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(54) Multi-functional telephone system with speech recognition and control device

(57) A telephone system which utilises speech recognition to identify the initial and regular spoken expression of callers and answerers, provide functions of voice controlled automatic dialling, access authorisation and recording. The names of the callers and related information can be preset so that this system can automatically filter out unwelcome calls depending on the recognition and the preset information; and notify the answerer the acceptable ones, and, meanwhile, the incoming caller's personal information will be displayed automatically after being identified. The volume of the ring will be increased gradually; its frequency and format can be preset to reflect the importance of the callers. Noise reduction and voice equalisation techniques are also applied to reduce the background noise and make the received signals best suit the user's preference. When the answer is not in, the system can automatically record the name of the incoming caller, time, times called, and message left or forward message to identified specific caller, etc. The system can also take verbal instruction to check and retrieve message of specified caller.

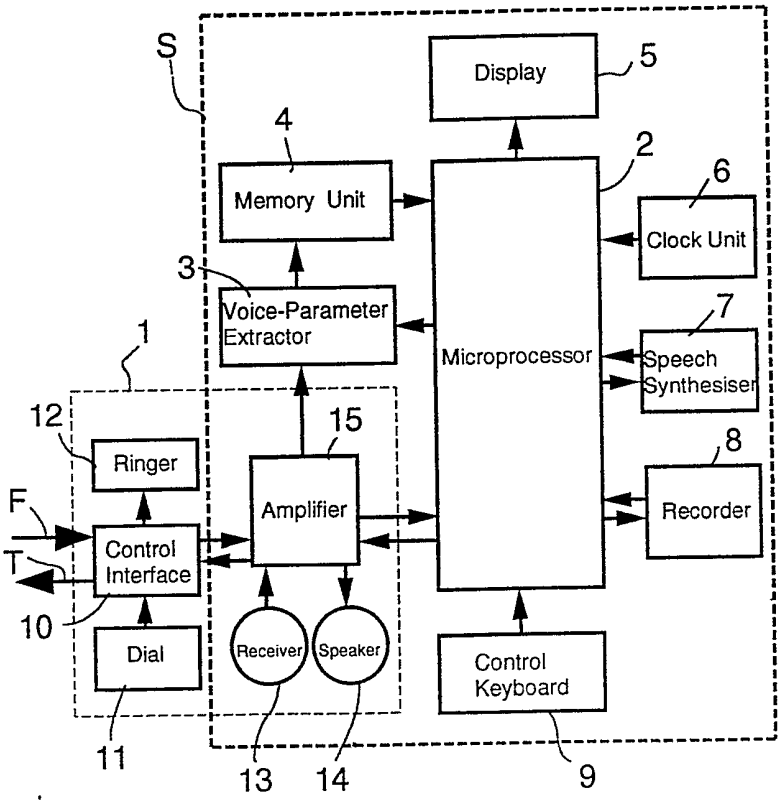

FIG. 1

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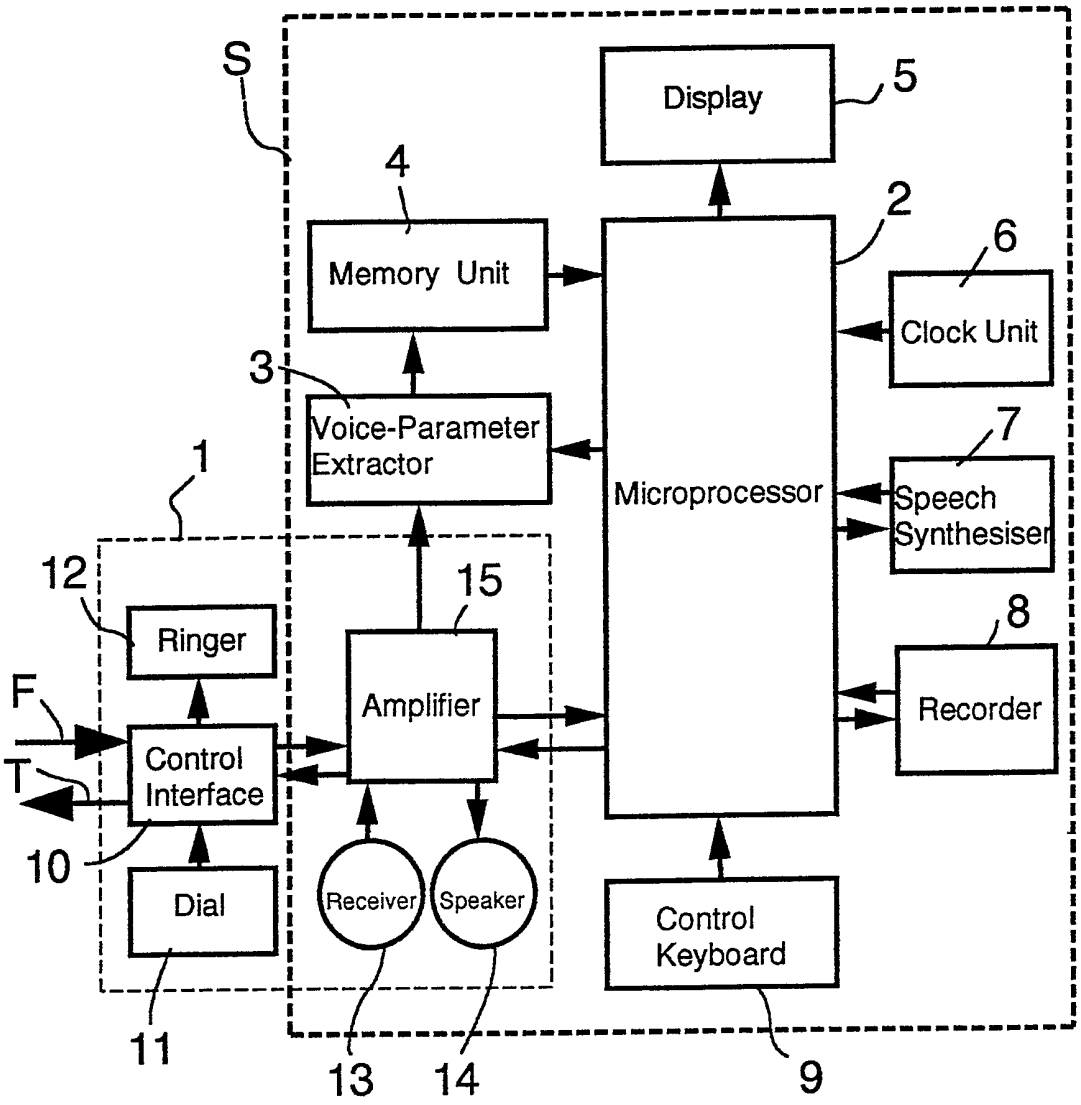

S
Display
5
4
2
Memory Unit
6
Clock Unit
3
Voice-Parameter Extractor
7
1
Microprocessor
Speech Synthesiser
12
15
8
Ringer
Amplifier
Recorder
F
T
Control Interface
10
Receiver
Speaker
Dial
Control Keyboard
11
13
14
9

FIG. 1

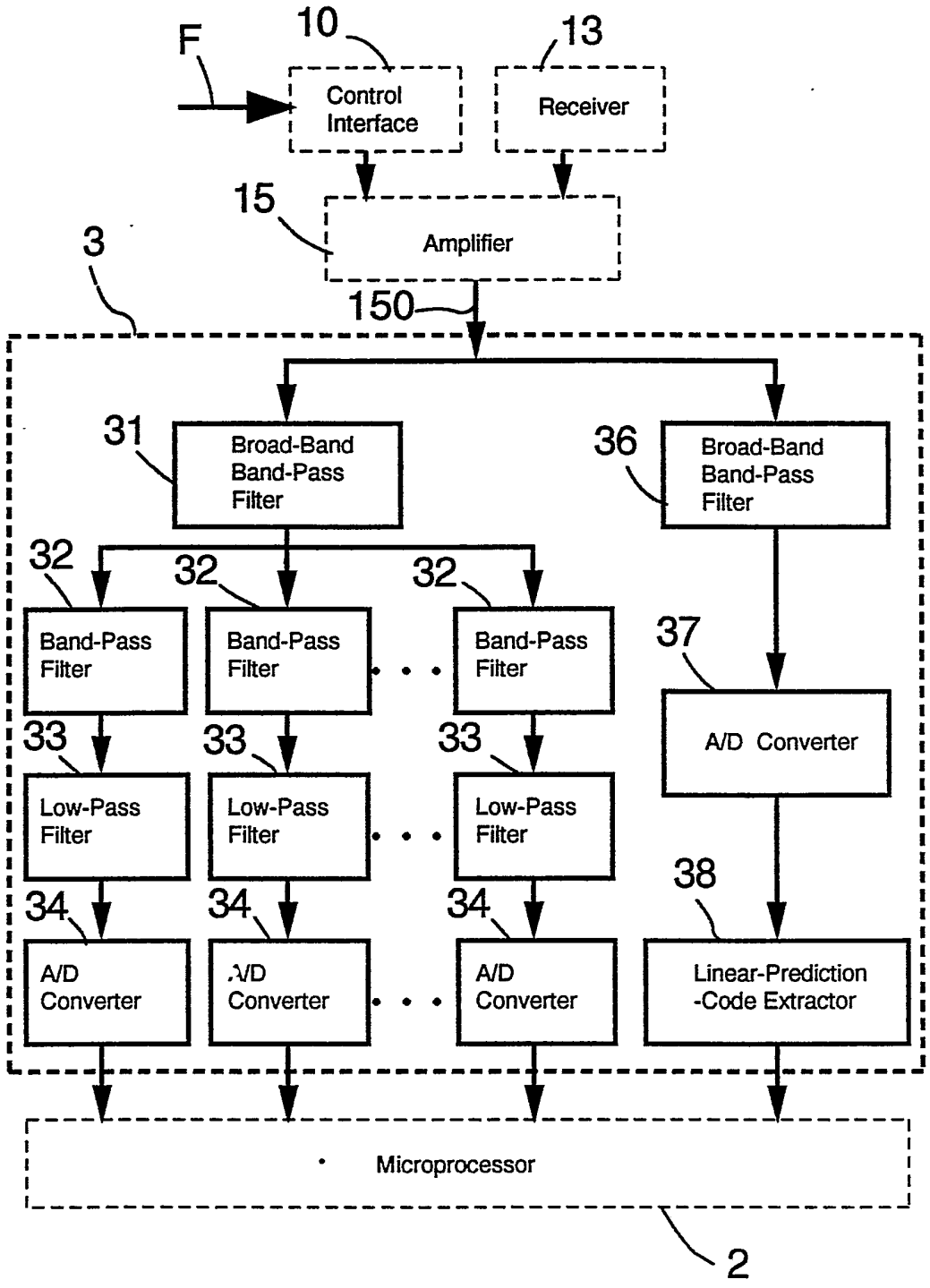

F
10
13
Control Interface
Receiver
15
Amplifier
3
150
31
Broad-Band Band-Pass Filter
36
Broad-Band Band-Pass Filter
32
32
32
Band-Pass Filter
Band-Pass Filter
Band-Pass Filter
37
A/D Converter
33
33
33
Low-Pass Filter
Low-Pass Filter
Low-Pass Filter
38
34
34
34
A/D Converter
A/D Converter
A/D Converter
Linear-Prediction -Code Extractor
Microprocessor
2

FIG. 2

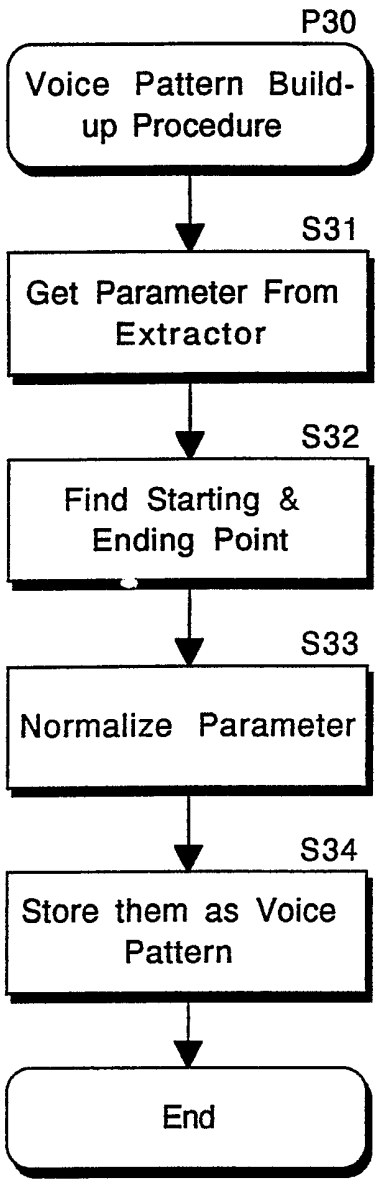

P30
Voice Pattern Build-up Procedure
S31
Get Parameter From Extractor
S32
Find Starting & Ending Point
S33
Normalize Parameter
S34
Store them as Voice Pattern
End

FIG. 3

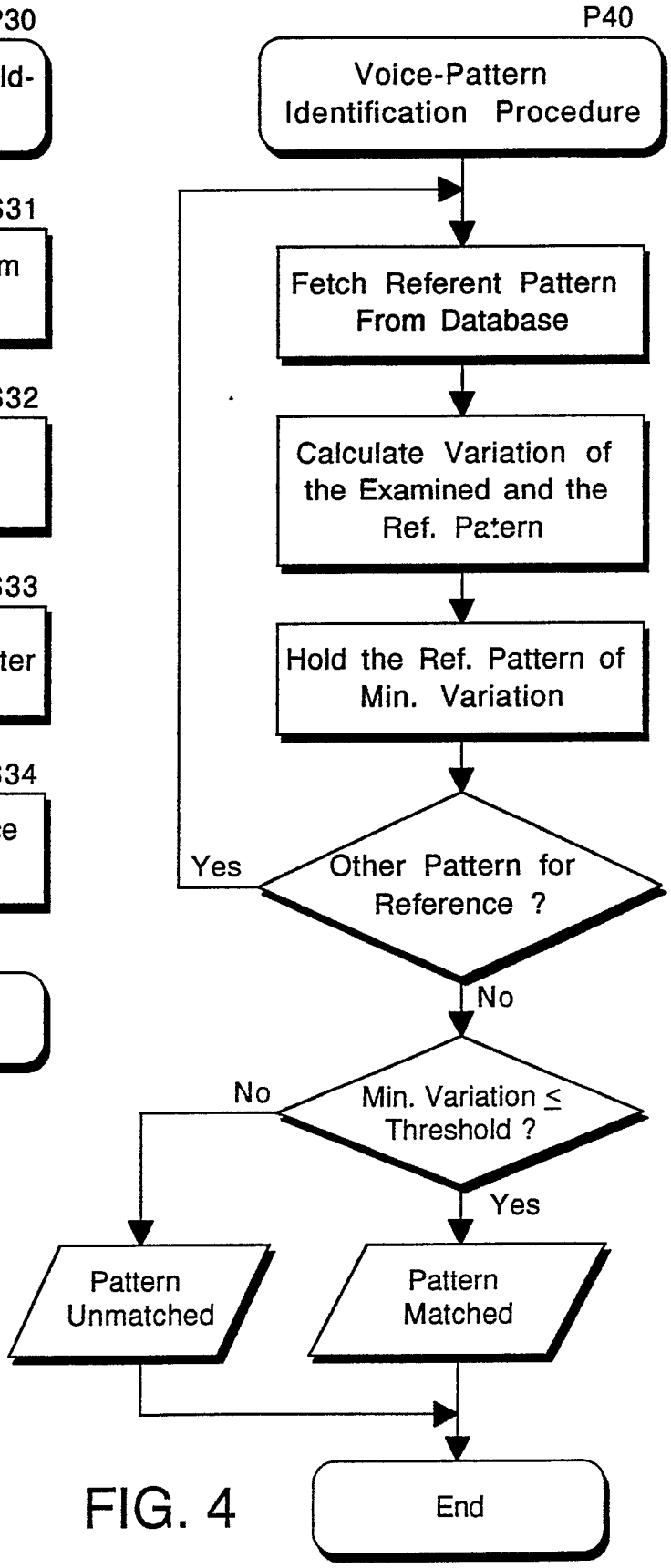
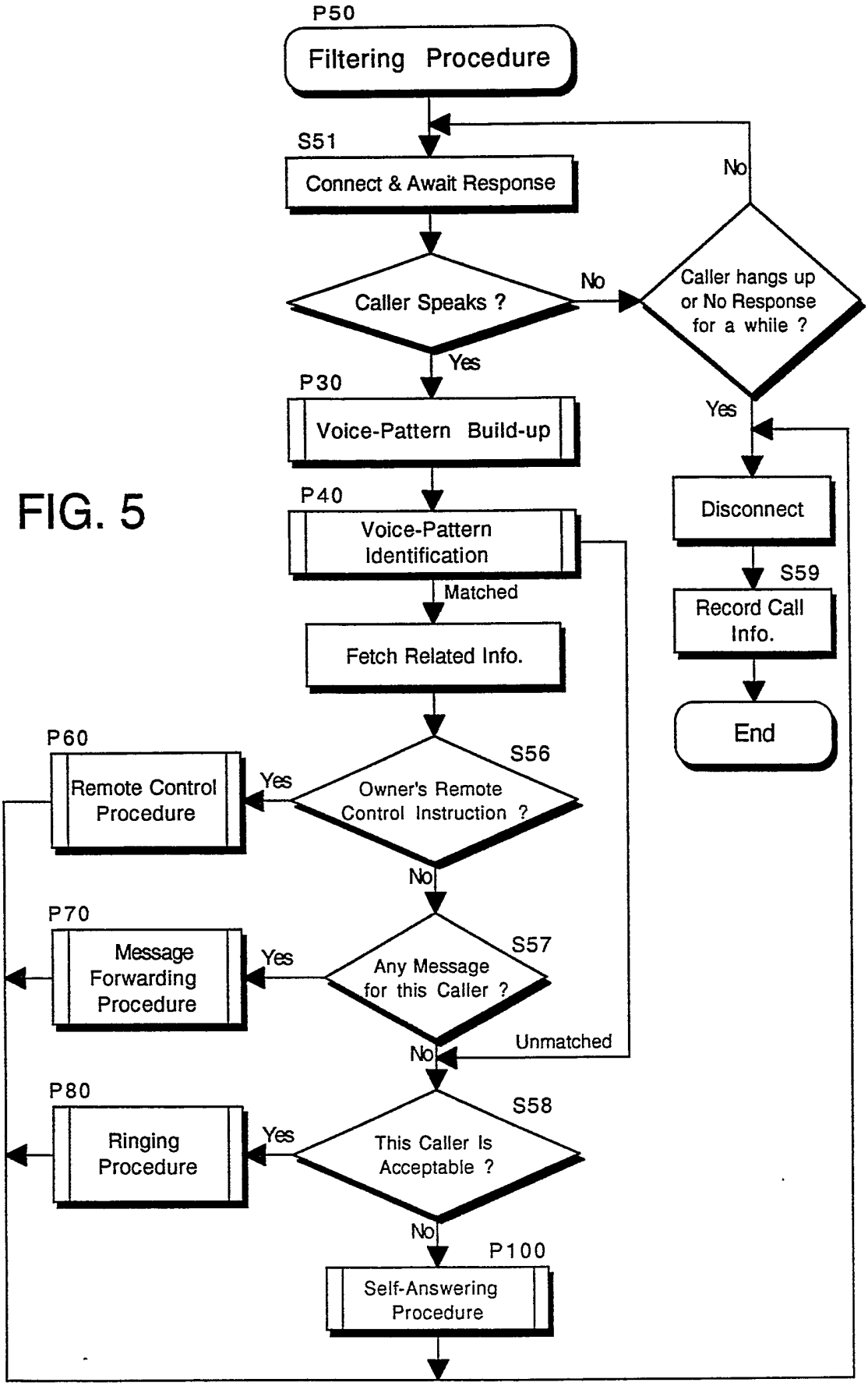

P40
Voice-Pattern Identification Procedure
Fetch Referent Pattern From Database
Calculate Variation of the Examined and the Ref. Pattern
Hold the Ref. Pattern of Min. Variation
Other Pattern for Reference ?
Yes
No
Min. Variation ≤ Threshold ?
No
Yes
Pattern Unmatched
Pattern Matched
End

FIG. 4

FIG. 5


P50
Filtering Procedure
S51
Connect & Await Response
Caller Speaks ?
No
Caller hangs up or No Response for a while ?
No
Yes
Yes
P30
Voice-Pattern Build-up
P40
Voice-Pattern Identification
Matched
Fetch Related Info.
Disconnect
S59
Record Call Info.
End
P60
Remote Control Procedure
Yes
S56
Owner's Remote Control Instruction ?
No
P70
Message Forwarding Procedure
Yes
S57
Any Message for this Caller ?
No
Unmatched
P80
Ringing Procedure
Yes
S58
This Caller Is Acceptable ?
No
P100
Self-Answering Procedure

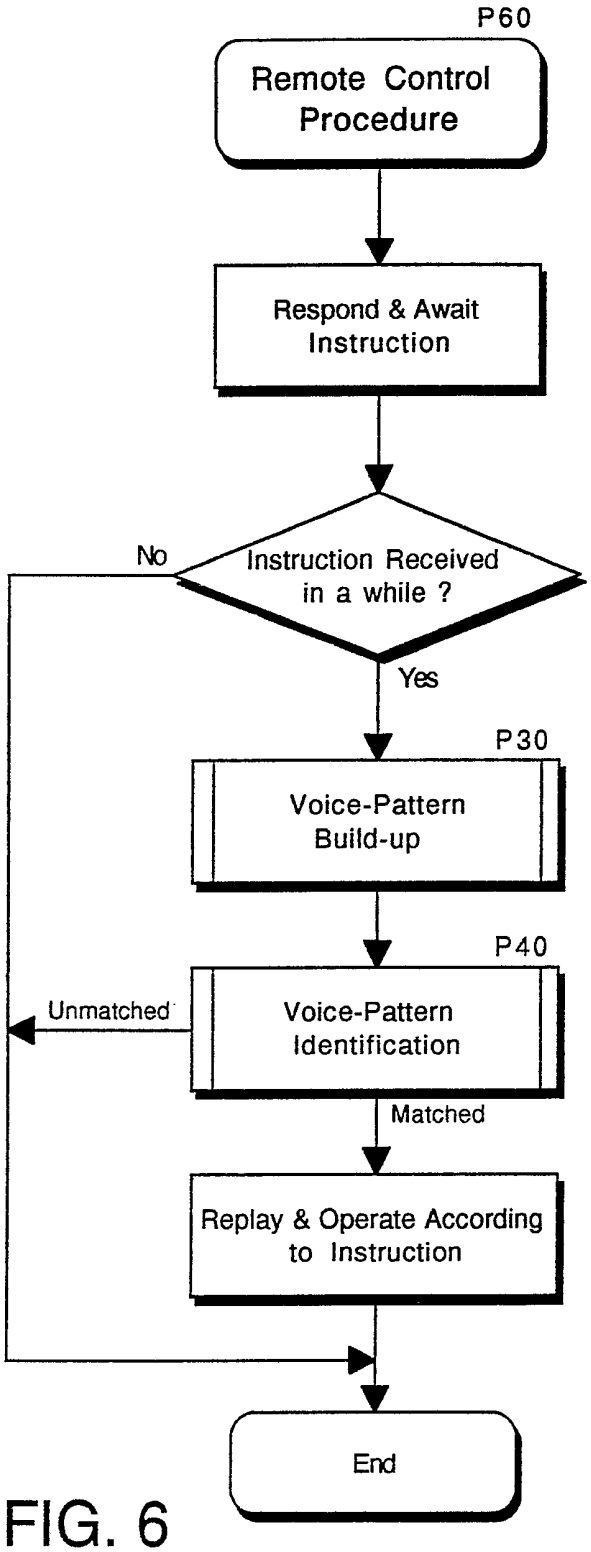

P60
Remote Control Procedure
Respond & Await Instruction
No
Instruction Received in a while ?
Yes
P30
Voice-Pattern Build-up
P40
Unmatched
Voice-Pattern Identification
Matched
Replay & Operate According to Instruction
End

FIG. 6

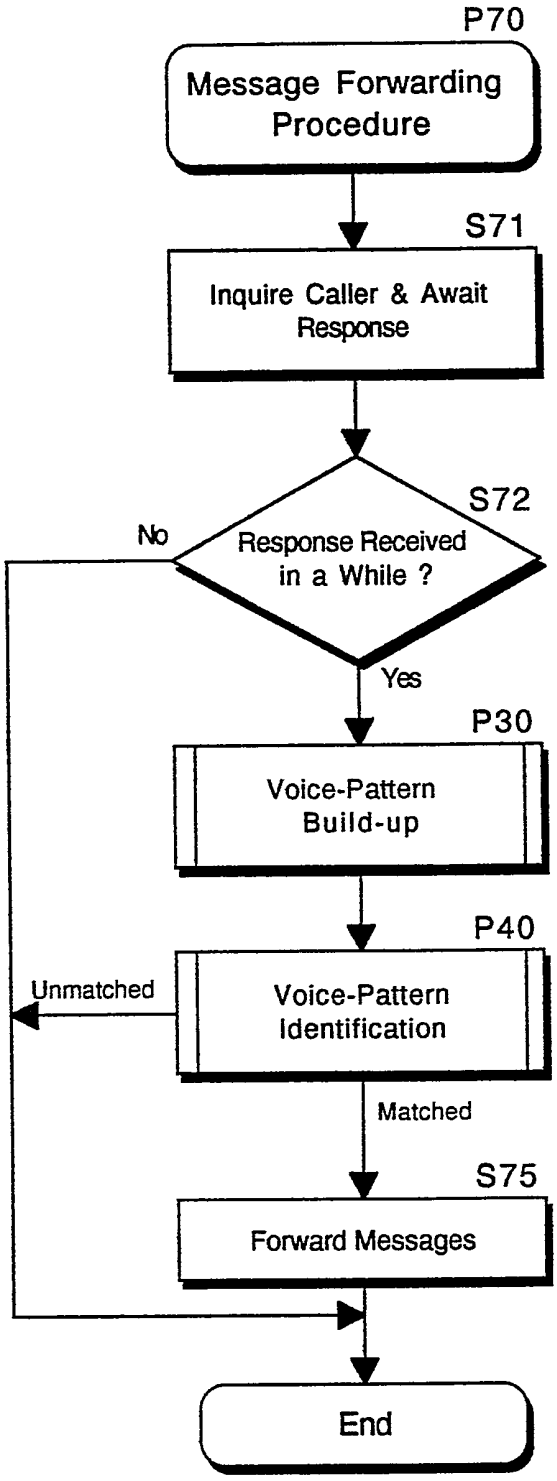

P70
Message Forwarding Procedure
S71
Inquire Caller & Await Response
S72
Response Received in a While ?
No
Yes
P30
Voice-Pattern Build-up
P40
Voice-Pattern Identification
Unmatched
Matched
S75
Forward Messages
End

FIG. 7

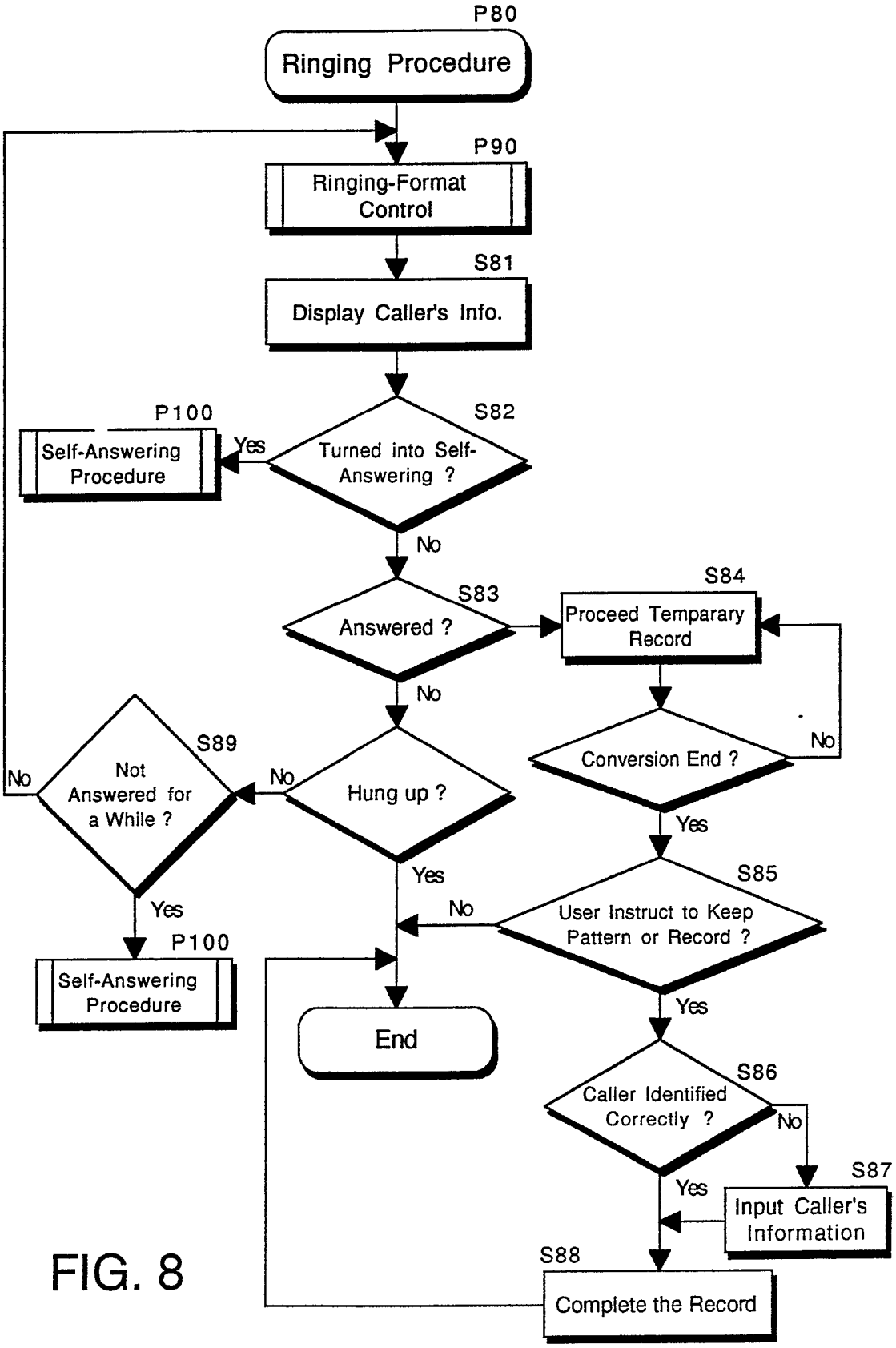

P80
Ringing Procedure
P90
Ringing-Format Control
S81
Display Caller's Info.
P100
Self-Answering Procedure
Yes
S82
Turned into Self-Answering ?
No
S83
Answered ?
S84
Proceed Temparary Record
No
Conversion End ?
No
Yes
S85
User Instruct to Keep Pattern or Record ?
No
Yes
S86
Caller Identified Correctly ?
No
S87
Input Caller's Information
Yes
S88
Complete the Record
No
S89
Not Answered for a While ?
No
Hung up ?
Yes
Yes
P100
Self-Answering Procedure
End

FIG. 8

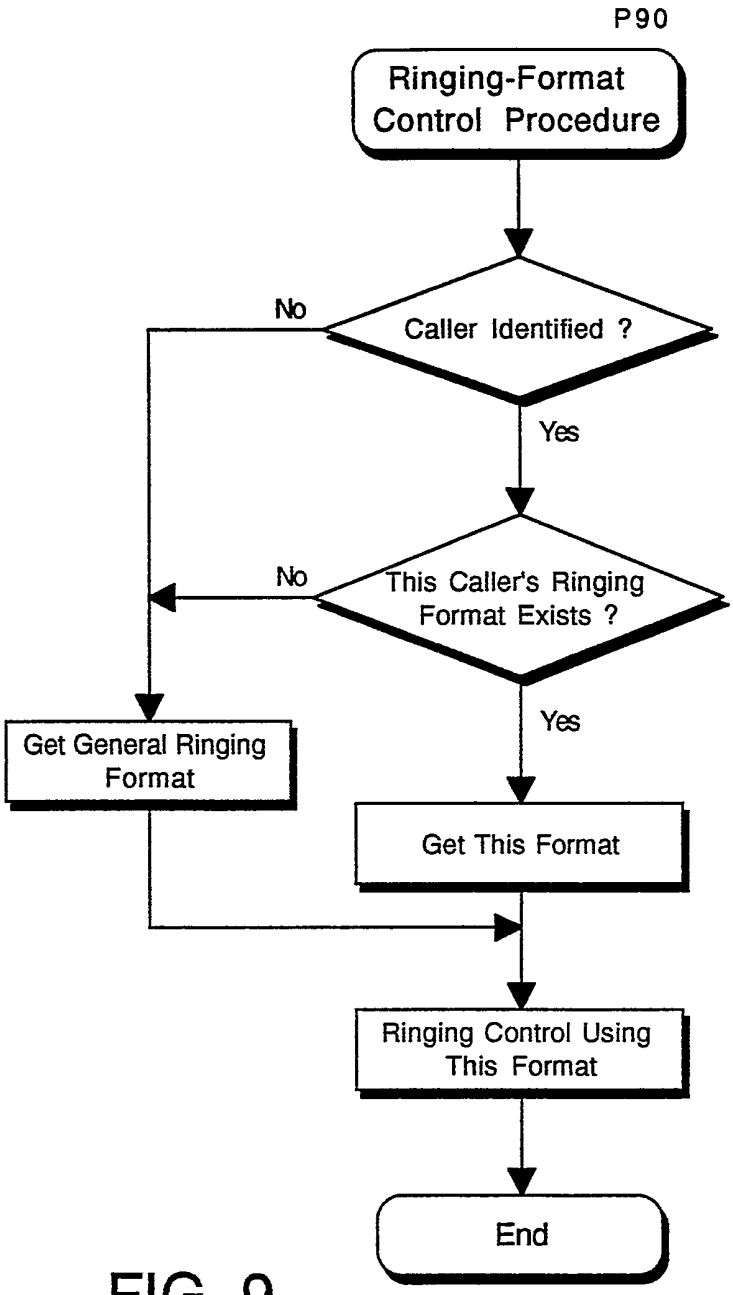

P90
Ringing-Format Control Procedure
Caller Identified ?
No
Yes
This Caller's Ringing Format Exists ?
No
Yes
Get General Ringing Format
Get This Format
Ringing Control Using This Format
End

FIG. 9

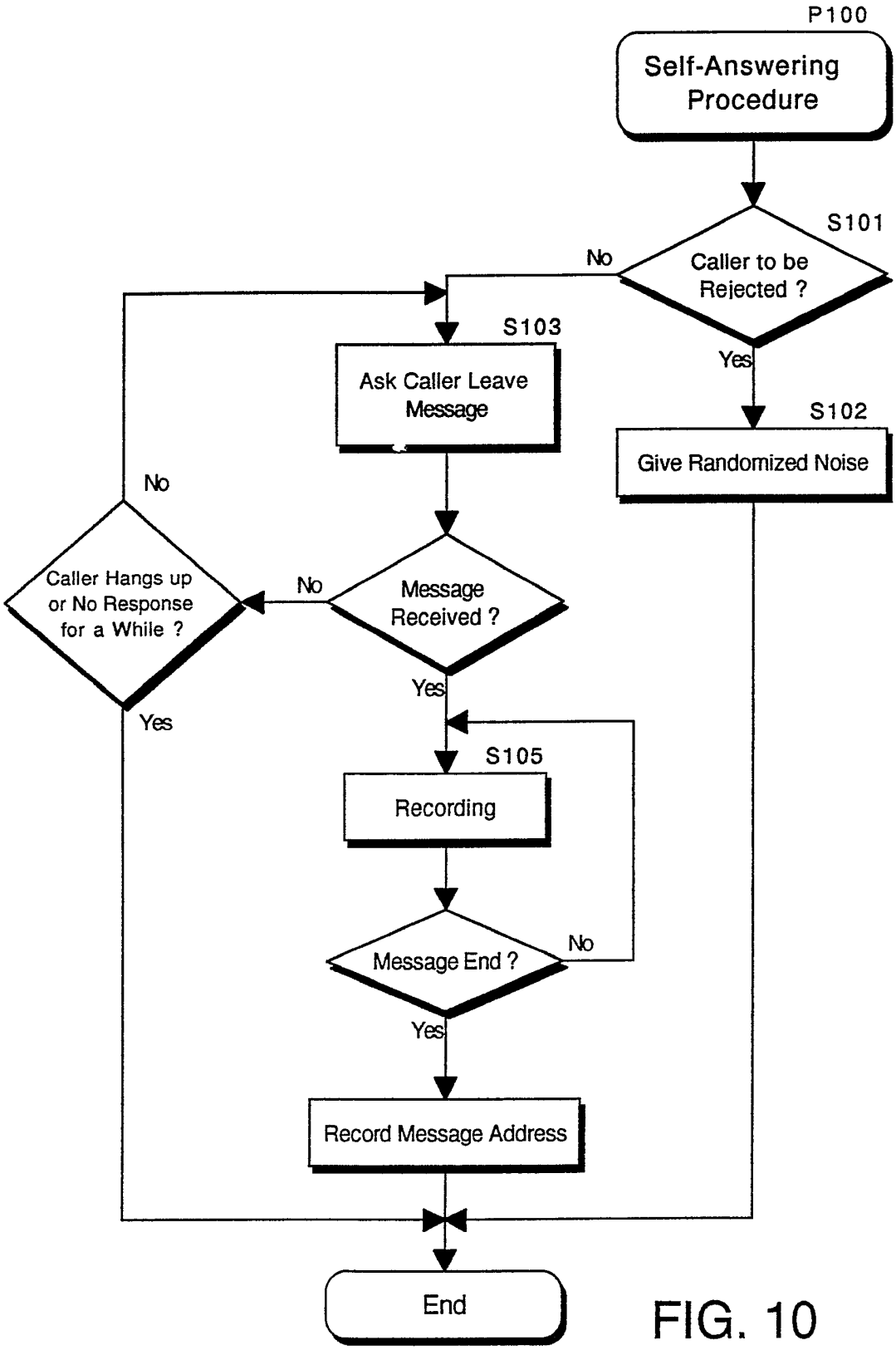

P100
Self-Answering Procedure
S101
Caller to be Rejected ?
No
Yes
S102
Give Randomized Noise
S103
Ask Caller Leave Message
Message Received ?
No
Yes
Caller Hangs up or No Response for a While ?
No
Yes
S105
Recording
Message End ?
No
Yes
Record Message Address
End

FIG. 10

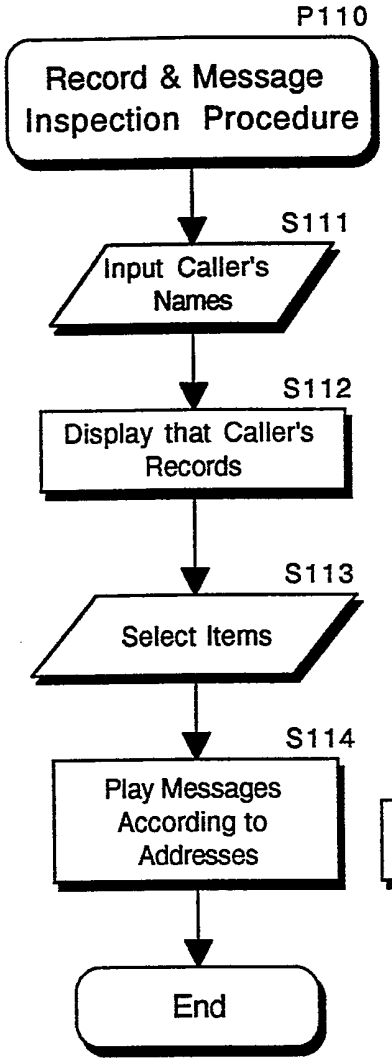

P110
Record & Message Inspection Procedure
S111
Input Caller's Names
S112
Display that Caller's Records
S113
Select Items
S114
Play Messages According to Addresses
End

FIG. 11

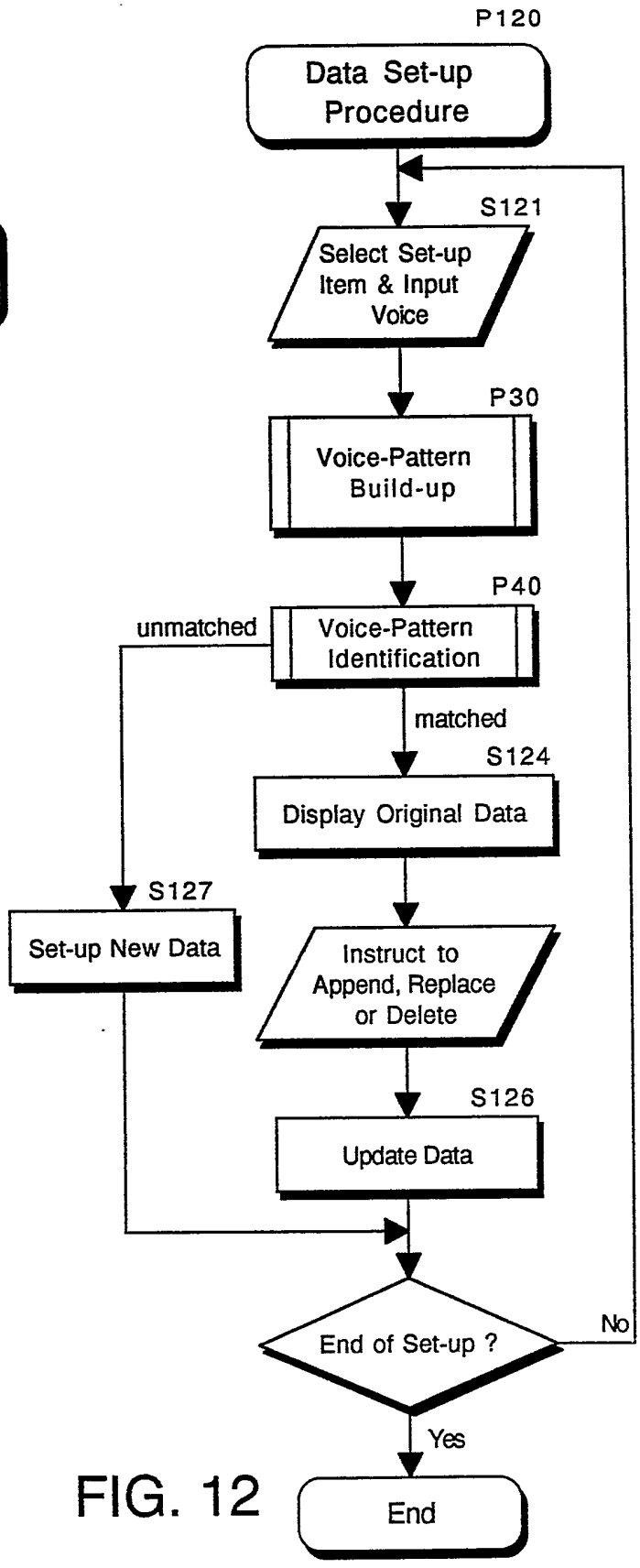

P120
Data Set-up Procedure
S121
Select Set-up Item & Input Voice
P30
Voice-Pattern Build-up
P40
Voice-Pattern Identification
unmatched
matched
S124
Display Original Data
S127
Set-up New Data
Instruct to Append, Replace or Delete
S126
Update Data
End of Set-up ?
No
Yes
End

FIG. 12

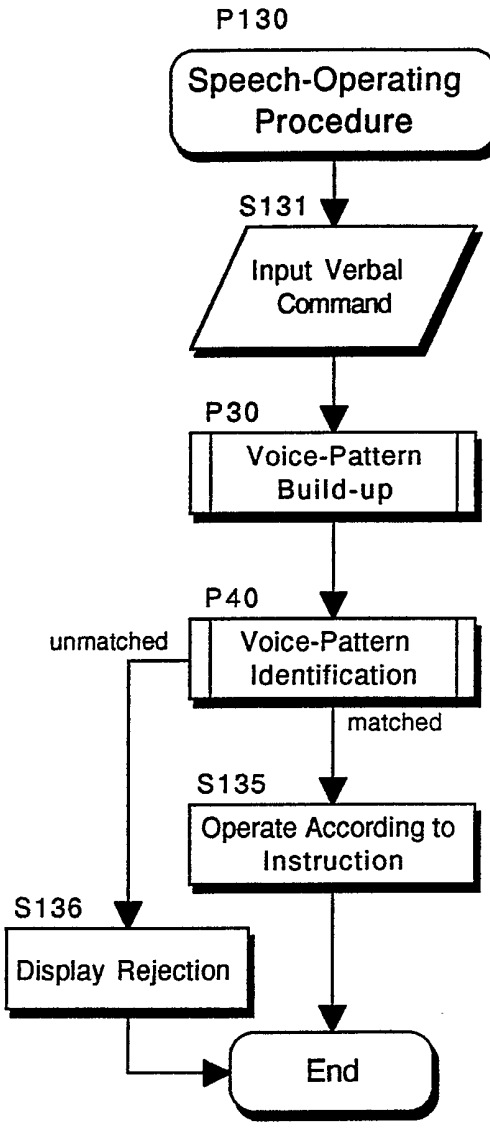

P130
Speech-Operating Procedure
S131
Input Verbal Command
P30
Voice-Pattern Build-up
P40
unmatched
Voice-Pattern Identification
matched
S135
Operate According to Instruction
S136
Display Rejection
End

FIG. 13

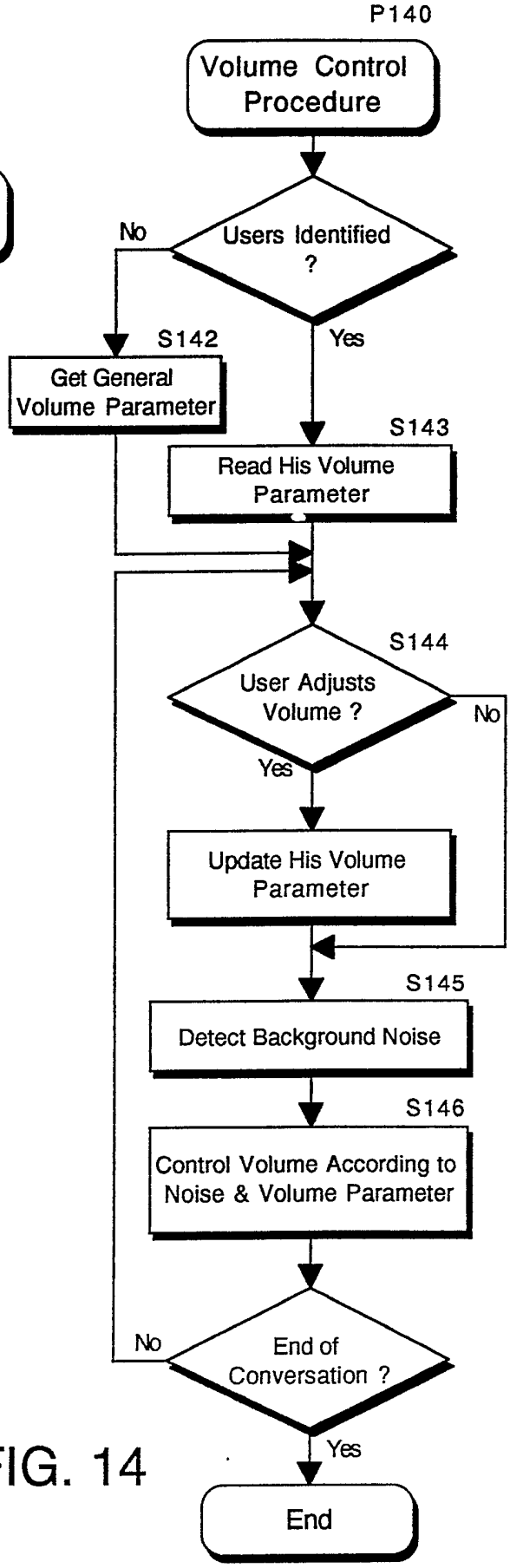

P140
Volume Control Procedure
No
Users Identified ?
Yes
S142
Get General Volume Parameter
S143
Read His Volume Parameter
S144
User Adjusts Volume ?
No
Yes
Update His Volume Parameter
S145
Detect Background Noise
S146
Control Volume According to Noise & Volume Parameter
No
End of Conversation ?
Yes
End

FIG. 14

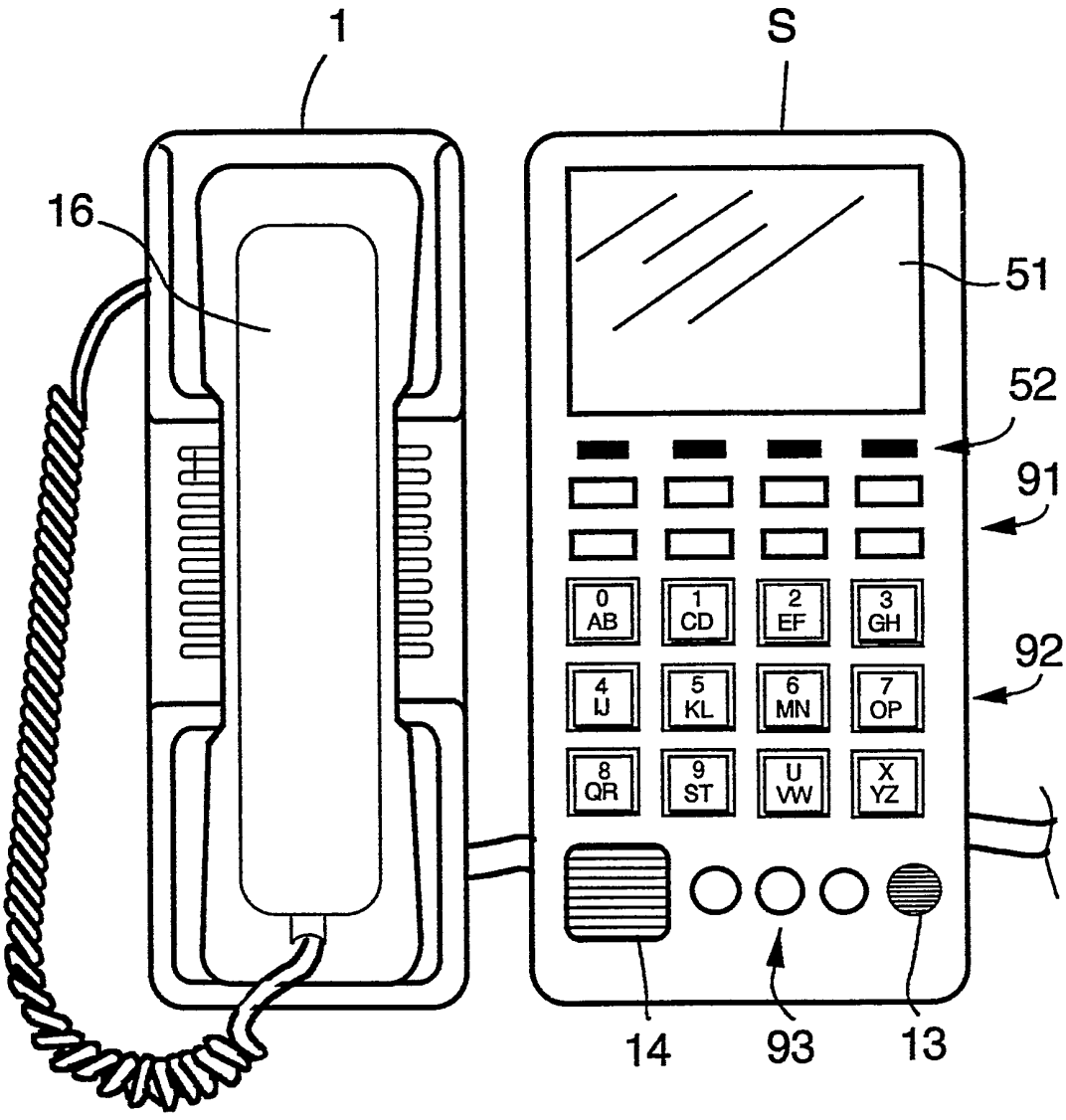

1
S
16
51
52
91
92
0 AB
1 CD
2 EF
3 GH
4 IJ
5 KL
6 MN
7 OP
8 QR
9 ST
U VW
X YZ
14
93
13

FIG. 15

MULTI-FUNCTIONAL TELEPHONE SYSTEM WITH SPEECH RECOGNITION AND CONTROL DEVICE

This invention relates to a telephone system and, more specifically, to an improved multi-functional telephone system with speech recognition and control device.

A conventional telephone, first, receives all the incoming calls without selection. The answerer, who may be annoyed by unwelcome calls, such as a wrong-number call, a call at late night or during busy hours, has no alternative but answering it. In fact, there are some calls that are expecting, and if he/she tries to avoid such a nuisance by rejecting all the incoming calls, he/she on the contrary might miss an urgent or important call. Thus, to answer or not makes the answerer feel uncomfortable.

Second, it does not provide any function letting an answerer learn of the caller in advance before he/she answers the call, and sometimes the answerer may not recognize immediately the voice of a caller because distortion during transmission or forget the caller's voice. These might hamper one's social or business relationship. As a result, some people ask their secretaries or assistants to filter the incoming calls first; however, it may cause privacy concerns in another way. To solve the above mentioned problems, there is telephone selector available now, yet it uses some extra digits as an identification code, and the phone owner has to notify all his/her close friends respectively of that code. This kind of improvement, therefore, brings disadvantages and reduces its merits; for example, the caller has to remember more digits when he/she calls, or if the secret code is disclosed unexpectedly, and what if a caller becomes

unwelcome sometimes for some reasons.

Thirdly, a conventional telephone, generally due to impediments such as volume of the speakers' voice, background noise, noise generated in the telephone transmission line or any other interference, sometimes can not be heard clearly. Thereby, it is impolite yet necessary to ask user at the other end to speak up.

Fourthly, the function of an answering machine nowadays records what the caller says; as to the caller who does not intend to leave message, there is no record at all. It does not store any information concerning to the caller, such as calling time, ringing times and how many times the caller has redialed. And, if a specific caller keeps redialing and leaving messages among several other callers, the machine user has to operate the tape back and forth and search for that caller; otherwise, he/she has to listen every recorded message according to incoming sequence. It is inconvenient, inefficient and keeps no confidential at all, since everyone can play it and acquire the whole information.

Fifthly, it can not identify who the user is. Therefore, in a phone, different users would have same controls and can not have proper actions by the user's identity; such as long-distance call access-right for authorized personnel only; requesting for information concerning to specified callers, and fetching for specific messages left.

Sixthly, some modern telephones, though equipped with special functions that several external telephone lines are connected to a host and any incoming call will be put to an available line in that host, or automatically transferred to a specified extension line, however, when the numbers of the callers are more than those of the answerers, or when the operators

have to answer several calls simultaneously, it is often impolite and inconvenient to hold on the first call for one moment to answer the others and then return to the first call. Also, it is possible that some callers may get impatient and hang up the phone.

Moreover, the volume of the rings in a call, whether loud or not, is constant. Although it can be tuned, yet it is always fixed and doesn't vary along the ringing period. For better service, the volume of the rings should be started from a low degree which will not frighten a nearby person, and increased gradually which enables a person faraway hearing it and coming to answer the phone if there is no answerer nearby.

An object of the invention is to provide a telephone system which will recognize the identity of a caller and display that caller's identity information before the answerer catches the phone.

Therefore, an object of this invention is to provide a telephone system which will, based on various preset criteria, screen the call automatically and take proper actions, such as notify person to answer, release message to that caller or disconnect the line.

Thirdly, this invention provides a telephone system which will reduce the noise and increase communication quality through automatic adjusting with the caller's identity, his/her voice volume and the background noise; and also provides the answerer a preferred volume based on his/her hearing ability or habit to listen to the call.

Fourthly, this invention provides a telephone system which will assist the answerer, when he/she is not in, all the call information, including the identity of the caller, when the call starts, and duration of the ringing before it is hung up, or the message it leaves.

Fifthly, this invention provides a telephone system which will assist the user through a specified voice in giving a name, a number or the preset secret codes, to instruct the telephone operation; the access-right thereof can be set so that any unauthorized person will be recorded or rejected; and the telephone can accept remote control commands from a specific caller for inspecting recorded messages or other operations.

Sixthly, this invention provides a telephone system with multi-line service which will assist the answerer, while he/she is answering one call and also is wanted on another line, to ask the second caller to hold on and quickly send information of the caller to the answerer, which gives him/her an alternative to answer it or give other response.

Moreover, this invention provides a telephone system in which the volume of the ring is increased gradually and its frequency can be preset in reflecting the importance of a caller, but keeps the answerer or the persons nearby from being startled at the abrupt ringing.

Briefly, a telephone system according to this invention comprises a speech-recognition device and a control device, which will identify a caller, display the caller's identity information, screen the caller with preset criteria, to notify someone to answer, release messages or disconnect the line, reduce noise and increase communication quality, record calling information, receive instructions through specific person's speech, automatic dial or retrieve specific recorded messages, manipulate multi-lines calling, and control ringing volume.

Other objects and advantages of this invention will become apparent from the following description.

FIG. 1 is a block diagram of a system of this invention.

FIG. 2 is an embodiment of a voice-parameter extractor of this invention.

FIG. 3 is a flow chart illustrating the build-up of voice pattern.

FIG. 4 is a flow chart illustrating the procedure of voice-pattern identification.

FIG. 5 is a flow chart illustrating the operation of automatic filtering of an incoming call.

FIG. 6 is a flow chart showing the procedure of receiving the owner's remote-control instructions.

FIG. 7 is a flow chart showing the procedure of distinguishing an incoming caller and forwarding specified messages.

FIG. 8 is a flow chart showing the procedure of ringing to notify answerers.

FIG. 9 is a flow chart showing the procedure of ringing-format control.

FIG. 10 is a flow chart showing the self-answering procedure.

FIG. 11 is a flow chart showing the procedure of inspecting the record and messages of the incoming calls.

FIG. 12 is a flow chart illustrating the procedure of setting-up data.

FIG. 13 is a flow chart illustrating the speech-operating procedure.

FIG. 14 is a flow chart showing the procedure of automatic volume control.

FIG. 15 is an outward view of an embodiment of this invention.

FIG. 1 shows the composition and structural relationships of the invented telephone system S and a general purpose telephone 1. The telephone 1 comprises a control interface 10, a dial 11, a ringer 12, a receiver 13, a speaker 14 and an amplifier 15. The incoming signal F, first, actuates the ringer 12 to sound. When the call is answered, the incoming signal F is

provided to the answer by the speaker 14 through the amplifier 15; in the meantime, the output signal T which is the responding signal of the answerer will be transmitted to the caller through the route of receiver 13, amplifier 15, and control interface 10. The dial 11 generates calling signal which will control an unshown switching system to transmit the output signal T to designated destination. This kind of process and facility are existing technologies and need not be described further.

The invented telephone system S, besides the basic structure of the telephone 1, consists of a group of control and functional units, including a microprocessor 2, a voice parameter extractor 3, a memory unit 4, a display 5, a clock unit 6, a speech synthesiser 7, a recorder 8 and a control keyboard 9.

As shown in FIG. 2, an embodiment of the voice-parameter extractor 3, the voice-parameter extractor 3 will analyse the voice-signal input 150 (either the incoming signals F through control interface 10, or the voice received by receiver 13 from the local telephone through amplifier 15) and fetch its specific voice-parameter as the reference for identification and comparison. It adapts two different voice recognition circuits altogether. One of which uses spectrum theory. It contains a broad-band band-pass filter 31 to attenuate frequencies outside of voice band, and several (usually 5 - 16) band-pass filters 32 and low pass filters 33 to filter and collect power in different spectrum ranges. The retrieved spectrum power will be converted to digital signal through analogue-to-digital (A/D) converters 34 and provided to the microprocessor 2. On the other hand, that voice-signal input 150 also goes through a broad-band band-pass filter 36, an A/D converter 37 and a linear-prediction-

code extractor 38 to get respective parameter (LPC coding) and be provided to the microprocessor 2. The linear-prediction-code extractor 38 can be implemented by existing DSP (Digital Signal Processor) chips. Since there are two parallel parameter-extractor circuits and they work concurrently, this voice-parameter extractor 3 gives two dimensional identifications and increases recognition rate. The complete circuit therefore can be simplified by adapting a special hybrid integrated circuit.

The microprocessor 2 will process the extracted parameters and erect respective voice-patterns by a procedure P30 as shown in FIG. 3. This system processes mainly single-word speech (such as telephone user's secret code, first word of a caller, first replied-word of an answerer, etc.). Therefore, to build-up voice-pattern is to process the serial parameter outputs of the extractor 3 (step S31), find the starting and ending point of the word (S32) and do other process, such as normalisation (S33). This procedures are of well known technology, and will not be described in detail herein. The resulting parameters are recorded in the memory unit 4 (FIG. 1) as the data base of voice pattern for recognition (S34). The linear-predictive-code extracted from the voice-parameter extractor 3 can also be provided to the speech synthesiser 7 (FIG. 1) and controlled by the microprocessor 2 and reproduced to be a voice output.

Voice-pattern identification procedure P40 of this system is illustrated in FIG. 4. The process is based on the well known variation-comparison method to analyse whether the examined speech matches the characteristic of any reference words and then take related procedures. Since this

invention deals with isolated words, special words and they are speaker-dependent, limited vocabularies that high recognition rate is easy to obtain.

The invented system S also has a display 5 (FIG. 1) to display information, a clock unit 6 to provide time information that the system requires, a recorder 8 to record and play messages of the user and the caller, and a control keyboard 9 to set/control system operation. The above described components are controlled and operated by the microprocessor 2. For example, an automatic reminder is programmed from the control keyboard 9 to set timer and information. The clock unit 6 will then keep timing and acknowledge the microprocessor 2 to operate. Other functions of the microprocessor 2 are exemplified from FIG. 5 through FIG. 14.

FIG. 5 shows the filtering procedure P50 of the invented system. When the system receives an input (ringing) signal, the ringer 12 (FIG. 1) does not sound immediately. Instead, the system will simulate the line as connected and await for the incoming voice (S51; the system may forward message first if necessary). Usually, believing that this line is connected, the caller will say "hello" or "Please..." which are the most common starting words for the caller. The system builds up voice-pattern (P30) of this speech, compares it with the pre-stored voice pattern database and identifies the caller (P40) (if the patterns are matched and relative personal information of the caller has been set and stored in the memory unit 4 by the phone owner) or judges as a new caller (if there is no matchable pattern stored in the memory unit 4).

As a result, if the call comes for remote control by the phone

owner(S56), the system goes into the remote control procedure P60 as shown in FIG. 6 and receives the owner's instructions to execute the related operation; such as to leave message to some specific persons, to take messages from some specific callers, or to control some specific appliances. These control commands are pre-instructed and preset (The data set-up procedure P120 will be described in FIG. 12). Moreover, if the system distinguishes the identity of the caller and there is a pre-stored message to him (S57), it will go to the message forwarding procedure P70 as shown in FIG. 7; after reinquiring and ascertaining the caller's identity (S71, S72, P30, P40), the system will forward the message (S75); or, the system will examine the identity of the caller (already set or unset) if he/she is the person that the phone owner would like to answer at that time (S58). In a word, the phone owner can preset the answering priority of any caller and the time criteria depending on his/her own mood, or his/her working time, rest time or night time when he/she does not intend to be disturbed; for example, the members of his/her family or his/her superior in office can be set to be answered anytime; some others are only set to be answered during a certain period of time, and some might be rejected all the time.

When the caller is set to be acceptable, the system will go to the ringing procedure P80 as shown in FIG. 8. The speech synthesiser 7 (FIG. 1) generates a verbal message for notifying the caller to wait for a moment, and the system starts ringing. The volume and format of the ring is under a control procedure P90 as shown in FIG. 9 that the volume increases gradually and its format reflects the importance of the caller which may be preset by the owner; the system can notify the answerer

by flashlight and display the identity of the caller (S81) on display 5 (FIG. 1) which makes the answerer well prepared to answer the call; or when the answerer does not intend to answer it at that moment (S82), he can punch the keyboard 9 and let the system go to self-answering procedure P100 shown in FIG. 10.

When the call is answered (S83), the amplifier 15 of the system will keep the volume of voice and quality of communication clear and stable; besides, the volume of the speaker can be adjusted automatically with background noise and the answerer's hearing habit (The volume control procedure P140 will be described in FIG. 14.); meanwhile, the recorder 8 records the conversation till the end of the call (S84), the phone owner can keep the record through a command or the record will be erased automatically (S85) if he/she does not make any command.

When the identity of the caller is unknown to the system, the phone owner, after the call, through speech or keypunch, can input the caller's information (S87) which enables the system to complete the record (S88) or also to generate a database of voice pattern and related information for recognition in the future. If the call is not answered but keeps on ringing for a certain time (S89), the system will go to self-answering procedure P100 as shown in FIG. 10, and a speech generated by speech synthesiser 7 will ask the caller to leave messages (S103), and then a recorder 8 will record any message right after (S105).

On the other hand, if the caller is not acceptable in this moment (S58), the system will go to self-answering procedure P100 as shown in FIG. 10. As to the caller assigned as one to be rejected (S101), the system will generate some randomized noise and make him/her believe that there is

some trouble in connecting the line and hang it up (S102).

After disconnection, the system will record each incoming call, the time a call comes, how long the ringer keeps on ringing, it is answered or not, the names of the caller and the answerer, for how long the conversation lasts, the times of a same person's calling, the time the conversation starts and the address of the record (S59). All the information is kept for statistics and investigation thereafter.

FIG. 11 shows a flow chart of record and message inspection procedure P110: when the user intends to inspect the recorded information from specific callers, he/she can input the names of the callers through speech (either by remote control or on the spot) or keypunching (S111); and the system will display the records of the callers according to the time sequence (S112); and the user reads them and selects the messages he wants (S113) and the system releases the messages based on the addresses of the records (S114). Because the system can distinguish the identity of the user based on his/her voice and verbal secret codes, the records of the specific callers can only be inspected by the specific users. For example, when the user inputs the information of a caller to the system, his speech or secret codes to identify the caller can be the base of the access code of inspection to that caller. As a result, it fulfils the requirements of keeping one's privacy.

The system will receive data and execute various operations through voice input. FIG. 12 shows a flow chart of data set-up procedure P120 with voice; the user, based on keypunching different domain selection (such as name or code) (S121), inputs the specific voice which will provide the system to set up a pattern (P30) and compare it with the

existing ones (P40); if matched, the system will display all the information (such as title, numbers, address, rank of importance, ringing type, etc.) (S124) which can be updated by the user (S126); if the user inputs new voice (S127), the system will build up a new data accordingly, and allow the related information to be input to a related file (such as what a voice refers to what other information or operation) till all is set up.

FIG. 13 shows a flow chart of speech operating procedure P130 that how the system is controlled by the user's verbal command. When the user inputs voice as command (S131), the system sets up a pattern (P30), compares it with the existed one (P40), distinguishes if it is matched and then takes the related operation (S135); otherwise, the system will display a rejection sign (S136). The user can directly name the answerer or the preset verbal codes when he/she intends to make a call, and the system will dial the numbers automatically if the voice-pattern is recognized; otherwise, the user will be rejected. Besides, since each user's verbal secret codes or first replied-voices are preset through the data set-up procedure P120, the system can recognize the user and answerer thereof and provide the function of recording and controlling.

FIG. 14 shows a flow chart of the volume control procedure P140 of the invented system. The amplifier 15 (FIG. 1), to deal with the incoming signals F, first filters the noise and amplifies the signals to a standard volume. The microprocessor 2 then, based on the background voice (S145) and the user's habit (S143), makes the received signals best suit for the user's preference. The unidentified user gets the general volume (S142). As to the volume parameter of each user, the system recognizes

each user and automatically records the very last adjusted status (S144,S145) which can be used next time.

FIG. 15 shows an outward view of an embodiment of this invention. The telephone system S is attached to a general telephone 1. The outside of the system S comprises a screen 51, pilot lamps 52, function (such as set-up, search, dial, record, play, etc.) keys 91, character keys 92, operation keys 93 (such as answer, reserve, disconnect, etc.), a receiver 13, and a speaker 14, etc. The user can enjoy all the invented functions by using the handset 16 or using the mentioned system S. The design of the mechanism, since it can be approached and modulated, based on the characteristics of this invention, by anyone who is skilled in the related prior arts, is not limited to the shown one. For example, a touch screen with soft keys, a cordless unit can be achieved.

This invention can be applied not only to a single phone, but also to multi-phones or multi-lines phone; that is, this invention can be installed in any kind of the existing telephone control system: for example, in the multi-lines phone, when the line of the answerer is occupied, the invention will connect the incoming call to another line automatically and ask the caller to wait a moment through self-answering, and then provide the answerer with information (such as the identity of the caller and how long he/she has been waiting for) which enable the answerer to feel free to answer it or not; if the caller can not reach the answerer through the line he originally uses, the system will transfer the call to the line the answerer ever used lately; many telephones can also communicate with each other at the same time, and one of them has a function to control the others - such as meeting function. Also, the telephone can function as a

reminder device, as the user can set time alarm and store message for that, while the control device detects the preset time is reached, it will trigger a ring and display the prestored message. Those modifications based on the speech recognition that identifies the users at both ends, according to this invention, should be included in the extent of the appended claims.

CLAIMS

1. A telephone system comprising a speech recognition and a control device in a general purpose phone set, for identifying identifications of users, including callers and answerers, based on voice patterns, and executing control procedures thereafter; said speech recognition device composed of a voice parameter extractor and a memory unit, for extracting voice pattern parameter, identifying said users according to said user's speeches of first-word, first-replied word, and secret codes, for recording said pattern parameter in a database at said memory unit, and for retrieving from said database as a reference for any further incoming call; said control procedures of said control device comprises the following steps: upon receiving a calling signal, (a) going to a connect state and awaiting for said caller's response, (b) selectively executing according to preset controlling criteria of said users, at least one of the operations of accepting the user's command, forwarding message to specified caller, ringing to notify answerer, disconnecting, self-answering and recording message.

2. A telephone system according to claim 1, further comprising recording and displaying means, for recording and displaying information concerning to said users, said information includes user's identity, times and duration of a call, and other data for later analysis.

3. A telephone system according to claim 1, wherein said control device comprises a volume control device, for dynamically adjusting volume of a speaker of said phone according to background noise and habitual hearing volume of said answerer; said hearing volume of said answerer is identified by said system, recorded and updated into said memory unit,

according to latest adjustment by said answerer, and will be retrieved as a standard for said answerer in his/her next hearing.

4. A telephone system according to claim 1, in which, said control device comprises a recording and playing means and an address recorder, for searching and playing messages left by said callers according to addresses recorded in said address recorder.

5. A telephone system according to claim 1, in which, said control device comprises a message manipulator, for providing the user in setting up, for any specific caller in any designated period, selections of ringing to notify, self-answering and disconnecting.

6. A telephone system according to claim 1, in which, said control device comprises a dial controller, for performing an automatic dialling after identifying an authorized user and forbidding an unauthorized user through said user's speech.

7. A telephone system according to claim 1, applied to either a multi-lines or a multi-phones system, in which, said control device comprises a line-connection means, for automatic connecting to any other available line and self-answering asking a caller wait for a moment while said answerer is busy on a line, providing information concerning to said caller's identity and how long said caller has been waiting to said answerer as an alternative for his answering sequence; and automatically connecting the line to a latest answering phone in case said answerer is not in a designated phone.

8. A telephone system according to claim 1, wherein said control device comprises a ringing control means for controlling the volume and frequency format of said ringing which is set by said answerer to a

specific caller, and controlling said ringing volume increase from a lower level to a higher level gradually.

9. A telephone system according to claim 1, in which, said control device comprises an alarm and reminder means for triggering a ring and displaying stored message preset by said users.

10. A speech recognition and control device, installed in a telephone system, substantially as hereinbefore described with reference to the accompanying drawings.

Examiner's report to the Comptroller under Section 17 (The Search Report)

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Relevant Technical fields

(i) UK Cl (Edition K) H4K: KBHX: KBNJ: KFB: KOE: KOF

(ii) Int Cl (Edition 5) H04M

Search Examiner

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Databases (see over)

(i) UK Patent Office

(ii)

Date of Search

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Documents considered relevant following a search in respect of claims

ALL

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	GB 2194412 A Page 1, lines 17-55	1
X	GB 2148569 A Page 2, lines 75 - Page 3, line 22	1,6
X	GB 2098830 A Page 1, lines 123 - Page 2, line 42	1,6

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Category	Identity of document and relevant passages	Relevant to claim(s,

Categories of documents

X: Document indicating lack of novelty or of inventive step.

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P: Document published on or after the declared priority date but before the filing date of the present application.

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