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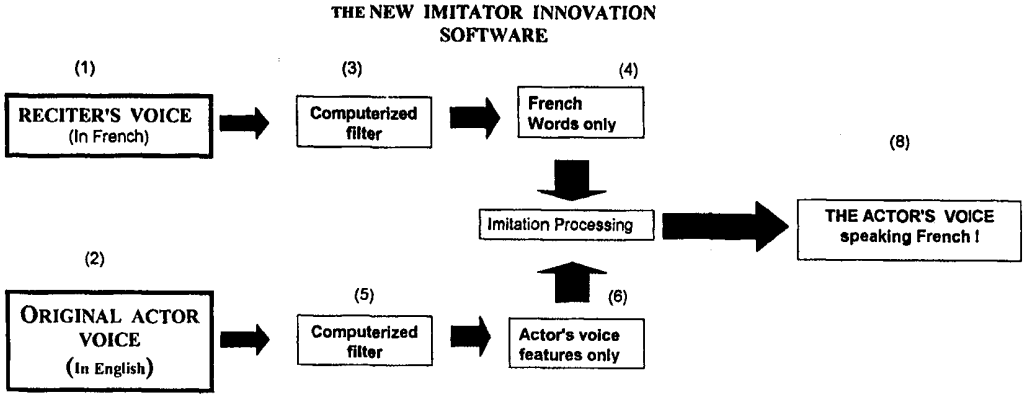
(54) Title: VOICE CHARACTER IMITATOR SYSTEM



(57) Abstract

A voice character imitator (8) operating on a computer system, where the speech heard, is a combination of voice features (6) and language words (4) of two different persons (1, 2), speaking two different languages. The achievement of this new imitating system is that, a person speaks in a different language, than the one originally recorded, but in his own original voice which matches his own character of speech. This new systems annuls the existing problem of lack of harmony in language dubbing, which renders the sound track uncomfortable to the viewer. This new system replaces the need for different reciters to cover all characters in a sound track. One reciter, after processing his voice, is able to replace male and female voices alike. The new imitating system, provides a possibility to create suitable voices for cartoons, as well as to imitate the sounds of musical instruments.

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Voice Character Imitator System

Field of the Invention

This invention relates to a method of voice imitating process operating on a computer system.

The invention is directed to the field of audio and audio-visual performances, where language dubbing is required.

Background of the Invention

The dubbing system for audio-visual performance to-date is performed by using several reciters to match the number of actors used in the audio-visual performance. The result of said dubbing system is that the voice of an actor, (or of the person interviewed), who speaks in his original language is mute, and what is heard is, the reciter's voice in the desired language. The special voice features of the actor or the real person who speaks are lost and the viewer is deprived of enjoying the voice character of the original speaker.

The dubbing system known to-date enables only the replacement of the original voice in one language with the voice of a reciter in the desired language. The known technology does not provide the means of imitation of the original voice features of the actual actor or speaker.

Summary of the Invention

This invention provides a new technology process operating on a computer system where only the voice features of an actor are stored (without words) in digitally code form creating a pattern of said features. The reciters' words in the desired language, without his voice features, are transplanted, by a suitable processing application program, into actors' pattern, in such a way that the actor speaks the desired language in his own voice and with his own voice features.

Drawings Description

Description of the Drawings

The foregoing aspects and advantages of the invention are better understood from the following detailed description of the drawings:

Brief Description:

Fig 1 - the program plan - illustrates the flow of message data in order to achieve the desired results.

Fig 2 - the detailed program plan - illustrates the decomposition and implementation of the different voices.

Fig 3 - <manager program window> - illustrates the three stages of the imitating process.

Fig 4 - <speaking by window> - illustrates the first stage of voice storage of reciter.

Fig 5- <original voice library window> - illustrates the storage of original voice to be transplanted.

Fig 6- <,imitating process window> - illustrates the flow of message data with imitation processing to be used by application program.

Fig 7 - Flow Process- is a block diagram that illustrates the flow of message data through the different stages to completion of imitating and storage.

Fig 8 - <Play/Record window> - illustrates the recording and playing process.

Detailed Description of the imitation process

As shown in the description hereunder, this new invention takes advantage of the special personal voice features attached to human voice (a), decomposes it, to words and features (namely: pith, tone and frequency) and transplant the words with new words which are imported from another decomposition (b), from where only the words are taken without the voice features. The decomposition and transplant procedure shall be referred hereafter as <the Imitator program>.

1. **Fig 1** - demonstrate the chart of the system: Reciter's French speaking voice (a) is stored in the imitator program on one file. Original actor's voice in English (b) is stored on another file. Both voices are being processed by the Imitator program. The processed voice that comes out from the imitator program has actors voice feature speaking French.

2. **Fig 2** - demonstrates the decomposing and reassembling of words and voice features system. The reciters' French speaking voice is taped on box (1). From there, it is transferred into box (3) which functions as a filter where the voice parameters are identified and decomposed into words and voice features. After decomposition, only the French words are stored in box (4).

3. The original actor's voice, speaking English, is taped on box (2). Undergoing the same proceedure of decomposing, in box (5), which functions as a filter where the voice parameters are identified and decomposed into words and voice features, the voice features without the words, are transferred into box (6).

4. Both parameters from box (4) and from box (6) are transferred into box (7) where the transplantation of the words into the voice features, takes place.

5. Box 8 stores the new outcome, which is: actor's voice is heard speaking French, using his own voice with all its special features, but in a different langauge than the original tape in box(2).

6. The Imitator program is controlled by an operating program, containing different screens, as illustrated in the following Figs, demonstrating, path by path the imitation procedure:

7. The first screen is shown in **Fig 3** - <**Imitator manager program**>. It describes the opening window with the imitator symbol (c1) on the left inner side, forward with three independent icons: <***Speaking by***> icon (F), <***Original voice library***> icon (G), and <***Imitation processing***> icon (H).

8. Small icons for <***Help***>*(c2)*, <***Exit***>*(c3)*, <***Magnify***>*(c4)* and <***Reduction***>*(c5)* are located on the upper window frame, left or right.

9. **Fig 4** - <**Speaking By**> **(F)** window. This screen contains 3 <read/write>, 3 <read only> and 2 <command> frame icons. The <read only> frame icons are: (i) The header <***speaking by***> (f1), (ii) the <***total record time***> (f5), which indicates the total recording time of the presented file appearing in the <***file***> frame (f3a), and (iii) the <***sample test***> (f10), which indicates the recorded voice statistic characters.

10. The <read/write> frame icons are: (i) the <***name***> (f2), for user to define reciterts' name. (ii) The <***file***> (f3a) for user to define each reciters' recorded voice under separate file name, and (iii) the <***movie***> (f4) for user to define the name of the movie or any other production, on which the dubbing is to be performed.

11. When <**Speaking By**> window is shown the <command> icons are activated. The command icons are as follows: (*i*) <***Save***> icon (f3), by which the added information is stored. and (*ii*) the <***Record voice now***> icon (f6), by which the <***Play/Record***> window (J), which appears under icon (f6), is activated. On the upper left or right, 4 additional icons are activated: <***Help***>*(f11)*, <***Exit***>*(f7)*, <***Magnify***>*(f8)* and <***Reduction***>*(f9)*.

12. By clicking on the <***Exit***>*(f7)* icon the <**Speaking By**>window (F) disappears and the system returns to the opening window of <**Imitator Manager Program**> **(C)**, [Fig 3].

13. By clicking on the <***Reduction***> ***(f9)*** icon the <**Speaking By**> **(F)** window is replaced by a **Temporary Format Configuration** and moves to the bottom area of the displayed screen.

14. By clicking on the <***Magnify***> ***(f8)*** icon the above temporary situation is annulled and the window returns to normal size occupying full screen.

15. **Fig 5 - <Original Voice Library>** window **(G).** Used for recording and storage of voice sound of the original actor. This window contains the following icons: 1 read/write, 4 read only and 2 command frame icons.

16. The read only icons are the followings: (*i*) the header ***<Original Voice Library> (g1)***, (*ii*) the ***<File>(g2),*** *(iii)* the ***<total record time>*** **(g3)**, which indicates the total recording time of the presented file appearing in ***<file>*** **(g2)**, and (*iv*) the ***<Sample Test> (g4),*** which indicates the recorded voice statistic characters.

17. The read/write icon is the ***<Actor Name>*** **(g10),** for user to define actors' name whose voice is being transplanted with reciters' words.

18. The Command icons activated are: (*i*) the ***<Save>*** **icon (G2a)** to store the added information *(ii)* the ***<Record voice now>*** icon **(g5),** by which the ***<Play/Record>*** window (J), which appears under button **(g5)**, is activated. On the upper left or right, additional 4 icons are activated: ***<Help>(g6)***, ***<Exit>(g9)***, ***<Magnify>(g8)*** and ***<Reduction>(g7)***.

19. By clicking on the ***Exit*** **(g9)** icon, the **<Original Voice Library>** window**(G)** disappears and the system returns to the opening window - **<Imitator Manager Program> (C)**, [Fig 3].

20. By clicking on the ***<Reduction> (g7)*** icon the **<Original Voice Library>(G)** window is replaced by a **Temporary Format Configuration** and moves to the bottom area of the displayed screen.

21. **Fig 6 - <Imitation Processing Program>** window **(H):** This window activates the Imitating program. which handles the final stage of the imitation procedure. The window contains the following: 3 <read/write> frames, 3 <read only> and 1 <command> icons.

22. The read only icons are: (*i*) the header ***<Imitation Processing>(h1)***, *(ii)* the ***<Speaking By library>(h2)***, and *(iii)* the ***<Original Voice library>(h3).***

23. The read/write frames are: *(i)* the ***<Speaking By library>(F)*** which contains all the saved files recorded through the said ***<Speaking By>*****(F)** window. *(ii)* the ***<Original Voice library>(G),*** which contains all the saved files recorded through the said ***<Original Voice>*** window(G). *(iii)* the ***<Imitation Processing>(h5)*** which contains the files of the new composed voice. while it is being processed and thereafter.

24. The command icon is the <***Imitation Processing>(h4).*** By clicking on it, the <***Play/Record Manager***> window(**J**) is activated. On the upper left or right, additional 4 icons are activated: <***Help>(h6)***, <***Exit>(h9)***, <***Magnify>(h8)***, <***Reduction>(h7)*** and icon *(h12),* which activates the <***Save Program***> window..

25. By clicking on the <***Help>(h6)*** icon the **HELP** program is activated. By clicking on <***Exit>(h9)*** icon the <**Imitation Processing**>window(**H**) disappears and the system gets back to the <**Imitator Manager Program**> (**C**). By clicking on the <***Reduction>(h7)*** icon the <**Imitation Processing**>window(**H**) is replaced by a **Temporary Format Configuration** and it moves to the bottom screen area. By clicking on the <***Magnify>(h8)*** icon the above temporary situation is annulled and the window gets back to normal size occupying whole screen.

26. **Fig 7 - Program Flow (9a).** The ***Program Flow*** block diagram, describs an example of one way of use divided into stages of use in order to achieve the desired imitation:

27. **Stage 1**: When starting operation, <**Imitation Manager**> window **(C)** appears on screen.

28. **Stage 2:** User opens the <**Imitating Processing**> window **(H).** This window replaces <**Imitation Manager**> window**(C)**.

29. **Stage 3:** User chooses the required file in the <***Speaking by*** > frame***(F).***

30. **Stage 4:** User chooses the required file in the <***Original Voice*** > frame***(G).***

31. **Stage 5:** User chooses the required file on the Imitation Processing list **(h5)** or creates a new file with icon **(h12).**

32. **Stage 6:** User clicks on **(h4)** to start imitation processing, the <***Play/Record***> window (J) is activated for imitation or monitoring audio files.

Claims: I claim

1. A method of voice character imitator system, where the result of the processing system produces a speech which is a combination of voice features and language words of two different voices. speaking in two different languages, operating on a computer system, comprising the steps of:

- receiving and storing in digital form, a speech of person (a) in his original language (z).
- receiving and storing in digital form, a speech of person (b) in his original language (x).
- the new imitating process system identifies and isolates the voice features of person (a), (pitch, tone and frequency) from his spoken words.
- the new imitating process system identifies and extracts the spoken words of person (b), (in language (x) from his voice features.
- the spoken words of person (b), are stored in digitally code form.
- Voice features of person (a), are stored in digital code form, creating a pattern of said features.
- the new imitating process system transplants the spoken words in language (x) into the voice features pattern of person (a).
- as a result of the imitating process, person (a) is heard to speak in language (x), in his own voice.

2. A method of voice imitating process as in claim 1, further comprising the steps of converting, modifying and recording on digital format, the speeches to be processed by the new system.

3. A method of voice imitating process operating on a computer system, comprising the steps of :

- the method of voice imitating process receives the above converted speech signal of person (a).

- the method of voice imitating process analyzes the digital recorded format and divides each bit separately, sampling the pith, tone and frequency and recognizes it as file statistic, meaning that each recorded file has its own independent adapted statistic file, covering the specific voice features.

- the voice imitating process system studies and modifies the voice features, each one separately, stores them and demonstrates them by coded statistic characters.

- the method of voice imitating process receives the converted speech of person (b).

- the method of voice imitating process analyzes the digital recorded format of the speech of person (b), separates words from voice features, extracts the words, stores them and demonstrates them by coded statistic characters.

4. A method of voice imitating process as in claim 3, further comprising the steps of an application program receiving the coded statistic characters of voice feature and the coded statistic characters of the words. The embedded structure as described in claim 1 is the result of the imitating process.

5. A method of voice imitating process for language imitation, as recited in claim 1, operating on a computer system, comprising the steps of:

- the voice imitating process includes an application program generating and embedding a structure and attached data values to elements of voice features on the one hand, and elements of words, on the other;

- the application program used by the voice imitating process includes application for speech recorder to receive and store the original speech of person (a) in language (z) and the original speech of person (b) in language (x).

- the application program used by the voice imitating process includes application for processing the above recorded signals extracting from speech of person (a), the voice features and from speech of person (b) the spoken words in language (x).

- the application program used by the voice imitating process includes application for recognition of voice features and sampling of pith, tone and frequency to be stored as file statistic.

- the application program used by the voice imitating process includes application for isolation and extracting of spoken words apart from voice features.

- the application program used by the voice imitating process generates the desired result of hearing person (a) speaking with his own voice features the words extracted from person (b), in language (x).

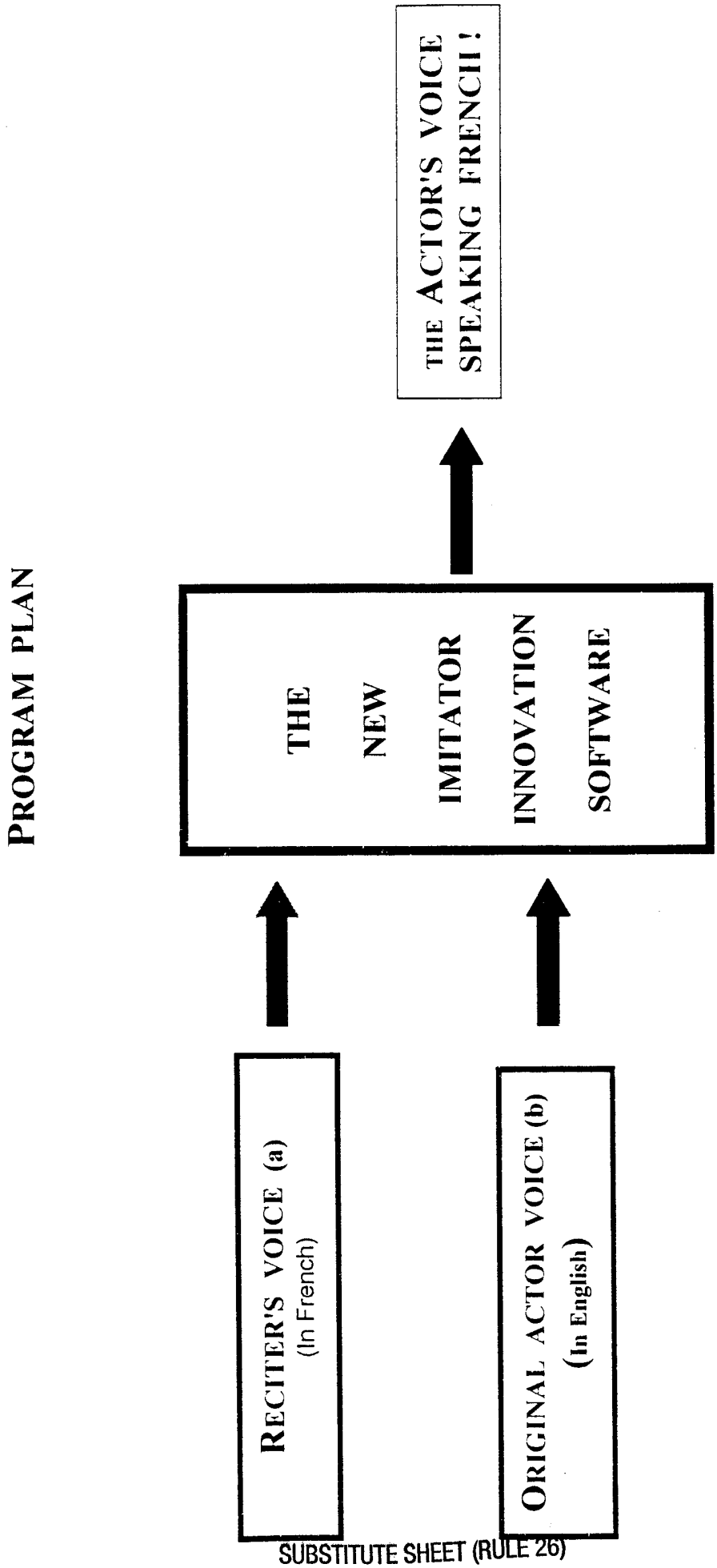
6. A method of voice imitating process as in claim 5 operating on a computer system for receiving sound signals in different languages and producing an imitation result, comprising:

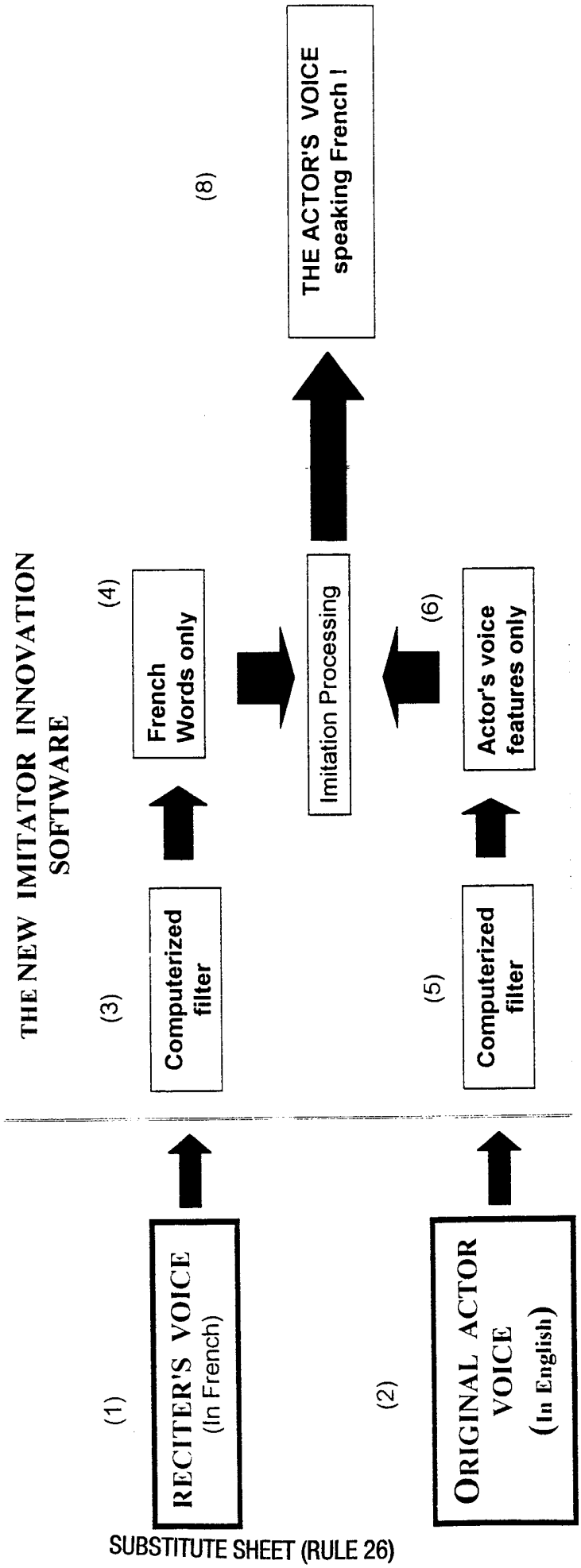
- a voice feature extractor adapted for receiving the sound signal in digital form, recognizing and generating the voice features to be further used by way of statistic file.

- a builder of statistic files containing desired spoken words in different languages, extracted from a recorded sound signal in the desired language.

- an imitating system for transplanting the above extracted words in the desired language into the identified and selected voice features.

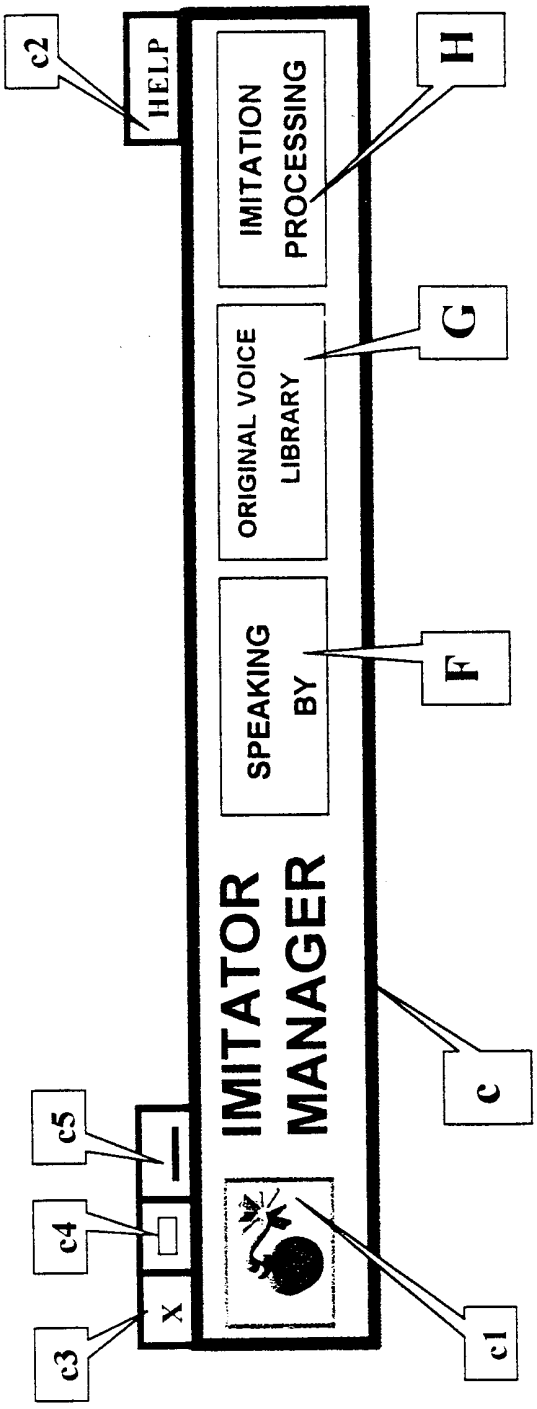
7. A method of voice imitating process as in claim 6, further comprising an application program for receiving the imitation results.


PROGRAM PLAN
THE ACTOR'S VOICE SPEAKING FRENCH!
THE NEW IMITATOR INNOVATION SOFTWARE
RECITER'S VOICE (a)
(In French)
ORIGINAL ACTOR VOICE (b)
(In English)

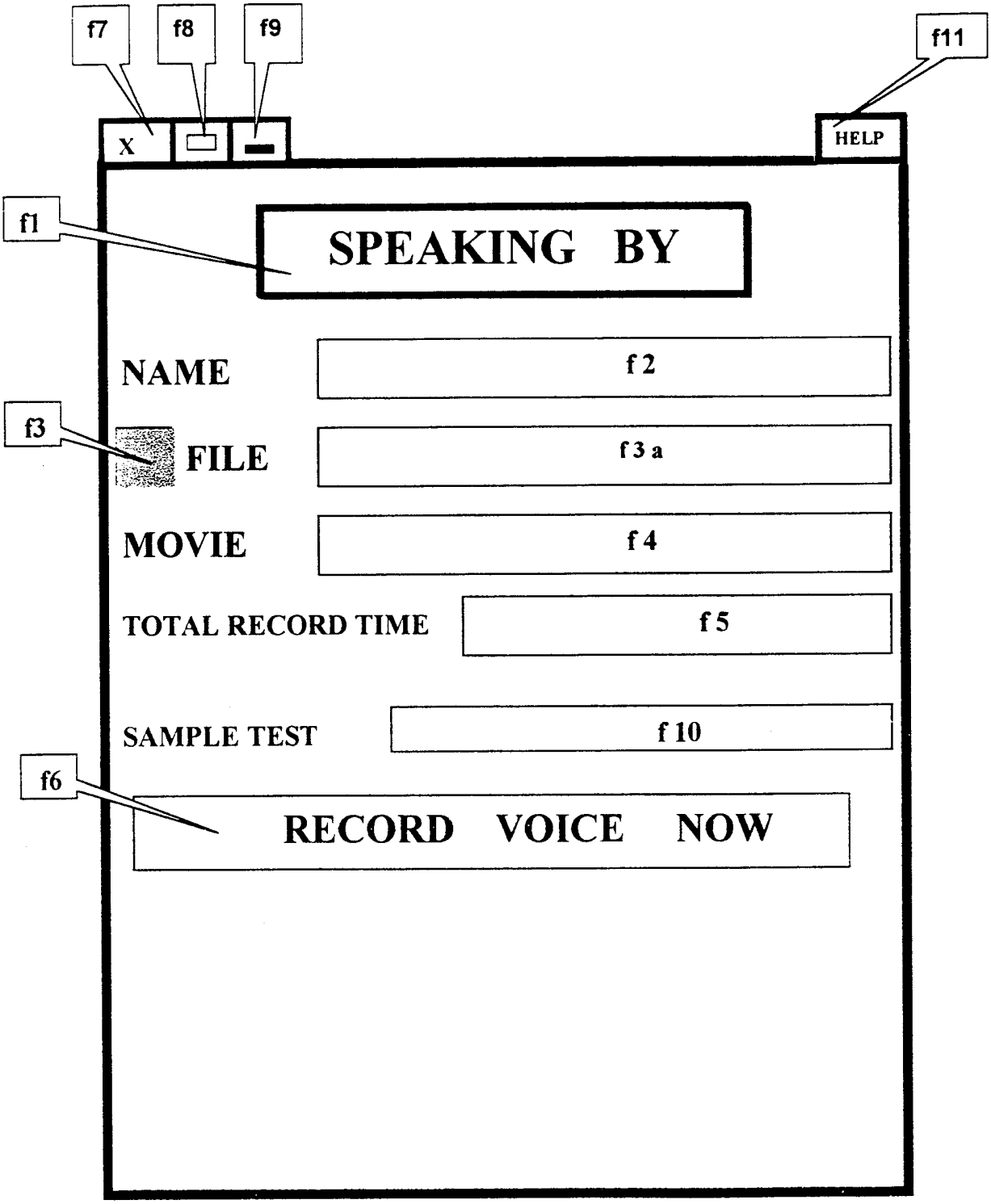

THE NEW IMITATOR INNOVATION SOFTWARE
(1)
RECITER'S VOICE
(In French)
(2)
ORIGINAL ACTOR VOICE
(In English)
(3)
Computerized filter
(4)
French Words only
(5)
Computerized filter
(6)
Actor's voice features only
Imitation Processing
(8)
THE ACTOR'S VOICE speaking French !

IMITATOR MANAGER PROGRAM

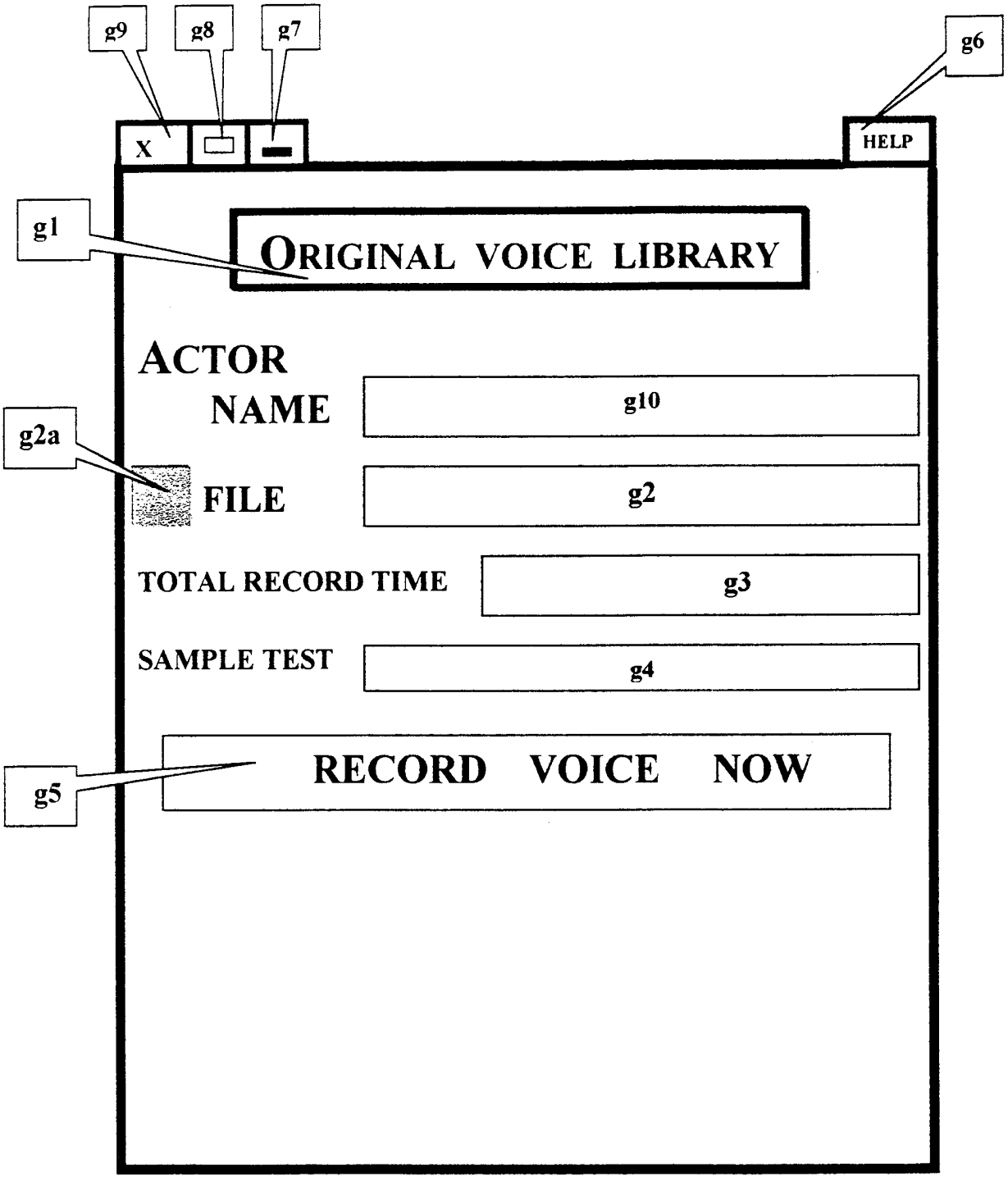
Window C

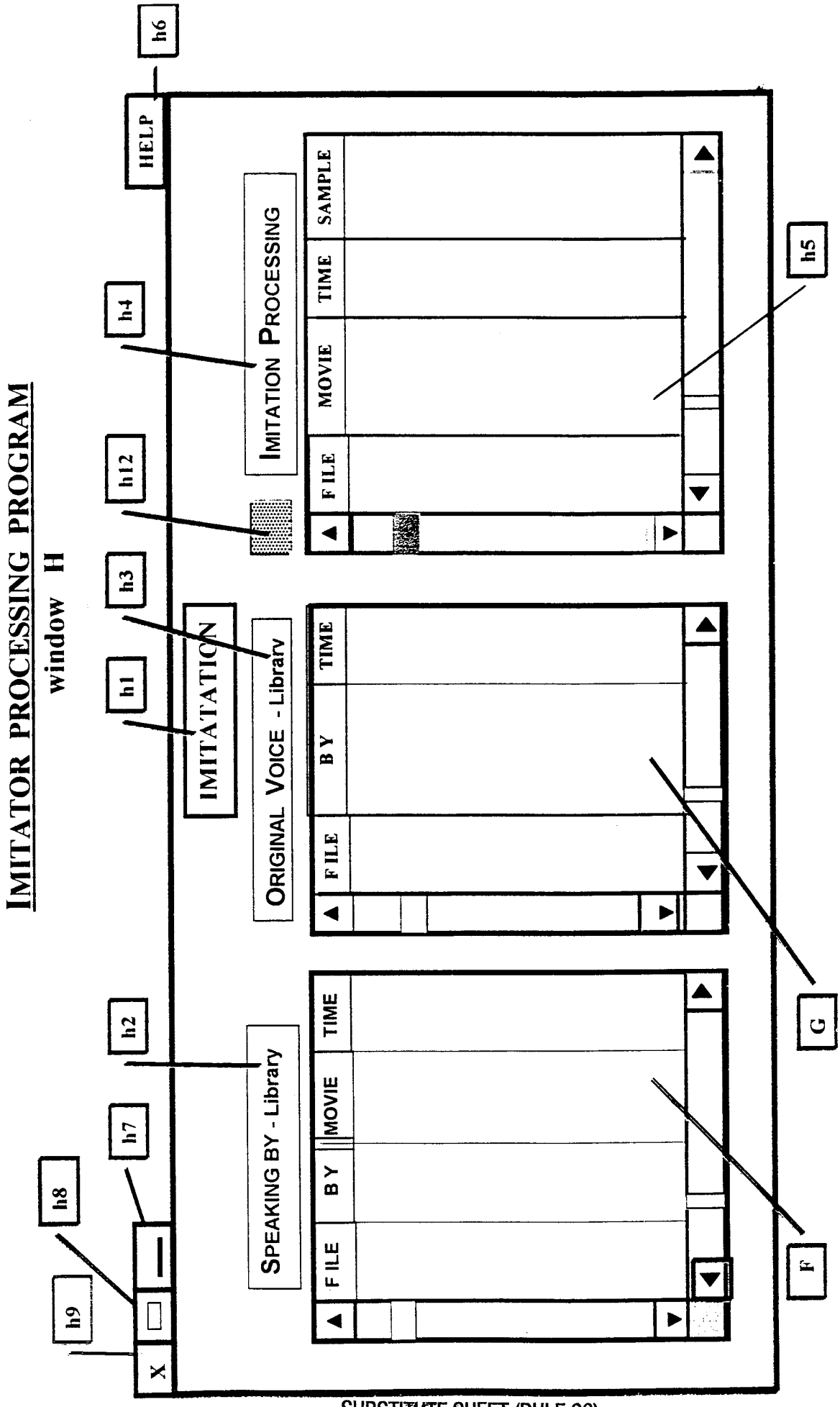


SPEAKING BY
window F



ORIGINAL VOICE LIBRARY
window G




IMITATOR PROCESSING PROGRAM
window H
h1
h2
h3
h4
h5
h6
h7
h8
h9
h12
IMITATION
ORIGINAL VOICE - Library
IMITATION PROCESSING
HELP
SPEAKING BY - Library
FILE
BY
MOVIE
TIME
SAMPLE
F
G
X

Program flow - 9a

Stages

1. **IMITATION MANAGER** window C

2. Open **IMITATION PROCESSING** window **H**

3. Point on the required file Of the **SPEAKING BY(a)** list in frame **F**

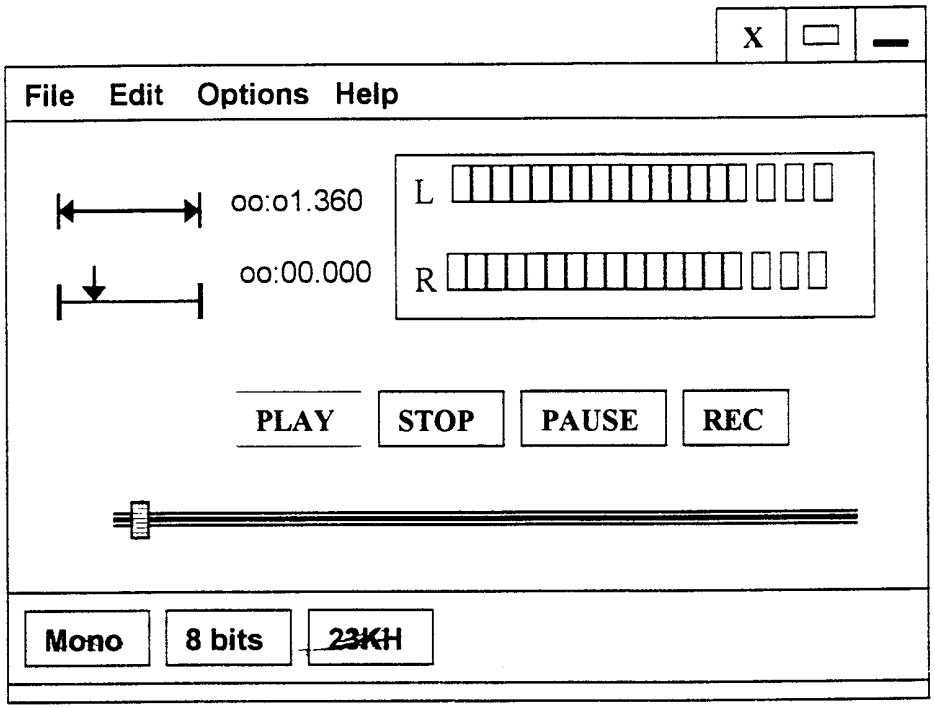
4. Point on the required file Of the **ORIGINAL VOICE(b)** list in frame **G**

5. Point on the required file from the **IMITATION PROCESSING** list in **h7** or creating a new file with **h5**

6. Clicking on **h4** to start imitation procedures

PLAY / RECORD PROGRAM

window J



INTERNATIONAL SEARCH REPORT

International application No.
PCT/IL98/00274

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :G10L 5/04
US CL :704/258, 277, 278

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. : 704/258, 277, 278

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.
A	US 5,613,056 A (GASPER et al) 18 March 1997, abstract	1-7
A	US 5,111,409 A (GASPER et al) 05 May 1992, abstract	1-7
A	US 4,884,972 A (GASPER) 05 December 1989, abstract	1-7
A	US 5,278,943 A (GASPER et al.) 11 January 1994, abstract	1-7

☐ 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 14 DECEMBER 1998	Date of mailing of the international search report 26 MAY 1999
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