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(54) Acoustic data control system and method of operation.

(57) An acoustic data signal control system comprises at least one control data signal input for receiving polytonal acoustic control data signals, a control data signal store for retrievably storing received polytonal acoustic control data signals, a plurality of controls for controlling separate retrieval of selected segments of stored polytonal acoustic control data signals independently of the order and timing in which they were received and stored, said controls individually or collectively controlling performance of a chosen number of selected modifications on at least one selected parameter of a retrieved segment of polytonal acoustic control data signal, and at least one control data signal output for delivering the modified segment of polytonal acoustic control data signal to at least one signal generation or processing device concurrently with operation of said controls.

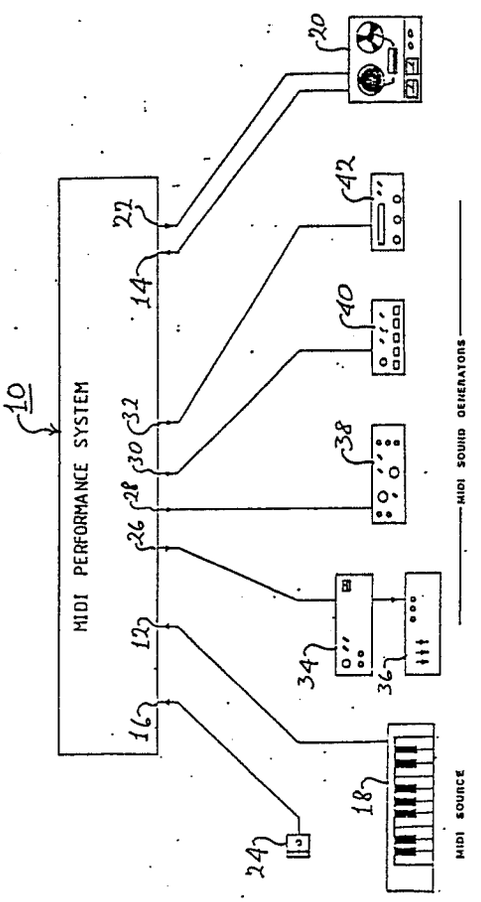


fig.1

EP 0 281 214 A2

"Acoustic Data Signal Control Systems and Their Methods of Operation"

BACKGROUND OF THE INVENTION

This invention relates to acoustic data signal control systems and their methods of operation.

Acoustic signals can be employed for a variety of purposes, including music, sound effects, and the like, particularly for entertainment. Proposals have been made for equipment such as sequencers which will control the synthesis of an audio signal by electronic or computer-based sound generators and processors such as oscillators, filters and the like, or will control the replay of electronically-sampled sounds of natural origin, such as the sounds of traditional musical instruments. Such previously proposed equipment tends to be limited in that having created or recorded a composition note-by-note, the user of such equipment is generally restricted in its performance to a substantially unmodified reproduction of the composition.

OBJECTS OF THE INVENTION

It is an object of the invention to provide an acoustic data signal control system, and a method of its operation, which will enhance the ability of the system operator to control the selection of segments of stored acoustic control data signals for reproduction, and to enable variation of the mode of reproduction in a manner chosen at the moment of reproduction or in advance of such time.

DEFINITIONS OF TERMINOLOGY

For the purposes of this invention, a number of definitions of words and phrases will now be made:-

(1) An acoustic control data signal is any form of electrical and/or magnetic signal used directly or indirectly to control acoustic data that immediately or ultimately results in audible sound.

(2) A polytonal acoustic control data signal is an acoustic control data signal (as defined above) comprising control information representing or relating to a plurality of fundamental frequencies. Preferably at least one of each of these fundamental frequencies occurs at least once in the duration of the controlled acoustic data, but of which fewer than all occur at least once in the duration of the controlled acoustic data.

(3) A sequence is a segment of a polytonal acoustic control data signal as applied to music. Sequences may comprise control information representing a variety of musical structures ranging from individual phrases, chords, rhythmic patterns, and the like, to longer structures such as melodies, bass lines, sections of harmony, and the like, and even entire musical works.

(4) A control includes an electrical switch or a functional equivalent of an electrical switch which can be operated by a person utilising a system in which the control is operated, and which may additionally or alternatively be operated automatically in response to a stored program or a control signal from an external source, the switch or its functional equivalent being effective in use to commence and/or to terminate the operation of a respective function of the system.

SUMMARY OF THE INVENTION

In the context of the definitions given above, the present invention provides an acoustic data signal control system comprising:-

(a) one or more control data signal inputs for receiving polytonal acoustic control data signals;

(b) a control data signal store for retrievably storing received polytonal acoustic control data signals;

(c) a plurality of controls for controlling separate retrieval of selected segments of stored polytonal acoustic control data signals independently of the order and timing in which they were received and stored;

(d) said controls individually or collectively controlling performance of a chosen number of selected modifications on one or more selected parameters of a retrieved segment of polytonal acoustic control data signal; and

(e) one or more control data signal outputs for delivering the modified segment of polytonal acoustic control data signal to one or more signal generation or processing devices concurrently with operation of said controls.

Thus the controller of the present invention can be regarded as a system for the performance of pre-recorded musical or other acoustic data sequences in which the sequences can be triggered or controlled independently in real time.

The acoustic data signal control system may be operated in conjunction with compatible musical instrument control interfaces, such as music keyboards with the conventional piano/organ key arrangement (as found on the majority of music

synthesisers) or other controllers such as guitar, drum, or wind instrument interfaces. Such interface devices transmit data signals to the control input of the acoustic data signal control system, the keys or other operational controls of the interface device constituting, or providing an extension to, the physical controls of the acoustic data signal control system. Such interface devices may be housed externally to the acoustic data signal control system or may be incorporated within a single integrated control system.

The signal generation or processing devices may be any known forms of acoustic signal generators or processors, such as synthesisers, computer music systems, sound sampling devices, automatically-controllable audio mixers, reverberation simulators, other audio effects devices and the like.

Such signal generation or processing devices may be housed externally to the acoustic data signal control system or may be incorporated within an integrated system for the control, generation, and/or processing of acoustic signals.

Stored polytonal acoustic control data signal segments are preferably accompanied by identification data by which each stored polytonal acoustic control data signal segment may be individually indentified, thereby to facilitate its selection and separate retrieval; such identification data may comprise a name or a number.

BRIEF DESCRIPTION OF THE DRAWINGS

An embodiment of the invention will now be described, by way of example, with reference to the accompanying drawings wherein:-

Figure 1 is a block circuit diagram of an acoustic data signal control system in the form of a music performance system conforming to the MIDI communications standard, along with its connections to external equipment; and

Figure 2 is a graphic representation of the front panel of the music performance system of Figure 1 and particularly illustrating the controls thereof.

DESCRIPTION OF PREFERRED EMBODIMENTS

Referring first to Figure 1, the music performance system 10 has a number of control data signal inputs 12, 14 and 16. The system input 12 receives acoustic control data signals from a compatible music synthesiser keyboard 18. The system input 14 receives synchronisation data or clock signals from an external tape recorder 20. Such clock signals may be formed by or derived from a recording from a remote source (such as a musical performance in another location), or have been created earlier on the equipment illustrated in Fig. 1 and fed to the recorder 20 through a synchronisation data or clock signal output 22. The system input 16 receives external ancillary control signals from a footswitch 24, or other external devices and systems (not illustrated).

Polytonal acoustic control data signals are input to the system 10 through the input 12. The basic musical data represented by these input signals are entered and edited in a manner which is superficially similar to the operation of a conventional music sequencer but differs substantially in that data representing individual phrases, chords, rhythmic patterns and the like are stored as separate sequences (musical segments) and are each allocated an identifying number or name. A large number of these polytonal acoustic control data signal segments or sequences are stored to form a library of sequences for subsequent independent retrieval, modification and output. Each such sequence is normally of greater duration and greater information content than a single musical note, but normally of lesser duration and lesser information content than a complete musical work.

A musical composition is created out of these stored sequences by initiating their selection and playback as and when required by operation of one or more selected controls, either in the system 10 or in the external keyboard 18. The desired sequences are retrieved in "real time", i.e. at the moment that reproduction of a desired sequence is required. The previously stored sequences are retrieved in any desired order, independently of the order in which they were stored. Retrieved sequences may be reproduced without modification, or they may be modified in respect of any one or more of the parameters that characterise polytonal acoustic data signals. These modifications may include variations of timing, pitch and loudness.

Such operational flexibility and rapidity of operational mode variation provide at least two major advantages over conventional music sequencers; firstly, the resulting composition can be instantaneously altered in a subtle or drastic fashion to suit the spontaneous demands of a live performance; and secondly, the various possibilities of a musical idea or set of ideas can be explored much more rapidly and thoroughly than is feasible with conventional equipment.

In addition to live performance as mentioned above, a new composition can be stored internally or externally for subsequent performance, with or without further editing. Storage of the new composition can be carried out by recording the identity and timing of the triggerings or initiations of the selected sequences, plus other associated actions;

these may include changes in the tempo, trigger profile (see below) and configuration number (see below). such a mode of storage is efficient in usage of electronic memory and is a form of data compression since a significant amount of music is composed from a relatively small number of ideas or concepts repeated at different pitches and timings. This mode of storage also facilitates editing of the compostion. Furthermore the data format used to store such a performance is similar to that used to store sequences so that, once recorded, musical material may be easily transferred from a sequence to a performance and vice versa.

As shown in Fig. 1, the system 10 has several acoustic control data signal outputs 26, 28, 30 and 32 coupled with external signal generation or processing devices 34, 36, 38, 40, and 42. Such devices could alternatively be integrated within the main sequencer 10 instead of being external devices as illustrated, in which alternative case the system outputs would deliver audio signals which could be directly applied to external loudspeakers or to amplifiers. Such units as are coupled together to form a selected one of the various possible assemblies that meet the objectives of the invention preferably all conform to a common musical instrument digital interface communications standard such that the units are compatible and interchangable; (such compatability is illustrated in Fig. 1 by use of the communications standard acronym "MIDI").

In figure 2, a control panel 50 holds an array of several groups of electrical switches (or their functional equivalents) which are variously labelled with identification numerals and acronyms as detailed below. The control panel 50 conveniently forms an integral part of the system 10 described with reference to Figure 1.

In the following description, each functional term as applied to an individual control or to a set of groups of controls is followed by an acronym or other abbreviation in brackets.

A group of three keys 52 control the overall functional modes, namely record/edit mode ("REC/EDIT"); sequence selection, retrieval, and playback mode ("PLAY"); and performance record/edit and playback modes ("PERF"). The simplest case of the playback mode can be reproduction without variation, though with the option of modification when required.

A set of twelve control keys 54 is used to control triggering (initiation) or selection of individual sequences in the "PLAY" and "PERF" modes. Any twelve sequences from the library of sequences held in the store of the sequencer 10 can be assigned at any one time to the keys 54.

A group of thirteen keys 56, arranged either singly or in small sub-sets are individually and collectively used to set up various alternative functional modes in the "PLAY" and "PERF" modes as will be subsequently detailed.

A key 58 ("CONFIG") is used for recalling previously configured (and automatically stored) configurations of control settings for rapid return to some previous set-up from a current set-up of the controls.

Various keys 60 arranged individually or in groups are used for controlling conventional functions of a sequencer such as editing, and for selecting, initialising or modifying operational parameters which do not require to be manipulated in real-time. These parameters are generally accessed using a series or "menus" or "pages", in a manner similar to that of other control equipment.

A rotary control 62 is employed for controlling various functions, particularly editing.

A display 64 provides visual information to the person operating the control panel 50.

The group of thirteen keys 56 are used to set up a sequence triggering mode or "trigger profile". Individual parameters of the trigger profile can be set on or off in any combination by use of these keys 56, and although some combinations may be redundant, the keys 56 provide several hundred distinct triggering modes. When the trigger profile is altered in real-time, the alterations have no effect on currently active sequences and only affect what will happen subsequent to following initiations. The trigger profile applies primarily to the action of the system during replay mode, but may also be used to control certain aspects of beahviour at the time of recording - for example in respect of sequences which are being monitored while recording a new sequence.

Details of the trigger profile parameters controlled by individual ones of the keys 56 are as follows:-

"STEP":-if this key 56 is on, a sequence will step through one note or chord at a time when its control key 54 is pressed or when it receives an external trigger (as detailed below). If this control key 56 is off, sequences are initiated and run at the current tempo until de-activated.

"ALIGN":-if this key 56 is on, sequences will behave rather like the tracks of a multi-track tape recorder in that they will always be in exactly the same relative synchronisation regardless of when they are initiated or de-activated. If this control key 56 is off, the relative timing of the sequences will be determined by the next two trigger profile parameters:-

"RELATIVE QUANTISATION" ("REL QUANT"):-if this key 56 is on, sequences will be forced to a certain level of relative synchronisation regardless of when they are initiated or de-activated. The level of synchronisation is selectable

by the user, and a typical value would be 1 semiquaver. (1/16 note).

"RESTART":-if this key 56 is on, all sequences will restart when a new sequence is initiated. If this key 56 is off, only the initiated sequence will restart.

"MOMENTARY" ("MOM"):-if this key 56 is on, the control keys 54 or the selected key of the external music keyboard 18 will behave in a momentary fashion in which pressing the respective key will cause initiation and releasing the respective key will cause de-activation. If this key 56 is respective key will cause de-activation. If this key 56 is off, the control keys 54, or the keys on the external keyboard 18 will toggle sequences alternately off and on upon successive depressions of the respective key.

"EXCLUSIVE" ("EXCL"):-if this key 56 is on, initiation of a sequence will cause automatic deactivation of other sequences; either all other active sequences or the other active sequences within the same group (as detailed below).

"GROUP":-if this key 56 is on, the sequences will behave as four groups with three sequences in each. This applies to "Exclusive" action as detailed above, but also allows each group to be triggered from a different range of the external keyboard 18.

"EXTERNAL TRIGGER" ("EXT TRIG"):-if this key 56 is off, sequences are initiated only by the control keys 54. On the other hand, if this key 56 is on, the control keys 54 are used to select or prepare individual sequences which are then initiated by an external source such as the keyboard 18 coupled to the input 12, or a footswitch coupled to the auxiliary input 16. When initiation is carried out from the keyboard 18, several versions of each sequence can be run simultaneously at different pitches corresponding to different keys on the keyboard 18, and thus each sequence has a set of control pitches associated with it. If the "Group" key 56 is on simultaneously, the keyboard 18 will behave as four independent ranges with three sequences controllable from each range.

"OVERRIDE":-if this key 56 is on, sequences are triggered from the control keys 54 while holding down selected keys on the external keyboard 18. In this case the sustained pitches corresponding to the held keys will be assigned as control pitches to specific sequences corresponding to whichever of the control keys 54 are pressed. This allows the user to override any existing control pitch assignments in a manner specific to particular sequences.

"TRANSPOSE" ("TPOSE"):-if this key 56 is on, incoming control pitches will transpose the existing control pitches, such that instead of current control pitches being replaced or supplemented, they will be shifted up or down in pitch.

"BUILD":-if this key 56 is off, each sequence can have only one control pitch associated with it, and new control pitches transmitted to the system 10 by depressing a key on the keyboard 18 will replace existing control pitches. However, if this key 56 is on, several versions of a single sequence can be run simultaneously at different pitches as described above, and individual control pitches can be toggled on and off by pressing the same key on the keyboard 18 several times.

"CYCLE":-if this key 56 is on, the incoming control pitches are applied to sequences in a sequential, cyclic manner such that the first control pitch is applied to the first active or pending sequence, the second control pitch is applied to the second active or pending sequence, et sequitur with a recycle back to the first sequence upon reaching the highest-numbered active or pending sequence. If the "Group" key 56 is on simultaneously with the "Cycle" key 56, the "Cycle" control function will apply independently to each group.

"NEW PITCH TRIGGER" ("NP TRIG"):-if this key 56 is off, pressing a key on the keyboard 18 initiates certain trigger functions only if all other keys on the keyboard have previously been released (these functions being "Step", "Restart", "Build off", and "Cycle"). If this key 56 is on, every key depression (control activation) will initiate these functions independently of how many keys are already held down.

Beyond the individual and collective (grouped) parametric modifications of the polytonal acoustic data signals detailed, more comprehensive collective parametric modifications are possible by abrupt changes of the configurations of complete sets of variables. Such a configuration is constituted by the following information:-

(a) the numbers or other informational labels ascribed to the twelve sequences currently assigned to the control keys 54. As a special case a "through" sequence (sequence number 0) may be assigned to one or more control keys; data received at these through positions from the external synthesiser connected to the input 12 is routed directly to the associated destinations (as defined below) rather than acting as sequence control data;

(b) a "repeat mode" defined for each of these twelve sequences and which may be "repeat", "single-shot" (perform once and then halt), and "hold at end" (perform once and then hold on the final note or chord of the sequence);

(c) output or destination addresses of up to twelve external sound generation devices. An address is associated with each control key 54 and consists of routing information specifying which sequence data is to go to a particular sound generation device;

(d) a "destination message" associated with each of the twelve sequences and transmitted to the assigned destination at the time a sequence is activated. These messages would typically consist of commands to the connected synthesisers indicating which preset timbres should be used in replaying the sequences;

(e) a secondary destination and message associated with each of the twelve sequences. These would typically consist of commands to connected audio effect units such as reverberation simulators indicating which preset effect should be invoked;

(f) input or source addresses associated with the twelve assigned sequences. These addresses indicate which of several communications channels are to be used as the controlling channel(s) when sequences are triggered from one or more external synthesiser keyboards 18. In a simple case a single address would be assigned to all twelve sequences; data received on this channel would then be applied to all twelve sequences while data on all other channels would be ignored. In a complex case each sequence would be assigned its own channel, permitting independent triggering from up to twelve different external keyboards or other control sources. This feature is useful in complex setups involving other types of sophisticated control equipment capable of multi-channel communication;

(g) a "velocity ratio" associated with each of the twelve assigned sequences. This parameter applies when the sequences are recorded using an external synthesiser or other instrument which transmits key velocity data and are later triggered using a similar external device transmitting key velocity data. Such velocity data is typically used to control the loudness or timbral brightness of the replayed notes. The velocity ratio defines the extent to which the resultant key velocity data sent to the sound generators is dependent on the velocity data stored in the sequence at the time of recording and the velocity data associated with the keystrike which triggers the sequence at the time of replay. Thus the velocity ratio is essentially a value which controls the weighting applied in calculating a weighted mean of pre-recorded and live velocity data.

(h) A "keynote" defined for each of the twelve sequences. This defines the control pitch which will cause the sequence to be triggered at its original pitch and to which all other control pitches are made relative;

(i) a set of "startup states" for each of the twelve control keys 54 which will be invoked at the time the configuration is recalled. These states can be selected from one of three options: "no change", "on", or "off". These states allow instantaneous activation and de-activation of multiple sequences at the time of configuration recall;

(j) a "pitch control inhibit" option selectable for each of the twelve sequences. If this option is selected, sequences will sound at their original pitch even when triggered from an external synthesiser keyboard. This is particularly useful when one or more of the twelve sequences is used to control a drum synthesiser as the combination of drum sounds (each triggered from a particular pitch in the sequence) will remain invariate when the sequence is triggered using different control pitches;

(k) a "pitch mask" and a set of twelve masking techniques, one for each of the twelve assigned sequences (see below);

(l) a set of pitches used to define the ranges or zones associated with sequence grouping as described above in connection with the "GROUP" key 56. The notes in the lowest zone can trigger sequences in the first group, notes in the second zone can trigger sequences in the second group, etc. These zones may be set up in such a way that they overlap; in other words such that certain pitches can trigger sequences in more than one zone;

(m) a set of pitch offsets which are applied to each of the zones described above. These offsets allow the transposition applied by different zones to be modified or nullified. For example, in the absence of such offsets, a zone defined as constituting the lowest octave of the synthesiser keyboard would always apply a large negative transposition to sequences triggered from it. An offset could be applied to restore the transposition to a more central region of the audible pitch range. These offsets are typically defined in multiples of one octave;

(n) a setting of the relative quantisation level applied when the "REL QUANT" key 56 is on (see above);

(o) a setting of the trigger profile; and

(p) any other information relevant to the configuration; for example, a tempo value.

Such a configuration can be set up in advance of required use by means of the selection pages and menus mentioned above, in conjuction with other front-panel keys and the rotary control 62. The data constituting the configurations is stored automatically. Any configuration can be recalled rapidly when required by combined operation of the "CONFIG" key 58, the "ENTER" key 60 and the rotary control 62. This can be done prior to playback and at any time during playback without stopping the performance system. Furthermore, such configuration changes can be stored as part of a performance so that they will occur automati-

cally during performance replay.

A further feature of the performance system is the ability to store a number of "pitch masks" which may be applied to the polytonal acoustic data transmitted on the outputs 26, 28, 30 and 32. The principle underlying these masks is that most styles of music consist of a series of periods varying in length from a few seconds to several minutes of which, during any single period, the musical pitches conform to a single "scale", typically consisting of from five to eight notes which constitute a subset of the twelve available semitones of the musical octave. During such a period, a pitch emanating from a musical instrument will sound reasonably correct or pleasing if it conforms to the current scale but incorrect or displeasing if it does not conform to the current scale. When triggering sequences from an external synthesiser keyboard using the "EXT TRIG" option described above, the application of control pitches in the manner described will frequently, in the absence of a pitch mask, produce pitches lying outside the current scale and which sound incorrect. The main reasons for this effect is that a sequence which in its original form consists only of pitches lying within the current scale may, when moved up or down in pitch in response to a received control pitch, result in pitches lying outside the current scale, even when the control pitch itself conforms to the current scale. The avoidance of such incorrect pitches therefore requires a knowledge of musical harmony and considerable care on the part of the user.

The function of a pitch mask is to alleviate this problem by inhibiting unwanted pitches or by shifting them up or down to the nearest pitch present in the mask. The detailed structure of the resultant sound may not always be easy for the user to predict particularly during an improvised performance or in complex cases where several polyphonic sequences are triggered from more than one pitch. However, the main purpose of the mask is to facilitate real-time manipulation of the general characteristics of a musical effect or texture without incurring the unpleasant effect of obviously incorrect pitches.

The mask is entered into the music performance system 10 by the user at some time prior to replaying sequences; this is achieved simply by playing the required scale or other pitch pattern on the external synthesiser keyboard. For each of the sequences assigned to the twelve control keys 54, one of four possible masking techniques must also be selected. these are:

1. Ignore mask (no masking effect);

2. Remove all pitches which do not conform to the mask, leaving gaps or rests in the music;

3. Force all pitches which do not conform to the mask upwards in pitch to the nearest pitch in the mask;

4. Force all pitches which do not conform to the mask downwards in pitch to the nearest pitch in the mask.

The mask takes effect during live or performance replay. Normally the mask remains fixed while the sequence pitches and control pitches vary, but the mask may itself be transposed up or down at any point in the music by switching on the "TRANSPOSE" key described above and pressing a key on the external synthesiser keyboard. This allows a single mask to be used for all scales of a similar type; for example a single mask consisting of the diatonic major scale could be used in any of its twelve transpositions without recalling a different configuration to invoke a new mask.

Although a pitch mask typically takes the form of a musical scale consisting of from five to eight notes, it can equally consist of a smaller or greater number of pitches. For example the mask might consist of the three notes of a major chord or even a single pitch; in this latter case only the rhythm of the masked sequence plus any pitch information spanning more than one octave will be retained. At the other extreme, a mask consisting of eleven pitches might be defined in order to mask out one particular pitch.

A further use of the pitch mask is its application to through sequences as described above. In this case the mask will remove wrong notes played accidentally on the synthesiser keyboard, a feature particularly useful during live improvisation.

Other modifications and variations can be made within the scope of the invention as defined in the appended claims.

Claims

1. An acoustic data signal control system comprising:-

(a) at least one control data signal input for receiving polytonal acoustic control data signals;

(b) a control data signal store for retrievably storing received polytonal acoustic control data signals;

(c) a plurality of controls for controlling separate retrieval of selected segments of stored polytonal acoustic control data signals independently of the order and timing in which they were received and stored;

(d) said controls individually or collectively controlling performance of a chosen number of selected modifications on at least one selected parameter of a retrieved segment of polytonal acoustic control data signal; and

(e) at least one control data signal output for delivering the modified segment of polytonal acoustic control data signal to at least one signal generation or processing device concurrently with operation of said controls.

2. An acoustic data signal control system as claimed in Claim 1 wherein the stored polytonal acoustic control data signal segments are accompanied by identification data by which each stored segment is identified to enable identified segments to be subsequently selected and assigned to the controls in different combinations.

3. An acoustic data signal control system as claimed in Claim 1 wherein said controls or controls of externally-connected devices are operable to create at least part of a combination of sounds by initiating replay of the segments when required in real time and wherein at the time of each initiation, operation of the controls applies parametric transformation to the replayed segments.

4. An acoustic data signal control system as claimed in Claim 3 wherein said controls comprise external or internal musical interface devices including music keyboards, guitar controllers, wind instrument controllers and drum sensors, said controls being operable to initiate and control replay of selected sequences.

5. An acoustic data signal control system as claimed in Claim 3 wherein pitch information relating to the operation of the controls is used to apply musical transpositions to at least one sequence at the time of its initiation.

6. An acoustic data signal control system as claimed in Claim 5 wherein any one sequence is run with simultaneously applied multiple transpositions corresponding to a set of control pitches.

7. An acoustic data signal control system as claimed in Claim 6 wherein the set of control pitches differs for each sequence from sets of control pitches applicable to a plurality of simultaneously active sequences.

8. An acoustic data signal control system as claimed in Claim 3 wherein at least one control parameter other than pitch information is used to apply musical transpositions to at least one sequence at the time of its initiation, and wherein each transposed version of a multiply-transposed sequence is initiated with different values for said parameters.

9. An acoustic data signal control system as claimed in Claim 8 wherein said at least one control parameter includes key-strike velocity.

10. An acoustic data signal control system as claimed in Claim 1 incorporating at least one predetermined and modifiable configuration of assignments of signal retrieval and parametric modification to selected controls.

11. An acoustic data signal control system as claimed in Claim 10 including a configuration store for storing said at least one configuration such as to enable subsequent rapid recall of a selected configuration for performance during playback without interrupting operation of the control system.

12. An acoustic data signal control system as claimed in Claim 5 wherein a trigger profile comprising differing trigger and control options is determinable by individually setting each parametric control off or on, with option determination being enabled during sequence replay by means of a single actuation of a respective control.

13. An acoustic data signal control system as claimed in Claim 12 wherein enabling of option determination avoids effects on currently active sequences while defining subsequent performance.

14. An acoustic data signal control system as claimed in Claim 12 wherein a said trigger profile comprises at least one parameter from the group of parameters consisting of:-

(a) "STEP";
(b) "ALIGN";
(c) "RELATIVE QUANTISATION";
(d) "RESTART";
(e) "MOMENTARY";
(f) "EXCLUSIVE";
(g) "GROUP";
(h) "EXTERNAL TRIGGER";
(i) "OVERRIDE";
(j) "TRANSPOSE";
(k) "BUILD";
(l) "CYCLE";
(m) "NEW PITCH TRIGGER".

15. An acoustic data signal control system as claimed in Claim 1 including a run and sustain control to cause a selected sequence to run through to the end of the sequence and then to hold on the final note or chord of that sequence.

16. An acoustic data signal control system as claimed in claim 1 wherein for at least one selected parameter, a weighting factor can be specified to control the time-varying resultant value of said at least one selected parameter transmitted at the time of playback as a weighted mean of the time-varying value stored at the time of recording and the time-varying value defined by an operator during playback.

17. An acoustic data signal control system as claimed in Claim 1 including means to specify a keynote for each sequence, said keynote defining a pitch that becomes a datum to which all received control pitches are related.

18. An acoustic data signal control system as claimed in Claim 1 including means to define a plurality of startup states such that at the time of a

configuration change or other user-selected time, a plurality of sequences will simultaneously adopt the defined startup states.

19. An acoustic data signal control system as claimed in Claim 1 including means to inhibit transposition of selected sequences such that said selected sequences always sound at their original pitch even when triggered by control events containing contrary pitch information.

20. An acoustic data signal control system as claimed in Claim 14 including means to specify the pitch ranges associated with the GROUP key and wherein said specified pitch ranges optionally overlap.

21. An acoustic data signal control system as claimed in Claim 20 including means to specify a pitch offset value for each said pitch range.

22. An acoustic data signal control system as claimed in Claim 1 including means to define at least one pitch mask to modify unwanted pitches in the output data signals.

23. An acoustic data signal control system as claimed in Claim 22 wherein the modification of unwanted signals comprises inhibition of said unwanted signals to remove said unwanted signals from the output, with consequential gaps in the output.

24. An acoustic data signal control system as claimed in Claim 22 wherein the modification of unwanted signals comprises a forced upward transposition of the unwanted pitch to nearest higher pitch present in the mask.

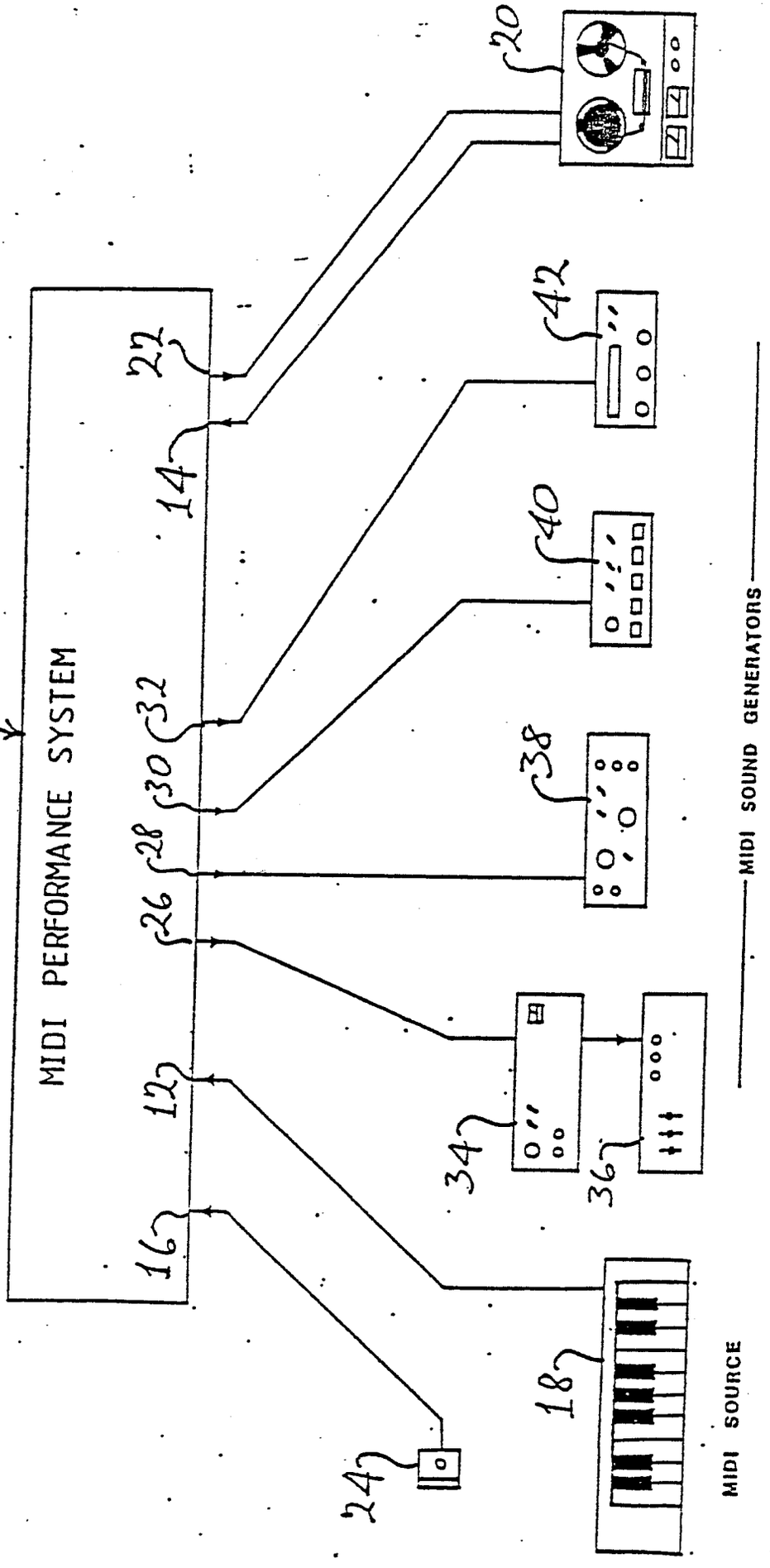
25. An acoustic data signal control system as claimed in Claim 22 wherein the modification of unwanted signals comprises a forced downward transposition of the unwanted pitch to the nearest lower pitch present in the mask.

26. An acoustic data signal control system as claimed in Claim 1 including controls to record, edit, and replay a performance comprising sequence trigger data signals and associated events including configuration, tempo, and trigger profile change signals, said control data signal store being such as to store these performance control data signals in a format compatible with the received polytonal acoustic control data signals whereby the respective signals or segments thereof are interchangeable.

27. An acoustic data signal control system as claimed in Claim 1, in operative combination with at least one signal generation or processing device.

28. The combination of Claim 27, wherein said device is selected from the group consisting of :-

(a) synthesisers;
(b) computer music systems;
(c) sound sampling devices;
(d) automatically-controllable audio mixers;
(e) reverberation simulators.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MIDI PERFORMANCE SYSTEM
12
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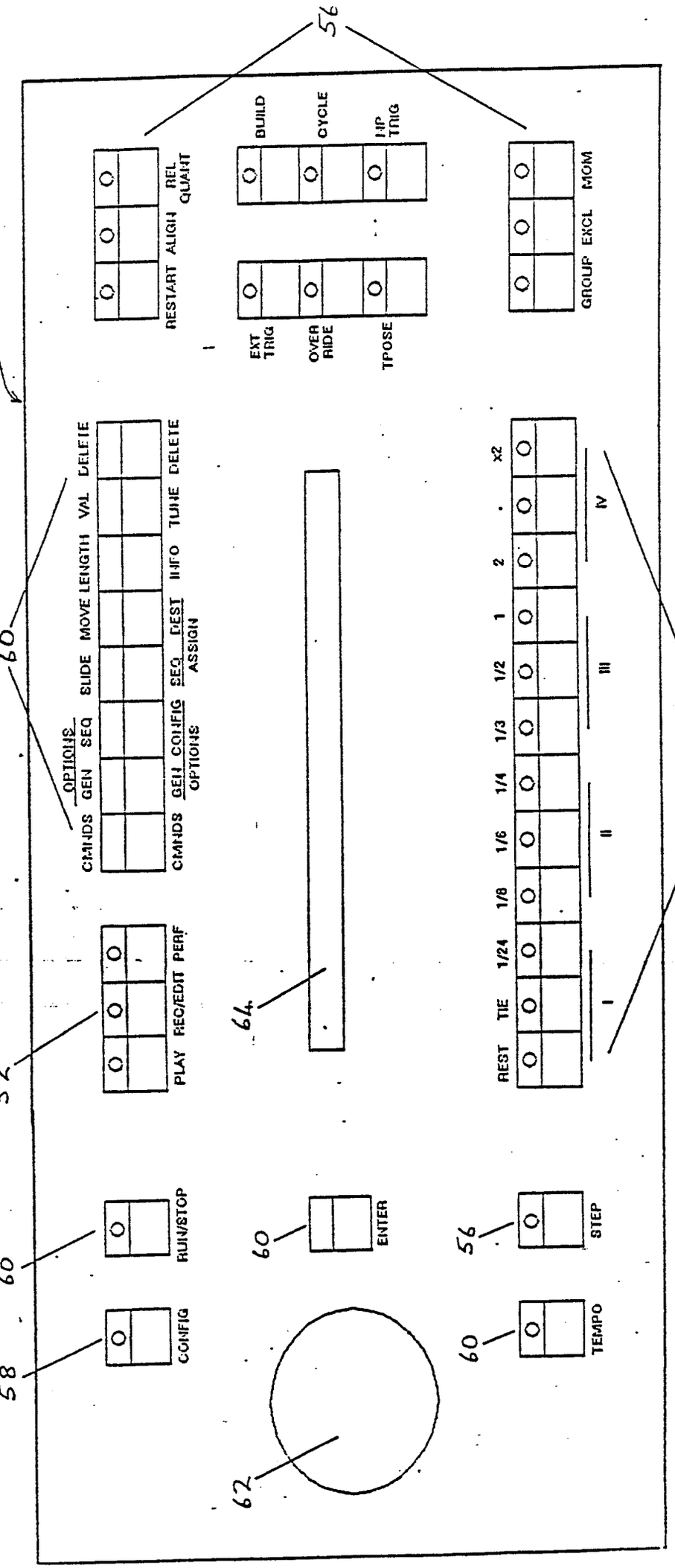
MIDI SOUND GENERATORS
MIDI SOURCE

fig.1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RESTART
ALIGN
REL QUANT
BUILD
CYCLE
HP TRIG
EXT TRIG
OVER RIDE
TPOSE
GROUP
EXCL
MOM
60
OPTIONS
CMNDS
GEN SEQ
SLIDE
MOVE
LENGTH
VAL
DELETE
CMNDS
GEN CONFIG OPTIONS
SEQ DEST ASSIGN
INFO
TUNE
DELETE
52
PLAY
REC/EDIT
PERF
64
REST
TIE
1/24
1/8
1/6
1/4
1/3
1/2
1
2
.
x2
I
II
III
IV
54
60
RUN/STOP
60
ENTER
56
STEP
58
CONFIG
62
60
TEMPO

Fig. 2