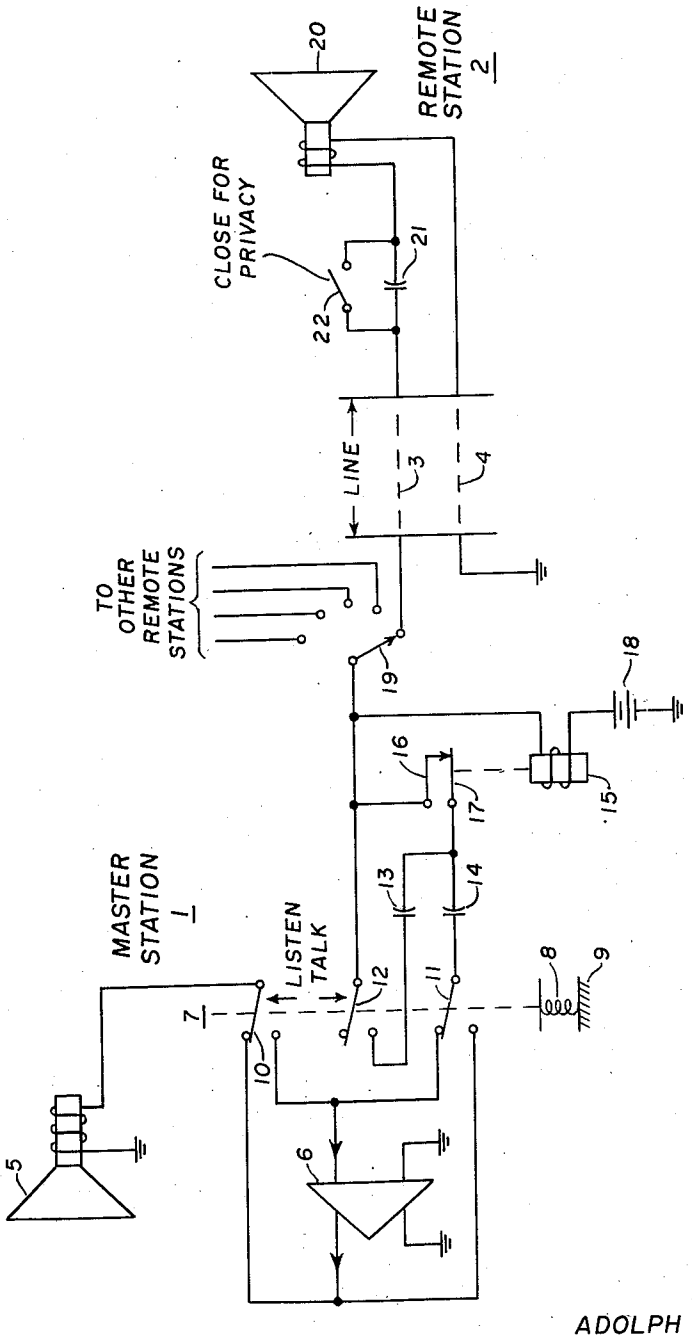
Aug. 13, 1957 A. A. BAKER, JR 2,802,900

INTERCOMMUNICATION SYSTEM

Filed June 1, 1954




INVENTOR.
ADOLPH A. BAKER, JR.
BY Philip A. Schmidt
HIS AGENT

United States Patent Office 2,802,900 Patented Aug. 13, 1957



2,802,900

# INTERCOMMUNICATION SYSTEM

Adolph A. Baker, Jr., Rochester, N. Y., assignor, by mesne assignments, to General Dynamics Corporation, a corporation of Delaware

Application June 1, 1954, Serial No. 433,610

4 Claims. (Cl. 179—1)

My invention relates to intercommunication systems, and more particularly to means for assuring the privacy of users thereof.

It frequently happens that an intercommunication system comprises a master station and a number of remote stations, the master station being so-called because its operator can initiate and carry on conversation with any one of the remote stations, whereas the remote stations cannot converse with each other. Such systems most commonly employ bidirectional transducers, that is, transducers which operate not only as loudspeakers to convert electrical energy into sound but also as microphones to convert sound energy into electrical energy. Master stations in systems of this type conventionally include amplifying means, such as an amplifier employing vacuum tubes, and communication-direction switching means having talk and listen positions. This switching means is conventionally spring-biased into the listen position, but may be displaced to the talk position when the operator of the master station wishes to speak to a remote station. The system may also include a station selecting switch for connecting the master station to the line extending to the particular remote station with which it is desired to converse.

Systems of this type are generally so arranged that the master station is controlled by a superior, and subordinates are stationed at the remote stations. By manipulating his station selecting switch, the superior may eavesdrop on proceedings at any of the remote stations. Even if the superior is not inclined to eavesdrop, his subordinates may still feel that such is the case. It may thus materially improve the esprit de corps of an organization using an intercommunication system to provide a non-eavesdropping arrangement, also known as a privacy system.

It is an object of my invention to provide a new and useful privacy system for an intercommunication system.

It is also an object of my invention to provide an intercommunication system privacy arrangement which offers a high degree of security to the users thereof, yet which is simple and inexpensive.

I accomplish the foregoing and other objects of my invention by providing privacy switch means at the remote station. The superior at the master station may call the remote station at any time, but if the privacy switch means is in the privacy position, no signal from the remote station can be heard until the subordinate at the remote station moves the switch means out of the privacy position.

To accomplish this type of operation, I provide a bifurcated signal path between the line and the transducer at the remote station. One branch of the bifurcated path is arranged to pass alternating current only, but the other branch is arranged to pass all frequencies including direct current. I also provide relay means and a source of direct current therefor at the master station, the relay and the source being connected in series with each other to the line. I prefer that the relay be arranged to be operated when the privacy switch means is closed.



In accordance with my invention, I provide transmission-interrupting means at the master station which are operative in response to the operation of the relay. I also provide a means for completing a talking path only when the communication-direction switching means is in the talk position, this completing means being operative regardless of the operation of the relay. I prefer that the transmission-interruption means and the means for completing the talking path be contained in first and second branches of a second bifurcated signal path at the master station. I further prefer that the transmission interruption means comprise a pair of break contacts on the relay, although those skilled in the art can appreciate that modifications of this arrangement are possible. The second branch may be an extra gang on the communication-direction switching means which completes the second branch only in the talk position. Thus the first branch is open when the privacy switch means is holding the relay operated, and the second branch is open when the communication-direction switching means is in the listen position. Eavesdropping is consequently impossible.

Further objects and advantages of my invention will become apparent as the following description proceeds, and the features of novelty which characterize my invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

For a better understanding of my invention, reference may be had to the accompanying drawing, which shows a schematic wiring diagram of a preferred embodiment of my invention.

Referring now to the drawing, there is shown a master station indicated generally by **1**, a remote station indicated by **2** and a line having conductors **3**, **4** interconnecting the remote and the master stations. Master station **1** is shown as having the most commonly encountered elements of an intercommunicating system of the type described: a bidirectional transducer, such as loudspeaker **5**; suitable amplifying means **6**, such as a vacuum tube amplifier; and a talk-listen switch **7**. Switch **7** is conventionally arranged to be biased into the listen position as by means of spring **8** reacting against a solid surface, indicated schematically at **9**, which may also support the stationary portion of switch **7**. Switch **7** may be of the well-known rotary wafer type having gangs **10** and **11**.

In addition to the foregoing elements at the master station, I prefer to provide an additional gang **12** on switch **7**, capacitors **13** and **14**, relay means **15** having break contact springs **16**, **17** and a suitable source of direct current for operating relay **15**, such as battery **18**. There may also be provided a conventional station selecting switch **19** for connecting master station **1** to remote station **2** or to other remote stations of the system at will.

Remote station **2** may also include a bidirectional transducer **20**; as in the case of transducer **5**, this may be of the type which functions both as a microphone and loudspeaker. There is also provided a capacitor **21** at remote station **2** in series with line **3**, **4**, this capacitor being shunted by privacy switch means **22**.

An examination of the drawing reveals that the signal path between line **3**, **4** and transducer **20** is bifurcated into a first and a second branch. The first branch is operative to pass alternating current only because of the inclusion of capacitance **21** in series therewith. The second branch is operative to pass all frequencies, including direct current, but there is provided privacy switch means **22** to open this second branch.

In similar fashion, there is provided a second bifurcated signal path between the communication-directing switch means **7** and line **3**, **4**. This bifurcated path also has two branches, the first branch passing through capacitor **13** and gang **12** of switch **7**, while the second branch is through break contacts **16**, **17** of relay **15**. Contacts

16, 17 constitute means operated by relay 15 for opening this second branch of the bifurcated path at the master station. Furthermore, gang 12 constitutes a switch means operative when switch 7 is in the listen position to open the first branch.

A conventional ground symbol has been used throughout the drawing to indicate connection to a plane of common reference potential, such as earth or zero potential. However, those skilled in the art can readily appreciate that the ground connections indicated may be made to a common metallic connection, such as a chassis. Alternatively, line 4 may comprise an earth return, although a metallic connection as indicated is preferable. In some instances, conductor 4 may comprise a shield around line 3.

Let it now be assumed that the operator of the master station wishes to call remote station 2. He accordingly moves station selecting switch 19 to the appropriate contact as shown. He then moves switch 7 to the talk position (down, in the drawing) against the force of spring 8. If switch 22 is in privacy position (closed) and consequently operated, a path is established from transducer 5 to transducer 20 extending from ground through transducer 5, gang 10, input of amplifier 6, output of amplifier 6, gang 11, capacitor 14, capacitor 13, gang 12, station selecting switch 19, line 3, closed switch 22, transducer 20 and line 4 to ground. If switch 22 is not in privacy position, relay 15 is not operated; a circuit between transducers 5 and 20 is then established, extending from ground, through transducer 5, gang 10, amplifier 6, gang 11, capacitor 14, contacts 17, 16, switch 19, line 3, capacitor 21, transducer 20 and line 4, to ground. The operator of the master station can obtain a reply from the remote station by releasing switch 7 to the listen position, in which case a circuit extends from ground, through line 4, transducer 20, capacitor 21, line 3, selector switch 19, back contacts 16, 17, capacitor 14, gang 11 in listen position, amplifier 6, gang 10, transducer 5 to ground. Under the foregoing conditions, the operation of the illustrated embodiment of my invention is substantially equivalent to that of a conventional intercommunication system.

When the subordinate at remote station 2 desires insurance against eavesdropping, he need merely close privacy switch means 22. This establishes a circuit for relay 15 extending from ground, through line 4, transducer 20, switch 22, line 3, station selecting switch 19, winding of relay 15 and source of potential 18 to ground. Even though relay 15 is operated, the operator at the master station 1 can call the person at remote station 2. This may be done by placing switch 7 in the talk position, in which case a circuit extends from ground through transducer 5, gang 10, amplifier 6, gang 11, capacitor 14, capacitor 13, gang 12, switch 19, line 3, switch 22, transducer 20 and line 4 to ground. However, no signal can travel in the reverse direction, i. e., from remote station 2 to master station 1, until the person at the former station so desires. To remove the privacy feature, switch 22 may be opened, thereby breaking the above-traced operating circuit for relay 15. This causes contacts 16, 17 to reclose and establish the talking circuit traced above.

While I have shown and described my invention as applied to a specific embodiment thereof, other modifications will readily occur to those skilled in the art. I do not, therefore, desire my invention to be limited to the specific arrangement shown and described, and I intend in the appended claims to cover all modifications within the spirit and scope of my invention.



What I claim is:

1. In an intercommunication system, the combination of a master station; a remote station; a line between said stations; amplifying means at said master station; communication-direction switching means having talk and listen positions at said master station; said stations each having a bidirectional transducer thereat; a first bifurcated signal path having first and second branches between said line and said transducer at said remote station; said first branch of said first path being operative to pass alternating current only and said second branch of said first path being operative to pass all frequencies including direct current; privacy switch means operative to open said second branch; relay means and a source of direct current therefor at said master station; said relay means and said source being connected in series with each other to said line, whereby said relay means operates only when said second branch of said first path is closed by said privacy switch means; transmission-interrupting means at said master station operative in response to the operation of said relay; and means for completing a talking path from said communication-direction switching means to said line only when said communication-direction switching means is in said talk position, regardless of the operation of said relay, whereby the operator of said master station may call said remote station at will but may not eavesdrop thereon if said privacy switch means at said remote station is closed.

2. In an intercommunication system, the combination of a master station; a remote station; a line between said stations; amplifying means at said master station; communication-direction switching means having talk and listen positions at said master station; said stations each having a bidirectional transducer thereat; a first bifurcated signal path having first and second branches connected between the remote station end of said line and said transducer at said remote station; said first branch of said first path being operative to pass alternating current only and said second branch of said first path being operative to pass all frequencies including direct current; privacy switch means operative to open said second branch; relay means and a source of direct current therefor at said master station; said relay means and said source being connected in series with each other to said line; a second bifurcated signal path having first and second branches connected between said communication-direction switching means and the master station end of said line; means operated by said relay for opening said second branch of said second path; and switch means operated when said communication-direction switching means is in said listen position for opening said first branch of said second path, whereby the operator of said master station may call said remote station at will but may not eavesdrop thereon if said privacy switch means at said remote station is closed.

3. The combination of claim 2 in which said first branch of said first bifurcated path includes a series capacitance.

4. The combination of claim 2 in which said first branch of said second path includes a series capacitance.

**References Cited** in the file of this patent

UNITED STATES PATENTS

2,269,144 Campbell ..... Jan. 6, 1942
2,529,912 Campbell ..... Nov. 14, 1950