caused by the selector signalling impulses.

The No. 6017B key provides a means for switching from the loud speaker set to the head receiver.

The No. 34H Resistance shunts the input of the amplifier and its purpose is to provide an adjustment for the loud speaker volume. As indicated in Figure 44 the three connections to the resistance are adjustable and should be placed on their proper taps by trial as follows. With the power supply turned on, the No. 6017B Key set to connect the amplifier, and the volume control set for full gain of the amplifier, lead No. 1 should be connected to give a total shunting resistance of from 40 to 100 ohms on the No. 34H Resistance so that the volume from the nearby station will not be too loud and at the same time the volume from the most distant station will be satisfactory.

With the foot switch operated and a distant station talking, lead No. 2 should be connected so that sufficient volume is obtained for break-in purposes from a distant station and at the same time so that the loud speaker will not howl when the dispatcher is speaking. With the No. 2 lead connected so as to reduce the shunting resistance to 10 or 20 ohms, howling will usually not occur, and sufficient volume will be obtained for break-in purposes.

The No. 3B foot switch connects the battery to the transmit-

ter and lowers the value of the shunting resistance across the input of the loud speaker set to prevent howling when the dispatcher is talking. The foot switch must be depressed to talk and released to receive, although reception at a reduced volume for "break-in" purposes may be had while the switch is depressed.

With the 100E Loud Speaker Set connected as described, adequate reception and "break-in" by any way-station operator should be obtained by the dispatcher over 200 miles of line.

#### CONNECTIONS AT WAY STATION

The No. 100E Loud Speaker Set, when used with the usual telephone equipment at a way station, should be connected directly across the line in series with a 141H Condenser with its two units connected in series to give a capacity of 0.01 mf. The condenser reduces the thump in the loud speaker caused by the selector signalling impulses and prevents the shunting of these impulses by the loudspeaker set.

The No. 3D foot switch should be connected as shown in Figure 42 except that the leads to terminals 8 and 9 of the foot switch should be connected to the input rather than the output side of the No. 100E Loud Speaker Set. With the input of the set short-circuited the operator when talking will receive any break-in by the dispatcher by means of the No. 189 Receiver.

When the amplifier is not in use keep the power turned off in order to conserve the life of the vacuum tubes.

If the amplifier fails to operate,

test the power supply and the associated polarity, particularly if the power supply is from a direct-current source. Should the signal lamp and the heater element of the tubes fail to light, remove the back cover plate and insert new tubes successively in their respective sockets to determine whether or not the heater element of any one tube has opened the series heater circuit.

If the amplifier fails to operate after replacement of all three vacuum tubes and the heater element of the vacuum tubes are operating at their normal brilliancy the operator should not in general try to correct the trouble himself but should obtain the services of the nearest distributor.

To insure continuous service from the amplifier it is recommended that spare RCA No. 78, No. 43 and No. 25-Z-5 tubes be kept on hand.

The power supply cord may be ordered as a No. M2CB Cord.

Information for ordering any other apparatus units in the No. 100E Loud Speaker Set is given in Figure 44.

#### *Foot Switches*

The No. 1 and No. 3 Type Foot Switches are used for making the necessary connections between the local battery, transmitter, and subscriber set and to change from the receiving to the transmitting position at the dispatcher's station or way station. Each foot switch is comprised of two contact spring pileups; the switches differ only in the spring combination controlled by the foot pedal. The contact springs have a breakdown of over 1,000 volts

AC between the springs and between the springs and frame. The foot switches are enclosed in a black finished metal case approximately  $7\frac{1}{2}$  inches high,  $3\frac{3}{4}$  inches wide and 3 inches in depth (not including the pedal). The maintenance parts for the following foot switches are given on page 106, Figure 57.

The No. 1B Foot Switch is equipped with a single make contact and is used with the No. 502A Subscriber Set at the dispatcher's station to connect the battery to the transmitter for talking. When the contact springs are open the minimum distance between contact points should be  $\frac{1}{32}$  inch and when contact is made there should be a minimum travel of  $\frac{1}{32}$  inch after contact is made. The maximum travel of the springs measured at the contact points should be  $\frac{1}{8}$  inch.

The No. 3B Foot Switch makes two and breaks one contact, and is used when a loud speaking telephone set is connected to the No. 502A Subscriber Set at the dispatcher's station. The switch connects the battery to the transmitter for talking and also reduces the shunt resistance across the input or output of the particular type of loud speaking telephone used. When the contact springs are open the minimum distance between contact points should be  $\frac{1}{32}$  inch and when contact is made there should be a minimum travel of  $\frac{1}{32}$  inch after contact is made. The maximum travel of the springs measured at the contact points should be  $\frac{1}{8}$  inch. The normally closed contact of the three-spring pileup should open before the contact of the two-spring pileup closes, which in turn