

(12) UK Patent Application (19) GB (11) 2 343 080 (13) A

(43) Date of A Publication 26.04.2000

(21) Application No 9924074.9

(22) Date of Filing 12.10.1999

(30) Priority Data
(31) 98043265 (32) 16.10.1998 (33) KR

(71) Applicant(s)
Samsung Electronics Co Limited
(Incorporated in the Republic of Korea)
416 Maetan-dong, Paldal-gu, Suwon-city,
Kyungki-do, Republic of Korea

(72) Inventor(s)
Soo-Ryeol Kim

(74) Agent and/or Address for Service
Dibb Lupton Alsop
Fountain Precinct, Balm Green, SHEFFIELD, S1 1RZ,
United Kingdom

(51) INT CL⁷
H04M 1/00 1/21 1/60

(52) UK CL (Edition R)
H4J JL J30H J30K J37K
H3Q QAX

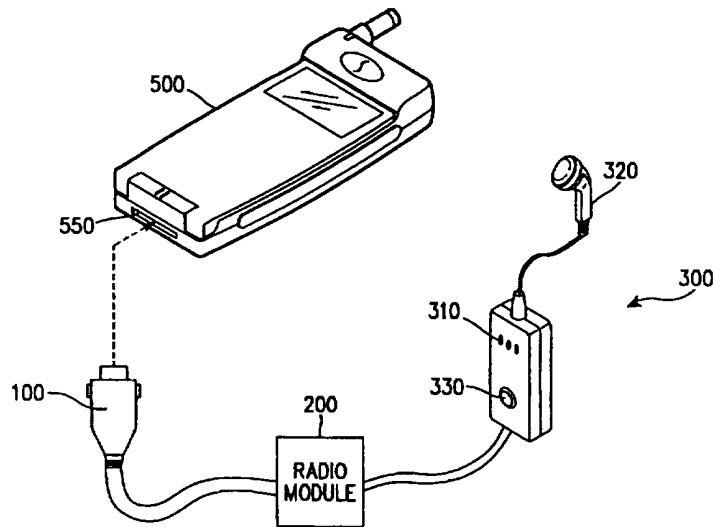
(56) Documents Cited
GB 2308775 A JP 100145470 A JP 031058047 A

(58) Field of Search
UK CL (Edition R) H3Q QAX , H4J JK JL , H4K KOX ,
H4L LDA LECY LERX LESF LEUF
INT CL⁷ H04B 1/20 1/38 1/40 , H04M 1/00 1/21 1/60
11/00 , H04R 1/10
ONLINE: WPI, EPODOC, JAPIO

(54) Abstract Title
Headset for mobile phone/radio combination has a device for muting the radio signal when the phone is in use

(57) The earphone and microphone headset enables hands-free use of a mobile phone/radio receiver combination. A control device mutes the radio signal when the phone is in use and also allows the user to manually switch between the telephone and the radio. It may also automatically mute the radio signal when a telephone call is received. The radio tuner may be included as part of the control device, mounted on the cable of the headset.

FIG. 1



GB 2 343 080 A

FIG. 1

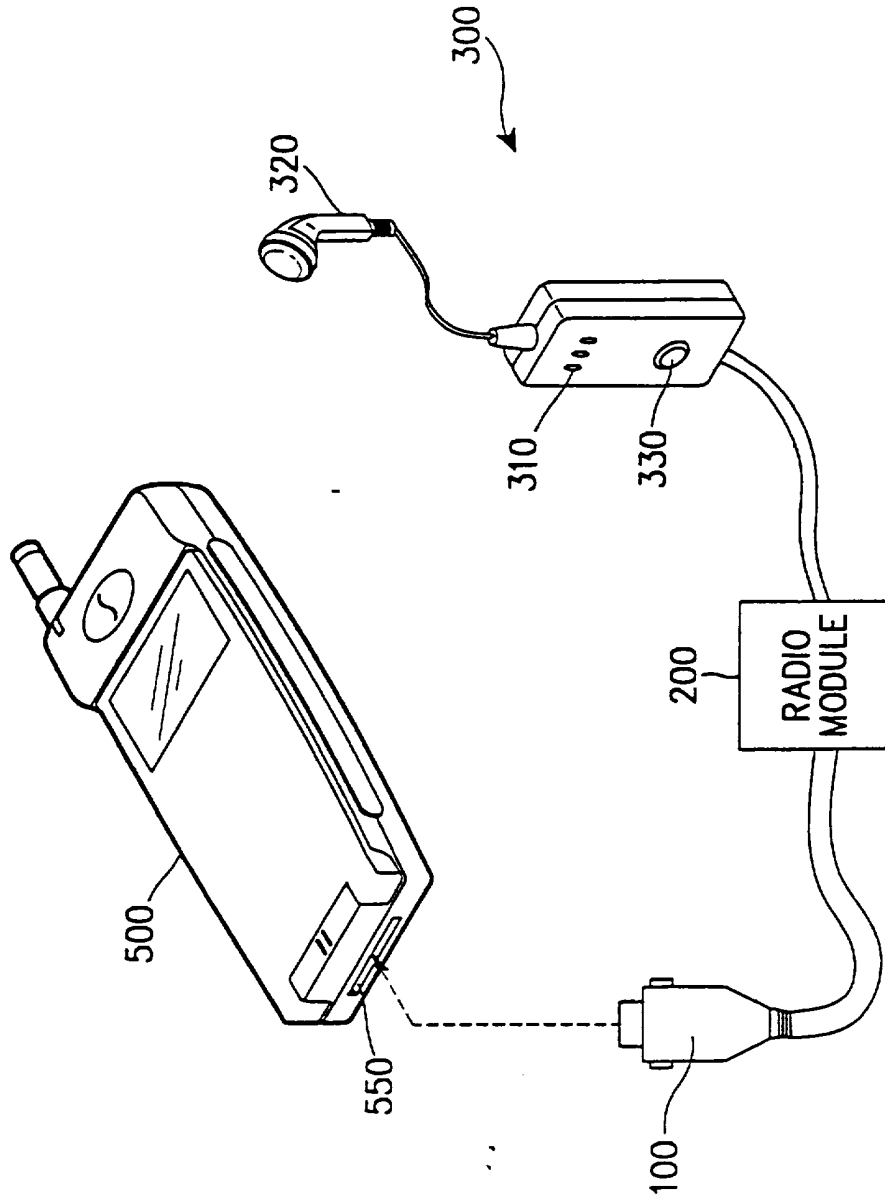


FIG. 2

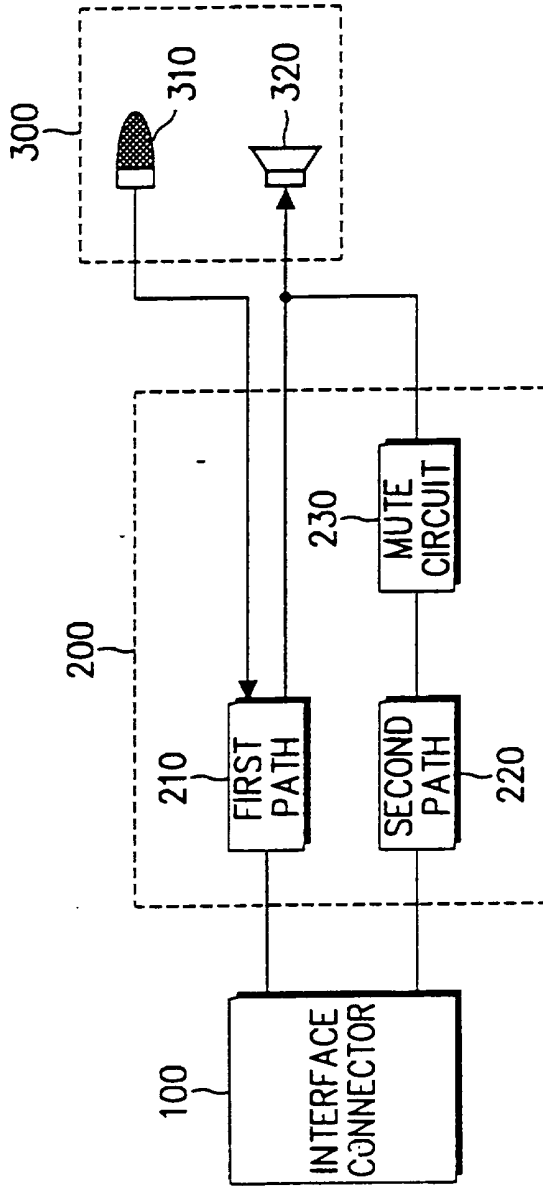
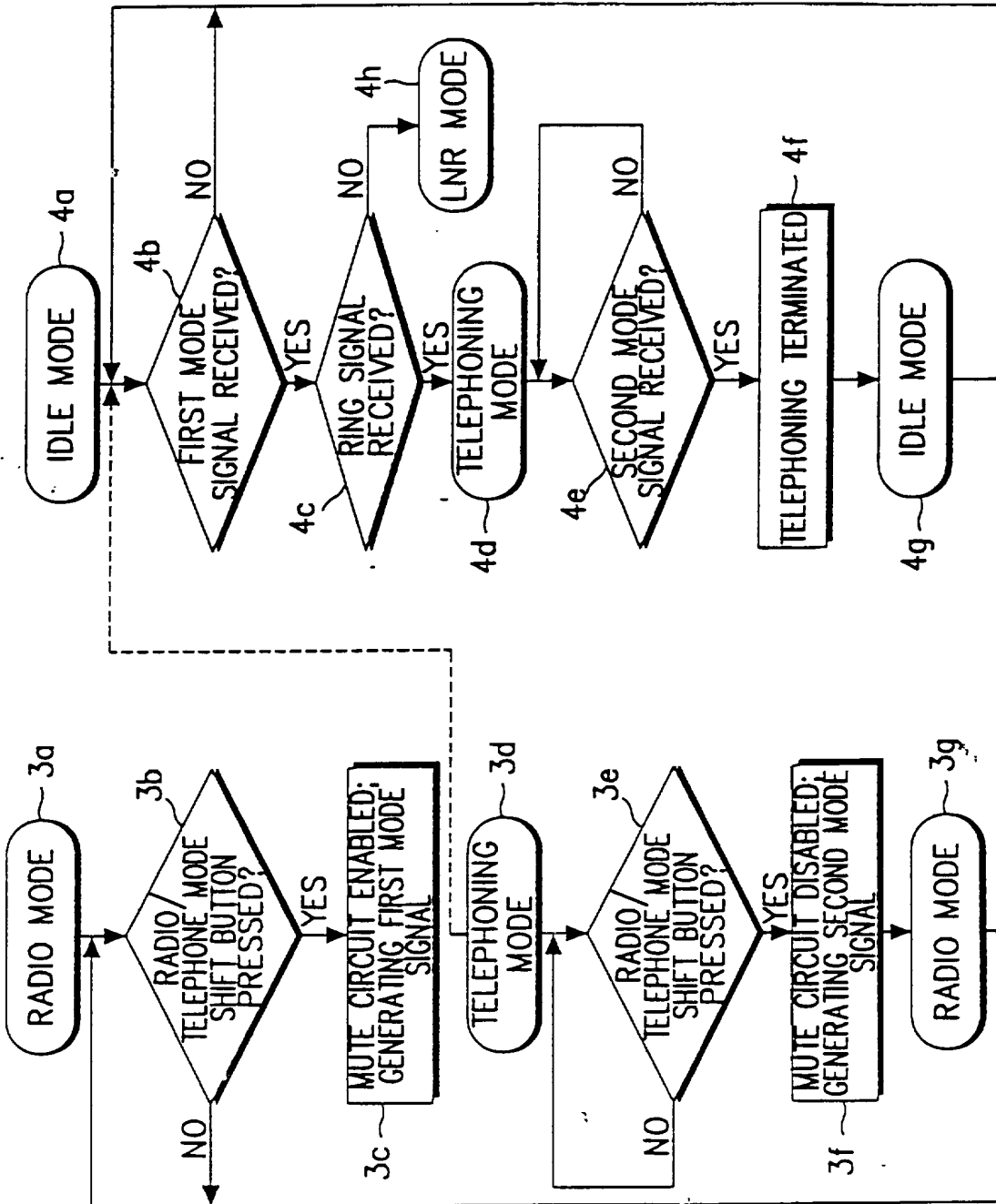


FIG. 3



1

EARPHONE-MICROPHONE COMBINATION INCLUDING A RADIO DEVICE
AND METHOD OF SHIFTING ITS OPERATIONAL MODE BETWEEN
TELEPHONING MODE AND RADIO MODE

- 5 The present invention relates to an earphone-microphone combination used simultaneously for both a mobile phone and a radio receiving set (hereinafter referred to as "radio"), and a method of shifting its operational mode between the telephone mode and the radio mode.
- 10 Generally, an earphone-microphone combination enables the user of a mobile phone to make and receive telephone calls whilst the mobile phone set is kept in a hands-free kit or stored in a pocket or bag. Similarly, an earphone enables the user of a portable palm-sized radio to listen
- 15 to the radio whilst the radio is stored in a pocket or bag. If the user wants to carry simultaneously both the mobile phone and the radio in a pocket or bag, he must have both an earphone-microphone combination for the mobile phone and a separate earphone for the radio in
- 20 order to be able to telephone or to listen to the radio.

It is an object of the present invention to provide an earphone-microphone combination including a control device, which may be used for a mobile phone. It is another object of the present invention to provide a

25 method of shifting the operational mode of such earphone-microphone combination between the telephone mode and the radio mode.

It is a further object of the present invention to provide a simplified apparatus so that the user does not

30 require several separate components and the associated wiring between them. Thus in one embodiment (described

later) the control device may contain a radio receiver as an integral part of the control device.

In one aspect of the present invention, there is provided a mobile phone/radio combination comprising:

5 a mobile phone for receiving and transmitting telephone signals;

a radio receiver for receiving radio broadcasts;

10 an earphone and microphone unit in which the earphone is adapted to convey audio signals originating from the radio broadcast and from telephone signals;

a control device operative to cause the earphone to receive an audio signal derived either from the radio signal or from the telephone signal; and

15 an interface connector for connecting the control device to the mobile phone.

In another aspect of the present invention, there is provided a control device for shifting the operational mode of an earphone and microphone unit between a telephone mode for receiving and transmitting telephone calls from a mobile phone and a radio mode for receiving radio signals from a radio receiver.

20 In a further aspect of the present invention, there is provided a method of controlling the operational mode of a mobile phone/radio combination as described above, the method comprising the steps of:

shifting the operational mode of the control device to the telephone mode when the control device is in

the radio mode by muting the radio in response to a first mode signal input by the user;

5 causing the operational mode of the mobile phone to shift from an idle mode to the telephone mode on detecting a ring signal or receiving the first mode signal;

10 shifting the operational mode of the control device to the radio mode by releasing it from muting in response to a second mode signal input by the user; and

causing the operational mode of the mobile phone to shift from the telephone mode to an idle mode in response to the second mode signal.

15 The device of the present invention enables the use an earphone-microphone combination with both a radio and a mobile phone. This device comprises a switching device for shifting the operational mode of the radio device between the telephone mode and the radio mode. This is achieved in practice using first and second mode
20 selection signals so that the radio is muted in the telephone mode. An interface connector connected with the hands-free kit interface connector of the mobile phone is connected to the control device to supply the power of the mobile phone battery to the control device (and radio
25 receiver if separate). The interface connector also serves to communicate the first and second mode signals and voice signals between the mobile phone and the control device and thus to or from the earphone-microphone combination.

The method of controlling the operational mode of an earphone-microphone combination comprises the steps of shifting the operation mode of the control device to the telephone mode when the control device is in radio mode by muting the radio in response to first mode signal input by the user. This causes the operational mode of the mobile phone to shift from an idle mode to the telephone mode on detecting a ring signal or receiving the first mode signal. The operation mode of the control device is shifted to the radio mode by releasing it from muting in response to a second mode signal input by the user. Thus the operational mode of the mobile phone is shifted from the telephone mode to the idle mode in response to the second mode signal.

The present invention thus relates to an mobile phone and radio combination in which a single earphone is used to relay either the radio broadcast or an incoming telephone call to the user. The mobile phone is connected via a suitable port to a control device which may include a radio receiver. In this case the control device is referred to as a radio device. Alternatively, the radio receiver may be a separate unit which is connected to the control unit. The control device is in turn connected to an earphone and microphone unit. The microphone unit serves to transmit the user's voice in an outgoing telephone signal delivered to the intended recipient via the mobile phone. The earphone is used both to provide an audio signal from the radio broadcast and an audio signal from an incoming telephone call. The control device contains appropriate mute and switching circuitry to allow the user to switch between the mobile phone function and the radio function.

When the mobile phone and radio combination is operating in the radio mode the ring signal of an incoming telephone call may be used to alert the user to a telephone call. The telephone ring signal may interrupt
5 the radio broadcast or be played simultaneously. The user may then operate a switch, which functions as a toggle switch, to switch from the radio function to the mobile phone function and thus receive a call. In the case of an incoming ring signal, it is also possible to
10 arrange for the ring signal itself to automatically effect the transfer from the radio function to the mobile phone function.

The toggle switch may be included in the control device carrying the switching and muting circuitry, or as part
15 of the earphone and microphone unit, or entirely separately. However, for ease of use the toggle switch is conveniently provided in the integral earphone and microphone unit.

The present invention will now be more specifically
20 described by way of example with reference to the accompanying drawings in which:

Fig. 1 is a perspective view for illustrating a radio device (i.e. a control device including a radio receiver) including an earphone-microphone combination that is
25 connected with a mobile phone according to the present invention;

Fig. 2 is a block diagram for illustrating the structure of an earphone-microphone combination connected through the radio device of Fig 1 to a mobile phone according to
30 the present invention; and

Fig. 3 is a flow chart for illustrating a method of shifting the operational mode of an earphone-microphone combination according to the present invention.

Throughout the drawings are used same reference numerals to represent same functional parts for convenience's sake. Detailed descriptions of conventional parts have been omitted for clarity.

5 Referring to Fig. 1, an earphone-microphone combination 300 consists of an earphone 320 for converting electrical signals of a mobile phone 500 or radio into audible sounds and a microphone 310 for converting voiced sounds into electrical signals transmitted to the mobile phone
10 500. A radio device 200 includes a radio receiver and is connected with the earphone-microphone combination 300. The operational mode of the radio device 200 may be shifted between a radio mode for listening to radio broadcasts and a telephone mode for allowing telephone
15 communication from the mobile phone by muting the radio device.

A radio device interface connector 100 is connected with the hands-free interface connector of the mobile phone 500 both to supply the battery power of the mobile phone
20 to the radio device and to allow transfer of signals such as first and second mode signals and voice signals between the mobile phone 500 and radio device 200 and earphone-microphone combination 300. The mobile phone 500 determines the connection with the earphone-
25 microphone combination 300 including the radio device by detecting that a specified port of its serial input/output part 550 such as request-to-send (RTS) terminal of RS232C is changed from a high state to a low state.

30 Referring to Fig. 2, the radio device 200 comprises various devices required to serve as a radio receiving set, such as tuner, volume controller, power on/off key,

etc. It is also provided with additional circuits for embodying the invention. Specifically, it includes a first path 210 for connecting the audio terminal of the hands-free kit interface connector of the mobile phone 500 to the earphone 320. It also includes a second path 220 for connecting the radio signals of the radio device to the earphone 320, and a mute circuit 230. The mute circuit 230 is connected between the earphone 320 and second path 220 for muting the radio signals depending on the first mode signal generated when the operational mode of the radio device is shifted from the radio mode for listening to radio broadcasts to the telephone mode for performing telecommunication.

Fig.3 illustrates a method of controlling the operational mode of the earphone-microphone combination including the radio device. The steps 3a to 3g represent the operation of the radio device 200, and steps 4a to 4h represent the operation of the mobile phone. There are two reasons why the user would press the mode shift button 330 as shown in Fig. 1 when he listens to the radio. The first situation is for the user to transmit a call signal, and the second situation is for the user to receive a call signal. The user is alerted to the second situation by a ring signal or vibration of the mobile phone 500.

According to steps 3a to 3c, when the radio/telephone mode shift button 330 is pressed to shift the operational mode of the radio device 200 from the radio mode to the telephone mode, the radio device 200 generates a first mode signal. The first mode signal enables the mute circuit 230 to mute the radio sounds. The first mode signal is generated by changing the specified port (for example, the ring indicator of the data cable such as

RS232C) of the serial input/output part 550 from a high state to a low state. In this case, according to steps 4a to 4d, the mobile phone 500 is shifted to the telephone mode from the idle mode by the first mode
5 signal when it detects a ring signal.

According to the subsequent steps 3d to 3g, if the user again presses the mode shift button 330 to generate the second mode signal, the radio device 200 disables the mute circuit to shift to the radio mode. The second mode
10 signal is also generated by changing the specified port of the mobile phone connected with the radio device interface connector 100 from a low state to a high state. As described above, the mode shift button 330 is a toggle switch to shift the operational mode between the radio
15 and telephone modes whenever pressed. In the case shown, the mobile phone 500 is shifted to the idle mode upon receiving the second mode signal which terminates the telephone function as can be seen from steps 4e to 4g. Alternatively if no ring signal is detected but the
20 toggle switch has been activated to shift the operational mode from the radio mode to the telephone mode, the mobile phone 500 is shifted to the last number redial (LNR) mode as shown by step 4h. Instead of LNR mode, the user may directly dial a phone number to make an outgoing
25 call and the radio is muted.

Thus, the earphone-microphone combination including the radio device of the present invention enables the user of a mobile phone both to telephone and to listen to the radio using a single earphone-microphone combination.
30 Thus, the invention resides broadly in the provision of a switchable mobile phone/radio combination whose function can be controlled by the user and which is capable of

shifting from the radio mode to the mobile phone mode on receipt of an incoming signal. Moreover, the radio is supplied with battery power from the mobile phone and thus does not require a separate battery.

Claims

1. A mobile phone/radio combination comprising:
 - a mobile phone for receiving and transmitting telephone signals;
 - 5 a radio receiver for receiving radio broadcasts;
 - an earphone and microphone unit in which the earphone is adapted to convey audio signals originating from the radio broadcast and from telephone signals;
 - 10 a control device operative to cause the earphone to receive an audio signal derived either from the radio signal or from the telephone signal; and
 - an interface connector for connecting the control device to the mobile phone.
- 15 2. A mobile phone/radio combination as claimed in claim 1, wherein the control device is operative on receipt of a signal and the combination includes means for providing a signal to the control device.
3. An mobile phone/radio combination as claimed in
20 claim 1 or 2, wherein the control device is a separate device from the earphone and head phone unit.
4. An mobile phone/radio combination as claimed in
25 claim 1, 2 or 3 wherein the control device includes a radio receiver.
5. An mobile phone/radio combination as claimed in claim 4, wherein the means for providing a signal to

the control device is a separate device from the control device.

6. An mobile phone/radio combination as claimed in any preceding claim, wherein the means for providing a signal to the control device is a toggle switch.
7. An mobile phone/radio combination as claimed in claim 5, wherein the means for providing a signal to the control device is located in the earphone and microphone unit.
8. An mobile phone radio combination as claimed in any preceding claim, wherein the control device does not form part of the earphone and microphone unit.
9. A control device for shifting the operational mode of an earphone and microphone unit between a telephone mode for receiving and transmitting telephone calls from a mobile phone and a radio mode for receiving radio signals from a radio receiver.
10. A device as claimed in claim 9, wherein the control device includes:
 - a first path for connecting a terminal of a mobile phone with an earphone-microphone unit;
 - a second path for delivering a radio signal from a radio receiver to the earphone-microphone unit; and
 - a mute circuit connected between the earphone-microphone unit and the second path.
11. A device as claimed in claim 9 or 10, wherein the mute circuit mutes audible radio signals to the earphone-microphone unit in response to a first

signal and restores transmission of audible radio signals to the earphone-microphone unit in response to a second signal.

- 5 12. A device as claimed in claim 9, 10 or 11, wherein the control device includes a radio receiver.
- 10 13. A device as claimed in any of claims 9 to 12, further including an interface connector connected with the hands-free kit interface connector of a mobile phone to supply the power of the mobile phone battery both to the control device and the radio receiver.
- 15 14. A method of controlling the operational mode of a mobile phone/radio combination as claimed in any of claims 1 to 8, the method comprising the steps of:
- shifting the operational mode of the control device to the telephone mode when the control device is in the radio mode by muting the radio in response to a first mode signal input by the user;
- 20 causing the operational mode of the mobile phone to shift from an idle mode to the telephone mode on detecting a ring signal or receiving the first mode signal;
- shifting the operational mode of the control device to the radio mode by releasing it from muting in response to a second mode signal input by the user;
- 25 and
- causing the operational mode of the mobile phone to shift from the telephone mode to an idle mode in response to the second mode signal.

15. A method as claimed in claim 13, wherein the mobile phone is shifted to the last number redial mode if no ring signal is detected after the first mode signal has been input.
- 5 16. An mobile phone/radio combination substantially as hereinbefore described with reference to Figures 1 to 3 and the accompanying description.
17. A control device substantially as hereinbefore described with reference to Figures 1 to 3 and the
10 accompanying description.
18. A method substantially as hereinbefore described with reference to Figures 1 to 3 and the accompanying description.



Application No: GB 9924074.9
Claims searched: All

Examiner: Rowland Hunt
Date of search: 15 February 2000

**Patents Act 1977
Search Report under Section 17**

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:
UK Cl (Ed.R): H3Q (QAX), H4J (JK, JL), H4K (KOX), H4L (LDA, LECY, LERX, LESF, LEUF)
Int Cl (Ed.7): H04B 1/20, 1/38, 1/40; H04M 1/00, 1/21, 1/60, 11/00; H04R 1/10
Other: Online: WPI, EPODOC, JAPIO

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2308775 A (NEC) whole document, particularly fig. 2 and page 14, lines 8-11.	1-3,8,9
X	JP 100145470 A (SHIBATA) fig. 1 and abstracts.	1,3,8
X	JP 031058047 A (UINGU) fig. 1 and abstract.	1

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.