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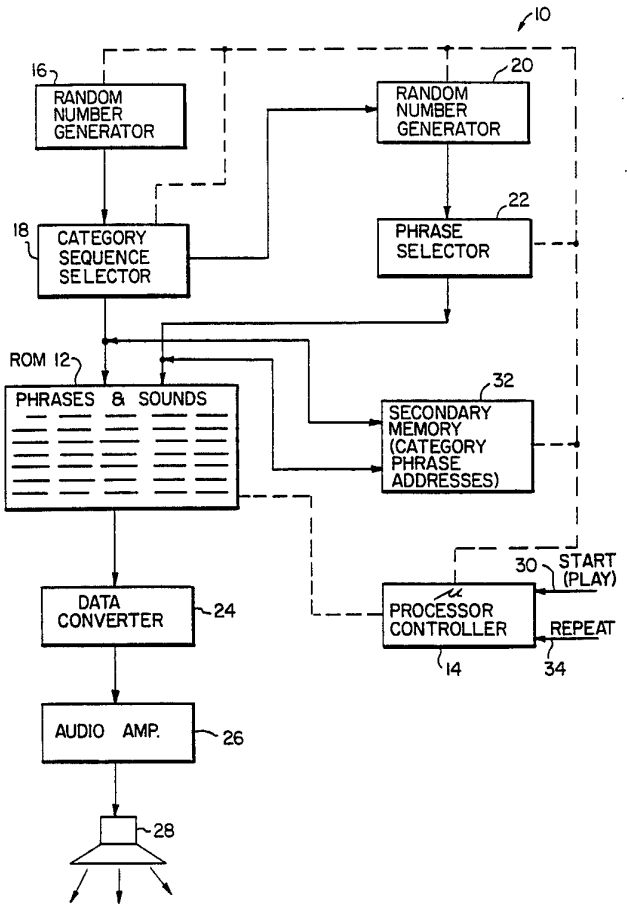
(54) Title: TOY WITH RANDOMIZED SOUND OUTPUTS

(57) Abstract

A toy controlled by a microprocessor (14) includes a memory (12) for storing audio data in digitized format. The data is segregated into categories, each containing a plurality of sound phrases, that is a word or words of speech in a digitized format. To form a sentence, phrases are randomly selected (20, 22) for output from several categories in a predetermined sequence of categories and converted from digital data into analog signals (24) that drive an amplifier (26) and loud speaker (28). The outputted sequence is selected at random.



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TOY WITH RANDOMIZED SOUND OUTPUTS

BACKGROUND OF THE INVENTION

This invention generally relates to sound enunciating toys and more particularly to toys which produce sounds in randomized sequences. Complete sentences can be spoken and sound effects can accompany spoken words.

Children have long used toys to learn vocabulary, spelling and reading skills. However, as with all toys, repetitive actions or responses from a toy quickly become monotonous for young people through the predictability of the output or response and through repetition. As a result, the user loses interest and the educational value of the device is quickly absorbed and the toy is neglected.

Toys which speak, whether it be a doll, a model airplane which provides engine noises, gun noises, bomb noises, etc. have heretofore been extremely limited in the variety of available responses to particular switch operations, movements, and the like.

What is needed is a sound emitting toy which is capable of outputting a seemingly infinite number of combinations of word phrases and sound effects in response to a user's request. The outputted word phrases should form substantially logical and grammatically correct sentences.

SUMMARY OF THE INVENTION

It is an object of the invention to provide an improved toy that can enunciate a large number of different coherent sentences with little repetition of complete sentences.

Another object of the invention is to provide an improved toy that speaks a large variety of coherent sentences which can be repeated immediately upon demand.

Yet another object of the invention is to provide an improved toy which can output sounds including output of a coherent sentence accompanied by sound effects.

A toy in accordance with the invention includes a memory for storing audio data in digitized format. The stored data is segregated into categories. In each category is a plurality of sound phrases, that is a word or words of speech in a digitized format. Phrases in a particular category may be devoted to sound effects instead of words of speech. To form a sentence, phrases are selected for output from several categories in a particular predetermined sequence and converted from digital data into analog signals that drive an amplifier and loud speaker. There are a plurality of available sequences. The outputted sequence is selected at random.

Within each category in the selected sequence, there are many available word phrases at respective memory addresses. The phrase, or phrases, to be outputted from a selected category is also selected at random. The interrelationship between the sequence of categories and the content of the categories is such that coherent, grammatically correct sentences are always outputted. By including a sound effect category in a sequence, the sentence will be preceded, followed or interspersed with sound effects as appropriate.

The entire process is controlled by a microprocessor which initiates a sentence sequence whenever the user demands by

operation of an external switch, which can be of any type, for example, electro-mechanical, purely electrical, optical, or sound activated. A capability to repeat a previously played sequence is available.

Such an arrangement of sound phrases into categories with many phrases stored in each category allows thousands of statements to be generated from a relatively small vocabulary of preferably between 50 and 100 words. These phrases may include sound effects that can be interspersed with the word phrases. Each phrase may be spoken by a character or doll or played back by a toy (automobile, airplane) in a random pattern. A "repeat" button or switch on the device causes playback of the last complete statement. For example, a toy figure of a soldier could "speak" in a progression or sequence of phrases that relate to a battle and form a generalized story of the battle. The sequence could begin with an attack, continue with words and sound effects to suggest fighting, and end in victory.

The same logic could apply to a vehicle, such as an airplane, flying to different places and reporting various experiences such as where to land, status of fuel supply and weather reports. Sound effects could be added such as thunder storms, turbulence with wind sounds, and a rough sputtering engine. Also, the plane could make landing sounds suggested when the wheels touch a runway, and takeoff sounds as the plane takes off and climbs. Phrases such as "fasten your seat belts" could be used in such a toy.

Further objects and advantages of the invention will be apparent from the following detailed description and drawings. The invention, accordingly, comprises the features of construction, combination of elements, and arrangement of parts which will be exemplified in the construction hereinafter set forth and the scope of the invention will be indicated in the claims.

BRIEF DESCRIPTION OF THE DRAWING

For a fuller understanding of the invention, reference is had to the following description, taken in connection with the accompanying drawings, in which:

Fig. 1 is a functional block diagram of an electronic circuit for randomized sound outputs in accordance with the invention for use in a toy ; and

Fig. 2 is a schematic circuit for performing the functions illustrated in Fig. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

A toy in accordance with the invention includes means for sound generation which may be incorporated into an otherwise conventional toy. For example, the toy can be a doll which becomes a speaking doll when the sound generator is incorporated. Plush toys such as teddy bears and other animals can be made to "speak" and emit sounds which may be triggered by operating a switch, speaking to the toy, petting it, combing it or squeezing the toy, etc. The toy may be a novelty for a birthday, Valentine's Day, or a seasonal character as Santa Claus. The toy can also be a simple box showing push buttons or switches and having a loud speaker.

Table I illustrates an exemplary vocabulary of word phrases and sound effects which might be used with a military style doll, a soldier. The table shows a matrix of word phrases, which may each include several words or a single word. The word phrases are segregated into categories A-D. A fifth category E is used to designate sound effects which are designated Sound 1 to Sound 10. In each category, there are many different independent word phrases. To form a coherent sentence, any word phrase taken from category A can be followed by any word phrase from category B, which in turn can be followed by any word phrase in category C, etc. Sound effects can precede the sequence of words, follow such a sequence, or be appropriately interspersed in such a sequence of words.

TABLE I

PROGRAM WITH MIX AND MATCH FUNCTIONS

GROUP A	GROUP B	GROUP C	GROUP D	GROUP E
BREAKER	HERE'S ONE FOR	THE SNIPER	ON THE HILL	Sound 1
ROADLOCK	IT'S LIGHTS OUT FOR	DESTRO	ON YOUR FLANK	Sound 2
GEN. BERNSTEIN	SHOOT AT	THE COBRA COMMANDER	NEARFT.AMERICA	Sound 3
COL. DEGUANO	COVER	THE BAD GUYS	IN THE SWAMP	Sound 4
HEAVY DUTY	INTERCEPT	THE VIPERS	IN THE CAVE	Sound 5
WILD BILL	FIRE AT	THE COBRA PARASITE	NEAR THE RIVER	Sound 6
GUNG HO	WATCH OUT FOR	THE COBRA EATHQUAKE	ON THE BEACH	Sound 7
GEN. FLAGG	MOVE OUT WITH	THE ENEMY	NEAR COBRA HQ	Sound 8
DUKE	BLOW-UP	THE ENEMY TANKS	ON THE BRIDGE	Sound 9
BARRICADE	ATTACK	THE COBRA SEPTIC TANK	ON THE RIDGE	Sound 10
	LET'S PARTY WITH			Quiet 1-3

In Table I, group A provides or implies a subject for a sentence. Group B includes a verb form; group C provides an object to go with the verb, and group D provides a prepositional phrase. Thus, by proper storage in memory of appropriate words, sentences may be readily formed from the word phrases. Also, exclamatory remarks that lack verbs can be provided, and not all of the categories are necessary to complete a sentence.

In the example, category E provides thirteen choices. Three of the thirteen sound effects are quiet. Then, on a random basis, in three out of thirteen uses, there is the probability that no sound effect will be played when category E is included in a selected sequence.

In an exemplary toy using the matrix of Table I, the phrases may be played, for example, in five different ways or modes. An entire output, for example, a sentence with a possible sound effect, can be produced by playing the five categories in the sequence A-E. Alternatively, the entire output can be played with the categories in the sequence E, A, B, C, D. Further, the output can be formed entirely from phrases in the categories B and C.

It is also possible to have an extended output that includes selections from categories A-E in sequence followed by another entire sequence A-E where the second sequence A-E is different from the first sequence A-E. That is, within each category, a different phrase is selected in the second go-around. Additionally, in this mode, additional connective words can be put between the two sequences, with such connective words being chosen from memory by a microprocessor. These intermediate words may or may not be part of the matrix of Table I, but may be stored in the same memory.

A fifth mode plays phrases and sounds from the categories A-E in sequence followed by another sequence including only the categories B and C (without repetition of the words from the first output of categories B and C). Additional words can be interspersed between the sequence A-E and the sequence B-C under control of the microprocessor.

Many other modes, that is, sequences of categories, could be set up for output. For example, category A may follow categories B-C and precede category D. The sound effects in category E can be interspersed at various places to enhance the ongoing "action".

It will also be possible to select more than one phrase in a given category in a selected sequence. This creates a possibility that two grammatically incompatible phrases will be selected for a single sentence output. This situation can be avoided by providing proper identification for each phrase in each category and programming the control system to prevent occurrence of incompatible phrases in a single sentence output.

A system 10 to provide a game, and other games similar to that described above, is functionally illustrated in Figure 1. Phrases and sounds are stored as audio data in a read-only memory (ROM) 12. The phrases and sounds are

segregated into categories as described, for example, in Table I. Each phrase and sound is at a particular address in the read-only memory 12. On command from a microprocessor 14, a random number generator 16 provides a signal to a category sequence selector 18 so that from the matrix of data in the read-only memory 12, selections are enabled in consecutive order in the categories of that sequence.

Substantially, in synchronism with the selection of each category in the sequence, a random number generator 20 provides a signal to a phrase selector 22 which randomly selects one of the phrases in the previously selected category. Then the next category in the sequence is enabled and the phrase selector 22, in response to another signal generated by the second random number generator 20, randomly selects a phrase in that enabled category, and so on until the entire selected sequence is completed.

As each category, and phrase within that category, is identified, the stored data at the address of that phrase is read out of the memory 12 to a data converter 24 wherein the retrieved digital data is converted into analog audio signals. These signals are amplified in an amplifier 26 and audibly output by a speaker 28.

The entire process is initiated by a start input signal represented by the arrow 30, which input signal may be provided by a switch that is mechanically or electronically operated, or may be sound activated, light activated, or operate from a remote control device as is conventionally used in electronic toys and electronic household devices.

After the selected sequence of categories is played, that is, after a sentence, or selected word phrases, with or without sound effects (as the device may be programmed), a second input signal, represented by the arrow 30, will initiate a new output, which is based upon the randomness of

the signals generated in the generators 16, 20, and therefore will differ from the previous output.

Additionally, the ability to replay or repeat any output is provided by a secondary memory 32. For each sequence selected by the category sequence selector 18, the secondary memory 32 stores the memory addresses of the phrases that are outputted to the data converter 24, audio amplifier 26 and speaker 28. That is, the secondary memory 32 stores the category/phrase addresses for the sequence as it is played. If the sequence includes five categories in a particular predetermined order, the secondary memory 32 will store the five addresses of the phrases and/or sound effects that make up that sequence. Upon input of a signal, represented by the arrow 34, the audio data at the memory addresses stored in the secondary memory 32 is automatically read out from the ROM 12 in the same sequence as the addresses were entered into the secondary memory 32, such that the converter 24, amplifier 26, and speaker 28 repeat the original audible output.

The output is repeated as many times as a signal is provided (arrow 34). A mechanical button switch, electronic switch, etc., as mentioned above in relation to the signal at 30, may be used. When a signal is again applied (at 30) to output a new "sentence", the addresses of the newly selected sequence displace the address data previously stored in the secondary memory 32, such that the new sequence can be repeated, if desired.

Circuit modules are available that provide all of the logical and storage functions illustrated in Figure 1. Such an integrated circuit module, for example, Texas Instruments' TSP50C10, is a combination speech digitizer and microprocessor integrated circuit that is capable of playing back prerecorded words and sound effects under control of a software program. Both the words and the software program are mask-programmed into a ROM of the device.

The integrated circuit (Fig. 2) operates from an external power supply 42, which is illustrated as batteries. However, an adaptor for connection to conventional household AC may be used alternatively, or both capabilities may be provided. In Figure 2, the integrated circuit 40 is controlled by two momentary push button switches, a play switch 44, and a repeat switch, push button 46. These switches, 44, 46, are external to the integrated circuit module 40. The play switch 44 causes a new random sound sequence to be played each time the switch 44 is pressed. The switch 44 also turns the toy ON and may cause output of a greeting message once each time the toy is turned ON from an OFF state. Such a greeting message is stored in an internal read only memory and its output is controlled by the microprocessor function circuit.

The microprocessor circuit may also turn the toy OFF automatically after a predetermined period of time, for example, three minutes, if neither switch 44, 46 has been activated during that period of time. This preserves the life of the batteries in the power supply 42.

The repeat switch 44 causes the previously played sound sequence to be replayed, as described above. The capacitor C1 serves as a filter for the power supply and the external resistance R1 pulls the integrated circuit initialization pin to the power supply voltage VCC. An oscillator frequency signal, as required by the integrated circuit 40, is provided by a ceramic resonator CR in conjunction with the capacitors C2, C3. For operation with the Texas Instrument integrated circuit, mentioned above, an oscillator frequency of 9.6 Mhz is required. Ceramic resonators are commercially available for this purpose. Transistors Q1-4, capacitors C4, and resistors R2-5 comprise an audio amplifier that drives a loud speaker, which audibly produces the sounds generated by the integrated circuit.

Thus, the integrated circuit in response to operation of the

switches 44, 46, internally selects a sequence of categories, randomly selects a phrase within each category of the sequence, and outputs analog audio signals to the audio amplifier and speaker. Within the integrated circuit module 40, a read only memory stores all of the phrases and sound effects which are mixed and matched in the system 10. Also provided is the microprocessor control and the digital-to-analog conversion of stored audio data.

It will thus be seen that the objects set forth above, and those made apparent from the preceding description, are efficiently attained and, since certain changes may be made in the above constructions without departing from the spirit or scope of the invention, it is intended that all matter contained in the above description, and shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

WHAT IS CLAIMED IS

1. A multi-speech sound system for use in games, toys, and the like, comprising:

first memory means for storing recorded audio data at respective memory addresses, said audio data being classified into a plurality of categories, each category including a plurality of said addresses;

first selection means for randomly selecting a sequence of said categories, said selected sequence being taken from a plurality of predetermined category sequences;

second selection means for randomly selecting at least one memory address of said audio data from each category of said selected sequence;

converter means for reading out said audio data from said selected memory addresses, and for processing said data, and outputting in said sequence corresponding audio signals;

output means for receiving said audio signals and outputting corresponding audible sounds in said sequence.

2. A multi-speech sound system for use in games, toys, and the like, as in claim 1, further comprising:

second memory means for storing said selected memory addresses of said first memory means, and means for commanding said converter means to read out from said first memory means said audio data at said selected addresses stored in said second memory means, and to output corresponding audio signals to said output means, whereby, on command, a previous sequence of outputted audible sounds is repeated.

3. A multi-speech sound system for use in games, toys, and the like, as in claim 1, wherein at least one of said categories includes audio data representing sound effects and the remaining categories include audio data of word phrases.

4. A multi-speech sound system as in claim 1, wherein said audio data in each said sequence provides a grammatically coherent output statement.

5. A multi-speech sound system as in claim 1, further comprising control means for synchronizing operation of said selection and converter means in response to an externally provided input signal, and means for providing said input signal.

6. A multi-speech sound system as in claim 1, wherein said audio data is stored in digitized format and said converter means includes means for digital to analog conversion of said audio data.

7. A multi-speech sound system as in claim 5, wherein said control means includes a microprocessor.

8. A multi-speech sound system as in claim 5, wherein said control means consecutively outputs two of said predetermined sequences, said sequences being randomly selected by said first selection means, and said memory addresses in each said category being randomly selected by said second selection means.

9. A multi-speech sound system as in claim 8, wherein said first memory means stores connective phrases and said control means inserts said connective phrase between said consecutive sequences.

10. A multi-speech sound system for use in games, toys, and the like, comprising

first memory means for storing recorded audio data at respective memory addresses, said audio data being classified into a plurality of categories, each category including a plurality of said addresses;

first selection means for randomly selecting a sequence of said categories, said selected sequence

being taken from a plurality of predetermined category sequences;

second selection means for randomly selecting at least one memory address of said audio data from each category of said selected sequence;

means for reading out said audio data from said selected memory addresses, and for processing said data, and outputting in said selected sequence corresponding audio signals.

AMENDED CLAIMS

[received by the International Bureau on 07 April 1994 (07.04.94); original claims 1-3,5 and 8-10 amended, new claims 11-18 added; other claims 4 and 6-7 unchanged (6 pages)]

1. A multi-speech sound system comprising:

first memory means having a plurality of categories, each of the plurality of categories having a plurality of addresses at each of which respective audio data is stored;

means for establishing a plurality of different sequences of any predetermined order and number of said plurality of categories;

first selection means for selecting one of said sequences;

second selection means for randomly selecting an address from each category of the selected sequence;

means for reading out in the order of the categories of the selected sequence the audio data of the randomly selected address of each category of the selected sequence; and

means for outputting the said read out audio data in audible audio output form.

2. A multi-speech system as in claim 1 further comprising second memory means for storing the selected sequence; and

means operating said reading out means and outputting means to repeat the audio data of the selected sequence.

3. A multi-speech sound system as in claim 1, wherein at least one of said categories includes audio data representing sound effects and the remaining categories include audio data of word phrases.

4. A multi-speech sound system as in claim 1, wherein said audio data in each said sequence provides a grammatically coherent output statement.

5. A multi-speech sound system as in claim 1, further comprising control means for operating said first and second selection means and said outputting means in response to an externally provided signal.

6. A multi-speech sound system as in claim 1, wherein said audio data is stored in digitized format and said outputting means includes means for digital to analog conversion of said audio data.

7. A multi-speech sound system as in claim 5, wherein said control means includes a microprocessor.

8. A multi-speech system as in claim 5 wherein said control means operates said first selection means to select two sequences, said second selection means for randomly selecting an address from each category of each of the two selected sequences, and said reading out and

outputting means to consecutively produce in audio form the audio data of said two selected sequences.

9. A multi-speech sound system as in claim 8, wherein said first memory means also stores audio data corresponding to connective phrases and said control means inserts a connective phrase between said consecutive sequences.

10. A multi-speech sound system for use in games, toys, and the like, comprising

first memory means for storing recorded audio data at respective memory addresses, said audio data being classified into a plurality of categories, each category including a plurality of said addresses;

first selection means for randomly selecting a sequence of said categories, said selected sequence being taken from a plurality of predetermined category sequences;

second selection means for randomly selecting at least one memory address of said audio data from each category of said selected sequence; and

means for reading out said audio data from said selected memory addresses, and for processing said data, and outputting in said selected sequence corresponding audio signals.

11. A multi-speech sound system as in claim 1, wherein said first selection means randomly selects the sequence.

12. A multi-speech sound system as in claim 1, further comprising second memory means for storing the selected sequence; and

means operating said reading out means and outputting means to repeat the audio data of the selected sequence.

13. A multi-speech sound system as in claim 5 wherein said control means operates said first selection means to select two sequences, said second selection means for randomly selecting an address from each category of each of the two selected sequences, and said reading out and outputting means to consecutively produce in audio form the audio data of said two selected sequences.

14. A multi-speech sound system as in claim 13, wherein said first selection means randomly selects each of the two sequences.

15. A method of producing multi-audio information comprising the steps of:

providing a memory;

establishing a plurality of categories, each category having a plurality of memory addresses with each

address storing digital data corresponding to an audio information segment,

establishing a plurality of predetermined sequences of categories of any predetermined order and number of said plurality of categories,

selecting one of said predetermined sequences of categories,

randomly selecting an address in each category in said one selected sequence, and

reproducing in audio form the randomly selected audio information segments from the categories in the order of said selected one sequence.

16. A method as in claim 15 wherein the step of selecting the sequence is made randomly.

17. A method as in claim 15, further comprising the steps of

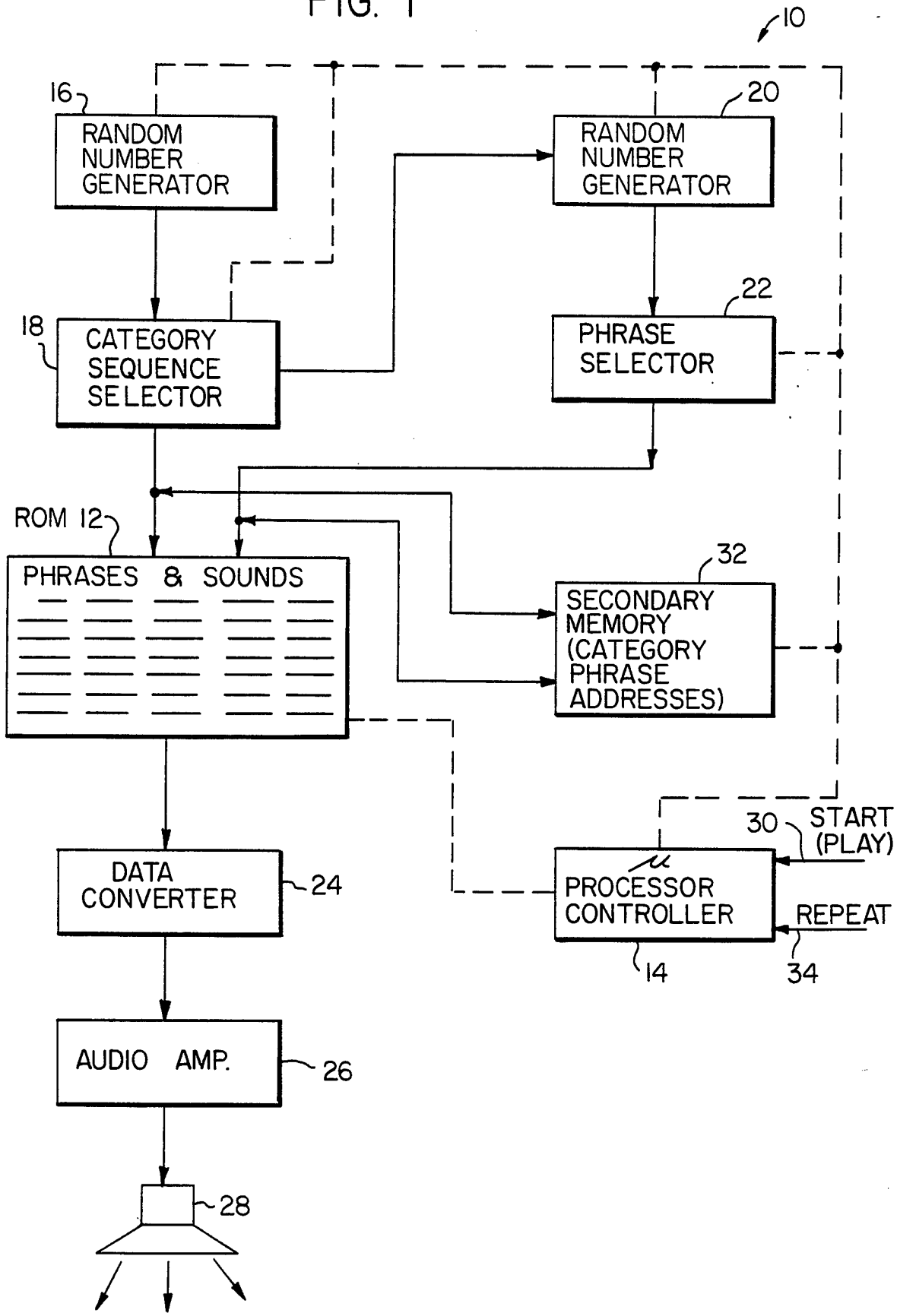
selecting a second one of said predetermined sequences of categories,

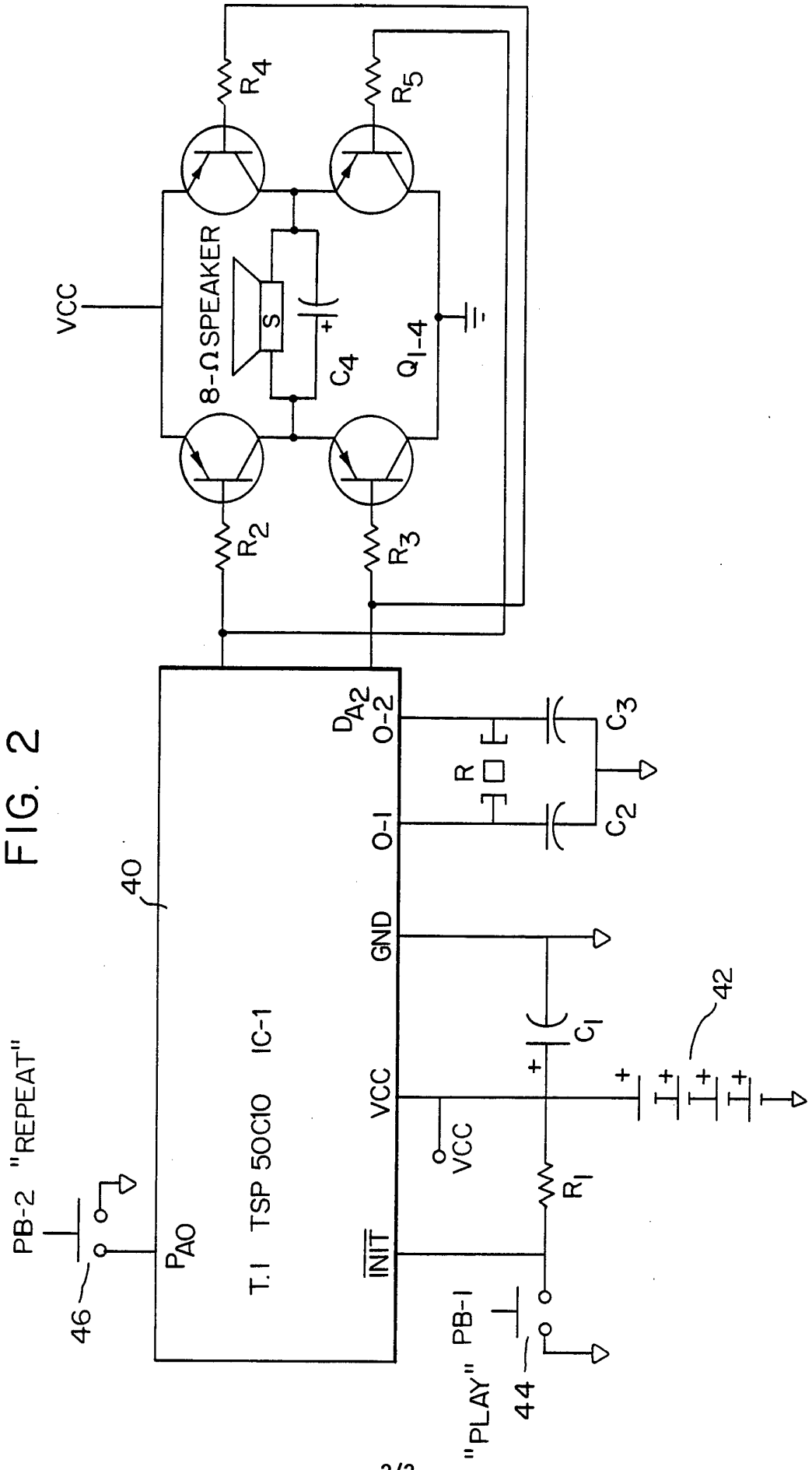
randomly selecting an address in each category in said second selected predetermined sequence, and

reproducing in audio form the randomly selected audio information segments from the categories in the order of said selected second predetermined sequence linked to the reproduction of the audio information segments of said selected one predetermined sequence.

18. A method as in claim 17 wherein the steps of selecting each of the two sequences is made randomly.

FIG. 1


10
16
RANDOM NUMBER GENERATOR
20
RANDOM NUMBER GENERATOR
18
CATEGORY SEQUENCE SELECTOR
22
PHRASE SELECTOR
ROM 12
PHRASES & SOUNDS
32
SECONDARY MEMORY (CATEGORY PHRASE ADDRESSES)
30
START (PLAY)
DATA CONVERTER
24
PROCESSOR CONTROLLER
REPEAT
14
34
AUDIO AMP.
26
28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R4
R5
R2
R3
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T.I TSP 50C10 IC-1
DA2
O-2
O-1
GND
VCC
INIT
PA0
R
C3
C2
C1
R1
42
PB-2 "REPEAT"
46
"PLAY" PB-1
44

FIG. 2

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US93/10733

A. CLASSIFICATION OF SUBJECT MATTER

IPC(5) :G10L 9/00
US CL : 395/2.81

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 395/2.81, 2.79

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X ---- Y	US, A, 4,857,030 (Rose) 15 August 1989, Figures 1A, 3, and 4.	1 and 4-10 ---------- 2-3
Y	US, A, 5,147,237 (Kwan et al) 15 September 1992, col. 8.	2-3
A	US, A, 4,799,171 (Cummings) 17 January 1989, Figures 4 and 5.	1-10
A	US, A, 4,266,096 (Inoue et al) 05 May 1981, col. 1, lines 29-64.	1-10

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
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