

(21) Application No 9204891.7

(22) Date of filing 05.03.1992

(30) Priority data
(31) 911165 (32) 08.03.1991 (33) FI

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(51) INT CL⁵
H04M 1/65 7/04

(52) UK CL (Edition K)
H4K KBHE KYX

(56) Documents cited
EP 0461572 A2 WO 90/13195 A1 WO 84/02435 A1
AU 008934763 A JP 600081934 A US 5058150 A
US 4803717 A US 4481382 A

(58) Field of search
UK CL (Edition K) **H4K KBHE KYX**
INT CL⁵ **H04M 1/65, H04Q 7/04**
Online databases: WPI

(54) **Mobile telephone with answering machine facility**

(57) A mobile telephone with an answering machine facility employs a common control section (C) including a memory (M) for controlling both the standard telephone functions and the answering machine facility. This "doubling-up" allows an answering function to be incorporated without size increase. Pre-recorded and incoming messages are stored in the mobile telephone's memory (M), under control of the mobile telephone's control section (C) and its control programs. Where the telephone is provided with a speech codec, this also acts as encoding and decoding means for the pre-recorded and incoming messages. The mobile telephone may be dual mode with an analogue section and a digital section.

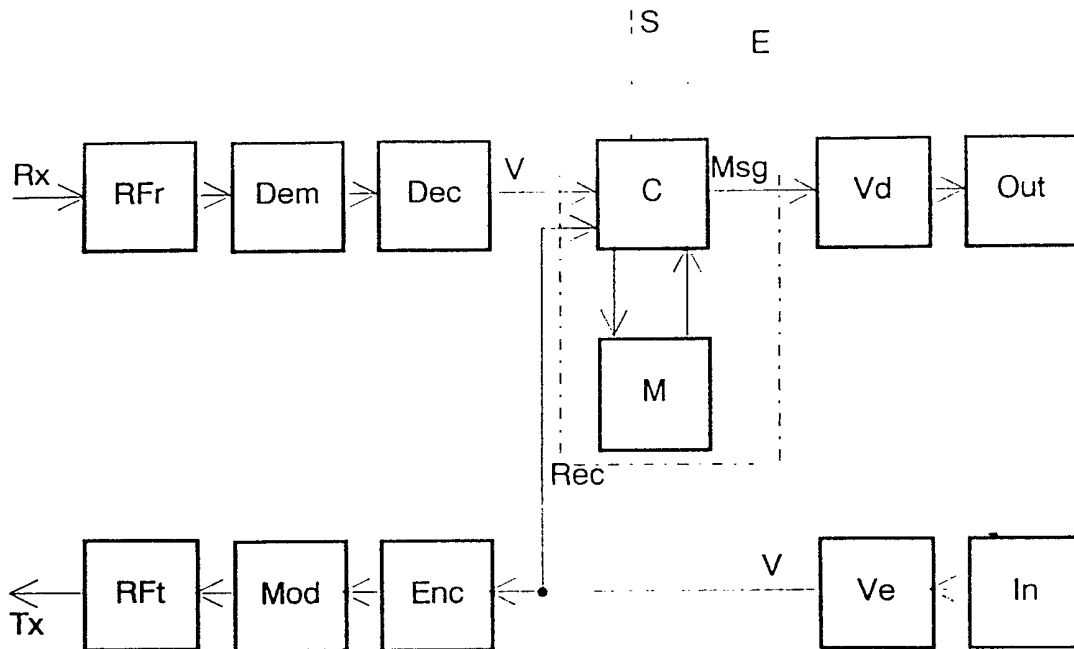


Fig. 1

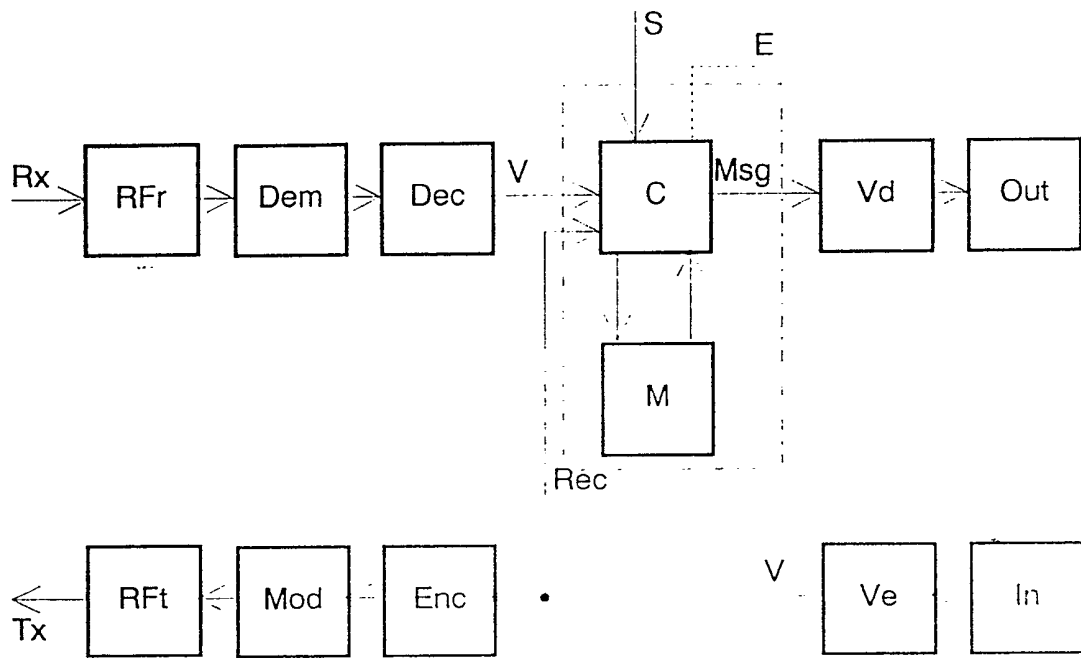


Fig. 1

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MOBILE TELEPHONE WITH ANSWERING FACILITY

The invention relates to a mobile telephone which incorporates an answering machine function.

The increasing popularity of mobile telephones has led to added facilities in them and, on the other hand, to added interface alternatives for various auxiliary equipment. A telephone answering machine has proved to be a useful auxiliary device in many applications. In connection with conventional telephones, stand-alone answering machines are often used, but so are more and more answering machines integrated into a telephone.

A stand-alone telephone answering machine is useful in connection with a mobile phone, but the inconvenient operation partly neutralizes the versatility obtained with a mobile telephone in mobile operation.

The aim of the invention is to overcome these problems by providing a mobile telephone with which a telephone answering function is favourably realized.

According to the present invention there is provided a mobile telephone comprising a control means including a memory means for controlling the function of the telephone and an answering machine function, wherein the control means is operable to control the answering machine function and the memory means is operable to store messages in said answering machine function.

The mobile telephone may further comprise a speech codec for decoding digitized speech signals received by the telephone and encoding digitized speech signals for transmission by the telephone wherein the speech codec

is operable as decoding and encoding means for the answering machine function. Controlled by the control section, speech data received on the digital speech channel can be connected directly into the storage medium. This has the advantage that the "doubling-up" the functions of the control means, memory means, and the speech codec allows an answering machine function to be incorporated in a telephone without any substantial increase in size of the telephone or the need to have any auxiliary devices coupled to the telephone.

The invention is very advantageously applied to a so called dual-mode mobile phone, i.e. operable in both analog and digital mode, and which comprises an analog telephone section in parallel with a digital telephone section. Then an analog message received during telephone answering operation is connected, under the control of a control section, to a storage medium via the speech codec in the digital section.

The speech codec utilizes current efficient coding algorithms specified for digital mobile phones. With algorithms in the control section it is possible to reduce the memory requirements of the telephone answering machine according to the invention, by using the algorithms to strip off information not pertaining to the speech from the speech data before it is stored into memory and/or using them for added compression of the speech data before it is stored into memory. One speech coding algorithm is Vector-Sum Excited Linear Predictive Coding (VSELP). This is short-term prediction coding and uses so-called code book accelerated counting. Speech coding is described in US patent no. 4630 262.

The invention will now be described, by way of example

only with reference to figure 1 which shows, in schematic form, the mobile phone's digital telephone section and function blocks of the telephone answering machine.

The figure shows a block diagram of a digital telephone section in a dual-mode mobile telephone known per se. In the dual-mode telephone there is, in parallel with the digital section, an analog telephone section (not shown), e.g. an American Mobile Phone System (AMPS) telephone section in a digital mobile telephone in accordance with the North American standard. The digital telephone section comprises, in the receiving branch Rx, the radio frequency sections RFr, a demodulator Dem, a channel decoder Dec, a speech signal decoder Vd and an analog output Out, which includes a digital to analog converter and for example a speaker. Correspondingly the transmission branch in the signal's direction of propagation comprises the input In, e.g. a microphone and an analog to digital converter, a speech signal encoder Ve, a channel encoder Enc, a modulator Mod and the radio frequency sections Rft, supplying the transmission signal into the antenna branch Tx. Advantageously in the receiving and the transmission branch the blocks Vd and Ve may be constructed as a single coding/decoding unit or a speech codec Ve/Vd, which utilizes the very efficient Vector-Sum Excited Linear Predictive Coding (VSELP) technique.

The figure also shows the functional blocks of the telephone answering machine function. The mobile telephone's control section acts as the answering machine's control means, and the telephone's memory also stores the controlling program required by the telephone answering functions. Logic C of the telephone's control section is coupled to the receiving branch so that the channel decoded signal V is supplied

to the logic C, and the logic C outputs a signal Msg to the codec Ve/Vd. The user controls the answering machine, for example via the mobile telephone's operating keys (not shown) with signal S input to the control logic C. From the logic C there is a coupling E to the interface of an optional auxiliary device, which can be e.g. a tape recorder, into which messages received by the answering machine can be unloaded at demand. For the functions of the telephone answering machine the control logic C further receives from the codec Ve/Vd output a digital signal connection Rec. The signal Rec is used to route the coded messages to the control logic C and the memory M and is used when the telephone is in analog mode and a message is to be recorded in the memory. The mobile telephone's Random Access Memory (RAM) memory M acts as the storage medium of the telephone answering machine, possibly extended according to the storage capacity requirements of the telephone answering machine. Here the construction of the mobile phone is not described in detail as such construction is well known to a person skilled in the art.

During digital operation of the dual-mode telephone the speech signals are efficiently encoded with the codec Ve/Vd, i.e. the speech is compressed to a very high degree, whereby the encoded speech signal comprises fewer bits. For example, compared with Pulse Code Modulated (PCM) encoded speech, the VSELP encoded speech signal V requires only 1/8 of the storage capacity, i.e. storing of one minute requires only about 480 kilobits. During digital operation it is possible to connect the incoming channel encoded signal V directly into the RAM memory M of the telephone answering machine, in order to store, in digital form, the messages received from the radio channel. The memory can output the messages, controlled by the logic

C, via the ordinary signal path Msg and through the codec Ve/Vd to be heard through the speaker. When the user wants to dictate an answer message to the telephone answering machine the logic C receives information about this requirement by receiving the signals S as supplied, for example, by pressing the telephones keys, whereby it connects the recording path Rec from the speech encoder Ve output to the memory M under control of logic C.

An essential part of the invention is the possibility to utilize the digital section of the mobile phone, even during analog operation. Then the analog signal path is connected via the input In, the speech encoder Ve and the recording path Rec to the logic C and further to the memory M. The user records answering messages in the same way as in digital operation. Signals received on the analog route are directed with switching means (not shown) to the analog to digital converter in the input In. Received messages stored in the memory are reproduced in the same way as in digital operation.

The invention is not restricted to any particular encoding process. It is possible to use future, more efficient, encoding algorithms in the codec Ve/Vd, whereby memory requirements can be further reduced. It is also possible to utilize the invention in any digital telephone which incorporates speech encoding/decoding, for example in the Pan-European mobile phone system Groupe Spéciale Mobile (GSM).

In view of the foregoing description it will be evident to a person skilled in the art that various modifications may be made within the scope of the present invention.

CLAIMS

1. A mobile telephone comprising:

a control means including a memory means for controlling the function of the telephone, and

an answering machine function, wherein the control means is operable to control the answering machine function and the memory means is operable to store messages in said answering machine function.

2. A mobile telephone according to claim 1 further comprising a speech codec for decoding digitized speech signals received by the telephone and encoding digitized speech signals for transmission by the telephone wherein the speech codec is operable as decoding and encoding means for the answering machine function.

3. A mobile telephone according to claim 2, wherein the telephone further comprises an analog telephone section in parallel whereby an analog message received during telephone answering operation is coupled, under control of the control means (C), to the memory means (M) through the speech codec (Vd/Ve).

4. A mobile telephone according to any preceding claim, operable such that during telephone answering operation speech data (V) received on a digital speech channel is connected directly, under control of control means (C), into the memory medium (M).

5. A mobile telephone according to claim 4, wherein the control means includes an algorithm, with which

information not pertaining to speech is stripped off the speech data before it is stored into the memory means.

6. A mobile telephone according to any preceding claim, wherein in that the control means contains an algorithm, with which speech data is additionally compressed before storing it into the memory means.

7. A mobile telephone according to any preceding claim, wherein the memory means (M) is a Random Access Memory.

8. A mobile telephone according to any preceding claim, wherein the operation of the telephone answering machine function is controlled with the operating keys of the mobile phone.

9. A mobile telephone according to any preceding claim, wherein the speech codec operates with VSELP coding/decoding.

10. A mobile telephone substantially as herein described with reference to the accompanying drawing.

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Patents Act 1977
Examiner's report to the Comptroller under
Section 17 (The Search Report)

Application number

9204891.7

Relevant Technical fields

- (i) UK CI (Edition K) H4K (KBHE, KYX)
- (ii) Int CL (Edition 5) H04M 1/65; H04Q 7/04

Search Examiner

G N CHAPMAN

Databases (see over)

- (i) UK Patent Office
- (ii) ONLINE DATABASES: WPI

Date of Search

24 JUNE 1992

Documents considered relevant following a search in respect of claims

1 TO 10

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X, P	EP 0461572 A2 (GRUNDIG) Note figures 1 and 2	1
X	WO 90/13195 A1 (SCHWARTZ) Note page 5 line 36 to page 6 line 26	1
X	WO 84/02435 A1 (MOTOROLA) Note figures 1 and 2	1
X, P &	US 5058150 (KANG) Note column 4 lines 65 to 68	1
X	US 4803717 (MARUI) Note figure 2	1
X	US 4481382 (EUCLID) Note figures 6 and 8	1
X, &	AU 8934763 A (KANG)	1
X	JP 60 81934 A (TOYOTA) Note control part 16	1

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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A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.
E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.
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