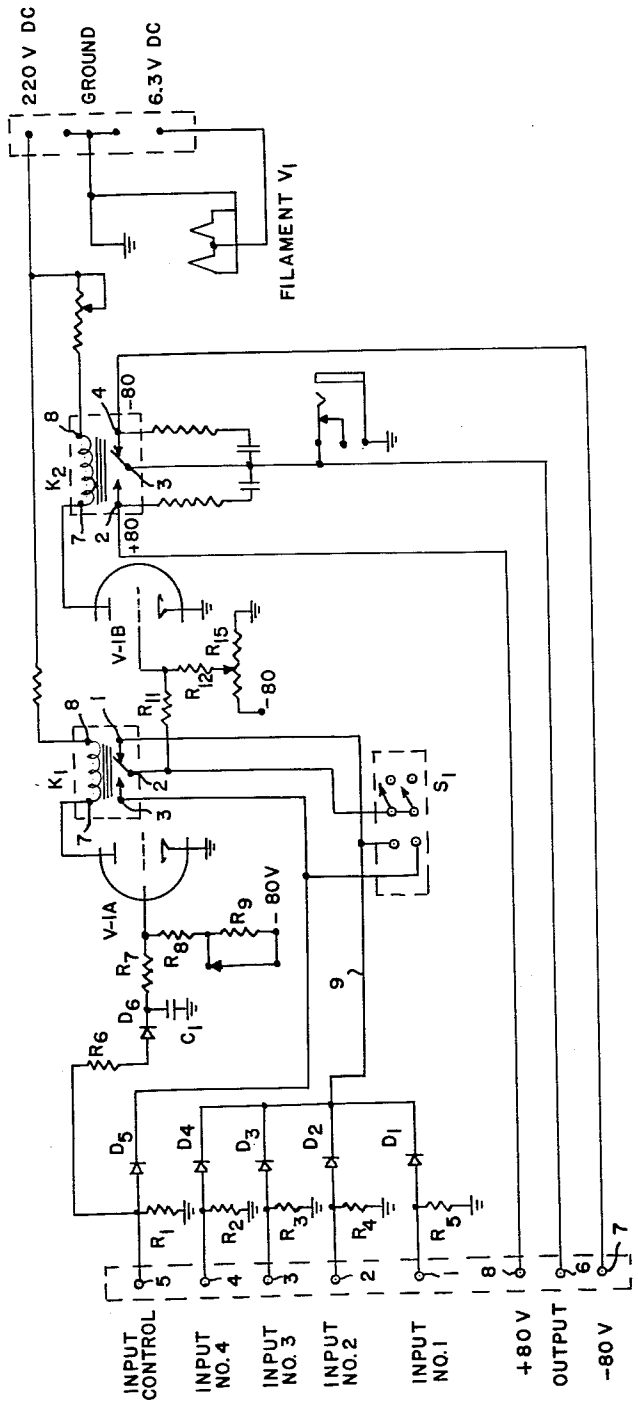
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CONFERENCE MIXER FOR TELEGRAPH CIRCUITS

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The invention described herein may be manufactured and used by or for the United States Government for governmental purposes without payment to me of any royalty thereon.

The purpose of this invention is to provide a network for coupling a plurality of telegraph circuits to a common output circuit in which provision is made for one of the circuits to act as a control circuit with a selective automatic override capability.

The mixer network will be described in more detail with reference to the schematic diagram of a specific embodiment thereof shown in the single FIGURE of the accompanying drawing.

Referring to the drawing, the specific conference mixer illustrated functions to reproduce the input telegraph signals at terminals 1—4 at the common output terminal 6, provided there is no signal at the control circuit input terminal 5. If there is an input telegraph signal at terminal 5, only this signal will be reproduced at output terminal 6.

Resistors R1—R5 act as load impedance for the input circuits connected to terminals 1—5. Diodes D1—D5 serve to isolate the input circuits from each other by making it impossible for energy in one circuit to be fed back into any of the other circuits. The telegraph signals with which the illustrated circuit is used are of the polarized type, in which a positive potential represents a space and a negative potential a mark, commonly used in teletypewriter circuits. The values of these potentials may be +80 volts and —80 volts, for example.

In the absence of an input signal on any of the input terminals 1—5, these terminals will normally be at the mark potential of —80 volts. Also output terminal 6 will be at the mark potential because of its connection through normally closed contacts 3—4 of relay K—2 to terminal 7 which is at —80 volts. The cathodes of diodes D1—D4 are connected together and thence through conductor 9, normally closed contacts 1—2 of K1, R11 and R12 to a point of negative potential on potentiometer R15. The tap on the potentiometer is set at a negative potential sufficient to produce anode current cutoff in tube V—1B and thereby hold relay K-2 in a deenergized state. Since the cathodes of D1—D4 are connected to the tap on R15, which has a potential higher than —80 volts, they have a potential higher than the —80 volt potential of the anodes and, therefore, no current flow through the diodes occurs.

When a telegraph signal appears in any of the input circuits, for example, input No. 1, each space in the signal will raise the potential of terminal 1 from —80 volts to +80 volts. This results in a current flow through D1, contacts 1—2 of K1, R11 and R12 to the tap on R15. The current flow in R12 raises the potential of the grid of V—1B above the cutoff point, causing anode current to flow and relay K2 to be energized. Actuation of K2 closes contacts 2—3 and applies +80 volt space potential from terminal 8 to output terminal 6. A mark following a space in the input signal allows terminal 1 to drop again to —80 volts which cuts off V—1B and releases K2, allowing —80 volt mark potential to be applied from terminal 7 through contacts 3—4 of K2 to output terminal 6. The telegraph signal at terminal 1 is, therefore, repeated at terminal 6. In a similar manner, the input signal at any

of the other input terminals 2, 3 and 4 is repeated at output terminal 6. As mentioned earlier, the input circuits are isolated from each other by diodes D1—D4, the flow of current into any input circuit as the result of a space potential in any other input circuit being prevented by the high back resistance of its diode.

The mixing circuit is so designed that an input signal in the control input circuit will always be repeated at output terminal 6 even though there may be a concurrent input signal in one of the other input circuits. This override capability is the function of override relay K1, tube V—1A and a timing circuit comprising condenser C1 and resistors R7, R8 and R9. Tube V—1A is normally biased beyond cutoff and K1 is normally deenergized. When a telegraph signal appears on input terminal 5, the +80 volt space potentials act through diode D6 to charge condenser C1 and raise the potential of the grid of V—1A above cutoff thereby energizing K1. With K1 actuated this signal on input terminal 5 passes through diode D5 and contacts 2—3 of K1 to the grid of V—1B with the result that it is reproduced at output terminal 6 in the manner already described. At the same time, input circuits No. 1—No. 4 are disconnected from the grid of V—1B by open contacts 1—2 so that any signals in these input circuits are not reproduced at the output terminal.

Resistor R6 has a relatively low resistance which, with the low forward resistance of D6, permits C1 to charge to space potential almost immediately so that none of the input signal is lost. Because of D6, C1 cannot discharge through R6 but must discharge through the much greater resistances R7, R8 and possibly R9. The time constant of the discharge circuit is made sufficiently long that C1 will not discharge sufficiently during the maximum separation of space potentials in the telegraph signal for V—1A to be cut off and K1 deenergized. If the signal at input terminal 5 ceases, however, C1 will eventually discharge to the point where V—1A is cut off and K1 deenergized, reconnecting input circuits No. 1—No. 4 to the grid of V—1B through contacts 1—2. The interval between cessation of signal at input terminal 5 and deenergization of K1 is controlled by the time constant of the C1—R7—R8 circuit. Condenser C1 may have a value of 1 microfarad with values of R7 and R8 selected to delay cutoff of tube V—1A by about 2 seconds, for example. A greater delay may be obtained if desired by removing the short circuit from R9.

Switch S1 may be provided to make the override feature selective. When this switch is thrown to the left contacts 1, 2 and 3 of K1 are permanently connected together, which has the effect of permanently connecting all five input circuits to the grid of V—1B. In this case, the input circuit connected to terminal 5 no longer acts as an overriding control circuit but is reduced to the same status as the other input circuits.

Since the distortion and bias present in the input signals are also present at the output terminal 6 it may be desirable to pass the output signal through a suitable signal regenerator before its application to the using equipment.

I claim:

1. A conference mixer for telegraph circuits comprising: a plurality of input circuits, means connecting said input circuits in parallel, an output circuit, an additional input circuit, a switching means connected between said input circuits and said output circuit, said switching means having a first position in which it connects said parallel connected input circuits to said output circuit and disconnects said additional input circuit from said output circuit and a second position in which it connects said additional input circuit to said output circuit and disconnects said parallel connected input circuits from said output circuit, said switching means being normally in said first position, and instantly acting means responsive to a tele-

graph signal in said additional input circuit and operative for the duration of said signal for actuating said switching means to said second position, said instantly acting means having a decay time constant not less than the maximum interval between potential changes in said telegraph signal.

2. A conference mixer for telegraph circuits comprising: a plurality of input circuits, means including an isolating diode in each input circuit for connecting said circuits in parallel, an output circuit, an additional input circuit, an electrically actuatable switch connected between said input circuits and said output circuit said switch being operative in its deenergized state to connect said parallel connected input circuits to said output circuit and to disconnect said additional input circuit therefrom and being operative in its energized state to connect said additional input circuit to said output circuit and to disconnect said parallel circuits therefrom, and means responsive to a signal in said additional input circuit and operative for the duration of said signal for energizing said switch.

3. A conference mixer for telegraph circuits comprising: first and second relays each having normally closed and normally open contacts and an actuating coil; first and second vacuum tubes each having an anode, a cathode and a control grid; a source of direct potential; means connecting the coil of said first relay and said source in series between the anode and cathode of said first tube; means connecting the coil of said second relay and said

source in series between the anode and cathode of said second tube; means biasing the grids of said tubes beyond the anode current cutoff point; a capacitor connected between the grid and cathode of said first tube; a plurality of input circuits; means connecting one of said input circuits to said capacitor through a diode poled so that the input signal charges said capacitor in such direction as to oppose the bias on the grid of said first tube; means coupling said one input circuit through the normally open contacts of said first relay to the grid of said second tube; means coupling the other input circuits in parallel and thence through the normally closed contacts of said first relay to the grid of said second tube; an output terminal; means for applying a negative voltage through the normally closed contacts of said second relay to said output terminal; and means for applying a positive voltage through the normally open contacts of said second relay to said output terminal.

4. Apparatus as claimed in claim 3 and in addition selective means for simultaneously bridging the normally open contacts and the normally closed contacts of said first relay.

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