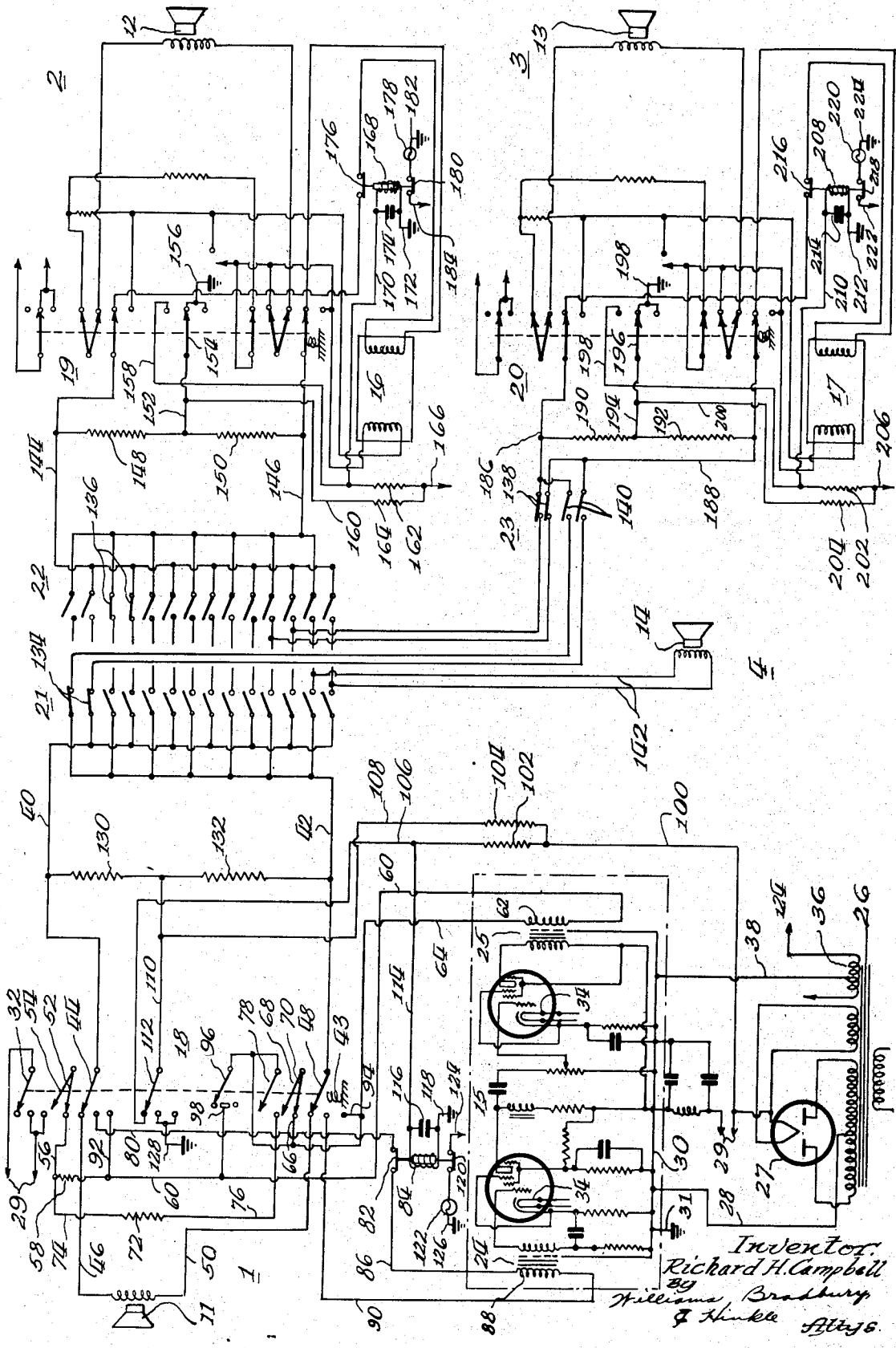
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COMMUNICATION SYSTEM

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COMMUNICATION SYSTEM

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The present invention pertains to intercommunication systems, and more particularly to intercommunicating systems of the loudspeaking type employing amplifiers, and has for its primary object the provision of a system rendering it less possible to connect amplifiers in series whereby undesirable overloading and objectionable noises otherwise resulting are avoided.

In loudspeaking intercommunicating systems of the type comprising a plurality of stations each including an amplifier, a translating device utilizable both as a microphone and a receiver, a communication control switch normally connecting the device to an interstation circuit for the reception of calls from other stations and operable into positions to connect the interstation circuit to the input of the amplifier and the device to the output of the amplifier, and vice versa, it is possible to connect the output of one amplifier to the input of another amplifier. The result is what may be aptly termed "double amplification," that is, two amplifiers in series are used instead of one for which the system is designed. This double amplification results in a very undesirable overloading of the amplifier whose input is connected to the output of the other because of the excessive voltage supplied to the input of the amplifier, which is normally excited only by the low voltage derived from the translating device, ordinarily a loudspeaker of the permanent magnet type, when utilized as a microphone. In addition, the result is the production of a loud "squawk" at the second station.

It is an object of the present invention to provide a new and improved system of the type described above wherein, upon selection of a busy station by another station, the circuit connections at the selecting station are so modified that the operator thereat is prevented from either listening or talking through the amplifier thereat.

A further object of the invention is to provide a circuit controlling means for modifying the circuit of the amplifier and also for providing a visual signal upon selection of a busy station.

Another object of the present invention is to provide a system wherein the circuit modifying means at a selected and not busy station is controlled to prevent the operator at the called station from utilizing the amplifier thereat, whereby double amplification is prevented when two stations are in communication with each other.

Other circuit arrangements for giving indication of the operative condition of a selected station are disclosed and claimed in my co-pending applications Serial Nos. 342,835 and 342,836 filed contemporaneously herewith. The first of these also discloses and claims circuit arrangements for controlling the operativeness of the amplifier.

Other objects and advantages of the present invention will become apparent from the ensuing description, in the course of which reference is made to the accompanying drawing, the single feature of which schematically represents a preferred embodiment of the invention.

Referring now to this figure, it may be seen that the illustrated intercommunication system is of the loudspeaking type, wherein communication is carried on alternately in opposite directions between a plurality of master stations under the control of manually operable communication direction control switches and wherein communication may be carried on between a master station and one or more substations under the control of a communication direction control switch at the master station.

The master stations are indicated by reference characters 1, 2 and 3 and the substation by reference character 4. These stations are provided with translating devices capable of being utilized both as microphones and loudspeakers, such as the loudspeakers 11 to 14, inclusive, which may be of the well-known permanent magnet type. The master stations 1, 2 and 3 are provided with amplifiers 15, 16 and 17, communication direction control switches 18, 19 and 20, and station selector switches 21, 22 and 23, all respectively.

The amplifiers may be of any well-known construction, and from the figure it may be seen that only the amplifier 15 at station 1 has been illustrated in detail. The amplifier comprises an input transformer 24 and an output transformer 25 interconnected by two stages of amplification. Power is supplied to the amplifier from a suitable source of alternating current through a transformer 26 and in part through a rectifier 27. The supply of rectified current (the B supply) is directed to the amplifier through conductors 28 and 29, the former of which is connected directly to a common conductor 30 of the amplifier, which is grounded as indicated by reference character 31, and the latter of which has interposed therein a power switch 32 operable simultaneously with the communication direction control switch 18. The B supply circuit to the amplifier is completed when the communication direction control switch is operated to condition the station for either talking or lis-

tening, and the power is cut off when the station is in idle condition.

The amplifier is conditioned to be ready for instantaneous use whenever the communication direction control switch is operated simultaneously to condition the station for talking or listening and to complete the B supply circuit by reason of the fact that the cathode heaters 34 of the two tubes of the amplifier are continuously supplied with heating current from a secondary winding 36 and transformer 26, the mid point of which is connected to the common ground conductor 30 by the conductor 38.

The communication direction control switch 18 is a manually operable multi-pole three-position switch. In a first position (the normal and the up and idle position), the loudspeaker 11 is connected directly to a communication circuit comprising conductors 40 and 42 for the reception of calls from other stations provided with amplifiers; that is, some other master station. In a second position (the intermediate and listening position) the loudspeaker is connected to the output and the communication circuit to the input of the amplifier. In a third position (the down and talking position, from which the switch is biased by a spring 43 into its intermediate position upon release) the loudspeaker is connected to the input and the communication circuit to the output of the amplifier.

The connection of the loudspeaker to the communication circuit in the idle position of the communication direction control switch, in which the switch 18 at station 1 is illustrated, is as follows: From conductor 40 through switch blade 44 and conductor 46 and from conductor 42 through switch blade 48 and conductor 50. In passing, it may be noted that in the idle position of the communication control switch, the "B" supply to the amplifier is disconnected by reason of the fact that the circuit through conductor 29 is interrupted by switch blade 32.

The connection of the loudspeaker to the output and the communication circuit to the input of the amplifier in the intermediate position of the communication direction control switch (in which position switches 19 and 20 at stations 2 and 3 are illustrated) is effected in the following manner: The loudspeaker 11 is connected to the output of the amplifier through conductor 46, switch blades 54, 55, conductor 56, a volume control resistor 58, and conductor 60, leading to one terminal of the secondary winding 62 of output transformer 25, and thence back to the loudspeaker through conductor 64, branch conductor 66, switch blades 68, 70, and conductor 50. At the same time, resistor 72 is connected in parallel with loudspeaker 11, in order to maintain substantially constant the impedance of the receiving circuit through a conductor 74 connected to conductor 56 and resistor 58, conductor 76 and switch blade 78. The connection of the communication circuit to the input of the amplifier is effected through switch blade 44, conductor 80, normally closed switch 82, controlled by a normally energized solenoid 84 forming one of the important features of the present invention, and the operation of which will be described in greater detail hereinafter, and conductor 86 to one terminal of the primary winding 88 of input transformer 24 and from the other terminal of this primary winding to conductor 42 through conductor 90 and switch blade 48.

The connection of the loudspeaker to the input and the communication circuit to the output of the amplifier in the third position of the communication direction control switch is effected in the following manner: The loudspeaker is connected to the input through conductor 46, switch blades 54, 52, conductor 80, the normally closed switch 82, and conductor 86, leading to one terminal of the primary winding 88 and from thence back to the other terminal of the loudspeaker through conductor 90, switch blades 70, 68, and conductor 50. The communication circuit is connected to the output of the amplifier through switch blade 44, branch conductor 92, and conductor 60, leading to one terminal of the secondary winding 62 and from thence to the other communication conductor 42 through conductor 64, branch conductor 94, and switch blade 48.

In order to avoid undesirable clicking noises while reversing the connections of the loudspeaker communication circuit to the input and output of the amplifier, there is provided a switch blade 96 and an elongated contact 98 connected respectively to the output conductors 64 and 60, so as to short-circuit the output when the communication direction control switch is operated from its listen to its talk position, or vice versa.

An important feature of the present invention is the provision of means preventing double amplification when the system is operated properly and decreasing the possibility of double amplification when the system is improperly operated. In the instant embodiment, this means comprises circuit modifying means, namely, the previously-referred-to solenoid 84. This solenoid is normally energized, that is, when the communication control switch is in its idle position, from the rectifier through conductor 100, resistors 102 and 104 connected in parallel by conductors 106, 108, 110 and switch blade 112 connecting conductor 110 to conductor 106 and conductor 114. Solenoid 84 is shunted by a condenser 116 and connected to ground through a conductor 118.

The solenoid 84, when energized, as it is under normal conditions, not only closes switch 82, but also closes switch 120 to connect a combined pilot and busy signal light 122 to a portion of the secondary winding 36 associated with transformer 26 through a circuit including conductor 124 and ground connection 126.

The resistors 102 and 104 are so proportioned with respect to the resistance of solenoid 84 that, when the communication control switch is operated to its intermediate or lowermost positions, at which time conductor 110 is grounded by switch blade 112 through the ground connection 128, the solenoid 84 is maintained energized. Good results have been obtained by using a solenoid having a resistance of about 12,000 ohms and making the resistors 102 and 104 with a resistance of about 200,000 ohms. The solenoid 84 is operatively connected to the interstation circuit through the communication conductors 40 and 42 and through the previously-mentioned switch blade 112 and conductor 110, the latter being connected between a pair of resistors 130 and 132 connected in series across conductors 40 and 42. These resistors have resistances of about 500 ohms each.

The above-described arrangement is such that if the operator at station 1 selects a station that is not busy, then the solenoid 84 remains energized so that the circuit to the input of the amplifier is completed by switch 82. However, if the operator at station 1 selects a busy station,

with the communication control switch at station 1 in its normal position, then the solenoid 84 is rendered ineffective to maintain switch 82 in its closed position, and as a result the switch 82 is opened, rendering it impossible for the operator at station 1 effectively to utilize the amplifier 15. Thus, it is impossible for the operator at station 1 to connect amplifier 15 in circuit with a busy station so as to create what has been termed double amplification.

A further advantage of the described arrangement is that if another station tries to listen to what is going on at station 1, then the solenoid 84 is de-energized and the pilot light 122 is extinguished to indicate this. The above-described advantages will become more apparent from a detailed description of the operation, appearing hereinafter following a description of the other stations in the system.

The selector switch 21 at station 1 includes switches individual to station 1, as for instance the two indicated by reference character 134, which are termed the station number 1 switches and which are ordinarily maintained in closed position in order that other stations may communicate with station 1. Each of the master stations is provided with as many pairs of switches as there are stations in the system, so that each station may communicate with the others. Thus, the selector switch 22 at station 2 is illustrated as having the same number of switches as selector switch 21, and the switch blades 136 thereof are closed in order to connect station 2 to the system for the reception of calls from other stations. The selector switch 23 at station 3, not illustrated in full, has been shown as including only the two pairs of switches 138 and 140, the former of which may be considered as being the switches associated with station 3.

The loudspeaker 14 at station 4 is connected directly by conductors 142 to one pair of interstation conductors so that it may be placed in communication with any of the master stations whenever the proper selector switches are operated at the master stations.

The apparatus at stations 2 and 3 corresponds identically with that at station 1, and for this reason it is not deemed necessary to describe the various circuit connections in detail. It may be noted, however, that the communication switches at stations 2 and 3 have been illustrated in their intermediate positions, as distinguished from the communication control switch as station 1, which is illustrated in its normal or uppermost position. The signalling circuit, however, to which the present invention primarily pertains, will be described in order that a better understanding may be had thereof.

The communication circuit conductors at station 2 are indicated by reference characters 144 and 146. Connected across these in series are the resistors 148 and 150 and from between them there extends a conductor 152 to switch blade 154 illustrated in the listen position wherein, and in the talk position, it completes a circuit to ground through grounding connection 156. The switch is operable in its uppermost position to complete a connection between conductor 152 and conductor 158 and conductor 160 to connect in parallel resistors 162 and 164. Energy from the rectifier (not shown) associated with amplifier 16 is supplied through a conductor 166 to the circuit modifying solenoid at station 2, indicated by reference character 168. The solenoid is connected by conductor 170 to conductor 158 and by conductor 172 to ground. The solenoid is also shunted by a condenser 174. The solenoid is normally energized and when so energized it is effective to complete the input circuit to amplifier 16 by means of switch 176 and to complete a circuit to the combined pilot and signal light 178 by another switch 180. The pilot light is grounded by a conductor 182 and is adapted to be connected to a suitable source of power by conductor 184.

The communication circuit at station 3 comprises the conductors 186 and 188 across which are connected in series the resistors 190 and 192, from between which leads a conductor 194 to switch blade 196. In the indicated position of the switch blade and in the talk position, it completes the circuit to ground through the grounding connection 198. The switch blade is operable upwardly to complete a circuit between conductor 194 and a conductor 198 and conductor 200 to connect in parallel the resistors 202 and 204.

The adjacent ends of resistors 202 and 204 are connected by a conductor 206 to a source of power (not shown), which may be, as at station 1, the rectifier associated with the amplifier. The circuit modifying solenoid at station 3 is indicated by reference character 208, one terminal of which is connected by conductor 210 to conductor 198 and the other terminal of which is grounded by a conductor 212. The solenoid is shunted by a condenser 214. The solenoid has associated with it a pair of switches 216 and 218, the first of which controls the amplifier input circuit and the latter of which controls a circuit to the combined pilot and signal light 220. The solenoid is normally energized, and when so energized, the amplifier input circuit is completed and the light connected to a suitable source of power through conductor 222 and the ground connection 224.

In the operation of the system described above in detail, it is contemplated that each of the amplifiers will normally be supplied with power from a suitable alternating current source through the transformers and the communication control switches will be in their uppermost positions, such as that at station 1. As a result, the solenoid windings will normally be energized and the electric lights supplied with energy, whereby these lights will act as pilot lights in addition to acting as signalling devices, and the amplifier input circuits will be completed. The amplifiers are normally inoperative, but are conditioned for instantaneous operation by reason of the fact that the cathode heaters are normally supplied with energy, but the "B" supply is cut off by the switches 32 associated with the various communication control switches. The station selector switches individual to the respective stations are closed so as to condition the stations for the reception of calls from other stations.

In the description of the operation, it is assumed that station 1 is not busy and that the communication control switch 18 thereat is in its idle position and that station 2 desires to communicate therewith. Then, with the communication control switch 19 at station 2 in its idle position, the operator at station 2 closes the uppermost pair of switches of selector switch 22 to connect the communication circuits 40, 42 and 144, 146. Inasmuch as the point between resistors 130 and 132 at station 1 is ungrounded, the solenoids at stations 1 and 2 remain energized, thus giving an indication to the operator

at station 2 that the selected station is free to receive a call. The operator at station 2 may then operate the communication control switch 19 thereat to its listen or talk position, at which time switch blade 154 connects to ground the point between resistors 148 and 150. The result of this operation is the de-energization of solenoid 84 at station 1 to break the amplifier input connection at that station and to extinguish light 122. The disconnection of the amplifier input circuit prevents the operator at station 1 from utilizing the amplifier thereat and the extinction of the light indicates to the operator at station 1 that someone is either listening or desires to talk to him. If the operator at station 2 operates the communication control switch to its talk position, then the operator at station 2 can talk to the operator at station 1. At this time the loudspeaker 12 at station 2 is connected to the input of amplifier 16 and the loudspeaker 11 at station 1 is connected to the output of the amplifier 16. Thereafter communication may be carried on between the two stations by the operator at station 2 manipulating the switch 19 thereat between its middle and lowermost positions.

If the operator at station 3 should now select either station 1 or station 2 with the communication control switch 20 thereat in its normal position, the solenoid 208 at that station is de-energized to indicate to the operator that station 1 or 2, which ever is selected, is busy, and likewise the input circuit of amplifier 17 is broken, so as to prevent double amplification. The de-energization of solenoid 208 results from the fact that with switch blade 196 in its uppermost position, the solenoid 208 is grounded through the interstation circuit and through switch blade 154 at station 2.

It should be noted that the amplifier 16 at station 2 remains operative when the solenoid 168 is initially energized and the communication control switch then operated to its listen or talk position. The solenoid is maintained energized by reason of the fact that even though conductor 152 is grounded, the ground circuit extends through resistor 164, so that only a portion of the current supplied to the solenoid is shunted therefrom.

From the above-described mode of operation, it may be seen that the present invention provides an arrangement whereby double amplification is prevented when two stations are in communication with each other. Double amplification is also prevented when a third station properly selects either of the two stations in communication. Thus, if the selection of one of two busy stations is made with the communication control switch at the third station in its proper position, it is impossible for the selecting station either to talk or listen through the amplifier thereat, although the operator at station 3, taking a specific instance, can listen to the conversation between stations 1 and 2 through the loudspeaker 13 with the communication control switch in its uppermost or idle position.

The mode of operation of the system is substantially the same when station 1 is in communication with the substation 4. At this time conductor 110 at station 1 is connected to ground by switch blade 112. Solenoid 84 remains energized, but if station 2 or 3 should now select station 1, then the solenoid 208 thereat is grounded through the previously-mentioned ground connection, the grounding circuit extending through the interstation circuit.

It may be mentioned that the master stations may also communicate with each other by alternate operation of the switches at the two stations between their uppermost and lowermost positions. If this mode of operation be followed, then the solenoids at the two stations are alternately energized and de-energized, so that the amplifiers at the two stations are alternately rendered operative. However, as in the first-described mode of operation, if a third station should select either of the two stations communicating with each other, the solenoid at the first station is de-energized to give the operator at the third station an indication that the selected station is busy, and likewise to prevent the operator at the third station from effectively utilizing the amplifier thereat whereby double amplification is prevented.

It is to be noted that while only a comparatively few stations have been shown in each of the embodiments illustrated, it should be understood that the number of stations may be multiplied to any extent desired. Although the invention has been disclosed 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 desire to secure by Letters Patent of the United States is:

1. In a multiple station intercommunicating system, the combination including, signal means at each station, current responsive means normally occupying a predetermined position controlling the signal means at each station, an amplifier at each station, a communication control switch at each station associated with the amplifier thereat, an amplifier circuit controlled by said switch, and switch means in said circuit operable by said current responsive means.

2. In a multiple station intercommunicating system, the combination including, a communication control switch at each station, an amplifier at each station, an amplifier input circuit controlled by said switch, switch means in said input circuit, and current responsive means at each station normally occupying a predetermined position for controlling said switch means.

3. In a multiple station intercommunicating system, the combination including, means including a switch and an amplifier having input and cutput connections controlled thereby at each station for establishing communication circuits between stations, switch means in said input connection to the amplifier, and current responsive means for controlling said last-mentioned switch means.

4. In a multiple station intercommunicating system, the combination including, means including a switch and an amplifier having input and output connections controlled thereby at each station for establishing communication circuits between stations, switch means normally occupying a circuit making position in said input connection to the amplifier, and current responsive means operable in response to selection of a busy station for operating said second-mentioned switch to a circuit-breaking position.

5. In a multiple station intercommunicating system, the combination including, a translating device at each station utilizable both as a microphone and a receiver, an amplifier at each

station, an interstation circuit, a communication control switch for connecting said device to the input and said interstation circuit to the output of the amplifier, or vice versa, a switch in the input circuit, a solenoid controlling said last-mentioned switch, and means responsive to an operative condition of a selected station for controlling the energization of said solenoid.

6. In a multiple station intercommunicating system, the combination including, a translating device at each station utilizable both as a microphone and a receiver, an amplifier at each station, a communication control switch at each station operable in one position to connect said device to the input of the amplifier, means for connecting the station to a selected station, a switch in the input circuit of each station, a solenoid at each station controlling said last-mentioned switch, and means responsive to an operative condition of a selected station for controlling the energization of said solenoid.

7. In a multiple station intercommunicating system, the combination including, a translating device at each station utilizable both as a microphone and a receiver, an amplified having input and output connections, a source of "B" supply for the amplifier, an interstation circuit, a selector switch for connecting the interstation circuit to selected remote stations, a pair of resistors of relatively low resistance connected in series across said interstation circuit, a multipole communication direction control switch normally occupying a position wherein the "B" supply to the amplifier is disconnected and the interstation circuit is connected to the translating device, and operable to a second position wherein the "B" supply is connected to the amplifier and the interstation circuit and device to the input and output of the amplifier, respectively, and to a third position wherein the connections of the interstation circuit and device to the amplifier are reversed, a switch in the input circuit of the amplifier, a solenoid controlling said switch, said solenoid being connected to a source of power through a relatively high resistance resistor, a second high resistance resistor connected between said source of power and a point between said two first-mentioned resistors, a switch connected between said two first-mentioned resistors and operable by said communication control switch for connecting said first-mentioned high resistance resistor in parallel with the second-mentioned high resistance resistor in the normal position of said communication control switch and for connecting the point between said series connected resistors to ground in the second and third positions of said communication control switch, whereby when one station selects a busy station with the communication control switch in its normal position, the solenoid at said one station is grounded and the switch controlled thereby is operated to open the amplifier input circuit, and whereby when one station selects a station that is not busy and communicates therewith by operation of the communication direction control switch to its second and third positions, the solenoid at the called station is grounded and the switch controlled thereby is operated to break the input circuit to the amplifier at the called station.

8. In a system according to claim 7, wherein the source of power for the solenoids and the "B" supply is a rectifier adapted to be connected to an alternating current source.

9. In a multiple station intercommunicating system, the combination including, a translating device at each station utilizable both as a microphone and a receiver, an amplifier having input and output connections, an interstation circuit, a selector switch for connecting the interstation circuit to selected remote stations, a pair of resistors of relatively low resistance connected in series across said interstation circuit, a multipole communication direction control switch normally occupying a position wherein the interstation circuit is connected to the translating device, and operable to a second position wherein the interstation circuit and device are connected to the input and output of the amplifier, respectively, and to a third position wherein the connections of the interstation circuit and device to the amplifier are reversed, a switch in the input circuit of the amplifier, a solenoid controlling said switch, said solenoid being connected to a source of power through a relatively high resistance resistor, a second high resistance resistor connected between said source of power and a point between said two first-mentioned resistors, a switch connected between said two first-mentioned resistors and operable by said communication control switch for connecting said first-mentioned high resistance resistor in parallel with the second-mentioned high resistance resistor in the normal position of said communication control switch and for connecting the point between said series connected resistors to ground in the second and third positions of said communication control switch, whereby when one station selects a busy station with the communication control switch in its normal position, the solenoid at said one station is grounded and the switch controlled thereby is operated to break the input circuit of the amplifier.

10. In a multiple station intercommunicating system, the combination including, a translating device at each station utilizable both as a microphone and a receiver, an amplifier having input and output connections, an interstation circuit, a selector switch for connecting the interstation circuit to selected remote stations, a pair of resistors of relatively low resistance connected in series across said interstation circuit, a multipole communication direction control switch normally occupying a position wherein the interstation circuit is connected to the translating device, and operable to a second position wherein the interstation circuit and device are connected to the input and output of the amplifier, respectively, and to a third position wherein the connections of the interstation circuit and device to the amplifier are reversed, a switch in the input circuit of the amplifier, a solenoid controlling said switch, said solenoid being connected to a source of power through a relatively high resistance resistor, a second high resistance resistor connected between said source of power and a point between said two first-mentioned resistors, a switch connected between said two first-mentioned resistors and operable by said communication control switch for connecting said first-mentioned high resistance resistor in parallel with the second-mentioned high resistance resistor in the normal position of said communication control switch and for connecting the point between said series connected resistors to ground in the second and third positions of said communication control switch, whereby when one station selects a station that is not busy and communicates therewith by operation

of the communication direction control switch to its second or third positions the solenoid at the called station is grounded and the switch controlled thereby operated to break the input to the amplifier at the called station.

11. In a multiple station intercommunicating system, including in combination, a translating device at each station utilizable both as a microphone and a receiver, an amplifier having input and output connections, an interstation circuit, a selector switch for connecting the output circuit to selected remote stations, a multi-pole communication direction control switch normally occupying a position wherein the interstation circuit is connected to the translating device, and operable to a second position wherein the interstation circuit and device are connected to the input and output of the amplifier, respectively, and to a third position wherein the connections of the interstation circuit and device to the amplifier are reversed, a switch in the input circuit of the amplifier, a solenoid controlling said switch, a source of power for said solenoid, a switch operable by said communication control switch and circuits controlled thereby for connecting said solenoid to its source of power and to the interstation circuit in the normal position of said communication control switch and for connecting the interstation circuit to ground in the second and third positions of said communication control switch, whereby when one station selects a busy station with the communication control switch in its normal position, the solenoid, at said one station is grounded and the switch controlled thereby operated to break the amplifier input circuit, and whereby when one station selects a station that is not busy and communicates therewith by operation of the communication direction control switch to its second or third positions the solenoid at the called station is grounded and the switch controlled thereby operated to break the input circuit to the amplifier at the called station.

12. In a multiple station intercommunicating system, the combination including, an amplifier at each station having input and output connections, an interstation circuit leading from each station, voice receiving and transmitting means at each station, a communication control switch and circuits controlled thereby for controlling the connections of the amplifier, voice receiving and transmitting means and interstation circuit, said switch normally conditioning the station for reception of calls from other stations, normally closed switch means in the amplifier input circuit, current responsive means for controlling said switch means, and means associated with communication control switch for operating said current responsive means to open said normally closed switch when said station is selected for communication by another station.

13. A unit for use in a multiple station intercommunicating system, including in combination, signal means, current responsive means normally occupying a predetermined position controlling the signal means, an amplifier, a communication control switch, an amplifier input circuit controlled by said switch, and switch means in said input circuit operable by said current responsive means.

14. A unit for use in a multiple station intercommunicating system, including in combination, a communication control switch, an amplifier, an amplifier input circuit controlled by said switch, normally closed switch means in said input circuit, and normally energized current responsive means for controlling said switch means.

15. A unit for use in a multiple station intercommunicating system of the type wherein each station is provided with a translating device utilizable both as a microphone and a receiver, an amplifier, an interstation circuit, and a communication control switch for connecting said device to the input and said interstation circuit to the output of the amplifier, or vice versa, including in combination a switch in the amplifier input circuit, a solenoid controlling said last-mentioned switch, and means responsive to the condition of a selected station for controlling the energization of said solenoid.

16. A unit for use in a multiple station intercommunicating system of the type wherein each station is provided with a translating device utilizable both as a microphone and a receiver, an amplifier having input and output connections, a source of "B" supply, an interstation circuit, a selector switch for connecting the interstation circuit to selected remote stations, and a multi-pole communication direction control switch normally occupying a position wherein the "B" supply to the amplifier is disconnected and the interstation circuit is connected to the translating device, and operable to a second position wherein the "B" supply is connected to the amplifier and the interstation circuit and device are connected to the input and output of the amplifier, respectively, and to a third position wherein the connections of the interstation circuit and device to the amplifier are reversed, including in combination, a pair of resistors of relatively low resistance connected in a series across the interstation circuit, a switch in the input circuit of the amplifier, a solenoid controlling said switch, said solenoid being connected to a source of power through a relatively high resistance resistor, a second high resistance resistor connected between said source of power and a point between said two first-mentioned resistors, a switch connected between said two first-mentioned resistors and operable by said communication control switch for connecting said first-mentioned high resistance resistor in parallel with the second-mentioned high resistance resistor in a normal position of the communicating control switch, and for connecting the point between said series connected resistors to ground in the second and third positions of said communication control switch, whereby when one station selects a busy station with the communication control switch at the one in its normal position, the solenoid at said one station is grounded and the switch controlled thereby operated to break the amplifier input circuit, and whereby when said one station selects a station that is not busy, and communicates therewith by operation of the communication direction control switch to its second or third position, the solenoid at the selected station is grounded and operates the switch controlled thereby to break the input circuit to the amplifier at the selected station.

17. A unit for use in a multiple station intercommunicating system of the type wherein each station is provided with an amplifier having input and output connections, an interstation circuit leading therefrom, voice receiving and transmitting means, a communication control switch, and circuits controlled thereby for controlling the connections of the amplifier, voice receiving and transmitting means, interstation circuit, and

wherein the control switch normal conditions the station for reception of calls from other stations, including in combination, normally closed switch means in the amplifier input circuit, current responsive means for controlling said means, and means associated with said communication control switch for grounding said current responsive means through the interstation circuit to open said normally closed switch when said station is selected for communication by another station.

18. A unit according to claim 17, wherein the current responsive means operates signal means when grounded.

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