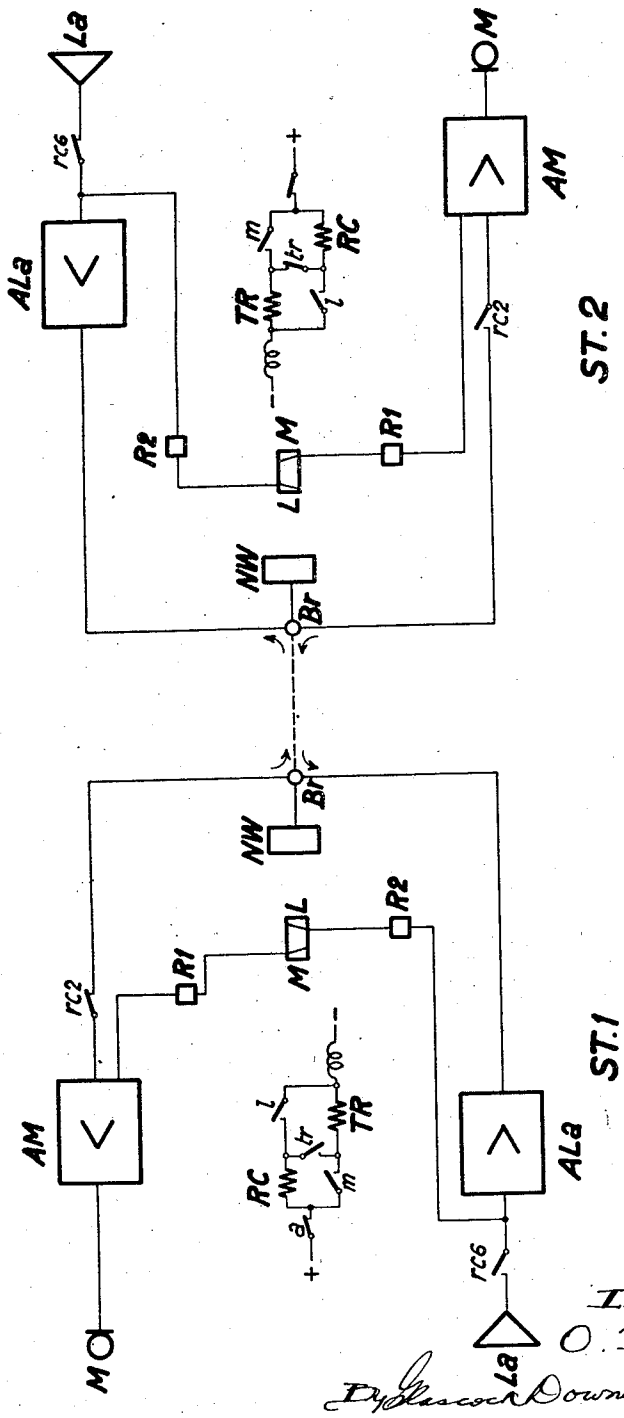
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VOICE OPERATED SWITCH FOR DUPLEX SYSTEMS

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VOICE OPERATED SWITCH FOR A DUPLEX SYSTEM

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This invention relates to an arrangement for changing over the direction of transmission in duplex systems for loud traffic.

Such arrangements are quite common and were hitherto effected by a switching device which, being in readiness for changing-over at the conclusion of audible signals, operated the change-over of the direction of transmission automatically at this stage (as for instance in the case of the switch device being controlled by a time-delay-relay). In these arrangements, it was further possible, independently of the conclusion of the audible signals, by means of manually operated equipment, to bring about a change-over of the direction of transmission.

The present invention relates to an arrangement for changing-over the direction of transmission in duplex systems for loud traffic, in which the changing-over of the direction of transmission usually takes place at the conclusion of the conversation or at any convenient moment during the conversation, without the use of a manually operated equipment. The switching is done by simply speaking into the microphone at the station wishing to call the other.

According to the invention the arrangement for changing-over the direction of transmission in bridge-duplex systems for loud traffic is characterized in that the microphone and loudspeaker circuits are connected through a differential-relay, the drive-armature of which can take up two working positions and one normal position. The relay is oppositely energised by the microphone and loudspeaker circuits respectively, hence modifying the condition of the switching-device on which the direction of transmission depends.

The accompanying drawing illustrates, by way of example, an arrangement according to the invention.

Both stations ST1 and ST2 are connected over the line L. Each station is equipped with a microphone M, a loudspeaker L*a*, amplifier equipment, i. e., amplifiers for outgoing microphone and incoming loudspeaker voice-currents A*m* and A*la*, and finally a bridge duplex switching apparatus in the line L at B*r*. In addition a balancing net system NW is symmetrically arranged with respect to L at B*r*. The switches *rc*2 and *rc*6, controlled by a relay RC of an accessory switching apparatus at the station, opens the out-going circuit of the amplifier A*m* associated with the microphone and closes the incoming circuit of the amplifier associated with the loudspeaker, respectively.

A differential relay ML having windings M and L, loops out-going circuits of the amplifiers via the rectifiers R1 and R2. The two windings of the differential relay control the contacts *l* and *m* of the accessory switching apparatus, the latter consisting of the afore-mentioned relay RC, a relay TR and two switches *a* and *tr*.

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The switching arrangements of the two symmetrical stations illustrated in the diagram corresponds to a changing-over interval in the conversation during which ST1 takes over the transmission and ST2, the receiving. This switching arrangement in operation position is normal after origination of a call.

On speaking into the microphone M at St1 the voice-current flows through the loudspeaker L*a* at ST2 via the amplifier A*m* at ST1, the switch *rc*2, both bridge duplex switches B*r*, the amplifier A*la* at ST2 and the switch *rc*6. In this way the winding M at ST1 and the winding L at ST2 are energised. Consequently the contact *m* closes and operates the relay TR. The closing of the relay contact *tr* has no further electrical effect on the non-energised relay RC on account of the latter being short circuited by the switch *m*.

At ST2 the switch *l* short-circuits the relay TR, the contact *tr* releases, the relay RC remaining energised as before.

The switches *rc*2 and *rc*6 on which the direction of transmission depends are controlled by relay RC. The electrical condition of relay RC remaining unaltered, no change in the direction of transmission occurs. Such a change can be operated only when the voice-current ceases, hence causing the switching apparatus to come automatically into action. In this case the electric state of ST1 is as follows:

The winding M of the differential relay ML is energized opening the contact at *m*, which, up to the present, short-circuited relay RC, so that this relay, already energised by a current flowing across switch *tr*, controls in its turn the closing and opening of contacts *rc*2 and *rc*6 respectively, thus bringing about a change-over in the direction of transmission.

The opposite switching condition is effected at ST2 in that the winding L is energised opening contact *l*, which, in further consequence of *tr* being open, releases the relay RC. As a result, the switching-over of contacts *rc*2 and *rc*6 is brought about and ST2 takes over the transmission (calling) ST1 the receiving.

On speaking now into M at ST2, the voice-current flows through L*a* at ST1 and the electric

condition will be respectively exactly the same as above described.

Now take for instance the case of the calling-station being at ST1 and of ST2 wanting to interrupt the conversation, i. e., wanting to change the direction of transmission. All he has to do is to speak into M at ST2. The following changes take place:

On energising the winding M of the differential relay LM at ST2, the magnetic field set up in L can be practically counterbalanced and the contact *l* will open. Under the former condition, the relay TR was short-circuited by the closed contact *l*, released the contact *tr* so that no current flowed through RC, thus preparing the station for calling. The respectively same changes take place at ST1, for, on energizing winding L of the differential relay ML, the magnetic field induced by M will be counterbalanced, contact *m* will open, relay RC will be energised and consequently the change-over of the direction of transmission is effected, at ST1. Upon hearing the audible signal from the loudspeaker at ST1 given by the operator at ST2, the operator at ST1 will cease to call into his microphone. By consequence, the winding M at ST2 and L at ST1 will be energised causing their corresponding contacts to close, whereby the relays Rc will be electrically immune, but will be prepared for a new change-over in the direction of transmission at some convenient interval.

Independent of the electric state of the switching arrangement according to the invention, whether ST1 or ST2 is playing the part of the calling or receiving station, or not, it is only necessary for the operator wanting to call to speak into his microphone in order to bring about a change-over in the direction of transmission.

The arrangement according to the invention can of course be combined with any of the accessory switching apparatus in use in telephony. In this way a time-delay-relay can be introduced to guard from being subjected to changing-over within certain time limits, the change-over being effected after intervals of more or less considerable length.

A certain amount of acoustic interference (echo) at each end is inevitable in sensitive apparatus but it can be reduced to a minimum by constructing the microphone-mouthpiece adequately. In some arrangements in which the electro-acoustic-transformer serves the two purposes of sending and receiving voice-currents, electric interference can result.

The balancing of the bridge impedance, depending on the range of the line over which the stations are looped, is effected on the bridge itself within very narrow limits. The incoming voice-current could also be converted with respect to frequency, and a corresponding frequency range limiting device could take the place of the impedance bridge, hence practically avoiding any back-feed within the station equipment. The voice-current frequency can without harm be reconverted on its passage over the amplifier A*la*.

What I claim is:

1. In a duplex system for loud traffic, a loudspeaker circuit, a microphone circuit, control contacts in said circuits for connecting and disconnecting the loudspeaker and the microphone, a differential relay connected in between said circuits, a relay for operating said contacts, an additional circuit including the contact operating relay, and control contacts in the additional circuit operated by said differential relay.

2. In a duplex system for loud traffic, a loudspeaker circuit, a microphone circuit, control contacts in said circuits for connecting and disconnecting the loudspeaker and the microphone, a differential relay connected in between said circuits, an additional circuit including two branches connected in parallel, a contact and a relay in each of the branches, one of the branch relays operating the control contacts, the branch contacts being operable by the differential relay, and a contact between the branches operable by the other branch relay to short circuit one of the branch relays according to the position of the branch contacts.

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