TITLE	**Internal Product Specification**
MODEL	**PDLci MK3 - 900MHz Single-Line Digital Cordless Telephone with Caller ID, Speakerphone & Base Keypad**

Internal Product Specification for the
PDLci MK3
900 MHz Single-Line Digital Cordless Telephone with Caller ID, Base Speakerphone & TAD

Revision History:

Revision	Description	Page	Effective Date
A	Draft Release	All	Apr 16/99
B	Incorporate Comments	All	May 14/99
0	Initial Release	All	June 8/99

Prepared By	Maria Liao	Approved By	Gary Rogalski
Title	Project Manager	Title	Engineering Manager

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1 Overview

This specification defines the functional and electrical performance requirements of the PDLci MK3 900MHz digital cordless telephone. The PDLci MK3 is intended to be compatible with most type of central office equipment in use in Canada, the United States and South America.

1.1 General Description

The PDLci MK3 is a digital cordless telephone. It is based on the design of the latest generation of the VTECH The PDLci MK3 is part of the VTECH's latest generation of 900 MHz digital cordless telephones. The current generation of 900 MHz digital cordless telephone product is based on the VTECH PDL MK2 design. The new digital products will be designed using the AM79C493 ASIC which is the third generation of the '49x series from AMD. This ASIC has been optimised for functionality and cost.

The design of the VTECH PDLci MK3 is based on the Sony CPX-953 model of single-line digital cordless telephone. The major changes required include the incorporation of a newly designed ADPCM TAD, a new mechanical chassis, speakerphone in the base, support for both contact and inductive charging of handset battery, and other optional features such as handset speakerphone, voice announce, call-waiting deluxe, and special purpose dialling (e.g. pay-per-use) keys.

1.2 Regulatory Standards

As a requirement for sale in the United States, the PDLci MK3 will comply with the electrical specifications defined in the following documents:

- FCC Part 15 Radio Emissions Requirements
- FCC Part 68 Telephone Line Interface Requirements
- UL 1459 Safety Requirements

As a requirement for sale in Canada, the PDLci MK3 will comply with the electrical specifications defined in the following documents:

- IC RSS-210 Radio Emissions Requirements
- IC CS-03 Telephone Line Interface Requirements
- CSA 225 Safety Requirements

In addition to the above mandatory regulations, the recommendations provided in EIA 470-B, TIA 571, TIA 631 and IEC 801-2 will be used as a guideline.

The caller ID features will meet the protocol requirements specified in the following Bellcore documents:

- TR-NWT-001401 Issue 1 Visual Message Waiting Indicator
- TR-NWT-000030 Issue 2 Voiceband Data Transmission Interface Generic Requirements
- TR-NWT-000031 Issue 4 CLASS Feature: Calling Number Delivery
- TR-NWT-001188 Issue 1 CLASS Feature: Calling Name Delivery Generic Requirements

The caller waiting deluxe features will meet the protocol requirements specified in the following Bellcore document:

- GR-416-CORE Issue 1 CLASS Feature: Call Waiting Deluxe

1.3 Preliminary Feature List

The PDLci MK3 will offer many of the same features as the Sony CPX-953, with only a few unique features to this phone. In addition to the standard features, the PDLci MK3 also offers a number of optional features that may be available on selected models. In the subsequent sections of this document, description related to these optional features will be identified in *italics*.

DESCRIPTION	STANDARD FEATURE	OPTIONAL FEATURE
System General		
900 MHz digital (ADPCM)	Y	
# channels	30	
Channel selection	auto	
DTMF dialing	Y	
# security codes	16.8M	
Digital scramble voice	Y	
# lines	1	
Battery specification	3.6V, 600mAh	
Handset		
Mechanical /Cosmetic		
Retractable antenna	Y	
Fixed antenna	N	
Backlit keypad	Y	
Backlit LCD	Y	
Reversible handset charging at desktop	Y	
Reversible handset charging at wall mount	Y	
Volume switch	N	
2.5mm headset jack	Y	
Handset speakerphone	N	Y
Belt clip	Y	
Features		
Any key answer (except OFF)	N	
# ringer types	4	
Ringer off	Y	
# speed dial entries	50	
# digits in speed dial entry	32	
Auto hang-up when handset returned to cradle	Y	
Extension-in -use indication	Y	
# ringer volume controls	3	
# ear-piece volume controls	4	
Out-of-range indicator (LCD display/LED)	LCD	
Memory match ringing	Y	
Telephone cord connection check	Y	
Base AC power check	Y	
Multi-handset	N	
Message waiting indication(LCD display/LED)	LCD	

TITLE	**Internal Product Specification**
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DESCRIPTION	STANDARD FEATURE	OPTIONAL FEATURE
Battery low indication(LCD display/LED)	LCD	
# redial	1	
Battery standby time	>7 days	
Battery talking time	>7 hours	
Line hold	Y	
Mic muting	Y	
Line flash (ms)	650 ms	
Caller ID (type)	Type II	Type 2.5
Handset intercom with base	Y	
Pause dialing	Y	
Handset privacy from interruption	N	
Handset conference mode	N	
Area code preset	Y	
Speakerphone	N	Y
CID voice announce	N	Y
Pay-per-use	N	Y
One-touch memory dialling	N	Y
Keys		
Numerical keys	12	
CHANNEL	N	
HOLD	N	/MUTE
MUTE	Y	/HOLD
PHONE ON	/FLASH	
OFF	Y	
FLASH	/PHONE	
PROGRAM	Y	
MEMORY	N	
CID	N	
REDIAL	/PAUSE	
CANCEL/DELETE	N	
INTERCOM	Y	
PAUSE	/REDIAL	
LINE 1	N	
LINE 2	N	
PRV	N	
CONF	N	
PPU keys	N	3
QUICKMEM keys	N	2
Receiver Volume (up & down)	Y	
SPEAKERPHONE	N	Y
SELECT	Y	
BACK (<)	Y	
FORWARD (>)	Y	
LEDs		

TITLE	**Internal Product Specification**
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DESCRIPTION	STANDARD FEATURE	OPTIONAL FEATURE
Speakerphone	N	backlit
Line 1		
Line 2		
Base Unit		
Mechanical /Cosmetic		
Backlit keypad	N	
Backlit LCD	N	
Allow reversible handset charging at desktop	Y	
Allow reversible handset charging at wall mount	Y	
Spare battery charger	Y	
Tone/pause switch	Y	
Ringer volume switch	Y	
Features		
Any key answer(except OFF)	N	
# ringer types	1	
# speed dial entries	10	
Extension-in-use indication	N	
# ringer volume controls	3	
# speaker volume control	8	
Ringer on/off	Y	
Memory match ringing	Y	
Speakerphone	Y	
Wall mountable	Y	
Page/handset locator	Y	
Intercom	Y	
Messaging waiting indication (LCD display/LED)	LED	
Conferencing	N	
Privacy from interruption	N	
AC power failure back-up with spare battery	Y	
Standby time with spare battery		
Talking Time with spare battery		
# redial	0	
Tone/pulse dialing	Y	
Line hold	Y	
Mic muting	Y	
Line Flash (ms)	650 ms	
CID (type) – incoming call only	N	
Handset intercom with base	Y	
Pause dialing	N	
CID voice announce	N	Y
Pay-per-use	N	
Keys		
Numerical keys	0	
HOLD	with LED	

TITLE	Internal Product Specification
MODEL	PDLci MK3 - 900MHz Single-Line Digital Cordless Telephone with Caller ID, Speakerphone & Base Keypad

DESCRIPTION	STANDARD FEATURE	OPTIONAL FEATURE
MUTE	with LED	
FLASH	Y	
PROGRAM	N	
MEMORY	N	
CID	N	
REDIAL	N	
CANCEL/DELETE	N	
INTERCOM	with LED	
PAUSE	Y	
LINE 1	N	
LINE 2	N	
OFF	N	
PAGE	N	
SPK PHONE (on/off)	with LED	
CONF	N	
PRV	N	
Speaker Volume (up & down)	Y	
PPU keys	0	
LEDs		
Spare battery	red	
Charge	red	
In use	red	
New call	N	red
Message	red	
CID		
Features		
CID type	II	2.5
# CID storage	50	
Repeat indication/counter	counter	
LCD display matrix	2*16	
# characters	15	
# digits for call-back	11	
Private CID display	Y	
Transmission CID display	Y	
Unavailable CID display	Y	
New call display	Y	
Display CID tel #	Y	
Display CID name	Y	
Display CID time	Y	
Delete CID data	Y	
Save CID to speed dial entry	Y	
Keys		
ADDITION DISPLAY	N	
ERASE/DELETE	N	

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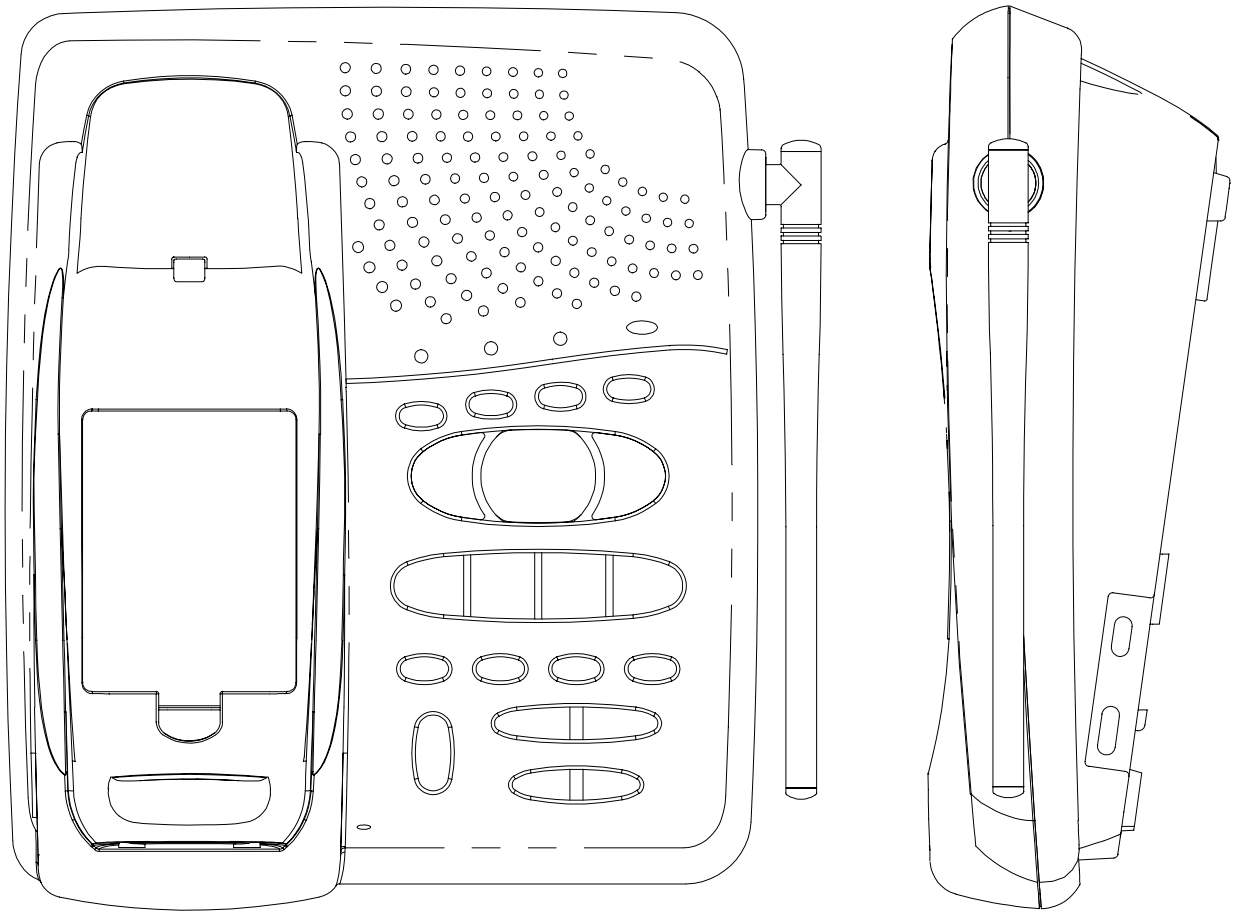
DESCRIPTION	STANDARD FEATURE	OPTIONAL FEATURE
FORWARD	N	
BACKWARD	N	
TIME/DATE	N	
ITAD		
Features		
Recording time	17	
# incoming messages	99	
# mail boxes	3	4
Private mail box	N	
OGM recording	Y	
Line selection for OGM	N	
Voice menu & operating guide	Y	
Day and time setting	Y	
Ringer setting	2,4,6, toll saver	
Call screening	Y	
Factory pre-set security code	Y	
Programmable	Y	
Audio messaging alert	Y	
2-way conferencing recording	Y	
Announce-only	Y	
Remote ITAD operation	Y	
New message display	Y	
Privacy screening	N	Y
Keys		
ANSWERING MACHINE ON/OFF	with LED	
MAILBOX 1	with LED	
MAILBOX 2	with LED	
MAILBOX 3	with LED	
MAILBOX 4	N	with LED
PLAY/STOP	N	
PAUSE	N	
SKIP	/FAST	
REPEAT	/SLOW	
FAST	/SKIP	
SLOW	/REPEAT	
RECORD	/MEMO	
ERASE	Y	
MEMO	/RECORD	
TIME	/SET	
MENU	Y	
SELECT	Y	
SET	/TIME	
Message Waiting (VMWI**)**		
FSK detection	Y	

DESCRIPTION	STANDARD FEATURE	OPTIONAL FEATURE
Stutter dial detection	N	Y

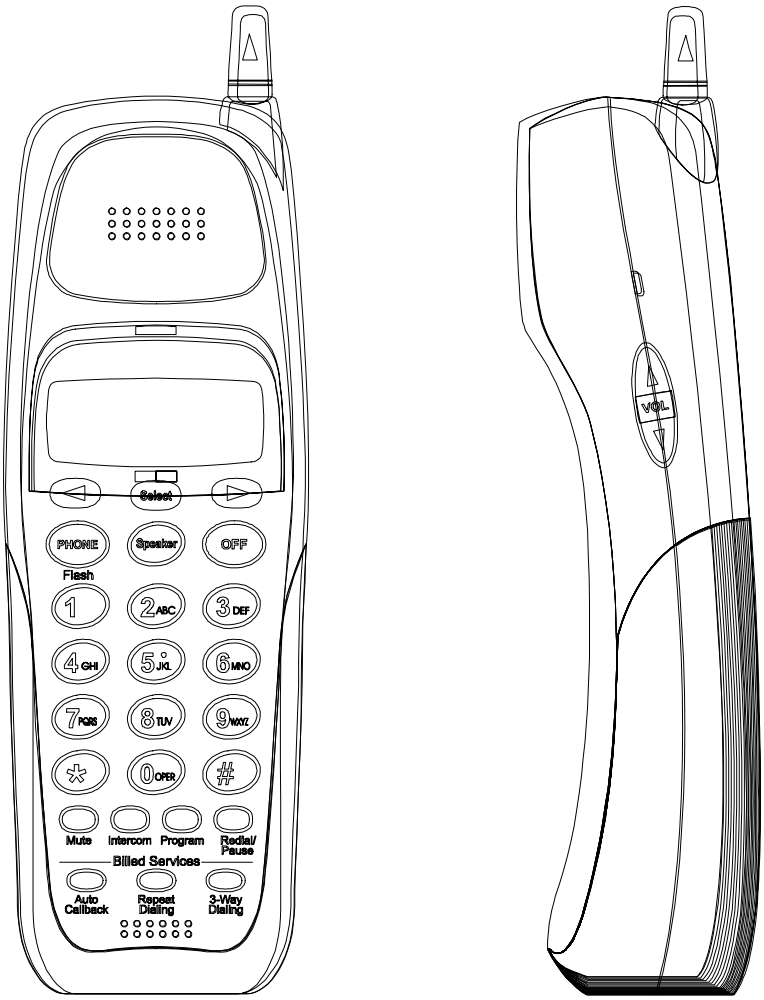
1.4 Cosmetic Styling

Line drawings for the PDLci MK3 base unit and handset are in the following sections.

1.4.1 Base Unit Line Drawing



1.4.2 Handset Line Drawing



2 Functional Layouts

2.1 Handset Functional Layout

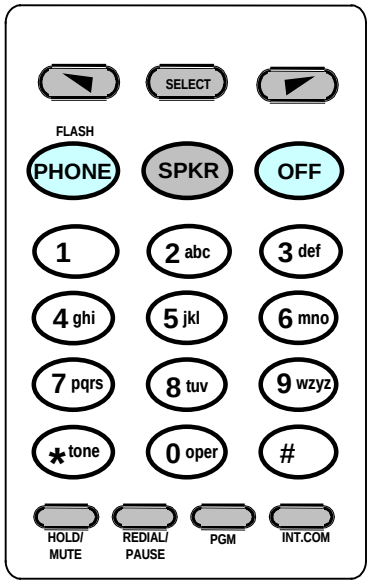


Figure 1 - Handset Keypad Layout

2.1.1 Handset LED Indicators

Speakerphone LED *- this LED illuminates steadily as backlighting for the <**SPKR**> key when the handset is activated.*

2.1.2 Handset Key Descriptions

<◄ > and < ►> keys - these keys are generally used for menu navigation or scrolling memory data. The <◄ > key moves to the left or previous selection while the < ►> key moves to the right or next selection. (On some models, <◄ > may be designated as <▼> and < ►> may be designated as <▲>.) All menu selection or data review will wrap around when scrolled continuously. During input/data editing, <◄ > will erase the character at the cursor while < ►> will move the cursor to the next position. In the IDLE mode, pressing these keys will access the caller ID log.

<SELECT> key - this key is generally used during menu navigation or reviewing memory data to enter the current menu selection or select the displayed memory record for operation. In the IDLE mode, pressing this key will access the handset directory.

<**PHONE**> **key** - this key is used to enter the TALK mode. If the handset is already in the TALK mode, pressing this key will generate a hook-flash on the PSTN line. This key is active in all of the handset operating modes.

<**OFF**> **key** - this key is used to exit all modes of operation and return the phone to the IDLE mode.

<**PGM**> **key** - this key is used to enter the PROGRAM mode. This key is only active in the IDLE mode; it has no function in the TALK mode.

<**HOLD/MUTE**> **key** – this key combines the function of hold and mute. The key will function as <**MUTE**> if pressed and released within one second or as <**HOLD**> if held longer than one second.

<**MUTE**> is valid during the TALK (*or handset SPEAKERPHONE*) or INTERCOM mode to disable the microphone in the mouthpiece or handset speakerphone. If the microphone is already muted, pressing the key a second time will cancel the mute. <**MUTE**> is not available during the handset HOLD mode.

<**HOLD**> is valid during the TALK (*or handset SPEAKERPHONE*) mode to place a call on hold.

<**REDIAL/PAUSE**> **key** – this key is used for last number redial or to insert a pause during dialling. This key will function as <**REDIAL**> when the handset is off-hook and no other dialling keys have been pressed. After the line is connected and one or more dialling digits have been sent, this key will function as <**PAUSE**>.

<**REDIAL**> is valid in the TALK (*or handset SPEAKERPHONE*) or PROGRAM mode. During the TALK (or handset SPEAKERPHONE) mode, <**REDIAL**> will dial the contents of the redial buffer. This key is also active in the PROGRAM mode for storing the redial buffer into a directory entry.

<**PAUSE**> is valid during TALK (*or handset SPEAKERPHONE*), or PROGRAM mode. In all cases, pressing this key will insert a 2-second pause into the dialling sequence. In the PROGRAM mode, the pause will be stored as a special digit in the phone number of a directory entry.

<**INT.COM**> **key** - this key is used to initiate an intercom with the base speakerphone. The handset may initiate by first paging the base, or respond to a page from the base. In either case, the phone will enter the INTERCOM mode. This key is active in the IDLE or handset HOLD mode.

<**TONE/***> **key** - this key is used to initiate temporary DTMF dialling. This key is only active in the TALK mode, and only if the default dialling method is pulse.

Receiver volume keys - these keys are used to adjust the volume of the earpiece receiver or handset speakerphone. There are four different levels of volume available. The volume will change only if the volume control key is held down for at least one second.

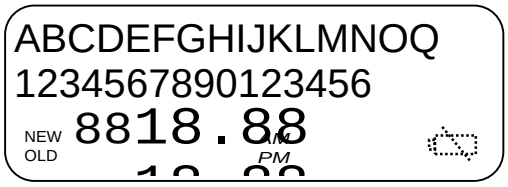
<***SPKR***> ***key*** *- this key is used to enter the handset SPEAKERPHONE mode. This key is active in the TALK, INTERCOM or SPEAKERPHONE mode only. If the handset is in TALK or INTERCOM mode, pressing this key will activate the handset speakerphone. If the handset is already in the SPEAKERPHONE mode, pressing this key will generate a hook-flash on the PSTN line.*

Special purpose keys *– these keys are used for billed services (pay-per-use functions), call-waiting deluxe operations, or one-touch memory dialling. In all cases, pressing such a key will enter TALK mode and dial the string that has been configured for the key. For the per-per-use and call-waiting deluxe keys, the associated dial string will be pre-programmed at the factory. The one-touch memory dialling keys will be user-configured. The per-per-use keys are valid during any operating mode; the one-touch memory dialling keys are valid during IDLE, TALK (or*

handset SPEAKERPHONE), HOLD, and INTERCOM modes; the call waiting deluxe keys are valid during TALK (or handset SPEAKERPHONE), HOLD or INTERCOM modes.

2.1.3 Liquid Crystal Display

The liquid crystal display (LCD) is a two-row by 16-character alphanumeric type display, with an additional row for icons/status at the bottom. The display will be as follows:



2.1.4 Keypad and LCD Illumination

Generally, the backlight on the keypad and LCD illuminates if the <**PHONE**> or <**PGM**> key is pressed when the handset is not in use, or when any of the DTMF keys or the <**PHONE**> key is pressed when the phone is off-hook. After a key is pressed, the illumination remains on for ten (10) seconds and then automatically turns off. Pressing any key during or after the ten-second interval restarts the ten-second timer. The backlight will not illuminate when the <**OFF**> key is pressed since user is assumed to have completed the desired phone operation. When the phone is off-hook, the backlight will also not be activated by the <**REDIAL**> key.

Backlight illumination also occurs during handset ringing for incoming calls. The backlighting follows the cadence of the ringing signal (i.e., illumination when ring on and no illumination when ring off). After termination of ringing, if the call is not answered, the illumination goes off and remains off until a key is pressed or another call is received. If the call is answered, the illumination remains on for ten seconds (ten-second timer restart as a result of pressing a key) and then turns off automatically provided no other keys are pressed.

Backlight illumination turns off immediately after handset is placed on cradle.

2.1.5 Headset Jack

The handset is equipped with a jack that is capable of mating with a 2.5 mm plug headset (optional headset purchased separately). When the headset is plugged in, the earpiece receiver and handset microphone are disconnected and redirected to the headset earpiece and microphone. The audio will be reconnected back to the handset ear- and mouthpiece when the headset is unplugged from the jack.

2.2 Base Unit Functional Layout

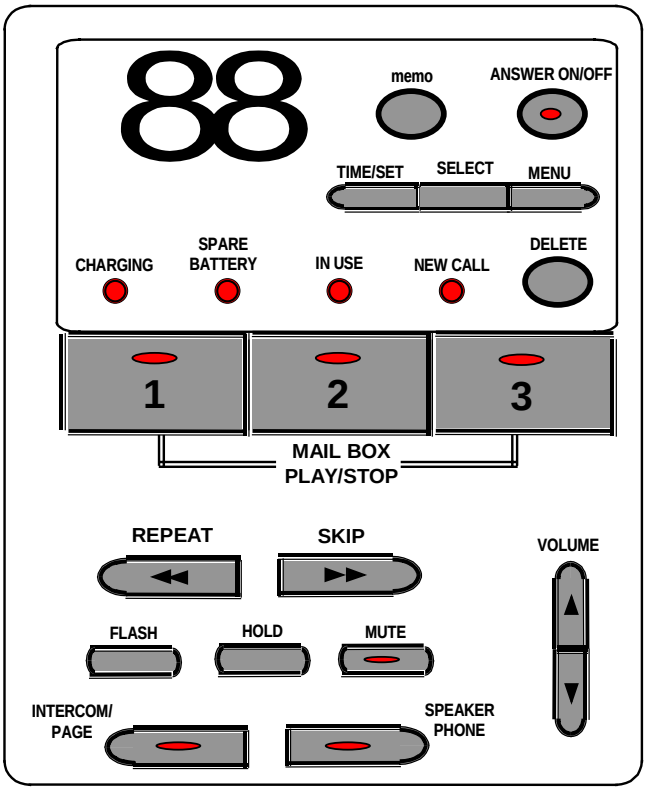


Figure 2 - Base Unit Layout

2.2.1 Base Unit LED Indicators

Charging LED - this LED illuminates steadily when the handset is resting in the base unit cradle and the handset battery is being charged.

Spare Battery LED - this LED illuminates steadily when the handset is resting in the base unit cradle and the handset battery is being charged. It will blink slowly when the phone is operating in POTS mode.

In Use LED - this LED illuminates steadily when the handset is in the TALK (or handset SPEAKERPHONE) mode. It will blink quickly during an incoming ring. It will blink slowly when a call is on hold during the handset HOLD mode.

Mute LED - this LED illuminates steadily when the base speaker is muted.

Speakerphone LED - this LED illuminates steadily when the base is in the SPEAKERPHONE mode. It will blink slowly when a call is on hold during the base HOLD mode.

Intercom/Page LED - this LED illuminates steadily when the base is in INTERCOM mode. It will blink slowly during a page when intercom is initiated.

Mailbox LEDs – these LEDs illuminates steadily when there are old messages in the corresponding mailboxes. They will blink slowly if there are new messages.

New Call LED *- this LED illuminates steadily when there are new calls in the handset caller ID log.*

Message LED *- this LED blinks when there is voice mail waiting from the CO.*

Hold LED *- this LED illuminates steadily when a call is placed on hold from the base unit.*

2.2.2 Base Unit Key Descriptions

<**SPKR**> **key** - this key is used to enter the base SPEAKERPHONE mode. If the base speakerphone is already engaged, pressing this key a second time will return the phone to the IDLE mode. This key is active in all of the base operating modes.

<**INT.COM**> **key** - this key is used to initiate an intercom with the handset. If the base is already in the INTERCOM mode, pressing this key a second time will terminate the intercom.

<**FLASH**> **key** - this key is used to generate a hook flash on the PSTN line during the base SPEAKERPHONE mode. It can be used to insert a hook flash into a speed dial entry during the base PROGRAM mode. This key is not valid in any other modes.

<**MUTE**> **key** – this key is used to disable the base microphone during the base SPEAKERPHONE or INTERCOM mode. If the microphone is already muted, pressing the key a second time will cancel the mute. <**MUTE**> is not available during the base HOLD mode.

<**HOLD**> **key** - this key is used to place a call on hold during the base SPEAKERPHONE mode.

<**MENU**> **key** - this key is used to program various answering machine features.

<**TIME/SET**> **key** - this key is used to announce the current time or to confirm the selected item or review the current settings.

<**SELECT**> **key** - this key is used to select different options in the menu setting mode.

<**MEMO**> **key** - this key is used to record an outgoing message or a memo.

<**ERASE**> **key** - this key is used to delete individual or all the messages in a mailbox.

<**ANSWER ON/OFF**> **key** - this key is used to enable or disable the answering machine to answer incoming calls.

<**SKIP/QUICK**> **key** - this key is used to skip forward a message during playback of messages in a mailbox, or to increase the playback speed during message review.

<**REPEAT/SLOW**> **key** - this key is used to repeat or playback the previous message in a mailbox, or to decrease the playback speed during message review.

Mailbox keys – these keys are used for to initiate and stop playback of incoming messages in the corresponding mailboxes.

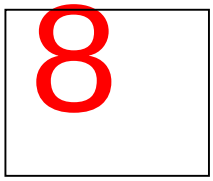
Speaker volume keys – these keys are used to adjust the volume of the base speaker. There are eight different levels of volume available. If the up/down adjustment keys are held down, the volume will be increased/decreased continuously through the eight levels at a rate of four levels/second.

Ringer switch – this switch, located on the side of the base unit, is used to set the base ringer volume (high, low or off).

Tone/Pulse switch - this switch, located on the side of the base unit, is used to set the default method of dialling to either PULSE or DTMF. The Tone/Pulse switch is read when the phone goes off-hook; it cannot be used to change the dialling method once a call is in progress.

2.2.3 Seven-Segment LED Display

A two-digit display on the base unit provides visual indication of the ITAD operation. Each digit utilises a seven-segment red LED display as follows:



3 User Interface Specification

This section provides the details of the PDLci MK3 user interface and includes a description of all the operating modes of the phone. The operation of the ITAD is described separately in Section 4. The main operating modes of the phone are:

- IDLE
- TALK / handset SPEAKERPHONE / base SPEAKERPHONE
- RINGING
- handset HOLD / base HOLD
- INTERCOM
- handset PROGRAM / base PROGRAM
- MEMORY REVIEW

These operating modes can be triggered by the following events:

- Keys pressed on the handset
- Keys pressed on the base
- Receiving an incoming call from the PSTN
- Replacing the handset onto the base cradle
- Removing the handset from the base cradle
- A timeout (where appropriate)

For this section, the following are to be noted:

- A <**Digit**> key can be any of the <**1**>, <**2**>, <**3**>, <**4**>, <**5**>, <**6**>, <**7**>, <**8**>, <**9**>, and <**0**> keys
- A <**Dial**> key can be a <**Digit**> key, the <*****> key, or the <**#**> key
- When more than one function is mapped to the same key, the details of the condition to invoke the different functions are described in Sections 2.1.2and 2.2.2. The user interface description is this section references the keys as if they are independent.
- When navigating the menu on the LCD, the selected menu item is highlighted by blinking the entry on the display. However, the selected item is shown in **BOLD** in the user interface description below.

3.1 IDLE Mode

The phone is in the IDLE mode when it is not in use by the user and there is no incoming signal from the telephone line. In this state, the phone is on-hook and the handset operates in power conservation mode. The handset is generally asleep with its transmitter and receiver turned off. It will wake up periodically and power up the receiver briefly to check for transmission from the base.

The phone can go from any of its operating mode to the IDLE mode. When the <**OFF**> key is pressed or the handset is placed on the base unit cradle, the phone will exit its current operating mode and go back to the IDLE mode without sending an error beep.

3.2 Dialling

There are two basic ways that a number can dialled out from the phone – dialling digits as they are entered on the keypad (live dialling), or dialling a string that has been stored in memory. In the latter case, the string may be an entry in the handset directory or base speed dial list, contents of the redial buffer (handset or base), or a caller ID record (handset only).

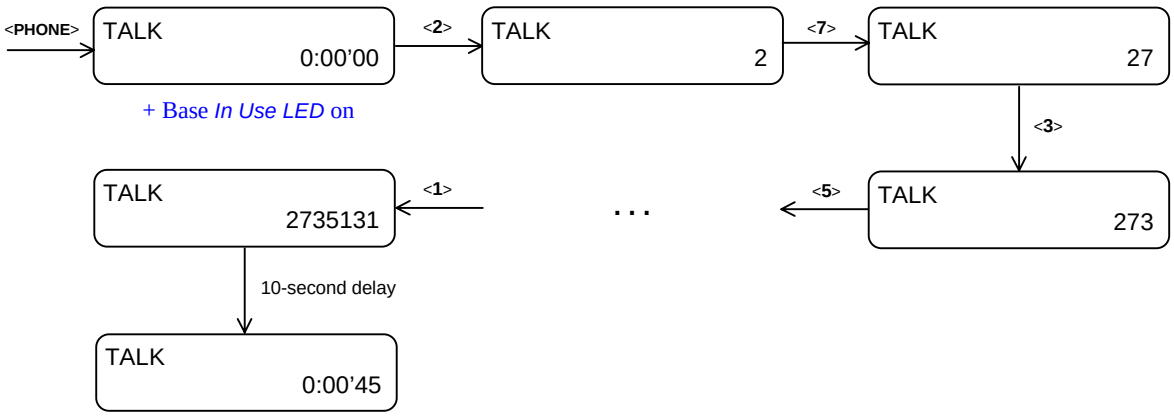
During dialling, the LCD will display a "dial monitor" to indicate the dialling in progress. Starting with the first digit dialled, subsequent digits will be appended to the dial string displayed as they are dialled. The dial monitor will be displayed for ten seconds after each <**Dial**> key pressed. After ten seconds , the dial monitor will be and replaced by the call timer on the display.

Pressing <**OFF**> during handset dialling or <**SPKR**> during base dialling will return the phone to the IDLE mode.

3.2.1 Live Dialling

To initiate live dialling, press either the <**PHONE**> on the handset or <**SPKR**> on the base to seize the line. The digits to be dialled will be sent 800 ms after the line has been seized or when the first digit is pressed, whichever occurs later.

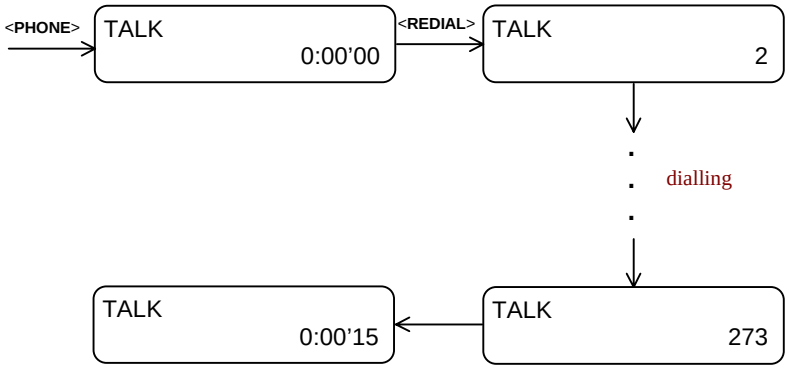
Besides the <**Dial**> keys, <**FLASH**>, <**PAUSE**> are also valid for dialling. The dial data will be stored in the appropriate redial buffer (depending where the dialling is initiated).



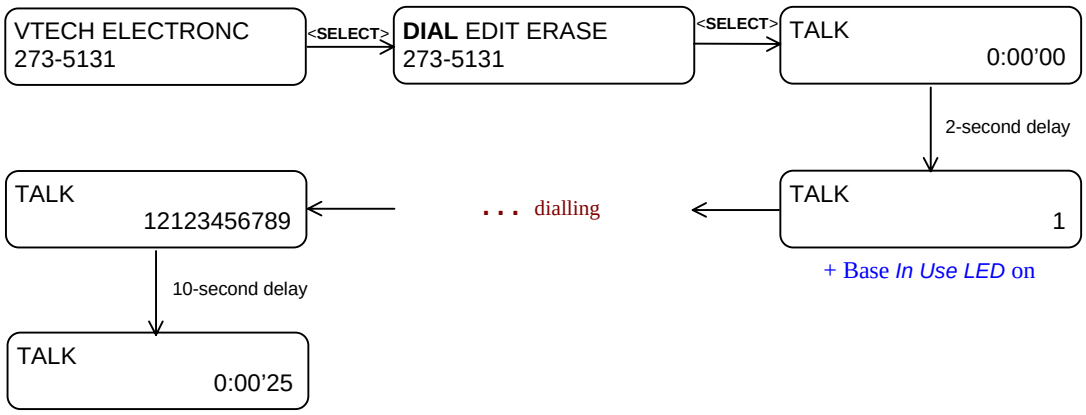
3.2.2 Redial

The <**REDIAL**> key will redial the last phone number dialled when the key is pressed immediately after the phone is off-hook. After any other keys have been dialled, <**REDIAL**> will no longer be valid. If the redial buffer is empty, the dialling unit will go back to the TALK with an error beep.

The base and handset will each have its own independent redial buffer. The redial buffer can hold up to 32 dialled digits. When the dialled string exceeds 32 digits, all existing data will be deleted and the redial buffer will become empty.



3.2.3 Directory Dialling (Handset)



To dial from the handset directory, the phone must be in the MEMORY REVIEW mode to select the appropriate directory entry. When <**SELECT**> is pressed during the directory menu display to initiate the dialling, the phone will automatically seize the line and start sending the pre-configured dial string after a 2-second delay.

3.2.4 Dialling with Special Purpose Keys (Option)

Some models may be equipped with special purpose keys on the handset that are used for dialling pre-configured sequence of digits. These keys can be used for one of the following:

- *accessing billed services (PPU)*
- *initiating call waiting deluxe (CWD) operations in response to CID during call waiting*
- *one-touch memory dialling (QuickMEM)*

The pay-per-use (PPU) and call waiting deluxe keys are factory configured while the one-touch memory dialling keys are user-configured.

*When a <**PPU**> or <**QuickMEM**> key is pressed, the phone will go into the TALK mode and dial the digit string associated with the key. A dial monitor will be displayed to show the dialling sequence. If the phone has been in the INTERCOM mode, the intercom will first be terminated (with a key beep sounding at the base).*

3.2.5 Tone/Pulse Dialling

The phone will support three dialling methods: pulse, tone (DTMF), and temporary DTMF. The pulse or tone dialling mode can be set as the default dialling method by the switch located on the base unit. The default dialling mode must be set before entering the TALK mode of operation; it is not possible to change the default dialling mode while a call is in progress.

Temporary DTMF dialling mode is only available when the default method is set to pulse. In that case, pressing the <**Tone/***> key will initiate temporary DTMF dialling such that all subsequent digits dialled will be in DTMF (including <*> and <#>). Temporary DTMF dialling will continue until the phone returns to the IDLE mode, at which point the default pulse dialling resumes.

During DTMF dialling, the <**Tone/***> key will dial the DTMF <*> digit. During Pulse dialling, the <#> key has no function and will be ignored (even though a key-beep will be generated).

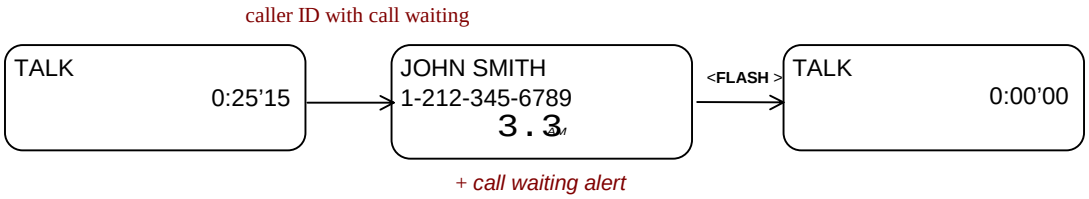
3.3 TALK Mode

The TALK and SPEAKERPHONE modes on the handset and the SPEAKERPHONE mode on the base are the main operating modes on the phone. In all cases, the phone is off-hook and dialling is possible. In the handset TALK (or SPEAKERPHONE) mode, an RF link is available between the handset and the base and both the transmit and receive audio paths are open for voice communication.

A call timer is available on the handset during the TALK or SPEAKERPHONE mode to show the call duration.

3.3.1 Caller ID with Call Waiting (CIDCW)

When caller ID data is detected during a call, the *call waiting alert* will be sounded and the data will be displayed for 20 seconds. The alert will occur on the unit or units (i.e. handset or base or both) that are active on the call.

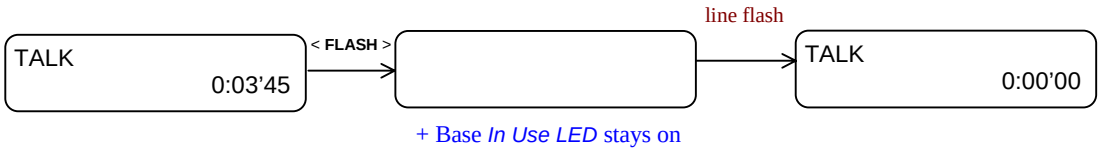


3.3.2 Flash

When the <**FLASH**> key is pressed during the handset TALK (or base SPEAKERPHONE) mode, a hook flash will be generated on the telephone line. The LCD display will be cleared during the flash operation. The <**FLASH**> key will be invalid until the flash is completed. After a flash, the call timer on the handset will be reset.

If <**OFF**> (or <**SPKR**> on the base) is pressed or handset is back on the cradle during flashing, the phone will return to the IDLE mode.

Flashing from handset:

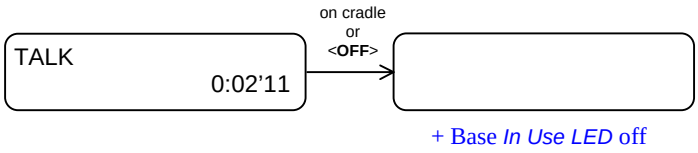


If the phone is in the handset SPEAKERPHONE mode, a hook flash can also be generated by pressing the **<SPKR>** *key on the handset.*

During call waiting, pressing **<FLASH>** will connect the user to the new call (the original call will be placed on hold at the CO). The new call will remain connected until **<FLASH>** is pressed again to switch back to the first call.

3.3.3 Call Termination

Hanging up at handset:



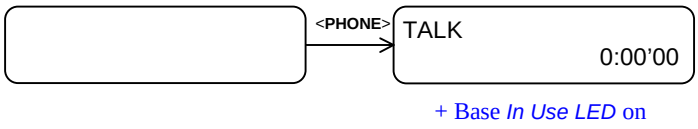
Hanging up at base:

- From the base SPEAKERPHONE mode, press <**SPKR**> to terminate the call.
- The phone will enter the IDLE mode and the base *Speakerphone LED* will be off.

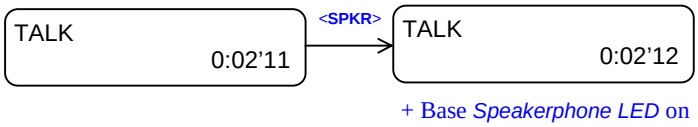
3.3.4 Three-Way Conference

When the handset is active on a call (handset TALK or SPEAKERPHONE mode), the base can join in on the call by pressing <<**SPKR**>. Similarly, when the base is active on a call (base SPEAKERPHONE mode), the handset can join in on the call be pressing **<PHONE>**.

From the base SPEAKERPHONE mode:



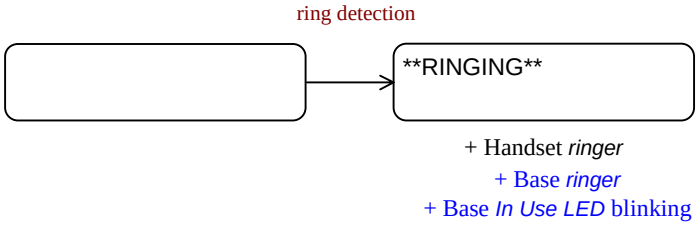
From the handset TALK mode:



3.4 Incoming Call

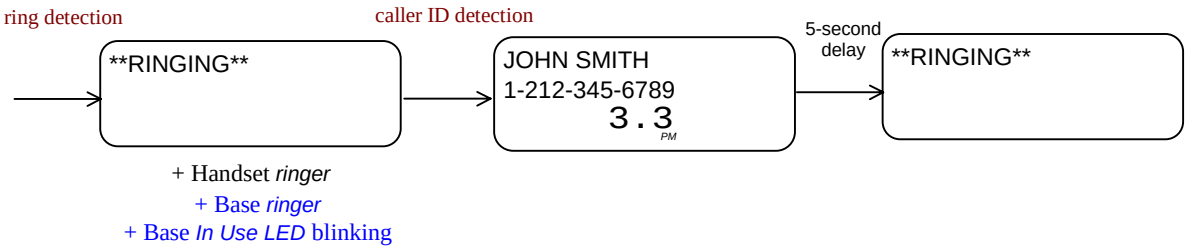
3.4.1 Normal Ringing

When ringing is detected, the phone will enter the RINGING mode and ringing indication will be made on both the handset and the base. The indication will include *ringer* sound and a message on handset LCD. In addition, the base *In Use LED* will blink quickly. All indication will stop and the phone will return to the IDLE mode when the incoming ringing signal terminates.



3.4.2 Ringing with Caller ID Data

When base unit detects the caller ID data that accompanies an incoming call, it will send the data to handset for display and storage.



At the handset, the data will be recorded as the most recent entry in the caller ID log. The repeat counter of the record will be set to "1" by default. If the data of the incoming call matches a previous record already in the log, the previous record will be deleted but the repeat counter of the current record will be modified accordingly. The maximum value of the repeat counter is nine, after which it will reset to zero.

If the log is already full (maximum of 50 records), the oldest entry will first be deleted to accommodate the incoming data.

Within the log, the records are classified as either "new" or "old" in accordance with the following:

- if there is new data in CID log previously
  call is not answered – data is "new"
  call is answered – data is "new"
- if there is no new data in CID log previously
  call is not answer – data is "new"
  call is answered – data is "old", is off

After the incoming record is added to the caller ID log, if there is new data in the log, the New Call LED on the base will blink. Otherwise, the New Call LED will be off.

3.4.3 Memory Match Ringing

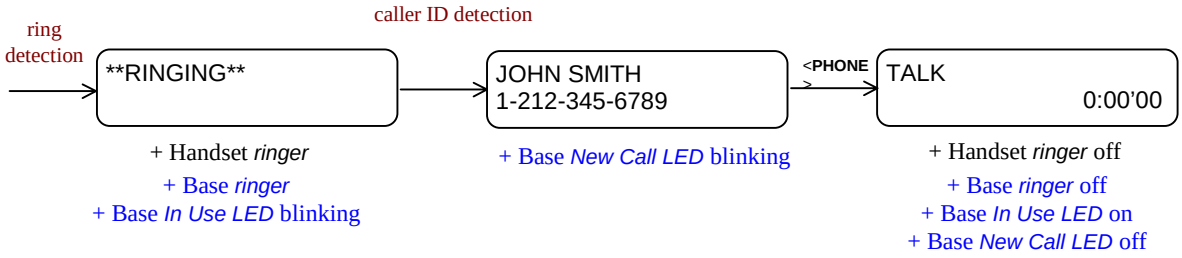
When received caller ID data matches with one of the entries in the handset directory, the phone will change to a different ringer sound to notify the user that the call is coming from an acquaintance. A match is assumed if the last seven digits of the incoming call are identical to those on one of the directory entries.

The memory match ringer is distinguished from the normal ringer and will be changed from the second ring onwards.

3.4.4 Answer Call

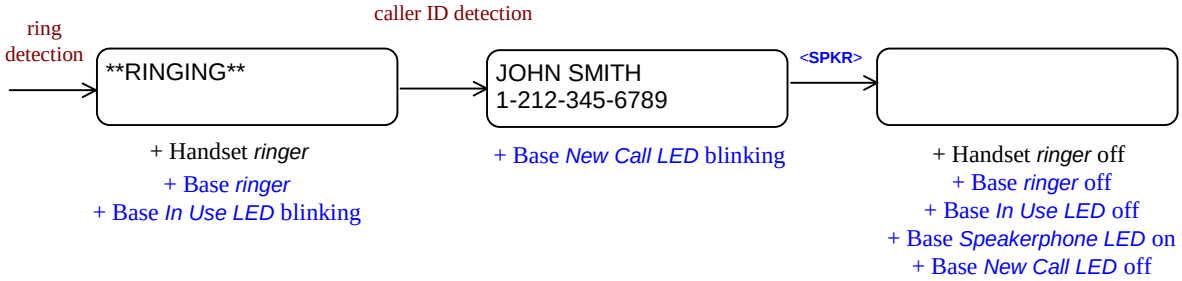
When either unit (handset or base) answer an incoming call, the ringing will terminate on both units.

Answering a call from the handset:



Besides using the **<PHONE>** key, the user may also press a number of other keys on the handset to answer the incoming call (see Section 3.11.2).

Answering a call from the base:



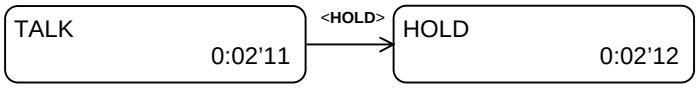
If there are no new calls in the caller ID log prior to the incoming call, the New Call LED will remain off because the received data will be regarded as old (see Section 3.4.2).

3.5 Hold

A call can be placed on hold from the unit (handset or base) that is active on the call. The phone differentiates between the handset HOLD mode and the base HOLD mode based on where the hold was initiated. During the HOLD mode, all keys will be ignored except **<INT.COM>** and **<PHONE>** on the handset, and **<INT.COM>** and **<SPKR>** on base.

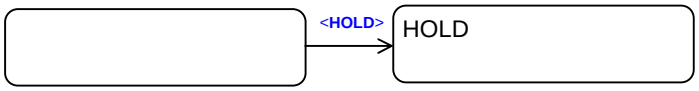
3.5.1 Place Call on Hold

Holding from handset (handset HOLD):



+ Base *In Use LED* blinking slowly

Holding from base (base HOLD):

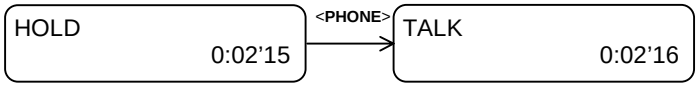


+ Base *Speakerphone LED* blinking slowly

3.5.2 Release Hold

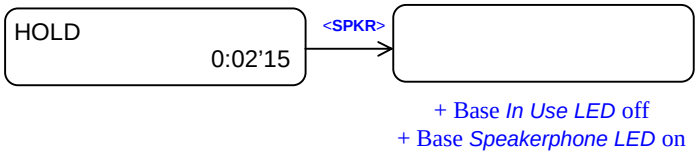
Either the handset or the base can release a call that has been placed on hold, regardless of where the hold was initiated. If the handset releases a call that was placed on hold by the base, the call timer displayed on the handset will start from zero.

From handset HOLD mode:

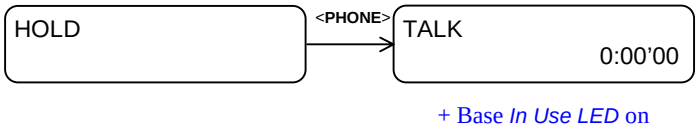


+ Base *In Use LED* on

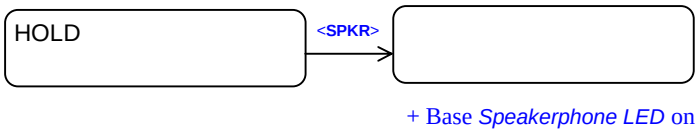
or



From base HOLD mode:



or

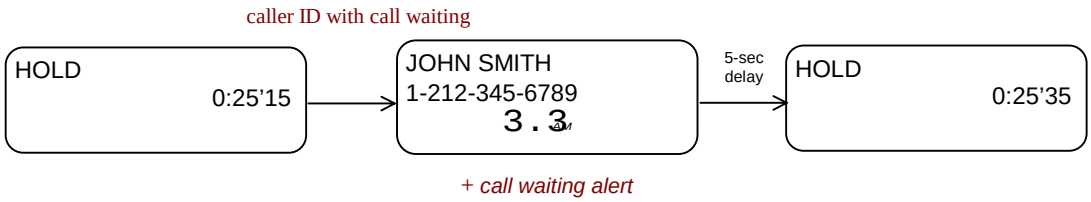


3.5.3 Automatic Hold Release

When off-hook is detected on a parallel telephone set, the phone will release the hold and go back to the IDLE mode unless the off-hook is detected during intercom or paging with the line on hold.

3.5.4 CIDCW during Hold

When caller ID data is detected while a line is on hold, the data will be displayed on the handset LCD for 20 seconds, after which HOLD will be redisplayed. The caller ID data will not be redisplayed when the call is released from hold.



3.6 Intercom

3.6.1 Page to Initiate Intercom

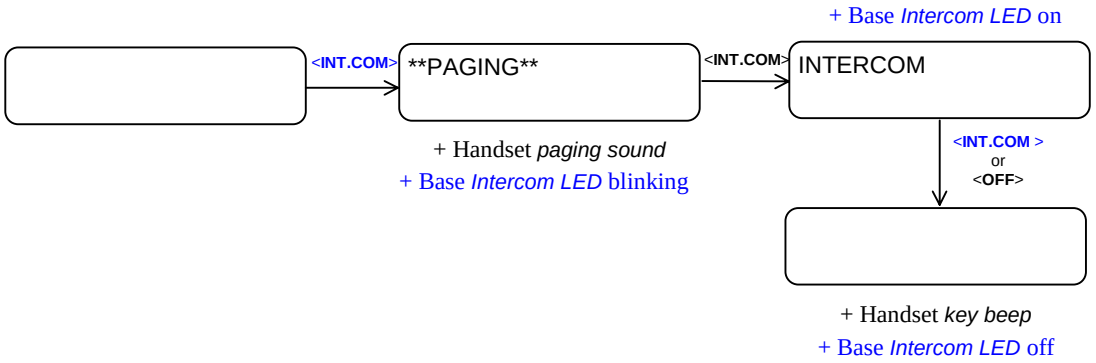
Either the handset or base can page its partner unit to initiate an intercom (paging will not be available if handset is resting on the cradle). The paged unit will be alerted with a *paging sound* (one-minute alert for handset and a single page sound for the base). The initiating unit can cancel the page (**<INT.COM>** for the base, or **<OFF>**or on-cradle for the handset) or the page can time-out. In either case, the phone will return to the IDLE mode.

If the base pages the handset, the phone will enter the INTERCOM mode if the handset respond to the page by pressing **<INT.COM>**. However, if the handset pages the base, the phone will enter the INTERCOM mode automatically after the single page, with no additional response from the base required. In the latter case, the base *paging alert* will be sounded even if the base *ringer* has been turned off.

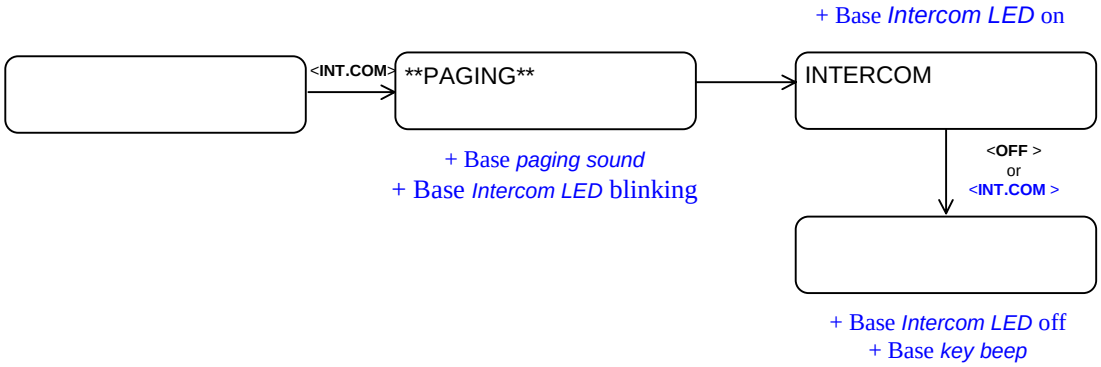
Pressing **<INT.COM>** on the base or **<OFF>** on the handset (or handset on-cradle) will terminate the intercom. When one unit ends the intercom, a *key beep* will sound on the partner unit to confirm the termination.

When ringing is detected during paging, the paging will stop and the phone will go to the RINGING mode.

Base initiating intercom:



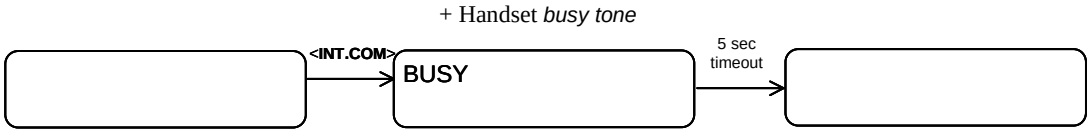
Handset initiating intercom:



3.6.2 Paging during a Call

When a unit (handset or base) page its partner unit while it is active on a call, the initiating unit will receive a busy indication via a *busy tone*. The LCD will also briefly display a BUSY message (for 5 seconds), after which any previous display will be resumed.

Handset initiating intercom:



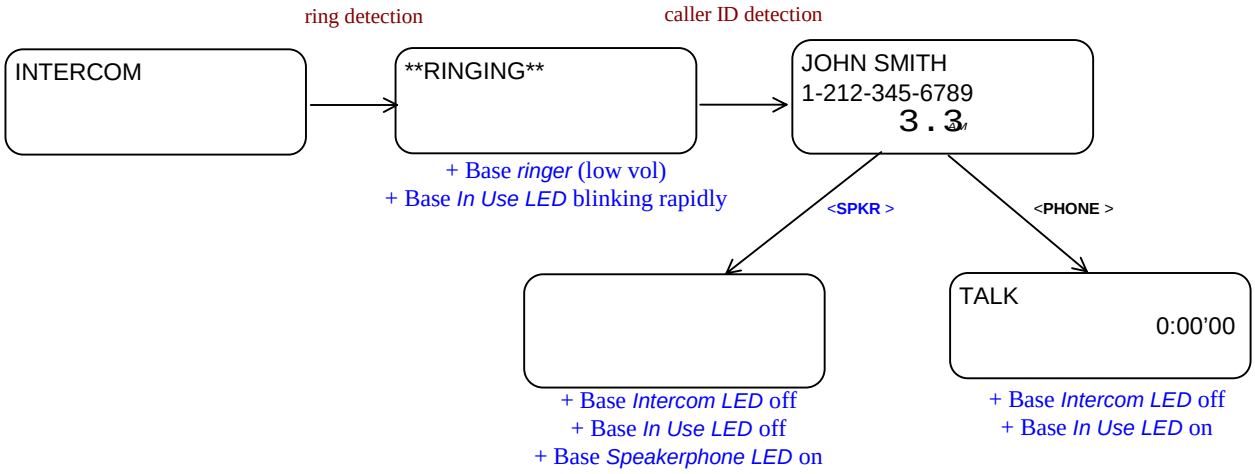
Base initiating intercom:

- Press **<INT.COM>** to page the handset (phone is in the handset TALK mode)
- Base *busy tone* will sound for five (5) seconds; phone will remain in the handset TALK mode

3.6.3 Ring Detection during Intercom

If ringing is detected while the phone is in the INTERCOM mode, the handset LCD will display a **RINGING** message followed by caller ID data. The *ringer* will only sound at the base and the ringing level will be low regardless of the ringer setting.

If either unit ends the intercom, the phone will change to the RINGING mode and the ringer levels will resume to the normal ringing settings. Alternatively, if the handset or base answers the call, the intercom will also be terminated and the phone will change to the handset TALK (or SPEAKERPHONE) or the base SPEAKERPHONE mode accordingly.



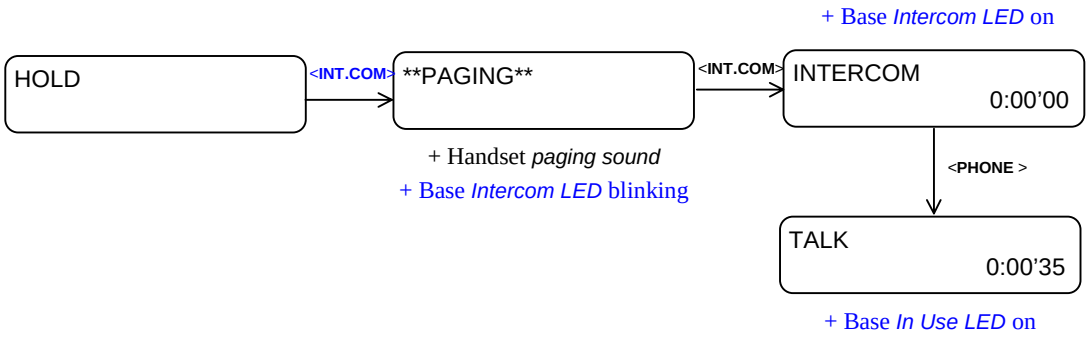
3.6.4 Transfer Call via Intercom

The intercom can be used to co-ordinate the transfer a call between the handset and base and vice-versa. If **<INT.COM>** is pressed at the handset during the handset TALK mode, or if **<INT.COM>** is pressed at the base during the base SPEAKERPHONE mode, the call is first placed on hold before the intercom is initiated.

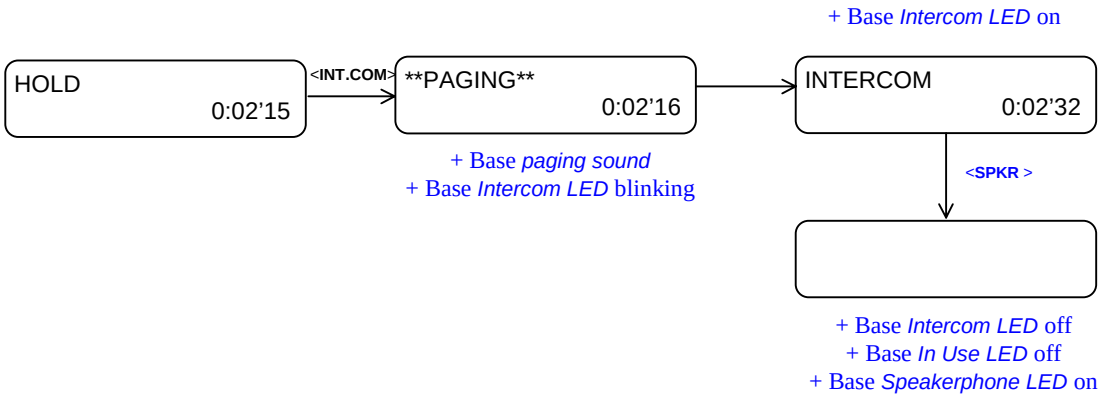
During the intercom, pressing **<PHONE>** on handset will switch the phone to the handset TALK mode while pressing **<SPKR>** on base will switch the phone to the base SPEAKERPHONE mode. The call timer will restart from 0:00'00 if the call was transferred between the handset and base.

If the page times out (handset only) or it is cancelled by the paged unit (using **<OFF>** in the case of the handset or **<INT.COM>** in the case of the base), the phone will return to the appropriate HOLD mode.

Switching from base to handset:



Switching from handset to base:



3.6.5 CIDCW during Paging with Line on Hold

When caller ID data is detected during paging with a line on hold, the handset LCD will briefly display the data (for 20 seconds), after which the previous **PAGING** message will be resumed unless the paging has timed out. The *call waiting alert* will also be heard in addition to the paging sound.

Handset being paged:

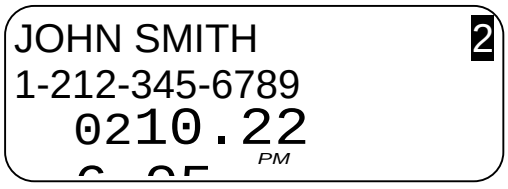
3.6.6 CIDCW during Intercom with Line on Hold

When caller ID data is detected during intercom with a line on hold, the *call waiting alert* will be sounded. In addition, the handset LCD will briefly display the data (for 20 seconds), after which the previous INTERCOM message will be resumed.

3.7 Caller ID Functions

Each displayed caller ID record contains the following information:

- Name (up to 15 ASCII characters), displayed on the first line of the LCD
- Phone number (details of display format below), displayed on the second line of the LCD
- Time and date stamp (time in 12-hour format), displayed on the right half of the icon/status line at the bottom of the LCD
- Repeat counter (single-digit, from 1 to 9), displayed in reversed video as the 16th character of the second line (only available when reviewing a caller ID record from the log)



Alternatively, it may contain one of the following messages if the incoming caller ID record indicates out-of-area, private, or long distance, and the name or the name and phone number data is unavailable:

- OUT OF AREA
- PRIVATE

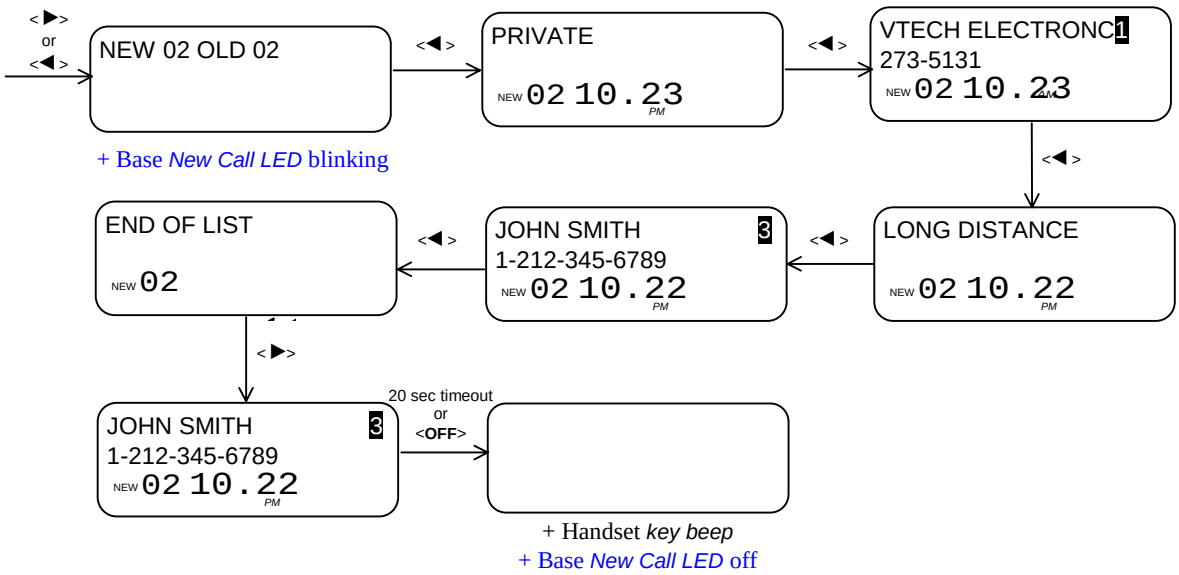
- LONG DISTANCE

If there are errors detected in the incoming caller ID data (indicated by an invalid checksum), a TRANSMISSION ERROR message will be displayed on the LCD when the data is received. However, the record will not be stored into the handset caller ID log.

Where there is a phone number available in the incoming caller ID data, the number will be in one of two formats – direct dial number (DDN) or dial number (DN). For DDN, all the digits in the data will be displayed without modifications, only adding "-" in the appropriate places as separators (e.g. 12123456789 becomes 1-212-345-6789 while 3456789 becomes 345-6789). For DN, the number of digits displayed for the phone number is determined based on matching the area code of the incoming call (where available from the local telephone company) with the area code(s) configured in the phone. If the area code matches the home area code, the call is assumed to be local and the seven-digit phone number is displayed (e.g. 2123456789 becomes 345-6789). Alternatively, if the area code matches one of the local area codes, the complete ten-digit phone number is displayed (e.g. 2123456789 becomes 212-345-6789). Otherwise, the call is assumed to be long-distance, and phone number displayed will include the preceding "1" for long distance dial (e.g. 2123456789 becomes 1-212-345-6789).

While a caller ID record is being reviewed (from the log) on the handset, additional operation that can be performed on the data includes dialling the displayed number, programming the data into the directory, or erasing the record.

3.7.1 Review Caller ID Records



From the IDLE mode, the phone can enter the handset MEMORY REVIEW mode to review the caller ID log. The review operation can be initiated by using either <◀ > or <▶> to begin scrolling through the data (<◀ > will start from the most recent while <▶> will start from the oldest record).

During review of caller ID data, only **<SELECT>**, <◀ >, <▶>, **<PHONE>**, and **<PGM>** will be valid.

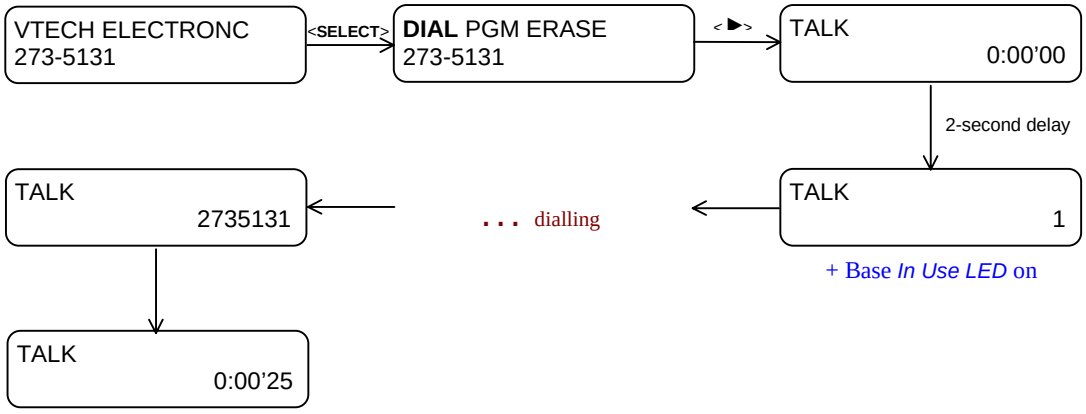
While the data is displayed, the LCD will clear and the handset will go back to the IDLE mode after a 20-second timeout with no operation, or when<**OFF**> is pressed, or if the handset is placed on the cradle. If ringing is detected during data display, the handset will go to the RINGING mode.

Once all the new caller ID records have been reviewed, the records will be marked as "old data" as soon as the review operation is completed. However, if there are still records that have not been reviewed when the review operation is terminated, the new data will remain as "new", even if some has just been reviewed.

It will be possible to review the caller ID data on the handset even if the base is in the base SPEAKERPHONE mode.

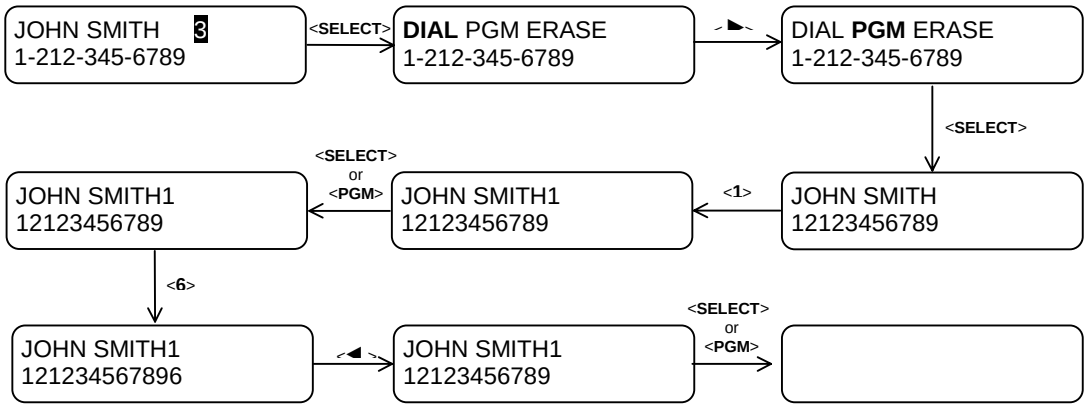
3.7.2 Call Back

During display of a caller ID record, the data can be selected for call back and the numbers can be easily dialled without re-entering the digits on the keypad. The area code(s) configured for the phone will be used to determine the digit string to be dialled (e.g. whether a preceding "1" for long distance calling is required) so user intervention to correct the dialled number can be minimised. If no home area code has been configured, a NO AREA CODE message will be displayed on the LCD and the phone will return to the IDLE mode with an *error beep*.



3.7.3 Program Caller ID Data into Directory

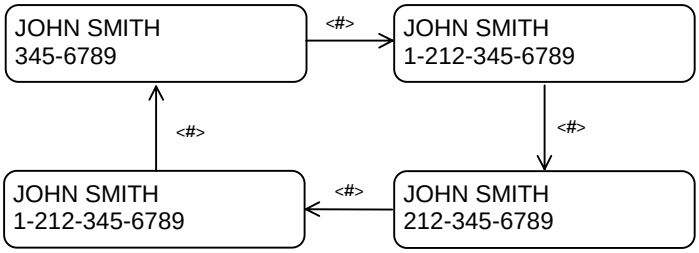
During display of a caller ID record, the data can be selected for programming into the directory. The data can be edited prior to storing into the directory (see Section 3.8.1 for details on movement of the cursor and character input).



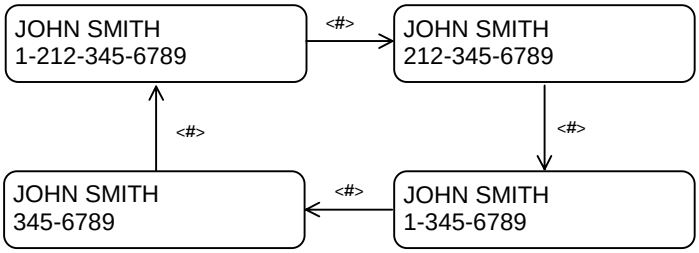
+ Handset *confirmation beep*

The number of digits in the phone number can be modified by pressing <#> repeatedly until the phone number with the correct number of digits appears in the display.

Area code in caller ID record matching home area code:



Area code in caller ID record not matching home area code:



If name data is not available, "OUT OF AREA", or "PRIVATE", the display will prompt for a name for the directory entry. If number data is not available, "OUT OF AREA", "PRIVATE", or “LONG DISTANCE”, the display will prompt for a dial string for the directory entry.

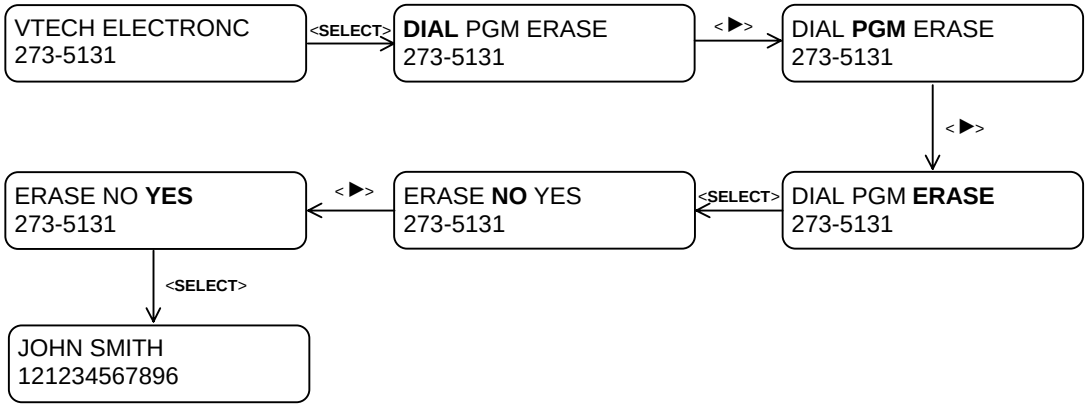
If memory is full, a MEMORY FULL message will be displayed along with an *error beep* and the display will subsequently return to the caller ID record. If no home area code has been configured, a NO AREA CODE message will be displayed on the LCD and the phone will return to the IDLE mode with an *error beep*.

<OFF> will cancel the programming operation and the display will return to the caller ID record. If the handset is placed on the cradle, the phone will change to the IDLE mode.

3.7.4 Delete Caller ID Data

Once reviewed, caller ID data can be deleted from the handset caller ID log. If all data has been reviewed (i.e. no new calls), an option will be provided in the menu to delete all the records in the log. Otherwise, only the current record that is being reviewed can be erased.

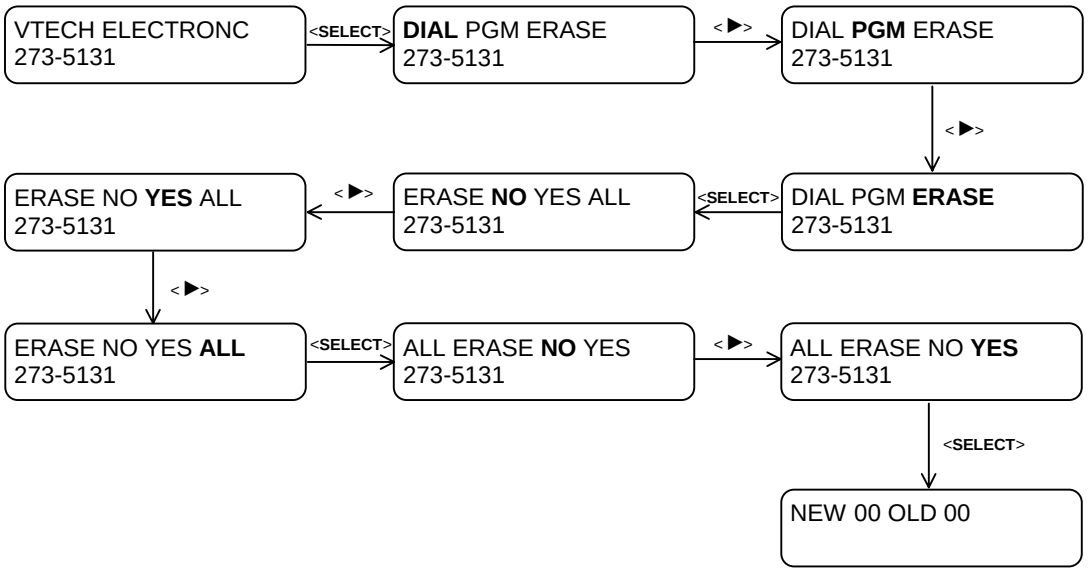
Erasing a single record:



+ Handset *confirmation beep*

Once a caller ID record is deleted, a *confirmation beep* will be sounded and the next (older) record will be displayed. When the last record in the log has been deleted, an END OF LIST message will be displayed on the LCD.

Erasing all caller ID data:



+ Handset *confirmation beep*

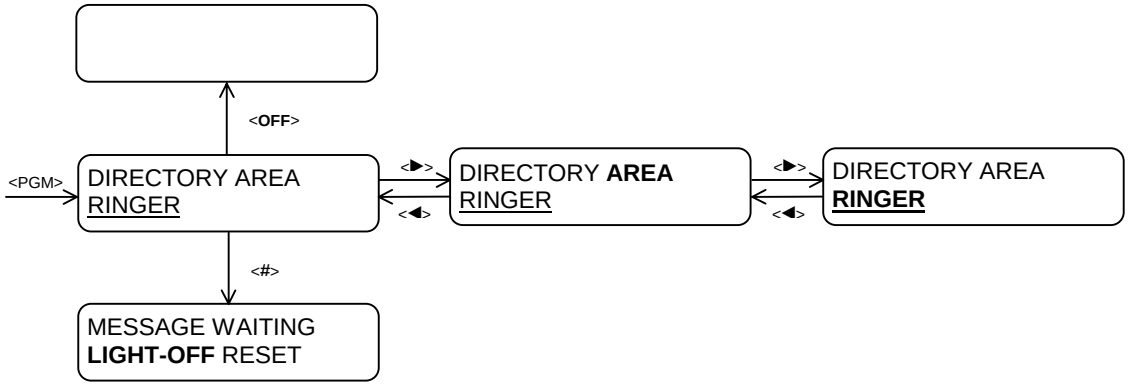
The delete operation will be cancelled if **<OFF>** is pressed or user selects not to erase the record(s). In these cases, the LCD will go back to caller ID review and re-display the current record. On the other hand, if the handset is replaced on the cradle or the delete operation times-out after 20 seconds, the phone will return to the IDLE mode with a *key beep*.

3.8 PROGRAM Mode

The PROGRAM mode provides the capability for the user to configure the following data:

- Handset directory entries (up to 50)
- Base speed dial list entries (up to 10)
- Home area code
- Local area codes (up to 5)
- Handset ringer type
- Handset ringer volume
- VMWI setting
- *Voice announce setting (option)*

All user-configured data will be stored in non-volatile memory.



Generally, programming can only be initiated if the phone is in the IDLE mode (except for programming caller ID data into the handset directory, see Section 3.7.3). However, it will be possible to program the handset directory during the base SPEAKERPHONE mode, or program the base speed dial list during the handset TALK (or SPEAKERPHONE) mode.

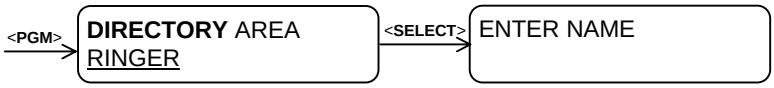
After **<PGM>** is pressed to enter the handset PROGRAM mode, only the **<SELECT>**, <►>, <◄ >, **<#>**, **<*>** and **<PHONE>** keys will be valid. Once the phone is in the PROGRAM mode, there is a 20-second time-out for key input.

Pressing **<SELECT>** or **<PGM>** at the end of the programming sequence will complete the operation. If there are no input errors, the new data will be stored into memory and the phone will return to the IDLE mode with a *confirmation beep*. Otherwise, in the event of an input time-out or a programming error, an *error beep* will be sounded and the phone will go to the IDLE mode.

If there is an incoming ring or page during the PROGRAM mode, the *ringer* or *paging alert* will be sounded but the programming operation can continue. The display of the caller ID data associated with the incoming call will be postponed until the current programming sequence is completed or if **<PHONE>** is pressed. In the latter case, the phone will abort the programming and go to the TALK mode.

3.8.1 Program Handset Directory

Start of programming:



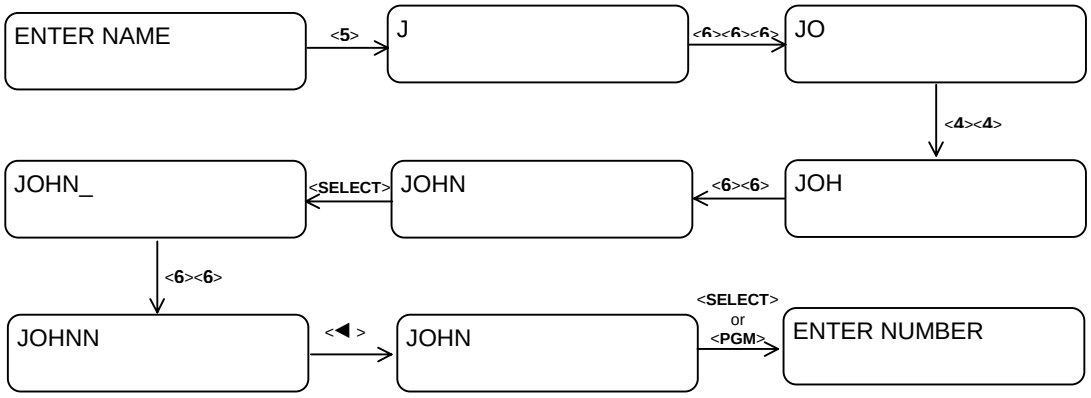
Each directory entry includes a name and the associated telephone number. The maximum number of directory entries is 50 (less if there are longer entries). If memory is full, a MEMORY FULL message will be displayed along with an *error beep* and phone will go to the IDLE mode.

The name can be up to 16 alphanumeric characters. The alphanumeric characters can be entered via the**<Dial>** keys; additional keys that are acceptable during the name entry phase include **<SELECT>**, <►>, <◄ >, and **<PHONE>** (<►> is not valid until at least one character has been entered). By pressing a **<Dial>** key repeatedly, a series of different characters can be entered from the same key as follows:

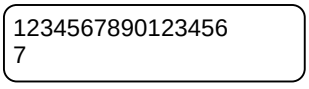
<**1**> = 1

<**2**> = A → B → C → 2 → A
<**3**> = D → E → F → 3 → D
<**4**> = G → H → I → 4 → G
<**5**> = J → K → L → 5 → J
<**6**> = M → N → O → 6 → M
<**7**> = P → Q → R → S → 7 → P
<**8**> = T → U → V → 8 → T
<**9**> = W → X → Y → Z → 9 → W
<**0**> = 0
<***> = *
<**#**> = & → ‘ → , → - → . → #→ &

During data entry, the cursor location is represented by the blinking character on the display. Generally, if a different <**Dial**> key is pressed, the cursor will advance to the next position automatically. However, the cursor can also be moved using the <►> and <◄ > keys. <►> will move the cursor forward if the next character to be entered uses the same <**Dial**> key as the previous character. <◄ > will shift the cursor to the left and erase the character at the previous position. <**SELECT**> or <**PGM**> will complete the name input and continue to telephone number input.



The telephone number typically includes up to 16 dial digits, including <**FLASH**> and <**PAUSE**>. A longer number, one with up to 32 dial digits, can also be accommodated. However, each entry that has an extended telephone number (i.e. beyond 16 dial digits) will decrease the total number of entries available in the directory by one (e.g. the directory will have a maximum of 25 entries if all entries have extended telephone numbers). When the 17th digit is entered, the display will scroll as follows:

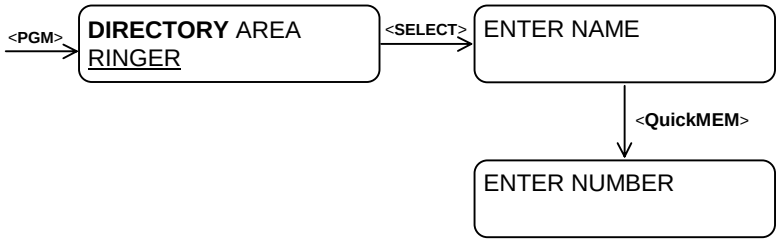


Valid keys that can be used to enter the dial string include <**Dial**>, <**REDIAL**>, <**FLASH**> and <**PAUSE**> (<**FLASH**> is only valid as the very first digit); additional keys that are acceptable during the telephone number input phase include <**SELECT**>, <◄ >, <**PHONE**>, and <**PGM**>. The cursor will advance each time a valid input key is pressed. <◄ > will shift the cursor to the left and erase the digit at the previous position. If <**REDIAL**> is pressed but the redial buffer is empty, an *error beep* is sounded as warning but telephone number input will continue.

<SELECT> or **<PGM>** will complete the telephone number input and the new entry will be stored into the handset directory.

3.8.2 Program One-Touch Memory Dialling Keys (Option)

In models include one or more user-programmable, one-touch memory dialling keys on the handset, the user can configure the desired digit string to be dialled when the associated memory key is pressed. Programming a **<QuickMEM>** *key is similar to adding a directory entry and is initiated from the same menu sequence.*



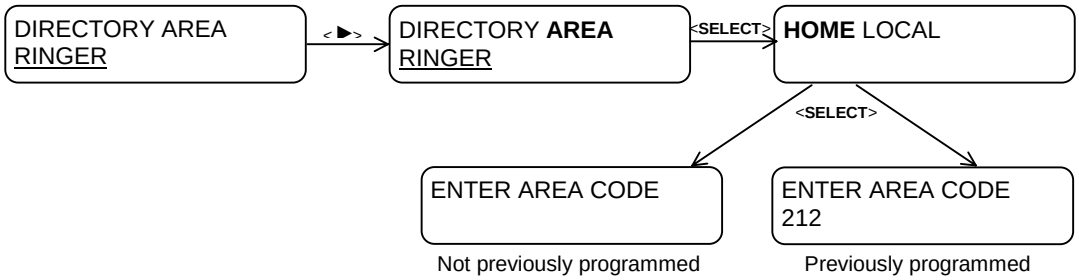
If a **<QuickMEM>** *key is pressed in place of a* **<Dial>** *key as the first alphanumeric character during the name input, the user is prompted to input the telephone number that will be associated with the selected key. The limitations of the digit string that can be entered will be the same as those for the telephone number in a directory entry.*

3.8.3 Program Home Area Code

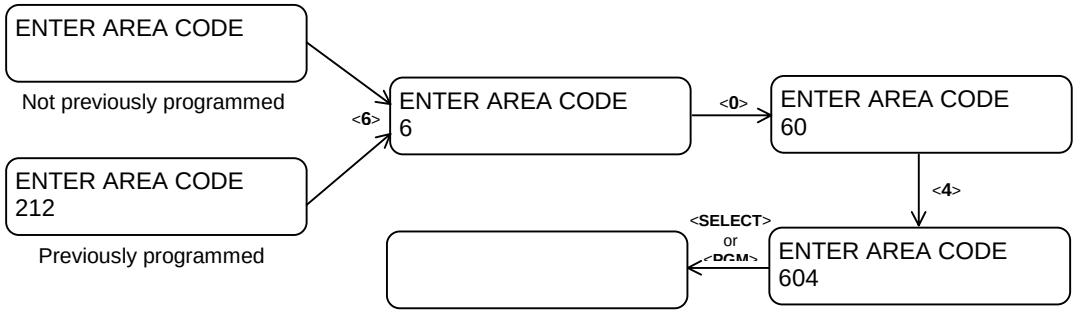
The home area code is configured to facilitate proper display of the phone number in the caller ID record. The home area code is compared to the area code of the incoming caller ID data to determine when a seven-digit display is appropriate.

If no area code has been configured for the phone, a NO AREA CODE message will display for 20 seconds on the handset LCD when the phone first powers on.

Start of programming:



Entering the area code:



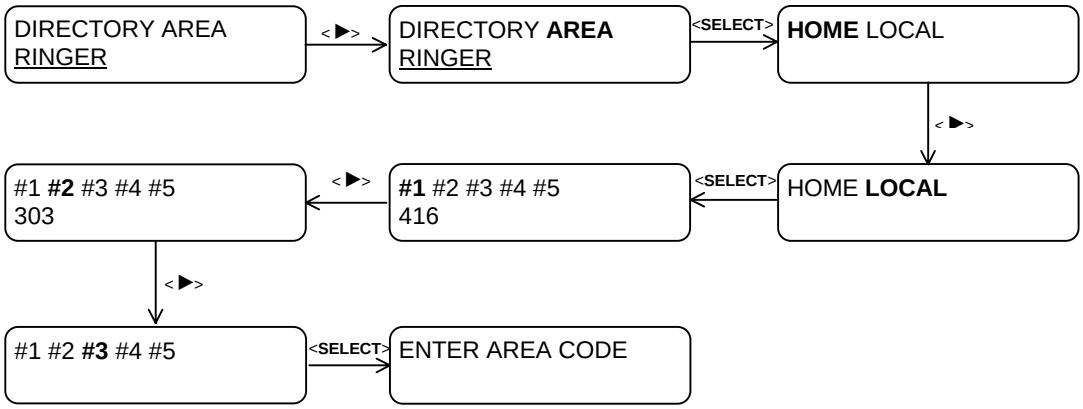
The home area code is three-digit long. Only the **<Digit>** keys can be used for entering the area code; additional keys that are acceptable during the area code input phase include **<SELECT>**, <◀ >, **<PHONE>**, and **<PGM>**. The cursor will advance each time a valid input key is pressed. <◀ > will shift the cursor to the left and erase the digit at the previous position.

<SELECT> or **<PGM>** will complete the home area code input and the data will be stored into memory. **<SELECT>** will be ignored until all three digits have been entered. Pressing **<PGM>** prior to completion of all three digits will be a programming error.

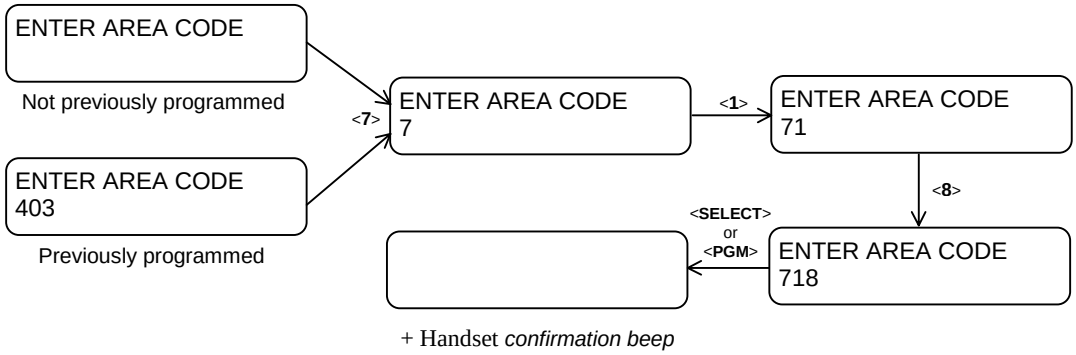
3.8.4 Program Additional Area Codes

Besides the home area code, up to five additional local area codes can be configured for the phone. Similar to the home area code, these local area codes are used to facilitate display of the phone number in the caller ID data. The local area codes are compared to the area code of the incoming caller ID data to determine when a ten-digit display is appropriate.

Start of the programming:



Entering the area code:



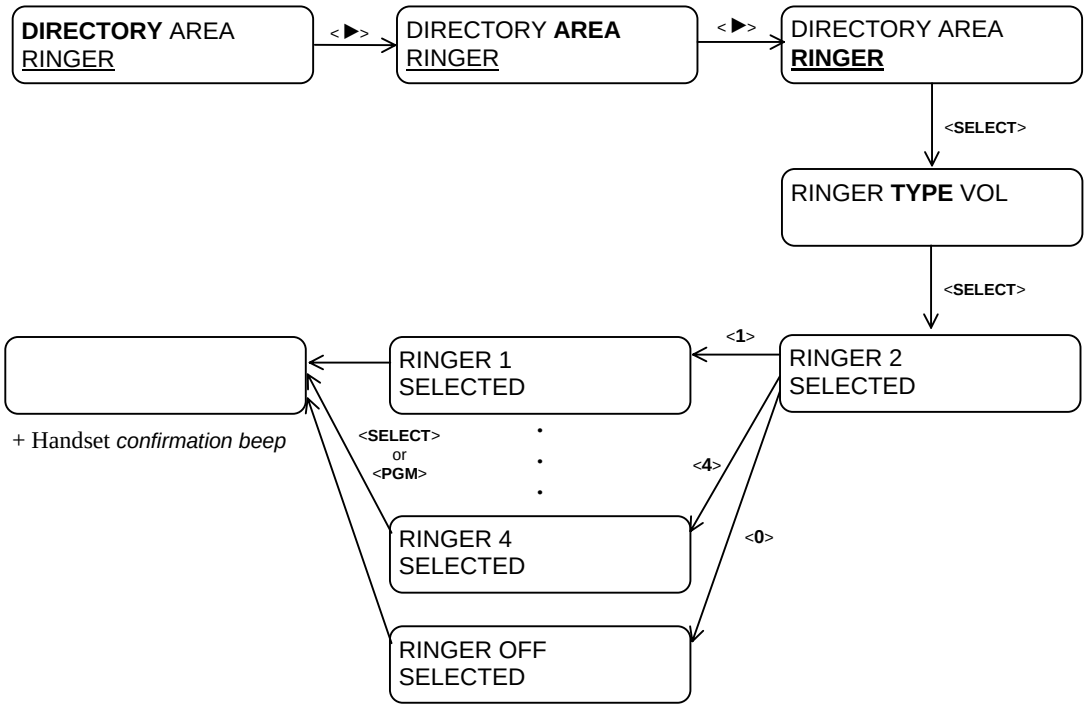
Each local area code is three-digit long. Only the **<Digit>** keys can be used for entering the area code; additional keys that are acceptable during the area code input phase include **<SELECT>**, <◄ >, **<PHONE>**, and **<PGM>**. The cursor will advance each time a valid input key is pressed. <◄ > will shift the cursor to the left and erase the digit at the previous position.

<SELECT> or **<PGM>** will complete the local area code input and the data will be stored into memory. **<SELECT>** will be ignored until all three digits have been entered. Pressing **<PGM>** prior to completion of all three digits will be a programming error. However, if the **<PGM>** key is pressed when the entry is cleared via repeated <◄ > on the current data, this will erase the selected local area code from memory.

3.8.5 Configure Handset Ringer Setting

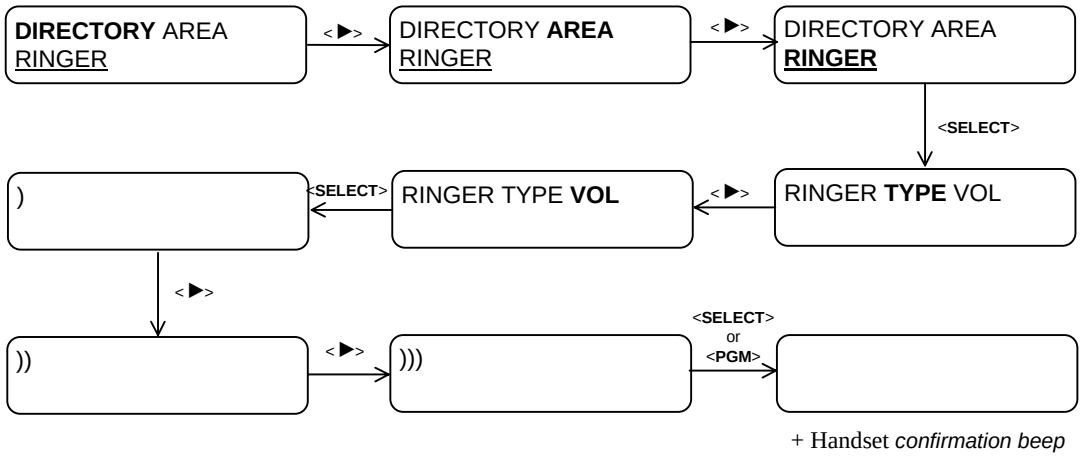
The handset ringer settings include the ringer type and ringer volume. The user can select a ringer type from one of four types or turn the handset ringer off. The ringer volume can also be set to one of three loudness level.

Configuring the handset ringer type:



When the menu selection is made to program the ringer type, the current setting will be displayed. Immediately after a key input to select the ringer type (<**1**>, <**2**>, <**3**>, <**4**>), the selected ringer will sound to provide auditory feedback (no *key beep* will be generated). If <**0**> to turn off the ringer, there will be no ringer sounded but a *key beep* will provide input confirmation.

Configuring the handset ringer volume:

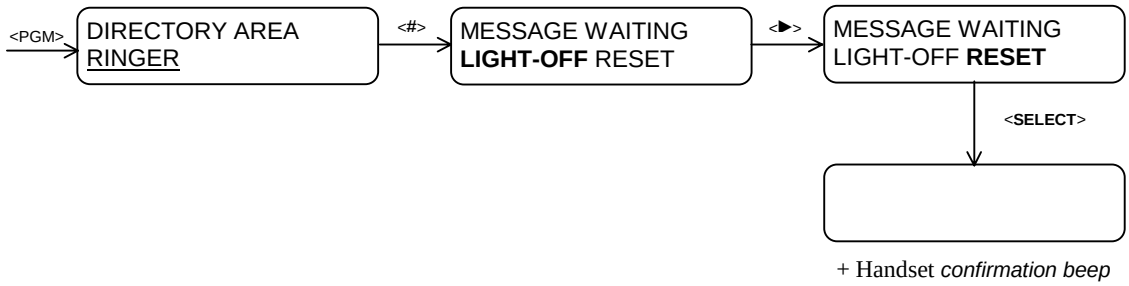


When the menu selection is made to program the ringer volume, the current setting will be displayed. The <◀ > and <◀ > keys are used to increase or decrease the volume respectively. Immediately after the key input, the ringer will sound at the corresponding level to provide auditory feedback (no *key beep* will be generated). Increasing the volume beyond the highest level or decrease it beyond the lowest level will cause an *error beep* to sound, but programming can continue.

3.8.6 Configure VMWI Setting

The setting(s) for the VMWI (see Section 3.11.6 for further details on the VMWI feature) can be modified in the handset PROGRAM mode to clear the VMWI or reset the VMWI detection mechanism.

Clearing the VMWI will turn off base *Message LED* and clear MESSAGE WAITING display from handset LCD. The indication will remain off until another message waiting signal is received from the local telephone company.



The VMWI detection mechanism can be reset to use both FSK and stutter dial tone detection where the latter option is available. This operation will also clear the VMWI (base Message LED and handset LCD message).

3.9 Memory Review and Modification

The phone has a number of parameters that are stored in memory. They include user-configured data (handset directory, base speed dial list, home area code, local area codes, ringer type, and ringer volume) as well as system updated data (caller ID log, and handset/base redial buffers). The data associated with these parameters can be

reviewed, and often modified, explicitly. In some cases, the data can be accessed for review during the IDLE mode through separate menu operation. In other cases, the data can only be reviewed by entering the PROGRAM mode and selecting the appropriate parameter. During the PROGRAM mode, any current setting/data for the parameter will be displayed. The user can then modify, or sometimes delete, the data for the parameter within the PROGRAM mode.

Data	Review	Modify	Delete
User-programmed			
Handset Directory	menu, from IDLE mode	menu, during review	menu, during review
Handset Memory Keys	*menu, from IDLE mode*	*menu, during review*	*function not available*
Home Area Code	during programming	during programming	function not available
Local Area Codes	during programming	during programming	during programming
Ringer Type	during programming	during programming	function not available
Ringer Volume	during programming	during programming	function not available
System-updated			
Caller ID Log	menu, from IDLE mode	function not available	menu, during review
Handset Redial Buffer	<**REDIAL**>, from IDLE mode	function not available	<**REDIAL**>, during review

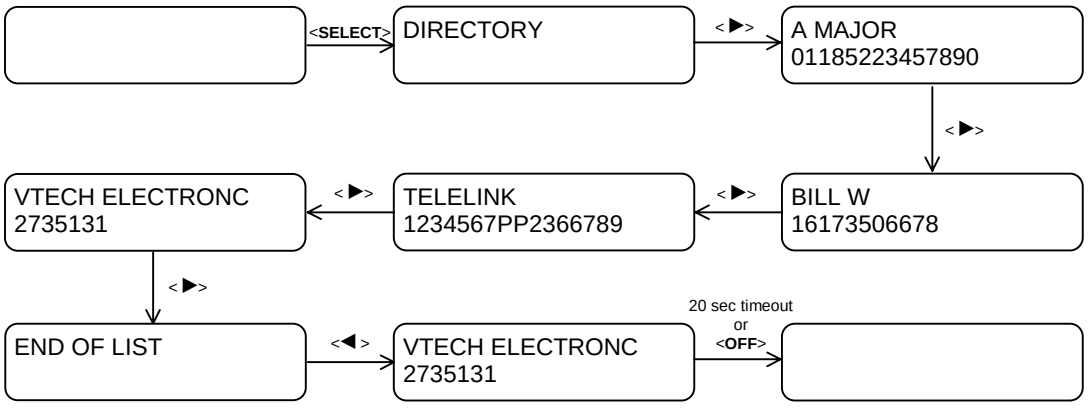
The following subsections describe the details of the MEMORY REVIEW mode (where the data review and modification operations are accomplished outside of the PROGRAM mode). They include the handset directory and handset redial buffer. The caller ID log is described separately in Section 3.7.

3.9.1 Handset Directory

While a directory entry is being reviewed on the handset, additional operation that can be performed on the data includes dialling the displayed number, modifying the data, or erasing the entry.

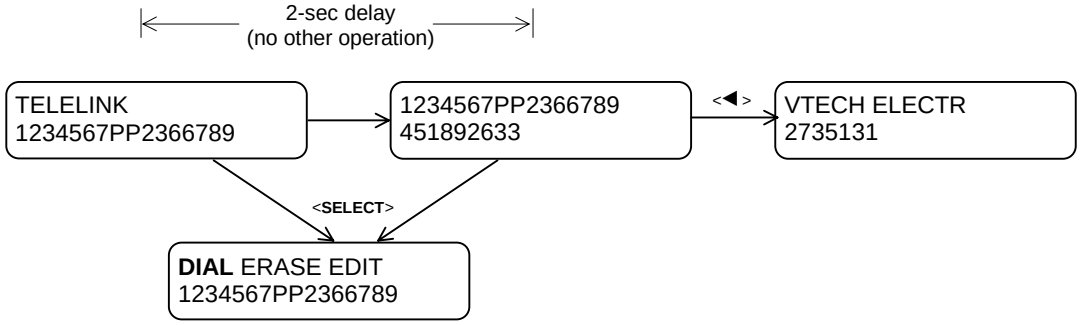
3.9.1.1 Review Directory

The directory on the handset can be reviewed from the IDLE mode by using <**SELECT**> to begin scrolling through the data.



During review of directory entries, only **<SELECT>**, <◄ >, < ►>, **<Dial>**, and **<PHONE>** will be valid.

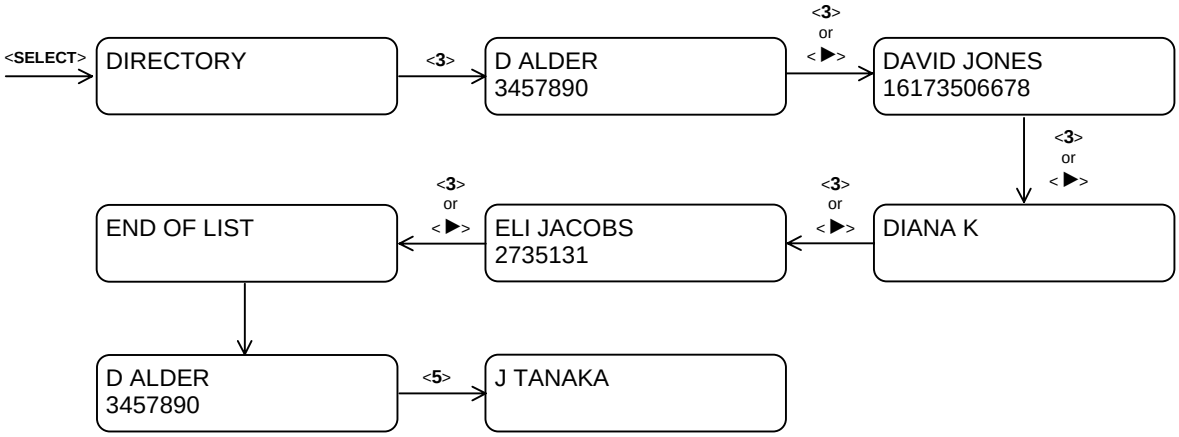
If the telephone number in the directory entry has more than 16 digits, the display will change after a brief 2-second delay to show the complete phone number.



The entries can be scrolled in sequence or an index can be used for navigation within the directory. The order of scrolling the entries using < ►> will be as follows:

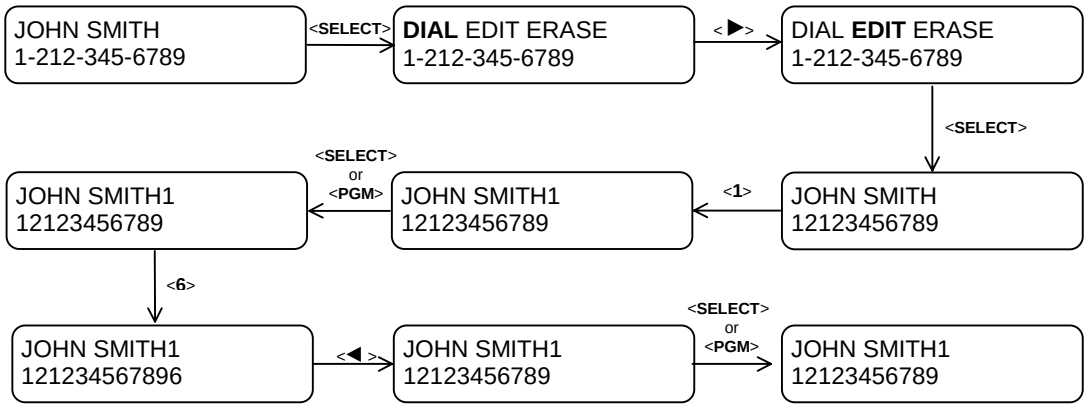
1: A to Z
2: other ASCII code
3: *, #
4: 0 to 9

If a **<Dial>** key is pressed anytime during display of a directory entry, the input will be used as index and update the display to show the first entry that matches the index. The mapping of the **<Dial>** keys to the alphanumeric characters for indexing will be based on the scheme for character input (see Section 3.8.1).



While the data is displayed, the LCD will clear and the handset will go back to the IDLE mode after a 20-second timeout with no operation, or when**<OFF>** is pressed, or if the handset is placed on the cradle. If ringing is detected during data display, the handset will go to the RINGING mode.

3.9.1.2 Modify Directory Entries

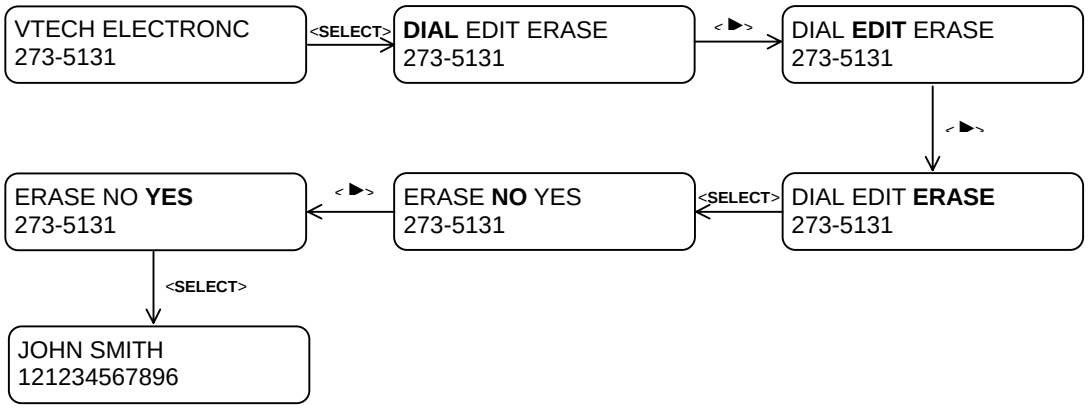


+ Handset *confirmation beep*

When editing the data in a directory entry, the movement of the cursor and the method for alphanumeric character input will be identical to the directory data input during the handset PROGRAM mode (see Section 3.8.1). If the editing sequence completes successfully, the directory entry will be updated in memory with the modification.

<OFF> will cancel the edit operation and the data in the stored entry will be redisplayed. If the handset is placed on the cradle, the phone will change to the IDLE mode.

3.9.1.3 Delete Directory Entries



+ Handset *confirmation beep*

Once a directory entry is deleted, a *confirmation beep* will be sounded and the next directory entry will be displayed. When the last entry has been deleted, an END OF LIST message will be displayed on the LCD.

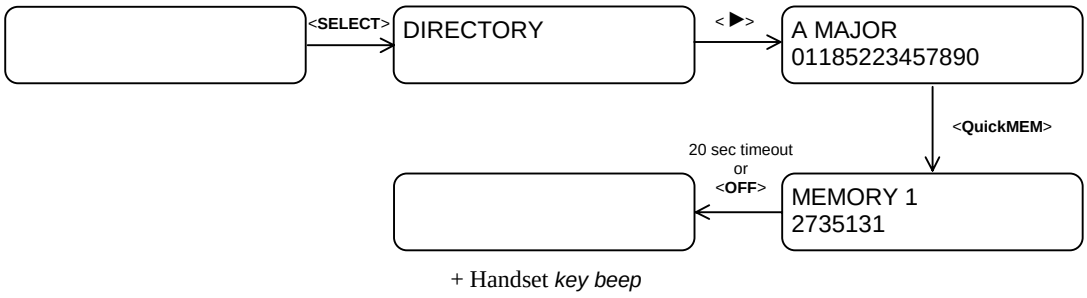
The delete operation will be cancelled if **<OFF>** is pressed or user selects not to erase the entry. In this case, the LCD will go back to directory entry review and re-display the current entry. On the other hand, if the handset is replaced on the cradle or the delete operation times-out after 20 seconds, the phone will return to the IDLE mode with a *key beep*.

3.9.2 Handset Memory Key Entries (Option)

The mapping of the handset memory keys are maintained as special entries within the handset directory. While they are not part of the 50 named entries that are available for general user definition, they are stored and can be reviewed and modified using the same menu sequence (though with some additional restrictions).

3.9.2.1 Review Handset Memory Key Entries

*The digit string that has been programmed to each memory key can be reviewed from the IDLE mode by using <**SELECT**> to begin scrolling the directory. During the display of any directory entries, pressing a <**QUICKMEM**> key will update the display to show the entry associated with the selected key.*



The memory keys are identified by "MEMORY x" in the directory, where "x" is a single digit (starting from "1") that refers to each memory dialling key. Thus, it will also be possible to view these entries by scrolling to the portion of the handset directory with the "M" entries.

If ringing is detected during data display, the handset will go to the RINGING mode.

3.9.2.2 Modify Handset Memory Key Entries

*The digit string assigned to a key can be modified by reprogramming the <**QUICKMEM**> key (see Section 3.8.2) or by selecting to edit the data when reviewing the memory key entry. With the latter approach, unlike a typical directory entry, the name of a memory key entry ("MEMORY x") cannot be modified; the user will only be able to change the telephone number. Pressing <**SELECT**> or <**PGM**> will complete the edit operation and program the new digit string to the associated <**QUICKMEM**> key.*

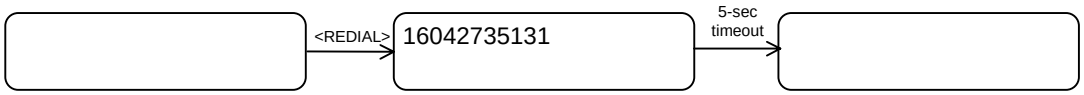
***<OFF>** will cancel the edit operation and the data in the stored entry will be redisplayed. If the handset is placed on the cradle, the phone will change to the IDLE mode.*

3.9.2.3 Delete Handset Memory Key Entries

There is no explicit operation to delete handset memory key entries once they have been entered. However, the digit string can be cleared when modifying the memory key entry.

3.9.3 Redial

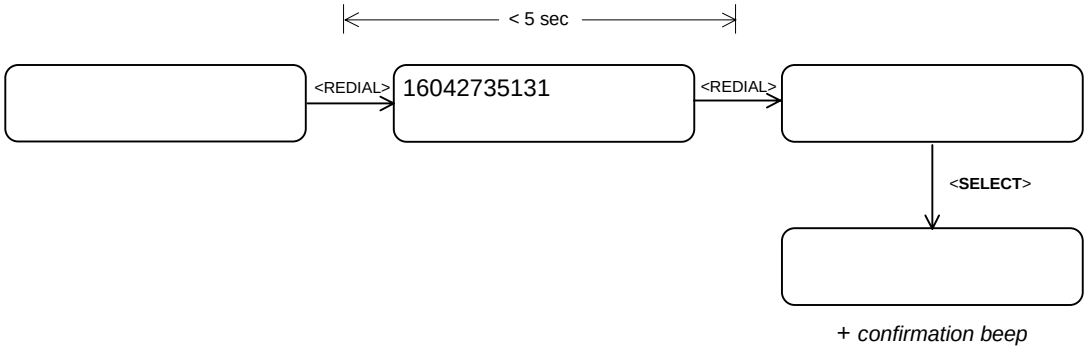
3.9.3.1 Review Handset Redial Buffer



If the contents of the redial buffer has more than 16 digits, the lower row in the LCD will also be used to display the complete number. The display of the redial buffer will clear after five seconds and the phone will go back to the IDLE mode. If a key is pressed during the display, it will be treated as input during the IDLE mode and the phone will change state accordingly. Similarly, if ringing is detected during the display, the phone will change to the RINGING mode.

It will be possible to review the redial buffer on the handset even if the base is in use.

3.9.3.2 Delete Redial Number



If the **<REDIAL>** key is pressed twice within five seconds when the phone is in the IDLE mode, the contents of the redial buffer will be erased (this operation is valid even if the buffer is already empty). The deletion operation is available for both the handset and base redial buffers. After the redial buffer is cleared, the phone will go back to the IDLE mode with a *confirmation beep*.

3.10 Voice Announce (Option)

The voice announce feature provides an audio announcement of an incoming call over the base and handset speakerphone. The announcement is based on the incoming caller ID data and can be one of three types: user-recorded names, pre-recorded generic announcements, or numeric announcement.

When the voice announce feature is enabled, the phone number portion of the caller ID data determines which type of announcement is made. When the number of the calling party matches one of the entries in the handset directory (the matching is based on the last seven digits of the phone number), the voice tag associated with the entry will be played. The voice tag is recorded by the user to identify the directory entry (generally the name will be used). It may be recorded when the entry is created, or added subsequently.

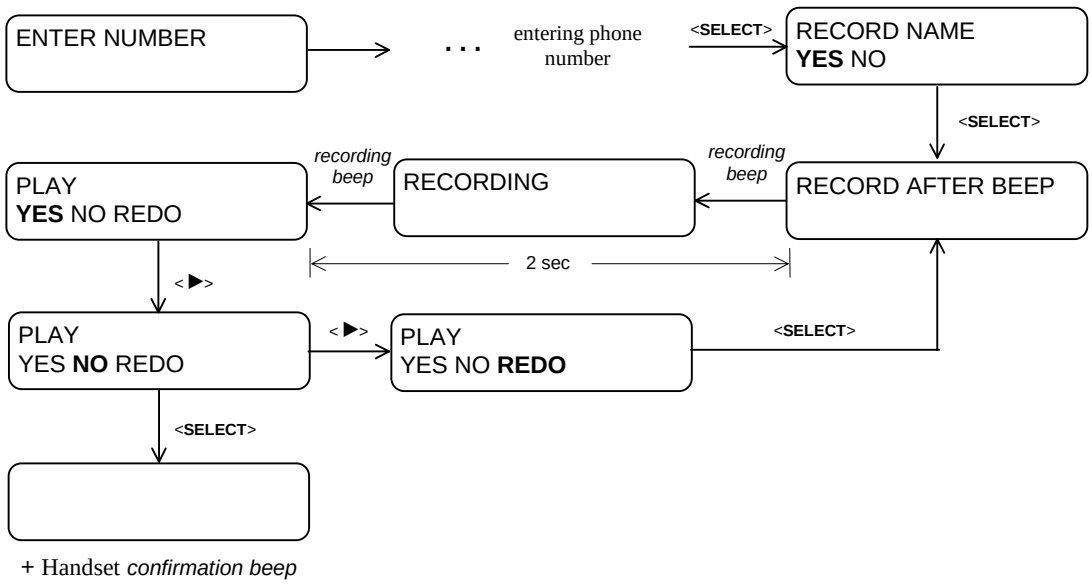
If no match for the caller number can be found in the handset directory, the caller ID data indicates a private or out-of-area caller, or the call has been intercepted by the Privacy Manager at the local telephone company (where available), a standard announcement that corresponds to "Unknown Caller", "Private Caller" or "Privacy Manager, press '1' to continue", respectively, will be made. These three standard announcements are pre-programmed on the phone.

The "Unknown Caller" announcement will not be used for no matched entries if numeric announcements are enabled. In this case, or if no announcement message has been recorded for a matched entry, numeric announcement of the digits of the incoming number will be made.

Caller ID announcement will be made if the phone is in the RINGING mode. The announcement is made during the four-second interval between the second and third incoming rings. Subsequent ringing will be suppressed until the voice announcement is completed. The announcement will not be made if the base or handset is in the SPEAKERPHONE or INTERCOM mode.

3.10.1 Add Announcement

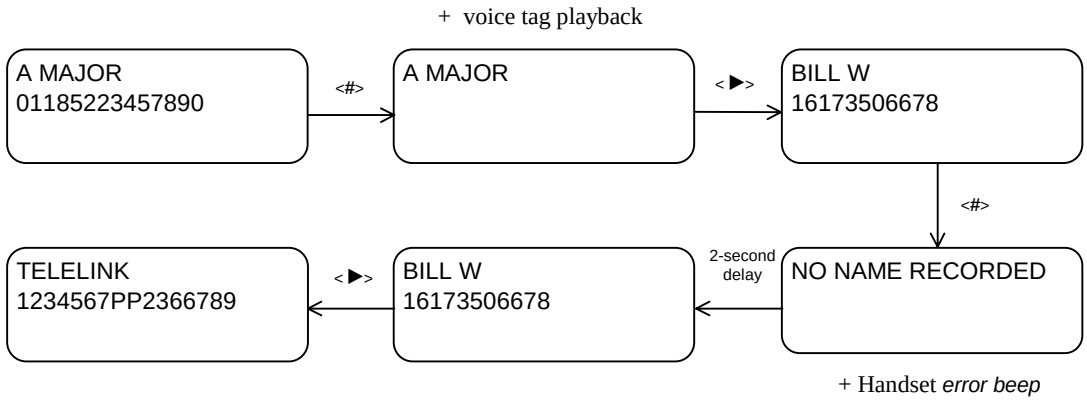
The recording is done via the mouthpiece microphone. The recording time will be for two seconds; however, any leading or trailing silence will be removed when the recording is stored into memory for subsequent replays.



After recording is completed, the user can select to play back the recording. If the user selects to play the recorded message, the announcement will be made at the base speakerphone (and the handset speakerphone, where available).

3.10.2 Review Announcements

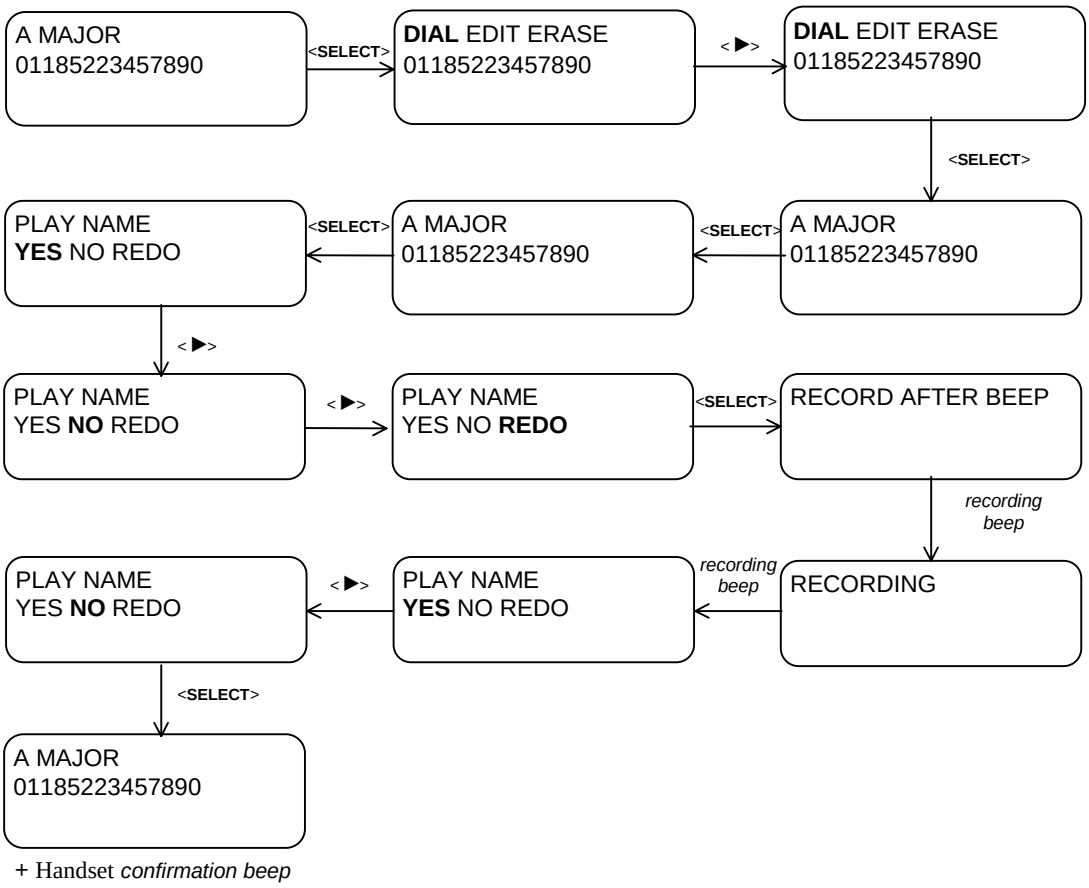
Review of the user-recorded announcements is available in the MEMORY REVIEW mode, during the display of directory entries. A small "v" symbol in the lower right-hand corner of the LCD will be shown if the entry has an associated voice tag. The voice tag can be accessed if <#> is pressed when the entry is displayed. The user will be given an option for audio playback of the associated announcement. Similar to the playback during the recording phase, the audio will be played on the base speakerphone (and handset speakerphone, where available).



If an entry does not have a voice tag recorded, an error beep will sound if the user attempts to access the announcement via <#>. However, the phone will remain in the MEMORY REVIEW mode and the current directory entry will continue to be displayed on the LCD.

3.10.3 Modify Announcements

Modification of user-recorded announcements includes changing the current recording for a directory entry, and adding a new recording to an entry (no previous voice tag). These operations are available during the MEMORY REVIEW mode, when editing individual directory entries.



During the edit operation, the first **<SELECT>** or **<PGM>** *pressed completes the name modification while a second* **<SELECT>** or **<PGM>** *completes the telephone number modification (see Section 3.9.1.2). Once the number input is complete, the* RECORD NAME **YES** NO *menu selection will be available for the user to add a voice tag if no previous recording has been. Otherwise, a* PLAY NAME **YES** NO REDO *menu option will be available for the user to change the voice tag (strictly playback without re-recording the name will also possible without generating an error). Similar to the operation to add announcement, recording will be done via the mouthpiece microphone. The recording time will be for four seconds and any leading or trailing silence will be removed when the recording is stored into memory for subsequent replays. Playback of the recording will be done via the base and handset speakerphone.*

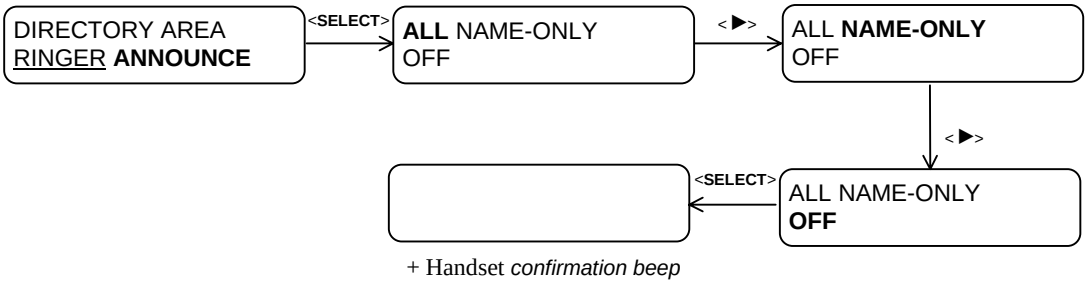
If the user does not want to make any changes to the voice tag associated with the directory entry, selecting "no" for playback to exit the edit operation.

3.10.4 Program Announcement Settings

The user has the capability to enable or disable the voice announcement feature. The settings available includes:

- *Turn on all (name, numeric and standard) types of voice announcements*

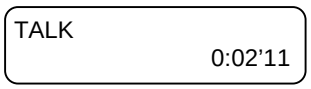
- *Turn on name (and standard announcements)*
- *Turn off voice announcements*



3.11 Special Features

3.11.1 Call Timer

While the phone is connected on a line, a call timer will display to indicate the duration of the call. The call timer is shown on the second line of the LCD as follows:



The maximum count of the timer is 9 hours 59 minutes and 59 seconds (9:59'59) after which the timer will be reset (0:00'00). The timer will be started when the call is first connected (i.e. excludes dial time for outgoing calls). In general, the count of the timer will be maintained even if the mode of the phone changes, as long as the line is still seized (e.g. from TALK to HOLD to INTERCOM and back to TALK). However, the timer will be reset subsequent to a hook flash or when the active unit is switched (e.g. from handset to base or vice-versa) during a call.

3.11.2 Easy-Answer

The easy-answer feature facilitates in-the-dark answering of incoming calls. When the phone is in the RINGING mode and the handset is off-cradle, pressing any key on the handset, except **<MUTE>**, **<OFF>**, and the **<Vol>** keys, will answer the call.

If ringing is detected when the handset is non-idle (e.g. in the INTERCOM, PROGRAMMING, or MEMORY REVIEW mode, or dialling during the TALK mode), this feature is not available.

On models equipped with the Voice Announce feature, if the incoming call has been intercepted by the Privacy Manager at the local telephone company (where available), the user is required to press "1" *to access the Privacy Manager.*

3.11.3 Handset On-Cradle / Off-Cradle

Depending on the operating mode of the phone, replacing the handset on the base unit cradle or lifting the handset off the cradle may result in the phone changing to a different mode. In all cases, a *key beep* will be sounded at the handset to indicate the change in the cradle status.

Handset on-cradle during the TALK mode, the INTERCOM mode, or when the handset is paged is similar to pressing <**OFF**>. The phone will change to the IDLE mode. On the other hand, when the handset goes on cradle during the RINGING or handset HOLD mode, the phone will remain in the current operating mode.

Handset off-cradle during the base SPEAKERPHONE or the base HOLD mode is similar to pressing <**PHONE**>. The phone will change to the handset TALK mode. On the other hand, when the handset goes off cradle during the RINGING mode, the phone will remain in the RINGING mode.

3.11.4 Key Beep

A *key beep* will be generated each time a key on the handset or base keypad is pressed. The beep provides audible confirmation for the key input. The only exception is the handset volume adjustment keys.

A *key beep* will also be generated for non-keypad actions including handset on-cradle, handset off-cradle, and intercom termination.

3.11.5 Line In Use Indication

During the IDLE mode, if an extension phone connected to the same telephone line goes off-hook, a LINE IN USE message will be displayed on the handset LCD. The message will remain on the display until the extension phone goes back on-hook.

3.11.6 Visual Message Waiting Indication (VMWI)

The visual message waiting indication feature will notify a user who subscribes to voice mail at the local telephone company that there are messages available. Frequency shift-keying (FSK) signal (*and optionally stutter dial tone*) detection will be used to decode the VMWI signal transmitted by the telephone company. Upon detection of a message waiting status from the CO, the *Message LED* on the base will be blink and MESSAGE WAITING will be displayed on the handset LCD.

Option

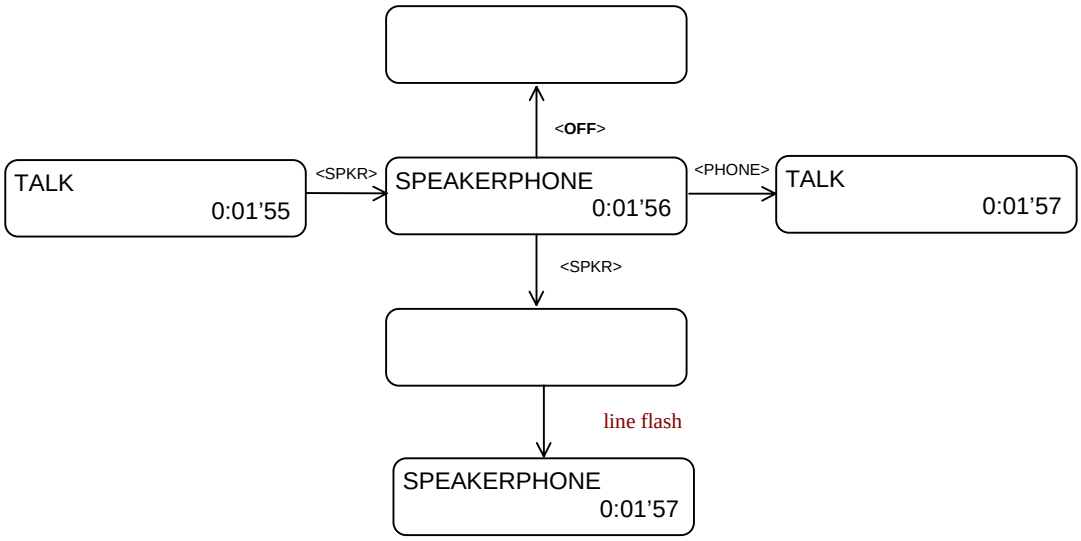
If the stutter dial tone detection option is available, the method of VMWI detection is initialised to use both FSK and stutter dial tone detection. However, once the phone detects the stutter dial tone, it will subsequently use only this method. The detection method can be explicitly re-initialised to again include FSK detection. The re-initialisation will also occur after an AC power result.

3.11.7 Handset Speakerphone (Option)

The handset speakerphone can be used during the TALK or INTERCOM mode. The audio will be disconnected from the earpiece receiver and mouthpiece microphone and redirected to the speakerphone.

*To activate the speakerphone via <**SPKR**>, the handset must already be in the TALK or INTERCOM mode (<**SPKR**> is not valid during the IDLE mode). While the speakerphone is engaged, other handset operations will remain the same as in the TALK or INTERCOM mode with the following additions:*

- <**SPKR**> *during the handset SPEAKERPHONE mode will generate a hook flash*
- <**PHONE**> *will disconnect the speakerphone and redirect the audio back to the earpiece receiver and mouthpiece microphone.*
- <**OFF**> *will terminate the line or intercom connection, disengage the speakerphone, and return the phone to the IDLE mode.*



The handset Speakerphone LED will be on during operation in the handset SPEAKERPHONE mode.

3.11.8 No Telephone Line Connected

If the phone is in the IDLE mode and detects there is no telephone line connected to the base unit, a CHECK TEL. LINE message will be displayed on the handset LCD to prompt the user to check the line connection to the base unit.

3.12 User Indication and Priority

3.12.1 Status Tones

Name	Description	Tone Generated	Priority	Section
Handset				
Ringer	• generated during incoming call • there are four types of ringer sounds (user-programmable) • ringer volume is user-programmable	4 sec off, 2 sec on; repeat	2	3.4
Paging	• generated when base pages the handset	0.56 sec off, 0.56 sec on	1	3.6
Busy	• generated if base is in SPEAKERPHONE mode when handset pages the base	2 kHz: 0.5 sec on, 0.5 sec off; repeat 5 times	3	3.6.2
Key beep	• generated whenever a key is pressed or when handset goes on or off cradle	2 kHz: 40 ms on	4	3.11.4
Error beep	• generated when an erroneous function is attempted or programming is aborted • key beep will be omitted when this tone is sent	2 kHz: 50ms off, 50 ms on; repeat 5 times	3	
Confirmation beep	• generated a programming command is completed successfully	2 kHz: key beep + 0.5 sec off, 0.5 sec on	3	3.8

Name	Description	Tone Generated	Priority	Section
Out of range alert 1	• generated when out of range is first detected	2 kHz: 100 ms on, 900 ms off; repeat for 30 sec	1	5.4
Out of range alert 2	• generated after out of range alert 1 has been sent for 30 sec	2 kHz: 100 ms on, 400 ms off; repeat 30 sec	1	5.4
Call waiting	• announces an incoming call during TALK mode • generated at low volume level • this tone will interrupt other tones (previous tone will continue after call waiting tone is completed)	2 kHz: 250 ms off, 40 ms on, 40 ms off, 40 ms on, 250 ms off	2	3.3.1
Low battery	• generated when low battery condition is detected on the handset (during non-IDLE mode)	2 kHz: 40 ms on, 3 sec off; repeat 5 times for each call or each operation attempted	5	6.2
Base				
Ringer	• generated during incoming call • only one type of ringer sound on base • ringer volume is adjusted by slide switch on base	2 sec off, 4 sec on; repeat	2	3.4
Paging	• generated when handset pages the base	0.56 sec off, 0.56 sec on	1	3.6
Busy	• generated if base is in SPEAKERPHONE mode when handset pages the base	2 kHz: 0.5 sec on, 0.5 sec off; repeat 5 times	3	3.6.2
Key beep	• generated whenever a key is pressed	2 kHz: 40 ms on	4	3.11.4
Max/min volume alert	• generated when maximum or minimum volume setting is reached when the setting is adjusted • key beep will be omitted when this tone is sent	2 kHz: 50 ms off, 50 ms on; repeat 3 times	3	
Call waiting	• announces an incoming call during SPEAKERPHONE mode • sent at low volume level • this tone will interrupt other tones in progress (tone will be resumed after call waiting tone is completed)	2 kHz: 250 ms off, 40 ms on, 40 ms off, 40 ms on, 250 ms off	2	3.6.4

3.12.2 LCD Messages

Name	Description	Priority	Section
RINGING	• displayed during incoming call	3	3.4
TALK	• displayed during handset TALK mode	4	3.3
SPEAKERPHONE	• *displayed during handset SPEAKERPHONE mode*	3	*3.11.7*
MUTING	• displayed when handset microphone is muted	3	2.1.2
HOLD	• displayed during (handset & base) HOLD mode	3	3.4.4
BUSY	• displayed if base is in SPEAKERPHONE mode when handset pages the base	2	3.6.2
LINE IN USE	• displayed when a parallel phone is off-hook	8	3.11.5
PAGING	• displayed when handset or base pages the other	2	3.6
INTERCOM	• displayed during INTERCOM mode	3	3.6
OUT OF RANGE	• displayed when handset out of range is detected	2	5.4
BATTERY LOW	• displayed when low battery on the handset is detected	5	6.2
MESSAGE WAITING	• displayed when VMWI signal from CO is detected	7	3.11.6
CHECK TEL. LINE	• displayed when the phone cannot detect a telephone line connected to the base	8	3.11.8

Name	Description	Priority	Section
CHECK AC POWER	• displayed when phone is operating in POTS mode	6	6.4
NO AREA CODE	• displayed when an operation requires access to the home area code and no code has been configured for the phone	3	3.7
MEMORY FULL	• displayed when no additional new entries can be programmed into the handset directory	3	3.8.1
CHANNEL SEARCHING	• displayed when handset is trying to re-establish connection with the base	1	5.5
FOUND CHANNEL x	• displayed when handset successfully re-establishes connection with the base on channel number "x"	2	5.5
TRANSMISSION ERROR	• displayed when error is detected in the CID data received from CO	3	3.7

3.12.3 LEDs

Name	Description	Section
Handset		
Speakerphone	• *on steady when handset speakerphone is engaged*	*3.11.7*
Base		
In Use	• blinks quickly during RINGING mode (40 ms on, 40 ms off; repeat) • blinks slowly during handset HOLD mode (0.5 sec on, 0.5 sec off; repeat) • on steady when handset is in the TALK or SPEAKERPHONE mode	3.4
Charging	• on steady when handset is resting in cradle and the handset battery is charging	6.1
Spare Battery	• blinks when phone is operating in POTS mode (0.5 s on, 0.5 s off; repeat) • on steady when spare battery is installed in base	6.3 & 6.4
New Call	• *blinks when there is new caller ID data to be reviewed on the handset (0.5 s on, 0.5 s off; repeat)*	*3.4.2 & 3.7.1*
Message	• *blinks when there is voice mail waiting from the CO (0.5 s on, 0.5 s off; repeat)*	*3.11.6*
Speakerphone	• blinks during base HOLD mode (0.5 sec on, 0.5 sec off; repeat) • on steady during base SPEAKERPHONE mode	3.4.4
Intercom	• blinks when paging (0.5 s on, 0.5 s off; repeat) • on steady during INTERCOM mode	3.6
Hold	• *on steady during base HOLD mode*	*3.5*
Mute	• on steady when base microphone is muted	2.2.2

4 ITAD Operation

The PDLci MK3 provides an advanced, integrated telephone-answering device (ITAD) that employs ADPCM encoding of the voice messages. The answering device includes three (*optionally four*) mailboxes for storing incoming messages. The ITAD can be operated locally, using keys available on the base unit, or remotely, via DTMF key inputs when calling in from another telephone.

The ITAD provides storage for up to 18 minutes of recording of incoming messages and memos (with silence compression) or 99 messages in total.

With the exception of turning on the answering machine and accessing remote operation, all other functions described in the following subsections are available only when the ITAD has been activated. The main modes of operation for the ITAD include answering incoming calls, recording memos, reviewing stored messages, and configuring settings.

When the ITAD is connected to an incoming call, various non-ITAD keys or events can cause the current answering machine function to terminate and the ITAD to release any connection to the telephone line:

- If **<PHONE>** on the handset or **<SPRK>** on the base is pressed, the phone will go into the TALK mode.
- If **<INT.COM>** on the handset is pressed (either to initiate an intercom, or in response to a page from the base), the phone will go into the INTERCOM mode.
- If a parallel telephone set goes off-hook, the phone will go into the IDLE mode.

For all remaining other ITAD functions, it will be possible for the phone to operate in the TALK (or handset SPEAKERPHONE), handset HOLD, handset PROGRAM, or MEMORY REVIEW mode even when the ITAD is in-use. However, phone operations that involve the use of the base speakerphone will cause the answering machine function to terminate:

- If **<SPRK>** on the base is pressed, the phone will go into the base SPEAKERPHONE mode.
- If **<INT.COM>** on the handset is pressed (either to initiate an intercom, or in response to a page from the base), the phone will go into the INTERCOM mode.

4.1 ITAD Local Operation

A number of keys on the base unit are provided for local access to ITAD functions. These keys include:

- <**ANSWER ON/OFF**>
- <**MEMO**>
- <**MENU**>
- <**SELECT**>
- <**TIME/SET**>
- <**MAILBOX #1**>
- <**MAILBOX #2**>
- <**MAILBOX #3**>
- <**MAILBOX #4**> *(option)*
- <**ERASE**>

- <**REPEAT/SLOW**>
- <**SKIP/QUICK**>

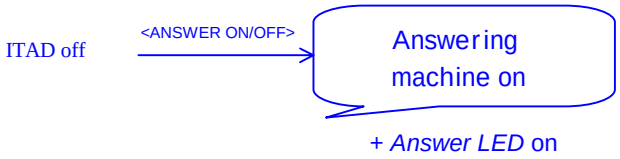
A <**Mailbox**> key refers to the key for any one of the three (*optionally four*) mailboxes - <**MAILBOX #1**>, <**MAILBOX #2**>, <**MAILBOX #3**> (*or* <**MAILBOX #4**>).

Pressing a <**Mailbox**> key during any local ITAD operation will exit the current function. There is also a no-activity timeout (20 seconds unless otherwise noted). In either case, a *termination beep* will be sounded to indicate current operation is terminated.

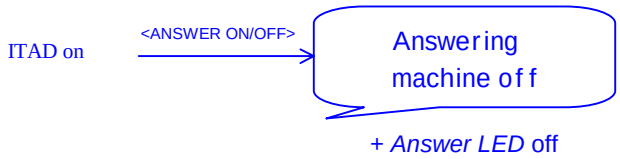
4.1.1 Activating the Answering Machine

After power up, the answering machine will be automatically turned on and is available to answer incoming calls. It can subsequently be deactivated and re-activated by the user. When the answering machine is off, all <**ITAD**> keys will be ignored except for <**ANSWER ON/OFF**>.

Activating the ITAD:



Deactivating the ITAD:



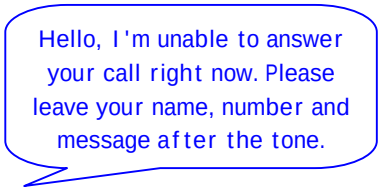
If the answering machine is turned on and configured to allow incoming messages but memory is full (see Section 4.1.9.3), the ITAD will be deactivated automatically. In this case, the *Answer LED* will remain lit and the 7-segment display will indicate memory full by alternately blinking F and the total number of new messages.

4.1.2 Answering Incoming Calls

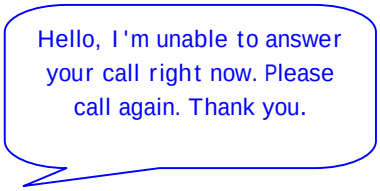
When the ITAD is activated, an incoming call that has not been answered after a pre-determined number of rings will be routed to the answering machine. The ITAD will answer the call and play an outgoing message (OGM) to greet the caller. The answering machine can be configured to allow the caller to leave a message after the greeting, or just play the announcement. For announce-only, the OGM will be played twice to ensure the caller does not miss the message.

There is a different OGM associated with normal and announce-only answering. Furthermore, the user can select to have a personal greeting or use the standard (pre-recorded) greeting in each case. When there are no custom OGM that has been recorded, the ITAD will use the default standard greeting.

The standard greetings are:



default normal OGM



default announce-only OGM

During ringing period, all the <**ITAD**> keys except for <**ANSWER ON/OFF**> will be ignored. If the answering machine is turned on while the phone is in the RINGING mode, the ring counter that is used to determine when the ITAD answers the call will start its count from the time the <**ANSWER ON/OFF**> key is pressed.

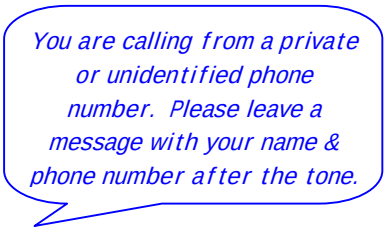
While the OGM is being played, the user can answer the incoming call by pressing **<PHONE>** on the handset or **<SPRK>** on the base. The ITAD will terminate the announcement and the phone will go into the TALK mode. Alternatively, if a parallel telephone set goes off-hook, the announcement will also be terminated and the phone will go into the IDLE mode.

If another call is received (call-waiting signal detected) while the answering machine is recording an incoming message, the recording will continue and the first call will remain connected.

Even when the answering machine is deactivated, it will answer an incoming call after ten rings. The ITAD will provide a "Please enter your security code" announcement to allow access to remote ITAD operations.

4.1.3 Privacy Screening (Option)

The privacy screening feature allows the answering machine to intercept calls that come in from unknown or blocked callers. Only models equipped with four mailboxes may offer this optional feature. When this feature is enabled (and the ITAD is not set to announce-only answering), the phone uses the caller ID information to determine which calls will be routed to the answering machine automatically. Since the CID information is received between the first and second rings, the phone will ring once before the call is answered by the ITAD. The caller will hear the pre-recorded privacy screening OGM as follows (this OGM is separate from the normal or announce-only OGM):

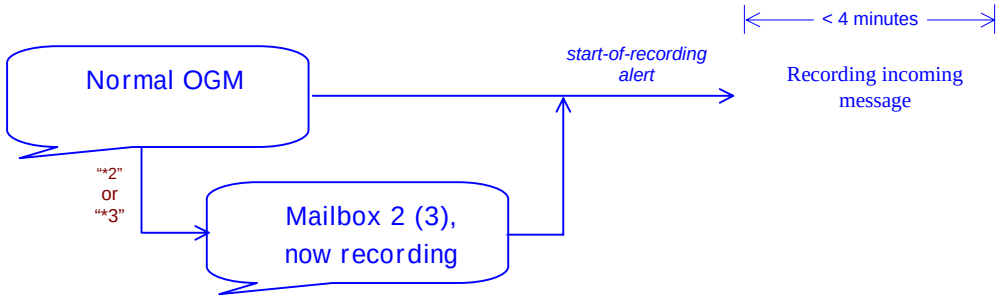


If the caller leaves a message, it will be placed in mailbox #4.

If the privacy screening option is not available or if the feature is disabled, operation of mailbox #4 (where available) will be identical to the remaining three mailboxes.

4.1.4 Recording Incoming Messages

When the ITAD is enabled to allow the recording of incoming message, the caller can begin recording after the OGM and the *start-of-recording alert*. Unless otherwise directed by the caller, the message will be stored in mailbox #1. The caller can select a different mailbox (i.e. mailbox #2 or #3) by entering **"*2"** or **"*3"** (DTMF only) at the remote telephone during the OGM playback.



Recording will be terminated when one of the following is detected:

- silence in excess of six (6) seconds
- three (3) consecutive busy tones or continuous busy tone for five (5) seconds from the telephone line
- **"*0"** (DTMF tone) from the telephone line
- **<PHONE>** on handset or **<SPRK>** on base is pressed
- a parallel telephone set goes off-hook

The maximum allowable length of an incoming message is four (4) minutes. If the maximum length is reached or if memory becomes full during recording, recording will also be terminated automatically.

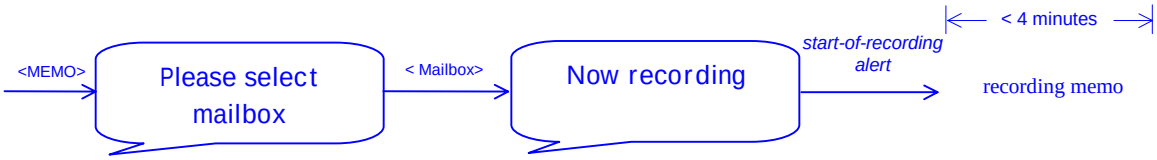
Extended period of silence at the end of the recording will be removed in the stored message. If the incoming message is less than two seconds long, it will not be regarded as a valid message. Otherwise, it will be stored into memory along with a time- and day-stamp and the appropriate ITAD message counters (i.e., the total number of messages in all the mailboxes and the number of new messages in the selected mailbox) will be incremented by one. The updated number of messages will be indicated on the 7-segment display.

When the recording is terminated, the ITAD will release the telephone line connection. The phone will stay off-hook and go into the TALK mode if the user has pressed the **<PHONE>** or **<SPRK>** key to intercept the call; in all other cases, the phone will go into the IDLE mode.

4.1.5 Call-Screening

When the ITAD answers a call and call-screening is enabled, the user will be able to hear the voices (to and from the caller) on the base speakerphone (assuming the volume level is sufficient loud). The user can choose to talk to the caller anytime after the ITAD has answered the call by one of the following: pressing <**PHONE**> on the handset, removing the handset from the cradle, pressing <**SPKR**> on the base, or picking up an extension phone. The ITAD will halt its operation and release its connection to the line (the handset, base or extension phone that has picked up the call will be connected instead). If the ITAD has been recording an incoming message, it will stop recording immediately but the message will still be stored into the mailbox.

4.1.6 Recording Memos



The user records the memo by speaking into the microphone in the base unit. During the recording, the 7-segment display will indicate the recording time in seconds. When the duration exceeds 99 seconds, the display will flash `99`.

There is no silence detection during memo recording. The recording will be terminated only when the user presses a <**Mailbox**> key or when the length of the memo reaches four (4) minutes. If memory becomes full during recording, recording will also be terminated automatically

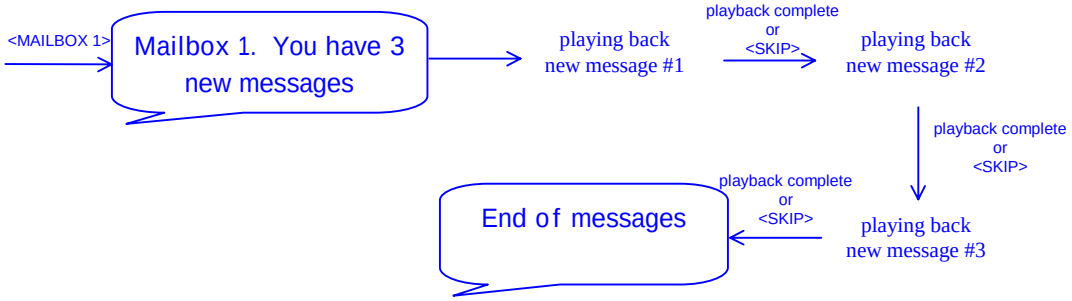
If the memo is less than two seconds long, it will not be regarded as a valid message. Otherwise, it will be stored into memory along with a time-and day-stamp and the appropriate ITAD message counters (i.e., the total number of messages in all the mailboxes and the number of new messages in the selected mailbox) will be incremented by one. The updated number of messages will be indicated on the 7-segment display.

4.1.7 Reviewing Messages / Memos

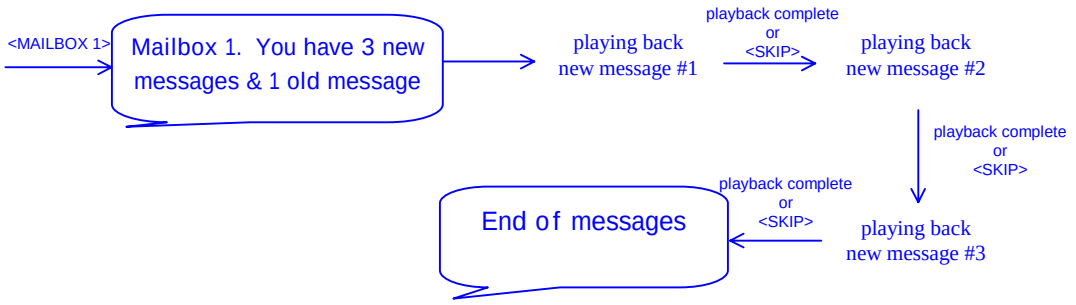
When the ITAD is not actively engaged in an operation (e.g. playing OGM, recording incoming message or memo, or changing configuration), the 7-segment display will blink a count to indicate the total number of new messages and memos stored in the answering machine. (The display will indicate a steady `0` if there are no new messages in any mailboxes.) All messages stored (new or old) can be reviewed by selecting to play back messages in a mailbox.

At the start of recording playback, the ITAD will announce the number of messages available in the selected mailbox. Generally, only the new messages in the mailbox will be played during message review. However, if there are no new messages in the mailbox, the ITAD will play back the old messages. A message will be considered old after it has been reviewed (played back completely or if it has been skipped through by the user deliberately). The playback sequence for the messages will be first-in-first-out (FIFO). During playback, the 7-segment display will indicate the number of the current message. The count display will blink if the message is new, or it will be on steady otherwise. A *start-of-recording alert* will sound prior to the start of each message, while the time- and day-stamp that indicates the time of recording will be announced at the end of each message.

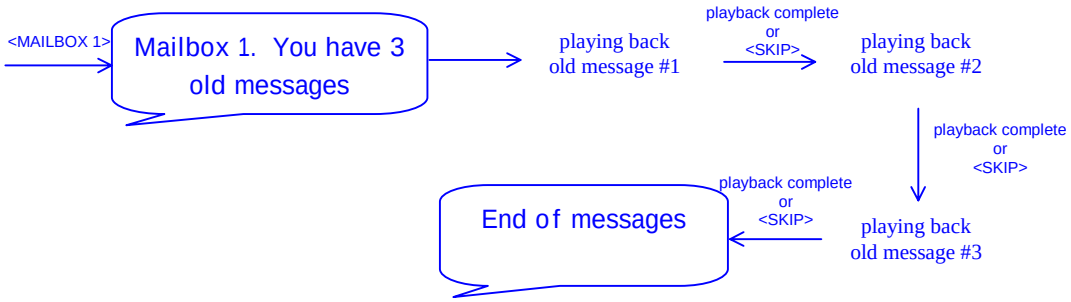
Mailbox with new messages only:



Mailbox with new and old messages:



Mailbox with old messages only:



The <**SKIP**> and <**REPEAT**> keys can be used to skip forward and backwards, respectively, within the message sequence during playback. Pressing <**SKIP**> will jump to the start of the next message. Pressing <**REPEAT**> within the first two seconds of a message will replay the previous message; otherwise, the current message will be replayed.

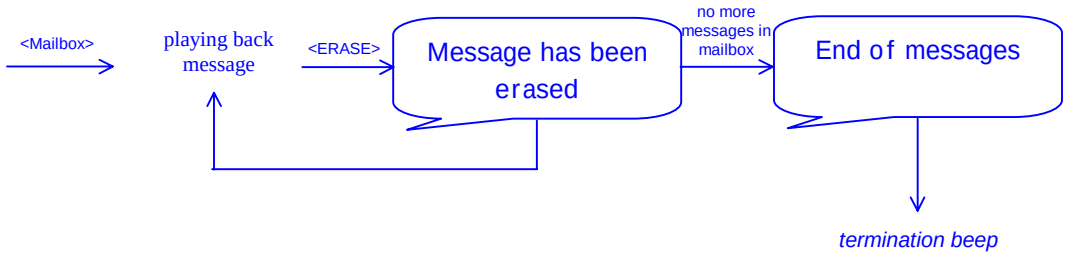
Pressing a <**Mailbox**> key during playback will exit before all messages in the mailboxes have been reviewed. A *termination beep* will be sounded to indicate review has been terminated.

At the end of message review ("End of Messages" announcement), if the ITAD has less than five minutes of recording time available, it will alert the user to the actual time remaining. The time will be rounded to the next lowest minute, or seconds if there is less than one minute (e.g. "Remaining recording time is 3 minutes").

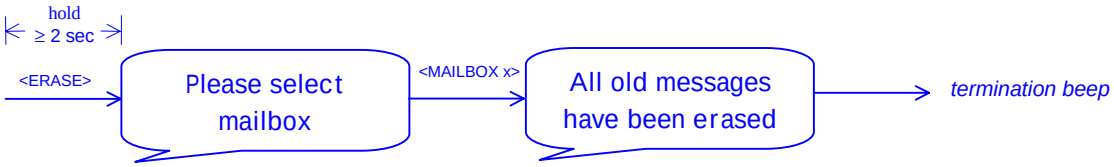
4.1.8 Deleting Messages

Messages can be deleted after they have been reviewed. The current message can be deleted by pressing <**ERASE**> at any point during the playback. If there are no new messages in a mailbox, the user is provided with the option to delete all the messages in that mailbox. Otherwise, only the current message being played back can be erased.

Erasing a single message:



Erasing all messages in a mailbox:



After messages have been deleted, the appropriate ITAD message counters (i.e., the total number of messages in all the mailboxes and the number of old messages in the affected mailbox) will be decremented accordingly. The updated number of messages will be indicated on the 7-segment display.

4.1.9 Special Features

4.1.9.1 Audible Message Alert

When the ITAD is enabled and audible-message alert is enabled, the ITAD will provide a periodic *message alert* (an audible beep every ten seconds) whenever there are new messages present in any of the mailboxes. If the user presses an <**ITAD**> key while the alert is on, all future alerts for the current message will be suppressed. The *message alert* will resume when another new message is received. In addition, when the phone is operating in the base SPEAKERPHONE mode, the alert will also be disabled temporally.

4.1.9.2 Variable Playback Speed

The ITAD provides the capability to adjust playback speed during message review. While a message is being played back, pressing and holding the <**QUICK**> or <**SLOW**> key will change the playback speed accordingly. At the higher speed, playback will be at 200% of the normal rate while at the slower speed, playback will be at 50% of the normal rate. The playback will remain at the adjusted speed for the duration of the key pressed (minimum is one second). Normal playback speed will resume after the key is released.

4.1.9.3 Memory Full

If the remaining recording time available is less than 30 seconds or the total number of messages in all the mailboxes exceeds 99, the ITAD will provide a memory-full indication on the 7-segment display by alternating between F and the number of new messages. No incoming messages or memos can be recorded until existing messages are deleted. If a user attempts to record a memo, the ITAD will provide a "Memory full" warning.

When memory is full, the answering machine will be automatically deactivated. In this case, it will answer an incoming call after ten rings with a "Memory full. Please enter your security code" announcement.

The memory-full condition in the answering machine will be maintained until a sufficient number of messages have been deleted to provide a minimum of 30 seconds of recording time.

4.1.9.4 Day and Time Announcement

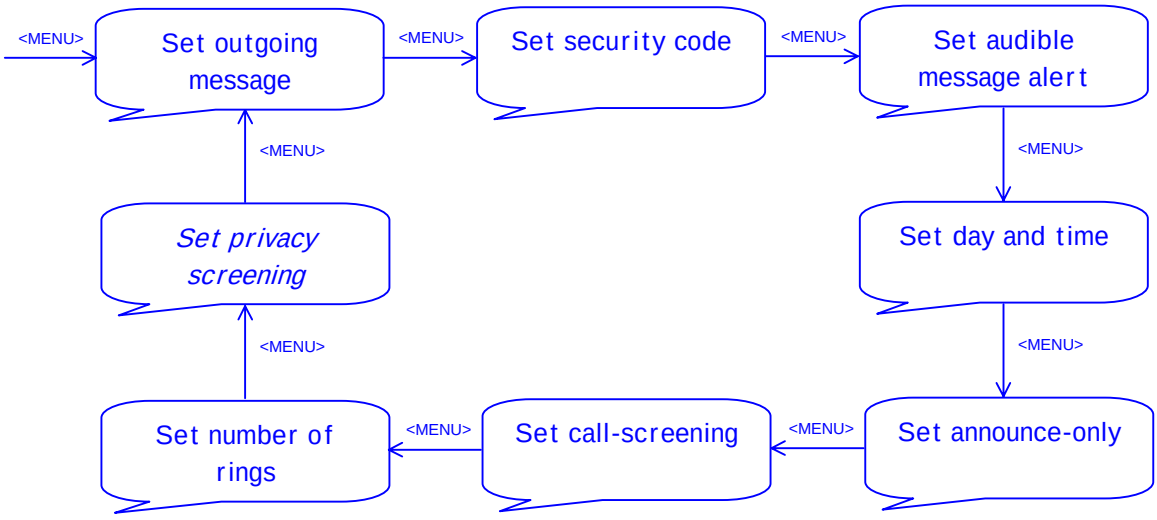
When the answering machine is idle and the <**TIME**> key is pressed, the current setting for the day of the week and time of the day will be announced.

4.1.10 Configuring the ITAD

The ITAD provides a number of parameters that can be set by the user to customise its configuration. They include

- personalised greetings (normal and announce-only OGM)
- security code for remote ITAD operation
- audible message alert enable/disable
- day of the week and time
- announce-only enable/disable
- call-screening enable/disable
- number of rings to wait before ITAD answers a call.
- *privacy-screen enable/disable (option)*

All parameters are set to a default value from the factory (see Section 7.9 for factory settings). User can choose to modify one or more settings by using the <**MENU**> key (pressing this key repeatedly will access the different parameters in turn). To facilitate the configuration process, the ITAD provides a menu that includes voice prompts to guide the user through the programming sequence. In addition, after each configuration change, a voice indication will also be provided to confirm the new setting.

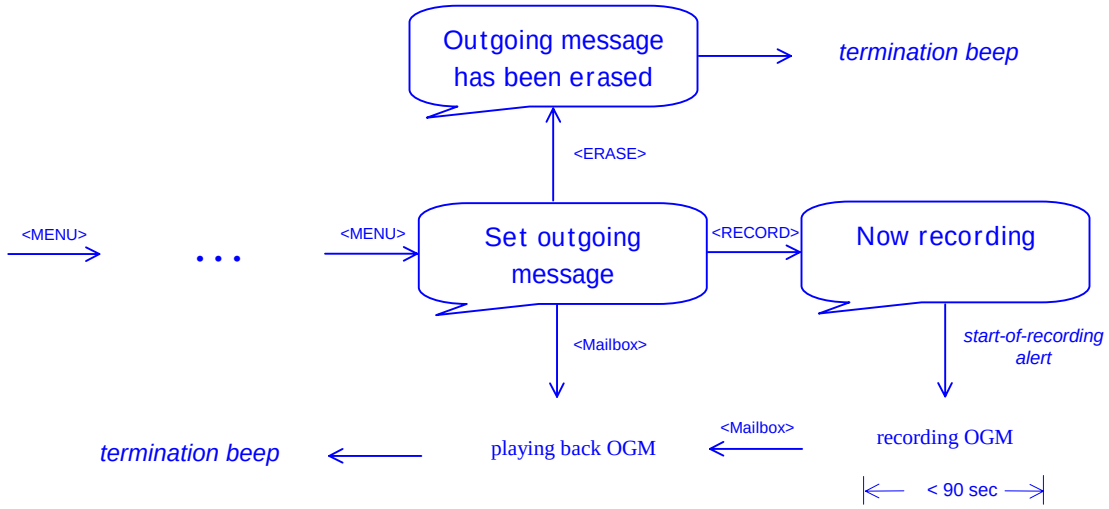


Once <**MENU**> is pressed to invoke the configuration menu, the ITAD will continue to cycle through each parameter setting with repeated pressing of the <**MENU**> key. Any parameters that have been modified via <**SET**> during the process will be stored . The ITAD will exit the configuration menu with a *termination beep* when a <**Mailbox**> key

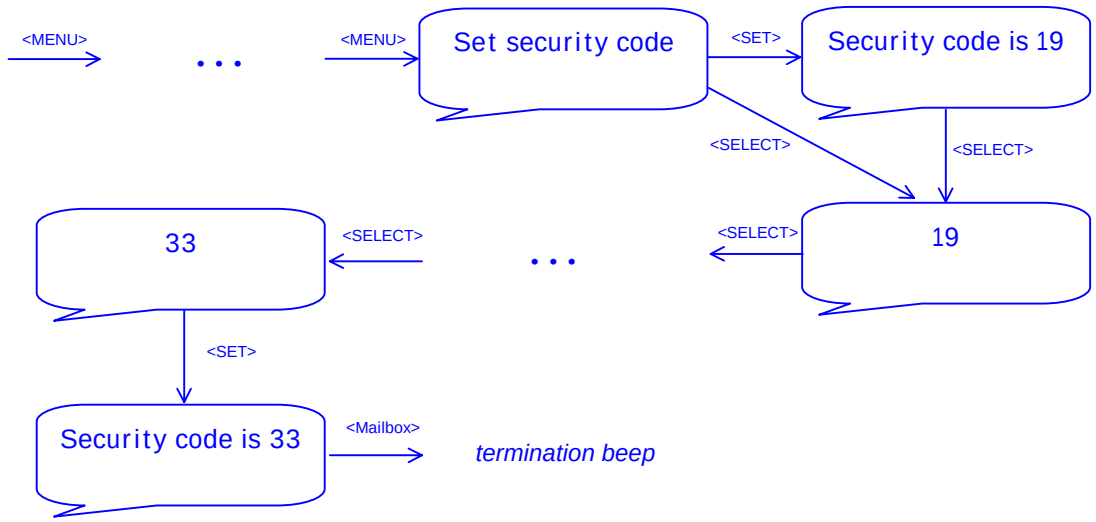
is pressed (this also applies when a <**Mailbox**> key is pressed as part of setting the outgoing message). There is also a no-activity timeout (one minute during day and time setting, 20 seconds otherwise) after which the ITAD will exit the configuration menu automatically.

4.1.10.1 Personal Greetings

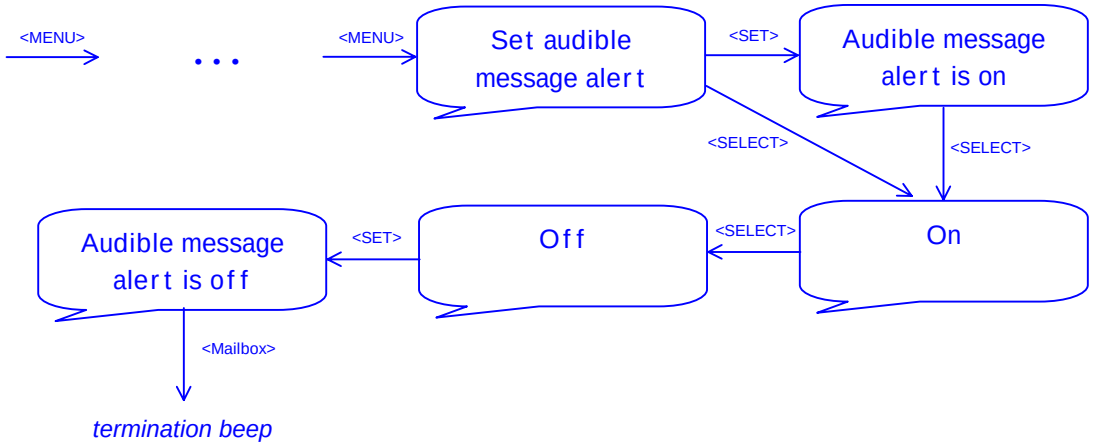
Personal greetings can be recorded to replace the standard OGM for both normal and announce-only answering. The answering mode that is currently set for the ITAD will determine which greeting will be recorded during ITAD configuration: if announce-only is enabled, the user will be able to record the announce-only greeting and if announce-only is disabled, the user will be able to record the normal greeting.



4.1.10.2 Security Code



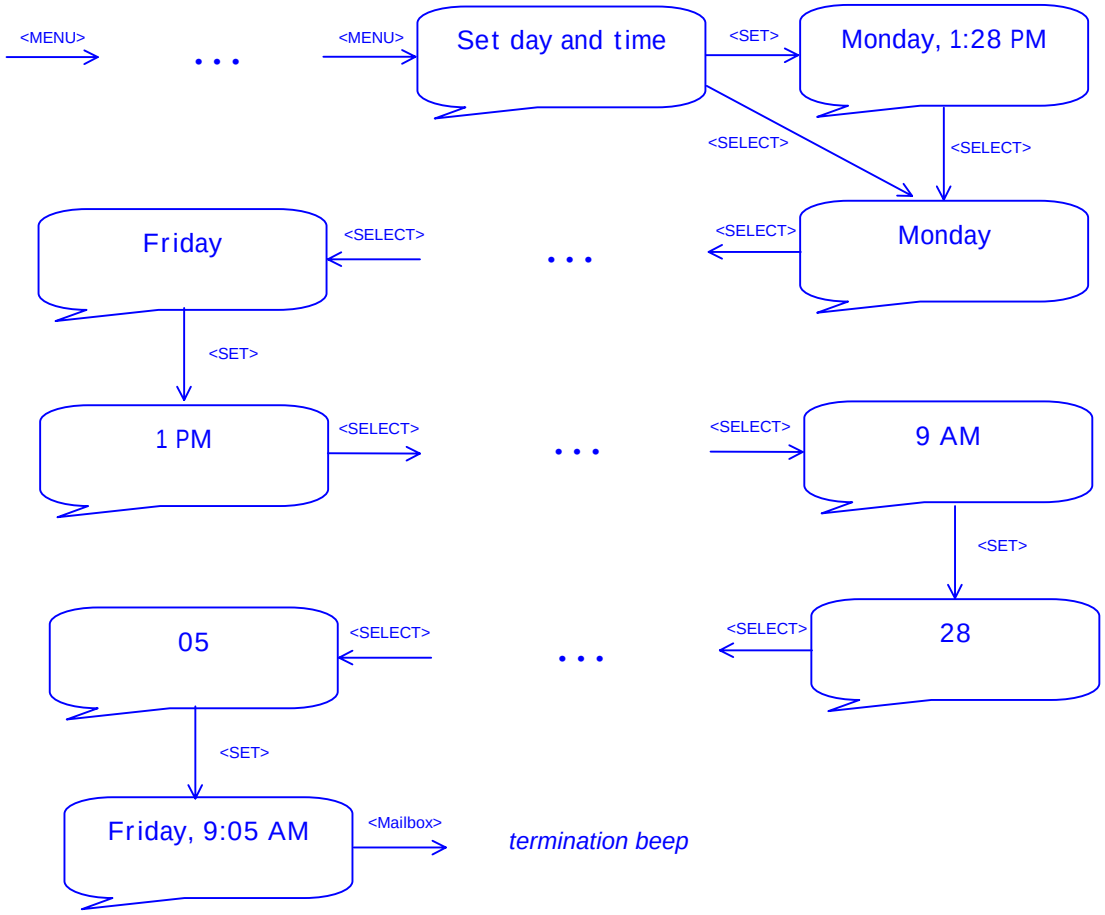
4.1.10.3 Audible Message Alert



When <**SELECT**> is pressed repeatedly during audible message alert configuration, the menu will cycle through the available options: on → `off` → on (the first option presented is always the current setting). While the options are announced, the 7-segment LED display will also indicate the corresponding values (`0N`, or `0F`).

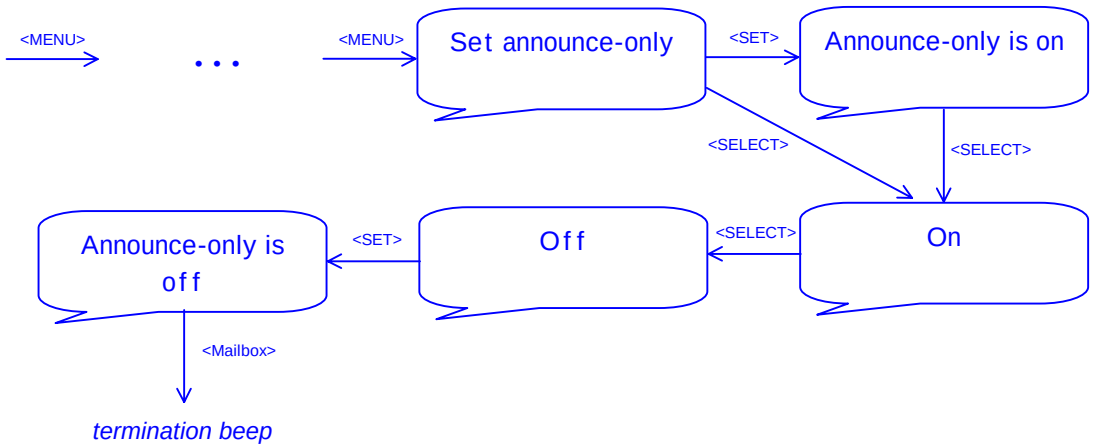
4.1.10.4 Day and Time

The ITAD maintains day-of-the-week and time-of-the-day settings that are used for time-stamping incoming messages and memos. The settings will need to be set upon initial power-up or after a power interruption (the 7-segment display will indicate `(L`).



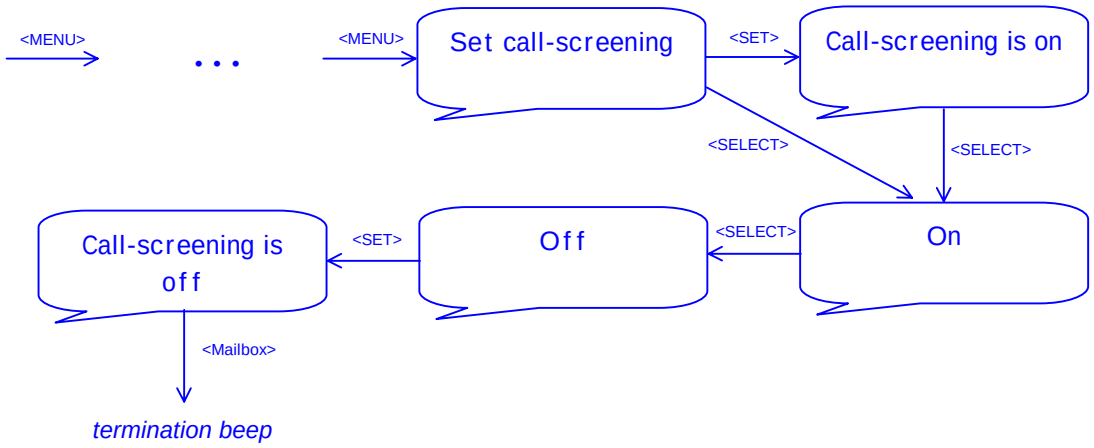
When <**SELECT**> is pressed repeatedly during time and day configuration, the menu will first cycle through the day-of-the-week options: Monday → Tuesday → … → Sunday → Monday. After a day is selected, the menu will cycle through the hour-of-the-day options: 1 AM → 2 AM → … → 11 AM → 12 PM → 1 PM → … → 12 AM → 1 AM. Finally, after an hour has been selected, the menu will cycle through the minute-of-the-hour options (00 → 01 → … → 59 → 00). In all cases, the first option presented in the menu is always the current setting. While the options are announced, the 7-segment LED display will also indicate the corresponding values.

4.1.10.5 Announce-Only



When <**SELECT**> is pressed repeatedly during announce-only configuration, the menu will cycle through the available options: on → `off` → on (the first setting presented is always the current configuration). While the options are announced, the 7-segment LED display will also indicate the corresponding values (`0N`, or `0F`).

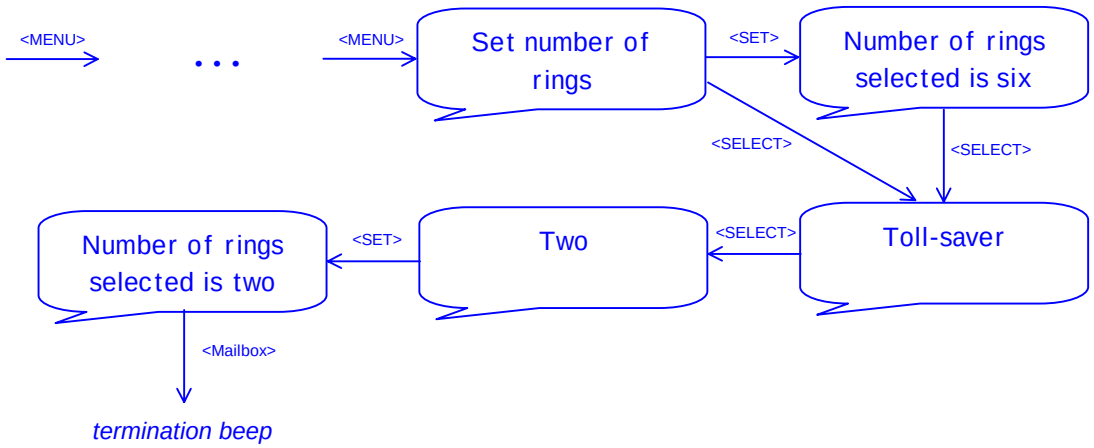
4.1.10.6 Call-Screening



When <**SELECT**> is pressed repeatedly during call-screening configuration, the menu will cycle through the available options: on → `off` → on (the first setting presented is always the current configuration). While the settings are options, the 7-segment LED display will also indicate the corresponding values (`0N`, or `0F`).

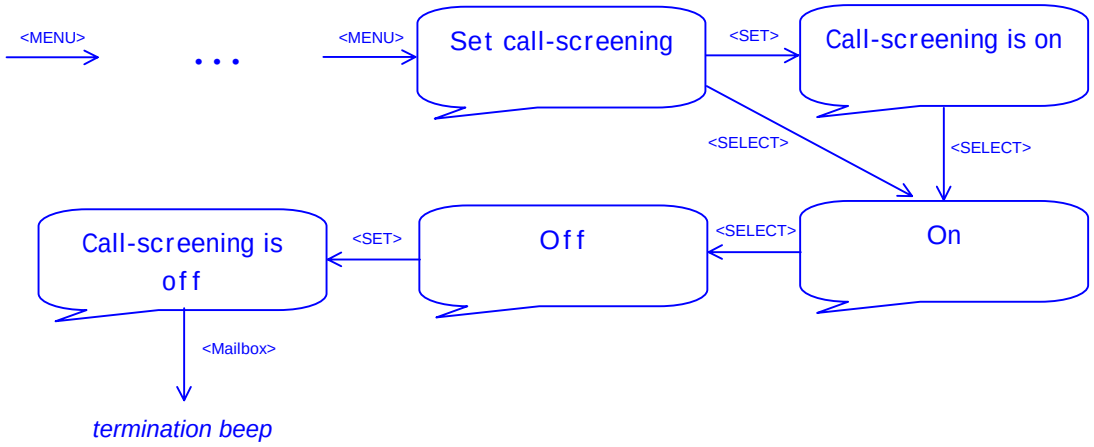
4.1.10.7 Number of Rings

The ITAD can be configured to answer an incoming call after two, four or six rings. In addition, a toll-saver setting is available whereby an incoming call will be answered after two rings only if there are new messages/memos stored in the ITAD, or four rings otherwise. The toll-saver feature is provided to help user avoid long distance charges when retrieving messages remotely (see Section 4.2.1) by allowing the user to hang up quickly when the ITAD does not answer the call on the second ring (i.e. no new messages).



When <**SELECT**> is pressed repeatedly during number of rings configuration, the menu will cycle through the available options: 2 → 4 → 6 → toll saver → 2 (the first setting presented is always the current configuration). While the settings are announced, the 7-segment LED display will also indicate the corresponding values (2, 4, 6, or TS).

4.1.10.8 Privacy-Screening (Option)



*When <**SELECT**> is pressed repeatedly during privacy-screening configuration, the menu will cycle through the available options: on → off → on (the first setting presented is always the current configuration). While the settings are options, the 7-segment LED display will also indicate the corresponding values (0N, or 0F).*

4.2 Remote Operation of ITAD

Remote ITAD operation provides the capability to control many of the functions of the answering machine by dialling in from another telephone. The user must call in from a telephone connected to a different phone line (i.e.

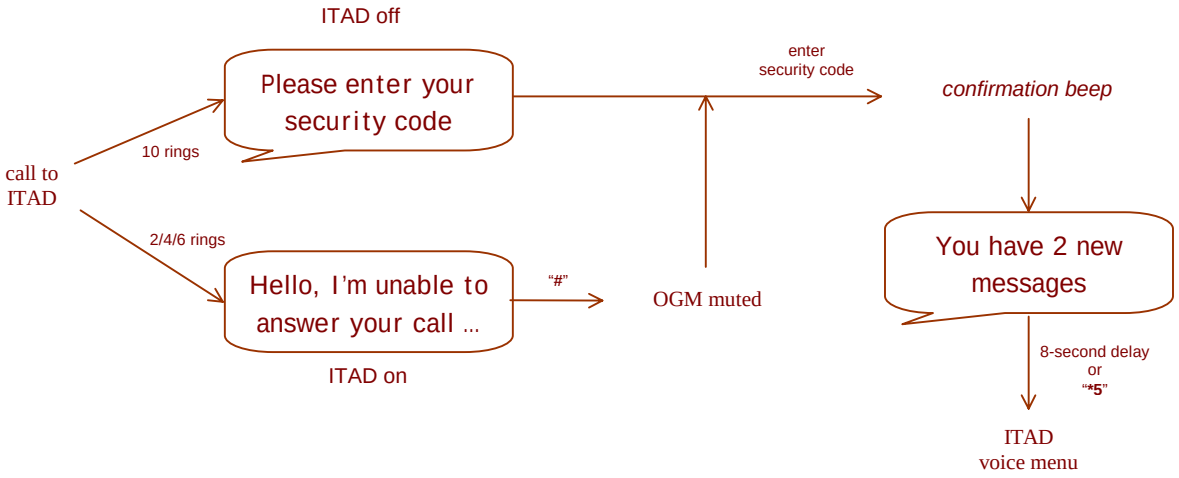
not an extension phone that is on the same line as the PDLci MK3). In addition, the calling telephone must support touch-tone signalling in order to transmit he DTMF tones required to access the various options.

The functions that are available via remote operations include activating/deactivating the answering machine, reviewing (and deleting) messages, recording memo, and modifying personal greetings.

During remote operation, entering "***0**" on the touch-tone keypad of the remote telephone or pressing a <**Mailbox**> key on the base unit will terminate the current operation and the ITAD will disconnect the line. The ITAD will also exit remote operation and hang up after a 20-second, no-activity timeout.

4.2.1 Accessing Remote Operation

To access the ITAD operations available from a remote telephone, the user must call in and dial the correct security code when the ITAD answers the call and plays the appropriate greeting or prompt.



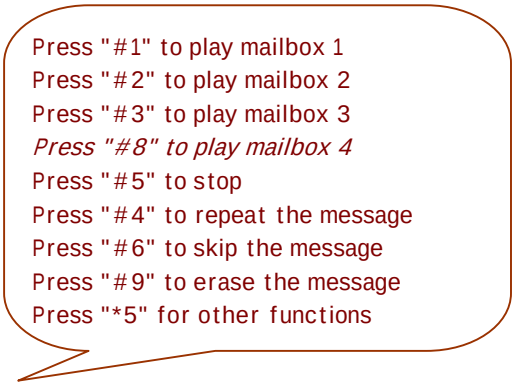
When the "**#**" key is dialled during the announcement, the announcement will be muted for two seconds to allow the caller to dial the two-digit security code. It will also be possible to enter the security code during the recording of an incoming message. In this case, the caller must dial the "**#**" key to interrupt the recording and dial the security code. The recording will be stopped after a valid security code has been entered, and the recorded incomplete message will be deleted.

The ITAD will disconnect the line automatically after three attempts to dial the correct security code have failed (dialling a single "**#**" will not be regarded as an error entry). If "**#***", "***#**", "**##**" or "******" is entered, the first digit is ignored. The two-second muting time will be counted from the second key.

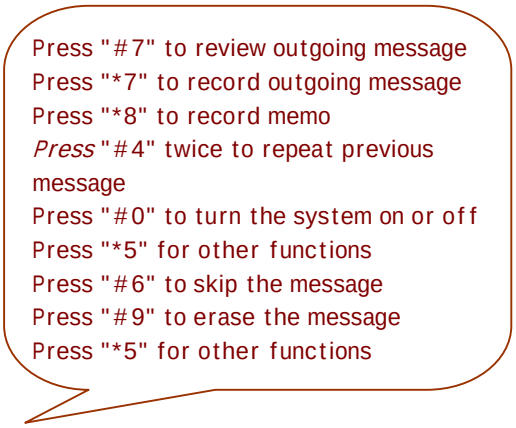
4.2.2 Voice Menu for Remote Control

The ITAD provides two pre-recorded voice menus to help the user navigate the remote operation options. A simple voice menu list the key sequence for accessing the most commonly used operations, while an advance voice menu is available to list the key sequence for the remaining operations available. The simple voice menu will be played in eight seconds after the caller has entered a valid security code and the ITAD announced the number of new messages or anytime the caller dials "***5**". The ITAD will change to play the advance menu if "***5**" is pressed (again) during the simple voice menu.

Simple voice menu:



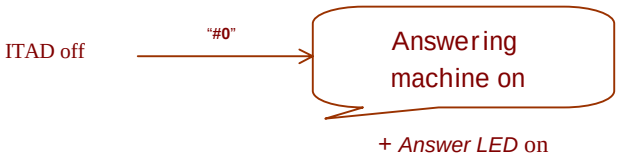
Advance voice menu:



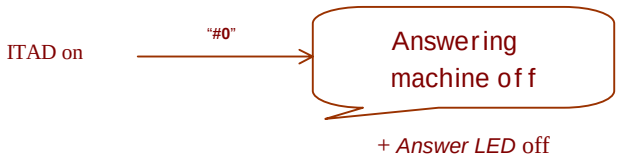
While the voice menu is being played, dialling any function key sequence will interrupt the voice menu and causes the ITAD to perform the associated function immediately.

4.2.3 Activating the Answering Machine

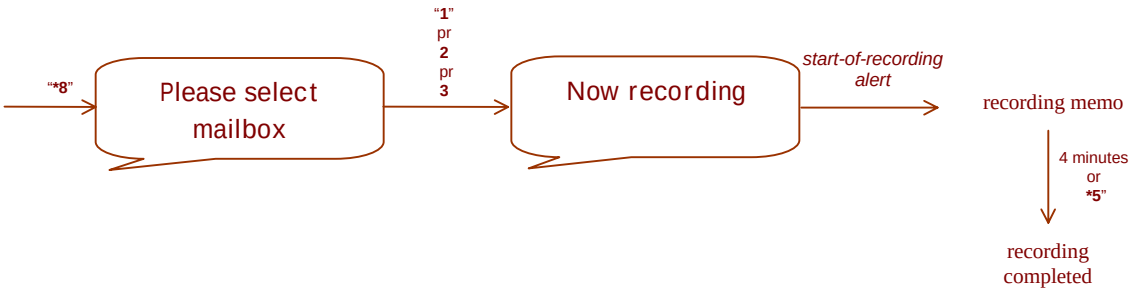
Activating the ITAD:



Deactivating the ITAD:



4.2.4 Recording Memos



The maximum length of the memo is four (4) minutes. If memory becomes full during recording, recording will be terminated automatically.

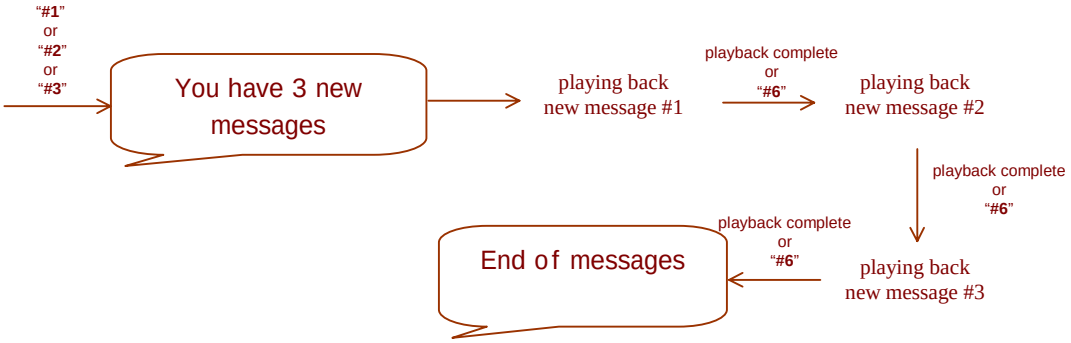
If the memo is less than two seconds long, it will not be regarded as a valid message. Otherwise, it will be stored into memory along with a time-and day-stamp and the appropriate ITAD message counters (i.e., the total number of messages in all the mailboxes and the number of new messages in the selected mailbox) will be incremented by one. The updated number of messages will be indicated on the 7-segment display.

If memory is already full or the total number of messages is 99 when "***8**" is dialled, no new memos will be accepted. In that case, the ITAD will provide a "Memory full" announcement.

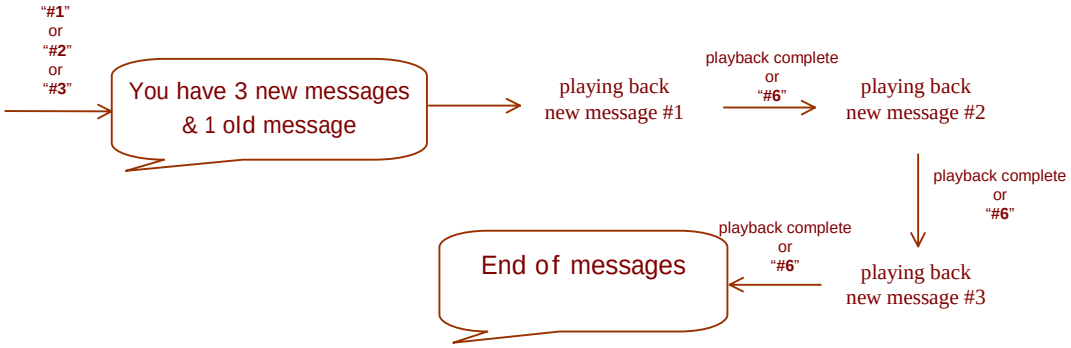
4.2.5 Reviewing Messages

The caller can select to review the messages in a desired mailbox by dialling the function key sequence that corresponds to the desired mailbox ("**#1**", "**#2**", and "**#3**" for mailboxes 1, 2 and 3 respectively; "**#8**" *can be used to access mailbox 4 where the privacy screening option is available*). At the start of recording playback, the ITAD will announce the number of messages available in the selected mailbox. Generally, only the new messages in the mailbox will be played during message review. However, if there are no new messages in the mailbox, the ITAD will play back the old messages. A message will be considered old after it has been reviewed (played back completely or if it has been skipped through by the user deliberately). The playback sequence for the messages will be first-in-first-out (FIFO). The time- and day-stamp that indicates the time of recording will be announced at the end of each message.

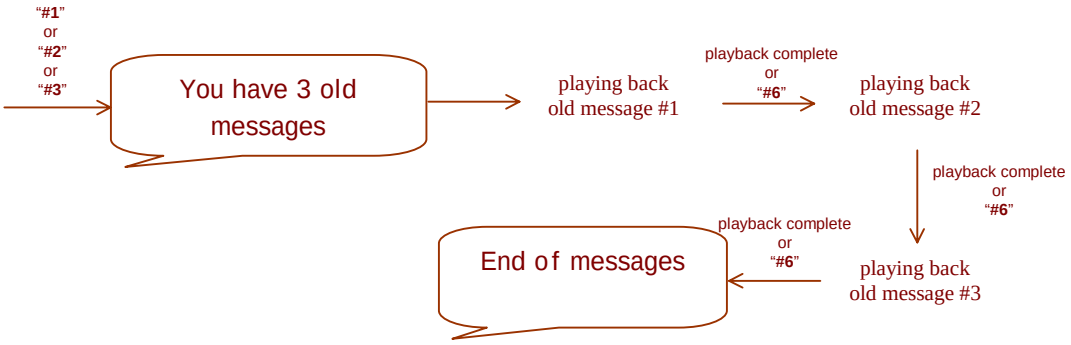
Mailbox with new messages only:



Mailbox with new and old messages:



Mailbox with old messages only:



The function key sequences **"#6"** and **"#4"** can be used to skip forward and backwards, respectively, within the message sequence during playback. Dialling **"#6"** will jump to the start of the next message. Dialling **"#4"** within the first two seconds of a message will replay the previous message; otherwise, the current message will be replayed.

Dialling "**#5**" during playback will exit before all messages in the mailboxes have been reviewed. A *termination beep* will be sounded to indicate review has been terminated.

Playback will be muted if "#" or "*" is dialled during message review. During this time, the ITAD will wait for additional digits dialled to complete a function key sequence. The ITAD will resume playback if no additional digit is dialled after a two-second timeout.

4.2.6 Deleting Messages

Messages can be deleted after they have been reviewed. The current message can be deleted by dialling the "**#9**" key sequence at any point during the playback.

4.2.7 Modifying & Confirming Greetings

Changing OGM:

Reviewing OGM:

4.3 User Indication and Priority

4.3.1 Seven-Segment LED Display

LED Display		Description	Priority	Section
0	steady	• indicates no new messages in any mailbox		4.1.7
1 .. 98	blinking	• indicates total number of new messages in all mailboxes • available when ITAD is on or off		4.1.7
0 .. 99	alternating	• indicates memory full or total number of messages		4.1.9.3

LED Display		Description	Priority	Section
& F		exceeds 99 • number displayed corresponds to the number of new messages		
1 .. 99	counting	• indicates recording duration in seconds during OGM/memo recording		4.1.10.1 & 4.1.6
99	blinking	• indicates recording time has exceeded 99 seconds		4.1.10.1 & 4.1.6
1 .. 99	on steady	• indicates current message number in selected mailbox during message playback		4.1.7
00 .. 99	steady	• indicates current security code during remote access code configuration		4.1.10.2
A	steady	• indicates ITAD is set for announcement only		4.1.2
0N or 0F	on for 1 sec	• indicates when feature is enabled or disabled during ITAD configuration		4.1.10
[L	alternating with normal display	• indicates clock needs to be reset after power failure		6.5
--	steady	• indicates an incoming call is being answered or base speakerphone is in-use		4.1.2
--	blinking	• indicates programming of ITAD menu items in progress		4.1.10
2, 4, 6 or TS		• indicates number of rings during ITAD configuration		4.1.10.7

4.3.2 Audible Status Indication

Message	Description	Priority	Section
Answering machine on	• Announced when ITAD is activated		4.1.1
Answering machine off	• Announced when ITAD is deactivated		4.1.1
Memory full	• Announced if memory is full when recording of new messages/memos is attempted		4.1.9.3
End of messages	• Announced when all messages (new or old, as appropriate) in the selected mailbox has been played		4.1.7
Remaining recording time is xx minutes/ seconds	• Announced at the end of message review when the amount of recording time remaining is less than 5 minutes		4.1.7

4.3.3 Status Tones

Name	Description	Tone Generated	Section
Key beep	• generated whenever a valid key is pressed • sent prior to voice prompt	2 kHz: 40 ms on	
Termination beep	• generated a programming command is completed successfully or redial is erased	2 kHz: key beep + 0.5 sec off, 0.5 sec on	

Name	Description	Tone Generated	Section
Start-of-recording alert	• generated to signify start of recording	2 kHz: 1 sec on	4.1.4, 4.1.6 & 4.1.7
Message alert	• generated when there are new messages and the audible message alert feature is enabled		4.1.9.1

4.3.4 LEDs

Name	Description	Section
Answer	• on steady when answering machine is on	4.1.1
Mailbox #1	• blinks when there are new messages stored in mailbox #1 • on steady when there are old messages stored in mailbox #1	4.1.7
Mailbox #2	• blinks when there are new messages stored in mailbox #2 • on steady when there are old messages stored in mailbox #2	4.1.7
Mailbox #3	• blinks when there are new messages stored in mailbox #3 • on steady when there are old messages stored in mailbox #3	4.1.7
Mailbox #4	• *blinks when there are new messages stored in mailbox #4* • *on steady when there are old messages stored in mailbox #4*	*4.1.7*

5 RF Link Operation

The radio frequency (RF) link is a full-duplex communication path between the PDLci MK3 base and the handset units. It is used to transfer both audio (voice) and data between the base and handset. There are a total of 30 RF channels available for communication. Only one channel may be selected as the active channel at any instant, though there are provisions to select to a different active channel when there are perceived interference on the current channel.

5.1 RF Link Data

Data is transmitted over the RF link between the handset and the base unit in packets. A fixed frame format is used to provide for the simultaneous transmission of three logical channels – voice, control and frame synchronisation data. The voice channel contains analog voice signals that have been are digitised using 32 kbps ADPCM data encoding; the control data are generally operational commands from the base to handset and vice-versa; and the frame synchronisation data facilitates reception of the packet over the RF link. For improved security, the voice and control data is scrambled prior to transmission; descrambling must be done at the receiving end prior to further processing of the voice and control data.

When the phone is in the IDLE mode, the base and handset will listen for data transmission from the other relating to the initiation of the PHONE, RINGING, PROGRAM or INTERCOM mode. If the handset is away from the cradle, the handset will be in the power-conservation mode of operation, in which the on-board electronics are essentially "asleep" but will wake up periodically to check for incoming data transmitted from the base. The handset will detect commands sent from the base within one (1) second (maximum ringing delay), while the base will detect commands sent from the handset within 200 ms (maximum on/off-hook delay).

5.2 Security Code

All data communication over the RF link will include a security code as required by FCC Part 15. When a frame is received over the RF link, the security code is contained in the packet (part of the control channel) will be verified before any data is processed. This prevents the handset from receiving commands from another base unit and vice-versa.

The handset and base units will use an identical, 24-bit security code that is factory-configured. The security code is stored in the non-volatile memory on both units and cannot be modified by the user.

5.3 RF Channel Selection

In order for the handset and base unit to communicate over the RF link, the selection of the active channel must be synchronised between the two units. An active channel is initially selected during the PDLci MK3 initialisation process. If the RF link subsequently degrades during operation, recovery involves the selection of a new communication channel that is automatically initiated and no user-intervention will be required.

Regardless of the phone's operating mode, both the handset and base units are constantly monitoring the quality of the active communication channel. Even when the handset is in power-conservation mode, the base is periodically transmitting link-status messages to the handset to verify the integrity of the RF link. The handset will also respond periodically to the link-status message to provide feedback to the base unit.

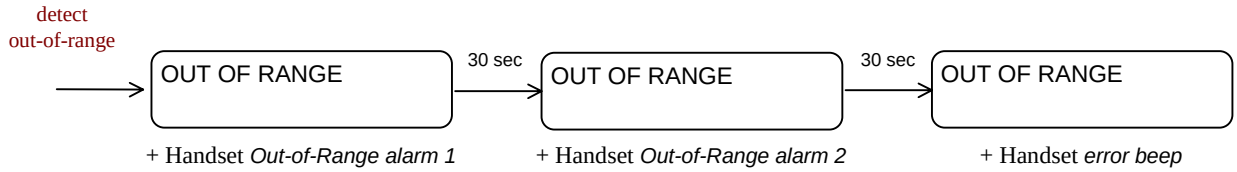
When the link is operational, the assessment of the channel quality is done based on the error rate detected on the incoming frames. While the voice channel is transparent, the control channel includes an error control mechanism.

If the error rate of the incoming data is beyond an acceptable threshold, either the handset or the base can independently initiate a channel change.

The best channel out of the remaining 29 channels will be selected as the new channel. (If no improved channel can be identified, the units will remain on the existing active channel and scanning for a new channel will begin again after a brief delay.) If a new channel is selected and a link can be maintained in spite of a degraded link condition, the change to a new channel will occur in a co-ordinated manner. Otherwise, the handset and base unit will attempt the link recovery procedure.

5.4 Handset Out of Range Detection

When the RF link is broken between the handset and the base, the handset will provide both a visual and audible alert. The audible alert consists of two separate alarm tones, and each will be sounded for 30 seconds for total duration of 60 seconds. The LCD will continue to display the OUT OF RANGE message until either the RF link is re-established or the battery becomes dead.



If the handset was in the TALK mode when out-of-range was detected, and the link is re-established during the sounding of the alarm (i.e. within 60 seconds), the handset will resume in the TALK mode and the conversation will be continued. Otherwise, the line will be dropped and the phone will return to the IDLE mode.

5.5 Link Recovery

The RF link between the handset and base can be broken because the handset has gone out-of-range or because of the active channel selection at the handset and base are out of synchronisation. In either case, the units will attempt to re-establish communication with each other. The base unit will continuously transmit packets on the different channels while the handset scans all the channels for an incoming packet from the base. To prevent a deadlock condition, the rates with which the units cycle through the channels are different between the handset and the base. With the handset scanning at a significantly faster rate than the base, the handset will have multiple chances of receiving the base transmission and responding to it before the base changes to transmit on another channel.

During the link recovery procedure, the LCD will continuously display the CHANNEL SEARCHING message. When the link is re-established successfully, the LCD will display the FOUND CHANNEL x message for five (5) seconds, where “x” identifies the (newly selected) active channel.

6 Power Management

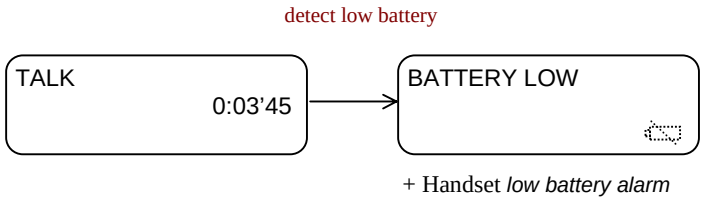
The PDLci MK3 is powered by a battery pack in the handset and by AC power (primary) or battery pack (backup) in the base unit.

6.1 Battery

The handset operates from a three-cell, 600 mAh battery pack which is rechargeable. There are no connectors attached to the battery pack. When fully charged, the battery will provide a minimum of seven (7) hours of operation in the TALK mode, three (3) hours of operation in handset SPEAKERPHONE mode, or seven (7) days of operation in the IDLE mode before requiring recharge. The battery pack will recharge automatically whenever the handset is placed in the cradle of the base unit. (The *Charge LED* will lit to indicate the battery is being charged.) In addition, the battery pack can also be recharged via a compatible remote charger.

6.2 Low Battery Indication

The phone will provide both audible and visual warning when low battery condition in the handset is detected. When the handset determines that the battery is running low, the LCD will display the icon. In addition, the LCD will display a BATTERY LOW message for fifteen (15) seconds and an audible alert will be made if the handset is in a non-IDLE mode. The low battery alarm will be repeated every three (3) seconds for up to five times during the active call or operation. The user may press any key during the fifteen-second alarm interval to suppress the message display and audible alert. Except for the continued display of the low-battery icon, the remaining low-battery indication will not be repeated until the phone goes off-hook or begins another operation after returning to the IDLE state.



6.3 Spare Battery Charger

The PDLci MK3 is equipped with a separate battery charger in the base unit that can be used to charge a spare battery pack (optionally purchased). The *Spare Battery LED* will illuminate when a battery pack is placed in the charger. The spare battery pack can also be used as backup power source for the base unit, as described in Section 6.4.

6.4 POTS Mode Operation

The PDLci MK3 provides a mode of operation that emulates a plain old telephone set (POTS). It allows the base unit to maintain operation during AC power outages or any situation where the AC power is removed from the base unit when there is a charged battery installed in the spare battery compartment.

To indicate the phone is operating in POTS mode, the handset LCD will display a CHECK AC POWER message and the base *Spare Battery LED* will blink.

During POTS mode operation, all handset functions will be available during except for intercom with the base, but all base speakerphone and ITAD functions will be inhibited:

- If the handset has been active on a call, it will remain connected to the line.
- If the base has been active on a call, it will be disconnected; the call will be dropped unless the handset has previously been in a three-way conference.
- If the call has been placed on hold by the base, the call will remain on hold and the handset can release the hold to pick up the call.
- If an intercom has been set up between the handset and base, the intercom will be terminated.

The phone will have no audible or visual indication when a low battery condition is detected on the spare battery during POTS mode operation.

6.5 Power Interruption

Either the handset or base unit may occasionally suffer from power interruption during operation. The handset power supply may be interrupted if the battery is physically removed from the compartment. Alternatively, the handset battery may be completely drained of its charges. In the base unit, the power supply is interrupted when AC power is unavailable.

In either case, the PDLci MK3 provides the capability to recover from the power interruption. Operation in the handset SPEAKERPHONE or TALK mode will be maintained through a brief power interruption (up to 125 ms in duration) to the base unit. In all other instances, the affected unit will be reset to allow the handset and base unit to re-establish RF communication and resume operation in the IDLE mode. The critical information that must be available to allow quick restoration of RF communication is the security code and the last active RF channel. On both the handset and base unit, this information will be restored directly from non-volatile memory.

All directory entries, redial information, caller ID log and area code(s) configuration will be retained through a power interruption to the handset. However, the ringer type, volume, and receiver volume settings will be reset to the default values when the power resumes. Similarly, the speakerphone volume setting will be reset after a power interruption to the base unit.

For the ITAD, all messages in the mailboxes, user-recorded announcements as well as configuration for the answering machine will be retained through a power interruption. After the power resumes, the ITAD will have a brief initialisation period (the - - indication will flash on the 7-segment display) before normal ITAD operation can resume (phone operation is available during this time). In addition, the real time clock will need to be reset by the user (the [L indication will show on the 7-segment display to remind the user).

7 Electrical Specifications

This section contains the electrical specifications of the PDLci MK3. The specifications as stated are guaranteed at room temperature.

The specifications are validated via automated production test equipment (ATE) or manual testing, both in accordance with VTECH's standard test set-up and procedure for each parameter. Parameters verified by the ATE (marked with *) are tested on every production unit at the board-level or final test stations. To protect against variation in the test equipment and allow for performance drift over time, the test limits for the ATE may be more restricted than the range specified here. The remaining parameters are confirmed during design validation or regulatory certification and re-verified with testing on random samples.

7.1 Operating Conditions

	Parameter	Min	Typ	Max	Units
7.1.1	Operating Temperature Range	0	25[1]	40[2]	°C
7.1.2	Base Unit Operating Voltage (AC Voltage, 60Hz)	96	120[1]	144	Vrms
7.1.3	Base Unit Operating Voltage (AC Adapter Output)		9[1]		Vdc
7.1.4	Handset Operating Voltage[3]	3.2	3.6[1]	4.2	Vdc

Notes:
1. Typical value represents the nominal testing value
2. Handset battery should not be operated above 40°C
3. Handset operates from a 3-cell NiCd battery

7.2 DC Electrical Characteristics

	Parameter	Min	Typ	Max	Units
7.2.1	Handset Standby Time	7			Days
7.2.2	Handset Continuous Talk Time (no speakerphone)	7			Hours
7.2.3	Handset Speakerphone Continuous Talk Time	3			Hours
7.2.4	Handset Talk Time - low battery detection to shutdown	15			Minutes
7.2.5	Base Unit Standby Time – POTS Mode		5		Hours
7.2.6	Base Unit Continuous Talk Time – POTS Mode		4		Hours
7.2.7	Handset Battery Charge Time[1]		16		Hours
7.2.8	Spare Battery Charge Time			24	Hours

Notes:
1. Contact charging

7.3 Audio Specifications

	Parameter	Min	Typ	Max	Units
7.3.1	Transmit Objective Loudness Rating (TOLR) @ 0 kft[1,2]	-40	-46	-53	dB
7.3.2	Receive Objective Loudness Rating (ROLR) @ 0 kft [1,2]	51	46	41	dB
7.3.3	Sidetone Objective Loudness Rating (SOLR) @ 0 kft [1,3]	19	8	3	dB
7.3.4	Receive Volume Adjustment Range	12			dB
7.3.5	Transmit Direction Acoustic Overload (into microphone)[4]	103			dBspl
7.3.6	Receive Direction Acoustic Overload (from receiver)[4]	103			dBspl
7.3.7	Transmit Direction Noise[5]			20	dBrnC
7.3.8	Peak Acoustic Pressure[6]			130	dBspl

Notes:
1. Tested using 0 kft of simulated telephone line
2. Tested at normal (low) volume level
3. Base unit connected to 0 kft of simulated telephone line terminated with 900 Ω
4. Acoustic level that results in 5% THD, measured at 1 kHz through a C-message filter
5. Handset isolated from sound input and mechanical disturbances
6. Tested at high volume level

7.4 Telephone Line Interface Specifications

	Parameter	Min	Typ	Max	Units
7.4.1	DTMF Frequency Tolerance	-1.5		+1.5	%
7.4.2	DTMF Low Group Tone Level[1]	-7.5	-5.0	-4.0	dBm
7.4.3	DTMF High Group Tone Level[1]	-5.5	-3.0	-2.0	dBm
7.4.4	DTMF Combined Tone Level[1]			+2.0	dBm
7.4.5	DTMF High Group Pre-emphasis (Twist)		2.0	4.0	dB
7.4.6	Pulse Dialling Break Duration[2]		60		ms
7.4.7	Pulse Dialling Make Duration[2]		40		ms
7.4.8	Pulse Dialling Rate		10		pps
7.4.9	Hook Switch Flash Duration[2]		650		ms
7.4.10	Ring Detection Frequency[3,4]	15		68	Hz
7.4.11	Ring Response Voltage[4]	40			Vrms
7.4.12	Ring No-Response Voltage[5]			25	Vrms

Notes:
1. Measured across a 900 Ω terminating impedance
2. Value can be changed via EEPROM setting (typical value shown is default setting)
3. The ringer must ring with signals within this range
4. Measured with a frequency of 20 Hz

5. The ringer must not ring with signals within this range

7.5 Calling Line Identification Specifications

	Parameter	Min	Typ	Max	Units
7.5.1	Receive Space Frequency	2178	2200	2222	Hz
7.5.2	Receive Mark Frequency	1188	1200	1212	Hz
7.5.3	Receive Baud Rate	1188	1200	1212	Baud
7.5.4	Mark FSK Detector Sensitivity	-32		-12	dBm
7.5.5	Space FSK Detector Sensitivity	-36		-32	dBm
7.5.6	FSK Detector Twist	-10		10	dB
7.5.7	CAS Detection Sensitivity	-32			dBm
7.5.8	Channel Seizure Delays			300	Bits
7.5.9	Immunity to Stuffed Mark Bits			360	Bits
	CAS				
7.5.10	Frequency Limits – Lower Tone	2033.5	2130	2236.5	Hz
7.5.11	Frequency Limits – Upper Tone	2612.5	2130	2887.5	Hz
7.5.12	Dynamic Range (per tone)	-32		-14	dBm
7.5.13	Twist			<6	dB
7.5.14	Tone Duration	75		85	ms
	ACK				
7.5.15	Signal Duration	55		65	ms

7.6 Radio Specifications

	Parameter	Min	Typ	Max	Units
7.6.1	Number of RF Duplex Channels[1]		30		-
7.6.2	Base Unit Transmission Frequency	902.30		906.65	MHz
7.6.3	Handset Transmission Frequency	923.10		927.75	MHz
7.6.4	Transmitter Frequency Stability (over temperature range)	-12.5		+12.5	kHz
7.6.5	Handset Recovered Acoustic Level - RF Test Signal[2,3]	95	97	99	dBspl
7.6.6	Base Unit Recovered Audio Level - RF Test Signal[2,4]	-11	-10	-9	dBv
7.6.7	Receiver Sensitivity – 100% Data Reception	-102	-105		dBm
7.6.8	Receiver Muting Level	-109		-107	dBm
7.6.9	Adjacent Channel Rejection (at 300 kHz offset)[5]	50	55		dB
7.6.10	Image Rejection[5]	55	60		dB
7.6.11	Clear Channel Detection Level	-105			dBm

	Parameter	Min	Typ	Max	Units
7.6.12	Deviation[6]		48		kHz

Notes:
1. A duplex channel includes one base-to-handset frequency and one handset-to-base frequency
2. RF test signal: 1 kHz audio signal FM modulated onto an RF carrier with ±25 kHz deviation
3. Acoustic level into artificial ear tested at normal (low) volume level
4. Measured at telephone line interface across 900 Ω termination
5. RF level of desired signal set to provide 25 dB SINAD (CCITT); rejection is relative level of interference signal above desired signal to reduce SINAD to 20 dB (CCITT)
6. Measured peak-to-peak

7.7 Frequency Allocation Tables

The RF channels for the PDLci MK3 are allocated in fixed pairs as indicated in the tables below. The duplex frequency is maintained at 22.75 MHz for 19 of the 30 channels and 17.95 MHz for the remaining 11 channels.

7.7.1 Base Unit Frequencies

Channel #	Transmit Frequency	Receive Frequency	Rx LO Frequency
1	902.30 MHz	925.05 MHz	914.35 MHz
2	902.60 MHz	925.35 MHz	914.65 MHz
3	902.90 MHz	925.65 MHz	914.95 MHz
4	903.20 MHz	925.95 MHz	915.25 MHz
5	903.50 MHz	926.25 MHz	915.55 MHz
6	903.80 MHz	926.55 MHz	915.85 MHz
7	904.10 MHz	926.85 MHz	916.15 MHz
8	904.40 MHz	927.15 MHz	916.45 MHz
9	904.70 MHz	927.45 MHz	916.75 MHz
10	905.00 MHz	927.75 MHz	917.05 MHz
11	902.45 MHz	925.20 MHz	914.50 MHz
12	902.75 MHz	925.50 MHz	914.80 MHz
13	903.05 MHz	925.80 MHz	915.10 MHz
14	903.35 MHz	926.10 MHz	915.40 MHz
15	903.65 MHz	926.40 MHz	915.70 MHz
16	903.95 MHz	926.70 MHz	916.00 MHz
17	904.25 MHz	927.00 MHz	916.30 MHz
18	904.55 MHz	927.30 MHz	916.60 MHz
19	904.85 MHz	927.60 MHz	916.90 MHz
20	905.15 MHz	923.10 MHz	912.40 MHz
21	905.45 MHz	923.40 MHz	912.70 MHz

Channel #	Transmit Frequency	Receive Frequency	Rx LO Frequency
22	905.75 MHz	923.70 MHz	913.00 MHz
23	906.05 MHz	924.00 MHz	913.30 MHz
24	906.35 MHz	924.30 MHz	913.60 MHz
25	906.65 MHz	924.60 MHz	913.90 MHz
26	905.30 MHz	923.25 MHz	912.55 MHz
27	905.60 MHz	923.55 MHz	912.85 MHz
28	905.90 MHz	923.85 MHz	913.15 MHz
29	906.20 MHz	924.15 MHz	913.45 MHz
30	906.50 MHz	924.45 MHz	913.75 MHz

7.7.2 Handset Frequencies

Channel #	Transmit Frequency	Receive Frequency	Rx LO Frequency
1	925.05 MHz	902.30 MHz	913.00 MHz
2	925.35 MHz	902.60 MHz	913.30 MHz
3	925.65 MHz	902.90 MHz	913.60 MHz
4	925.95 MHz	903.20 MHz	913.90 MHz
5	926.25 MHz	903.50 MHz	914.20 MHz
6	926.55 MHz	903.80 MHz	914.50 MHz
7	926.85 MHz	904.10 MHz	914.80 MHz
8	927.15 MHz	904.40 MHz	915.10 MHz
9	927.45 MHz	904.70 MHz	915.40 MHz
10	927.75 MHz	905.00 MHz	915.70 MHz
11	925.20 MHz	902.45 MHz	913.15 MHz
12	925.50 MHz	902.75 MHz	913.45 MHz
13	925.80 MHz	903.05 MHz	913.75 MHz
14	926.10 MHz	903.35 MHz	914.05 MHz
15	926.40 MHz	903.65 MHz	914.35 MHz
16	926.70 MHz	903.95 MHz	914.65 MHz
17	927.00 MHz	904.25 MHz	914.95 MHz
18	927.30 MHz	904.55 MHz	915.25 MHz
19	927.60 MHz	904.85 MHz	915.55 MHz
20	923.10 MHz	905.15 MHz	915.85 MHz
21	923.40 MHz	905.45 MHz	916.15 MHz
22	923.70 MHz	905.75 MHz	916.45 MHz
23	924.00 MHz	906.05 MHz	916.75 MHz

Channel #	Transmit Frequency	Receive Frequency	Rx LO Frequency
24	924.30 MHz	906.35 MHz	917.05 MHz
25	924.60 MHz	906.65 MHz	917.35 MHz
26	923.25 MHz	905.30 MHz	916.00 MHz
27	923.55 MHz	905.60 MHz	916.30 MHz
28	923.85 MHz	905.90 MHz	916.60 MHz
29	924.15 MHz	906.20 MHz	916.90 MHz
30	924.45 MHz	906.50 MHz	917.20 MHz

7.8 Safety Specifications

	Parameter	Min	Typ	Max	Units
7.8.1	HI POT current[1]			5	mA

Notes: 1. Current drawn when 1 kV is applied simplex on tip and ring for 60 s

7.9 Factory Settings (Product Level)

The default factory settings for the telephone are as follows:

	Parameter	Setting
7.9.1	Handset Ringer Volume	3 (high)
7.9.2	Handset Ring Type	1
7.9.3	Handset Receiver Volume	2
7.9.4	Base Ringer Volume	High
7.9.5	Base Speaker Volume	1
7.9.6	Dial Mode	Tone
7.9.7	Directory Locations	All locations empty
7.9.8	Speed Dial Locations	All locations empty
7.9.9	Caller ID Records	All records cleared
7.9.10	Visual Message Waiting Indicator	Cleared
7.9.11	Flash time	(650 ms)
7.9.12	Pulse Dialling Break Duration	(60 ms)
7.9.13	Pulse Dialling Make Duration	(40 ms)
7.9.14	*Voice Announcement*	*(all)*
7.9.15	ITAD – Answering Machine On/Off	(on)

	Parameter	Setting
7.9.16	ITAD – Mailboxes	All mailboxes empty
7.9.17	ITAD – Personalised Greetings	All messages cleared
7.9.18	ITAD – Call screening	(enabled)
7.9.19	ITAD – Number of rings	(4)
7.9.20	ITAD – PIN	19
7.9.21	ITAD – Day & Time	(Monday, 12:00AM)
7.9.22	ITAD – Audible Message Alert	(disabled)
7.9.23	ITAD – Announce Only	(disabled)
7.9.24	*ITAD – Privacy Screening*	*(disabled)*

TITLE	Internal Product Specification
MODEL	PDLci MK3 - 900MHz Single-Line Digital Cordless Telephone with Caller ID, Speakerphone & Base Keypad

8 Detailed Electrical Specifications

8.1 Chassis Temperature

	Parameter	Min	Typ	Max	Units
8.1.1	AC Adapter Case Surface Temperature[1,2]			50	°C
8.1.2	Handset Chassis Surface Temperature[1,3]			35	°C
8.1.3	Base Chassis Surface Temperature[1,3]			35	°C

Notes:
1. Ambient temperature = 25°C
2. Operate continuously for 24 hours at rated load of 150 mA

8.2 Detailed DC Electrical Characteristics

Specifications marked with * are guaranteed at the nominal testing temperature and voltage on all units with the use of automated production test equipment (ATE)

	Parameter	Min	Typ	Max	Units
8.2.1	Base Unit Current - Standby Mode[1,2]	35	45	55	mA
8.2.2	Base Unit Current - Talk Mode[1,2]	55	65	75	mA
8.2.3	Handset Current - Sleep Sub-mode[3]	3	4	12	mA
8.2.4	Handset Current - Wake Sub-mode	38		60	mA
8.2.5	Handset Current - Talk Mode	58		95	mA
8.2.6	Handset Sleep Duration - Standby Mode				ms
8.2.7	Handset Wake Duration - Standby Mode			95	ms
8.2.8	Reset Threshold (HS) – voltage falling/shutdown		3.5		Vdc
8.2.9	Reset Threshold (HS) – voltage rising		3.4		Vdc
8.2.10	Battery Dead Shutdown (HS)			3.2	Vdc
8.2.11	Handset Charge Current		60		mA
8.2.12	Spare Battery Charge Current		30		mA
8.2.13	Loaded Cradle Charge Contact Voltage[4]	3.3		4.3	V
8.2.14	Loaded Spare Battery Charge Contact Voltage[4]	1.7		2.5	V

Notes:
1. DC current from 9 V power supply
2. Cradle and spare battery charge currents = 0 mA
3. Average current per cycle (not MCU current consumption)
4. Voltage measured across a 50 Ω charge circuit load resistor

8.3 Detailed Audio Specifications

Specifications marked with * are guaranteed at the nominal testing temperature and voltage on all units with the use of automated production test equipment (ATE).

	Parameter	Min	Typ	Max	Units
8.3.1	Transmit Objective Loudness Rating (TOLR) @ 9 kft[1,2]	-38	-44	-51	dB
8.3.2	Transmit Objective Loudness Rating (TOLR) @ 15 kft[1,2]	-36	-42	-49	dB
8.3.3	Receive Objective Loudness Rating (ROLR) @ 9 kft[3,,4]	53	48	43	dB
8.3.4	Receive Objective Loudness Rating (ROLR) @ 15 kft[3,4]	55	50	45	dB
8.3.5	Sidetone Objective Loudness Rating (SOLR) @ 9 kft[5]	19	8	3	dB
8.3.6	Sidetone Objective Loudness Rating (SOLR) @ 15 kft[5]	19	8	3	dB
8.3.7	Receive Direction (Handset Background) Noise[6,7]			40	dB(A)

Notes:
1. Tested in accordance with EIA 470-B, paragraph 4.2.1.2
2. Transmit frequency response, when tested in accordance with EIA 470-B, paragraph 4.2.1.3, meets requirements in table 3
3. Tested at normal (low) volume level, in accordance with EIA 470-B, paragraph 4.2.2.2
4. Transmit frequency response, when tested in accordance with EIA 470-B, paragraph 4.2.2.3, meets requirements in table 4
5. Tested in accordance with EIA 470-B, paragraph 4.2.3.2, methods (d) and (e)
6. Tested at normal (low) volume level
7. Handset isolated from sound input and mechanical disturbances

8.4 Detailed Telephone Line Interface Specifications

Specifications marked with * are guaranteed at the nominal testing temperature and voltage on all units with the use of automated production test equipment (ATE).

	Parameter	Min	Typ	Max	Units
8.4.1	Off Hook AC Impedance[1]		600		Ω
8.4.2	Off Hook DC Resistance[2]		220		Ω

Notes:
1. Measured at 1 kHz, -20 dBV_{oc} with 20 mA loop current applied to tip and ring
2. Measured with 20 mA loop current applied to tip and ring

8.5 Detailed Radio Specifications

Specifications marked with * are guaranteed at the nominal testing temperature and voltage on all units with the use of automated production test equipment (ATE).

	Parameter	Min	Typ	Max	Units
8.5.1	RF Channel Spacing		150		kHz
8.5.2	IF Frequency		10.70		MHz

TITLE	Internal Product Specification
MODEL	PDLci MK3 - 900MHz Single-Line Digital Cordless Telephone with Caller ID, Speakerphone & Base Keypad

	Parameter	Min	Typ	Max	Units
8.5.3	Handset Transmit Power	-7.5		-2.5	dBm
8.5.4	Base Unit Transmit Power	-7.5		-2.5	dBm
8.5.5	Handset FM Peak Deviation; Acoustic Test Tone[1]	23	25	27	kHz
8.5.6	Base Unit FM Peak Deviation; Audio Test Tone[2]	24	25	26	kHz
8.5.7	Base & Handset FM Peak Deviation - Overload Level[3]		40		kHz
8.5.8	Base FSK Peak Deviation - Data	35	40	45	kHz
8.5.9	Handset FSK Peak Deviation - Data	30	40	55	kHz
8.5.10	Receiver Sensitivity – 25 dB SINAD[4]		-110		dBm
8.5.11	Intermodulation[5,6]	55	60		dB
8.5.12	Co-channel Rejection	-14	-10		dB
8.5.13	Open Field Range – clear talking				Metres
8.5.14	Open Field Range – useable				Metres
8.5.15	Minimum Channel Searching Time				ms

Notes:
1. Acoustic test tone: 1 kHz tone, 97 dBspl at artificial mouth output
2. Audio test tone: 1 kHz tone, -5 dBV open circuit voltage from 900 Ω source
3. Overload level corresponds to acoustic overload of 103 dBspl (transmit and receive)
4. Measured through a CCITT audio weighting filter
5. RF level of desired signal set to provide 25 dB SINAD (CCITT); rejection is relative level of interference signal above desired signal to reduce SINAD to 20 dB (CCITT)
6. Interfering carriers injected at ±600 kHz and ±1200 kHz offset from the desired signal.

8.6 Product Reliability

The product will be designed to meet guidelines specified by document WAQ9082.

8.7 EEPROM Parameter Settings

These settings will be available after Prototype Assembly.