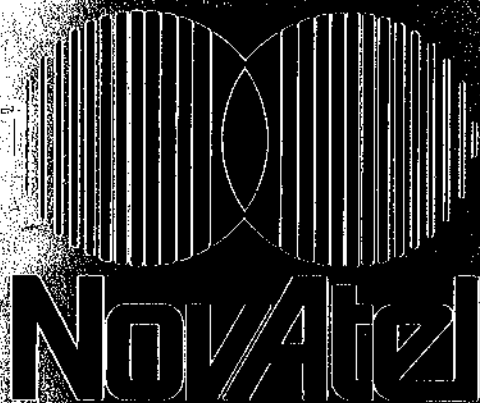# TRAINING MANUAL

Model 8300/8301/8305   Cellular Telephone

NovAtel

Air International Pty Ltd

January 1988

Manual Part No: 700-0096

NovAtel 8300/8301/8305 Training Manual

Table of Contents

Fig. 1 System Network

This diagram represents any given area to be served by a Cellular Mobile Telephone System. This area is divided into smaller regions with slightly overlapping borders. These smaller regions are known as cells. Each cell is equipped with its own radio transmitter, receiver, and control equipment. Collectively, this equipment is known as a 'cell site'.

Each 'cell site' transmitter broadcasts relatively low power radio signals on a specific group of preassigned frequencies. Each signal (from this cell site) is intended to communicate with mobile units primarily within this cell. Each cell has a unique paging channel and SAT allocated to it for location purposes.

Accordingly, each mobile radio broadcasts a similarly low power signal to the 'cell site' receiver within its cell, thereby further minimising the potential for interference to surrounding cells (see Figure 1).

All 'cell sites' are connected to a mobile subscriber switching centre (MSSC) by land lines or microwave radio links. The MSSC is a computerised telephone switch connected by land lines to the public telephone network through which all calls to and from land line subscribers (telephones) are routed.

With proper location of cell sites within the area of mobile telephone service ensuring coverage, and low power transmitter operation minimising channel interference, the added benefit of up to 624 voice channels divided strategically among cells further enhances the performance of a cellular system.

This division or grouping of frequencies, coupled with the use of low power transmissions, allows the same frequencies to be re-used over and over in non-adjacent cells. Again, this contributes to the use of available channels by many more subscribers than in conventional systems (see Figures II, III, and IV).

In addition to the various omni antenna re-use patterns, frequency re-use may also occur through the use of sectored antennas. Again a key purpose of sectored patterns is to provide more channels in a given area while still not exceeding 624 total voice channels. However, sectored antenna patterns have other benefits also, such as directional use near mountains, hill, water and other terrain coverage and/or location identification. These are technical factors which are considered by systems design engineers and are not important to the function of the mobile unit (see Figures V and IV for example).

There is also one other device employed in the frequency re-use designs. And that is the use of Supervisory Audio Tones (or SAT tones) to help provide additional protection against a mobile trying to talk on the same frequency at two separate cell sites. The cellular system concept utilises 3 SAT tones (5970 Hz, 6000 Hz and 6030 Hz) which are sent by the base/MSC and transponded (repeated by the mobile). If the SAT tone returned by a mobile is not the same sent by a cell site, the MSSC will not accept the call and a 'Hand Off' will be initiated. Thus a cellular system employs both a space separation of the same frequency plus a supervisory tone to minimise co-channel interference (see Figure VI for an example).

A key factor in the ability of a cellular system to provide effective communications between cells is the process known as 'Hand Off'. As a mobile moves through a cell, its radio signal is picked up by the closest antenna/tower. As the mobile approaches the edge of the cell, its signal will become weaker within that cell. At the same time, the mobiles signal will grow stronger as it moves toward the next cell and into it.

The MSSC the strength of the mobiles signals in those calls nearest the mobile radio. At some point, the MSSC will decide to switch the mobile's signal to the new cell where the signal is now the strongest. This is 'Hand-Off' and is generally performed so smoothly in 0.2 second that subscribers don't even know its happening. This delay may slow down data/fax transmissions if used.

If any one cell becomes too crowded as the number of mobile users on the system grows, the capacity can be increased by subdividing the cell into smaller cells, again re-using some of the same frequencies and reducing the power accordingly. This is called cell splitting.

To summarise, Cellular means

1. The city (or other area) is divided into small, lower powered cells.

2. Calls are routed through the nearest cell to the MSSC to the Public Telephone Network, or vice versa.

3. Calls are 'Handed Off' from cell to cell as a mobile moves through a city (or other area).

4. Frequencies can be re-used in non adjacent cells.

5. Cells can be subdivided, or split, into smaller cells to accommodate heavy user demand in particular areas as the number of mobile users increase.

6. Virtually unlimited channel capacity exists to handle mobile telephone conversations, the upper limit is typically 60,000 subscribers per MSSC.

7. Profit.

1. Use about 666 (832 extended) ultra high frequency, duplex channels in a system with limited antenna height and RF power to minimise and control the area coverage to allow multiple frequency re-use in order to maximise total number of subscriber calls that can simultaneously to be made in a given city.

2. Total, wide-area coverage is accomplished through electronic hand-off from one site (cell) to another, under the control of an electronic central switch.

3. Mobile power and frequency assignment is controlled by the MSSC to also aid in controlling the coverage in order to increase frequency re-use for maximum simultaneous calls per city.

4. Unique subscriber identification on a Worldwide basis, minimises the ability of hackers to piggy-back onto another subscriber number. Older systems had no protection against multiple users operating under the same telephone number,

5. A grade of service (0.04 in Australia) and speech quality consistant with the conventional wired telephones, in use by any Telecom Administration.
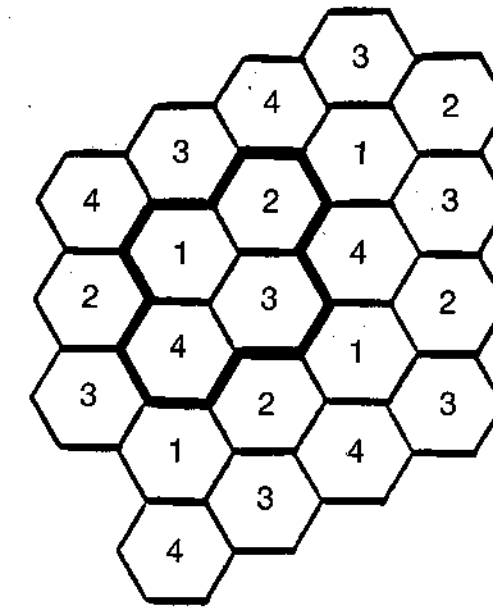
Figure II. 4 Cell Pattern
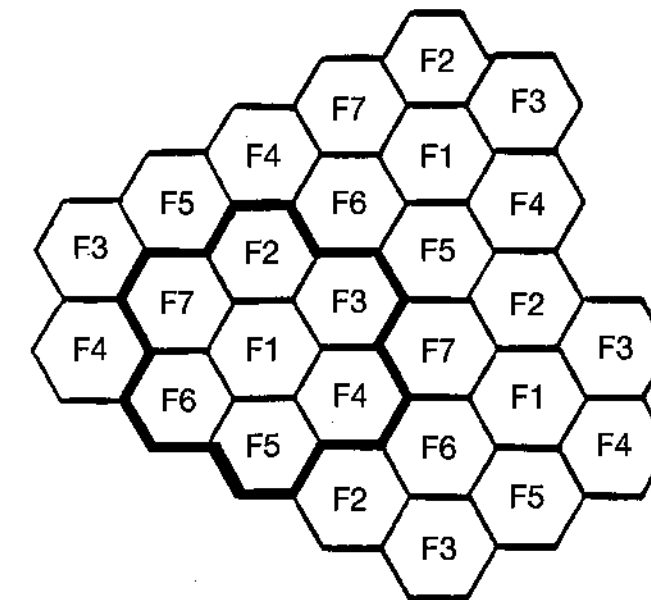
Figure III. 7 Cell Pattern (Used in Australia)

Cell A
FI

Cell B
F2

Cel C
FI

Radio communicates with this cell initially

'Hand Off' occurs here in 0.2 seconds

Radio now communicates with this cell only

Side View Fig. IV

Cell A

Cell B

Cell C
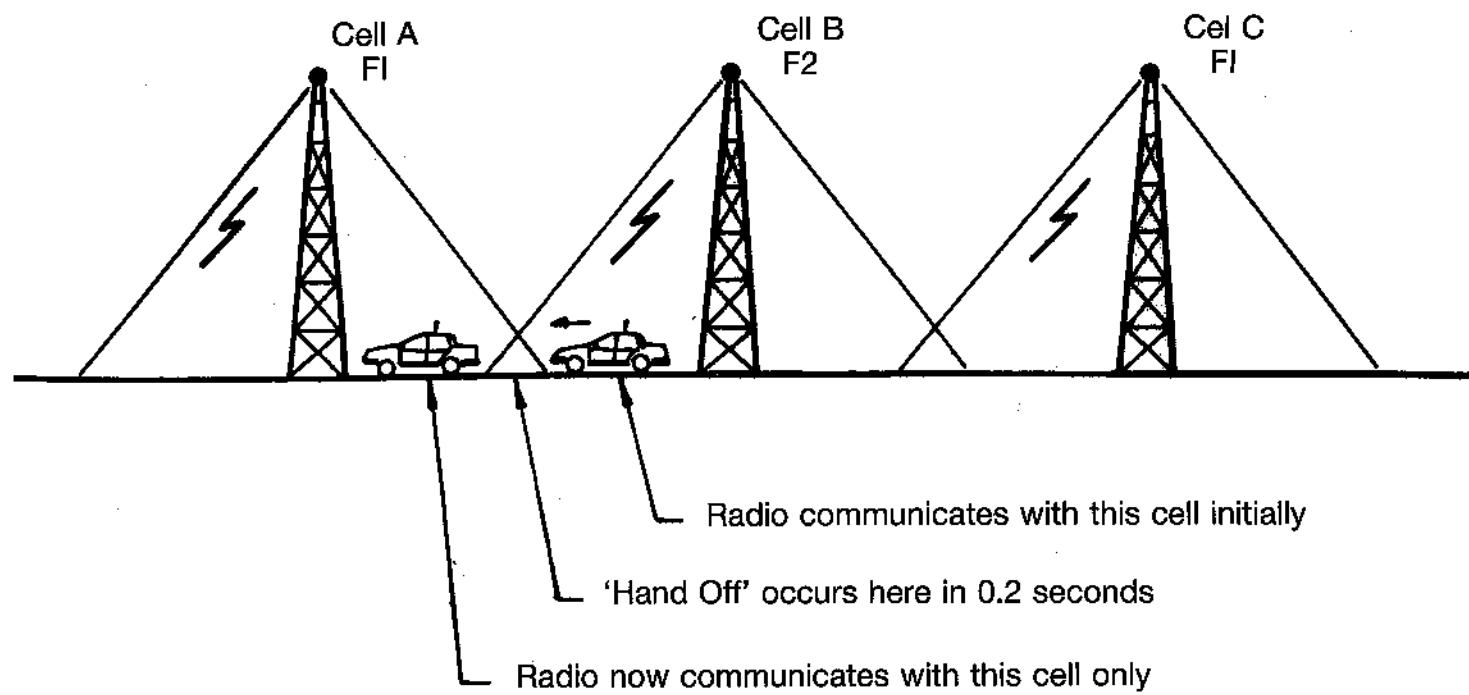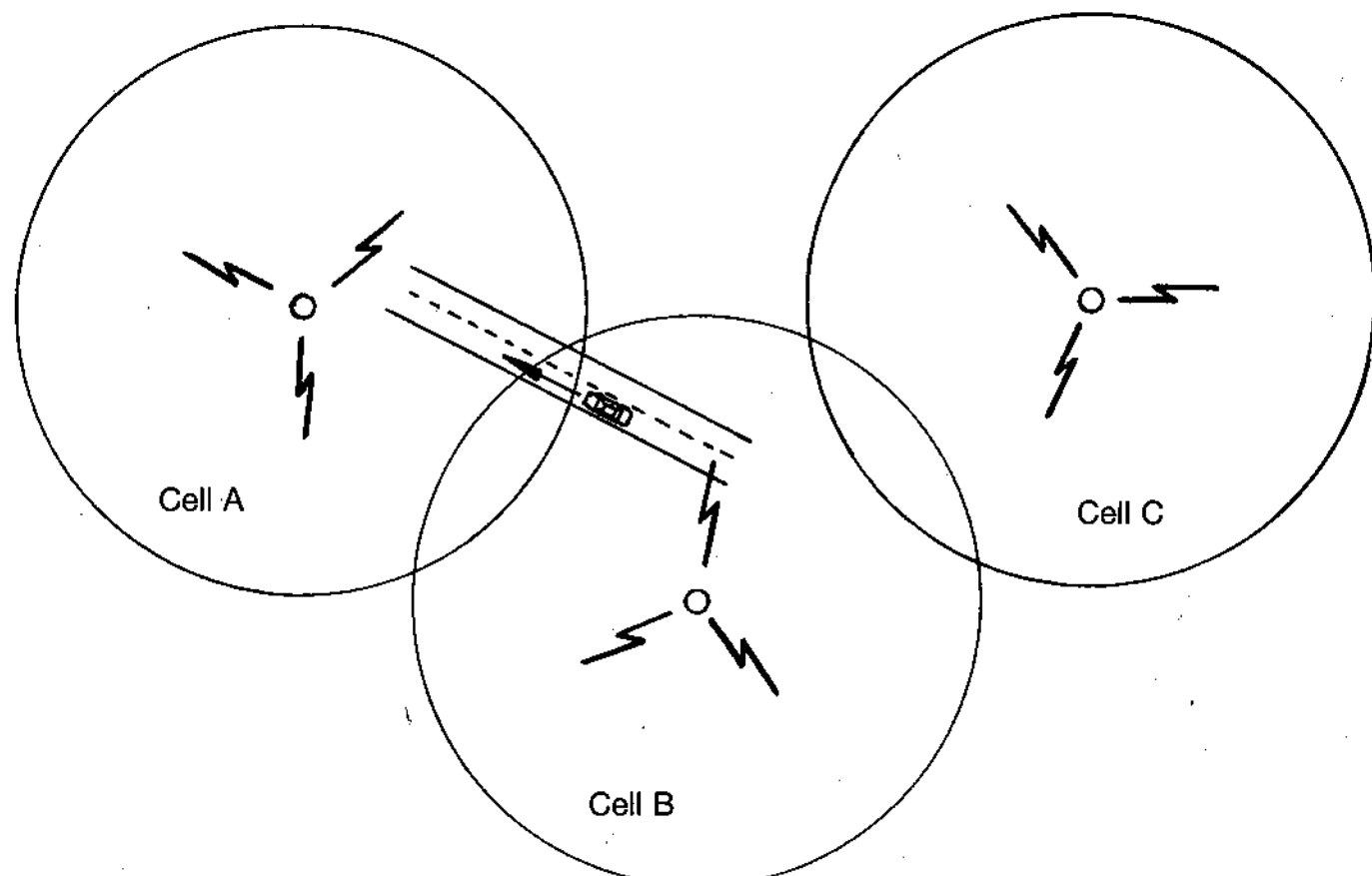
Top View Fig. V

SAT SPATIAL ALLOCATION
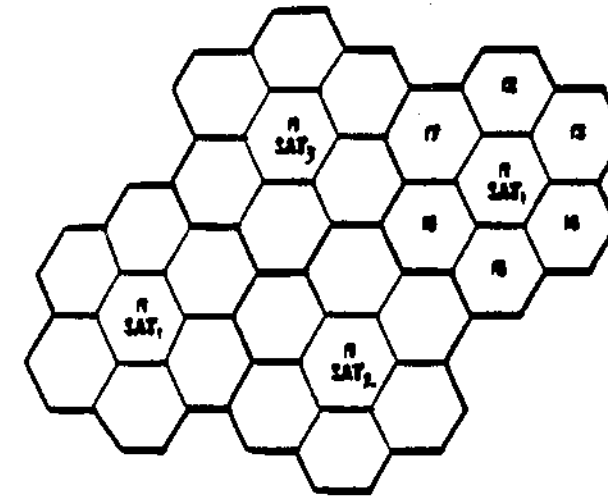
SAT1: 5,970 Hz
SAT1: 6,000 Hz
SAT3: 6,030 Hz

Figure VI

SAT: SUPERVISORY AUDIO TONE (5970, 6000, 6030 Hz)
   – TRANSMITTED BY CELL SITE AND TRANSPONDED BY MOBILE

ST: SIGNALLING TONE (10kHz)
TRANSMITTED BY MOBILE TO:
1) CONFIRM ORDERS
2) SIGNAL FLASH REQUESTS
3) SIGNAL RELEASE REQUESTS

8300
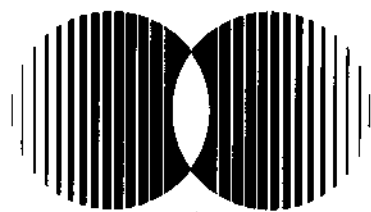
NovAtel

PRODUCT
CONFIGURATION
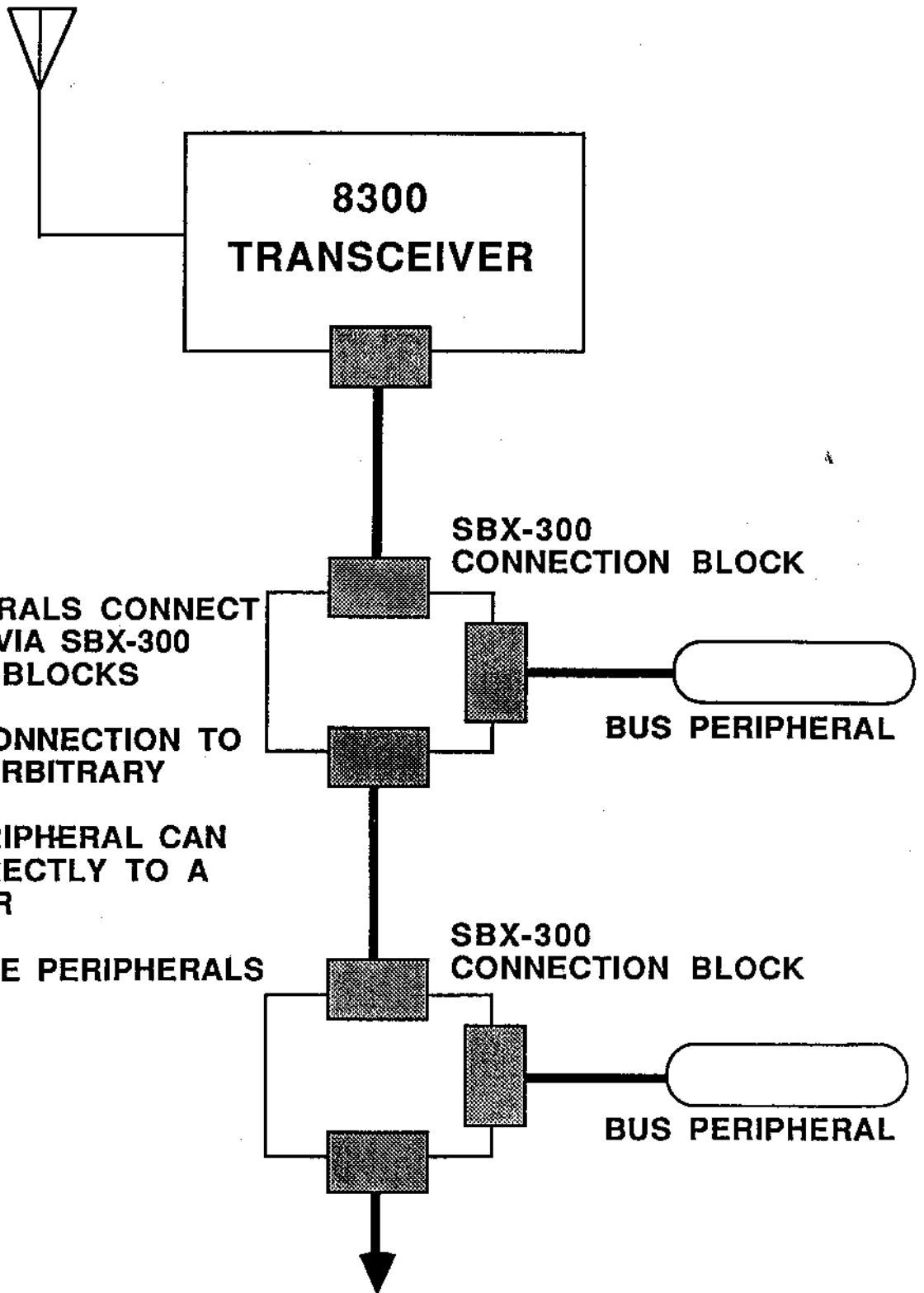
8300 TRANSCEIVER

RULES:

ALL PERIPHERALS CONNECT TO THE BUS VIA SBX-300 CONNECTOR BLOCKS

ORDER OF CONNECTION TO THE BUS IS ARBITRARY

A SMART PERIPHERAL CAN CONNECT DIRECTLY TO A TRANSCEIVER

CABLE TO THE PERIPHERALS IS SHIELDED

SBX-300 CONNECTION BLOCK

BUS PERIPHERAL

SBX-300 CONNECTION BLOCK

BUS PERIPHERAL

8 PIN MODULAR CONNECTOR

STAR CONNECTION

HAND SETS

TRANSCEIVER

JUNCTION
BOX

BUS CONNECTION

HAND SETS

TRANSCEIVER

CCU

NovAtel Communications, Ltd.

TRANSCEIVER

GCH-300
SMART HANDSET

ALT-300/ATG-300
ALERT TONE

TRANSCEIVER

GCH-300
SMART HANDSET

ALT-300 ONLY
ALERT TONE

SHS-300
SIMPLE HANDSET

TRANSCEIVER

GCH-300
SMART HANDSET

SBX-300
SPLITTER BOX

SPK-300
SPEAKER KIT

HFU-300
HANDSFREE UNIT

EXTERNAL MIC
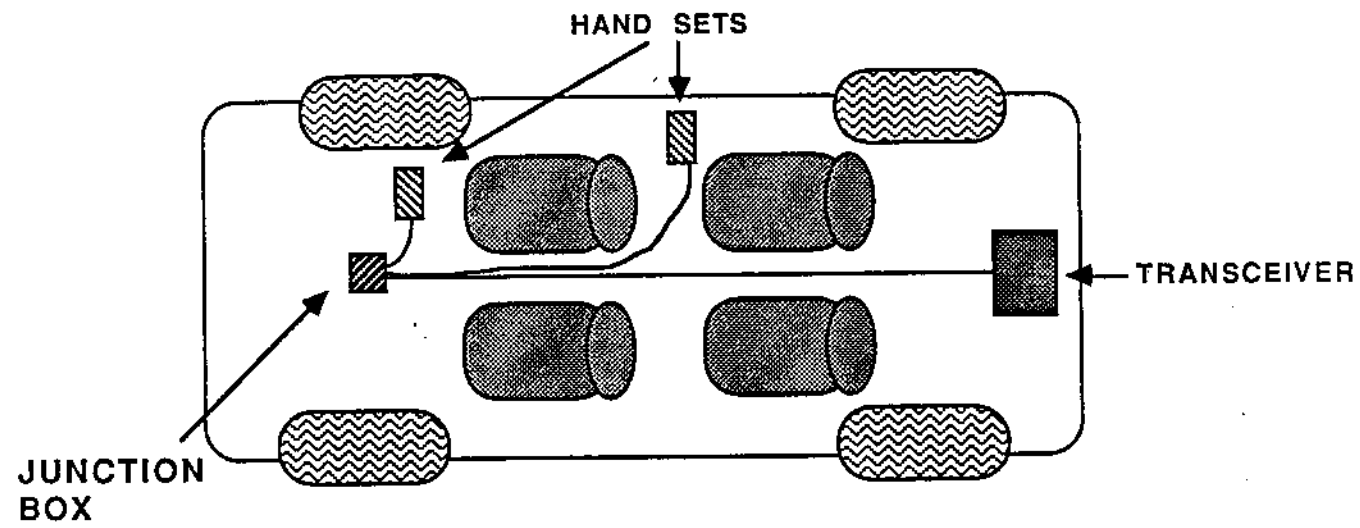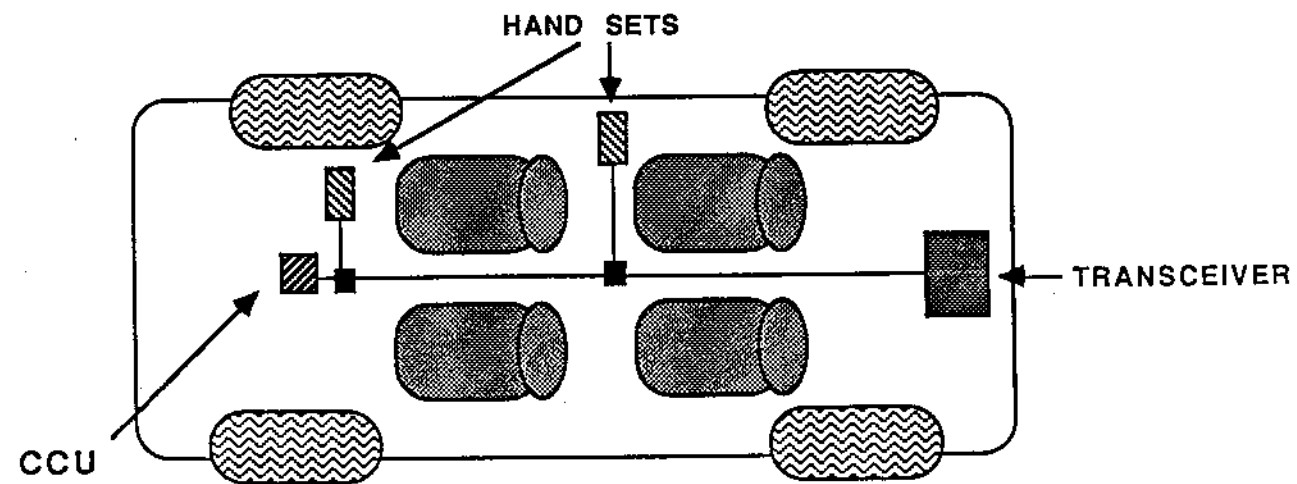
8300 NovAtel
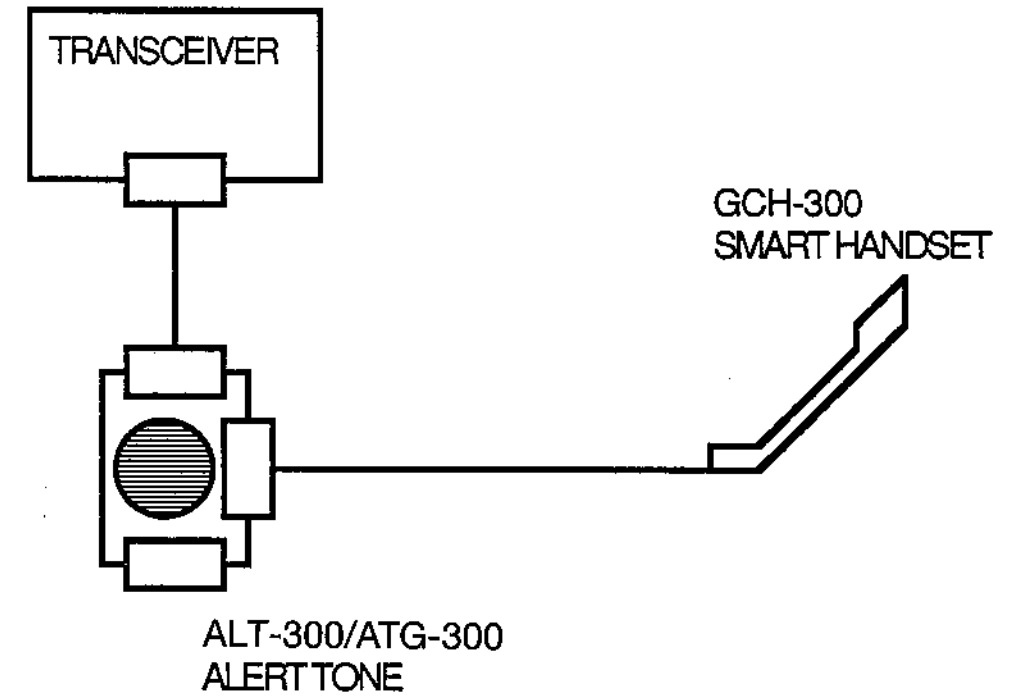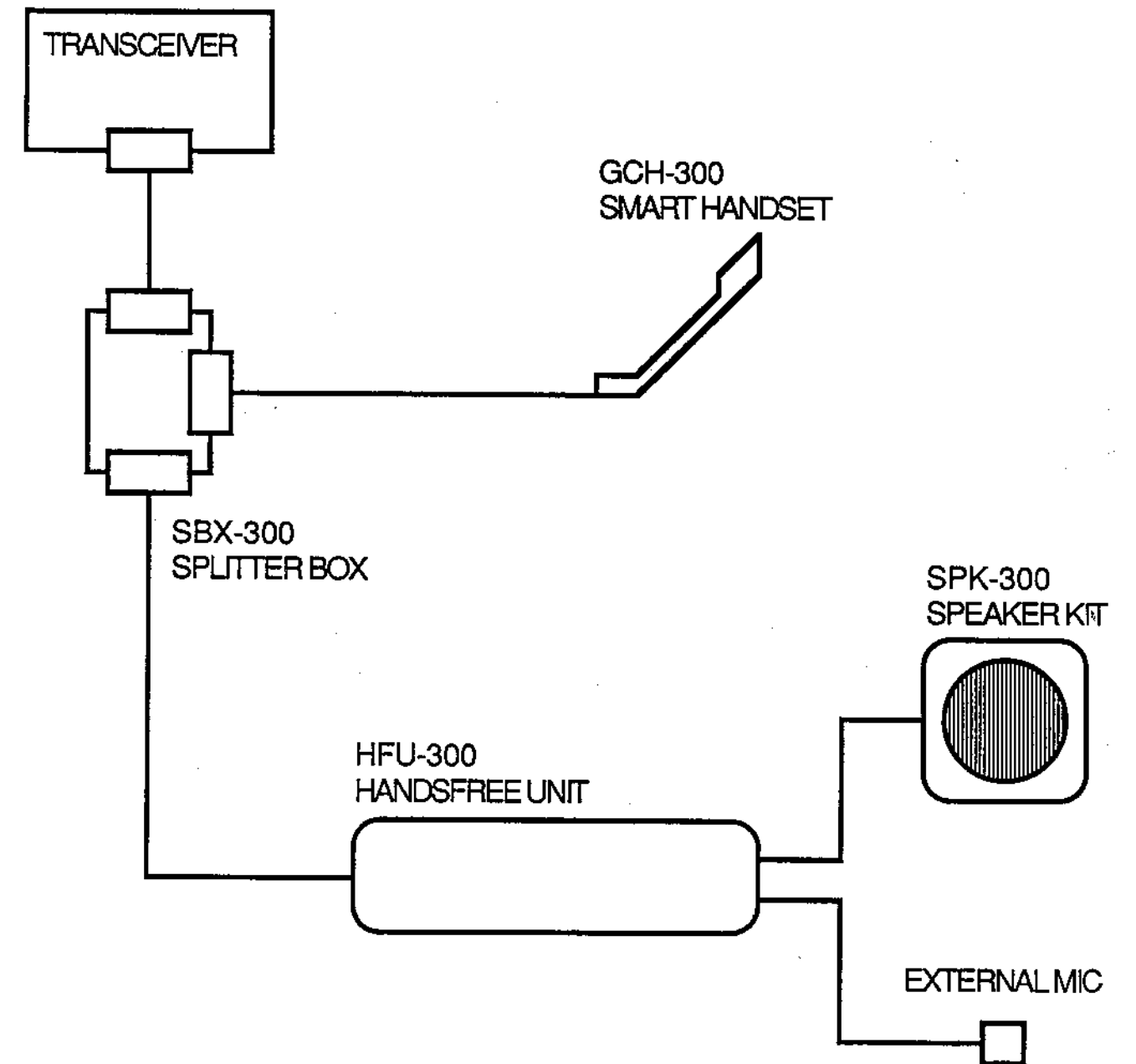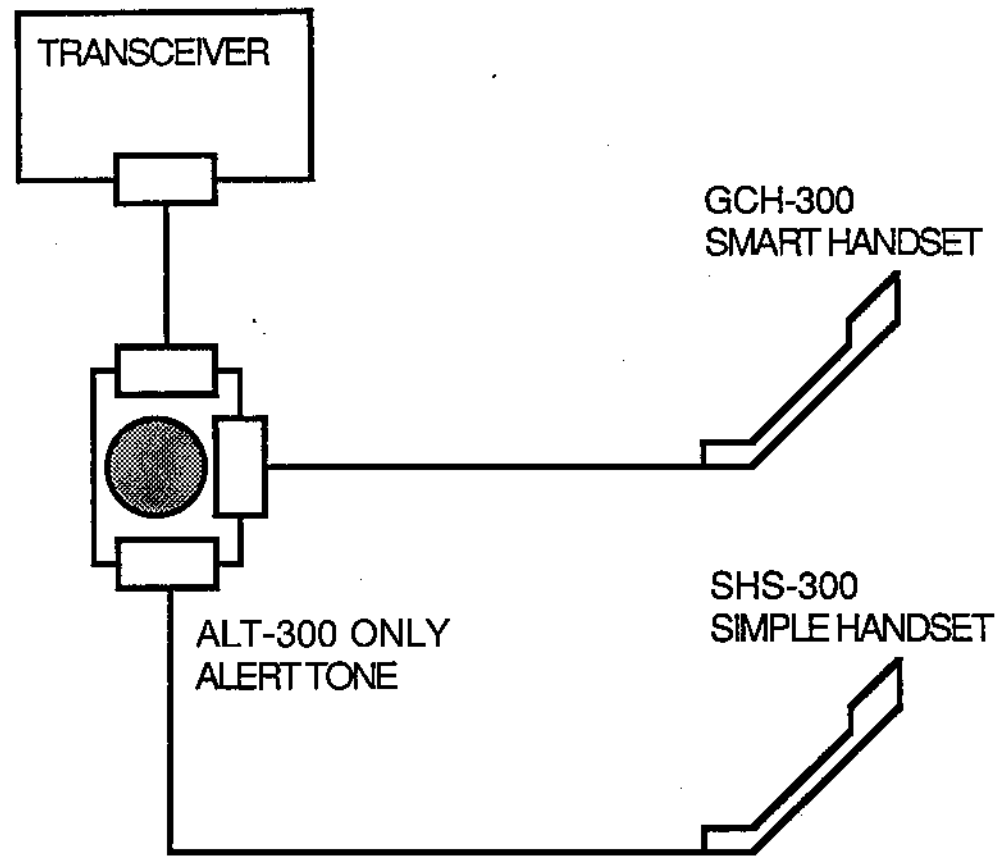
PRODUCT
OPERATION

READY means that the radiotelephone is ready to make a call. NOSVC means that no cellular service is available at present. NOSVC also appears briefly when the phone is first turned on and when a call is ended.

The second line of the display indicates system preference status. For example, 'PREF, -A-' indicates you prefer system A.

Along the top edge of the display are four status indicators: 'ROAM' indicates that you are not presently in service on your home system. 'NoSvc' indicates that no cellular service is available. 'Horn' indicates that the horn feature is activated. 'InUse' appears during a call and indicates that air time is being used.
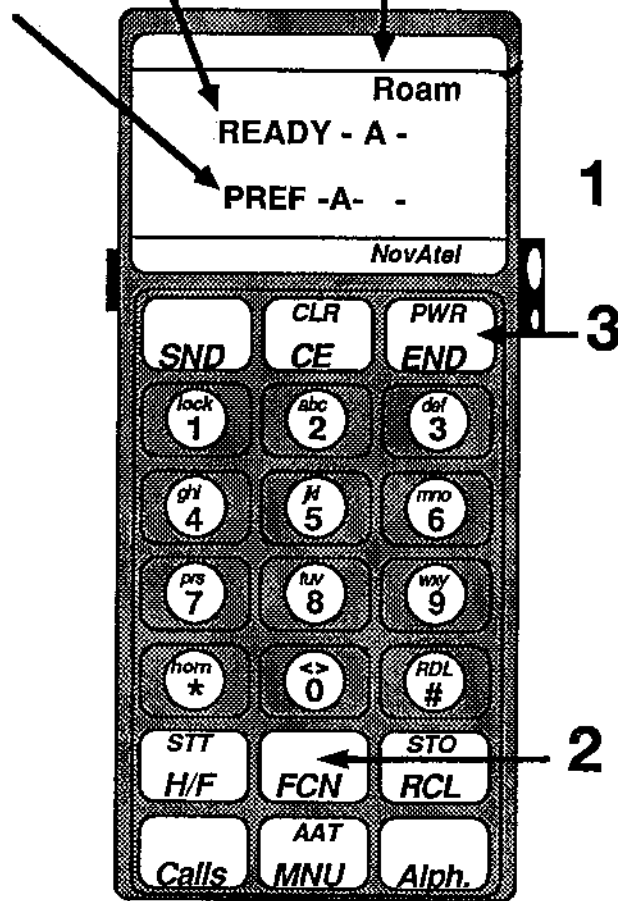
1   **YOUR VEHICLE IGNITION MUST BE TURNED ON.**

3

2

The key sequence FCN PWR END will turn the power on, also turns it off. The power to your radiotelephone turns off automatically when you turn off your vehicle ignition.

If a call is in progress when you turn off the vehicle ignition, the phone stays on until you end the call.

InUse
THE NUMBER YOU
ARE CALLING WILL
APPEAR HERE.

| A-B | CLR | PWR |
| SND | CE | END |

lock 1	abc 2	def 3
ghi 4	jkl 5	mno 6
prs 7	tuv 8	wxy 9
horn *	0	RDL #

| STT H/F | FCN | STO RCL |
| Calls | AAT MNU | Alph. |

1 ENTER THE NUMBER THAT YOU WISH TO CALL ON THE KEYPAD

2
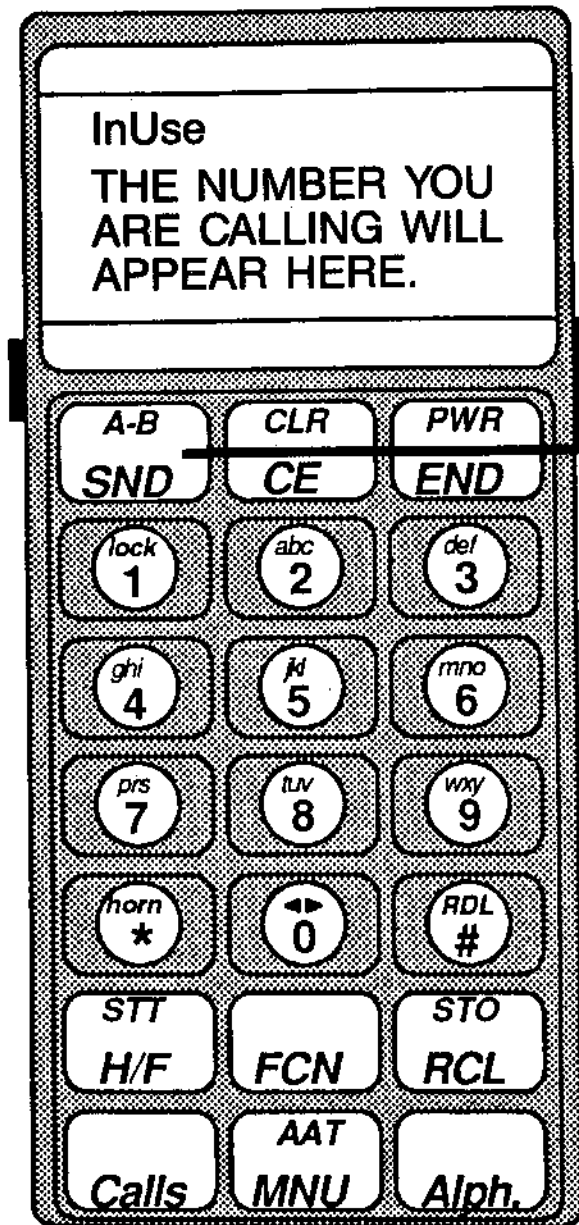
3 THE CALLED PARTY ANSWERS

4 REMOVE THE HANDSET FROM ITS CRADLE AND BEGIN YOUR CONVERSATION

You can also place your call with the handset off-hook. If the called party does not answer, or you get a busy signal, press the END key to terminate the call attempt.

InUse
THE NUMBER YOU
ARE CALLING WILL
APPEAR HERE.

| A-B | CLR | PWR |
| SND | CE | END |

lock 1	abc 2	def 3
ghi 4	jkl 5	mno 6
prs 7	tuv 8	wxy 9
horn *	0	RDL #

| STT H/F | FCN | STO RCL |
| Calls | AAT MNU | Alph. |

1 ENTER THE NUMBER THAT YOU WISH TO CALL ON THE KEYPAD

2
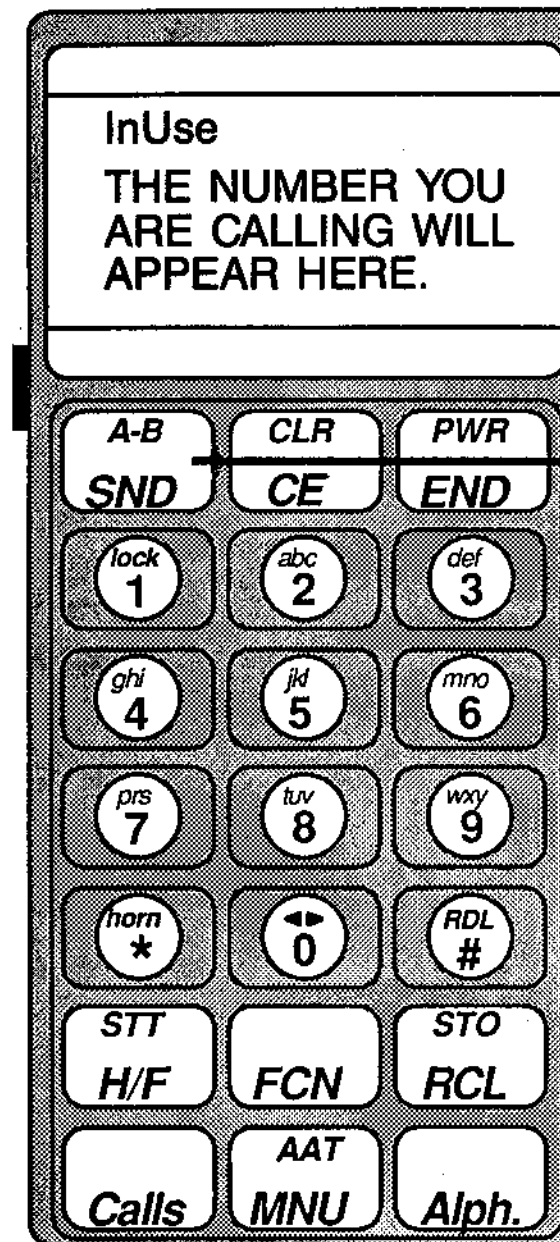
3 THE CALLED PARTY ANSWERS.

CARRY ON YOUR CONVERSATION VIA THE HANDS-FREE

There is no need to remove the handset from its cradle to initiate your hands-free conversation. If the called party does not answer, or you get a busy signal, press the END key to terminate the call.

```
┌─────────────────────────┐
│  InUse                  │
│                         │
│  ┌────┬────┬────┐       │
│  │A-B │CLR │PWR │       │──── 1
│  │SND │CE  │END │       │
│  ├────┼────┼────┤       │
│  │lock│abc │def │       │
│  │ 1  │ 2  │ 3  │       │
│  ├────┼────┼────┤       │
│  │ghi │jkl │mno │       │
│  │ 4  │ 5  │ 6  │       │
│  ├────┼────┼────┤       │
│  │prs │tuv │wxy │       │
│  │ 7  │ 8  │ 9  │       │
│  ├────┼────┼────┤       │
│  │horn│ ◄►│RDL │       │
│  │ *  │ 0  │ #  │       │
│  ├────┼────┼────┤       │
│  │STT │    │STO │       │
│  │H/F │FCN │RCL │       │
│  ├────┼────┼────┤       │
│  │    │AAT │    │       │
│  │Calls│MNU │Alph.│     │
│  └────┴────┴────┘       │
└─────────────────────────┘
```
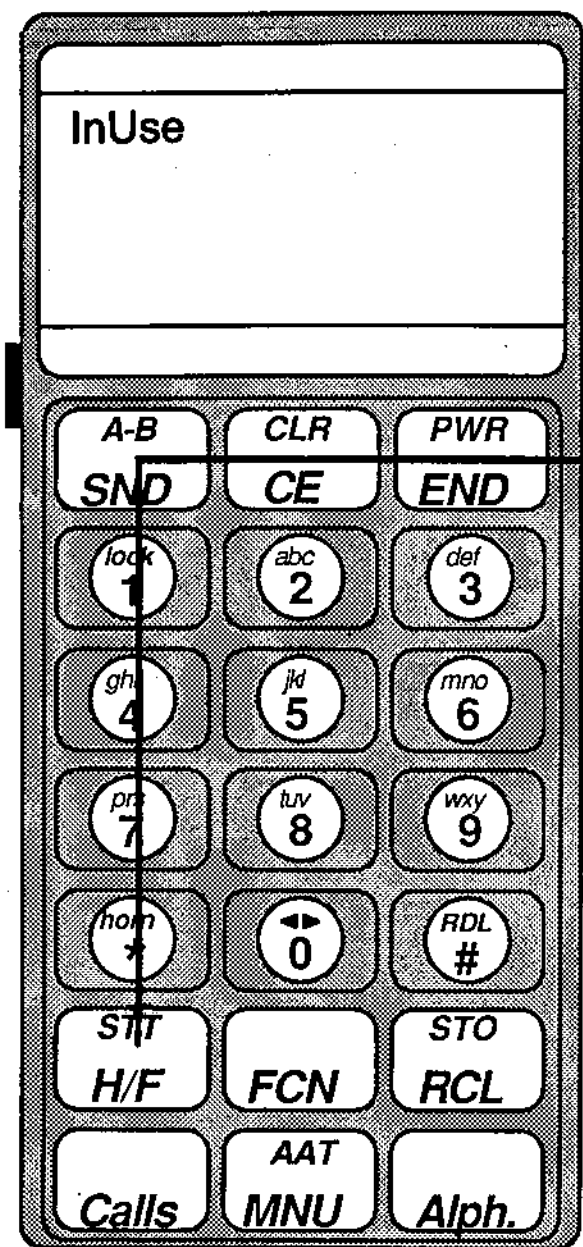
2 REPLACE THE HANDSET ON ITS CRADLE.

Your call will be transferred from the handset to the hands-free unit when the handset is secured on its cradle.

```
┌─────────────────────────┐
│ ◄ INDICATES THERE ARE   │
│   SOME DIGITS PRECEDING │
│   THOSE DISPLAYED       │
│   INDICATES THE DIGITS  │
│   DISPLAYED ARE THE     │
│   LAST GROUP OF DIGITS ►│
│  ┌────┬────┬────┐       │
│  │A-B │CLR │PWR │       │
│  │SND │CE  │END │       │
│  ├────┼────┼────┤       │
│  │lock│abc │def │       │
│  │ 1  │ 2  │ 3  │       │
│  ├────┼────┼────┤       │
│  │ghi │jkl │mno │       │
│  │ 4  │ 5  │ 6  │       │
│  ├────┼────┼────┤       │
│  │prs │tuv │wxy │       │──── 1
│  │ 7  │ 8  │ 9  │       │
│  ├────┼────┼────┤       │
│  │horn│ ◄►│RDL │       │──── 2
│  │ *  │ 0  │ #  │       │
│  ├────┼────┼────┤       │
│  │STT │    │STO │       │
│  │H/F │FCN │RCL │       │
│  ├────┼────┼────┤       │
│  │    │AAT │    │       │
│  │Calls│MNU │Alph.│     │
│  └────┴────┴────┘       │
└─────────────────────────┘
```
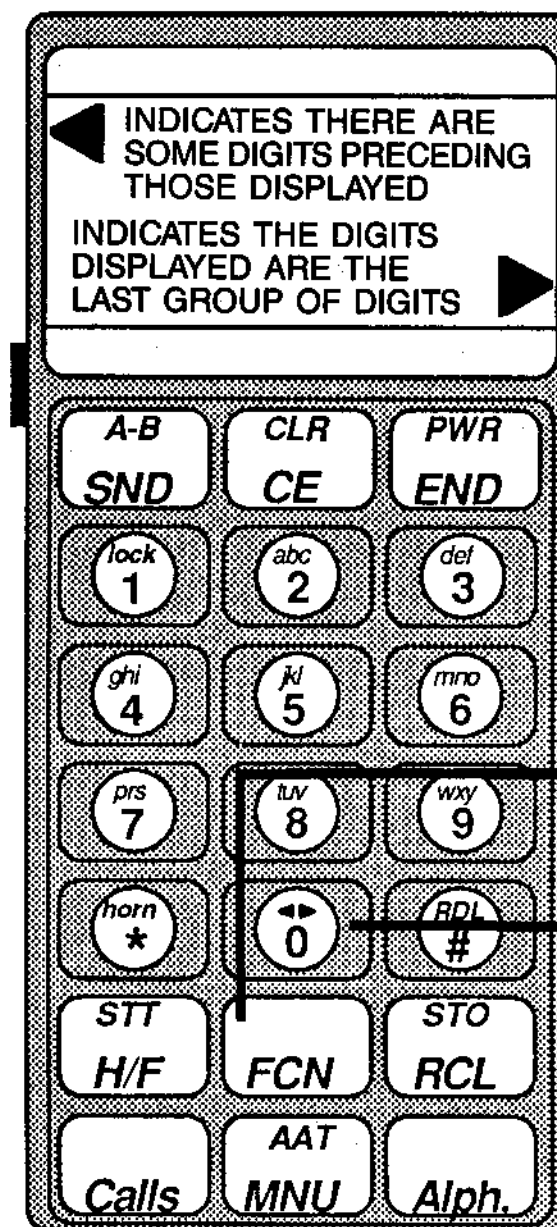
TO VIEW THE PART OF A NUMBER WHICH PRECEDES THAT WHICH IS DISPLAYED. . .

2 KEEP PRESSING THIS KEY TO DISPLAY ANY SUBSEQUENT GROUP OF DIGITS

Your phone can handle numbers up to 32 digits in length but can display only 14 digits at a time. An arrow in the top left corner indicates that there are some numbers preceding those displayed. eg, international numbers which exceed the 14 digit display.

1 REPLACE THE HANDSET ON ITS CRADLE.

OR

Your call will be terminated if you replace the handset on its cradle, or press the end key. To terminate a hands-free call, press the end key.

InUse
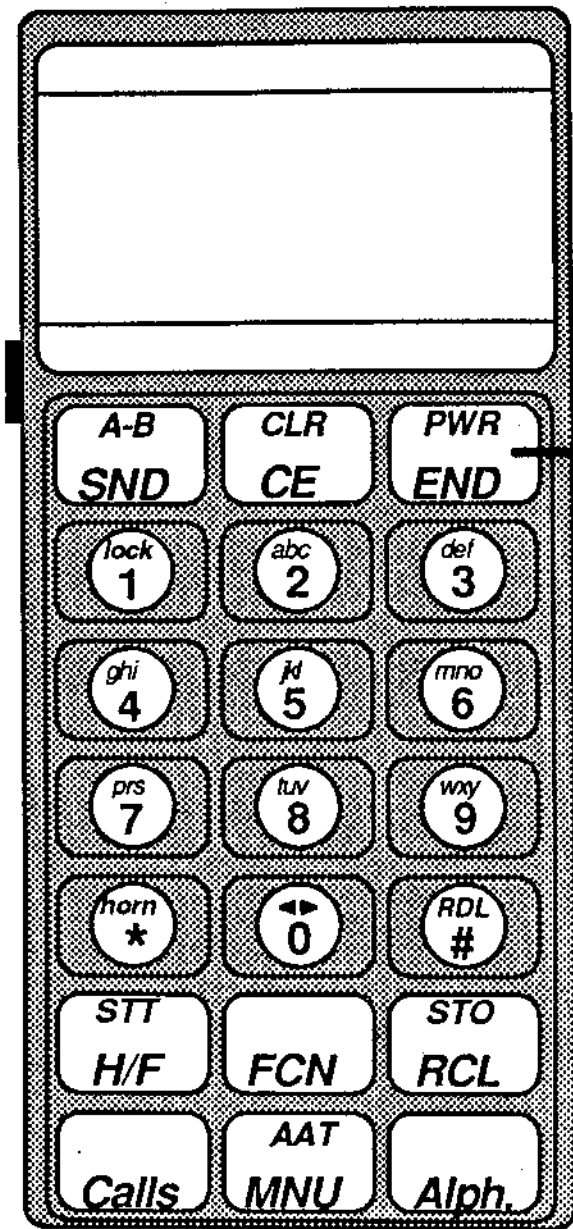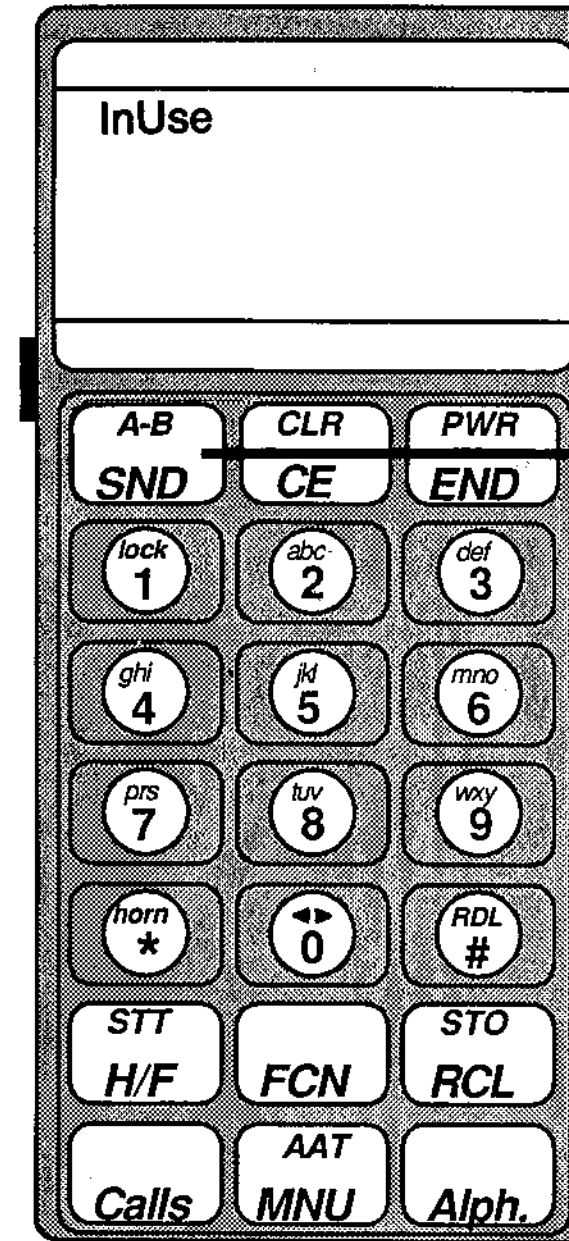
1 HANDSET ON HOOK
Lift the handset off of the cradle and begin your conversation

OR

1 HANDSET OFF HOOK

InUse

A-B	CLR	PWR
SND	CE	END

lock 1	abc 2	del 3
ghi 4	jkl 5	mno 6
prs 7	tuv 8	wxy 9
horn *	0	RDL #

| STT H/F | FCN | STO RCL |
| Calls | AAT MNU | Alph. |

— 1

There is no need to remove the handset from its cradle to initiate your handsfree conversation.

MobileNet can be instructed to automatically divert your incoming calls to another telphone service – mobile or not. This is useful for those times when you are absent from your mobile phone. You can instruct **MobileNet** to divert all calls to your home, office or to a colleague's telephone service.

There are three types of Call Diversion
- **Unconditional Call Diversion**
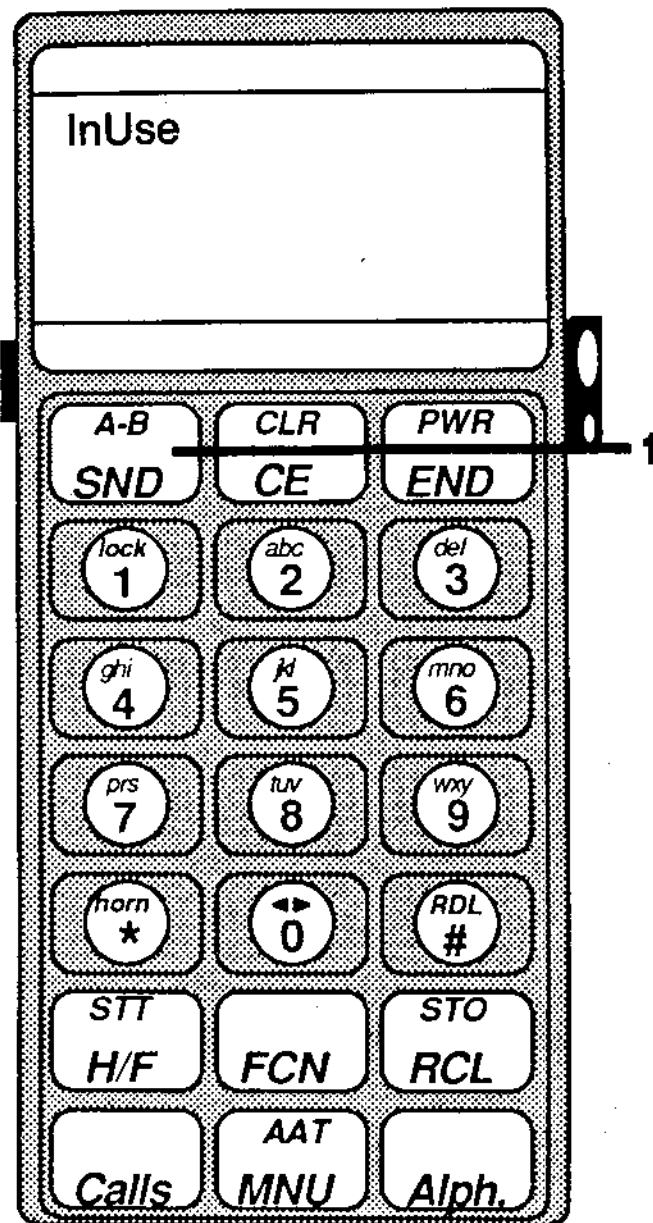- **Diversion on No Reply**
- **Diversion on Busy**

The three types of diversion can be set to
- **Registered Number Diversion**
- **Variable Number Diversion**

The Registered Number Diversion is the number you nominated when you first applied for the service. The Variable Number Diversion is any telephone number you insert after keying in the diversion access code.

Unconditional Call Diversion

MobileNet will divert all incoming calls, while outgoing calls may still be made. Unconditional Call Diversion can be set to the Registered Number Diversion or the Variable Number Diversion.

Call Diversion on No Reply (Recommended)

For those times when you are constantly leaving your phone unattended but would like to recieve calls when you are there, you can instruct **MobileNet** to divert calls when there is no reply on your mobile phone. (This facility diverts calls even when the mobile phone is switched off.)
Once again your registered number can be used or you can activate a variable number.

Call Diversion on Busy

MobileNet can also divert your incoming calls when your mobile telephone is engaged or busy. This is useful for those times when you are expecting an important call but the phone could be tied up. You can divert incoming calls to your registered number or to a variable number wherever a message can be taken.

Registered Number Diversion

Activating			Deactivating		
Diversion	KEY IN	PRESS	Diversion	KEY IN	PRESS
Unconditional	* 21 #	(SEND)	Unconditional	# 21 #	(SEND)
No Reply	* 61 #	(SEND)	No Reply	# 61 #	(SEND)
Busy	* 24 #	(SEND)	Busy	# 24 #	(SEND)

When you activate, deactivate diversion, a recorded message will indicate the status of the diversion facility you dialled.

Variable Number Diversion

When activating this diversion facility insert the access code, then insert the telephone number required (including STD area code).

The Variable Number

- must be a full national number, ie, with STD area code
- maximum of 12 digits
- overides diversion to registered number

Activating

Unconditional Call Diversion
key in: * 21 ☐☐☐☐☐☐☐☐ #
press: (SEND)

Diversion on No Reply*
key in: * 61 ☐☐☐☐☐☐☐☐ #
press: (SEND)

Diversion on Busy
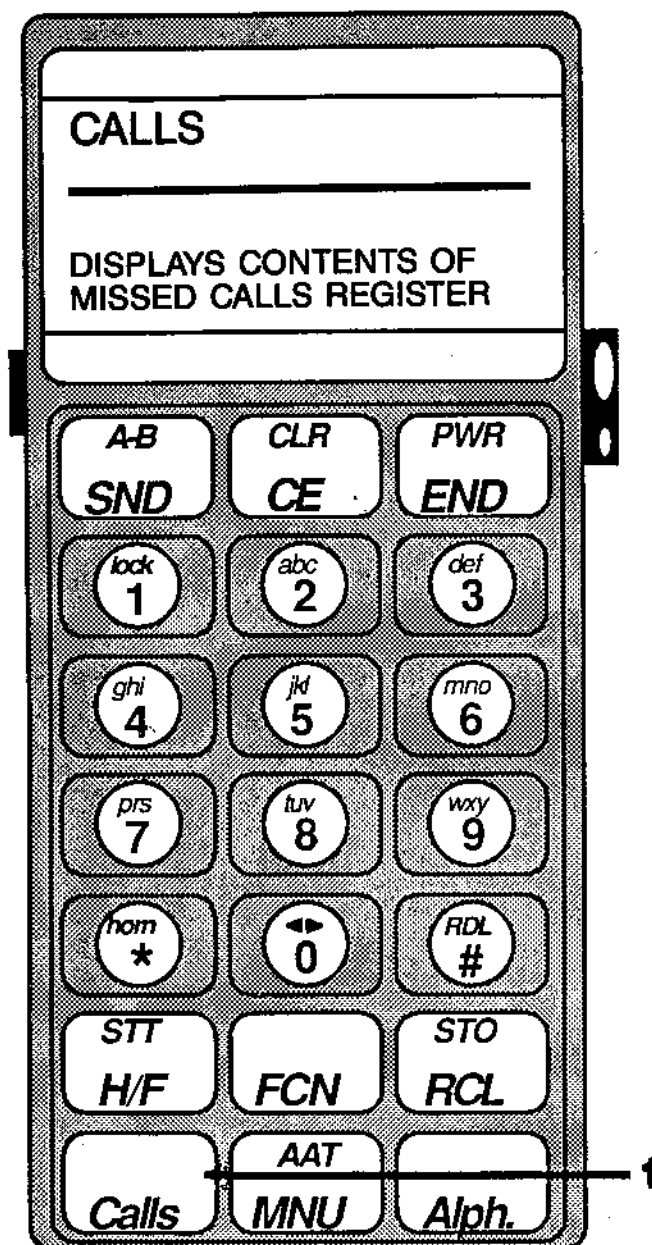key in: * 24 ☐☐☐☐☐☐☐☐ #
press: (SEND)

Deactivating
To deactivate Variable Number Diversion follow the same procedure as Deactivating Registered Number Diversion.

Note:
To return the Call Diversion to the Registered Number Diversion, you will need to cancel the Variable Number Diversion, then activate Registered Number Diversion.

MobilNet is a trademark of Telecom Australia.

```
┌─────────────────────────────┐
│  CALLS                      │
│  ─────────                  │
│                             │
│  DISPLAYS CONTENTS OF       │
│  MISSED CALLS REGISTER      │
│                             │
│  ┌───────┐ ┌───────┐ ┌───────┐
│  │ A-B   │ │ CLR   │ │ PWR   │
│  │ SND   │ │ CE    │ │ END   │
│  └───────┘ └───────┘ └───────┘
│   (lock 1) (abc 2)  (def 3)  │
│   (ghi 4)  (jkl 5)  (mno 6)  │
│   (prs 7)  (tuv 8)  (wxy 9)  │
│   (hom *)  (0)      (RDL #)  │
│  ┌───────┐ ┌───────┐ ┌───────┐
│  │ STT   │ │       │ │ STO   │
│  │ H/F   │ │ FCN   │ │ RCL   │
│  └───────┘ └───────┘ └───────┘
│  ┌───────┐ ┌───────┐ ┌───────┐
│  │ Calls │ │ AAT   │ │ Alph. │──── 1
│  │       │ │ MNU   │ │       │
│  └───────┘ └───────┘ └───────┘
└─────────────────────────────┘
```

The Missed Call Register counts the number of calls received by the phone but not answered. For the calls to register, turn on the phone by activating the horn alert function.

If you do not want the horn to sound when calls are received and registered, first disable the horn function using the Menu.

NOTE: Once you read the contents of the register, it resets to zero.

For use with diversion on no reply.

This facility allows you to control the types of calls accessible by your mobile telephone.

- unrestricted access
- barred ISD
- national calls only
- local calls only
- incoming calls only

When you applied for the **MobileNet** service you were requested to choose two of the above call access types. This facility enables you to alternate between the two selected call types by using your Personal Identification Number (PIN).

To activate the alternative access
key in: * 33 (PIN) #
press: (SEND)

To deactivate the alternative access and restore to normal
key in: # 33 (PIN) #
press: (SEND)

To verify Call Type
key in: * # 33 #
press: (SEND)
or

attempt to call a barred number.
(A recorded message will indicate the status, when activating, deactivating or verifying.)

Master Reset
By inserting # 99 PIN # **Mobile Net** allows you to reset your call diversions and Call Access Category to pre-activated status.
Invoking this facility, deactivates all Diversions and the Call Access Control.

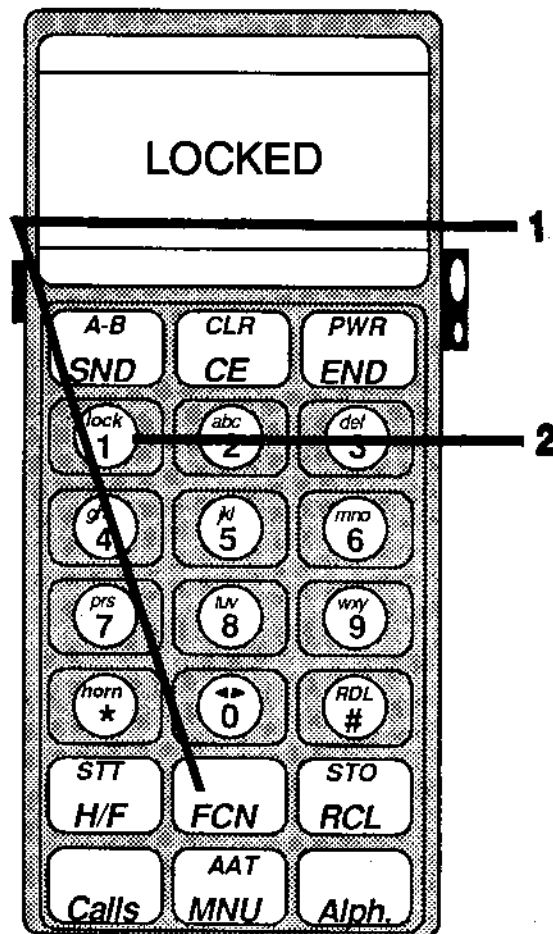MobilNet is a trademark of Telecom Australia.

TO UNLOCK

```
READY -A-
PREF  -A-
```
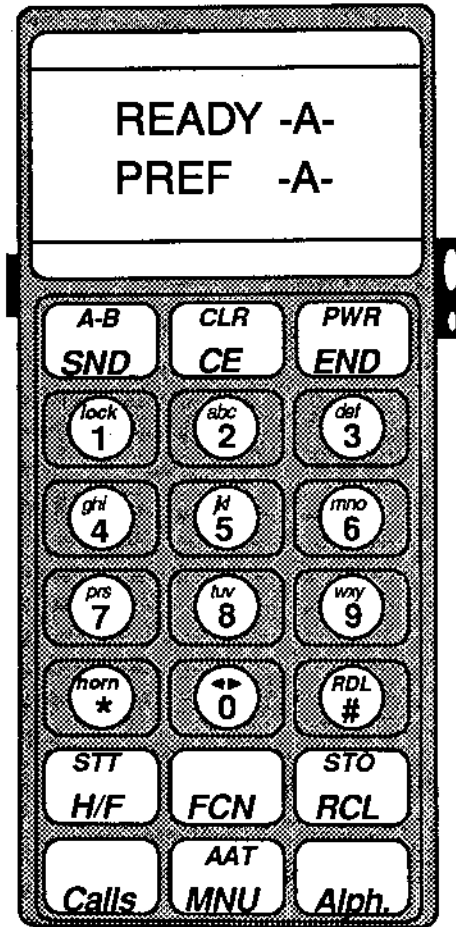
Enter the TIER 1* or TIER 2* lock code on the keypad. This code will be between one and four digits long. The digits will not appear on the display, or make any tones sound as you enter them.

ENTER THE TIER 1 OR TIER 2 SECURITY CODE ON THE KEYPAD

TO LOCK

```
LOCKED
```

1

2

*TIER 1 AND TIER 2 SECURITY CODES

Two separate, user programmable security codes are available.

Entering the tier 1 security code fully unlocks the phone; the user has full privileges.

Entering the tier 2 code unlocks the phone partially; the user cannot make STD calls. If a call to a STD number is made, the message ACCESS DENIED appears on the display.

Lock codes are changed through the Menu function.

EARPIECE AUDIO (handset only)
Earpiece audio is adjusted with the handset off-hook. Continue to pressing the indicated key until the desired result is achieved.

◄— INCREASE
◄— DECREASE
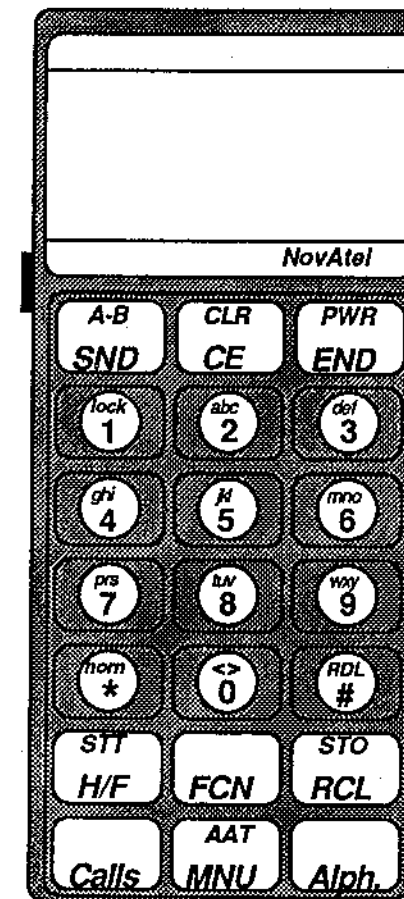
SPEAKER TONES AND AUDIO
Speaker tones and audio are adjusted with the handset on-hook (on the cradle). Continue pressing the indicated key unitil the desired result is achieved.

1

INCREASE
OR — 2
DECREASE

BELL VOLUME
The bell volume can be adjusted with the handset on or off the hook. the two sequence must be pressed each time another level of bell volume is desired.

YOU CAN ADJUST ALL TONE OR AUDIO LEVELS WHILE THE PHONE IS IN USE. YOU CAN ALSO ADJUST THEM WHEN PHONE IS IDLE, A TONE WILL SOUND TO HELP.

IF YOU ARE USING A HANDSET WITH A CCU, EITHER UNIT CAN BE USED TO SET THE HANDSET EARPIECE VOLUME.
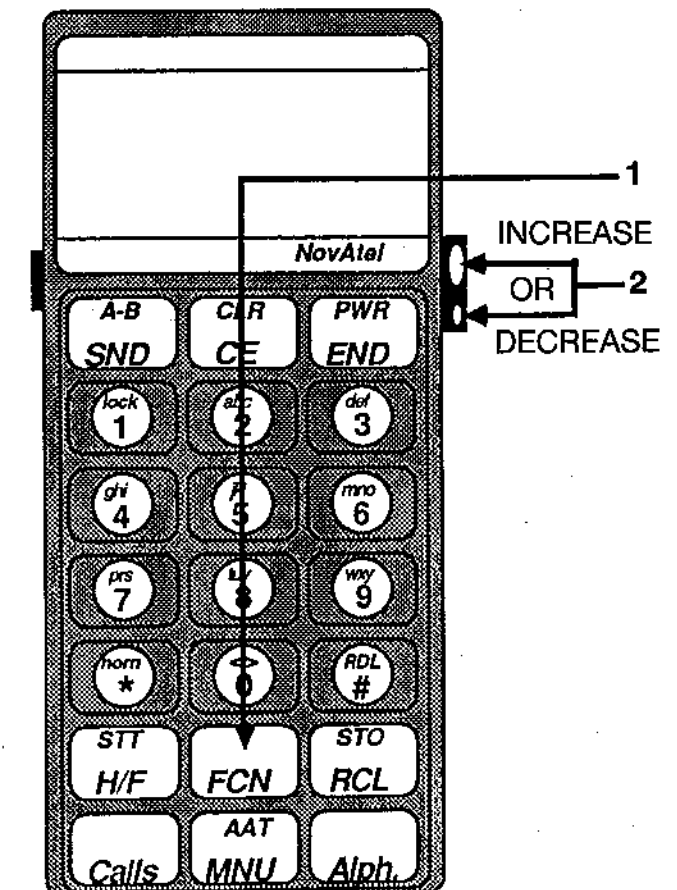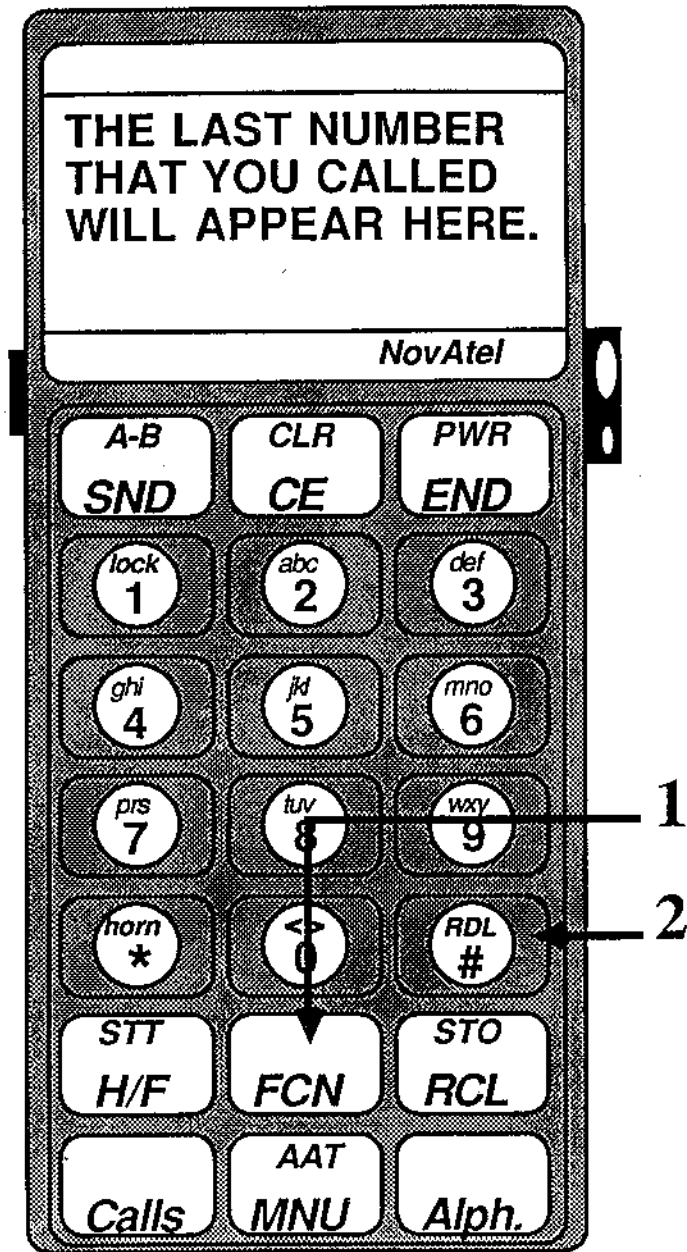
This function recalls the display and sends the last number that you called. Note that this will be the last number that was entered and sent, or recalled and sent. If you did not press SEND after dialing a number, it will not be redialed.

It is best to check the display quickly after using this function to assure that it is the number that you want to dial. If not, press the END key.

DELETE LAST CHARACTER ENTERED
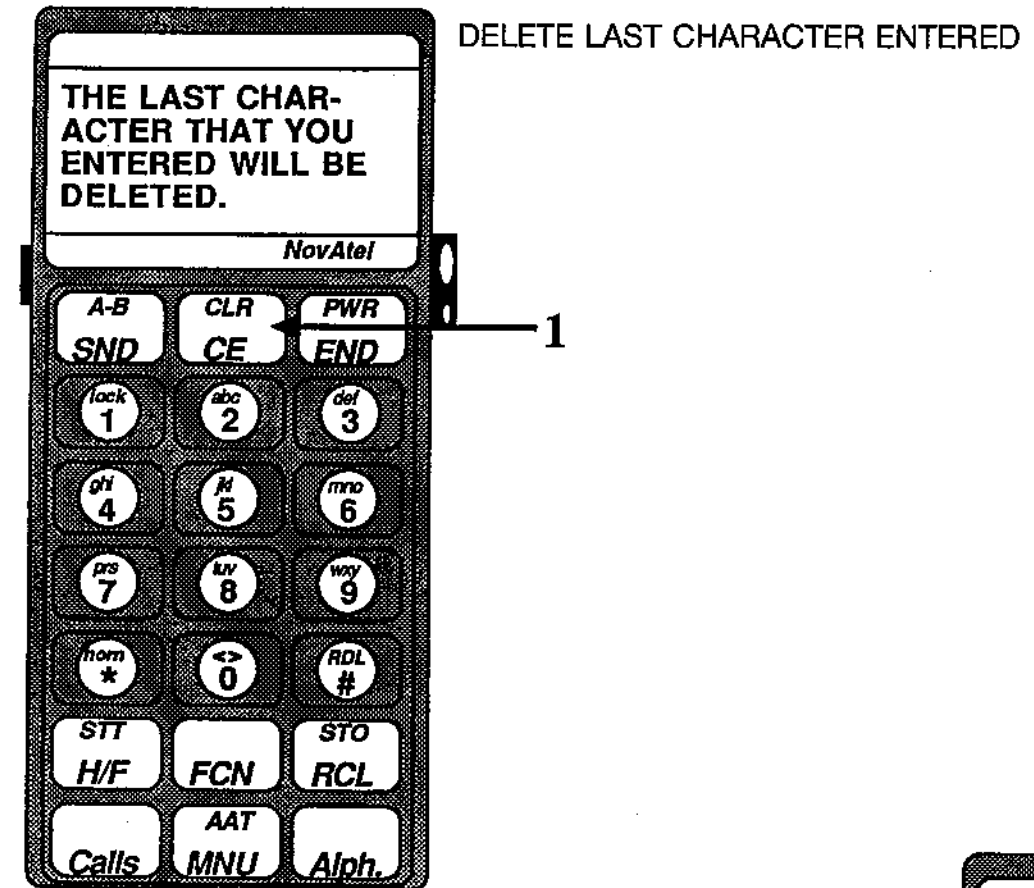
CLEAR ENTIRE DISPLAY/FUNCTION

This function can be used to clear what is on the display or any function that is in progress.

It cannot be used to end a call.

THE NAME CORRESPONDING
TO THE NUMBER (IF ANY)
APPEARS HERE.

THE RECALLED ENTRY
NUMBER APPEARS HERE

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1 THE PROMPT 'ENTRY' WILL
   APPEAR ON YOUR DISPLAY

2 ENTER THE TWO DIGIT
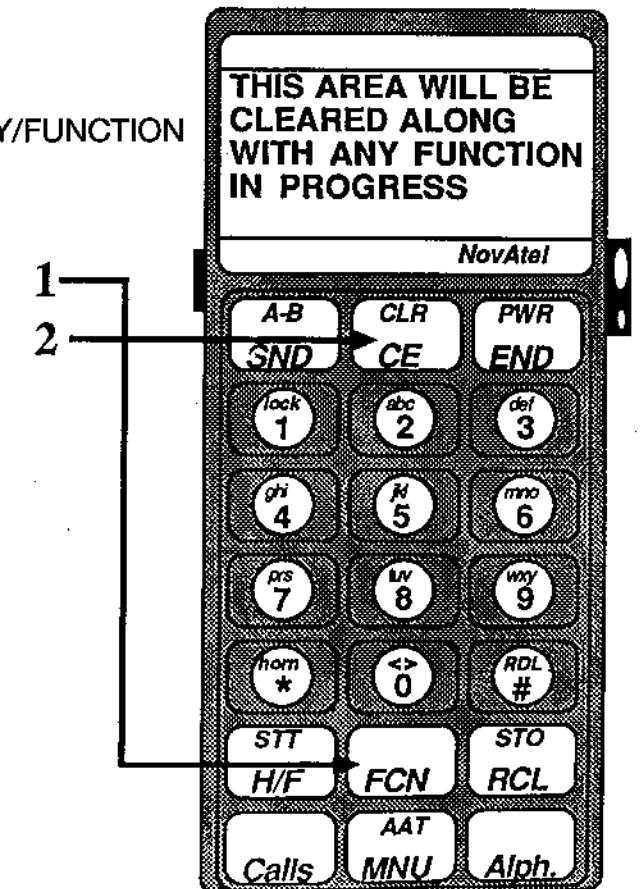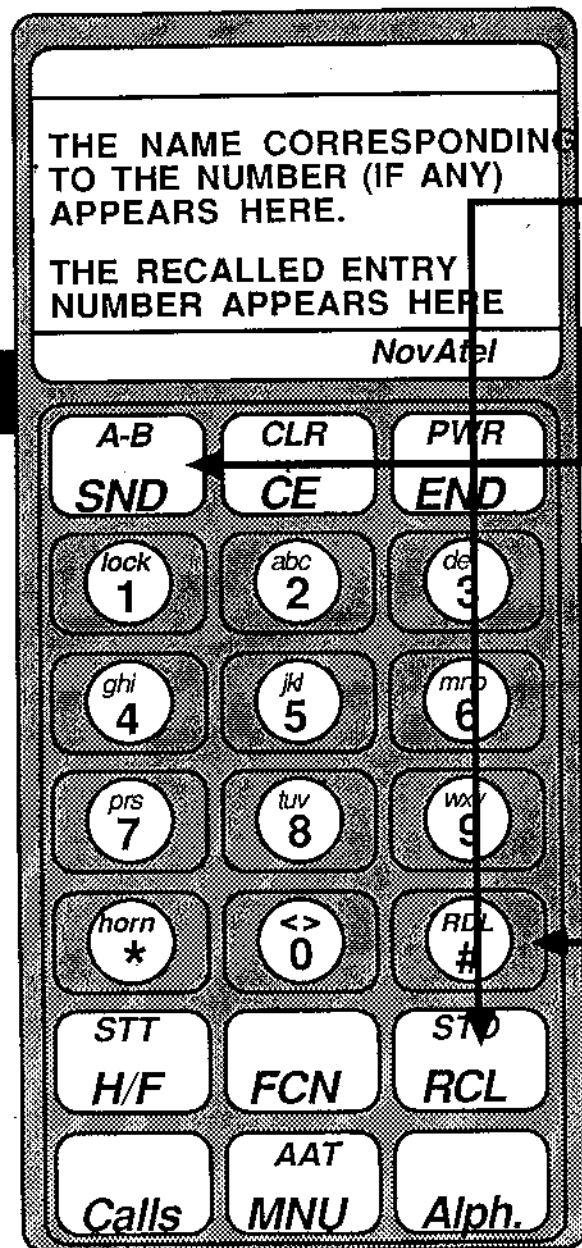   STORAGE LOCATION OF THE
   NUMBER YOU WISH TO RECALL

3 TO PLACE A CALL TO THIS
   ENTRY

   THE PHONE NUMBER
   REPLACES THE NAME ON THE
   DISPLAY.

TO VIEW THE TELEPHONE
NUMBER ON THE DISPLAY
BEFORE SENDING IT.
(Can be used for any method
of recalling numbers.)
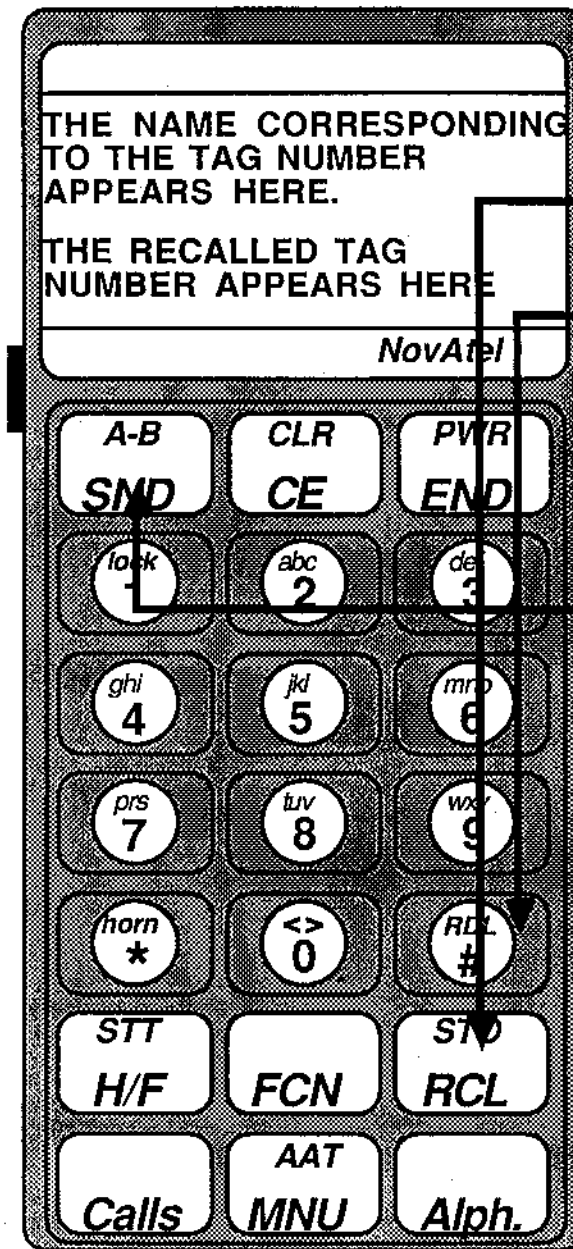
THE NAME CORRESPONDING
TO THE TAG NUMBER
APPEARS HERE.

THE RECALLED TAG
NUMBER APPEARS HERE

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1. THE PROMPT 'ENTRY' WILL
   APPEAR ON YOUR DISPLAY

2. THE PROMPT 'TAG' WILL
   REPLACE 'ENTRY'

3. ENTER THE ONE DIGIT TAG FOR
   THE NUMBER YOU WISH TO
   RECALL (1-4)

4. TO PLACE A CALL TO THIS
   ENTRY

   THE PHONE NUMBER REPLACES
   THE NAME ON THE DISPLAY.

Tag memory locations give you fast access to four stored telephone numbers using fewer keystrokes. You can enter your own tag names or use the default names provided.

The four default tag names are # 1) HOME
                                # 2) OFFICE
                                # 3) OPERATOR,
                                # 4) EMERGENCY

```
ENTRY
PROMPTS YOU TO ENTER
A STORAGE LOCATION NO.

STORED AT
CONFIRMS THE LOCATION

                    NovAtel
```
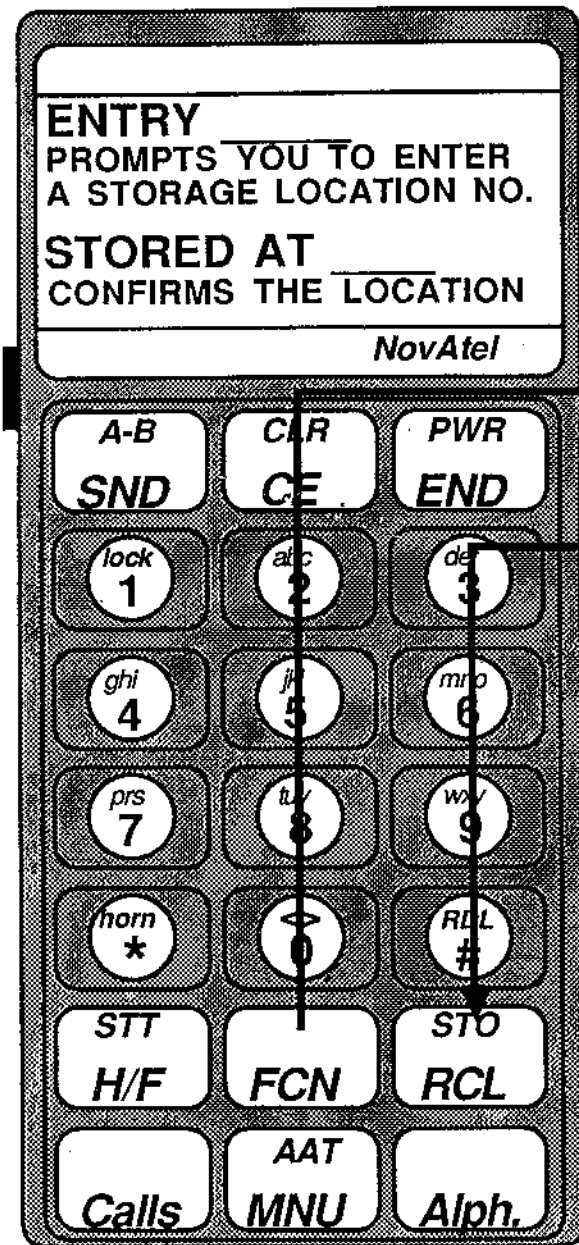
1 ENTER THE TELEPHONE
NUMBER YOU WISH TO STORE.
IF YOU WANT TO USE AN ALPHA
NAME AS WELL, DO IT NOW
USING ALPHA MODE.

2

3

4 ENTER THE STORAGE
LOCATION NUMBER (01-46)

5 THE DISPLAY CONFIRMS THE
STORAGE LOCATION

There are 50 memory locations numbered 01-50 available for storing telephone numbers: 46 telephone numbers up to 32 digits in length with their 8-character names and four fast access tag memory locations. Storing numbers with names in locations 47 through 50 overwrites the tag memory. Memory location '00' is reserved for the Scratchpad.

You can enter the name and number in a storage location in any order.
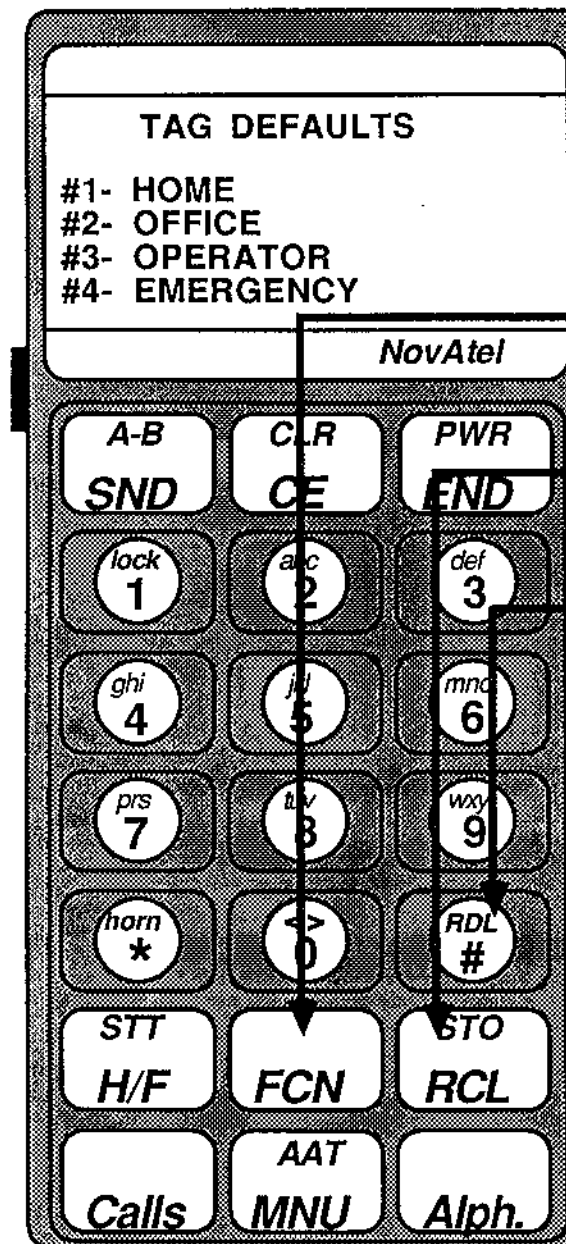
```
        TAG DEFAULTS

#1- HOME
#2- OFFICE
#3- OPERATOR
#4- EMERGENCY

                    NovAtel
```

1 ENTER THE TELEPHONE NUMBER
FOR THE TAG. IF YOU WANT TO
CHANGE THE TAG NAME, DO IT
NOW USING ALPHA MODE

2

3

4

5 ENTER THE TAG NUMBER
(#1- #4) IN WHICH YOU
WANT TO STORE THE
NUMBER (AND NAME, IF
CHANGED)

Tag memory locations give you fast access to four stored telephone numbers using fewer keystrokes. You can enter your own tag names or use the default names provided.

Storage in tag locations # 1-# 4 is distinguished from direct memory locations 01-04 by the presence of the ' # ' at the beginning of the number, and the absence of the '0'. The four tag locations occupy memory locations 47-50.

THE SCRATCHPAD
INFORMATION WILL
APPEAR HERE AS YOU
ENTER IT.

A-B	CLR	PWR
SND	CE	END
lock 1	abc 2	def 3
ghi 4	jkl 5	mno 6
prs 7	tuv 8	wxy 9
horn *	0	RDL #
STT H/F	FCN	STO RCL
Calls	AAT MNU	Alph.

1 ENTER THE NUMBERS ON THE
KEYPAD DURING CONVERSATION

2

3, 4 PRESS TWICE
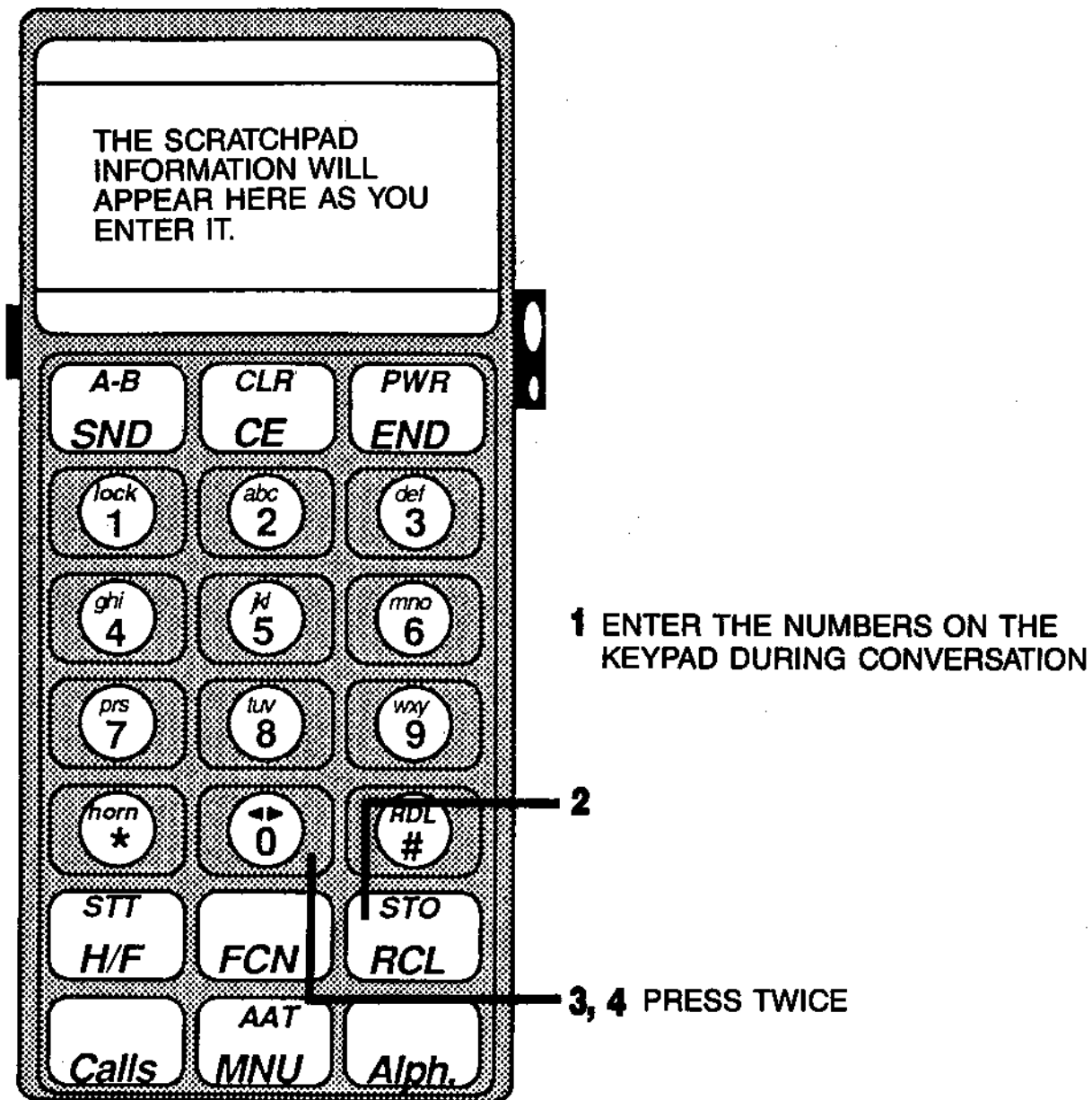
Use this function to make note of information given to you during a call. The display
will clear automatically as soon as you enter the first character. Unless your phone is
configured for Fast Dialing from the Menu, the party on the other end of the line will
not hear your keypad tones as you enter.
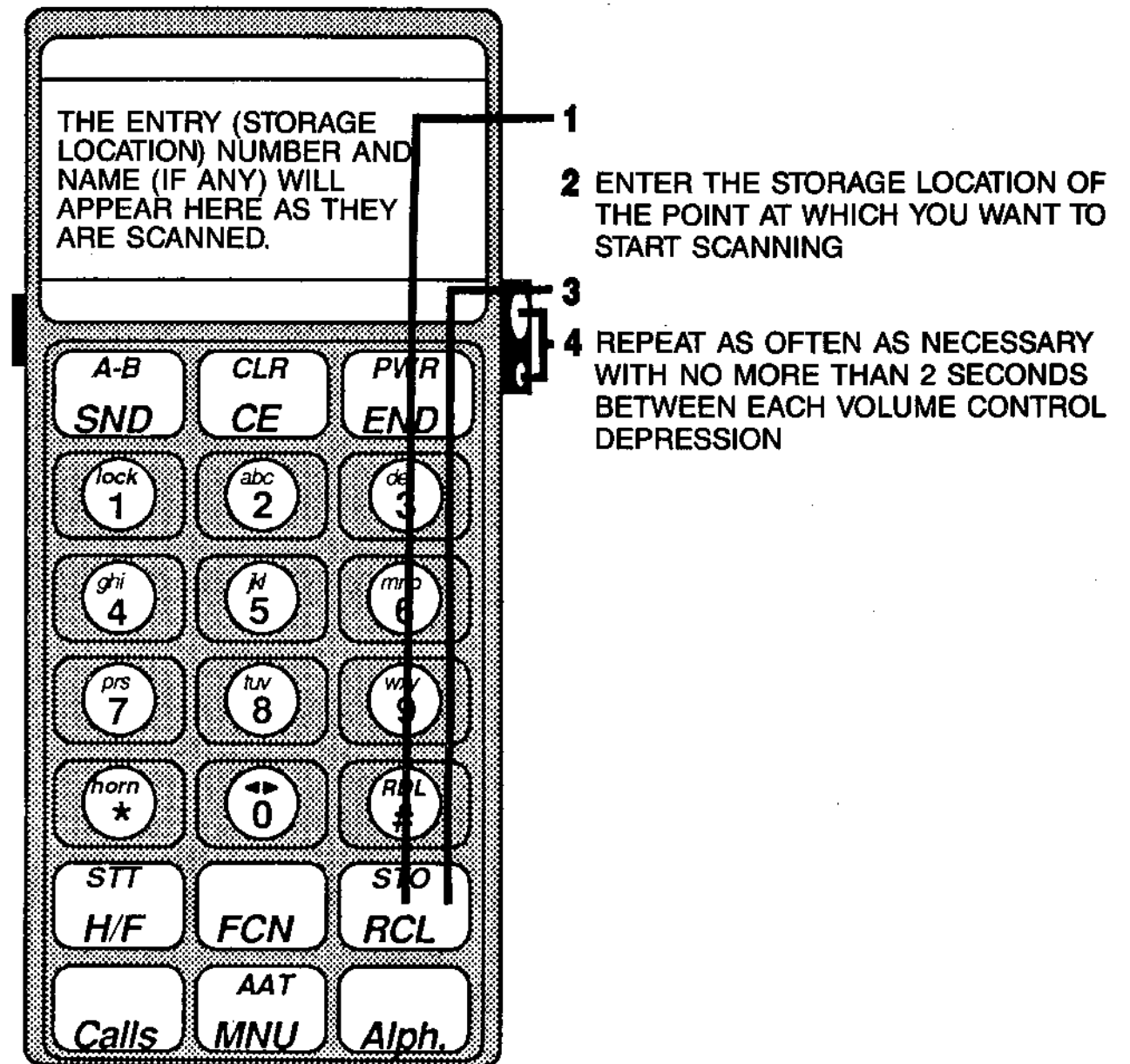
You can store the information from the Scratchpad (maximum 32 characters) during
your conversation, or recall it at the end of the conversation as shown above.

THE ENTRY (STORAGE
LOCATION) NUMBER AND
NAME (IF ANY) WILL
APPEAR HERE AS THEY
ARE SCANNED.

A-B	CLR	PWR
SND	CE	END
lock 1	abc 2	def 3
ghi 4	jkl 5	mno 6
prs 7	tuv 8	wxy 9
horn *	0	RDL #
STT H/F	FCN	STO RCL
Calls	AAT MNU	Alph.

1

2 ENTER THE STORAGE LOCATION OF
THE POINT AT WHICH YOU WANT TO
START SCANNING

3

4 REPEAT AS OFTEN AS NECESSARY
WITH NO MORE THAN 2 SECONDS
BETWEEN EACH VOLUME CONTROL
DEPRESSION

Each depression of the Volume Control displays the next (or previous) number and name
(if any). Once the desired entry is found, place the call as in direct recall.

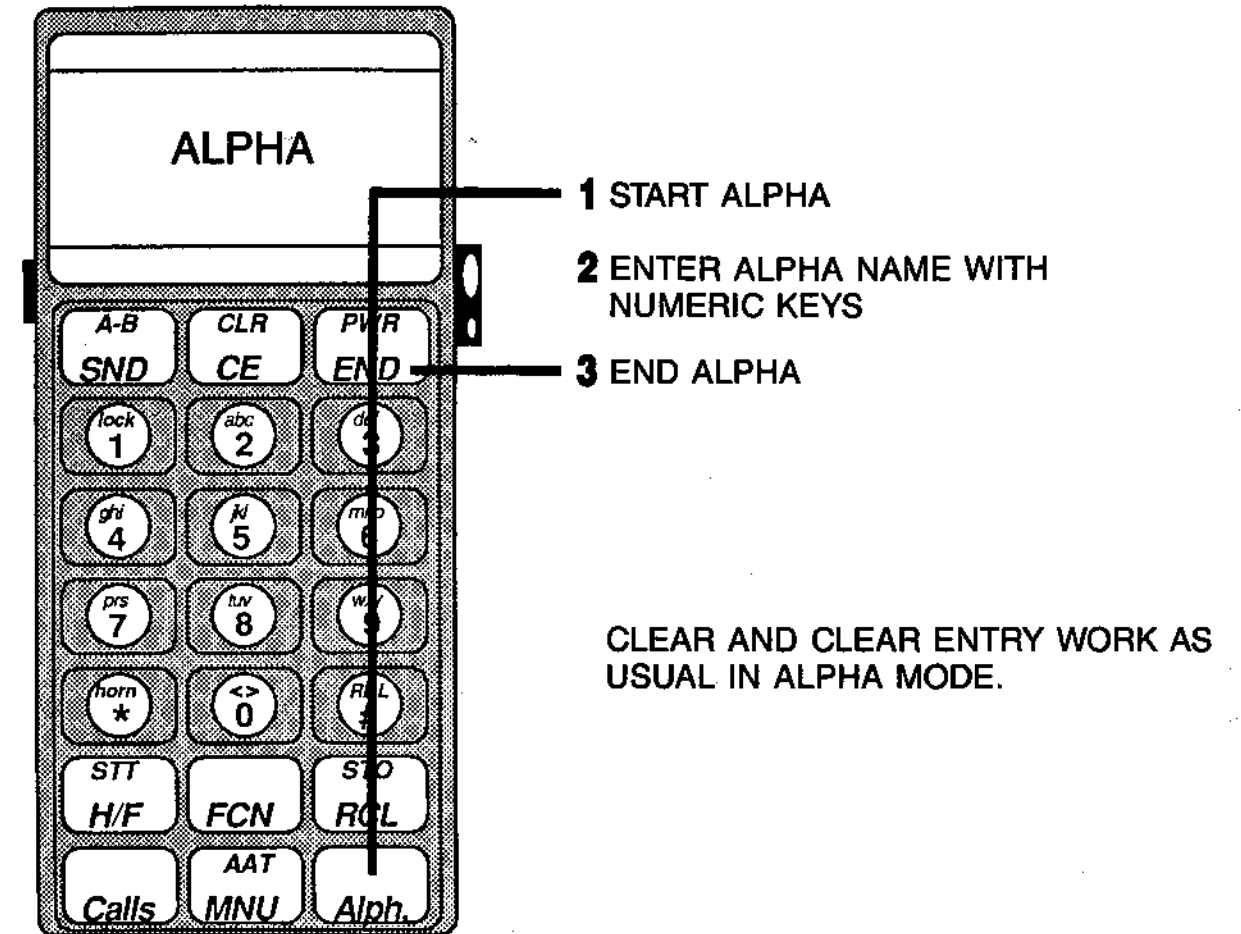THE ALPHA NAME THAT MATCHES THE CHARACTERS YOU SPECIFIED WILL APPEAR HERE.

1

2

3 ENTER THE ALPHA NAME (OR PART OF NAME) FOR WHICH YOU ARE SEARCHING

4

THE FIRST ALPHA NAME WHICH MEETS YOUR CRITERIA WILL APPEAR ON THE DISPLAY. TO VIEW ANY OTHER NAMES ALSO BEGINNING WITH THE CHARACTERS YOU SPECIFIED, USE THE VOLUME CONTROL.
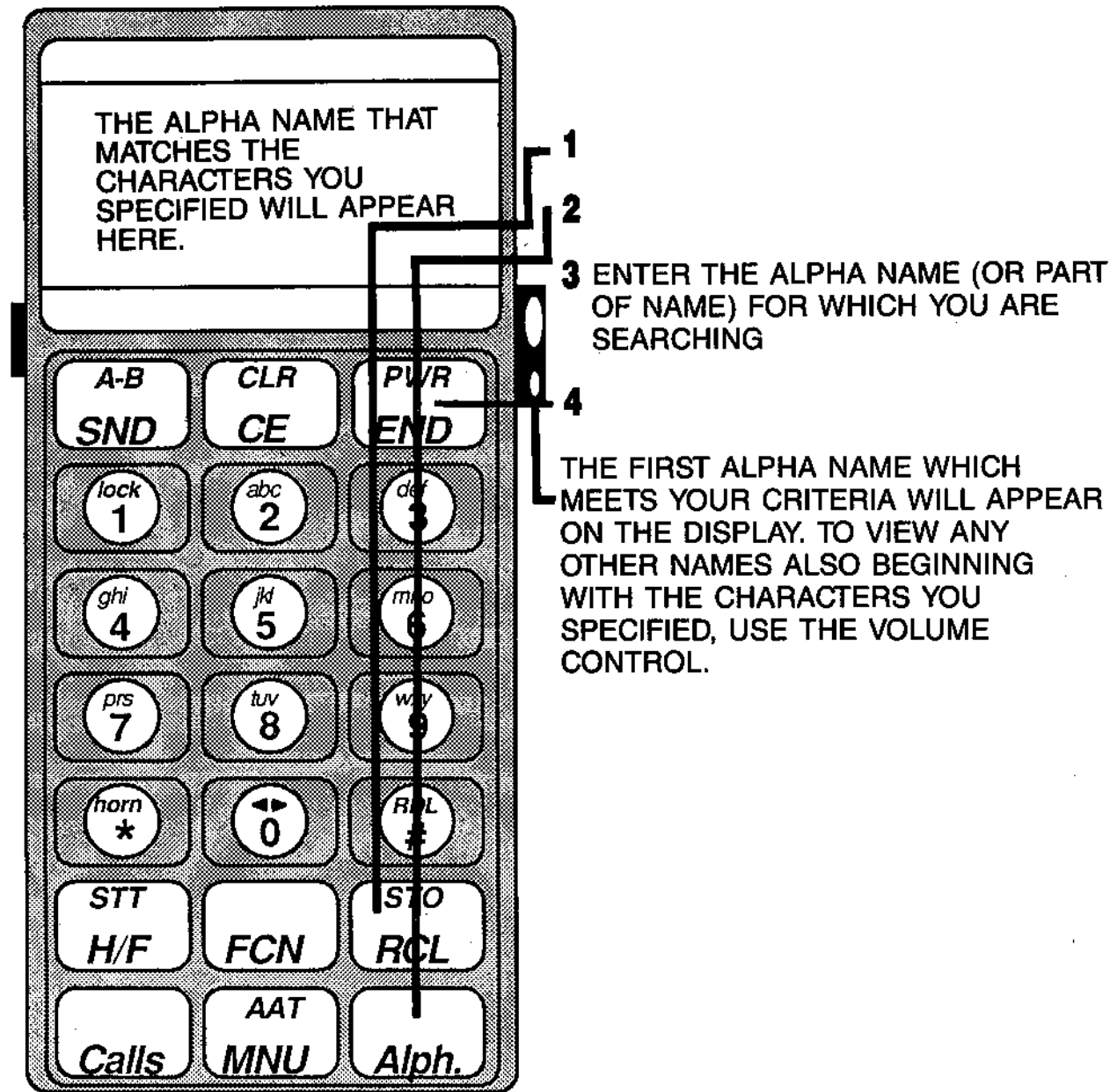
Enter up to 8 characters to be searched for. You don't have to enter the entire name (i.e. you could enter GE to search for GEORGE). You can then search for other items in this alphabetic string (i.e. GEOFF or GERMANY) by using the volume control key to scroll up or down numerically through the memory locations. Once an entry is found, place the call as in direct memory recall.

The NO ENTRY message on your display indicates that no more entries match the alphabetic string.

ALPHA

1 START ALPHA

2 ENTER ALPHA NAME WITH NUMERIC KEYS

3 END ALPHA

CLEAR AND CLEAR ENTRY WORK AS USUAL IN ALPHA MODE.

Enter the name of the ALPHA prompt by pressing keys according to their character's position.

Press once for "M",
Press twice for "N"
Press three times for "O"

Select the next character by either:
1) Pressing a second appropriate key.
2) If the character required is on the same key, press [RDL #]
3) By selecting the last letter, the same key can be pressed for the next letter.

EXAMPLE: Enter the name "Mona"

M

O (no need for "#" key here, as you have selected the last letter on the key.)

N (no need for "#" key here, as your next letter is entered with another key.)

A

Certain characters do not appear on the key pad, to access them:
'Z' follows 'Y', 'Q' follows 'P', and a blank space is entered with the 'O'
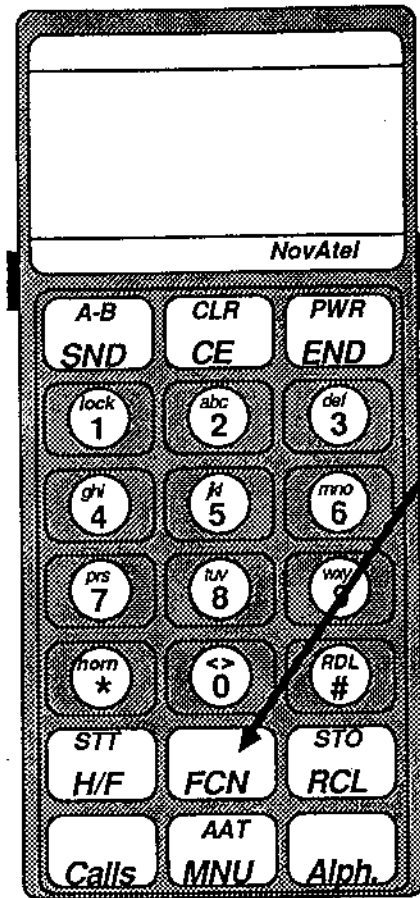
BRIGHTER

OR

DIMMER

To adjust the illumination of the handset (display and keypad) press the indicated keys simultaneously. This can be done with the handset on or off the hook.

Microphone Mute

1 ──────➤
MUTE BUTTON
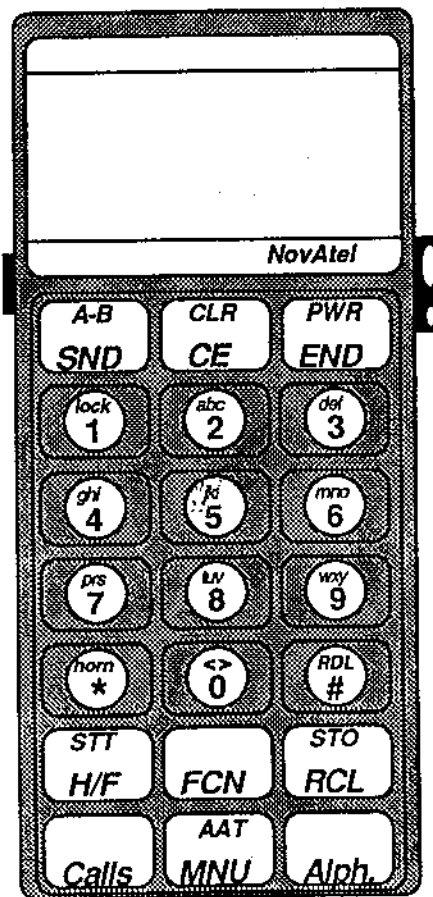
THIS FUNCTION MUTES ALL HANDSET, CCU AND HANDS-FREE MICROPHONES CONNECTED TO THE TRANSCEIVER.

Use the MUTE function to prevent the called party from hearing a private conversation at your end.

You must hold the mute button down for as long as you want the function activated.

THE NUMBERS WHICH YOU HAVE RECALLED OR ENTERED TO SEND AS DTMF TONES WILL APPEAR HERE.
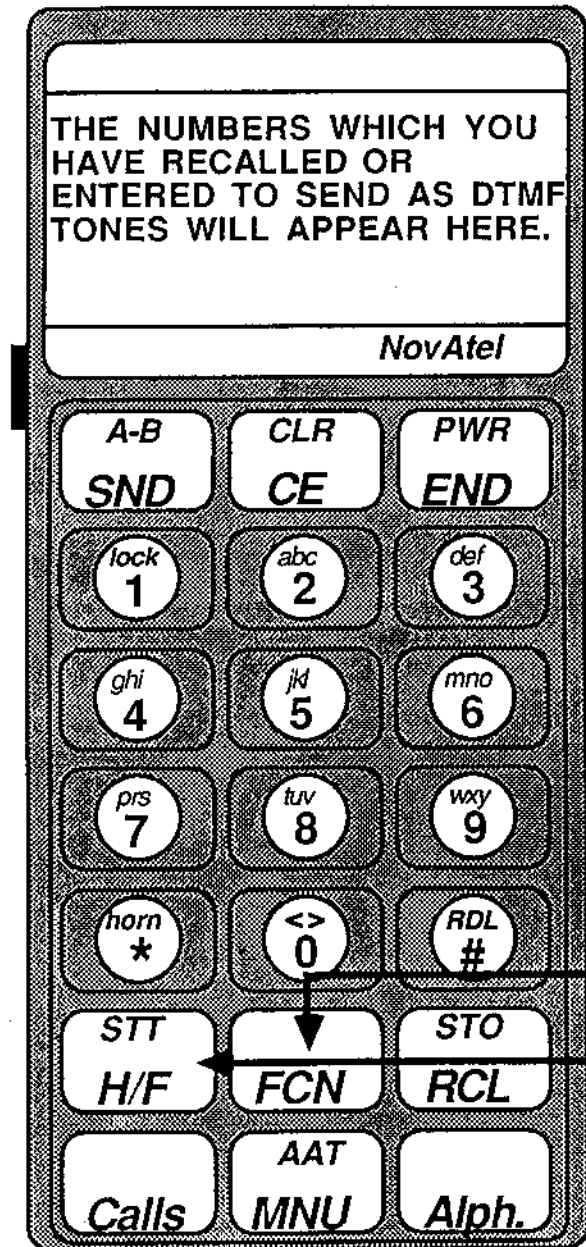
1. RECALL OR ENTER THE TOUCH TONE NUMBERS TO BE SENT

2

3

The radio sends the numbers on the display in DTMF or touch-tone format to the terminal at the other end of the line during regular conversation mode.

```
        AIR TIME
        00 00 00
   TOGGLE VOLUME CONTROL FOR

        TOT TIME
        00 00 00
```

1

2 AIR TIME FOR THE MOST RECENT
CALL IS DISPLAYED

3 TO VIEW TOTAL AIR TIME FOR THE
PHONE
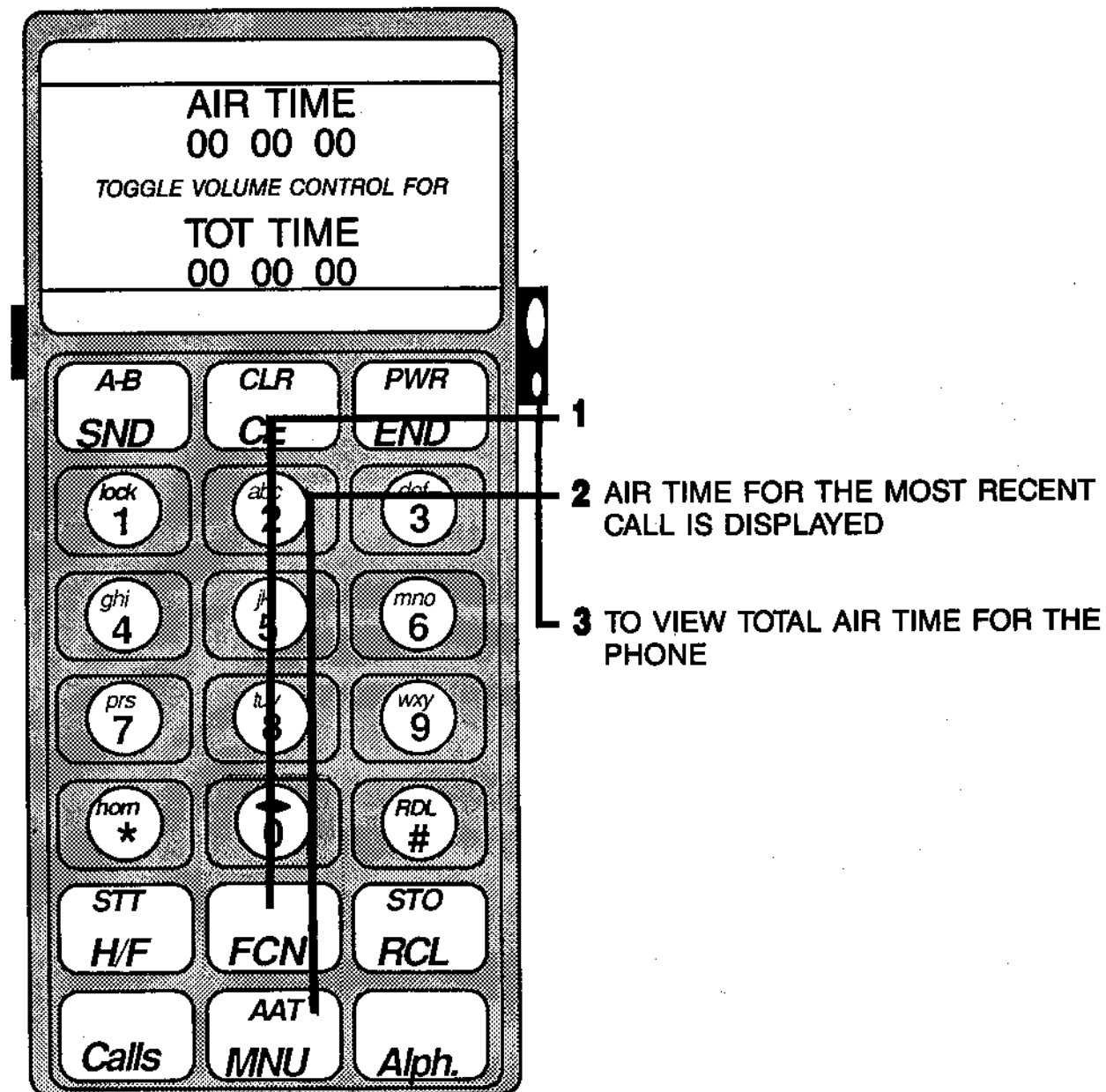
Air-Time records & displays the duration of the most recent call made in hours, minutes and seconds. The counter restarts at the beginning of each call. This function updates once per second when selected during a call.

Total Air-Time records & displays the total air time used by the phone since installation in hours, minutes and seconds. The number is reset to 00 00 00 at 99 59 59.

```
   MNU        8300
   REV        0000
```

1

2 TO VIEW THE FIRST, AND ALL
SUBSEQUENT MENU SELECTIONS
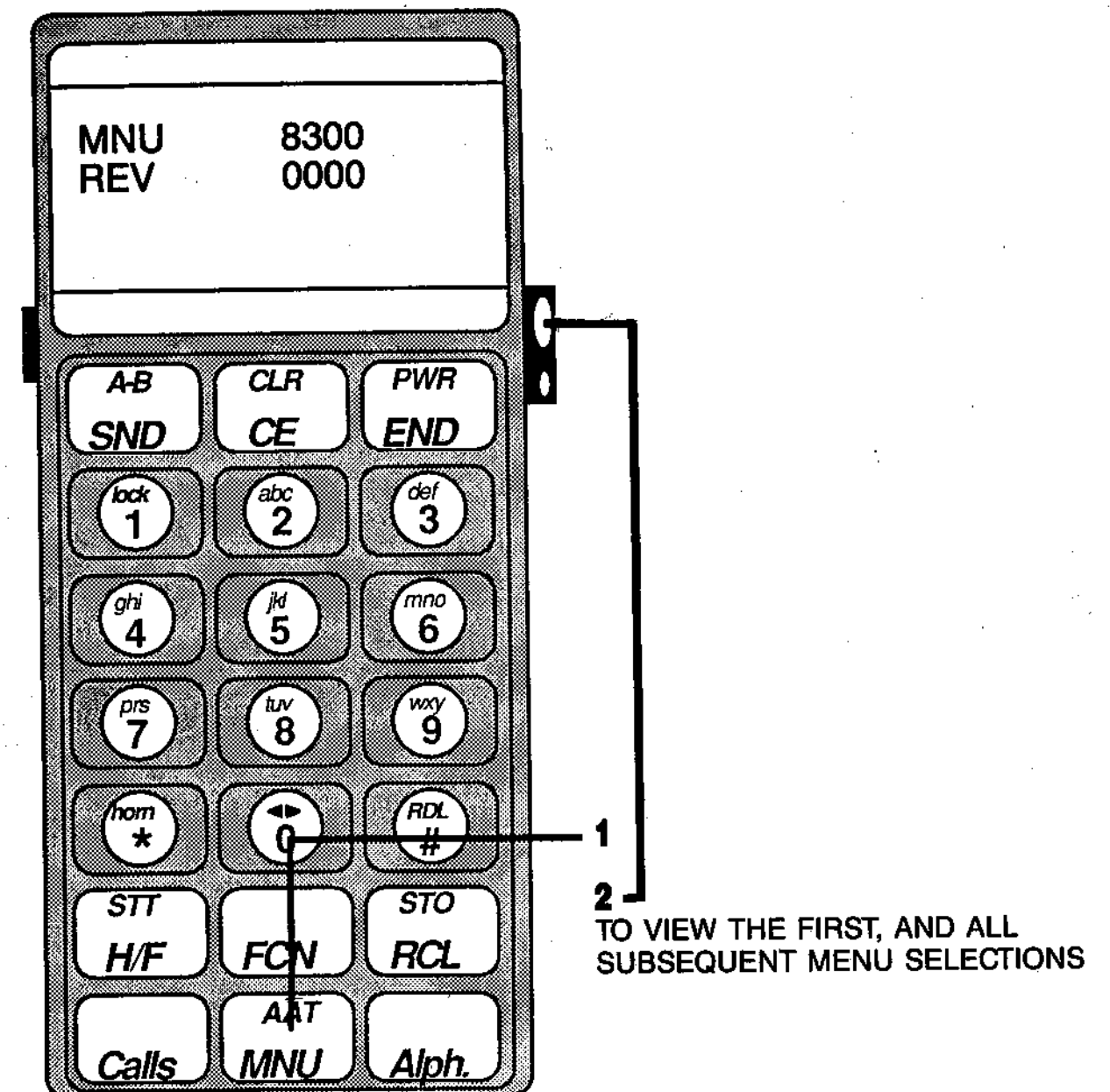
The menu feature is used to reconfigure your radiotelephone to suit your needs. It gives you the capability to:
1) Change both Tier 1 and Tier 2 Lock Codes,
2) Set the time interval for Automatic Call Retry,
3) Fast Dial Feature - Set silent, auto or manual fast dial mode,
4) Enable or Disable your Horn Alert,
5) Verify your Electronic Serial Number.

Toggle through the various Menu selections with the volume control button.

You can exit the Menu at any time by pressing the END key.

SELECTION 1 - LOCK CODES

OLD CODE LEVEL 1

A-B SND | CLR CE | PWR END
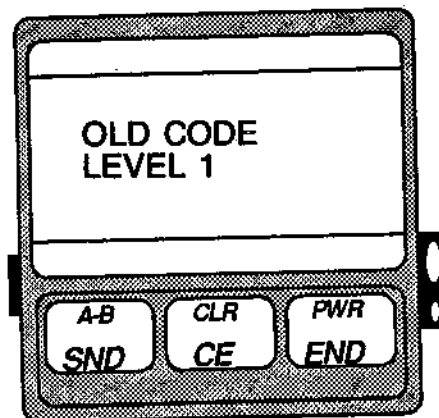
1 ENTER THE OLD TIER 1 LOCK CODE. THE FACTORY CODE IS 1,2,3,4.

(IF THIS CODE IS ENTERED INCORRECTLY, YOU WILL NOT BE ABLE TO CHANGE THE LOCK CODE.).

NEW CODE FFFF

A-B SND | CLR CE | PWR END
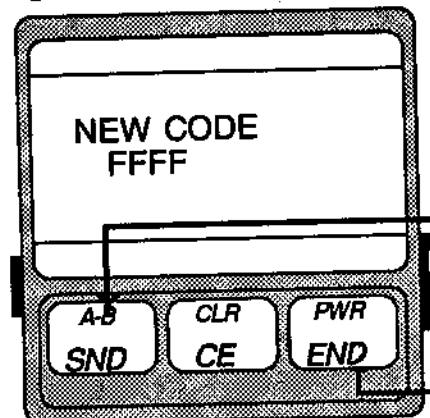
2 ENTER THE NEW LOCK CODE FOR TIER 1 (ANY COMBINATION OF 1 - 4 NUMERIC DIGITS) THE LEADING 'F' CHARACTERS REPRESENT NOTHING TO THE RADIOTELEPHONE.

3 TO COMMIT THE NEW ENTRY TO YOUR RADIOTELEPHONE'S MEMORY

4 TO GO TO THE NEXT MENU SELECTION:

OR

TO EXIT

OLD CODE LEVEL 2

A-B SND | CLR CE | PWR END
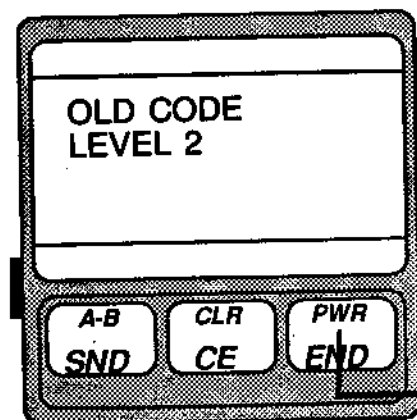
REPEAT THE ABOVE PROCESS TO CHANGE THE TIER 2 LOCK CODE. THE FACTORY CODE IS 0, 0, 0, 0.

TO GO TO THE NEXT MENU SELECTION:

OR

TO EXIT

NEW CODE FFFF

A-B SND | CLR CE | PWR END
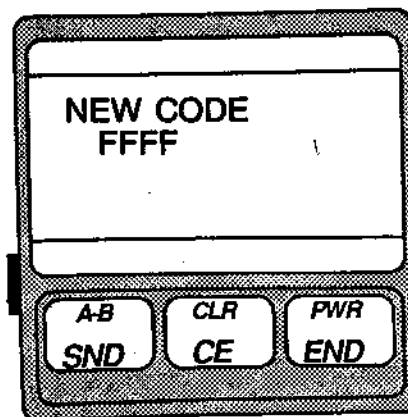
SELECTION 2 - RETRY INTERVAL

RETRY RATE   020

A-B SND | CLR CE | PWR END
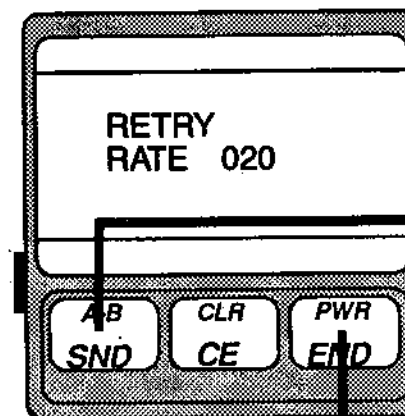
1 ENTER THE DESIRED INTERVAL BETWEEN CALL RETRIES. THE INTERVAL RANGE IS 2 TO 512 SECONDS IN INCREMENTS OF TWO

2 TO COMMIT THE NEW ENTRY TO YOUR RADIOTELEPHONE'S MEMORY

3 TO GO TO THE NEXT MENU SELECTION

OR

TO EXIT

SELECTION 3 - FAST DIAL

FD MODE SILENT

A-B SND | CLR CE | PWR END
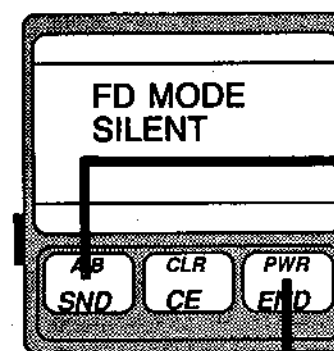
1 THE SEND KEY TOGGLES BETWEEN THE THREE AVAILABLE MODES, CONTINUE TO PRESS IT UNTIL THE DESIRED MODE APPEARS ON THE DISPLAY.

2 TO GO TO THE NEXT MENU SELECTION

OR

TO EXIT

FD MODE AUTO

FD MODE MANUAL
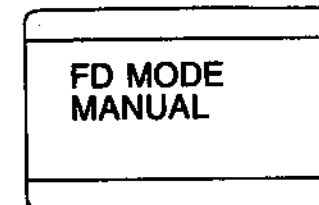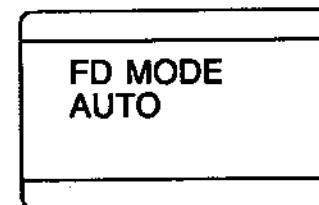
FAST DIAL MODE DESCRIPTIONS

After placing a call, touch-tone may be sent directly from the keypad. The Fast Dial feature selects one of three methods to send touch-tone from the keypad.

SILENT: No tones are sent.

AUTO: Tones are sent in short burst.

MANUAL: Tones are continuous as the key is pressed (up to 3 seconds long).

Note that this feature does not affect sending tones from memory under "Send Touch-Tone".

SELECTION 4 - HORN ALERT

```
HRN ALRT
ENABLED

A-B   CLR   PWR
SND   CE    END
```

1 PRESS THE SEND KEY TO TOGGLE BETWEEN THE TWO HORN ALERT OPTIONS

2 TO GO TO THE NEXT MENU SELECTION

OR

TO EXIT

```
HRN ALRT
DISABLED

A-B   CLR   PWR
SND   CE    END
```
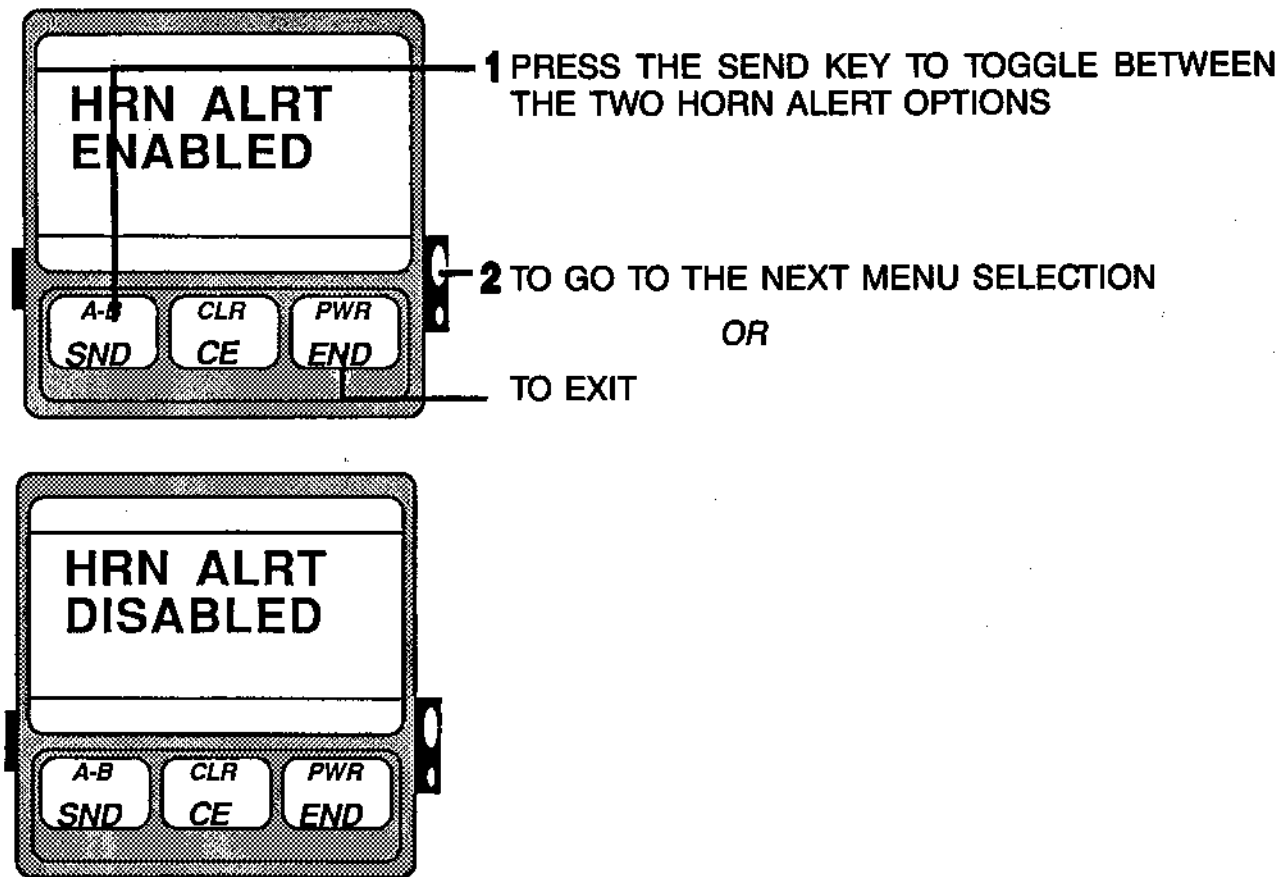
The Horn Alert feature allows you to enable or disable the Horn Alert function. With the Horn Alert DISABLED, you can use the Missed Calls Register without the horn sounding when calls are received. With the Horn Alert ENABLED, the vehicle horn will sound when an incoming call is received if the Horn function is activated.

SELECTION 5 — VERIFY E.S.N.

```
SERIAL
8EO X X X X

A-B   CLR   PWR
SND   CE    END
```

1 TO EXIT
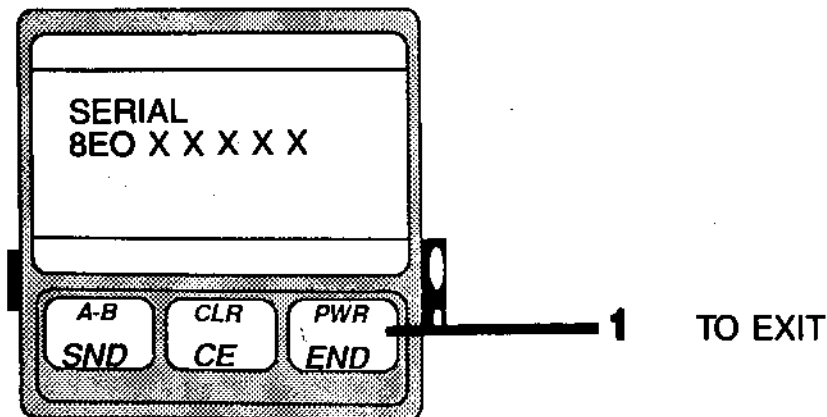
This screen shows you the Electronic Serial Number for the phone. The Serial Number cannot be changed. Telecom Australia must have this number correctly registered in order to place phone calls.

```
CALL
RTRY ON
OR
CALL
RTRY OFF

A-B    CLR    PWR
SND    CE     END

lock   abc    del
 1      2      3

ghi    jkl    mno
 4      5      6

prs    tuv    wxy
 7      8      9

horn
 *      0     RDL
               #

STT           STO
H/F    FCN    RCL

       AAT
Calls  MNU   Alph.
```

1

2, 3 PRESS TWICE
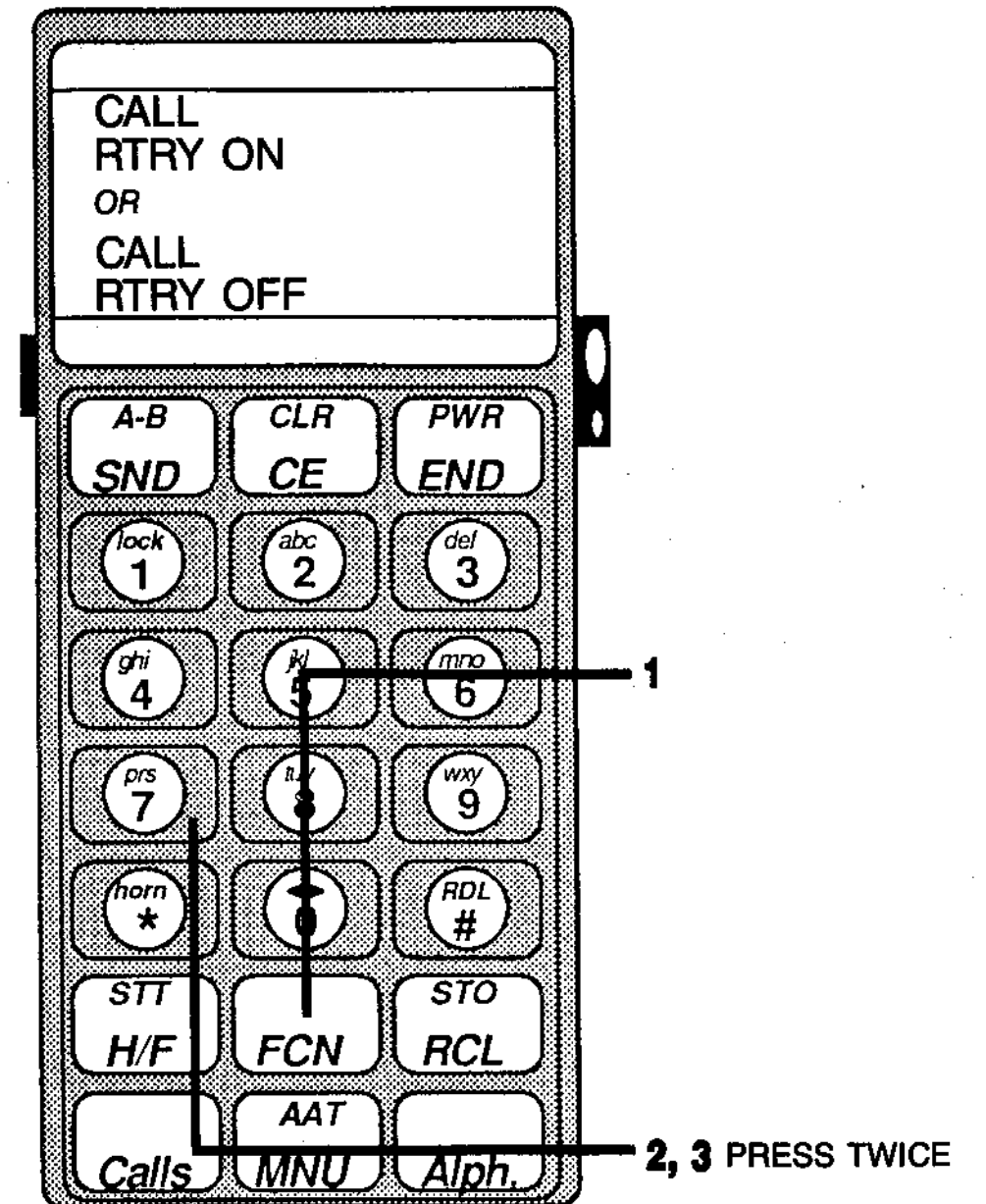
If the system won't process your call (fast busy or other alert tone) due to system congestion or being out of range, the re-try function will repetitively dial the number for you at timed intervals. The default interval is every 20 seconds, but you can select your own interval using the menu function.

NOTE: This function is not applicable for calls which result in a busy signal from the called party.

The FCN 77 which activates the call retry function will also turn the function off.

The FCN 7 on the 8305 telephone will show call retry status.

CONFIGURATION MODE

8300

NovAtel

NovAtel Communications Ltd.
8300 Cellular Radiotelephone
Configuration Utility Description - Australia

The Configuration Utility is used to program the radiotelephone with information needed for identification, billing and special features. Some of these features concern the ability of the radiotelephone to select from two available cellular systems. For the Australian market, it is important that these features be programmed to accommodate the national cellular network as decribed in these instructions.

Access Configuration Mode by entering a special lock code into the handset or CCU that came with the transceiver. The volume control is used to advance through the parameters. Each parameter appears on the display with its current configuration. Change the configuration by entering the information on the handset or CCU keypad. Advance to the next parameter by pressing the SND key. The actual programming of the radiotelephone takes place when you press the END key to exit the mode. You can press the END key to exit at any time.

Lock the radiotelephone (if not already locked)

▶ (FCN) (lock 1)   LOCKED
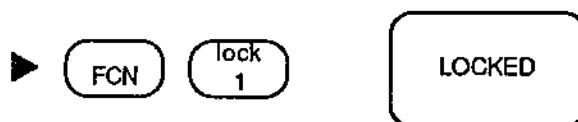
Enter the configuration access code.

▶ (#) (2) (5) (9)   CNF 8300 REV AA03
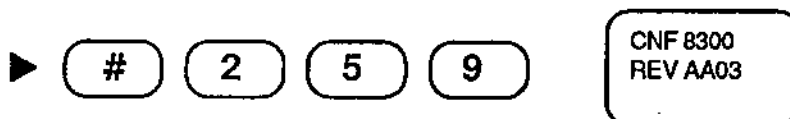
▶ Press the O (increase) volume control to advance to the first parameter.

SERIAL 8E0XXXXX

This screen shows the serial number for the radiotelephone that is encoded in memory. The information is encoded as shown below. The serial number cannot be changed.

SERIAL 8E0XXXXX — serial number (in HEX) 00000 <= XXXXX <= 3FFFF
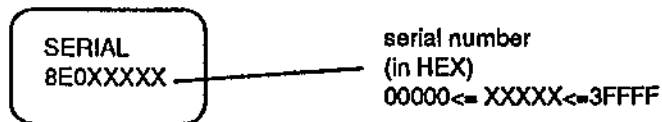
MIN 505 0XX-XXXX

The first screen displays the current Subscriber Area Code and Subscriber ID Number for the radiotelephone.

▶ Enter the new mobile identification (the digits 5050, plus the balance of the phone number, excluding the prefix 018) and press SND. Otherwise advance to the next screen.

Use the CE key to make corrections.

```
INIT REP
USE SND
```

The second screen is the repertory memory initialization utility. It clears the repertory memory, air-time and air-charge registers.

▶ Press the SND key to initialize (clear) the stored repertory memory of the radiotelephone.

```
WAIT
```

The wait message indicates that the initialization process is in progress (this could take as long as 10 seconds).

```
SIDH
    XXXXX
```

This display shows the current Home Area System ID Number. This number is used to identify the home area system of the radiotelephone.

▶ Enter the new   Refer to appendix 1.
identification number
and press SND.

Press CE to revert to
the original number.

```
IPCH    333
```

This display shows the current Initial Paging Channel. The IPCH is the channel on which the radiotelephone initially accepts a call while in its home service area. In Australia the only valid Initial Paging Channel is 333.

▶ Ensure that the screen reads IPCH 333.
If it does not, enter 333 and press SND, or
press CE to revert to Channel 333.

```
ACCOLC
    0X
```

This display shows the current Access Overload Class for the radiotelephone. The ACCOLC default value is the 2nd to last digit in the Subscriber ID Number as set in step 1.

▶ Enter 0 and the last
digit of the phone·
number, then press
SND.

```
GIM
    00
```

This display shows the current Group Identification Mark for the radiotelephone. The GIM provides for the grouping of units for local control options.

▶ Enter the GIM as 00
value (0 - 15) and
press SND.

Press CE to revert to
the original value.

```
IDCCA
    333
```

This display shows the Initial Data Control Channel for System A. In some markets this channel can be changed for system testing.
This feature is not used in Australia.

```
IDCCB
    334
```

This display shows the Initial Data Control Channel for System B. In some markets this channel can be changed for system testing
This feature is not used in Australia.

```
┌──────────────┐
│  REG TBL     │
│  SIZE 1      │
└──────────────┘
```

This display shows the Registration Table Size (1 to 4, one-digit). Enter 1, then

▶ (SND) to program the selection.

If another value is subsequently selected,

▶ (CLR) to return to the original selection.

```
┌──────────────┐
│ LOCK  CODE   │
│ 1      XXXX  │
└──────────────┘
```

This display shows the current Tier 1 lock code for the radiotelephone. See the Owner's Manual for information on how to change lock codes.

```
┌──────────────┐
│ LOCK  CODE   │
│ 2      XXXX  │
└──────────────┘
```

This display shows the current Tier 2 lock code for the radiotelephone. See the Owner's Manual for information on how to change lock codes.

```
┌──────────────┐
│ INVLD   ID   │
│ 1      NONE  │
└──────────────┘
```

```
┌──────────────┐
│ INVLD   ID   │
│ 2      NONE  │
└──────────────┘
```

```
┌──────────────┐
│ INVLD   ID   │
│ 3      NONE  │
└──────────────┘
```

This series of four screens lets you define and enable or disable four different Invalid System Identification numbers. The message NONE beside the location number indicates the location is disabled. Use the volume control to select one of the four numbers.

▶ Press the # key to toggle the status of the location.

```
┌──────────────┐
│ INVLD   ID   │
│ 1  _ _ _ _ _ │
└──────────────┘
```

```
┌──────────────┐
│ INVLD   ID   │
│ 4      NONE  │
└──────────────┘
```

Enter the Invalid ID number in decimal format (it can range from 0 to 32767). Press CE to revert to the original state for the location. Press the SND key to enter the number.

```
┌──────────────┐
│ OPTION       │
│ LU     CLR   │
└──────────────┘
```

This screen shows the Local Use Option. This option, when SET, allows the use of local system enhancements in some markets. Ensure that the screen reads OPTION LU CLR.

▶ Press the SND key to toggle the status.

```
┌──────────────┐
│ OPTION       │
│ EX     CLR   │
└──────────────┘
```

This screen shows the Extended Address option status. When SET, this option causes the MIN2 to be transmitted along with the MIN1 code on each transmission within the home system. Ensure that the screen reads OPTION EX CLR.

▶ Press the SND key to toggle the status.

```
┌──────────────┐
│ OPTION       │
│ PS     SET   │
└──────────────┘
```

This screen shows the preferred system status for the radiotelephone. When SET, the preferred system is A or the non-wireline system. When CLR, the preferred system is B or the wireline system. Ensure that the screen reads OPTION PS SET.

▶ Press the SND key to toggle the status.

```
┌──────────────┐
│ OPTION       │
│ IRI    CLR   │
└──────────────┘
```

This screen displays the status of the Intersystem Roam Inhibit option. The IRI option, when SET, disables the ability of the unit to select the non-preferred system. Ensure that the screen reads OPTION IRI CLR.

▶ Press the SND key to toggle the status.

```
┌──────────────┐
│ OPTION       │
│ EE     SET   │
└──────────────┘
```

This display shows the current End to End Signalling status. When SET, the radiotelephone is able to send DTMF tones during conversation.

▶ Press the SND key to toggle the status.

```
┌──────────┐
│ OPTION   │
│ FD   SET │
└──────────┘
     │
     ▼
┌──────────┐
│ OPTION   │
│ MFD  SET │
└──────────┘
     │
     ▼
┌──────────┐
│ OPTION   │
│ 32D  SET │
└──────────┘
     │
     ▼
┌──────────┐
│ OPTION   │
│ MLH  SET │
└──────────┘
     │
     ▼
┌──────────┐
│ OPTION   │
│ LMH  SET │
└──────────┘
     │
     ▼
```

The Fast Dial option and the following screen Manual Fast Dial option are used to configure the Fast Dial feature. Use the matrix below to determine how the two options should be set. This feature can also be configured using the menu feature, see the Owner's Manual for details.

▶ Press the SND key to toggle the status.

FD	MFD	
CLR	CLR	(Silent, use STT to send tones)
CLR	SET	— Auto mode (95 ms. tone, 65 ms. interval)
SET	CLR	
SET	SET	—Manual mode (direct relationship)

This display shows the status of the 32-Digit Dialling option. When SET, the radiotelephone is able to display and transmit phone numbers up to 32-digits in length. When CLR, the radiotelephone can display and transmit only phone numbers up to 16-digits in length.

▶ Press the SND key to toggle the status.

This screen shows the status of the Mobile-to-Land Hold-off. This option, when SET, causes the accumulated air-time counter to ignore the first thirty seconds of a mobile-originated call if the call is terminated within this time.

▶ Press the SND key to toggle the status.

This screen shows the status of the Land-to-Mobile Hold-off option. When SET, this option causes the Accumulated Air-Time counter to ignore the first thirty seconds of a land-originated call if the call is terminated within this time.

▶ Press the SND key to toggle the status.

```
┌──────────┐
│ OPTION   │
│ CRU  SET │
└──────────┘
     │
     ▼
┌──────────┐
│ OPTION   │
│ NLM  SET │
└──────────┘
     │
     ▼
┌──────────┐
│ OPTION   │
│ HAL  SET │
└──────────┘
     │
     ▼
┌──────────┐
│ OPTION   │
│ ONL  SET │
└──────────┘
     │
     ▼
┌──────────┐
│ CNF 8300 │
│ REV AA03 │
└──────────┘
```

This screen shows the status of the Call Round-Up option. When SET, causes the air time to be displayed in hours and minutes with the seconds rounded up to the nearest minute. When CLR, the air time is displayed in hours, minutes and seconds.

▶ Press the SND key to toggle the status.

This screen displays the status of the No Land-to-Mobile option. The NLM option, when SET, causes the air-time to be saved for mobile-originated calls.

▶ Press the SND key to toggle the status.

This screen displays the status of the Horn Alert Enable option. When this option is SET, the horn alert feature is enabled; when CLEAR, the horn alert is disabled. With the horn alert disabled, the radiotelephone's missed calls register can be used without the horn alert sounding when calls are received. This option is also accessible by the user through the Menu feature.

▶ Press the SND key to toggle the status.

This screen displays the status of the On-Line Diagnostic option. The ONL option, when SET, enables the use of On Line Diagnostics.

▶ Press the SND key to toggle the status.

▶ The parameters wrap around to the beginning.

▶ Use end to finish this mode.

BILLING MODE

8300

NovAtel

NovAtel Communications Ltd.
8300 Cellular Radiotelephone
Billing Mode Description

The Billing Mode information utility is used to examine billing and power-down information for the 8300 Radiotelephone. It is also used to reset the internal air-timer and control scratchpad status.

Access Billing Mode by entering a special lock code. Press the O (increase) volume control to advance through each utility. Press the o (decrease) volume control to back-up. Use the following instructions to use each utility. Press the END key to exit the mode:

Lock the radiotelephone (if not already locked)

▶ (FCN) (lock 1)   (LOCKED)
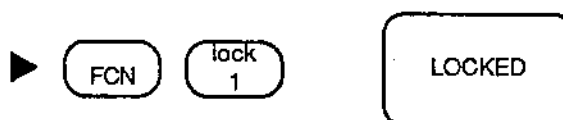
Enter the billing access code.

▶ # (1) (8) (5)   (BIL 8300 REV AA03)
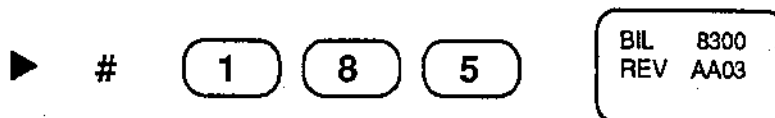
▶ Press the O (increase) volume control to advance to the first information screen.

(TOT TIME 00-00-00)

The first of the accumulated air-time screens appears. Press the CE key to clear the contents of the accumulated air-time register. Press any key other than volume, CE or END to advance to the next screen.

(ACC ERR 00-00-00)

An ACC ERR message indicates that the radiotelephone was turned off while a call was in progress. The air-time indication may not be accurate.

```
┌─────────────┐
│ MIN   XXX   │
│ XXX-XXXX    │
└─────────────┘
```

This screen displays the telephone number of the radiotelephone. See the Configuration Utility Description for information on changing the telephone number.

```
┌─────────────┐
│ LOCK 1      │
│       XXXX  │
└─────────────┘
```

This screen displays the tier 1 Lock Code for the radiotelephone. See the Owner's Manual for information on changing the Lock Codes.

```
┌─────────────┐
│ LOCK 2      │
│       XXXX  │
└─────────────┘
```

▶ Pressing any key other than volume or END displays a second screen which shows the tier 2 Lock Code.

```
┌─────────────┐
│ INVLD   ID  │
│ X           │
└─────────────┘
```

This screen shows the Invalid System ID numbers that have been set for the radiotelephone. Use any key other than volume or END to display all of the invalid system ID numbers (there can be up to four). The message NONE indicates that there is no number programmed at that location.

```
┌─────────────┐
│ STACK       │
│ ALARM   0   │
└─────────────┘
```

This screen shows the Stack Alarm status. Any value other than 1 or 0 indicates a software problem.

```
┌─────────────┐
│ SCRATCH     │
│ PAD   ENA   │
└─────────────┘
```

The Scratchpad Enable/Disable screen controls the scratchpad memory status. When enabled, the scratchpad operates as described in the Owner's Manual. When disabled, phone numbers can not be entered on the keypad. Calls can be made only to numbers that can be recalled from memory.

```
┌─────────────┐
│ SCRATCH     │
│ PAD   DIS   │
└─────────────┘
```

▶ Toggle the scratchpad status by pressing any key except volume and END.

```
┌─────────────┐
│ PWR DOWN    │
│ CODE   X    │
└─────────────┘
```

The Power Down Code screen displays a code that describes the most recent power-down sequence. The codes are:

0   Uncontrolled power down. Usually means an external power loss or external voltage out of range, i.e. less than 7.5 Vdc or greater than 18 Vdc.

1   The ignition switch of the automobile was turned off.

2   The radiotelephone was powered off from the handset.

3   Either the handset was unplugged from the transceiver or the transceiver cannot communicate with the handset.

4   The RF detector inside the transceiver detected RF energy when there should not have been any present. This can be internal to the transceiver (connector or transmitter problem) or the antenna can pick-up signals from other sources.

5   A firmware memory failure

6   Electronic serial number read error.

7   NAM read error.

```
┌─────────────┐
│ SERIAL      │
│ 8E0XXXXX    │
└─────────────┘
```

This screen shows the serial number for the radiotelephone that is encoded in memory. The information is encoded as shown below. The serial number cannot be changed.

```
┌─────────────┐
│ SERIAL      │
│ 8E0XXXXX    │
└─────────────┘
              serial number
              (in hex)
              00000<= XXXXX<=3FFFF
```

INSTALLATION

```
┌─────────────┐
│ BIL   8300  │
│ REV   AA03  │
└─────────────┘
```

The Billing Mode rotation starts over from the beginning.

8300

NovAtel

Installation Diagram

Note: Other combinations possible
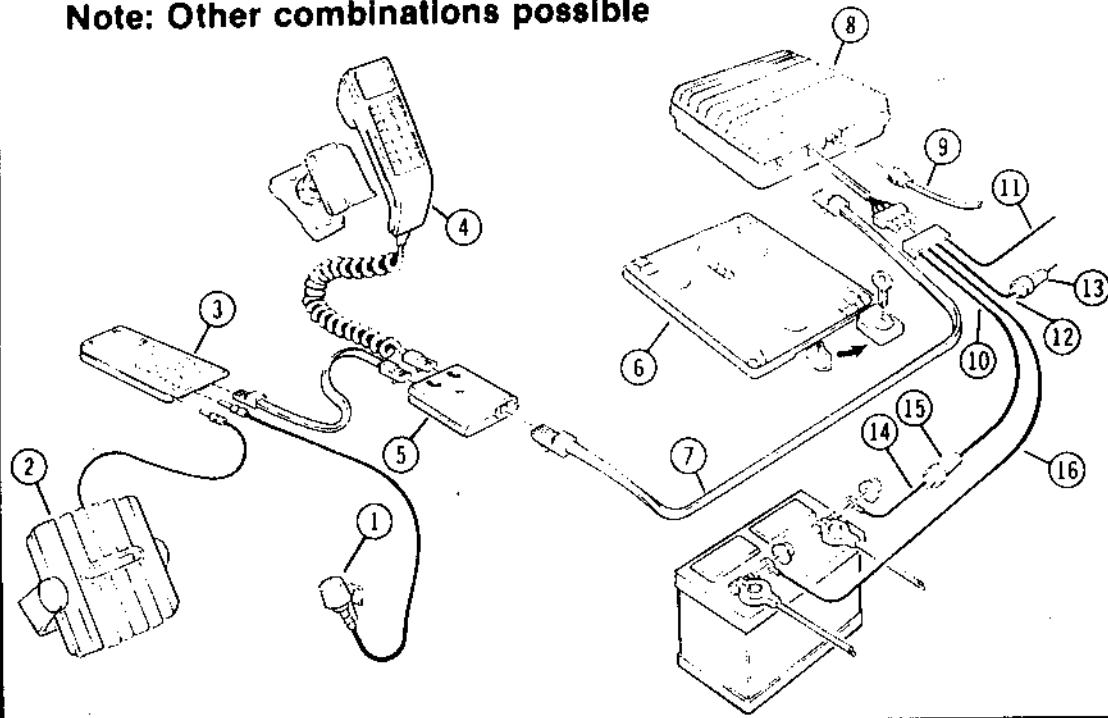
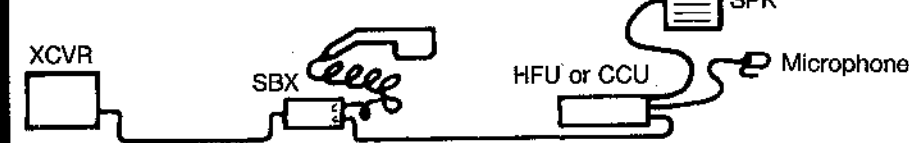|	
1	Microphone
2	Speaker
3	Compact control unit or hands free unit
4	Handset
5	Splitter box
6	Mounting base
7	Control cable
8	Transceiver
9	Antenna cable
10	Power cable
11	Yellow, horn alert
12	Violet, ignition sense
13	4 AMP fuse
14	Red + 13 VDC
15	5 AMP fuse
16	Black, negative ground

8300 SERIES STANDARD SYSTEMS

RULES

1. Only one loudspeaker in the system; either one HFU or CCU or ALT.

2. Total control cable length not to exceed 10 metres.

3. Ensure that control cables **FROM** the transceiver are not plugged into sockets for the handsets. If this rule is not followed, the person in the vehicle cannot be heard at the other end of the conversation.

4. Unplug power cable at transceiver before adding any new parts to the system.
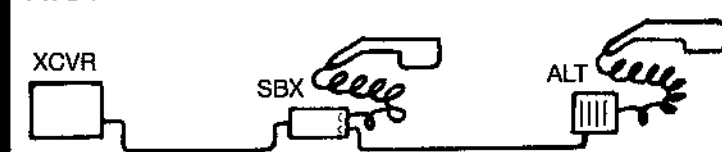
BASIC MODEL

XCVR ATG/ALT

HANDS-FREE MODEL

XCVR SBX HFU or CCU SPK Microphone

TWO HANDSETS

XCVR SBX ALT

TWO HANDSETS

XCVR ALT SBX

HANDS-FREE AND TWO HANDSETS

XCVR SBX SBX HFU or CCU SPK Mike

DO'S AND DON'TS

The Cellular Mobile Telephone you are about to install is a high tech electronic device that has been designed to provide many years of trouble-free service. This unit has been thoroughly tested before shipment from the factory. Good installation practices are important if the phone is to function properly and provide long   service to your customer.

DO'S

a. **DO** bench check operation on phone before installation by hooking up a 12-volt **regulated** power supply (3-4 AMP rating) and alternate antenna.

b. **DO** make a test call using the phone as it comes from the factory. The call will not be completed, but expect a recorded message from the phone company.

c. **DO** connect power cable directly to the battery. **DO** use the fuse provided.

d. **DO** make good connections when installing the TNC coax connector to the antenna feed line. Use a good quality crimping tool when connecting TNC "crimp-on" connector.

e. **DO** mount transceiver away from underside exhaust system. **DO** mount cables away from exhaust system, away from sharp edges, and away from high travel areas.

f. **DO** move vehicle outside the building when making initial "on the air" check. Often buildings with metal construction will shield RF signals and interfere with phone operation.

g. **DO** check efficiency of antenna operation by using the Bird model 43 wattmeter or equivalent. A poor connection in antenna system will cause erratic operation between "service and no service", and cause intermittent noise conditions including drop-out. A glass mounted antenna should always be checked for efficient operation with wattmeter.

h. **DO** check out phone on bench when customer complains of poor operation of the phones before exchanging phone or handset.

i. **DO** verify that all cables are making good connections and are properly seated on sockets before removing phone or handset from vehicle for bench check.

j. **DO** verify Electronic Serial Number with the telephone company when customer's complaint is "fast busy". Experience indicates system operator occasionally makes mistakes when entering ESN on system. Use wattmeter to verify power output if complaint is fast busy.

DON'TS

a. **DON'T** use a 1/4 wave antenna (about 100 mm long) unless mounted on the roof.

b. **DON'T** splice power cable.

c. **DON'T** ground power cable to fire wall or any location other than the battery.

d. **DON'T** attempt internal adjustments to radio

e. **DON'T** mount transceiver with heat sink in down position, resting heat sink on floor or on carpeting.

This list describes a minimum toolkit necessary to install the phone. Certain vehicles will need specific tools peculiar to those vehicles.

1. Phillips Head Screwdrivers.

2. Flat Screwdrivers.

3. 10, 11, 12, 13, 14 mm socket set

4. 10, 11, 12, 13, 14 mm ring and open end spanners.

5. RG58 style connector crimp tools, normal power connector crimp tools, normal power connector crimp tool.

6. Spare TNC RG58 cable crimp connectors.

7. 3, 4.5 mm drill bits.

8. Power drill.

9. Stepped reamer for antenna hole.

10. Pull wire/old speedo cable.

11. PVC tape (BLACK).

12. Cable ties (BLACK).

13. Scotchloks, solderless cable connectors.

14. Spare 50, 100, 200 mm Handset extensions.

15. Bird 43 wattmeter with 5 w 400-1000 MHz element or telewave thruline wattmeter.

16. Multimeter.

17. Spare relay, connector if horn option is required.

Introduction

This radiotelephone is easy to install using a few common tools and about two hours of your time. The secret to an excellent installation is planning. Take the time to think through the entire installation, evaluating where each component should go and planning which cable routes to use. There are many different ways to install a radiotelephone in an automobile – one not necessarily being better than the other. To make better decisions, read through this installation guide once to understand what the mounting requirement of each component is. Then layout where each component is to be installed and make sure that all your cables have enough length.

If you are uncertain about how an electrical connection is made or how a component is installed, contact your dealer or distributor for assistance.

Caution!

Be absolutely certain of what is on the other side of a surface before you drill. Typical hazards include electrical wiring, transmission housings, fuel tanks, brake lines, heater cores, etc. Wear eye protection when drilling holes.

For mounting locations where it is necessary to drill through carpet material, the following method is recommended:

1. Punch holes with a small punch.
2. Make a small slit in the carpet, insert a short piece of metal tubing and drill through the tubing.

Electrical connections should be made with no power applied; the connection to the positive battery terminal should be your **LAST INSTALLATION STEP.**

Installation

Please note the following equipment configuration limitations:

One Hands-Free Unit (HFU) per transceiver. One compact Control Unit (CCU) per transceiver. Do not connect a HFU and a CCU to the same transceiver. Do not use an ALT-300 with a HFU or CCU.

Do not connect or disconnect any peripheral from the transceiver while the ignition line power is on. Damage or incorrect operation of the peripheral could result.
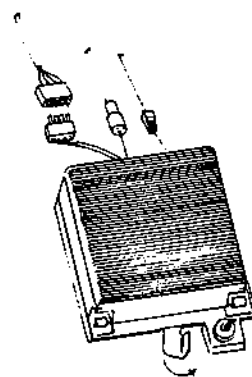
Transceiver

Disconnect the positive lead from the vehicle battery.

Start the installation by mounting the transceiver. Transceivers are usually mounted in the trunk but also can be mounted under a seat, behind the dashboard or inside a cargo compartment. Mark three holes with a punch using the mounting base as a template. Drill three holes suitable for the mounting hardware provided. Refer to the illustration below. Clean away any debris left from the drilling operation. Mount the transceiver in the most convenient orientation on the mounting base.
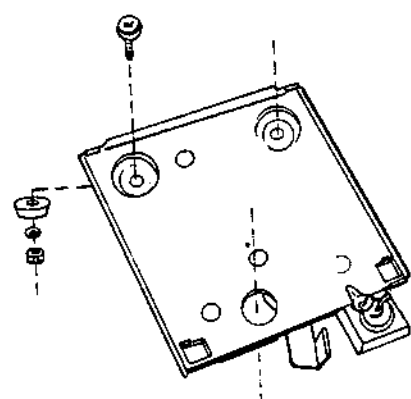
Secure the mounting base.
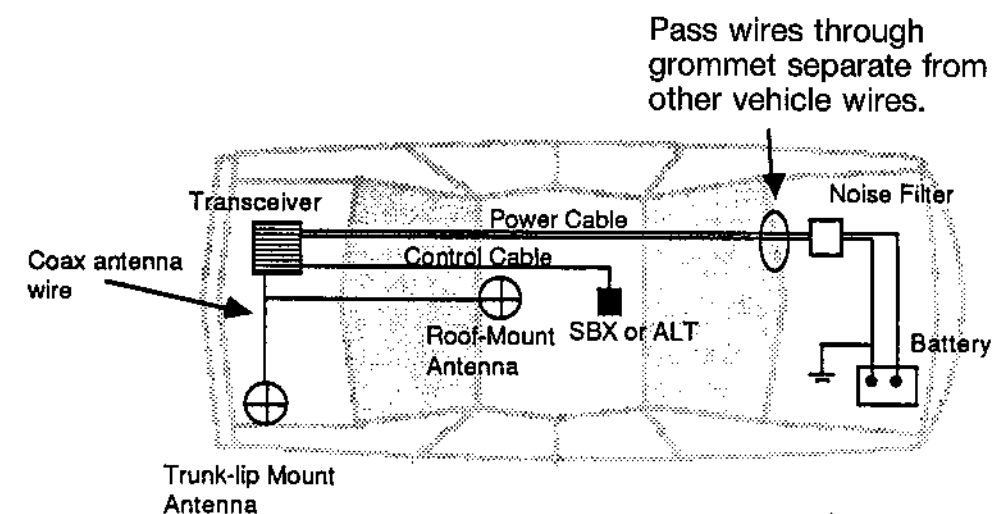Use the thick washers to level
the mounting base, as needed.

Attach the transceiver.
Push the lever as shown.
Lock with key. (If fitted.)

Power harness

Route the power harness next. The power harness consists of four wires:

The black wire is ground and connects to the black wire on the power filter. The red wire is the power wire and connects to the red wire on the power filter. The violet wire is the ignition sense. As its name implies, it senses the status of the ignition switch but draws no significant amount of power. It connects to an ignition switched terminal. The yellow wire is the horn alert and connects to the vehicle horn circuit as shown in the horn wiring diagrams on p.71. (This connection is optional.)

Refer to the interconnection diagram at the end of this installation guide. Connect the power harness connector to the transceiver. Route the power harness from the transceiver to the engine compartment (the illustration below shows a typical trunk mount routing). Note that the wires with fuses on them are separate from the main harness. This is so the harness can be passed easily through a small opening in the firewall. You may not want to pass the violet (ignition sense) wire through the firewall if you intend to connect it to a fuse terminal inside the passenger compartment.

Pass wires through
grommet separate from
other vehicle wires.

Transceiver
Power Cable
Noise Filter
Coax antenna
wire
Control Cable
Roof-Mount SBX or ALT
Antenna
Battery
Trunk-lip Mount
Antenna

Once the harness is routed, connect the wires as follows (refer to the interconnection diagram):

First, connect the short violet ignition sense wire to the accessory or ignition terminal in the fuse box. Attach a suitable terminal to the end of the short violet wire to make the connection. Cut the violet wire in the harness to meet the short violet wire. Connect the two violet wires using the crimp connector provided.
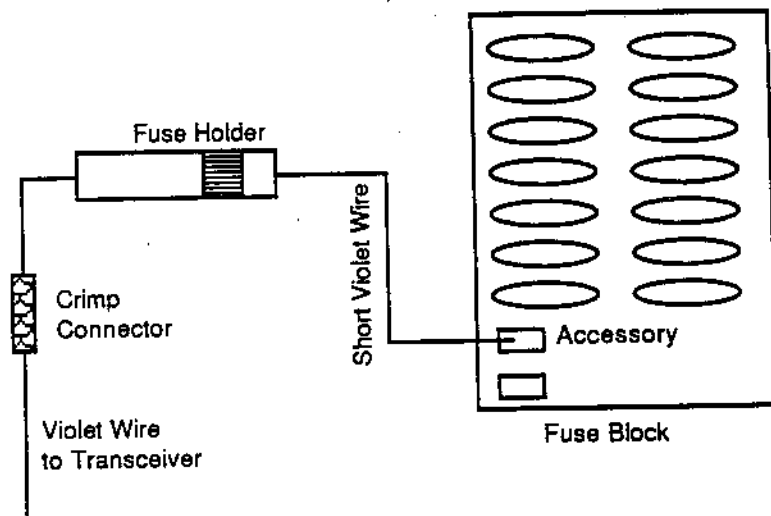

Connect the black wire from the power harness to the short black wire on the noise filter using the crimp terminal provided. Connect the long black wire on the filter to the negative battery terminal using the eye connector. Connect one end of the short fused red wire to the battery terminal and the other end to the orange noise filter wire using the crimp connector. Connect the red wire from the transceiver to the red wire of the filter.
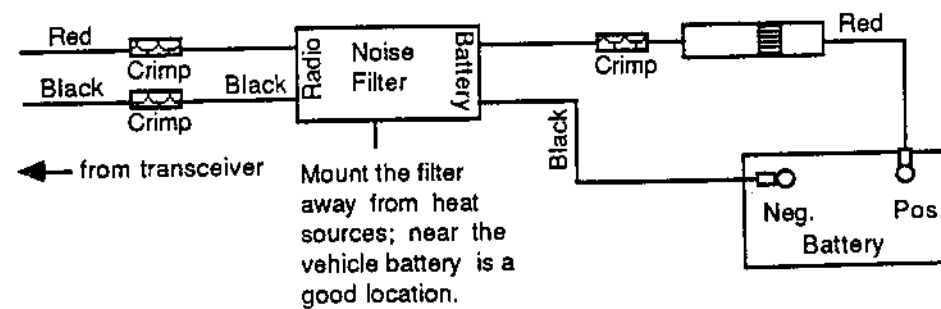
The noise filter is not necessary with the model 8305 telephone, but can be used if desired.

Horn alert feature

The yellow wire in the power harness provides a path to ground in the transceiver when the radiotelephone's bell circuit is activated, thereby sounding the horn when a call is received. If you are not going to use this feature, coil up the yellow wire and fasten it out of the way. If you are going to use the horn alert, it will be necessary first to install a horn relay. As indicated in the illustrations below, the horn relay contacts are installed in the same line as the existing horn button. It is recommended that the horn relay you install be equipped with a 1N4001 diode, or equivalent, to prevent spiking to the transceiver. Connect one terminal of the relay coil to the yellow transceiver wire and the other terminal, through a fuse, to the positive battery terminal. If the vehicle ignition must be on for the horn to sound, then it will be necessary to wire a bypass around the ignition switch.
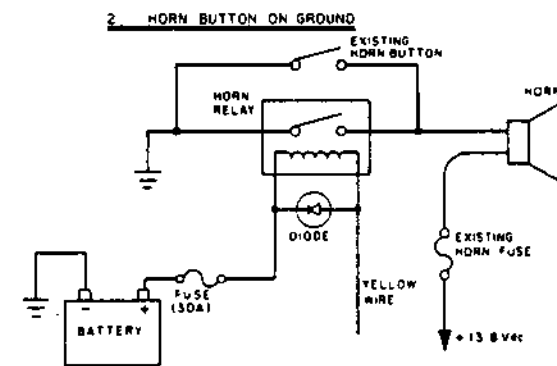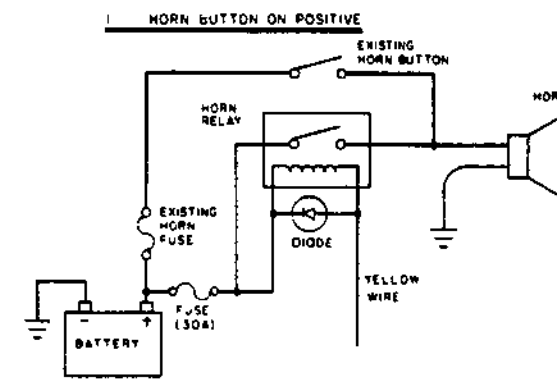
SBX-300 Junction box

Mount the SBX-300 junction box in a location that provides easy control cable connection and access. If you are going to be using a handset, make sure that the SBX-300 location provides suitable handset cord length (extension cables for the handset cord are available from your dealer). Drill a suitable mounting hole. Remove the paper from the adhesive backing on the SBX-300. Insert the screw provided through the hole in the centre of the SBX-300 and tighten.
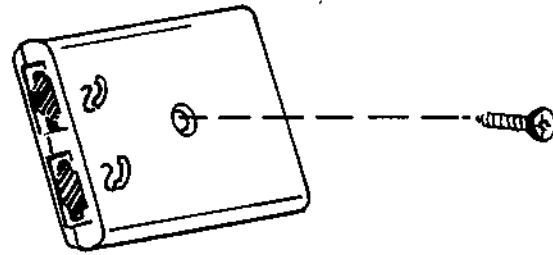
ALT-300 Junction box

Mount the ALT-300 junction box in a location that provides easy control cable connection and access. Make sure that the ALT-300 location provides suitable handset cord length. Drill suitable mounting holes and install the ALT-300 as shown.
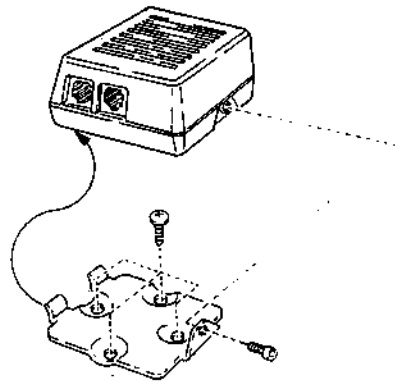
ATG-300 Alert Tone Generator

The ATG-300 alert tone generator can be used in place of the ALT-300 alert tone speaker, as indicated on the 8301/8300 Interconnection Diagram. Allow enough room for the handset cord to stretch comfortably to the user's ear and ensure that the speaker is in an unobstructed line with the user. Mount the ATG-300 on one of the mounting plates provided, depending on which of the two mounting configurations (illustrated below) is chosen.
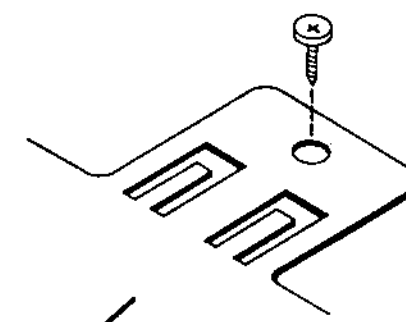
Ensure that the prongs on the base plate projection face downward. This will prevent twisting of the assembly.
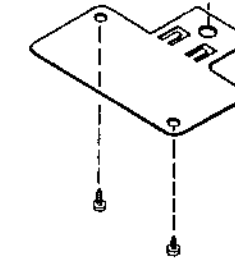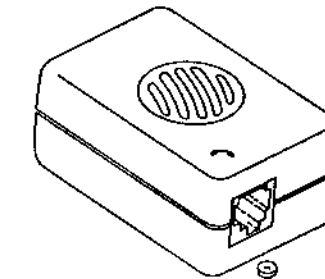
1. Stand-alone mounting

Use two machine screws to attach the base plate to the alert tone generator.

Use the self-tapping screw to attach the ATG/base plate assembly to a sound surface in the vehicle.
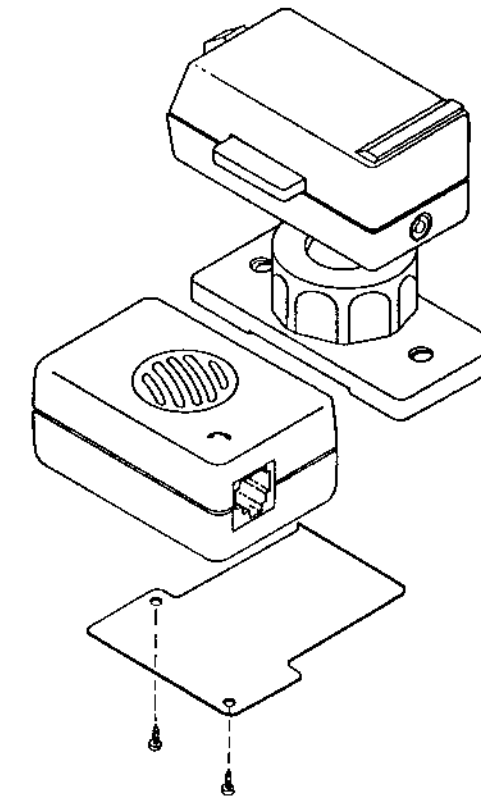
2. Mounting with swivel

Remove the cradle/swivel (if already mounted).

Use two machine screws to attach the base plate to the alert tone generator.

Clamp the projection from the base plate under the cradle/swivel.

Control cable

Connect one end of the control cable to the SBX-300 (or ALT-300). Run the cable beneath the carpet (along one side of the driveline/exhaust tunnel is a good location) to the transceiver (if you have to pull the cable at all, wrap some tape around the connector to prevent it from catching and breaking). Coil any excess cable and connect the other end of the cable to the transceiver. If a longer control cable is required, contact your dealer.

Control cable (to transceiver)

Handset cord

HFU or CCU

SBX-300
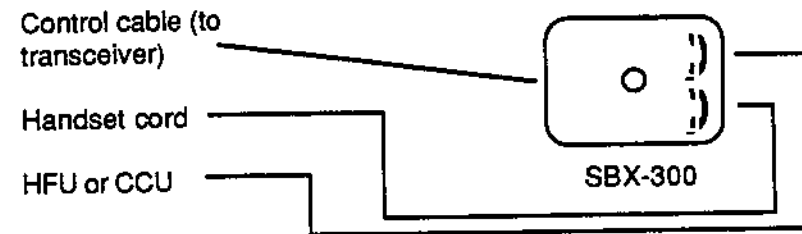
Handset

Mount the handset as shown in the diagram. If required, use the right angle bracket. Make sure that the handset does not interfere with the operation of any controls, sliding seats, glovebox doors, etc. Rotate the collar on the swivel to adjust the degree of effort required to reposition the handset. Connect the handset cord to the SBX-300 (or ALT-300), (ATG-300). If necessary the swivel may remove and the Cradle fitted directly to the right angle bracket.
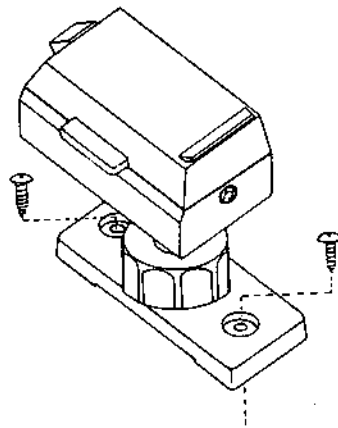
Compact Control Unit (CCU)

The CCU is best installed close to your line of sight so you don't have to look too far away from the road when you want to use it. Mount the CCU as shown in the diagram. Connect a length of control cable from the SBX to the connector on the side of the CCU. Install the SPK-300 next finding a location where it is out of the way but can still be heard easily. Connect the speaker cable to the speaker connector on the CCU. If you plan to use the optional extension microphone with the CCU, install it now connecting it to the microphone connector.
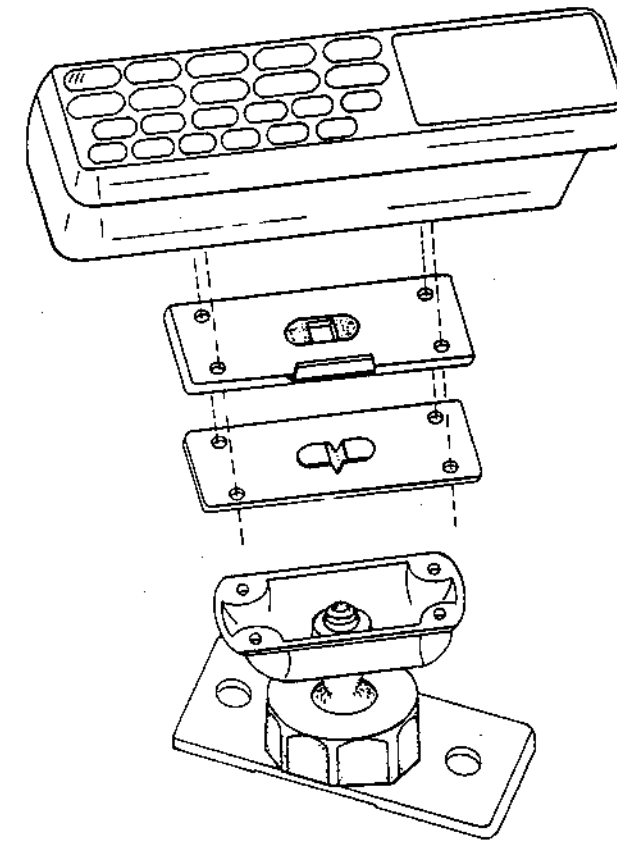
Hands-Free Unit

The Hands-Free Unit (HFU) does not have to be accessed once it is installed so you can locate it out of sight (under the instrument panel, center console, etc) using the supplied bracket. Refer to the Diagram. Install the SPK-300 finding a location where it is out of the way but can still be heard easily. Connect the speaker cable to the speaker connector on the HFU.
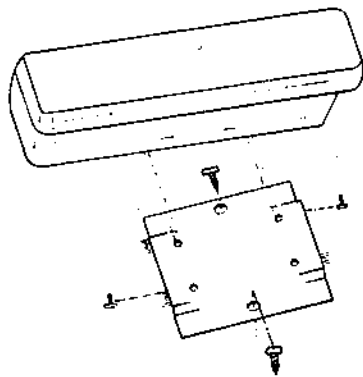
HFU Microphone placement

The microphone should be mounted in a quiet, vibration-free location away from heavy air flow, for example on the roof near the rear view mirror. Other good locations include on top of the dash or under the crash pad. The foam mount may be attached directly to the vehicle interior or to the microphone clip. The microphone should not be in a direct line with the SPK-300 speaker. Connect the microphone cable to the microphone connector on the HFU.
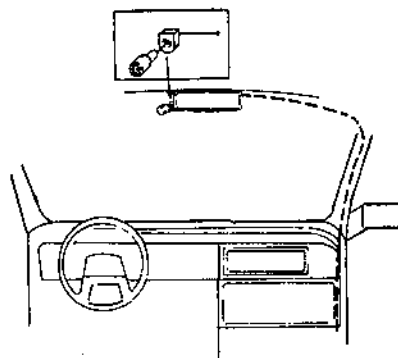
Antenna Connection

Use only antennas recommended by your dealer for use with your radiotelephone! Install the selected antenna using the instruction supplied with it.

Connect the antenna TNC connector to the antenna connector on the transceiver. Shown below are some sample antenna mounting locations.

Glass-mount with gain type antenna.
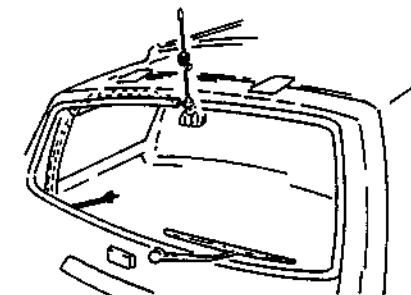
Centre of trunk through hole mount with gain type antenna.

ANTENNA WHIP
LOCKWASHER
LOCKING NUT
O-RING
7/8" DIAMETER
VEHICLE SHEET
BUSHING ASSY.
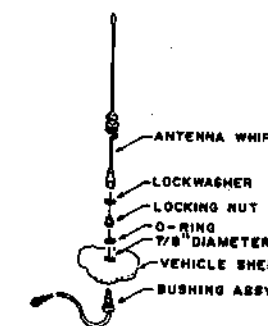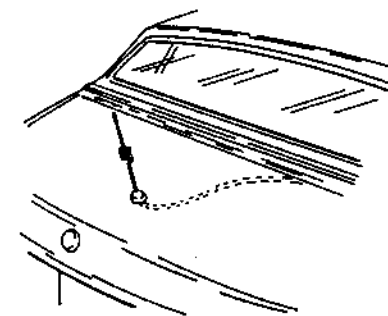
Follow fitment instructions supplied with the antenna kit.

Initial Phone Diagnostics Using Telecom's Recorded Messages

1. Telecom Message

'The number you have called is not available from this service.
To enquire about the numbers available, please call your Telecom business office'.

Possible Fault

a. Incorrect configuration – check for the correct phone number programmed into phone.

b. Telecom have not validated phone, or they have validated incorrect information.

2. Telecom Message

Fast busy ('Beep Beep Beep')
The phone is being denied access by Telecom.

a. This could either be a phone or Telecom fault.

Program test number 'A' into the phone (via configuration) see p79 for your area test number.

Initiate phone call eg. 1194, or to test number 'B' for your area.

Telecom Message

'The number you have called is not available from this service. To enquire about the numbers available, please call your Telecom business office.'

b. This recording shows there are no faults with the mobile phone – the fault is at Telecom's end i.e., incorrect phone number or serial No.

Telecom Message

Fast Busy ('Beep Beep Beep')
This implies the mobile phone has a fault i.e., transceiver or antenna problem. Check programmming. Check for proper ESN. Check number registrations with Telecom. If a test call cannot be completed substitute a known working transceiver with a test number into the vehicle and make a test call for system intercept. Check antenna. Program a test number into unit and check for recorded message.

Australian Test 'A' Numbers		Test 'B' Numbers	
Sydney	5050 22 52 00	Sydney	018 201399
Brisbane	5050 72 28 91	Brisbane	018 701399
Adelaide	5050 82 06 50	Adelaide	018 801399
Melbourne	5050 31 13 91	Melbourne	018 301399
Hobart	5050 12 02 50	Hobart	018 101399
Darwin	5050 89 3391	Darwin	018 80 1399

Problem Description	Possible Remedy
No power-up (wake up)	Check all fuses, power and ignition connections. Substitute known working transceiver and/or control unit in vehicle.
Powers down during all processing. Intermittent power-up/power-down.	Check all power connections. If possible read power-down code in Billing Mode. Substitute known working control unit and/or transceiver.
No transmit audio	Reverse hands free and control unit connections on the SBX-300. Substitute HF mic. Check to ensure the transceiver and control unit are connected to the appropriate socket on the SBX-300 or the ALT-300. Check all cables, remake all cable connections. Try control unit directly into transceiver. Substitute known working control unit and/or transceiver.

Problem Description	Possible Remedy
Intermittent transit audio	Control unit must be initialised on cradle. Plug control unit directly into the transceiver. Check all data cables and connections. Substitute known working control unit and/or transceiver.
No Service – will not go ready	Check programming (INVLD SID TABLE). Substitute known good transceiver.
Backlighting stays on – No power-up/power-down.	Remove main power for approximately 30 sec, reconnect and check out. Check all power and data cable connections. Plug the control unit directly into the transceiver. Check the voltage on the Red and Violet wires relative to ground. Substitute known working control unit and/or transceiver.
Phone number does not appear on the display – tones are present.	Check 'SCRATCH PAD ENABLE/ DISABLE' in the Billing Entry mode. Substitute a known working control unit and/or transceiver.
Control Unit, transceiver or other peripheral drawing excess current.	Check all power connections and fuses. Check all data and power cables for pinches or cuts which may cause a short. Replace damaged device and check out. Substitute a known working control unit and/or transceiver.

Problem Description	Possible Remedy
Will make calls but will not receive calls.	Check programming. Ensure correct telephone number is used. Change location of vehicle. Substitute a known working registered transceiver into the vehicle. Usually a system problem. Check if 'INCOMING CALLS ONLY' has been selected with Access Control.
Cannot make long distance or information calls, display shows ACCESS DENIED.	Unlock unit with tier 1 lock code. If not known use billing entry to read the lock codes. Substitute known working transceiver.
Unit drops calls or excessive static during call processing.	Possible system problem or unit in bad service area. Substitute antenna and drive vehicle to suspect area to see if problem persists. Substitute a known working registered transceiver and repeat test.
Corrupted ESN or ESN reads incorrectly into system or simulator.	Replace the transceiver.
Partial backlighting on control unit.	Replace control unit.
Unit initialises during programming.	Check all power and data cable connections. Substitute control unit and/or transceiver with known working units.
Control unit display changes system preference or roam indicator illuminates on display incorrectly during call processing.	Replace transceiver.

Problem Description	Possible Remedy
Keypad buttons stick on control unit.	Replace control unit.
Partial loss of display segments in control unit.	Remove main power from transceiver for 30 seconds, connect power and retry for correct display. Substitute known working control unit and/or transceiver.
No speaker audio. Control unit has earpiece audio.	Remove main power from the transceiver for 30 seconds, connect and retry. If hands free is used replace SPK-300 and re-test. Replace hands free with power removed and re-test. If no hands free is used remove main power and replace ALT-300 and test. Substitute a known working control unit, hands free, cradle or data cables.
No control unit earpiece audio. Unit has speaker audio.	Check all cable connections. Remove main power for 30 seconds and retry. Substitute known working control unit, transceiver and/or cradle and re-test.
No speaker or control unit earpiece receive audio.	Check all data cables and connections. Remove the main power for 30 seconds. Reconnect power and re-test. Substitute known working data cable, hands free (if equipped), control unit, ALT-300 SPK-300 and/or transceiver.
Intermittent or no control unit back-lighting.	With unit powered-up, press and hold the FCN and the volume up/down keys. Check all data and power connections. Substitute knowing working control unit and/or transceiver.

Problem Description	Possible Remedy
Distorted transmit audio.	Substitute known working control unit hands free, hands free microphone, ALT-300 and/or transceiver.
Distorted receive audio.	Substitute known working control unit, hands free, ALT-300, SPK-300 and/or transceiver.
Insufficient transmit audio.	Check ALT-300/SBX-300 connections are correct. Substitute known working control unit, hands free (if equipped), hands free microphone ALT-300/SBX-300 and/or transceiver.
Insufficient receive audio.	Increase volume settings. Substitute known goods hands free (if equipped), SPK-300, ALT-300 and/or transceiver.
Partial loss of keypad action (loss of row or column).	Substitute known working control unit and re-test.
Unit goes into LOCKED on power-up.	Both lock codes may be the same, change one lock.
No Service.	Bad antenna connection, check for shorts.
Buzz in speaker which changes with engine speed.	Make sure that power filter is connected. Route cables away from ignition leads.
Horn Alert Inoperative	Make sure horn function is selected and ignition is off. Ground the yellow lead, the horn must function. Replace transceiver.

TNC CRIMP CONNECTOR ASSEMBLY INSTRUCTIONS

	Trim cable to dimensions shown, taking care not to nick the inner conductor or the braid.
	Slip crimp sleeve over cable. Place inner conductor into contact. Note that the end of contact and inner dielectric must be butting and square. Crimp with appropriate tooling.
	Flair outer braid and gently but firmly push the contact into the connector housing until a gentle snap is felt, indicating the contact is in place. Slip the crimp sleeve in place, butting the flange against the connector housing, and crimp with appropriate tooling.

1. Check that no shorts exist between inner conductor and the outer. If using glass antenna, unscrew connector from sender unit before testing.

2. Check continuity to antenna and to earth.

To obtain phone number allocation contact Air International as per the back page.
Melbourne 645 1666.
Interstate Toll Free (008) 33 1136.

To request connection of new service send **'Request for Validation of MobilNet Service'** document to:

SYDNEY AREA

District Telecommunications Manager
Sydney City D.T.B.
GPO Box 7045
Sydney 2001

Attention: Special Products Group

Telephone: (02) 234 1311
Facsimile: (02) 235 0817
Telex: AA70293

BRISBANE AREA

Officer in Charge
Mobile Service Centre
188 Vulture Street
South Brisbane 4001

Telephone: (07) 837 2831
Facsimile: (07) 844 1848
Telex; AA140088

HOBART AREA

Business Systems Branch
1/80 Elizabeth Street
Hobart Tasmania 7000

Telephone: (002) 20 8800
Facsimile: (002) 20 8129
Telex: AA58123

WOLLONGONG AREA

Business Sales Manager
PO Box 1787
Wollongong NSW 2500

Telephone: (042) 28 2680
Facsimile: (042) 29 2000
Telex: AA29023

MELBOURNE AREA

Customer Services Section
Business Terminals Branch
Commercial Department
Telecom Australia
7th Floor
219 Elizabeth St
Melbourne 3000

Telephone: (03) 605 6428
Facsimile: (03) 670 6099
Telex: AA152723

ADELAIDE AREA

Mobile Products Service Centre
Business Systems Branch
46 King William Street
Kent Town
South Australia 5067

Telephone: (08) 42 9283
Facsimile: (08) 363 0038
Telex: AA89411

DARWIN AREA

Telecom Mobile Products
PO Box 1134
Darwin NT 5794

Telephone: (089) 81 7386
Facsimile: (089) 89 3532

NEW ZEALAND

Secular Communications Ltd
153 Nelson Street
Auckland

Telephone: (09) 789 770, 797 195
Facsimile: (09) 778 797

Note:
* Request must be typed with owners signature.
* A telex or phone call is not acceptable.
* Approxiamately two days should be allowed for Telecom processing.
* If validation request is sent via facsimile the original MUST be mailed to Telecom within 5 working days.

SIDH, System Identification Code and MIN1, MIN2 Numbering.

Australia

Adelaide	08329	MIN2 = 505
Albury/Wodonga	08363	
Brisbane	08327	MIN 1 = 089 XXXX Darwin
Burnie	08347	08X XXXX Adelaide
Campbelltown	08321	07X XXXX Brisbane
Canberra	08339	062 XXXX Canberra
Darwin	08333	052 XXXX Geelong
Devonport	08347	042 XXXX Wollongong
Geelong	08367	03X XXXX Melbourne
Gladstone		02X XXXX Sydney
Gosford	08355	012 XXXX Hobart
Hobart	08331	013 XXXX Launceston
Iron Triangle		09X XXXX Perth
Launceston	08345	
Melbourne	08325	
Mornington		
Newcastle	08341	
Noosa		
Nowra		
Penrith		
Perth	08335	
Rockhampton		
Sydney	08321	
Toowoomba	08353	
Townsville		
Woollongong	08343	

New Zealand

Auckland	08577	MIN2 = 530
Christchurch	08583	
Wellington	08581	MIN1 = 09X XXXX Auckland
		089 XXXX Whangarei
		073 XXXX Rotorua
		071 XXXX Hamilton
		070 XXXX Napier
		067 XXXX New Plymouth
		063 XXXX Palmerston Nth
		056 XXXX Timaru
		054 XXXX Nelson
		04X XXXX Wellington
		03X XXXX Christchurch
		024 XXXX Dunedin
		021 XXXX Invercargill

ABBREVIATIONS used in the Electronics Industry.

AC	Access Channel/Alternating Current
BHCA	Busy Hour Call Attempts
BOM	Bill of Materials
BS	Base Station
CAD	Computer Aided Design
CCITT	International Telegraph and Telephone Consultative Committee
CPU	Central Processing Unit of computer
DTMF	Dual Tone Multi-Frequency (dialling signalling)
DOC	Department of Communications
dB	Decibel (ratio of electrical quantities)
dBm	Decibel with ref. to 1 milliwatt
dBmO	Decibel with ref. to normalised level
dBmOp	Decibel with ref. to normalised level psophometric weighted
dBu	Decibel with ref. to 1 microvolt
EIA	Electronic Industries Association (USA)
EMF	Electromotive Force ignoring equivalent impedances
FCC	Federal Communications Commission (USA)
FM	Frequency Modulation
GPIB	IEEE-488 Interface Standard
HMSC	Home Mobile Services Switching Centre
MTS	Mobile Telephone System (Telecom's old system)
MSSC	Mobile Services switching centre
NMT	Nordic Mobile Telephone System
PC	Paging Channel/Personal Computer
PSTN	Public Switched Telephone Network
SAT	Supervisory Audio Tone (cellular system)
SIDH	System Identification Code (cellular systems)
SMD	Surface Mount Devices
SMT	Surface Mount Technology
SPC	Stored Programme Control
TACS	Total Access Communications System
UHF	Ultra High Frequency band, Cellular, TV etc.
VC	Voice Channel
VLSI	Very Large Scale Integration
VMSC	Visited Mobile Services Switching Centre
Z	Impedance (similar to resistance but for AC quantities)

GCH-300 SERIES
HANDSET

CRADLE/
SWIVEL

SPK-300
SPEAKER

OR

SPK-305
SPEAKER

8301/9300
TRANSCEIVER

ANTENNA
CONNECTOR

TRANSCEIVER
MOUNTING
BASE

CCU-300
(OR HFU-300)

300 SERIES
CONTROL
CABLE

HORN
(YELLOW)

IGNITION
SENSE
(VIOLET)

POWER
CONNECTOR

POWER
HARNESS

4 A
FUSE

CRIMP
CONNECTION

SBX-300
JUNCTION
BOX

300 SERIES
CONTROL CABLE

RED

BLACK

COLOURED*

GCH-300
SERIES
HANDSET

MICROPHONE

HANDSFREE

OR

HANDSET
ONLY

COLOURED*

LINE FILTER

5 A
FUSE

BLACK

POSITIVE
+13.2 Vdc

RED

See label on
filter for
orientation of
coloured wires

CRADLE/SWIVEL

BLACK

VEHICLE
BATTERY
(not to scale)

ATG-300 OR ALT-300

ALT-300
MOUNTING BASE

8301/9300 RADIOTELEPHONE
INTERCONNECTION DIAGRAM

8300 Peripheral Options

TRANSCEIVER

GCH-300
SMART HANDSET

SBX-300
SPLITTER BOX

SPK-300
SPEAKER KIT

CCU-300
COMPACT CONTROL UNIT

SHS-300
SIMPLE HANDSET
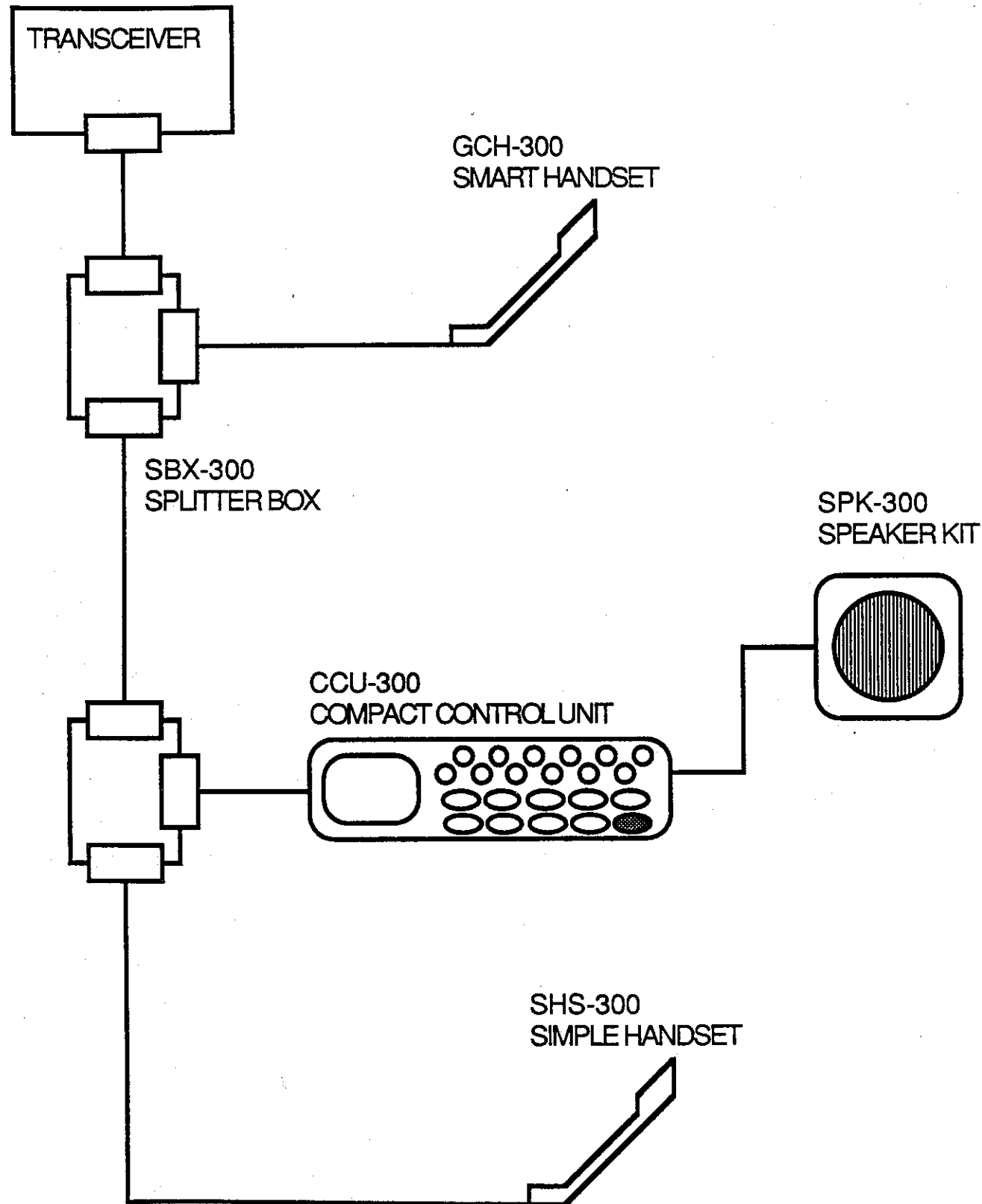
NOVATEL MODEL 8300/8301/8305 CELLULAR TELEPHONE FUNCTION BLOCK SURVEY

FACTORY ACCESS

83 *

SERVICE MODE
USED FOR BENCH TESTING

END

DEALER ACCESS

185

BILLING MODE
USED FOR RENTED PHONES

END

259

CONFIGURATION MODE
SETS PHONE IDENTITY

END

INCOMING
CALLS
ONLY

LOCKED

TIER
2
UNLOCK

FCN
1

LOCAL
CALLS
ONLY

TIER
1
UNLOCK

FCN
1

UNRESTRICTED
CALLS

MNV   END

FCN   FCN
9   9

MENU
USER VARIABLES SETUP

DIAGNOSTICS:
CHANNEL, RSSI
SAT, POWER LEVEL

NORMAL USER ACCESS

ENGINEERING ACCESS

FACTORY LOCK CODES	
TIER 1	1234
TIER 2	0000