April 21, 1942. R. H. CAMPBELL 2,280,280

COMMUNICATION SYSTEM

Filed Nov. 4, 1940 2 Sheets-Sheet 1

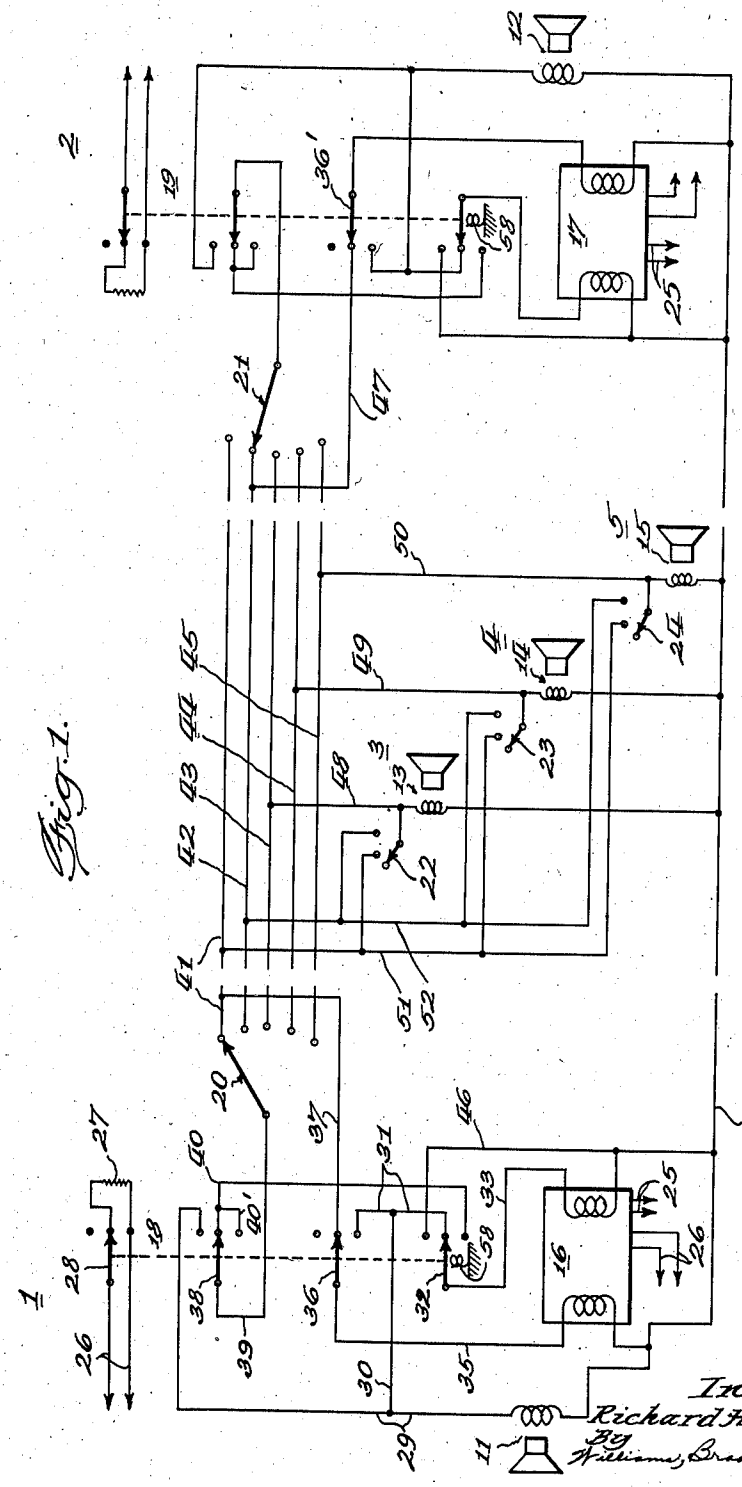


Fig. 1.

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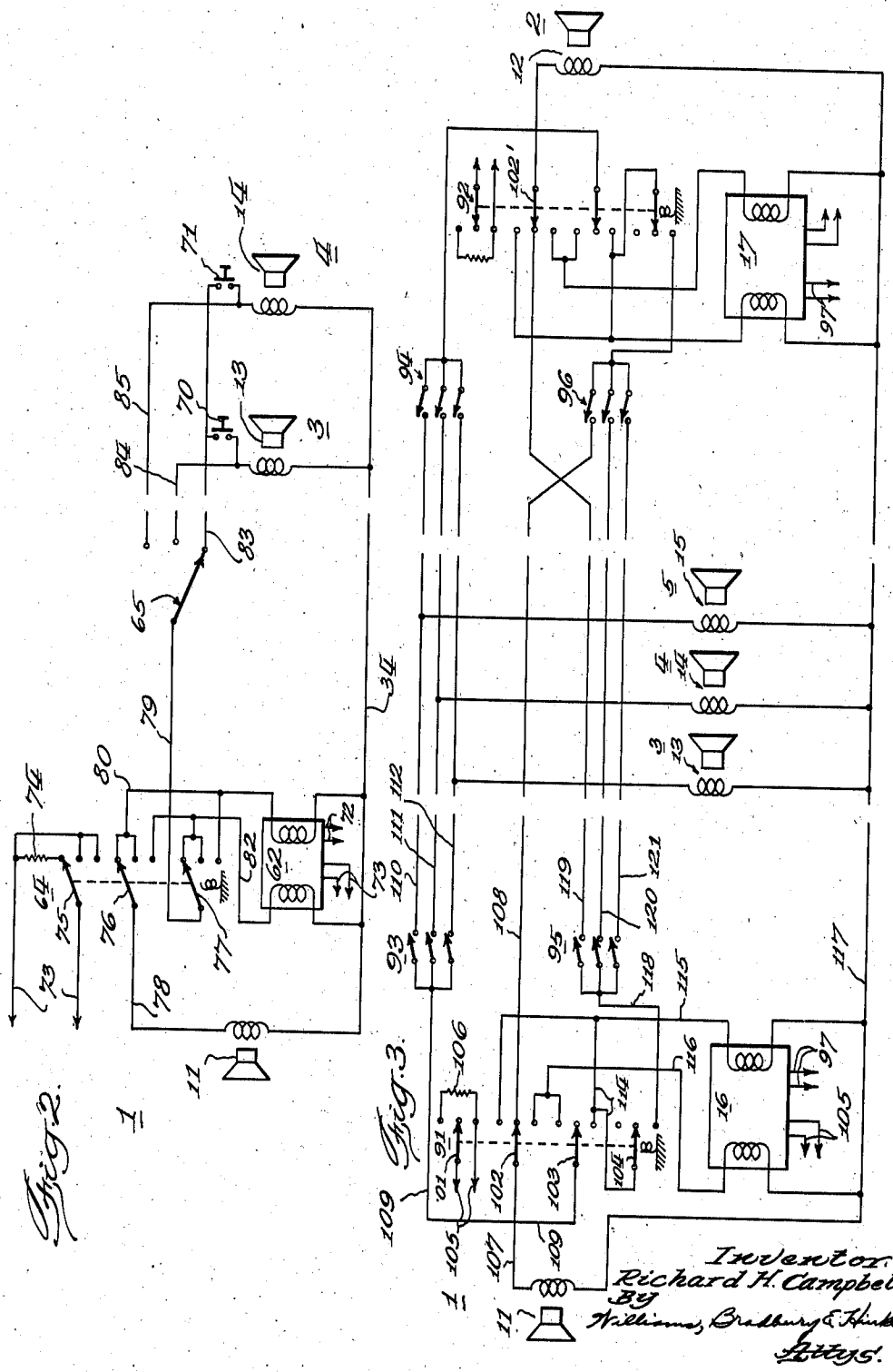


Fig. 2.

Fig. 3.

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Patented Apr. 21, 1942 2,280,280

UNITED STATES PATENT OFFICE

2,280,280

COMMUNICATION SYSTEM

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Application November 4, 1940, Serial No. 364,133

14 Claims. (Cl. 179—40)

The present invention relates to communication systems and more particularly to intercommunicating systems of the loudspeaking type.

Loudspeaking intercommunicating systems of the type employing amplifiers and sound translating devices capable of performing the dual functions of a microphone and loudspeaker may be divided into two classes in so far as the nature of the units at the stations constituting the systems is concerned. One class of system comprises one station, ordinarily called a master station, having an amplifier, a loudspeaker-microphone, and a communication control switch, and one or more other stations, which may be called sub-stations, each having a loudspeaker-microphone. The communication control switch at the master station is arranged alternately to connect the loudspeaker-microphones at the master and sub-stations to the output and input of the amplifier so that communication may be carried on alternately in opposite directions between the stations. The second class of system comprises two or more master stations with which may be combined one or more sub-stations.

In systems of both classes, in order for the sub-stations to originate a call, it is necessary that the amplifier at the master station be normally operative, and as a result power is consumed even when the system is not being used.

A primary object of the present invention is the provision of a communication system wherein the amplifier at a master station is maintained normally operative, but with reduced "B" potential. By supplying the amplifier with reduced "B" potential, a number of advantages are realized. One is that the sub-stations not provided with amplifiers can call the master stations. A second is that power consumption is reduced during those periods when the apparatus is not being utilized and the life of the tubes of the amplifiers is increased. Third, the squawk resulting from the connection of the output of one amplifier to the input of another amplifier in systems comprising a plurality of master stations is minimized.

A further object of the present invention is to provide new and improved circuit arrangements embodying normally operative amplifiers.

A further object of the present invention is to provide a simplified system comprising a number of master stations and a number of sub-stations, whereby the operator is readily enabled to select either type of station and readily manipulate the communication control switch in order to provide alternate two-way communication with the particular type of station selected.

Other objects and advantages of the present invention will become apparent from the ensuing description, in the course of which reference is had to the accompanying drawings in which:

Fig. 1 is a schematic circuit diagram illustrating one embodiment of the invention, which embodiment comprises a plurality of master and sub-stations;

Fig. 2 is a schematic circuit diagram of a system embodying the invention, which system comprises a single master station and a plurality of sub-stations; and

Fig. 3 is a schematic circuit diagram of another system comprising a plurality of master and sub-stations and in which the selection of master and sub-stations and determination of the proper mode of operation of the communication control switch are simplified.

Referring now to Fig. 1, it may be seen that the illustrated system is of the loudspeaking type wherein communication is carried on alternately in opposite directions under the control of manually operable communication direction control switches at the master stations.

The master stations are indicated by reference characters 1 and 2, and the sub-stations by reference characters 3, 4 and 5. While only a limited number of both types of stations have been illustrated, it should be understood that the number of stations may be varied to meet the requirements of any particular installation. All the stations are provided with translating devices capable of being utilized both as microphones and loudspeakers, such as the devices 11 to 15, inclusive, which may be of the well-known permanent magnet type. These devices will be referred to hereinafter as loudspeakers. Master stations 1 and 2 are provided with amplifiers 16 and 17, manually operable three-position communication direction control switches 18 and 19, and station selector switches 20 and 21, all respectively. While the station selector switches have been illustrated as being of the rotary type, it should be understood that push button switches may be utilized. The sub-stations are provided with "call" switches 22, 23 and 24, respectively, so arranged in circuits that calls may be originated at the sub-stations and so that the latter may transmit messages to master stations but that the master stations cannot "eavesdrop" on the sub-stations.

The amplifiers may be of any well-known construction, and accordingly they have not been

illustrated in detail. The amplifiers may be supplied with suitable energizing current, either alternating or direct current, through conductors indicated by reference characters 25. The amplifiers are normally operative, but the "B" supply is reduced, thereby to reduce power consumption during standby, to increase the life of the amplifier tubes, and to minimize the squawk resulting from double amplification.

Considering now the apparatus of station 1, it may be seen that the "B" supply circuit indicated by reference character 26 is normally completed through a resistor 27 by the uppermost switch blade 28 of the three-position communication control switch 18.

In the normal position of switch 18, in which it is shown, the "B" supply circuit is completed through the resistor 27, as previously described. Loudspeaker 11 is connected to the output of the amplifier through a circuit including conductors 29, 30, 31, lowermost switch blade 32 of switch 18, and conductor 33, the return circuit being completed by a common conductor 34 which may be the shield covering interstation conductors, to which reference will be had shortly. This normal connection of the loudspeaker to the output of the amplifier prevents other stations from "eavesdropping" on the station. The input of the amplifier is connected to an interstation conductor 41 individual to station 1 by a circuit including conductor 35, switch blade 36 of switch 18, and conductor 37. Switch 18 also includes a fourth switch blade 38 connected by conductor 39 to selector switch 20. In the normal position of switch 18 blade 38 does not perform any useful function as conductor 40, with which it is in circuit, as well as conductor 40', which is connected to conductor 40, are disconnected from other circuits.

In addition to interstation conductors 34 and 41, to which reference has already been made, the system comprises a number of interstation conductors 42, 43, 44 and 45 individual to stations 2, 3, 4 and 5, respectively. However, before describing the remainder of the system, it is deemed best to complete the description of the circuits at station 1 as well as the operation of communication control switch 18.

The communication control switch is operable to its lowermost position to call a sub-station or to answer a call from another master station. In this position loudspeaker 11 is connected to the input of the amplifier, and the output of the amplifier is connected to the selector switch 20 and by the latter to the interstation conductor individual to a selected station. At this time resistor 27 is cut out of circuit by switch blade 28 so that the full "B" potential is supplied to the amplifier tubes and the full output of the amplifier utilized. Loudspeaker 11 is connected to the input of the amplifier through a circuit including conductors 29, 30, 31, switch blade 36, and conductor 35. The output of the amplifier is connected to selector switch 20 through a circuit including conductor 33, switch blade 32, conductors 40 and 40', switch blade 38 and conductor 39.

The communication control switch 18 is also operable into a third position, its uppermost position, in order to call another master station. At this time the amplifier is rendered inoperative, by reason of switch blade 28 breaking the "B" supply circuit and switch blade 32 short-circuiting the amplifier output through a circuit including conductors 33 and 46, and loudspeaker 11 is connected directly to the selected interstation conductor through a circuit including conductor 29, switch blade 38, conductor 39, and selector switch 20.

The equipment at station 2 and its mode of operation corresponds substantially to that at station 1. The selector switch 21, however, is normally positioned to complete a circuit from interstation conductor 42, which, it may be remembered, is the conductor individual to station 2, and conductor 42 is furthermore connected by a conductor 47 to a contact associated with a switch blade 36' corresponding to switch blade 36 at station 1. In view of the identical nature between the apparatus at stations 1 and 2, except as noted immediately above, it is deemed unnecessary further to elaborate upon the description of the equipment at this station.

Loudspeakers 13, 14 and 15 at stations 3, 4 and 5 are connected by conductors 48, 49 and 50 to interstation conductors 43, 44 and 45,, respectively. The loudspeakers are also connected to common conductor 34. The call switches 22, 23 and 24 are connected directly to conductors 48, 49 and 50 and are operable to connect their associated loudspeakers to either of conductors 51 and 52, which are connected, respectively, to conductors 41 and 42 individual to stations 1 and 2.

In the description of the operation of the system of Fig. 1, it is assumed that the amplifiers 16 and 17 are supplied with suitable energizing current and that the communication control switches 18 and 19 are in their illustrated positions, so that the amplifiers are normally operative with reduced "B" potential. Assuming first that an operator at station 2 desires to communicate with the operator at station 1, then it is necessary for the operator at station 2 first to select station 1 by moving selector switch 21 to complete a circuit to interstation conductor 41, and then to manipulate the communication control switch 19 to its uppermost position. This results in the connection of loudspeaker 12 to the input of amplifier 16 through a circuit including a blade of communication control switch 19, selector switch 21, conductor 41, selector switch 20, conductor 37, switch blade 36, and conductor 35, the input circuit being completed through the common conductor 34. Loudspeaker 11 at station 1 is connected to the output of amplifier 16, and as a consequence, the operator at station 2 may call the operator at station 1. Thereafter, the operator at station 1 controls the direction of communication by operation of the communication control switch 18 at station 1 from its indicated to its lowermost position, thereby alternately to connect the loudspeakers 11 and 12 to the output and input of amplifier 16. When the call is completed, the selector and communication control switches are returned to their indicated positions. If desired, the latter may be provided with springs 58 operable to return them to their indicated positions from their lowermost positions.

When the operator at station 1 desires to call the operator at station 2, the above described procedure need only to be reversed.

The mode of communication between a master station and a sub-station will be described in connection with stations 1 and 3. If the operator at station 1 desires to call station 3, the selector switch 20 is first operated to complete a circuit to interstation conductor 43, and communication control switch 18 is then operated to its lowermost position, thereby to connect loudspeaker 11 to the input of amplifier 16 and loud-

speaker 13 to the output of the amplifier. To respond, the operator at the sub-station operates switch 22 to complete a circuit from loudspeaker 13 to conductor 41 through conductor 51, after which the operator at the master station controls the direction of communication, as previously described, by operating switch 18 between its indicated and lowermost positions, thereby alternately to connect the loudspeakers 11 and 13 to the output and input of amplifier 16.

When the operator at station 3 desires to call the operator at station 1, call switch 22 is operated to complete a circuit from loudspeaker 13 to conductor 51. With selector switch 20 and communication control switch 18 in their indicated positions, loudspeaker 13 is connected to the input of the amplifier through a circuit including conductors 41 and 37, switch blade 36, and conductor 35, the circuit being completed through the common conductor 34. Upon receipt of the call, the operator at station 1 preferably moves selector switch 20 to complete a circuit to conductor 43 and thereafter communication is carried on in alternate directions by operation of switch 18 at station 1 between its indicated and lowermost positions. When a call is originated by a sub-station, it is not necessary that the selector switch at the called master station be operated, as two-way communication can be carried on over the circuit individual to the master station.

From the foregoing description of the embodiment of the invention illustrated in Fig. 1, it may be seen that power consumption is reduced during stand-by periods, that is, when the apparatus is not being utilized, and the life of the tubes is increased by reason of the fact that a reduced "B" potential is utilized. Furthermore, if the output of one of the amplifiers is inadvertently connected to the input of the other, the squawk resulting from this double amplification is minimized. In addition, sub-stations not provided with amplifiers can call master stations but master stations cannot "eavesdrop" on sub-stations as the loudspeakers at the sub-stations cannot be connected to the inputs of the amplifiers unless the switches 22, etc., thereat are operated.

In Fig. 2 the invention is illustrated in connection with a system comprising a single master station and a plurality of sub-stations. The master station, indicated by reference character 1, is provided with a normally operative amplifier 62, a loudspeaker 11, a communication control switch 64, and a selector switch 65. The sub-stations, indicated by reference characters 3 and 4, are provided with loudspeakers 13, 14, and call switches 70 and 71, respectively. The amplifier is supplied with suitable power through conductors 72, and when the communication control switch 64 is in its indicated position, the "B" supply circuit for the amplifier is completed through conductors 73, resistor 74, and the uppermost switch blade 75 of switch 64.

The communication control switch includes also switch blades 76 and 77, the former of which is connected by conductor 78 to loudspeaker 11 and the latter of which is connected by conductor 79 to selector switch 65. In the indicated position of switch 64, loudspeaker 11 is connected to the output of amplifier 62 through a circuit including conductor 78, switch blade 76, and conductor 80, the circuit being completed through common conductor 34. At the same time the selector switch is connected to the input of the amplifier through a circuit including conductor 79, switch blade 77, and conductor 82. In its intermediate position, the communication control switch 64 is effective to cut out resistor 74, thereby to supply full "B" potential to the amplifier while maintaining unchanged the circuit connections to the input and output of the amplifier. As a result, incoming calls may be heard at full volume. In the lowermost position of communication control switch 64, loudspeaker 11 is connected to the input of the amplifier through a circuit including conductors 78 and 82 and switch blade 76, while the selector switch is connected to the output of the amplifier through a circuit including conductors 79 and 80 and switch blade 77.

When the communication control and selector switches 64 and 65 are in their indicated positions, calls may be originated at the substations by operation of the call switches 70 or 71. In its indicated position, selector switch 65 completes a circuit to interstation conductor 83 so that upon closure of switches 70 or 71, loudspeaker 13 or 14 is connected to the input of the amplifier 62 through a previously described circuit. Upon responding to the call, the operator at station 1 manipulates selector switch 65 to complete a circuit to the calling sub-station through either conductor 84 or conductor 85, which conductors are respectively associated with stations 3 and 4.

Reviewing the operation of the system of Fig. 2, it may be seen that the master station may call either sub-station by operation of selector switch 65 to select the desired sub-station, and thereafter operating communication control switch 64 to its lowermost position. At this time, as previously described, loudspeaker 11 is connected to the input of amplifier 62 and the output of the latter is connected to the selected sub-station through the switch blade 77, conductor 79, and selector switch 65. Communication may thereafter be carried on in opposite directions by operation of communication control switch 64 alternately to its lowermost and intermediate positions. This communication is at full volume as the resistor 74 is not inserted in the "B" supply circuit. Upon completion of the call, the communication control and selector switches are returned to their indicated positions.

In case the operator at one of the sub-stations, sub-station 3 for instance, desires to call the operator at the master station, it is necessary only for the former to close switch 70. This results in the connection of loudspeaker 13 to the input of the amplifier through a circuit including conductor 83, selector switch 65, conductor 79, switch blade 77, and conductor 82. Inasmuch as loudspeaker 11 is connected to the output of amplifier 62, the operator at the master station is enabled to receive the call, after which communication may be carried on between the two stations as though the call originated at the master station.

The system of Fig. 3 combines the normally operative amplifier with a selector switch arrangement enabling the operators at master stations readily to call either other master stations or sub-stations, and at the same time enabling the operators readily to determine the proper mode of manipulation of the communication control switches for the selected type of station.

Referring now to Fig. 3, it may be seen that like the embodiment of Fig. 1, the system comprises two master stations, indicated by reference characters 1 and 2, and three sub-stations, indicated by reference characters 3, 4 and 5, and

that these stations are provided with loudspeakers 11 to 15, inclusive. The master stations are provided with amplifiers 16 and 17, communication control switches 91, 92, and with a first set of selector switches 93 and 94 for selecting sub-stations and a second set of selector switches 95 and 96 for selecting the master stations. The amplifiers are supplied with suitable energizing power through conductors 97.

The mode of operation of the communication control switches at the master stations is dependent upon whether a sub-station or another master station is selected. When a master station is selected the communication control switch is operated from its intermediate position, in which it is shown, to its lowermost position. In this position, the loudspeaker at the master station is connected to the output of the amplifier of another station for reception, and in the lowermost position, the loudspeaker is connected to the input of the amplifier at that station for transmission. When a sub-station is selected, the communication control switch is operated between its uppermost and lowermost positions. In the uppermost position, the loudspeaker at the sub-station is connected to the input of the amplifier and the output of the amplifier is connected to the loudspeaker at the master station. In the lowermost position, the connections of the two loudspeakers to the amplifier are reversed.

Referring again to Fig. 3, it may be seen that the communication control switch 91 at station 1 comprises four switch blades, 101, 102, 103 and 104. Blade 101 is adapted in the indicated position of the switch to break the "B" supply circuit which extends to the switch blade through conductors 105, thereby rendering the amplifier inoperative. In the uppermost position of switch 91, a reduced "B" potential is supplied to the amplifier through resistor 106, and in the lowermost position, the full "B" potential is supplied to the amplifier, the resistor 106 being cut out of circuit and the "B" supply circuit being completed through conductors 105 and switch blade 101. Switch blade 102 is connected by conductor 107 to loudspeaker 11, and in the indicated position of switch 91, the loudspeaker is connected to an interstation conductor 108 individual to station 1 for the reception of calls from other master stations. Switch blade 103 is connected by conductor 109 to the sub-station selector switch 93. The selector switch 93 comprises a number of individual switches equal to the number of sub-stations—three in this case. The sub-stations are connected to interstation conductors 110, 111, and 113 individual thereto. Switch blade 104 is connected by conductors 114 and 115 to the output of the amplifier. The input of the amplifier is connected by conductor 116 to the lowermost fixed contact associated with switch blade 102 and to the uppermost fixed contact associated with switch blade 103. One terminal of each of the amplifier input and output connections as well as of the various loudspeakers is connected to a common conductor 117.

The master station selector switch 95 is also shown to consist of a number of individual switches one less than the number of master stations in the system. These switches are connected by conductor 118 to the lowermost fixed contact associated with switch blade 104. The individual switches of selector switch 95 are adapted to connect conductor 118 to a conductor 119 individual to station 2 and to conductors 120 and 121 individual to other master stations of the system, which stations, however, have not been illustrated.

The apparatus and equipment at station 2 correspond identically with that of station 1 with exception of the fact that the switch blade 102' corresponding to switch blade 102 at station 1 is connected to conductor 119, the conductor individual to station 2.

Communication control switches 91 and 92 have two normal positions. One normal position is the position indicated, at which time the master stations are conditioned for reception of calls from other master stations, and the other normal position is the uppermost position, at which time the amplifier is rendered operative with a reduced "B" potential for the reception of calls from the sub-stations through the closed selector switches 93.

The operation of the system will first be described with the master stations conditioned for reception of calls from other master stations, at which time the communication control switches 91 and 92 occupy the indicated positions. In the event station 1 desires to communicate with station 2, a selector switch is operated to connect conductor 118 to conductor 119, and the communication control switch 91 operated to its lowermost position, thereby to render operative the amplifier 16 and to connect loudspeaker 11 to the input of amplifier 16, and to connect the output of the amplifier to conductor 119 which is connected to loudspeaker 12 at station 2. In answering, the operator at station 2 first closes the uppermost selector switch, which is associated with conductor 108, and then operates communication control switch 92 to its lowermost position. To listen to the answer of the operator at station 2, the communication control switch at station 1 is returned to its indicated position. Thereafter, communication in alternate directions is accomplished by alternate operation of the communication control switches at stations 1 and 2 to their intermediate and lowermost positions.

In order to condition the system for reception of calls from the sub-stations, the communication control switches 93 or 94 are closed and the communication control switches 91 or 92 operated to their uppermost positions. When this is done, for instance at station 1, the amplifier is rendered operative with reduced "B" potential and loudspeaker 11 is connected to the output of the amplifier for reception of messages from the sub-stations which are connected to the input of the amplifier. Loudspeaker 11 is connected to the output of the amplifier through conductor 107, switch blade 102, and conductor 115. The loudspeakers at the sub-stations are connected to the input of the amplifier through the selector switches 93, conductor 109, switch blade 103, and conductor 116. Upon reception of a call, the operator at station 1 may return the call by operating the communication control switch to its lowermost position, at which time loudspeaker 11 is connected to the input of amplifier 16, and the output of the amplifier is connected to the calling sub-station through conductors 115 and 114, switch blade 103, conductor 109, and the selector switch 93 associated with the calling sub-station.

From the foregoing it may be noted that the communication control switches at the master stations have two modes of operation and that the mode of operation is dependent upon whether or not the communication is between master

stations or a master station and a sub-station. By utilization of two sets of selector switches, one associated with each type of station, the operator at any master station can readily determine the proper mode of operation. Thus, confusion as to the proper mode of operation of the communication control switches is avoided.

It is to be noted that while only a comparatively few stations have been shown in each of the embodiments of the invention illustrated, it should be understood that the number of stations may be multiplied to any extent desired. Furthermore, while all of the stations illustrated are of the type employing a common conductor, it should be understood that the common conductor may be eliminated and that pairs of conductors may be utilized for each station, in which event the various switches would be modified accordingly.

While the invention has been disclosed in connection with specific details of preferred embodiments thereof, it should be understood that such details are not intended to be limitative of the invention except in so far as set forth in the accompanying claims.

Having thus described my invention, what I claim as new and desired to secure by Letters Patent of the United States is:

1. A unit for use at a station in an intercommunicating system of the loudspeaking type, including in combination, an amplifier, a voice reproducer, and means for connecting said voice reproducer to the output of said amplifier and for rendering said amplifier operative with reduced "B" potential.

2. A unit for use at a station in an intercommunicating system, including in combination, an amplifier, a source of primary power and a source of "B" potential for said amplifier, a voice reproducer, "B" potential reducing means, and switch means for connecting said voice reproducer to the output of said amplifier and for rendering effective said "B" potential reducing means.

3. In an intercommunicating system of the loudspeaking type, the combination including, an amplifier having input and output connections, a source of primary power and a source of "B" potential for said amplifier, a loudspeaker-microphone located in proximity to said amplifier, a loudspeaker-microphone located remote from said amplifier, "B" potential reducing means, and means including a manually operable switch and circuits associated with said amplifier, "B" potential reducing means and loudspeaker-microphones controlled by said switch for connecting the first of said loudspeaker-microphones to the output and the second of said loudspeaker-microphones to the input of the amplifier and rendering effective said "B" potential reducing means.

4. In an intercommunicating system as set forth in claim 3, wherein the switch and circuits are so arranged that in another position of the switch the connections of the loudspeaker-microphones to the amplifier are reversed and full "B" potential is supplied to the amplifier.

5. In an intercommunicating system of the loudspeaking type, the combination including, a first station having a normally operative amplifier, a multi-position communication control switch, a loudspeaker-microphone and amplifier "B" potential reducing means, a second station having a loudspeaker-microphone, and circuits associated with said amplifier, loudspeaker-microphones and "B" potential reducing means so constructed and arranged with respect to said control switch that in one position of the latter the loudspeaker-microphones at the first and second stations are connected to input and output of the amplifier and the "B" potential reducing means is rendered effective and that in another position the connections of the loudspeaker-microphones to the amplifier are reversed and full "B" potential is supplied to the amplifier.

6. In an intercommunicating system of the loudspeaking type, the combination including, a first station having a normally operative amplifier, a multi-position communication control switch, a loudspeaker-microphone and amplifier "B" potential reducing means, a second station having a loudspeaker-microphone, and circuits associated with said amplifier, loudspeaker-microphones and "B" potential reducing means so constructed and arranged with respect to said control switch that in one position of the latter the loudspeaker-microphones at the first and second stations are connected to output and input of the amplifier and the "B" potential reducing means is rendered effective and that in another position the loudspeaker-microphones are connected to the amplifier as aforesaid and full "B" potential is supplied to the amplifier and in a third position the connections of the loudspeaker-microphones to the amplifier are reversed and full "B" potential is supplied to the amplifier.

7. In an intercommunicating system of the loudspeaking type, the combination including, a plurality of stations each including a loudspeaker-microphone, an amplifier, a source of primary power normally connected to said amplifier, a source of "B" potential, "B" potential reducing means and a communication control switch, interstation circuits between said stations, and means including the control switch at each station and circuits controlled thereby for connecting an interstation circuit to the input of said amplifier, the loudspeaker-microphone to the output of the amplifier and for rendering effective said "B" potential reducing means.

8. In an intercommunicating system of the loudspeaking type, the combination including, a plurality of stations each having a loudspeaker-microphone, an amplifier, a source of primary power normally connected to said amplifier, a source of "B" potential, "B" potential reducing means, a communication control switch and a station selector switch, and a number of communication circuits equal to the number of stations, the communication control switches at each station controlling circuits associated with the amplifier, "B" potential reducing means, loudspeaker-microphone and selector switch so that in one position of the communication control switch and with the selector switch connected to an interstation circuit individual to the station, that interstation circuit is connected to the amplifier input by said communication control switch, the "B" potential reducing means is effective and the loudspeaker-microphone is connected to the output of the amplifier, whereby the station is conditioned for reception at reduced volume, and so that in another position the loudspeaker-microphone is connected to the output of the amplifier, the interstation circuit is connected to the input of the amplifier through said selector switch and the "B" potential reducing means is rendered ineffective, whereby the

station is conditioned for transmission at full volume.

9. In an intercommunicating system of the loudspeaking type, the combination including, a plurality of stations each having a loudspeaker-microphone, an amplifier, a source of primary power normally connected to said amplifier, a source of "B" potential, "B" potential reducing means, a communication control switch and a station selector switch, and a number of communication circuits equal to the number of stations, the communication control switches at each station controlling circuits associated with the amplifier, "B" potential reducing means, loudspeaker-microphone and selector switch so that in one position of the communication control switch and with the selector switch connected to an interstation circuit individual to the station, that interstation circuit is connected to the amplifier input by said communication control switch, the "B" potential reducing means is effective and the loudspeaker-microphone is connected to the output of the amplifier, whereby the station is conditioned for reception at reduced volume, and so that in a second position the loudspeaker-microphone is connected to the output of the amplifier, the interstation circuit is connected to the input of the amplifier through said selector switch and the "B" potential reducing means is rendered ineffective, whereby the station is conditioned for transmission at full volume, and so that in a third position the amplifier is rendered inoperative by cutting off its "B" supply and the loudspeaker-microphone is connected to the selector switch, whereby a selected station can be called through the amplifier at the selected station after which the called station can control the direction of communication by operation of the communication control switch thereat.

10. In an intercommunicating system of the loudspeaking type, the combination including, a station having a loudspeaker-microphone, an amplifier, a source of primary power normally connected to said amplifier, a source of "B" potential, "B" potential reducing means, a communication control switch and a station selector switch, a plurality of other stations provided with loudspeaker-microphones and call switches, and a number of communication circuits equal to the number of stations, the communication control switch at said first station controlling circuits associated with the amplifier, "B" potential reducing means, loudspeaker-microphone and selector switch so that in one position of the communication control switch and with the selector switch connected to an interstation circuit individual to the station, that interstation circuit is connected to the amplifier input by said communication control switch, the "B" potential reducing means is effective and the loudspeaker-microphone is connected to the output of the amplifier, whereby the station is conditioned for reception at reduced volume from said other stations upon operation of the call switches thereat to connect the loudspeaker-microphones to the circuit individual said first station, and so that in another position the loudspeaker-microphone is connected to the output of the amplifier, the interstation circuit is connected to the input of the amplifier through said selector switch and the "B" potential reducing means is rendered ineffective, whereby the station is conditioned for transmission to a selected other station.

11. In an intercommunicating system of the loudspeaking type, the combination including, a plurality of stations of the type having a loudspeaker-microphone, amplifier, station selecting means and a communication control switch, a plurality of other stations of the type having a loudspeaker-microphone, and interstation circuits between said stations, said communication control switches being operable according to one mode when communication is carried on with a station of the first type and according to another mode when communication is carried on with a station of the other type, and each of said stations of the first type having separate station selecting means for each type of station to assist the operators thereat in properly operating the communication control switch.

12. In an intercommunicating system of the loudspeaking type, the combination including, a plurality of stations each having a loudspeaker-microphone, an amplifier, a switch controlling the direction of communication and the "B" supply to the amplifier, and two groups of station selector switches, a plurality of other stations each having a loudspeaker-microphone, one of said groups of selector switches being associated with said first mentioned stations and the other with said other stations, interstation circuits between said stations, said communication control switch being so constructed and arranged in circuit with the loudspeaker-microphone, amplifier, "B" supply controlling means, and groups of selector switches, so that when one of said first mentioned stations is selected the communication control switches at the stations are alternately operable between two positions for reception and transmission, the transmission being through the amplifier at the transmitting station, and so that when one of said other stations is selected the communication control switch at the selecting station is alternately operable between one of said two and a third position for reception and transmission through the amplifier at the selecting station.

13. In an intercommunicating system of the loudspeaking type, the combination including, a plurality of master stations each having a loudspeaker-microphone, an amplifier, a switch controlling the direction of communication and also operable to supply full or reduced "B" potential to or cut off the "B" supply to the amplifier, and two groups of station selector switches, a plurality of sub-stations each having a loudspeaker-microphone, one of said groups of selector switches being operable to select master stations and the other to select sub-stations, interstation circuits between said stations each of which is individual to a station, the communication control switch at each station being so constructed and arranged in circuit with the loudspeaker-microphone, amplifier, "B" supply controlling means, selector switches and interstation circuits that in one position the loudspeaker-microphone is is connected to the interstation circuit individual thereto and the amplifier "B" supply is cut off, whereby the master station is conditioned for reception of calls from other master stations, so that in another position the loudspeaker-microphone is connected to the input of the amplifier, full "B" potential is supplied to the amplifier and the output of the amplifier is connected to both groups of stations selector switches, whereby the station is conditioned for transmission of messages to other stations, and so that in a third position the loudspeaker-microphone at the master station is connected to the output of the am-

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plifier and the selector switches associated with the sub-stations are connected to the input of the amplifier, whereby the master station is conditioned for reception from sub-stations.

14. In an intercommunicating system of the loudspeaking type, the combination including, a pair of stations each provided with an amplifier, a source of primary power to which the amplifier is normally connected, amplifier "B" potential reducing means, a loudspeaker microphone, a communication control switch and station selector switch means, and interstation circuits between said stations, the communication control switch at each station being constructed and arranged with respect to the amplifier, "B" potential reducing means, loudspeaker-microphone and selector switch means so that in a normal position the amplifier is supplied with reduced "B" potential, an interstation circuit is connected to the amplifier input, and the loudspeaker-microphone is connected to the amplifier output, so that in a second position the amplifier output is connected to an interstation circuit through the selector switch means, the amplifier input is connected to the loudspeaker-microphone, and the amplifier is supplied with full "B" potential, and so that in a third position the amplifier "B" supply is cut off and the loudspeaker-microphone connected to an interstation circuit, whereby one station can call another by operating the communication control switch thereat to its third position, after which the called station can control the direction of communication by operation the communication control switch thereat between its first and second positions.

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