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CLAIMS:

1. Cordless telephone set comprising at least one base station and at least one handset, an exchange of identification codes taking place between the base station and the handset, characterized in that a connection is also set up with the aid of a second identification code stored in the base station.
- 5 2. Cordless telephone set as claimed in Claim 1, characterized in that a connection is also set up with the aid of a changeable identification code.
3. Cordless telephone set as claimed in Claims 1 and 2, characterized in that a connection is set up only with the aid of a combination of the second identification code and the changeable identification code.
- 10 4. Cordless telephone set as claimed in one of the Claims 1, 2 or 3, characterized in that a handset number allocated to the handset is transmitted.
5. Base station of a cordless telephone set, in which an identification code is stored in the base station, characterized in that storage means for storing a second and/or third identification code are provided.
- 15 6. Base station of a cordless telephone set as claimed in Claim 5, characterized in that the first identification code is transmitted on the basis of detected correspondence between an identification code contained in the message received by the radio channel and the stored second and/or third identification code.
7. Base station of a cordless telephone set as claimed in Claim 5 or 6,
- 20 characterized in that one of the identification codes stored in the base station is substituted by an identification code received by the radio channel.
8. Handset of a cordless telephone set comprising a keypad, the handset being provided for transmitting identification codes stored in the handset, characterized in that instead of the identification code stored in the handset a second and/or third
- 25 identification code entered by way of the handset keypad is provided for transmission.
9. Handset of a cordless telephone set as claimed in Claim 8, characterized in that together with the second and/or third identification code the transmission of a handset number that can be dialled by way of the keypad is effected.
10. Handset of a cordless telephone set as claimed in Claim 9, characterized
- 30 in that the dialled handset number is stored in the handset.

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DESCRIPTION

Cordless telephone set.

5 The invention relates to a cordless telephone set comprising at least one base station and at least one handset, an exchange of identification codes taking place between the base station and the handset.

 With cordless telephone sets the frequencies of the radio channels between base station and handsets of the cordless telephone sets are standardized. The
10 cordless telephone sets may optionally access the standardized radio frequencies. However, an access to the same radio channel is then certainly to be avoided for a handset and a base station not allocated to each other.

 For example, DE-OS 39 18 697.0 discloses an exchange of identification codes between a base station and a handset for avoiding, by way of such a code
15 exchange, a connection being established between a handset and a base station not allocated to each other. The element receiving an identification code verifies the received code with a stored identification code and terminates the connection when the two identification codes do not match. That document has further disclosed that an identification code issued only once is stored already during the manufacturing process
20 in a read-only memory of the base station and in a read-only memory of the handset of each telephone set comprising a base station and a handset.

 Furthermore, for example, EP 03 03 998 A2 has also disclosed cordless telephone sets in which such an identification code is produced in the base station as a random number and is transmitted to a handset when the latter is charged in the base
25 station.

 It is an object of the present invention to realise greater flexibility in a cordless telephone set of the type mentioned in the opening paragraph.

 This object is achieved in that a connection is also set up between a handset and a base station with the aid of a second identification code stored in the base
30 station.

 In all prior-art cordless telephone sets which have a safety check for avoiding accesses by non-allocated base stations or handsets, a mobile unit is capable of setting up a radio connection to a specific base station only when it transmits to the base

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station the identification code somehow agreed upon in common. With the solution proposed it is also possible with the second identification code stored in the base station to set up a connection for data exchange. Each user who knows the second code may enter this code by means of a handset compatible with the base station. In this manner
5 any user of such a handset can sign on at any base station that may be selected at random by the user, provided that he knows the second identification code of the base station.

The base station, recognizing a correspondence between the identification code transmitted by the radio channel and its own second identification code stored in
10 the base station, then transmits the first identification code stored in the base station to the handset that signs on. The handset stores the received first identification code of the base station in an overwritable memory. This terminates the sign-on procedure. For a further data exchange between the base station and the signed-on handset, for example, a conversation set up between the base station and the signed-on handset, only the first
15 identification code is used thenceforth. This is advantageous in that protection against manipulations is extensively provided because the first identification word remains concealed from everybody.

In a further embodiment of the invention a changeable identification code is provided. This changeable identification code may be, for example, a personal
20 identification number which may be changed at will by the user of a cordless telephone set. This identification code can thus be kept secret to everybody.

In a further embodiment of the invention a connection set-up without the first identification code is only performed when the second identification code and the changeable identification code are co-transmitted. This embodiment is advantageous in
25 that the signing on of a mobile station by an unauthorized user is avoided with the largest possible degree of reliability.

During the manufacturing process, the second identification code for each base station can be issued only once, so that an accidental signing on of an adjacent base station is avoided, whereas in the case of an exchange of personal identification
30 numbers users of adjacent base stations might accidentally dial the same personal identification number. On the other hand, the additional personal identification number ensures that a user who happens to be familiar with a second identification code cannot sign on a compatible handset at the base station of another user.

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The reliability is further enhanced in that after a specific number of sign-on attempts by a handset with a changeable identification code that does not match the changeable identification code stored in the base station, the handset is switched to a state in which entries are no longer possible. In an embodiment in which the handset
5 can only be reset by a service engineer, the temptation to manipulate is considerably reduced due to the attendant cost of resetting a blocked handset.

In a further embodiment a handset number which can be dialled by the user can be transmitted to the base station when the handset signs on. This embodiment is specifically suitable for private branch exchanges constituted by cordless telephone
10 sets, in which a plurality of cordless telephone sets are handled by a single base station. On the basis of the handset number which is also stored in the handset, the associated handset may be addressed selectively. In the case of telephone exchanges constituted by cordless telephone sets, a simple enlargement of the numbers of subscribers that can be handled by the telephone exchange may thus be provided by the subscribers themselves.

15 The possibility of handsets signing on and signing off is advantageous in that each handset may be allocated to an arbitrary base station. For example, it is possible to use a handset both at home and at the office. In this manner the purchasing costs may be reduced to the actually necessary number of handsets.

Since the signing on and signing off of the handsets is effected *via* the
20 handsets themselves, it is also possible to effect a signing on or signing off when there is no direct access to the base station. This might be important, for example, when the base station is located in a closed space.

The invention will now be further described and explained with reference to an exemplary embodiment.

25 For signing on a new handset, first a combination of keys in the handset is to be depressed, which enables the start of a sign-on procedure. In the exemplary embodiment they are the "SET" keys and the figure 9. Then a six-figure system identification code SSSSSS is to be entered and after that a four-figure personal identification number XXXX. The system identification code is known to each
30 purchaser of a base station, for example, by means of enclosed information. If, additionally, a personal identification number for signing on and signing off is provided, as is the case in this exemplary embodiment, this system identification code may be attached even in full view to the base station without a loss of reliability. Without the

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knowledge of the personal identification number, unauthorized manipulation is nevertheless largely precluded.

Depressing an acknowledge key, the "*" key in the exemplary embodiment, acknowledges the sign-on procedure. In the exemplary embodiment a one-
5 figure number N which may be allocated to the handset may be depressed subsequent to the acknowledge key.

The handset now transmits by a free radio channel the entered system identification code SSSSSS, the personal identification number XXXX, and the handset number N of the handset. If the base station with the uniquely issued system
10 identification code SSSSSS is located within radio range of the handset, it recognizes on the basis of the second identification code a sign-on request directed to the base station. By evaluating the personal identification number XXXX, it recognizes whether the sign-on request has been issued by a user authorized thereto. If this is the case, the base station transmits the identification code stored in the first base station to the mobile
15 station by the established radio channel. The mobile station receiving the first identification code over the selected radio channel stores this identification code in an electrically erasable memory. In this manner the identification code is retained even if the handset experiences an electric power failure.

Simultaneously, the handset produces an acknowledge tone, in the
20 exemplary embodiment a continuous tone lasting 3 seconds, to inform the user of the successful sign-on attempt. If the handset does not receive an identification code within a predetermined time interval, either because the handset is located outside the radio range of the base station or because a non-matching personal identification number was dialled for signing on, the handset will produce a warning signal. In the exemplary
25 embodiment this warning signal consists of three successive pulse-like audio signals.

The base station monitors the number of attempts a handset makes to sign on with a false personal identification number. If in excess of eight consecutive unsuccessful sign-on attempts are made, the base station sends a blocking order to the handset. On the basis of this blocking order all the input facilities in the handset are
30 blocked. This blocking function may only be reset by a service engineer.

If, on the other hand, it is detected during the sign-on procedure that already another handset has signed on at the base station under the transmitted handset number, the base station will not send back its first identification code either. In this

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manner the user is again informed of the situation by means of a warning tone. Such abortive attempts, however, are discarded for the blocking of the handset, because the correct personal identification number had each time been used.

A handset can be signed off in a similar fashion. The personal
5 identification number then provides a safeguard against an unauthorized person's signing off of a handset. In the exemplary embodiment the procedure already described is carried out while the gate key "#" *in lieu of* the asterisk key "*" on the numerical keypad of the handset is to be depressed. In this case the reply of the base station is only necessary for an acknowledge tone which signals the successful signing off.

10 Furthermore, in the exemplary embodiment the personal identification number is changed by means of a handset. In the exemplary embodiment the personal identification numbers of base stations are set at a predetermined value *i.e.* 0000 during the manufacturing process. Especially in this case a change of the personal identification number is strongly advised. By depressing the key combination of "SET" and the figure
15 9, the programming of the handset is introduced. Subsequently, the six-figure system identification code SSSSSS, the thus far valid personal identification number XXXX and a new four-figure personal identification number YYYY are to be entered. By depressing the "SET" key, the change of the personal identification number is terminated and the change request is transmitted by a radio channel. The base station
20 which recognizes the authorization for the change of the personal identification number on the basis of the system identification code and the correct thus far valid personal identification number, now writes in its memory the new personal identification number YYYY received in the message and sends back an acknowledge message to the user by the radio channel.

25 The handset number dialled during a sign-on procedure is stored in the handset. The handset may now be selectively responded to under this number, for example, in a private branch exchange constituted by cordless telephone sets. For this purpose, the messages used by a base station for setting up a conversation comprise a message portion in which an handset number may be transmitted. By comparing the
30 handset number contained in the received messages with its own stored handset number, the handset can recognize a selective call addressed to this handset.

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