

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
22 March 2001 (22.03.2001)

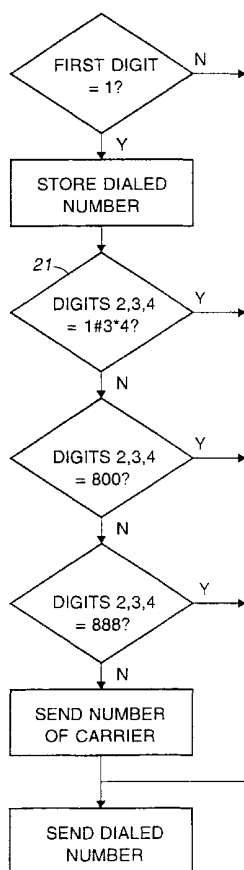
PCT

(10) International Publication Number  
WO 01/20886 A1

- (51) International Patent Classification<sup>7</sup>: H04M 3/42 (74) Agent: WILLE, Paul, F.; 6407 East Clinton Street, Scottsdale, AZ 85254 (US).
- (21) International Application Number: PCT/US00/40897
- (22) International Filing Date: 14 September 2000 (14.09.2000) (81) Designated States (national): BR, CA, CN, IN, JP, KR, MX.
- (25) Filing Language: English (84) Designated States (regional): European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).
- (26) Publication Language: English
- (30) Priority Data: 09/395,260 14 September 1999 (14.09.1999) US  
Published:  
— With international search report.  
— Before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments.
- (71) Applicant: ACOUSTIC TECHNOLOGIES, INC. [US/US]; Suite 303, 1921 South Alma School Road, Mesa, AZ 85210 (US).
- (72) Inventor: THOMASSON, Samuel, L.; 1034 East Hearne, Gilbert, AZ 85234 (US).
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: METHOD AND APPARATUS FOR LONG DISTANCE CARRIER SELECTION

(57) Abstract: Apparatus within a telephone detects a long distance prefix, stores the dialed number (11), sends a code for a long distance carrier (17), and then sends the dialed number to the local exchange carrier (18). The apparatus also checks the stored number for toll-free area codes (14, 15) and the dialed number is sent without the code when a toll-free area codes is detected. Automatic insertion can be defeated by including a particular code in the dialed number or by a defeat switch on the telephone.



WO 01/20886 A1

## METHOD AND APPARATUS FOR LONG DISTANCE CARRIER SELECTION

## BACKGROUND OF THE INVENTION

This invention relates to telephone dialing systems and, in particular, to a method and apparatus for automatically selecting a long distance carrier.

5 Many automatic dialing systems are known in the art, including "speed dialing," wherein a particular sequence of digits is stored in memory and associated with a single key for retrieval and automatic dialing. Many software programs that keep track of business or social contacts are capable of automatically dialing a number looked up by a user. These programs dial  
10 whatever information has been stored by a user and can dial any number of digits.

There are several long distance carriers and the selection of some carriers typically incurs a dialing penalty of seven digits in addition to a long distance prefix, a three digit area code, and the seven digit number being called. If the call  
15 is being made from a cellular telephone or using a credit card, the number of digits that must be correctly entered can be formidable. Programming an automatic dialer with the correct information is no less annoying even if, in theory, it must only be done once.

Automatic dialing systems do not distinguish between local and long  
20 distance calls, requiring the carrier selection code to be entered for each long distance call. If the carrier is changed, then all the corresponding numbers must be changed in an automatic dialing system. Some numbers are always used less frequently than others and the administrative overhead can be significant.

Separate automatic dialing systems are known in the art; e.g., U.S. Patent  
25 4,980,910 (Oba et al.). Although a separate automatic dialing mechanism is widely useful, it is preferred to have a system that can be incorporated into a telephone or into the service line to a house.

In view of the foregoing, it is therefore an object of the invention to provide a method and apparatus for automatically inserting a long distance carrier  
30 selection code in the data from a telephone.

A further object of the invention is to provide a method and apparatus for automatically recognizing long distance toll calls and inserting a long distance carrier selection code in the data from the telephone.

Another object of the invention is to provide a system that can be implemented within a telephone, as a plug-in addition using modular jacks, or as an addition to the wiring in a household for serving all interior telephones.

A further object of the invention is to provide an apparatus and method for automatically inserting a long distance carrier selection code in the data from a cellular telephone or a wired telephone.

#### 10 SUMMARY OF THE INVENTION

The foregoing objects are achieved in this invention in which, if a long distance prefix is detected, the dialed number is stored, a code for a long distance carrier is sent from a telephone to the local exchange carrier, and then the dialed number is sent to the local exchange carrier. The stored number is also checked for toll-free area codes and the dialed number is sent without the code when a toll-free area code is detected. Automatic insertion can be defeated by including a particular code in the dialed number or by a defeat switch on the telephone.

#### BRIEF DESCRIPTION OF THE DRAWINGS

A more complete understanding of the invention can be obtained by considering the following detailed description in conjunction with the accompanying drawings, in which:

FIG. 1 is a flowchart of a method in accordance with a preferred embodiment of the invention;

FIG. 2 is a flowchart of a method in accordance with an alternative embodiment of the invention; and

FIG. 3 is a block diagram of apparatus constructed in accordance with another aspect of the invention.

#### DETAILED DESCRIPTION OF THE INVENTION

FIG. 1 is a flowchart of a method in accordance with a preferred embodiment of the invention in which the selection of long distance carrier is fixed. Specifically,

the access number of a long distance carrier is stored in permanent memory within the telephone. "Permanent" memory is memory that by its nature is permanent, e.g., read only memory (ROM), or memory that is alterable but the means for changing the data is absent; e.g., erasable programmable read only  
5 memory (EPROM) without the voltages or the logic necessary to effect change.

When a number is dialed, the digits are stored in memory, as indicated in step 11, and analyzed for content. Specifically, the first digit is checked to see if it is "1". If so, then it is assumed that a long distance call is being made. If the first digit is not "1", then a local call is assumed and the process skips to the last step,  
10 sending the stored number.

Because some long distance calls are toll-free, e.g. 800 and 888 numbers, dialed numbers including these "area codes" must not have a code for a long distance carrier automatically inserted into the data stream from a telephone. Steps 14 and 15 check for these area codes and, if either is found, the program  
15 skips to the last step.

Having tested for long distance and eliminated toll-free calls, the access code for a particular long distance carrier is then sent; e.g., 10-10-577, as indicated in step 17. Finally, the dialed number is sent, as indicated in step 19.

The software for implementing the process illustrated in FIG. 1 is easily added  
20 to the existing software in telephones, whether they are desk type, wall mount, cordless, or cellular. The access number is fixed in the telephone, thereby assuring that long distance calls from that telephone will be sent to the particular long distance provider. In some cases, it might be desirable to defeat the automatic carrier selection code and FIGS. 2 and 3 address this situation.

FIG. 2 differs from FIG. 1 in the addition of step 21, wherein the dialed  
25 number is inspected for a defeat code, and in reversing the first two steps. By inspecting the first digit first, the process is slightly faster than if the entire dialed number is stored prior to analysis. On telephones that display the dialed digits and other information, the dialed number is already stored and the process  
30 begins with inspecting the dialed number for a long distance code.

If a defeat code, e.g. 1#3\*4, is found, the process skips to the last step, sending only the dialed number. The automatic selection can also be defeated by a

switch actuated by the user. Step 21 in FIG. 2 would then be checking an I/O port to determine whether the switch were open or closed.

FIG. 3 illustrates the electronics within a telephone as modified in accordance with another aspect of the invention. Microprocessor 31 is coupled to ROM 32, RAM 33, and I/O circuit 34. These elements are separate circuits or are incorporated into microprocessor 31. Display 36, keyboard 37, and telephone operations circuit 38 are particularly adapted to provide telephone functions. Circuit 38, for example, provides tone encoding and decoding, among other functions.

In accordance with the invention, switch 41 is coupled to one or more input pins of I/O circuit 34. As illustrated in FIG. 3, switch 41 is a single pole, triple throw switch wherein each throw is coupled to a pull-up resistor. Switch 41 is operated by a user to indicate which one of several long distance carriers to use for a call. Without switch 41, input 42 is held above ground by resistor 43 coupled between input 42 and a source of positive DC voltage, typically indicating a logic one. When switch 41 is in the position shown, input 42 is grounded, typically indicating a logic zero. With each input corresponding to a long distance carrier, the user can choose among three carriers by grounding the appropriate input. As seen by the user, switch 41 is simply a three position slide switch located on the side or rear of the telephone with other switches (not shown), such as for adjusting ring volume or for selecting tone or pulse dialing.

The invention thus provides a method and apparatus for automatically recognizing long distance toll calls and inserting a long distance carrier selection code in the data from the telephone to a local switching network. The invention can be implemented within a telephone, as a plug-in addition using modular jacks, or as an addition to the wiring in a household for serving all interior telephones. Any type of telephone, e.g. cellular or wired, can include a circuit constructed in accordance with the invention.

Having thus described the invention, it will be apparent to those of skill in the art that various modifications can be made within the scope of the invention. For example, a binary coded switch can be used instead of switch 41. The foregoing description applies to domestic telephone calls only. One can also test for international prefix (011) and send the dialed number through the

long distance carrier if an international call is being made. The number of digits in the defeat code is a matter of choice. The only criterion for a defeat code is that it be unique.

What is claimed is:

1. A method for automatically inserting a code for a long distance carrier into a number dialed in a telephone, said method comprising the steps of:
  - 5 detecting a long distance prefix;
  - storing the dialed number if a long distance prefix is detected;
  - sending the code for a long distance carrier; and
  - sending the dialed number.
- 10 2. The method as set forth in claim 1 and further including the steps of:
  - checking the stored number for toll-free area codes; and
  - sending the dialed number without the code when a toll-free area code is detected.
- 15 3. The method as set forth in claim 1 wherein the telephone includes a switch for indicating whether or not to insert the code for a long distance carrier automatically and said method includes the steps of:
  - checking the state of the switch prior to said step of sending the code for a long distance carrier; and
  - 20 sending the code for a long distance carrier, or not, in accordance with the state of the switch.
4. The method as set forth in claim 1 wherein the switch can indicate more than one long distance carrier and further including the steps of:
  - 25 storing the codes for more than one long distance carrier;
  - checking the state of the switch prior to said step of sending the code for a long distance carrier; and
  - sending the code for a long distance carrier, or not, in accordance with the state of the switch.

5. The method as set forth in claim 1 and further including the steps of:  
checking the stored number for a defeat code; and  
sending the dialed number without the code for a long distance carrier when  
5 a defeat code is detected.



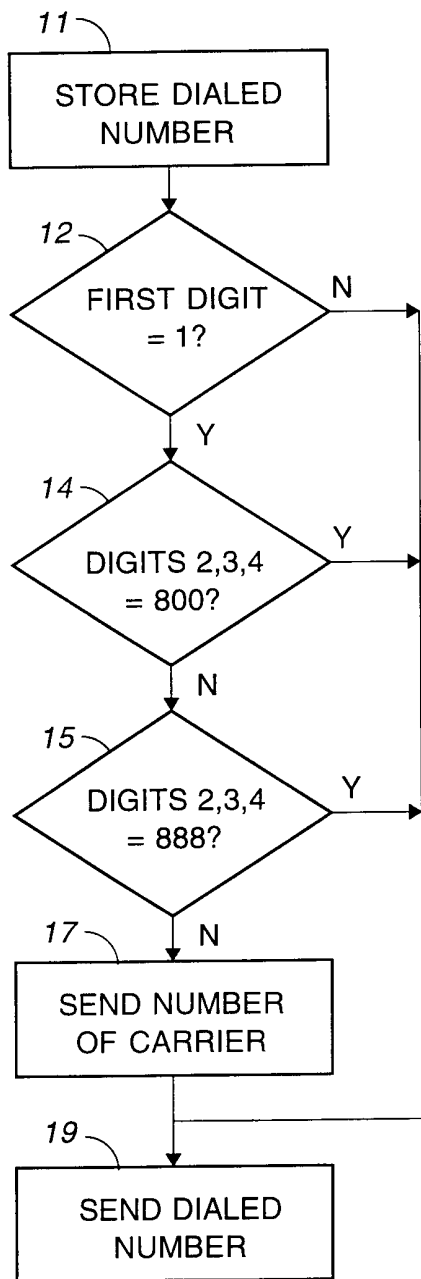


FIG. 1

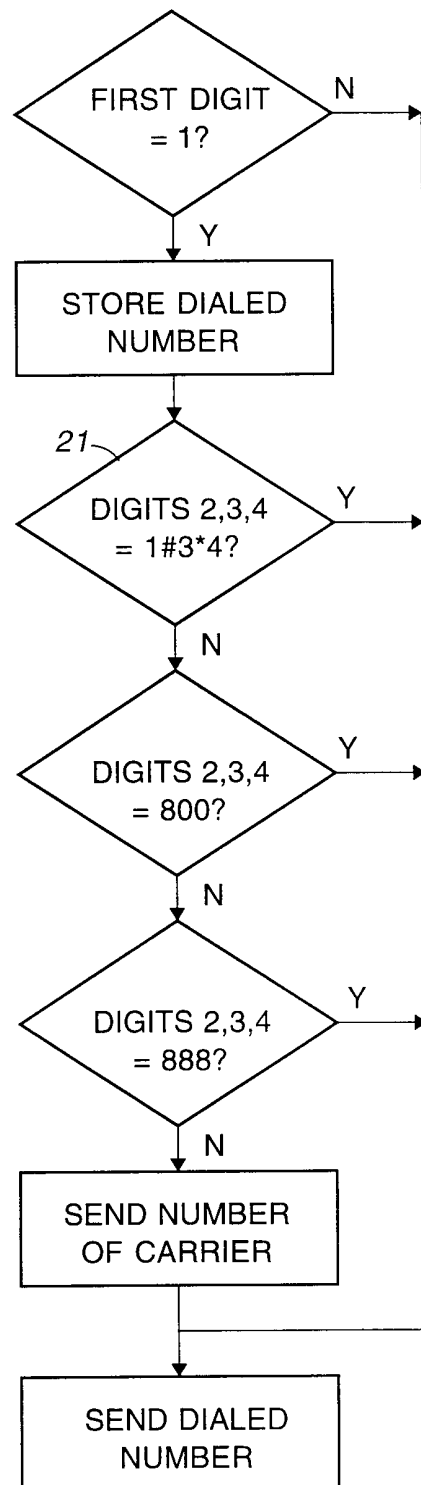


FIG. 2

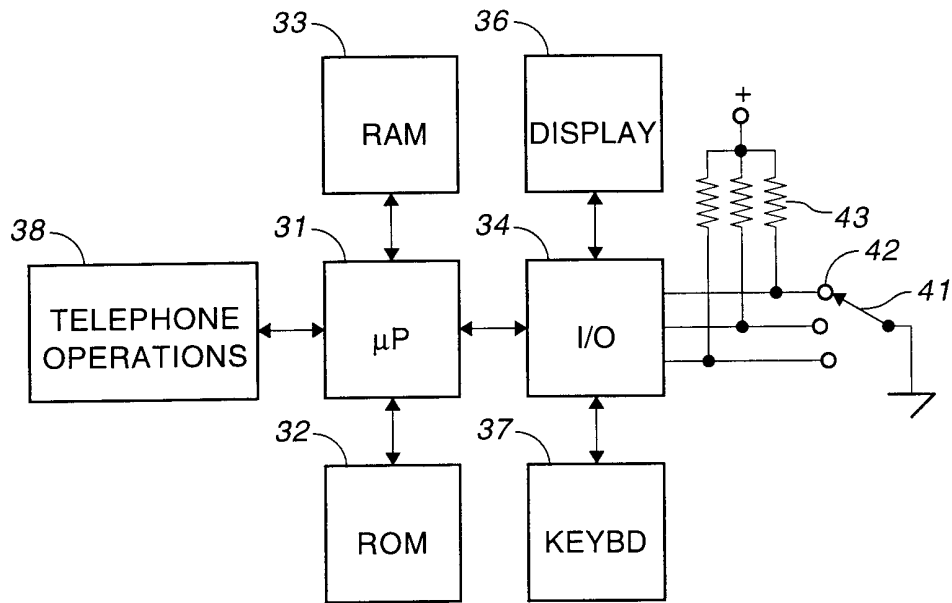


FIG. 3

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US00/40897

**A. CLASSIFICATION OF SUBJECT MATTER**  
 IPC(7) : H04M 3/42  
 US CL : 379/201  
 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. : 379/201, 216, 219-221, 227, 229, 355, 112, 115

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)  
 EAST

C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,878,122 A (WHITE et al) 02 March 1999 (02.03.1999), columns 4-5.	1, 3, and 4
---		-----
Y		2 and 5
Y	US 5,425,085 A (WEINBERGER et al) 13 June 1995 (13.06.1995), column 6, lines 7-17.	2 and 5
A	US 5,420,914 A (BLUMHARDT) 30 May 1995 (30.05.1995), ABSTRACT.	1-5
A	US 5,550,915 A (PARTRIDGE, III) 27 August 1996 (27.08.1996), ABSTRACT.	1-5

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

* Special categories of cited documents:		"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance		"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier application or patent published on or after the international filing date		"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)		"&" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means		
"P" document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search 12 December 2000 (12.12.2000)	Date of mailing of the international search report <b>26 JAN 2001</b>
--	--

Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703)305-3230	Authorized officer Ahmad Matar Telephone No. (703) 305-4731
--	---

