KEYBOARD ACTUATED RHYTHM ACCOMPANIMENT

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9 Claims

ABSTRACT OF THE DISCLOSURE

Electronic circuits forming a part of an electronic organ for producing percussive tones such as drums, blocks, brushes, cymbals and the like, concurrently with the musical tone notes and keyed by the keys of the manuals and by the pedals.

It is common practice to provide small dance bands or musical combinations for producing or playing popular music for dancing or for entertainment. One or more instruments may be used to play the melody, and, in addition, there preferably is a rhythm accompaniment produced by one or more musicians operating with various percussive type sound generators, such as drums, blocks, brushes, cymbals, and the like. Such a rhythm accompaniment varies in a repetitive nature, differing in accordance with the nature of the music, i.e., fox-trot, samba, cha-cha, etc.

Often a small club or the like simply cannot afford the expense of more than one musician. This musician will often play an electronic organ, since it provides the most versatile effects. In order to provide the highly desirable rhythm accompaniment, various rhythm devices have been developed, and as far as I am aware, the first of these was sold commercially by the Wurlitzer Company and known as the "Sideman" rhythm device. This device was disclosed and claimed in U.S. Letters Patent No. 3,207,835 in the names of Holman, Hearne, and Korinke, and it further is disclosed and claimed in Joseph H. Hearne patent application for Rhythm Device, Ser. No. 580,504, now Pat. No. 3,258,069, filed Sept. 19, 1966. The "Sideman" rhythm device referred to is a separate unit.

In order to conserve space, and to produce results in strict conformity with a player's timing, and for other desirable purposes, further advances were made wherein electronic generators simulating the sounds of drums, blocks, cymbals, etc., were incorporated as added-on, built-in parts of an electronic organ, sold by the Wurlitzer Company under the trademark "Ssh-boom." This latter device is disclosed and claimed in Joseph H. Hearne application Ser. No. 341,080, now Pat. No. 3,317,649, filed Jan. 29, 1964, for "Manual Control of Electronic Percussion Generated With Organ," allowed on Dec. 16, 1966, and in Harold O. Schwartz and Peter E. Maher application Ser. No. 448,362, now Pat. No. 3,340,344, filed Apr. 15, 1965 for Transistorized Electronic Percussion Generator With Organ.

The present invention is concerned with a built-in electronic percussion generator forming a part of an electronic organ, generally similar to that just outlined. It is an object of the present invention to provide improved means for keying or gating the various percussion sound oscillations.

It is a further object of the present invention to provide improved means for modulating a hissing sound to simulate the shimmer of a cymbal.

It is another object of the present invention to produce a built-in percussion accompaniment better adapted for mass production and requiring less in the way of selected components.

Still another object of the present invention is to provide switching or gating means in percussion generator circuits in an electronic organ which operate more rapidly than in the past.

Other and further objects and advantages of the present invention will be apparent from the following description when taken in connection with the accompanying drawings wherein:

FIG. 1 is a perspective view of an organ constructed in accordance with the present invention;
FIG. 2 is a block diagram corresponding to certain parts of the present invention;
FIG. 3a is a partial wiring diagram of the improved percussion generator circuits; and
FIG. 3b comprises the remainder of the percussion circuit wiring diagram, and is to be considered in conjunction with FIG. 3a.

Turning now in greater particularity to the drawings, and first to FIG. 1, there will be seen an electronic organ generally designated by the numeral 10 and including an upper keyboard or manual 12, and a lower keyboard or manual 14, along with a plurality of stop tablets 16. The organ also includes a pedalboard or clavier 17, a loudspeaker system 18 which may be complex (as is known in the art), and a swell pedal 20 for controlling the overall volume of the organ.

The electronic circuits of the organ are indicated schematically in FIG. 2, and include a plurality of organ tone generators 22. These tone generators may be of any well-known type, including transistor oscillators. The generators preferably are of the constant oscillator type, and are respectively connected to key switches 24 operated by the keys for pedals of the keyboards 12 and 14 and the pedalboard 17 to stop switches and filters indicated collectively at 26, these stop switches being operated by the stop tablets 16. Connection is then made through a preamplifier 28 to an organ amplifier 30, and hence to the loudspeaker 18, which, as indicated previously, can be rather complex in nature.

The organ circuits also include a noise generator and amplifier, indicated generally at 32. This is connected through a diode 34 to a junction point 36. The junction is connected through a diode 38 to a junction 40, and through a capacitor 42 to a junction 44. A brush keyer 46 is connected through a resistor 48 to the junction 52. Connection is made from the junction 36 through a diode 50 to a junction 52, and from thence through a capacitor 54 to the junction 44. A cymbal keyer 56 is connected through a resistor 58 to the junction 52. Connection is made from the junction 44 through a junction 60 to noise output amplifier and filter 62. A shimmer generator 64 is connected through a resistor 66 to the junction 60. The noise output amplifier and filter 62 is connected to the amplifier 30 through a resistor 68. A drum generator 70 also is connected to the amplifier 30 through a resistor 62, and is under the control of a drum keyer 74.

A brief functional description of operation is believed in order at this point to facilitate understanding of the complete wiring diagram to follow hereinafter. Thus, each time one of the key switches 24 of a keyboard 12 or 14 is operated to produce an appropriate musical melody tone, the cymbal keyer 56 or brush keyer 46, or both, depending on the setting of appropriate stop tablets 16, is operated. The diodes 34, 38 and 50 are normally biased off. As will be appreciated, the diodes 34 and 38 are in series, thereby greatly increasing isolation over a single diode, and likewise the diode 34 is in series with the diode 50. If the brush keyer 46 is operated, the
diodes 38 and 34 are biased on to conduct a noise signal from the noise generator and amplifier 32 to the noise output amplifier and filter 62. The circuits are such as to simulate the sound of a cymbal that is struck with a brush. On the other hand, if the cymbal keyer 56 is operated, the diode 50. If the brush keyer 46 is operated, the signal is the cymbal stick.

An amplified noise signal simply by itself is somewhat of a hissing sound, and therefore is not quite an accurate representation of a cymbal. However, the shimmmer generator operates at a frequency just slightly below the audio range, and amplitude modulates the noise signal, thereby providing a more realistic cymbal sound.

Each time a key switch 24 is closed by depression of a pedal 16, the drum keyer 74 is operated to cause the drum generator to produce a drum-like sound. In a specific drum circuit to follow hereinafter, the drum generator is a damped oscillator that is normally biased short of oscillation. The drum keyer provides a potential pulse that momentarily biases the generator into oscillation, which oscillation decays rapidly. Obviously, it would be fully equivalent to provide a continuously operating generator for the drum signal, and to open a gate rather suddenly and then to close it in decaying fashion to simulate the drum sound. The pedal switches also are capable of closing the drum keyer.

FIGS. 3a and 3b should be considered, with both disposed horizontally and FIG. 3b disposed immediately above FIG. 3a. Certain of the wires extend from one figure to another, and these are respectively labeled A through H on both figures. It will be understood that these are continuous, and have been broken only for the sake of placing the drawing on two sheets to make it large enough.

Referring now to the upper left portion of FIG. 3b, the keyboards 12 and 14 are partially represented diagrammatically by a broken line rectangle. Included therein is a positive voltage source, indicated at B+ as a supply bus 76, connected through a resistor 80 to a distribution bus 82 shunted by a filter comprising capacitor 84 and resistor 86. Collector rods or buses 88 of the upper manual are respectively connected through resistors 90 to a collector 92. The collector 92 is connected through a resistor 94 to the bus 82, and it is also connected through a diode 96 to a line 98. A few of the key switches 100 of the upper manual are shown diagrammatically. Each is grounded and is normally spaced out of contact with the adjacent bus 88. The key switches 100 are selectively closed against their cooperating buses whenever a pressed key is depressed.

Similarly, as to the lower manual, there is a collector 102 connected through a resistor 104 to the bus 82, and also connected through a capacitor 106 to a line 108. The key switches 110 of the lower manual are likewise grounded, and are normally spaced from, but are engageable with the collector buses or bus rods 112 upon depression of a corresponding key. The buses being connected through resistors 114 to the collector 112.

It will be understood that there is a voltage divider action among the resistors 80, the resistor 94, and the various resistors 96. (Similarly, there is a voltage divider action among resistor 80, resistor 104, and resistors 114.) Thus, whenever one of the switches 100 is closed, the voltage divider action causes the potential on the collector 92 to drop from the B+ potential on the line 76 to some lower value, and thus causes a negative pulse to be applied to the resistor 96. If one key switch is held down, and another depressed, and then two resistors 90 are connected in parallel, again somewhat dropping the voltage on the collector 92 and sending another negative pulse through the capacitor 96. These negative pulses are used for keying purposes, as will be brought out shortly hereinafter. As will be understood, the same situation pertains with regard to the key switches 110 of the lower manual 14.

The line 98 leads from FIG. 3b to FIG. 3a to a diode 116 paralleled by a resistor 118. The diode 116 is poised so as to pass negative pulses, but not any possible pulses or disturbances of a positive polarity. The other side of the diode is connected to a stop tablet switch 120 which is operated by one of the stop tablets 16, specifically the one numbered for FIG. 3a as 16-1 and labeled “SSH-BOOM UPPER.” The other side of the switch 120 is connected to a collector 122 which leads through a connecting line 124 to the input of the brush keyer 46. The negative pulse applied at the input to the brush keyer is indicated above the line 124 and to the left of the brush keyer at 126.

The line 108 also extends from FIG. 3b down onto FIG. 3a to a switch 128, this being controlled by one of the stop tablets 16, specifically numbered as 16-2 and labeled “SSH-BOOM LOWER.” This switch is also connected to the line 124.

The line 122 is connected through a capacitor 130 to a normally open switch 132 which is closed by means of one of the stop tablets 16, specifically numbered as 16-3 and labeled “SSH-BOOM PEDAL CYMBAL.” The other side of the switch 132 is connected to a line 134. The line 134 is connected through a resistor 136 to a positive voltage source indicated at B+. Connection is made to the line 134 by a normally open switch 140 grounded through a resistor 138. The switch 140 is arranged to be closed whenever one of the pedals 17 is depressed, and this, for example, can be done by means of a well-known ball which is pivoted whenever any pedal is depressed, whereby to close the switch 140. Thus, the voltage appearing on the line 134 is dropped any time the switch 140 is closed, thereby causing a negative pulse or spike to be passed by the capacitor 130 to the line 24. As will be understood, it is normal for the pedal notes to be played only one at a time, and hence it is only necessary to provide one switch 140.

A second switch 142 is also closed by depression of any pedal 16, and this switch is connected through a resistor 144 to a positive voltage, but of lower potential than the B+ supply. The switch 142 may be ganged with the switch 140, and is so shown. The opposite side of the switch 142 leads through a line 146 to a line 148, and this in turn leads to a stop tablet controlled switch 150 which is ganged with the switch 132 for closure by the stop tablet 16-3. The other side of the switch 150 is connected to a line 152, and this line passes through a diodes 154 in series with a resistor 156, shunted to ground by a capacitor 158, to a line 160, about which more will be said shortly. However, it will be recognized that with the switch 150 closed, whenever the pedal switch 142 is closed a positive voltage is applied through the diode 154 to the line 160. This positive voltage is used for keying, as will be brought out shortly.

Attention now should be directed to the upper portion of FIG. 3b wherein the brush keyer 46 is shown in detail. The line 124 is connected to the base of a transistor 162, the base being connected to ground by a resistor 164 paralleled by a capacitor 166. The transistor is of the p-n-p type, and has the collector thereof connected through a resistor 168 to a positive potential line 170. The base of this transistor also is connected through a resistor 172 to the line 170, thereby serving with the resistor 164 as a voltage divider biasing the base. The emitter is connected to ground through a resistor 174 paralleled by a capacitor 176. The transistor 162 and associated components will be recognized as forming an amplifier which amplifies and inverts the pulse 126.

The collector of the transistor 162 is also connected to the base of a transistor 178, also of the p-n-p type, and having the collector thereof connected direct to the positive supply line 170. The emitter is connected to ground through a resistor 180, and is also connected to a diode 182. The transistor 178 will be recognized as an emitter follower buffer amplifier, and the output pulse thereof is
positive as indicated at 184, being sharpened and amplified. The diode 182 is poled to pass positive pulses. The diode 182 is connected to a resistor 186, the junction between the diode and resistor being shunted to ground by a rather small capacitor 188. The output side of the resistor 186 also is shunted to ground by a relatively small capacitor 190, and also is connected to the resistor 186 previously mentioned. The capacitors and resistors just mentioned may not in every instance be necessary, but are desirable in some organs to slow the attack somewhat, and thereby to avoid adverse interaction with a reverberation unit.

The noise generator and amplifier 32 includes an n-p-n transistor 192 having the base thereof grounded, and having the emitter thereof connected through a resistor 194 to a positive voltage supply line 196. The collector is not connected, and the base and emitter serve as a diode biased to its Zener point to produce a noise output. A dropping resistor 198 connects the positive voltage supply line 196 to the previously mentioned voltage supply line 170.

The output of the Zener biased transistor 192 is connected through a capacitor 200 to the base of an n-p-n transistor 202. The collector of this transistor is connected through a resistor 204 to the positive voltage line 170. The output of the transistor 202 is connected through a resistor 206 which is connected to the base of the transistor 202, and also to a grounded resistor 208, the resistors 206 and 208 determining the bias of the base. The emitter is connected to a resistor 210 paralleled by a capacitor 212, and this parallel combination is grounded through a resistor 214. Ideally, the resistor 214 would not be required, but this resistor is of selected, rather small value to compensate for other tolerances in the circuit to produce the desired output.

As will be appreciated, the transistor 202 and associated circuit elements comprise an amplifier for the noise generated by the Zener-connected transistor 192, and the output of the transistor stage 202 is taken from the collector, being connected through a capacitor 216 to the base of a following n-p-n transistor 218. The collector again is connected through a resistor 220 to the voltage supply line 170, and voltage divider resistors 222 and 224 provide bias for the base, the resistor 224 being shunted by a capacitor 226. The emitter is grounded through a resistor 228 and parallel capacitor 230, and the output is connected through a filter 232 comprising a series resistor 234 paralleled by a capacitor 236, the input side of this parallel combination being shunted to ground by capacitor 238. The output side is connected to the diode 34.

The junction point 36 is connected to the diode 34 as previously stated, and is shunted to ground by a capacitor 240. It is also connected to the diodes 38 and 50 as previously stated, the diode 38 being connected through the capacitor 42 to the junction 44, with the intermediate junction 40 being grounded through a resistor 242. Similarly, the intermediate junction 52 is grounded through a resistor 244, and is connected to the capacitor 54, as previously noted. The capacitor 54 is connected through a resistor 246 to the base of a transistor 248 forming a part of the noise output amplifier and filter. The collector of this transistor is connected through a resistor 250 to the positive voltage line 170, while the base is biased by voltage divider resistors 252 and 254 connected between the line 170 and ground. The emitter is grounded by a resistor 256 paralleled by a capacitor 258. The output of the transistor stage employing the transistor 248 is taken from the collector through a capacitor 260 which leads through a resistor 262 to a shunting tank or tuned circuit comprising parallel connected inductance 264 and capacitor 266. Connection is continued through a series resistor 268 and a shunting capacitor 270 to a junction 272. The junction 272 is connected through a series resistor 274 and a grounded shunting resistor 276 to the resistor 68 previously mentioned.

Reference now should be made to the shimmer generator 64 at the upper left portion of FIG. 3a. Connection is made to the D generator at 294 cycles as indicated at 278, and this connection goes through a resistor 280 to a junction 282 also made at 284 to the adjacent D# generator at 311 cycles per second, and from this connection the resistor 286 leads to the junction 282. Connection is made from the junction 282 through a capacitor 288 to the base of an n-p-n transistor 290, the collector of which is connected through a resistor 292 to the positive voltage supply line 170. The base is connected to ground by a resistor 294, and the emitter is also connected to ground by a resistor 296. The transistor is biased off, and the base to emitter section acts as a diode detector. The sum and difference frequencies are detected, and the output of the transistor, taken from the collector, is applied to a roll-off filter to eliminate frequencies of 294 cycles per second and above. The filter includes a shunting capacitor 298, and a resistor 300 connected to the emitter by a coupling capacitor 302. The output side of the resistor 300 is shunted to ground by a capacitor 303, and also is connected to the resistor 66 and a line 304 to the junction 44. Only the 17-cycle per second difference frequency is amplified to the level of the bias input to the transistor 248, and this 17-cycle per second frequency amplitude modulates the noise signal applied to the base of the transistor 248, thereby to produce a shimmering effect simulating a mechanical cymbal.

The drum generator 70 comprises a phase shift oscillator which is biased short of oscillation. It includes an n-p-n transistor 306, the emitter of which is connected to a junction 308 leading through a resistor 310 and a coupling filter comprising series resistor 312 and shunting capacitor 314 to the positive voltage supply line 170. A voltage divider resistor 316 is connected to the top of the resistor 310, and at the opposite end is connected to the base of the transistor 306, the base also being connected through another voltage divider resistor 318 to ground. Series capacitors 320 and 322 also are connected in series to the base, and the junction between these two capacitors is grounded through a resistor 324. The far end of the capacitor 322 is connected through a resistor 326 to a junction 328, the latter being grounded through a resistor 330, and also connected to a resistor 332. The resistor 332 is connected to a junction 334, grounded through a capacitor 336, and connected through a diode 338 to a junction 340, the latter being grounded through a resistor 342 and a connection through line 344. A feed-back capacitor 348 is connected from the collector of the transistor 306 to the junction between the capacitor 322 and the resistor 326 in a phase shift oscillator connection.

The line 346 is connected to a switch 350 operated by a "S-S-H BOOM PEDAL DRUM" stop switch 16-4. When this switch 350 is closed, closure of the switch 142 applies positive potential to the line 346, which passes a positive pulse through the capacitor 344, and through the diode 338 to bias the phase shift oscillator of the drum generator for oscillation. Since the capacitor 344 passes only a pulse, the bias immediately starts to decay as the capacitor 336 is initially charged and subsequently decays through resistors 332 and 330, whereby the oscillations decay in the manner of a struck drum. The diode 338 prevents the capacitor 336 from discharging backwards into the source. Diodes 154 and 182 serve similar purposes.

The emitter of the transistor 306 is grounded through a resistor 352 shunted by a capacitor 354. The junction 308 on the collector is connected through a coupling capacitor 356 and a series resistor 358 to a junction 360 shunted to ground by a capacitor 362. The junction also is connected to a line 364 which leads to a movable switch contact 368 of a switch 366. The movable switch contact normally engages a fixed switch contact 370 connected.
to the junction 372 between series resistors 374 and 376, the latter of which has the bottom end thereof grounded. The top end of the resistor 374 is connected to line 378. Another fixed switch contact 380 engageable by the movable contact 368 is connected direct to the line 378. The position of the switch contact 368 is determined by one of the stop tabs 16, namely, a "NORMAL SSH-BOOM VOLUME-FULL" stop tab 16-5. The movable contact 368 engages the fixed contact 370 for the normal position, and there is some attenuation through the voltage divider action of the resistors 374 and 376. With the stop tab moved to the "FULL" position, the movable contact engages the fixed contact 380, and there is no attenuation.

There is a second movable contact 382 which is normally engageable with a fixed contact 384. This fixed contact is connected through a resistor 386 to ground. The movable contact 382 is ganged with the movable contact 368, and is moved from the fixed contact 384 by movement of the stop tab 16-5 from its normal to its full position.

The movable contact 382 is connected to a line 388 leading to a junction 390, and hence to the junction 272 on the output side of the noise output amplifier and filter. Thus, in the normal position of the stop tab 16-5, the resistor 386 shunts the output of this noise output amplifier and filter, and with the movable switch contact 382 engaged there is no such shunting, thus raising the volume level.

The junction 390 also is connected by a line 392 to a movable switch contact 394 normally engageable with the grounded fixed switch contact 396. A movable switch contact 398 is ganged with a fixed switch contact 400, which also is grounded. The movable switch contact 398 is connected to the wire 378. Both of the movable contacts 394 and 398 are ganged together and are controlled by a "SSH-BOOM OFF-ON" stop tab 16-6. With the stop tab 16-6 in the "OFF" position, the movable contacts 394 and 398 engage their respective fixed grounded contacts, and thereby shunt the drum generator and the noise output amplifier and filter outputs to ground. Conversely, when the stop tab 16-6 is moved to the "ON" position, the grounding shunt is removed, and the full output of the amplifier is passed.

Voltages at various connections are shown at the upper right corner of Fig. 3a. Thus, a line 402 leads from the resistor 68 and goes to the amplifier 30, preferably through a preamplifier stage to provide an out of phase relationship at a reverberation unit, and thereby to prevent unfavorable reaction thereon. Alternatively, it can, of course, go to an entirely separate amplifier and loudspeaker system.

Similarly the line 388 is connected through a line 404 to a resistor 406 leading to a junction 408, and onto the amplifier 30.

In like manner, the line 378 leads to a junction 410 which is connected through a cross-over resistor 412 to the junction 408. The resistor 410 also is connected through a series resistor 414 leading to the amplifier.

**OPERATION**

 Portions of the operation of the present invention have been set forth heretofore. However, in order to put everything in one place as to operation, and with reference to Fig. 2 and also FIGS. 3a and 3b, closure of any key switch 100 of the upper manual or of a key switch 110 of the lower manual, with the appropriate stop tabs 16-1 and 16-2 closed, a negative pulse will be transmitted to the brush keyer 46. This will apply a positive pulse to the junction 40, and bias diodes 34 and 38 for conduction momentarily. The noise signal generated by the noise generator amplifier 32 will be passed briefly as somewhat of a hissing sound, but amplitude modulated by the shimer generator 64, whereby to produce a momentary cymbal sound, specifically of a cymbal struck lightly with a wire brush.

The upper manual path includes the diode 116, whereas there is no such diode in the lower manual path. This is not significant relative to the circuit, but is provided to prevent notes played on the lower manual, with both upper and lower "SSH-BOOM" stop tables operated, from feeding back to the upper manual to cause false operation of other circuits. The resistor 118 paralleling the diode is to provide for discharge of capacitors when the diode is no longer conducting.

When any pedal note is played with the stop tab 16-3, "SSH-BOOM PEDAL CYMBAL," actuated, a negative pulse again will be transmitted to the brush keyer 46, to produce the same action as just described. At the same time, a positive potential will be applied to the line 152, and through the diode 154 to junction 52, whereby to turn on diodes 50 and 34. These diodes will remain turned on as long as the pedal is held down. When the pedal is released, the capacitor 158 will discharge through the resistor 156 to provide a decay. Thus, a tone is produced that is similar to a crash cymbal, i.e., a cymbal struck with a drum stick or the like. Also, if the SSH-BOOM PEDAL DRUM" stop tab 16-4 is in operating position, playing of a pedal note will apply a potential to the line 346, which will be in the nature of a pulse through the capacitor 344 and diode 338 to turn on the drum generator 70 in a decaying fashion to produce a thump similar to that of a bass drum.

It will be observed that the brush keyer is quick acting, and therefore produces a brush sound simultaneously with the playing of a musical or melody note. The diode gates for the brush and cymbal are inexpensive and reliable in operation. Using the two diodes in series reduces leakage noise by a factor of at least ten over a transistor gate using a single transistor. Although turning on of one of the diodes 38 or 50 turns on the diode 34, thereby leaving only one diode to block in the other path, a higher noise level can be tolerated at this time, since it will be masked by the sound being produced.

Although reference has been made heretofore to "brush" and "cymbal," it will be understood that both are sounds as produced by a cymbal, the former as when a cymbal is lightly actuated by a wire brush, and the latter as when a cymbal is struck by a drum stick or the like. Hence the term "cymbal" is used generically in the claims. Similarly, a pedal is a key operated by the foot, and "key" is intended in a generic sense to cover a pedal as well as a manually operated key.

With reference to the shimer generator 64, it will be noted that the generation of the shimer frequency by the detecting of a difference signal and filtering out of the sum frequency eliminates the necessity of a separate tone generator, and in particular eliminates the need for providing some means of frequency stabilization for the shimer generator.

The specific example of the invention as herein shown and described is by way of example. Various changes in structure may occur to those skilled in the art, and will be understood as forming a part of the present invention insofar as they fall within the spirit and scope of the appended claims.

The invention is claimed as follows:

1. An electronic rhythm percussion accomplishment system comprising a keyboard musical instrument having a plurality of keys, a plurality of key switch means selectively closed thereby, a plurality of music tone generators respectively operated by said keys for playing music, means for generating a wide spectrum of audio frequency electrical noise, diode means connected to said noise generators, electronic output means connected to said diode means for producing a cymbal type tone upon conduction of said diode means, said diode means being normally biased off, and means connecting said key switch means and said diode means for rendering said diode means conductive upon closure of said key switch means, said diode means comprising two di-
odes forming parallel paths between said noise generating means and said output means, there being separate means connecting key switch means to each of said two diodes for respectively rendering said diodes conductive.

2. A system as set forth in claim 1 and further including a third diode in series with each of said first two diodes and with said noise generating means, and rendered conductive by interaction with either of the first two diodes rendered conductive.

3. A system as set forth in claim 1 wherein the means interconnecting said key switch means and said diode means includes means for delivering a pulse to said diode means to render said diode means only momentarily conductive.

4. A system as set forth in claim 1 wherein the means interconnecting said key switch means and one of said diodes includes means for delivering a pulse only momentarily to render that diode conductive, and the means interconnecting the key switch means and the other diode includes means for rendering the other diode continuously conductive for a predetermined time.

5. A system as set forth in claim 4 wherein said diode means further includes a third diode in series with each of said first two diodes and with said noise generating means, said third diode being normally non-conductive and rendered conductive upon conduction of either of said first two diodes.

6. A system as set forth in claim 1 and further including means for providing a low frequency oscillation, and means interconnecting said oscillation providing means and said diode means for amplitude modulating the noise signal passed by said diode means.

7. An electronic rhythm percussion accompaniment system comprising a keyboard musical instrument having a plurality of keys, a plurality of key switch means selectively closed thereby, a plurality of music tone generators respectively operated by said keys for playing music, means for generating a wide spectrum of audio frequency electrical noise, diode means connected to said noise generating means, electronic output means connected to said diode means for producing a cymbal type tone upon conduction of said diode means, said diode means being normally biased off, means connecting said key switch means and said diode means for rendering said diode means conductive upon closure of said key switch means, means for providing a low frequency oscillation, and means interconnecting said oscillation providing means and said diode means for amplitude modulating the noise signal passed by said diode means, the low frequency oscillation providing means comprising a pair of tone generators differing in frequency, a detector circuit connected to both said tone generators for detecting the sum and difference frequency thereof, and filter means for eliminating said two frequencies and the sum frequency and passing only the difference frequency.

8. An electronic organ rhythm percussion accompaniment system comprising an electronic organ having a plurality of keys, a plurality of key switch means selectively closed by said keys, a plurality of organ tone generators respectively controlled by said key switch means for playing music, organ output means including amplifier means connected to said generators and said key switch means for reproducing such music, means for generating a wide spectrum of audio frequency electrical noise, gate means connected to said noise generating means and to said output means for producing a cymbal type tone upon opening of said gate means, said gate means being normally non-conductive, means for comparing the frequencies of two adjacent ones of said organ tone generators, filter means for eliminating all but the difference frequency, means interconnecting said filter means and said gate means for amplitude modulating noise signals passed by said gate means, and means interconnecting said key switch means and said gate means for rendering said gate means conductive upon closure of said key switch means.

9. An electronic organ rhythm percussion accompaniment system as set forth in claim 8 wherein the frequency comparing means includes detecting means for detecting the sum and difference frequencies.

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FOREIGN PATENTS

ELLIEBERMAN, Primary Examiner
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U.S. Cl: X.R.
UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,520,984 Dated July 21, 1970

Inventor(s) William V. Machanian

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 2, line 58, change "62" to --72--;
Column 3, line 6, cancel the entire line and substitute:
--diodes 50 and 34 are turned on to conduct a noise--
Column 3, line 66, change "thus" to --this--;
Column 9, line 25, change "dides" to --diodes--.

SIGNED AND
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NOV. 5 1970

(SEAL)
Attest:
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