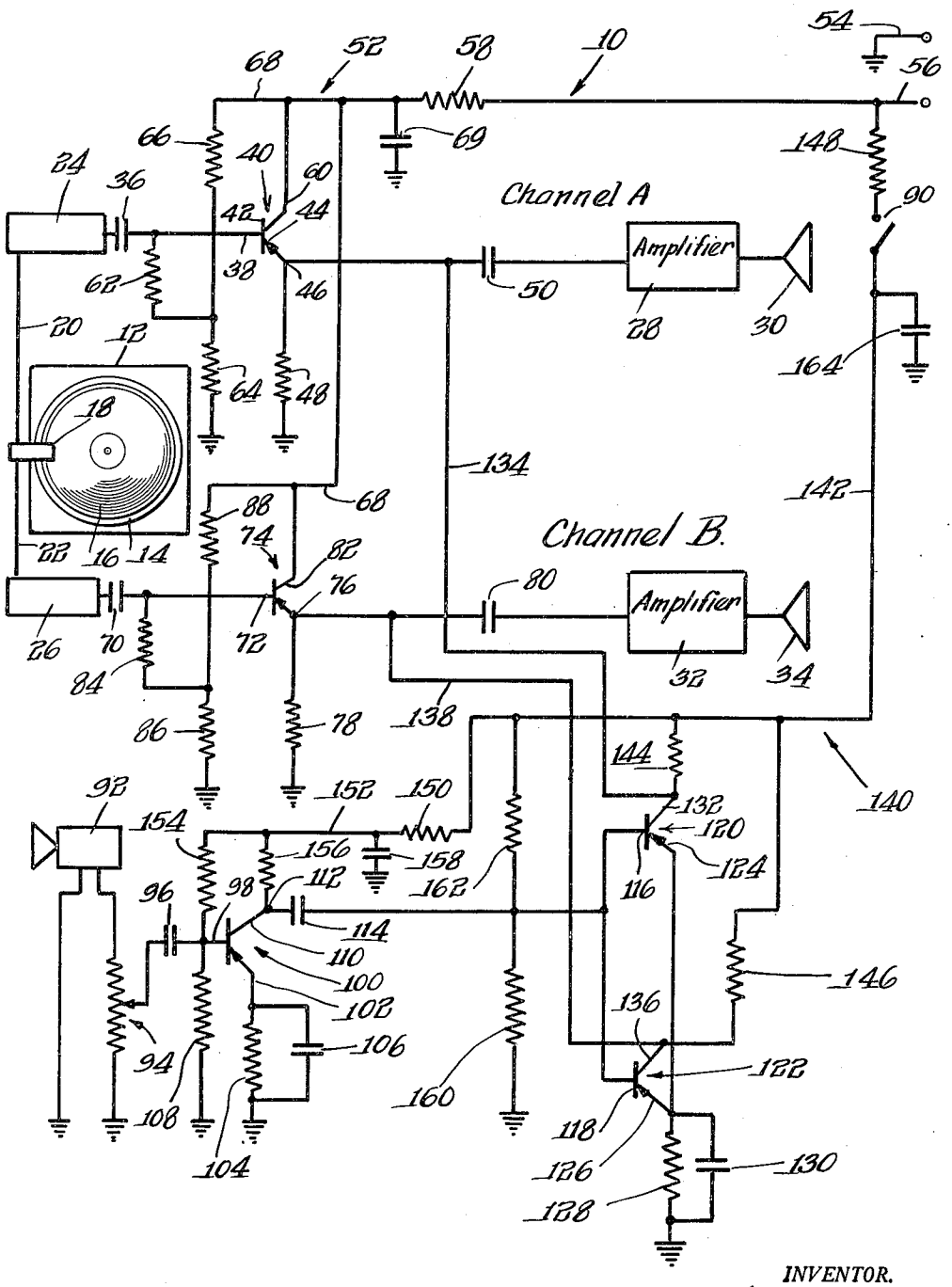
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STEREOPHONIC BACKGROUND MUSIC AND PUBLIC ADDRESS SYSTEM

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STEREOPHONIC BACKGROUND MUSIC AND PUBLIC ADDRESS SYSTEM

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The present invention relates to background music systems, particularly stereophonic music systems of this character. Background music systems are used to advantage in providing musical background in factories, business establishments, and other places where people work and play. The inherent advantages of providing background music, where this is appropriate, can be further extended through the use of stereophonic music systems for this purpose.

In addition to providing a musical background, such background music systems when installed can be used to great advantage as highly effective public address systems. Thus, an announcer may cut into a program of entertainment to give routine messages and/or instructions in case of an emergency.

One object of the invention is to provide a new and improved background music system having improved means for effecting a changeover of the system from a music system to a public address system and back again in a smooth non-irritating manner which avoids abruptness in the changeover from one source of sound signals to another.

Another object is to provide an improved sound system having improved means which is operative to effect a prompt transition of the system from a background music system to a public address system and back again in a manner which avoids startling or irritating abruptness in the changeover operation, even though there may be no interruption in the strength of the normal background music sound signals which are supplied continuously to the system throughout the duration of an announcement, and, more significantly, throughout the changeover to a public address system at the beginning of an announcement and the changeover back to a music system at the conclusion of an announcement.

A further object is to provide an improved sound system as recited in the previous objects which provides stereophonic background music through two output channels and utilizes both of the channels for public address system purposes.

A further object is to provide an improved sound system as recited in the previous objects which changes over to either a public address system or a background music system in the manner recited, in response to operation of a single control switch.

Another object is to provide an improved sound system as set forth in the above objects in which the changeover to a public address system and to a background music system is effected in the manner recited through the switching action of semiconductors in a new and improved transition circuit incorporated into the sound system.

An additional object is to provide a stereophonic sound system of the above character which is changed over smoothly to either a background music system or a public address system in a manner which provides for fully independent operation of the two channels of the system when used to supply stereophonic background music.

Other objects and advantages will become apparent from the following description of the exemplary embodiment illustrated diagrammatically in the single figure of the accompanying drawing.

Having reference to the drawing in greater detail,

the stereophonic background music and public address system 10 forming the exemplary embodiment of the invention illustrated comprises a source 12 of stereophonic background music signals. In a background music system the source of electrical stereophonic sound signals should be capable of supplying such signals throughout a program of indefinite duration. In this instance, the source 12 of stereophonic sound signals is formed by an automatic phonograph (also denoted by the number 12) comprising a turntable 14 which rotates a record 16 in association with a stereophonic pickup cartridge 18 having two output leads 20, 22 connected, respectively, to two preamplifiers 24, 26.

The two preamplifiers 24, 26, which are independent of each other, form the first stages, respectively, of two separate stereophonic sound channels identified in the drawing by the legends "Channel A" and "Channel B." Thus, the preamplifier 24 of Channel A is coupled through program switching means, to be described presently in detail, with an amplifier 28 which drives a loud-speaker 30. Similarly, the preamplifier 26, Channel B, is connected through program switching means, to be described, with an amplifier 32 which drives a loud-speaker 34.

Normally the sound system 10, including the automatic phonograph 12, operates continuously without attention over long periods of time to supply stereophonic musical programs for the stimulation and enjoyment of people present on the premises on which the system is installed. As previously intimated, background music systems of this character have found advantageous use in factories, business establishments of various sorts, places of amusement, and in other environments where people are present. It is most desirable that a system of this character be capable of operating at peak efficiency over long periods of time without requiring attention of attending personnel. For this reason, the automatic phonograph 12 is set to operate continuously without interruption.

Yet, it may be extremely desirable to use the sound system from time to time to make announcements or give instructions to the people within hearing range. Use of the system for this purpose in situations where a public address system is essential or advantageous multiplies the advantages stemming from installation of a background music system of this character.

To use the sound system for public address purposes, it is necessary to substitute the amplification of the human voice for the regular musical program.

The improved background music and public address system 10 provided by the invention operates in response to actuation of a single control switch to effect a smooth, non-irritating transition of the system into a public address system after being put into operation to supply background music. Moreover, the system 10 responds with equal efficiency to operation of the control switch to effect a smooth, pleasing transition of the system from operation as a public address system back to continued operation in supplying background music. Moreover, as will presently appear, the pleasing transition of the system from a background music system to a public address system and vice versa is achieved while the source of musical sound signals, in this instance the automatic phonograph 12, operates continuously to supply sound signals to the inputs of both of the sound channels "A" and "B."

Having reference to the drawing, it will be noted that the preamplifier 24 in Channel A is coupled through a capacitor 36 with the input terminal 38 of an electronic switch 40 formed by a semiconductor or transistor having its base 42 connected to the control terminal 38. The emitter 44 of the transistor 40 is connected to an output terminal 46 which is grounded through a resistor 48 and

coupled through a condenser 50 with the input of the amplifier 28.

The transistor 40 is normally energized to transmit sound signals through its output terminal 46 by means of a first power circuit 52 comprising a grounded power line 54 and a companion power line 56 which supply direct current negative potential through a resistor 58 to a collector terminal 60 of the transistor 40. As shown, the input terminal 38 of the transistor 40 is connected through a resistor 62 to a connection to adjacent ends of two resistors 64 and 66, which are connected in series between ground and a conductor 68 connected to the transistor side of the resistor 58, and hence to the transistor terminal 60. A capacitor 69 is connected between the conductor 68 and ground.

The circuitry of Channel B is similar to that of Channel A. Thus, the preamplifier 26 is coupled through a capacitor 70 with the base terminal 72 of a transistor 74 having an emitter terminal 76 grounded through a resistor 78 and coupled through a capacitor 80 with the input of the amplifier 32. The conductor 68 of the power circuit 52 is connected to the collector terminal 82 of the transistor 74 whereby the power circuit 52 energizes and activates the transistor 74 to transmit sound signals to its output terminal 76 concurrently with energization of the transistor 40 in Channel A. A resistor 84 connects the input terminal 72 of the transistor 74 to the electrically adjacent ends of two resistors 86, 88 connected between ground and the conductor 68, as shown.

Normally, the system 10 operates as a background music system as recited, the power circuit 52 energizing both transistors 40 and 74 to transmit the continuing signals from the source 12 to the respective output terminals 46 and 76 for amplification in later phases of Channels A and B.

Upon closure of a single microphone or control switch 90, the transmission of stereophonic sound signals through the inputs of the respective amplifiers 28, 32 is progressively suppressed and progressively replaced with amplified sound signals from a microphone 92, so that the system 10 is smoothly and pleasingly transformed into a public address system.

Thus, with reference to the drawing, the microphone 92 is connected through a potentiometer 94 and a coupling condenser 96 with the input terminal or base 98 of a transistor 100. The emitter 102 for the transistor 100 is grounded through a resistor 104 and a capacitor 106 in parallel. The transistor input terminal 98 is also grounded through a resistor 108.

The collector 110 of the transistor 100 connects with an output terminal 112 which is coupled through a capacitor 114 with the base terminals 116, 118 of a pair of transistors 120, 122. The emitters 124, 126 of the respective transistors 120, 122 are grounded through a resistor 128 and a capacitor 130 in parallel.

The two transistors 120 and 122 serve, as will presently appear, to apply an amplified signal from the microphone 92 to the inputs of both amplifiers 28 and 32 of the respective Channels A and B for public address system purposes.

Thus, the collector 132 of the transistor 120 is connected through a conductor 134 with the input side of the coupling capacitor 50 in Channel A. Similarly, the collector 136 of the transistor 122 is connected through a conductor 138 with the input side of the coupling capacitor 80 in Channel B.

Normally, all three of the transistors 100, 120 and 122 coupled to the output of the microphone 92 are deenergized and inactive, with the result that the output signals from the microphones are not applied to the sound Channels A and B.

Closure of the normally open microphone switch 90 activates a changeover circuit 140 to progressively suppress the outputs of the respective transistors 40, 74, which supply musical background signals to the amplifiers 28 and 32, and to progressively energize the transistors 100, 120 and 122 to apply the microphone signals to both amplifiers 28 and 32 for public address system purposes.

Thus, as illustrated, a conductor 142 of the changeover circuit 140 is connected through resistors 144 and 146 with the respective conductors 134 and 138. Closure of the switch 90 connects the conductor 142 through a resistor 148 with the negative potential power supply conductor 56 of the power supply circuit 52, whereby the changeover circuit 140 becomes a second power supply circuit.

The conductor 142 of the circuit 140, which is energized upon closure of the switch 90, is also connected through a resistor 150 with a conductor 152, which connects through resistors 154 and 156 with the input and output terminals 98 and 112 of the transistor 100. The conductor 152 is coupled to ground by a capacitor 158. The output side of the capacitor 114, which couples the transistor 100 to the transistors 120 and 122 is grounded through a resistor 160 and is connected to the conductor 142 through a resistor 162.

Most significantly, the conductor 142 of the changeover circuit 140 is coupled to ground through a capacitor 164 which operates in conjunction with the resistor 148 to effect a progressive or gradual energization of the conductor 142 upon closure of the microphone switch 90. Also, the capacitor 164 serves, upon opening of the microphone switch 90, to maintain an interim potential on the conductor 142, so that the conductor 142 is deenergized progressively rather than abruptly.

Thus, upon closure of the microphone switch 90 to transform the sound system 10 into a public address system, the conductor 142 is progressively energized through the coaction of the resistor 148 and the capacitor 164 until its potential approaches that of the power supply conductor 56. The effect of this is to progressively deenergize and suppress operation of the two electronic switches or transistors 40, 74 which supply musical background signals to the Channels A and B. Inspection of the circuit reveals that the terminals 46 and 60 of the transistor 40, for example, are short circuited through resistors 58, 148 and 144. Similarly, the terminals 76 and 82 of the transistor 74 are short circuited through the resistors 58, 148 and 146. Short circuiting of the input and output terminals of the respective transistors 40, 74 renders these elements inoperative to transmit music signals.

Concurrently with the suppression of the passage of sound signals through the transistors 40 and 74, with the attending progressive attenuation of the background music sounds normally generated by the loud-speakers 30, 34, the transistors 100, 102 and 122 are progressively energized to progressively amplify sound signals from the microphone and to transmit the amplified microphone signals to both amplifiers 82, 32 with progressively increasing intensity. The result is a smooth electrical transformation of the background music system to operation as a public address system in a manner which avoids abrupt changes in the level of the sounds emitted from the speakers 30, 34. Moreover, during use of the system for public address system purposes, the amplifiers and loud-speakers of both Channels A and B are used at their maximum efficiency in the reproduction of the sound sensed by the microphone 92.

An equally smooth, progressive transition of the system back to a background music system is effected automatically upon opening of the microphone switch 90. Opening of the switch 90 is followed by a progressive deenergization of the transistors 100, 120 and 122 and a progressive reactivation of the background music transistors 40, 74. Thus, as previously explained, the capacitor 164 serves, upon opening of the switch 90, to feed its charge back to the conductor 142, thus assuring a gradual decay of the line voltage applied to this conductor when

the switch 90 is closed, and hence a gradual transformation of the electrical functioning of the structure back to operation as a background music system.

Moreover, the progressive electrical transformation of the electrical operation of the system to operate as either a background music system or as a public address system is produced by operation of the single switch 90 without any necessity for modifying or interrupting the normal operation of the source 12 of background music signals which, as such, is not affected by operation of the switch 90.

It will be appreciated that the invention is not necessarily limited to the particular construction illustrated but includes variants and alternatives within the spirit and scope of the invention as defined by the claims.

The invention is claimed as follows:

1. A stereophonic background music and public address system comprising, in combination, two complemental sources of electrical signals for stereophonic sound, two electronic switches having inputs continuously coupled to said respective sound signal sources, two amplifiers continuously coupled to the outputs of said respective electronic switches, two loud-speakers driven by said respective amplifiers, first power circuit connected to energize both of said electronic switches to activate the latter, a normally inactive third electronic switch having an output coupled to the inputs of both said amplifiers, a microphone continuously coupled to the input of said third electronic switch, a normally inactive second power circuit connected to energize said third electronic switch to activate the latter, control switch means coacting with said second power circuit to controllably energize the latter, reactance means coacting with said second power circuit to effect a gradual energization and a gradual deenergization of the latter in response to operation of said control switch means, and means coupling said second power circuit to both of said first mentioned electronic switches to suppress operation of the latter as an incident to energization of said second power circuit whereby a progressive energization of said second power circuit effects a progressive suppression of the acoustical reproduction of sound signals from said two sources and a progressively increased acoustical reproduction of sound signals from said microphone and a progressive deenergization of said second power circuit effects a progressive ceasing of the acoustical reproduction of microphone sound signals and a progressive renewal of the acoustical reproduction of sound signals from said sources.

2. A stereophonic background music and public address system comprising, in combination, two complemental sources of electrical signals for stereophonic sound, two electronic switches having inputs coupled to said respective sound signal sources, two amplifiers coupled to the outputs of said respective electronic switches, two loud-speakers driven by said respective amplifiers, power circuit means connected to energize both of said electronic switches to transmit signals from said sources to said respective amplifiers, a normally inactive third electronic switch having an output coupled to the input of both said amplifiers, a microphone coupled to the input of said third electronic switch, a changeover circuit for energizing said third electronic switch to transmit microphone signals to both amplifiers, control switch means coacting with said changeover circuit to control the latter, and means coupling said changeover circuit to both of said first mentioned electronic switches to suppress operation of the latter to transmit sound signals therethrough as an incident to energization of said third switch by the changeover circuit.

3. A background music and public address system comprising, in combination, a first electronic switch having a plurality of terminals including a control terminal and an output terminal, a source of background music signals continuously coupled to said control terminal, an amplifier continuously coupled to said output terminal, a loud-speaker driven by said amplifier, a first power supply circuit connected to first and second ones of said electronic switch terminals to apply a voltage thereacross to activate said switch to produce electric sound signals at the output terminal thereof, a second electronic switch having a plurality of terminals including an input terminal and an output terminal, means continuously coupling said second switch output terminal to the input of said amplifier, a microphone coupled to the input terminal of said second electronic switch, a normally inactive second power supply circuit, a control switch for activating said second power supply circuit, means connecting said second power supply circuit to first and second ones of said second electronic switch terminals to apply a voltage thereacross to activate said second electronic switch upon activation of said second power supply circuit, means interconnecting said second power supply circuit with said first and second terminals of said first switch to effectively short circuit the last mentioned terminals to render said first electronic switch inactive upon activation of said second power circuit, and reactance means coupled with said second power circuit to effect a gradual activation of the latter upon operation of said control switch.

4. For use in a background music system or the like, sound signal selector means comprising, in combination, a first electronic switch, means for energizing said switch, means for connecting a first source of sound signals continuously to the input of said switch, means for coupling the output of said switch to an amplifier, a second electronic switch, means for connecting a second source of electric sound signals continuously to the input of said second switch, means for continuously coupling the output of said second switch to the output of said first switch, changeover circuit means including a control switch therefor connected to energize said second switch and connected to suppress operation of said first electronic switch as an incident to energization of said second electronic switch, and reactance means coupled with said changeover circuit to effect a gradual increase in the effectiveness thereof and a gradual decrease in the effectiveness thereof in response to operation of said control switch to control the changeover circuit.

5. In a background music and public address system, the combination of a first electronic switch, a source of background music signals coupled to the input of said switch, an amplifier connected to the output of said switch, a loud-speaker driven by said amplifier, a second electronic switch having an output connection to the input of said amplifier, a microphone coupled to the input of said second electronic switch, circuit means connected to activate said first electronic switch to transmit background music signals therethrough, normally inactive changeover circuit means connected to both said first electronic switch and said second electronic switch to render said first switch inactive and to activate said second switch in response to activation of said changeover circuit means, control switch means coacting with said changeover circuit means to control activation of the latter, and reactance means coupled with said changeover circuit means to effect gradual activation and gradual deactivation of the latter in response to operation of said control switch means.

6. In a background music and public address sound system, the combination of a first electronic switch, a source of background music signals coupled to the input of said switch, an amplifier connected to the output of said switch, a loud-speaker driven by said amplifier, a second electronic switch having an output connection to the input of said amplifier, a microphone coupled to the input of said second electronic switch, circuit means connected to energize said first electronic switch to transmit background music and sound signals from said source to said amplifier, and changeover circuit means including a control switch therefor connected to energize said sec-

ond electronic switch and connected to suppress operation of said first switch as an incident to energization of said second electronic switch to transmit sound signals from said microphone to said amplifier.

7. A stereophonic background music and public address system comprising, in combination, two complemental sources of electrical signals for stereophonic sound, two amplifiers, a first pair of electronic switches having outputs connected to said respective amplifiers, two loud-speakers driven by said respective amplifiers, a first power circuit connected normally to energize both of said switches to transmit signals from said sources to said respective amplifiers, a second pair of electronic switches having outputs coupled to said respective amplifiers, a microphone, means coupling said microphone to the inputs of said respective switches of said second pair, a second power circuit for energizing said second pair of electronic switches to transmit signals from said microphone to said amplifiers, control switch means coacting with said second power circuit to effect energization and deenergization of the latter, reactance means coupled with said second power circuit to effect a gradual energization and a progressive deenergization of the latter upon operation of said control switch, and means connecting said second power circuit with both of said switches of said first pair to neutralize the energization of the latter by said first power circuit and effectively deenergize said first pair of switches upon energization of said second power circuit.

8. In a background music and public address system, the combination of a first pair of transistors each having a plurality of terminals including a control terminal and an output terminal, two complemental sources of electrical background music signals coupled to the control terminals of said respective transistors, two amplifiers coupled to the output terminals of said respective transistors, two loud-speakers driven by said respective amplifiers, a first power circuit connected to first and second ones of said terminals of each of said transistors to energize both of said transistors to transmit electrical sound signals from said sources to said respective amplifiers, a second pair of transistors each having a plurality of terminals including a control terminal and an output terminal, means connecting said output terminals of said respective transistors of said second pair with said respective amplifiers, a microphone coupled to the control terminals both of said second pair of transistors, a second power circuit connected to two terminals of each of said transistors of said second pair to energize said second pair of transistors to transmit microphone signals to said amplifiers, reactance means and switch means coacting with said second power supply circuit to effect progressive energization and progressive deenergization thereof, and means connecting said second power circuit to one of said first and second terminals of each of said first pair of transistors to apply power to said first pair of transistors which neutralizes the energization thereof by said first power circuit upon energization of said second power circuit.

9. In a background music and public address system, the combination of a first transistor having a plurality of terminals including a control terminal and an output terminal, a source of electrical background music signals coupled to the control terminal of said transistor, an amplifier coupled to the output terminal of said tranistor, a loud-speaker driven by said amplifier, a first power supply circuit connected to a first one of said terminals of said transistor to energize the transistor to transmit electrical sound signals from said source to said amplifier, a second transistor having a plurality of terminals including a control terminal and an output terminal, means connecting said output terminal of said second transistor with said amplifier, a microphone coupled to the control terminal of said second transistor, a second power circuit connected to a terminal of said second transistor to energize said second transistor to transmit electrical microphone signals to said amplifier, reactance means and switch means coacting with said second power circuit to effect progressive energization and progressive deenergization thereof, and means connecting said second power circuit to a second one of said terminals of said first transistor to apply power to said first transistor which neutralizes the energization of said first transistor by said first power circuit upon energization of said second power circuit.

No references cited.