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[56]

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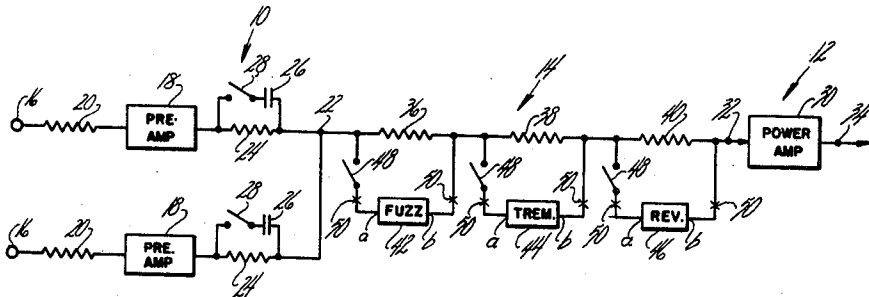
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[54] MUSIC AMPLIFIER WITH TONE MODIFYING STAGE

7 Claims, 1 Drawing Fig.

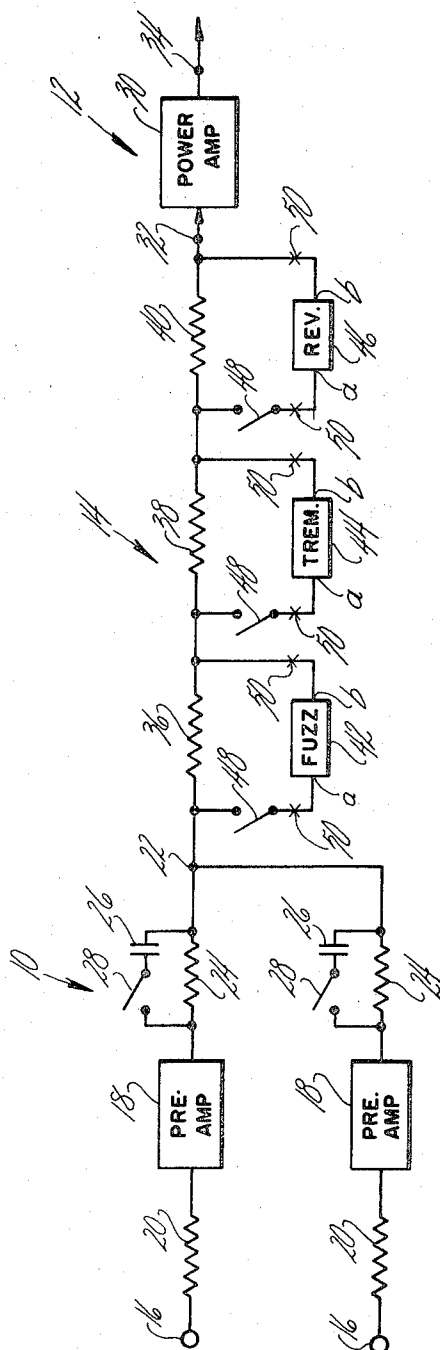
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ABSTRACT: A music amplifier for amplifying voice or musical instrument signals has a tone-modifying stage including one or more tone modifying circuits for modifying or distorting the input signal to produce different musical effects, such as fuzz, tremolo or reverberation, in the output signal. Each tone-modifying circuit is separate from the remainder of the amplifier and may be either functionally disabled through the operation of a switch or physically removed from the amplifier for repair or replacement without otherwise impairing the operation of the amplifier.



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MUSIC AMPLIFIER WITH TONE MODIFYING STAGE

BACKGROUND OF THE INVENTION

This invention relates to music amplifiers of the type commonly used for amplifying vocal and instrumental sounds, and deals more particularly with such an amplifier including a tone modifying stage for modifying the input sound signal to produce a special effect in the output signal.

Music amplifiers of the type commonly used by performers for amplifying vocal and/or instrumental sounds commonly include a tone modifying or "effects" stage by which the pure input tone or sound is modified to produce an output signal which is other than a merely amplified version of the input tone. Common effect circuits used in the tone modifying stage are, for example, a "fuzz" circuit which operates to distort the input signal to give the output signal the effect of real speaker distortion, a "tremolo" circuit to produce a wavering or tremolo effect in the output signal, and a "reverberation" circuit for producing an echo or reverberation effect in the output signal. In the past, these various tone-modifying circuits have been connected as separate stages in series with one another between the regular input and output stages of the amplifier so that the failure of any one of these circuits has completely disabled the amplifier and prevented its operation until the defect was repaired. As the number of effect stages is increased, the likelihood of a failure correspondingly increases so that in the past the situation has been that the more versatile the amplifier the more subject it was to failure.

The present invention overcomes the above problems by providing a tone-modifying stage wherein the various effect circuits are separate circuits so connected with the remainder of the amplifier that they may be disconnected or open circuited without impairing the operation of the remainder of the amplifier. Therefore, should an effect circuit fail, the amplifier will lose the benefit of such circuit but will nevertheless be capable of further operation without the effect produced thereby. Further, each effect circuit is preferably wholly or at least partially contained on a separate circuit board or otherwise provided as a separate module which is connected to the remainder of the amplifier by a plug-in or other type of releasable connector so as to allow a defective circuit to be readily removed for repair and/or replaced by another circuit. Also, the arrangement is such that each effect circuit may be turned on or off by a simple manually operated switch operable to either make or break a connection connecting the circuit to the remainder of the amplifier.

SUMMARY OF THE INVENTION

The invention resides in a music amplifier including a tone-modifying stage having an input terminal and an output terminal and operable to modify the signal appearing at the input terminal to produce a different version thereof at the output terminal. At least one resistor is connected between the input terminal and a tone-modifying circuit is connected in parallel with and across the ends of such resistor. Part of the pure tone appearing at the input terminal passes through the resistor and appears at the output terminal. However, the tone-modifying circuit which bridges the resistor distorts or otherwise modifies the pure tone at the input terminal and produces a modified signal at the output terminal which is added to the pure tone passing through the resistor thereby producing, when the tone-modifying circuit is connected with the resistor, a resultant modified signal at the output terminal. The tone-modifying circuit may, however, be disconnected from its resistor, in which case only the pure tone appears at the output terminal. Preferably, the tone-modifying stage includes a number of resistors connected in series with one another each bridged by a separate tone-modifying circuit any one of which, by virtue of its bridging relationship with its resistor, may be disconnected from its resistor without destroying the ability of the amplifier to continue functioning without such circuit.

BRIEF DESCRIPTION OF THE DRAWING

The drawing is a schematic illustration of an amplifier embodying this invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawing, a music amplifier embodying this invention is there illustrated and consists essentially of an input stage indicated generally at 10, an output stage indicated generally at 12 and a tone-modifying stage indicated generally at 14. The input stage 10 is designed to receive two different input signals and accordingly includes two input jacks 16, 16 each of which may be connected to a microphone intended to pick up the sound of a performer's voice or the sound of a performer's instrument. For example, the two different input jacks 16, 16 may in use be connected respectively to the microphones or pickups on two different guitars or other instruments played by two performers of a musical group. Each input jack 16 is connected to a preamplifier 18 through a resistor 20 and the outputs of the two preamplifiers are connected to a common terminal 22 which forms the output terminal of the input stage 10. Preferably, and as shown, the output circuit of each preamplifier includes a top-boost circuit consisting of a resistor 24 and capacitor 26 connected in parallel with each other and also including a switch 28 in the capacitor circuit. When the switch 28 is closed, the capacitor 26 provides a lower impedance path for the higher frequency components of the signal so that such components are emphasized or "boosted." The output stage 12 consists of a power amplifier 30 which is or may be of generally conventional construction. The input terminal of the power amplifier 30 is indicated at 32 and its output terminal at 34. The output terminal 34 may be in the form of a jack adapted for connection by a suitable line to an appropriate speaker or speaker system.

The tone-modifying stage 14 is connected between the output terminal 24 of the input stage 10 and the input terminal 32 of the output stage 12 and includes a first circuit made up of three resistors 36, 38 and 40 connected in series with one another between the terminals 22 and 32. These resistors together with the input stage 10 and the output stage 12 comprise what may be considered to be a fixed part of the amplifier in that they are connected with one another and with the terminals 22 and 32 by solder or other relatively permanent connection means and are not intended to be readily removable or replaceable. The resistors 36, 38 and 40 form a direct circuit between the terminals 22 and 32 so that whenever a signal appears at the terminal 22 a corresponding signal will be transmitted through them to the terminal 32 to provide an input for the output stage 12 regardless of whether the tone-modifying circuits hereinafter described are functioning.

In addition to the resistors 36, 38 and 40 the tone-modifying unit stage 14 further includes three tone-modifying circuits 42, 44 and 46 each associated with a respective one of the resistors. As shown, each tone-modifying circuit 42, 44 or 46 is connected in parallel relationship with and across the ends of its associated resistor 36, 38 or 40. The input terminal of each tone-modifying circuit is indicated at *a* and the output terminal is indicated at *b*. Each tone-modifying circuit is further of such a construction as to produce at its output terminal a modified form of the signal appearing at its input terminal.

Various different circuits may be used as the tone-modifying circuits to produce different desired effects. In the presently illustrated case, however, the stage 42 is indicated to be a "fuzz" circuit, the stage 44 is indicated to be a "tremolo" circuit and the stage 46 is indicated to be a "reverberation" circuit. More particularly, the "fuzz" circuit 44 may comprise a high gain amplifier the output of which is clipped to develop higher harmonics, which higher harmonics produce an effect similar to the distortion produced by an overdriven speaker. The tremolo circuit 44 may constitute a bridge circuit, the impedance of which is changed cyclically by an oscillator, the frequency of which is preferably adjustable over a range of

about 3 to 12 cycles per second, so that the amplitude of the signal appearing at the output terminal *b* thereof is varied between high and low limits at the frequency rate of the oscillator. The reverberation circuit 46 in turn may consist of a delay circuit utilizing an electrical to mechanical transducer, a mechanical delay element such as a spring, and a mechanical to electrical transducer for producing at its output terminal *b* a signal which includes components delayed in time from corresponding portions of the input signal appearing at terminal *a*.

Considering the tone-modifying circuit 42, for example, its connection in bridging or parallel relationship with its associated resistor 36 has the effect that the output signal appearing at the output terminal *b* of the circuit 42 is added to the pure tone passing through the resistor 36 so that the signal passed on to the resistor 38 and modifying circuit 44 is a modified signal resulting from the summation of the outputs of the resistor 36 and the modifying circuit 42. As mentioned above, however, the presence of an input signal to the resistor 38 and its associated tone-modifying circuit 44 is not dependent on the proper functioning of the tone-modifying circuit 42 and if the circuit 42 is disconnected from its resistor 36 a signal will still be supplied to the resistor 38 and circuit 44, which signal consists solely of that passing through the resistor 36. Therefore, if the circuit 42 is disconnected or rendered nonfunctioning for any reason, the overall operation of the amplifier will be impaired only to the extent of losing the benefit of the effect produced by the circuit 42, and the amplifier may be continued to be used the same as before but without this effect. The same statement holds true for the other tone-modifying circuits 44 and 46.

This capability of disconnecting a tone-modifying circuit without fully destroying the operation of the amplifier makes possible a simple switching system for connecting and disconnecting the tone-modifying circuits to and from the amplifier to bring them into and out of play as desired. As shown, this switching means comprises a simple two-position switch 48 connected in series with the associated tone-modifying circuit. When one of the switches 48 is closed, its associated tone-modifying circuit is connected across the associated resistor 36, 38 or 40 to bring it into play and add its effect to the output appearing at the terminal 34. When a switch 48 is open the associated tone-modifying circuit is disconnected from its resistor and its effect is totally removed from the output. Of course, the various tone-modifying circuits 42, 44 and 46 also preferably contain volume controls for varying the degree or intensity of the effect added thereby and, as mentioned, the tremolo circuit 44 also preferably contains an adjustment to permit variation of the frequency of the tremolo effect.

The ability of the amplifier to operate without any one of the tone-modifying circuits 42, 44 or 46 being connected in circuit with its associated resistor 36, 38 or 40 has the additional important benefit that failure of any one of the circuits does not fully interrupt operation of the amplifier and any one of these circuits may be removed for repair and the amplifier continued to be used while the repair is being made. Further, each of the tone-modifying circuits 42, 44 and 46 is preferably contained entirely or at least in part on a printed circuit board, or is otherwise made of a separate module, which contains the input and output terminals *a* and *b* of the circuit and which is connected with its associated resistor by a releasable connector means which permits the circuit board or module to be readily removed from the remainder of the amplifier for repair or for replacement by another available circuit board or module. The releasable connector means may take any well known construction and may, for example, comprise a simple plug-in type of connector utilizing prongs on the circuit board or module received in sockets connected with the associated resistor, such connector means being indicated in the drawing at 50, 50.

The ready removability of the tone-modifying circuits provided by the releasable connector means 50, 50 not only facilitates repair by replacement of a defective circuit with a

new one but also makes it possible to expand the versatility of the amplifier by having available a large number of tone-modifying circuits in module form each producing a slightly different effect from which large number of available modules desired ones may be selected and plugged into the amplifier at will. It should also be understood that although the amplifier illustrated in the drawing is one utilizing three different tone modifying circuits, the invention is not necessarily limited to this number of circuits and, if desired, a smaller or large number of such circuits may be used following the general scheme illustrated and described.

I claim:

1. A music amplifier comprising an input stage having input and output terminals, an output stage having input and output terminals and a tone-modifying stage connected between said input and output stages, said tone-modifying stage including a circuit connected between said output terminal of said input stage and said input terminal of said output stage and including a plurality of resistors connected in series with one another, and a plurality of tone-modifying circuits each connected in parallel with and across the ends of a respective one of said resistors for producing at the output end of such associated resistor a modified form of the signal appearing at the input end thereof.

2. A music amplifier as defined in claim 1 further characterized by a plurality of switches each associated with a respective one of said resistors and manually operable to make or break the circuit between its associated resistor and the associated tone-modifying circuit.

3. A music amplifier comprising an input stage having input and output terminals, an output stage having input and output terminals, and a tone-modifying stage connected between said input and output stages, said tone-modifying stage including a first circuit connected between said output terminal of said input stage and said input terminal of said output stage and including a resistor, a tone-modifying circuit having input and output terminals and operable to produce at its output terminal a modified form of the signal appearing at its input terminal, and means connecting said tone-modifying circuit in parallel with and across the ends of said resistor, said tone-modifying circuit being at least in part part of a module physically separate from said input stage, said output stage and said first circuit, said module including said input and output terminals of said tone-modifying circuit, and said means connecting said tone-modifying circuit in parallel with and across the ends of said resistor comprising connector means releasably connecting said module with said resistor.

4. A music amplifier as defined in claim 3 further characterized by said first stage including a plurality of resistors connected in series with one another, a plurality of tone-modifying circuits each having input and output terminals and operable to produce at its output terminal a modified form of the signal appearing at its input terminal, each of said tone-modifying circuits being at least in part part of a module separate from said input stage, said output stage and said first circuit, there being a plurality of said modules one for each of said tone-modifying circuits, and each of said modules including said input and output terminals of its associated tone-modifying circuit, and connector means for releasably connecting each of said modules with its associated one of said resistors so as to connect the tone-modifying circuit of said module in parallel with and across the ends of such resistor.

5. A music amplifier as defined in claim 4 further characterized by a plurality of switches each associated with a respective one of said resistors and manually operable to make or break the circuit between its associated resistor and its associated tone-modifying circuit.

6. A music amplifier including a tone-modifying stage having input and output terminals, said tone-modifying stage including a plurality of resistors connected in series with one another between said input and output terminals, and a plurality of tone-modifying circuits each connected in parallel with and across the ends of a respective one of said resistors

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for producing at the output end of said resistor a modified form of the signal appearing at the input end thereof.

7. A music amplifier as defined in claim 6 further characterized by each of said tone-modifying circuits being at least in

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part part of a module separable from the remainder of said amplifier, and connector means for releasably connecting each of said modules to its associated one of said resistors.

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