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# User Guide



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**PowerTrunk**

# MDT-400

TETRA mobile terminal

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## WASTE MANAGEMENT



The symbol means that the product must be taken to separate collection at the product end-of life. Do not dispose of these products as unsorted municipal waste

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# 1 GUARANTEE

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PowerTrunk Inc.. guarantees the replacement or repair, free of charge, of any products that are found to have a manufacturing defect, in accordance with the general conditions of the PowerTrunk Inc.. guarantee.

Under no circumstance shall PowerTrunk Inc.. be held responsible for problems or damage caused by any accessory or auxiliary element that has not be supplied by or certified by PowerTrunk Inc.. Neither shall PowerTrunk Inc.. guarantee the functioning of this product with auxiliary equipment or accessories that have not been supplied or certified by PowerTrunk Inc..

In no case shall PowerTrunk Inc. be held responsible for damages caused by an installation carried out by personnel not authorized by PowerTrunk Inc.

## 2 ABOUT THIS MANUAL

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Thank you for purchasing this PowerTrunk MDT-400 or DT-410radio.

TETRA's most advanced services and a wide range of options and accessories will help you obtain the best performance from mobile communications in your work.

This manual will show you how easy it is to use the main features of your new TETRA terminal. You will learn how to make a group call, an individual call, how to send status message or how to edit a text message and send it to one or several users.

***Before using the equipment, please read this manual carefully.***



***In addition to instructions on how to use the radio, you will also find safety information, among which the international guidelines on exposure to radio frequency.***

***Please keep this manual at hand for future reference. For further information, contact your service provider.***

At the end of this MDT-400 and DT-410 manual, you will find a Quick Reference Guide. In addition, each unit is supplied with an Installation Guide.

Some functions described in this guide may depend on the configuration and options of the equipment, as well as the firmware version.

Please, contact your service provider for more detailed information about the available features of your equipment.

## 3 FOR YOUR SAFETY

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### 3.1 General

PowerTrunk Inc. has obtained official approval for a wide range of accessories for the MDT-400 and DT-410 radios: antennas, audio accessories, etc. These accessories have undergone all type of tests to ensure their suitability and safety for the use they have been designed for, either vehicle use (MDT-400) or desktop use (DT-410). Use only PowerTrunk Inc.-approved accessories.

For your safety, only have your equipment and accessories repaired by personnel authorised by PowerTrunk Inc.. An incorrect installation (*MDT-400 / DT-410 Installation Guide*) or repair could be dangerous and will render your guarantee void.

Read the chapter USA and Canada regulations for more information



### 3.2 Exposure to RF energy

Your MDT-400 / DT-410 equipment, together with the accessories for which PowerTrunk Inc. has obtained official approval, have been designed and manufactured so that they do not exceed the limits of exposure to radio frequency energy established in international guidelines.

These regulations, which are result of periodical scientific trials by independent organisations, include a considerable safety margin, designed to guarantee the safety of all staff, regardless of their age or state of health.



***MDT-400/DT-410 is restricted to occupational/controller use to satisfy RF energy exposure limits. This radio is NOT authorized for general population.***

***Use only accessories and antennas approved by PowerTrunk Inc. Use of non-approved accessories and antennas may exceed RF energy exposure limits.***

### 3.3 Electromagnetic compatibility

The majority of electronic devices are susceptible to electromagnetic interference if they are not adequately shielded, designed or configured for electromagnetic compatibility.

To avoid these compatibility conflicts, it is necessary to respect current local regulations. This equipment complies with the requirements of the **Radio Equipment Directive 2014/53/EU**.



***Warning: Burns may be suffered if the bare part of the antenna is touched during radio equipment transmissions.***

***Long periods of transmission may cause the rear part of the equipment, where the power amplifier radiator is located, to reach a high temperature.***

It must be taken into account that some mobile digital devices may interfere with hearing aids or other medical devices. If this interference were to occur, please contact your service provider or consult with the manufacturer of the hearing aid or medical device.

Using two TETRA devices with antennas in close proximity may cause mutual interference. If this were to occur, separate the antennas until the interference disappears.



#### ***Vehicular Installation***

***The MDT-400 / DT-410 terminal must be supplied with a continuous nominal 12V voltage in equipment terminals (minimum 10.8V, maximum 15.6 V).***

### **3.4 Other warnings**

#### *Vehicles*

RF signals may affect motor vehicles' electronic systems if they are not properly installed or well protected. For more information, check these aspects of your vehicle or the equipment you have added with their manufacturers.

For correct installation of the equipment, please follow the instructions given in the *MDT-400 / DT-410 Installation Guide*. Avoid using the area above the airbag or the area where it will inflate. Airbags inflate with great force and the equipment could be projected forward and cause serious injuries to vehicle occupants.

#### *Potentially explosive environments*

Disconnect the equipment when you are in an area with a potential explosion hazard and comply with all notices and instructions.

Areas with a risk of explosions are often (although not always) indicated. Amongst these are fuel filling areas (Ship decks, petrol stations, installations used for storing and transporting fuel or chemical products) vehicles that use LPG and areas where the air contains particles such as grain, powder or metal particles.

Sparks in these areas can cause explosions or fires, with the resulting risk of injury and even death.

### *Driver safety*

Check the laws and regulations on using mobile phones and radiotelephones in the area where you are to drive and always abide by them. While driving, concentrate all your attention on driving and always have your hands free to manoeuvre the vehicle.

As a precautionary measure, whenever possible, park off the road to make or receive a call.

### *Programming*

The equipment must always be programmed using a version of the programmer that is compatible with the version of firmware.

## **3.5 Antenna**

- Do not use the equipment without an antenna.
- To guarantee safety compliance, always use only antennas validated by PowerTrunk Inc.
- Never use the equipment if the antenna is damaged. If a damaged antenna comes into contact with the skin, it may cause burns.

## **3.6 Audio accessories**

1. Only use accessories approved by PowerTrunk Inc.
2. Follow the guidelines for fitting audio accessories in the *MDT-400 / DT-410 Installation Guide*.

## **3.7 Maintenance**

The following recommendations will help you to increase the service life of the equipment and maintain the guarantee coverage:

1. Do not install the equipment in dirty, damp or dusty locations. It is recommended to install it out of **direct sunlight** and away from **sources of heat**. High temperatures can reduce the service life of electronic components and deform or melt some plastics.


2. Any **liquid** spilt on the equipment can cause serious damage. If this occurs, consult your authorised Technical Service.
3. Use a soft damp cloth for cleaning the outside surfaces. Never use chemical sprays or abrasive cleaning products.
4. Do not obstruct or cover the ventilation holes of the DT-410 office unit.
5. Do not store the equipment in cold places. When the device warms up, there may be condensation inside that could damage the electronic circuits.
6. Protect the equipment from impacts or being dropped. Circuit boards and more sensitive mechanical components may get broken.
7. If you observe an error indication on the equipment screen that prevents it from working normally, consult your service provider.
8. **Do not open the equipment** or try to modify it in any way. There are no user-serviceable parts inside and removing the cover will expose you to electrical shocks and other hazards. Any attempt to open the equipment and manipulate it in any way will render your guarantee void.
9. **Do not insert objects into the DT-410 desktop unit casing slots**, as they could come into contact with high voltage and cause shocks, fires or unit failure.
10. Do not place **heavy objects** on the equipment or on its power cable. A damaged cable could cause shocks or fires.
11. **Only use the power cable** supplied with the equipment. To avoid shocks, the DT-410 must be earthed.
12. Disconnect the equipment antenna when there are storms, to avoid **lightening** damage.

## 4 FIRST STEPS

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### 4.1 Start-up

In the case of the DT-410, switch on the equipment with the main switch at the back of the device.

1. Keep the key  pressed to switch the equipment on or off.
2. On **starting-up**, it will display a welcome message (which can be configured by programming). The software version of the equipment and the user's name and address will also be displayed for a few seconds.
3. If the equipment requests a PIN, enter the 4-digit code (by default the code is 0000), which will appear on screen as \*\*\*\*, and press OK. It is recommended to change this code for a safer one that you are able to remember.
4. If the user does not enter a correct PIN code after a number of permitted tries (which can be configured, 3 attempts by default), the equipment will be locked until the personal unlocking code - PUK - is entered (a 10-digit code). This code is provided by your Service Provider.
5. When **switching off** the equipment, it will display a switch-off message and an acoustic warning.

In the case of the DT-410, once the equipment has switched off completely at the front, you can proceed to turn off the main switch at the rear.

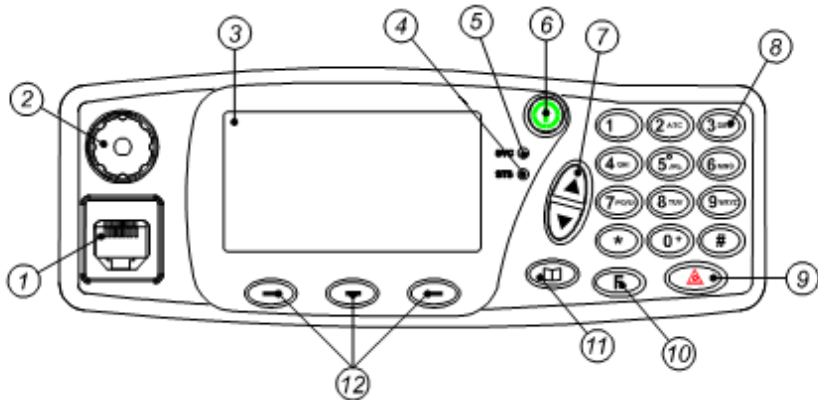
## 4.2 Working modes

1. There are three working modes: network mode (V+D), direct mode (DMO) and DMO-GATE mode. In network mode (V+D), the equipment will be operational when the system has been successfully registered. Then the display will show the symbols  (Valid network indicator) and  (signal level indicator).
2. During the system registration and network access process, the SVC LED will be lit up continuously in red, and when a valid network is found it will flash and try to register into it. When the register is complete, a characteristic programmable acoustic signal will be heard, the SVC LED will turn green and the screen will display the message "In service". If the equipment is unable to access a network, the display will show "No service" and the SVC LED will stay red. Even if the equipment has not registered, it is possible to access the Main Menu, to select the Direct working Mode, for example, without need for infrastructure.
3. In DMO mode, the SVC LED will be green and the symbol  (Direct mode active indicator) will be displayed in the symbol line of the display (Upper line). In this mode, the symbol  (valid network indicator) is not displayed.
4. If the equipment has the DMO-GATE option available, this working mode can be selected, which will enable the transfer of group calls from the network to terminals in DMO mode and vice versa.
5. The equipment may be configured to start in any of the available modes or it is possible to change the mode manually through the "Working modes" menu.

## 5 BASIC USE

This manual is common for both equipment models: the MDT-400 mobile equipment and the DT-410 office unit.

Both models have the same front panel, described below.



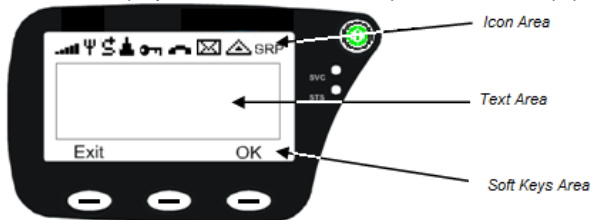
The MDT-400 can also be used without front for data applications using the PEI protocol and audio control through the 600-ohm interface. If your equipment has this configuration, consult with your Service Provider to learn about the services available and how to access them.


















No.	Description	Observations
1	Microphone connector	Connector for handheld Microphone or Micro-loudspeaker or desktop microphone (DT-410). Connector for the programming cable.
2	Volume control	Adjusts the volume level. Screen adjustment Contrast, Volume audio and Volume tones.
3	Screen	Alphanumeric display 4 x 16, line of symbols and line of 'soft keys'.
4	STS LED Indicator	Call status indicator.
5	SVC LED Indicator	Service indicator.
6	ON/OFF key	Key to switch on / off
7	Navigation keys	Navigation by menus/submenus and their options. Editing phone books / messages.
8	Alphanumeric keyboard	For entering number and characters. (See section 6.3)
9	Emergency key	Starts / cancels the emergency call.
10	Function key	Combined with other keys, it enables rapid access to certain functions. By continuous pressing, it changes the working mode (TETRA V+D<-> DMO)
11	Menu key	Access to Main Menu.
12	Soft keys	Press to select the corresponding on-screen option.

## 5.1 Display indicators

The on-screen indicators display information about the operation of the equipment:



Symbol	Description
	Signal intensity (RSSI) or level of coverage indicator
	Valid network (Only in V+D network mode)
	Emergency call established (steady). Flashing if the call is being set up.
	Call established
	Message received (steady). Flashing when a message is being sent.
	Discrete mode active. Converts a semi-duplex incoming call with direct signalling to on/off hook signalling.
	All tones off
GRP PRV PHN PBX BRD	Type of voice call selected: group (GRP), private (PRV), broadcast (BRD), phone (PHN) or through telephone exchange (PBX).

	GPS position valid (steady). Flashing if GPS position is not valid. Will only be displayed if the GPS option is installed in the MDT-400 unit.
	Direct mode (DMO) activated.
	Data packet connection. Steady if the connection has been established. Flashing if data transfer is under way.
	Call diversion activated.
	Inclusion call activated.
<b>F</b>	Access to sequential functions with  key.
	Messages received box full
	Steady: Terminal registered in encrypted mode. Encrypted call. Flashing: Terminal registered in encrypted mode. Clear call.
abc/ABC	Text editing screen
	GSM call established (steady). Flashing during call establishment. Will only be displayed if the GSM option is installed and activated.
	Active group scan (groups in listening mode).
	DMO-GATE mode.
	Presence of a DMO-REP detected in the DMO frequency selected.
	When the terminal has the E2EE module (End to End Encryption) active: Active call with E2EE Encryption. Clear call active.
	Migration. Terminal registered in a different network to its own local one.
	TxI (Transmit Inhibit) functionality. Transmissions temporarily inhibited (except emergency call).

## 5.2 LED Indicators.

LED indicators display information about equipment operation:

SVC LED	
LED status	Function
Off	Equipment not operational.
Red	Equipment not in service (no network registered).
Flashing red	Equipment in the process of registering.
Green	Equipment in service (Registered on the network). Equipment operational (DMO).
Flashing orange	Equipment in programming mode

STS LED	
LED status	Function
Off	No call being carried out.
Red	Equipment transmitting a call. PTT pressed (semi-duplex call) or until the communication is over (duplex call, only in TMO –trunking mode).
Flashing red	Request or end of transmission.
Green	Equipment receiving a call.
Flashing green	Call in progress, no one transmitting.
Orange	Call being established.

If the two LEDs (SVC and STS) are orange, this indicates an error. If this occurs consult your Service Provider.

### 5.3 List of editable characters

The following table displays the characters available for editing texts on the MDT-400 and DT-410.

Keys	Screen characters										
	Number of times to press the key										
	1	2	3	4	5	6	7	8	9	10	11
1	Space	.	1	,	&	\$	@	#	¿	?	¡
	!	:	;	_	"	'					
2 ABC	A a	B b	C c	2	Á á	À à	Â â	Ã ã	Ä ä	Å å	Ç ç
3 DEF	D d	E e	F f	3	É é	È è	Ê ê	Ë ë			
4 GHI	G g	H h	I i	4	Í í	Ì ì	Î î	Ï ï			
5 JKL	J j	K k	L l	5							
6 MNO	M m	N n	O o	N ñ	6	Ó ó	Ô ô	Õ õ	Ö ö	Ø ø	
7 PQRS	P p	Q q	R r	S s	7						
8 TUV	T t	U u	V v	8	Ú ú	Û ù	Û û	Ü ü			
9 WXYZ	W w	X x	Y y	Z z	9						
0 +	+	-	0	=	*	÷	/	\	(	)	[
	]	{	}	<	>						

## 5.4 DT-410 desktop unit

The DT-410 desktop unit integrates the radio equipment with a built in power supply and an internal loudspeaker to optimise the space needed for fixed installations.



***The desktop unit has not been designed to bear heavy weights; therefore heavy objects should not be placed on top of it.***

Its menus and operation are the same as the mobile MDT-400 equipment, with the following exceptions:

If the DT-410 is controlled via PEI (E.g., from a PC application), only one screen is displayed, enabling two options:

- Return to manual control of the equipment, pressing soft key '**MMI**'
- Enable or disable the internal loudspeaker, selecting **Loudspeaker Yes** or **No**.

The volume control and the on/off switch remain active.

## 5.5 Main screen

The main screen is that of Voice Calls (in V+D network mode) – Group mode.

The equipment will be prepared to press PTT (Press-to-talk) and directly launch a call to the group selected.


The basic information viewed on this screen consists of the range the selected group belongs to, the name of the group and its status.

The soft key '**Mode**' (Lower right-hand side of the screen) enables selection between other types of call (private, telephone, PABX). If desired, automatic return to the preferred type of call can be programmed after a few seconds.

## 6 MAIN MENU

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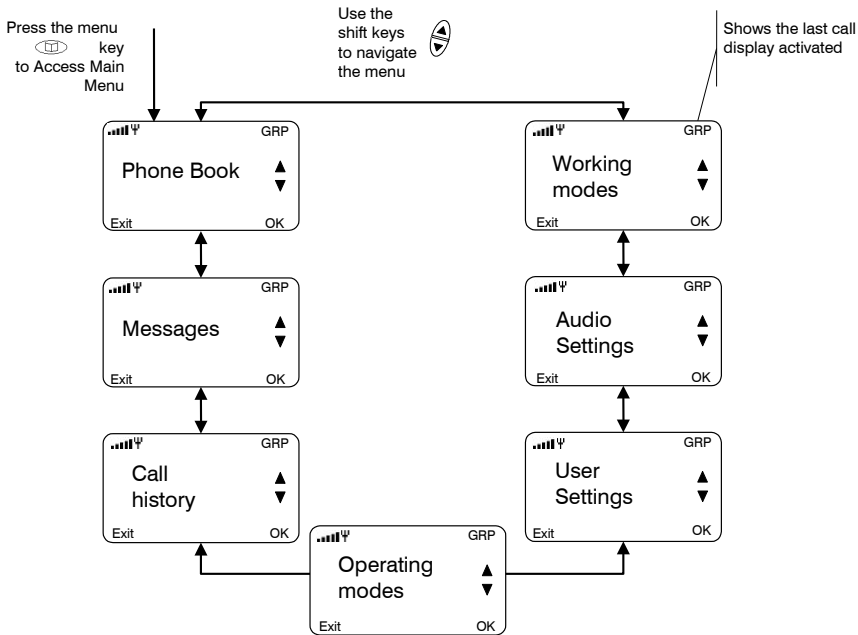
To access the Main Menu, press the key .

The Main Menu is cyclically organised and the different screens can be accessed using the navigation keys: .

The soft keys can enable or disable menu options, access submenus and return.

Some screens may not be displayed, depending on the configuration of your equipment.

To avoid certain configurations being accidentally modified, some functions can be restricted by programming. The menus/functions that can be restricted are phone books, call register, operating modes, accessories (In configure audio), sending status messages and sending text messages.





## PHONE BOOK

Private →	Add Erase Mem status Edit	PSTN →	Add Erase Mem status Edit
Group →	Add Erase Mem. status Preferred GRP	PABX →	Add Erase Mem status Edit

**1. WORKING MODE**

V+D  
DMO  
Gateway  
GSM

**2. AUDIO SETTINGS**

Audio volume →	+/-	Active tones	On/Off Keypad tones Control tones Call-in tones Call-out tones TX permission RX permission Received msg Sent message	On/Off On/Off On/Off On/Off On/Off On/Off Off/Normal/High On/Off
Accessories →	Standard Handset Hands free kit Auto PTT detection			
Ringtone	Tone1... 10			
		Tone volume	+/-	

**3. USER SETTINGS**

Language

Screen →

Backlight  
Brightness  
Negative  
Contrast

PIN code →

PIN Request  
Change PIN**4. OPERATING MODES**

Area selection

Local area  
Areas 1..14  
Wide area

TxI mode

On / Off

Discrete mode

On / Off

**5. CALL HISTORY**

Dialled

Received

Missed

Erase all

**6. MESSAGES**

Status →

Read  
Send  
Erase status

Text →

Inbox  
Outbox  
New  
Configure  
Erase Inbox  
Erase Outbox

## 7. ENCRYPTION (optional)

This menu will only be displayed if the E2EE option has been installed.

Set Date & Time →	Date Time
Select PLAIN/CRYPTO →	Prefer CRYTO Prefer PLAIN Use default
Factory Reset →	Fact. Reset Pwd
Key Set Check Value →	Key Set CV
Info Security Proc.	
Info Crypto Module	

## 8. GPS INFO (optional)

This menu will only be displayed if the GPS option has been installed. The following information could be accessed only if GPS position has been provided.

Latitude – Longitude  
Speed (Km/h, mph) – Course – Deviation.  
Time – Date

## 7 BASIC FUNCTIONS


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### 7.1 Group Calls

Group calls will enable you to communicate with a group of users that are allowed to participate in the communication. Select GRP mode with the soft key **'Mode'**.

A group call is always semi-duplex with direct signalling: the group selected on screen is directly connected by pressing PTT, and it is not possible to listen and speak at the same time.

The groups are organised in **ranges** (or folders). Each range can have several groups and their distribution is established by programming.

To select the range and group, use the navigation keys .

Alphabetic search will only be applied to the groups included in the selected range.

Once the user has selected one of the ranges, it will only be possible to move through the groups included in that range. The groups will be sorted alphabetically within each range. The selected range / group is displayed on the screen.

To change the range, press the soft key **'Range'**.

When a group has been selected, its status will be displayed on screen for a few seconds. The call to this group will proceed if the group is available. If it isn't, pressing PTT will display the message "Non-valid group".

The user must keep the PTT key pressed to **send** the call, and the rest of the users in the group will listen directly.

The STS led will turn red (transmission) or green (reception).

The speaker's identifier (or name if available in the phone book) will be displayed on screen.

The group call is directly **received**, with no action necessary on the part of the user. The equipment will inform the user that a group call has been received with a short alert tone and the name of the user speaking at any given moment as well as the name of the group will be displayed on screen.

The call will be disconnected by pressing the soft key '**Hang**' or the AUX key of the handheld microphone or simply by releasing PTT and waiting for the system to disconnect. The group call will be finished by the system if it detects that for a certain time no user has requested permission to transmit.

Any other user can leave the call using the same procedure, although it will continue for the rest of the users.

It is possible to configure the groups to listen by programming, so you will receive all the calls in this status.

Accessing the **Call history** submenu from the **Main Menu**, you can answer the last received group call.

## 7.2 Individual calls

An individual call is a call between 2 users. No other user will listen to your call. It can be made to numbers on the TETRA network (private calls) or to numbers on the external telephone network (PSTN or PABX telephone calls).

MDT-400 / DT-410 will enable you to make the following individual calls:

- **Semi-Duplex with direct signalling:** The caller has permission to speak first. It is not possible to speak and listen simultaneously.
- **Semi-Duplex with "hook" signalling:** The receiver must answer (unhook) first. It is not possible to speak and listen simultaneously.

- **Duplex:** The signalling is hook (the called party must answer first). It is possible to speak and listen simultaneously. It is not necessary to press PTT to speak.

To make a private semi-duplex call:

- Enter the number of the person you wish to call or select it from the phone book.
- With the soft key **'Mode'** (lower right-hand part of the screen) select the type of call you wish to make (PRV, PSTN, PABX).
- If the call you wish to make is direct signalling, press the PTT button and speak directly. When you wish to stop speaking, release the button. Then your interlocutor can carry out the same operation: press PTT and talk.
- For semi-duplex calls with Hook signalling, start the call by pressing the AUX button on the hand-held microphone. This option must be enabled by programming. The user must accept (unhook) the call first. When the call has been established, the user who wishes to speak must keep PTT pressed.
- There are two ways to finish any type of private call: By pressing the AUX button on the hand-held microphone or by the soft key **'Hang'**.

If Discrete Mode is active (☒), a semi-duplex incoming call with direct signalling will be converted to hook signalling.

To enable this mode, go to the **Operating Modes → Discrete Mode** menu. This option must be previously enabled by programming.

To make a duplex call:

- Enter the number of the person you wish to call or select it from the phone book.
- With the soft key **'Mode'** (lower right-hand part of the screen) select the type of call you wish to make (PRV, PSTN, PABX).
- Start the call by pressing the soft key **'Call'**.
- During the establishment of the call you will hear a call tone. Wait for the caller to take the call. At that moment, the call is established and it will be possible to begin speaking without having to press the PTT button.

- Either user can disconnect the call by pressing the AUX key of the handheld microphone or by the soft key '**Hang**'.

Accessing the **Call history** submenu from the **Main Menu**, you can repeat a call recently made or answer a received or missed call.

Accessing the **Messages** submenu from the **Main Menu**, it is possible to read the status messages received (**Read** the status messages option) and use the phone of the sender (**Answer** a selected message option or pressing PTT or AUX on that screen).

Accessing the **Messages** submenu from the **Main Menu**, it is possible to read the text messages received (**Inbox** option of the text messages) and use the phone of the sender (**Phone Back** option in the **Options** of a selected message).

### 7.3 *Status messages*

The MDT-400 and DT-410 allows you to send status messages to individual and group addresses: "Call Back", "Urgent request" and "Emergency". These are standard messages that can be enabled or not by programming



It is also possible to send messages predefined by the user by programming. They are messages whose number code and associated text are defined by the user.

In the **Messages** submenu of the **Main Menu**, select the option "Status".


You can send status messages to individual addresses (TETRA private addresses or telephone addresses) or group addresses stored in the phone book, or directly dial the individual destination address.

Once the destination has been selected, press soft key '**Send**'.

When the message is received in the infrastructure, this will send a confirmation "Message sent" or inform of "Failed sending" to the equipment.

To send a status message rapidly to a predefined address (individual or group) press  +  + Digit 1 + Digit 2. This option must be enabled by programming.

The message number is indicated with *digit 1* and *digit 2* and it corresponds to the position occupied by the message in the list. This can be consulted to know the place each one occupies (**Messages Menu** in the **Main Menu**).

When a **new** status message is received, the equipment informs the user by means of an information screen that a message has been received and the symbol  is displayed.

To read old status messages, select Status from the **Messages** submenu of the **Main Menu**, which contains the following options: Read, Send and Delete status.

## 7.4 Text messages

Another service that you will be able to carry out with your MDT-400 / DT-410 equipment is to send text messages of up to 140 characters (160 if GSM7 protocol is selected and the equipment languages has a code scheme ISO LATIN 1).

This service is expandable through the activation of the concatenated messages, which allows receiving and sending text messages of up to 1000 characters (contact to your service provider for more details).

The number of characters remaining to send the data in a single message, it is shown in parenthesis in the screen upper left and if the messages concatenated are enabled, the message number which the cursor is.

You can write a new message using the text keyboard (Select **Text/New** in the **Messages** submenu of the **Main Menu**), or select one of the messages stored in the out tray (**Text/Outbox**).


If the equipment has been programmed with Unicode languages or the equipment has any E2EE option, the number of characters is less.



Once the message is written or any message is chosen from the outbox, select its destination address as explained in section 8.3 (Status messages). Then press the soft key '**Send**'.

The terminal will indicate the result of the message sending only when the message has been correctly sent. If you don't receive this informative message, the message has not been correctly delivered to the receiver yet.

Moreover, the use of a Service Centre is supported by the terminal. This ensures the message reception even if the receiver is not available when the message was sent.

When a **new** text message is received, the equipment informs the user by means of an information screen that a message has been received and the symbol  is displayed, which informs that you have a new unread message.

In **Text/Inbox**, you can see all the text messages received, and in **Text/Configure**, you can access the different parameters that can be modified in the text message service, such as activation of delivery reports, for example.


You can ensure that your message has been successfully received by the receiver, by receiving the delivery report of the received message.

MDT-400 / DT-410 enable **the reception of text messages immediately**. The characteristic of this special type of message is that its content is displayed on the screen as soon as it is received.

## 8 SPECIAL FUNCTIONS

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### 8.1 *Emergency calls*

By keeping  key pressed, an emergency call is begun, which has maximum priority and will cancel any call being made at that moment.

This type of call can be configured by programming, and can be: **private** semi-duplex direct call, **group** call, **broadcast** call, **telephone** call (PSTN, PABX) or **status message**.

It is also possible to configure the emergency call in DMO, being able to configure a different call destination in V+D and DMO.

The emergency icon will be displayed flashing on the display.

If the equipment cannot establish the call or send the status message, it will continue trying, unless the user cancels the call by pressing the emergency key again.

After a loss of service or equipment being switched off, the emergency call will try to be re-established when the equipment is operational again if the parameter "**Continue emergency call**" is enabled by programming.

If the emergency call is a voice call, there is an initial automatic transmission time (5 seconds by default) for semi-duplex calls, without having to press PTT.

When this time is over, the user must press PTT to transmit as usual (if it is a semi-duplex call).

This type of call can also be initiated by activating an **external input** (available in the rear connector) to which, for example, an emergency pressure pad can be connected. Consult your Service Provider about the availability of this option.

It is possible to configure two additional codes – emergency codes – such as 112, 999 or others.

When the user enters these codes on the keyboard, the MDT-400 sends the emergency call as programmed.

In addition, the sending of standard emergency message can also be configured (Status code: 0) just before carrying out the event programmed for the emergency key.

Another possible configuration, only available by programming, is to define the PTT as priority within the active call. This option enables the definition of priority users, who will be able to interrupt the person speaking during a call in progress.

## 8.2 **Broadcast call**

Broadcast calls are point-to-multipoint calls where only the calling user has transmit permission, called user cannot even try to transmit in these calls. The rest of call characteristics are analogous to group calls.

## 8.3 **Working modes: Direct mode**

This special mode, called DMO, enables you to communicate directly with other TETRA equipment without needing to use a network.

To access DMO mode, select the **Working Modes/DMO** menu, or press the rapid access configured in your equipment for this function.

In DMO mode, you may carry out group calls and individual calls. The emergency button will also be available, with which you can carry out a call with maximum priority (pre-emptive), as detailed in the previous section.

In DMO mode:

- You may carry out group calls and individual calls.
- You may send Text and status messages, both group and individual

The emergency button will also be available, with which you can carry out a call, or send and status message, with maximum priority (pre-emptive), as detailed in the previous section

Each group programmed to work in DMO mode has a frequency associated, so that a change of group implies a change of frequency and only equipment with the same group selected will be able to communicate with one another in this working mode.

Individual calls will be carried out using the active channel, i.e., the one associated to the selected group.

#### *Group calls*

To start a group call in DMO mode, select the group with the navigation arrows keys and press PTT. The operation is similar to a group call in network mode.

#### *Individual calls*

To start a private call, first dial the destination number or select it from the phone book. Then press PTT.

#### *Status messages*

See 7.3

#### *Text messages*

See 7.4

## 8.4 Working modes: DMO-GATE mode

This section describes the DMO and V+D functionality supported by MDT-400 working in DMO-Gateway mode.

To access DMO-Gateway mode, select the **Working modes/Gateway** menu or press the rapid access F + #.

In this working mode, the MDT-400 will act as a bridge in the communications between equipment in DMO mode and the infrastructure.

All the supplementary services are disabled in this working mode. The Data Packet Transmission service is also disabled, as is the sending and receiving of status and text messages, by both the user and the application.

DMO-GATE enables communication between DMO and TMO in end to end encrypted mode.

The only phone book that exists in the equipment working in this mode is an assignment table where a group configured in V+D is matched to another group configured in DMO.

The same groups stored in the group phone book are used.

The programming tool creates the DMO - V+D matching.

The scanning lists must not be enabled.

All the audio and voice signalling is disabled in this working mode, except the tones for establishing, maintaining and ending calls.

## 8.5 Security

The equipment has the following security services:

- PIN code  
From the **User settings/PIN code** menu you can enable or disable the request for a PIN code on turning on the equipment as well as modify this code.
- Authentication  
MDT-400 / DT-410 supports the authentication of the radio equipment by the infrastructure, which ensures that the user trying to connect to the network has a valid permission to do so.  
This service requires the equipment to have its corresponding code installed.  
To change the code you must contact your Service Provider.
- Remote enabling / disabling of the equipment.  
The MDT-400 / DT-410 can be enabled or disabled from the infrastructure, through the air interface.
- This disablement can be **temporary** or **permanent**.  
Recovery of a temporarily disabled unit is carried out by the infrastructure. In the case of permanent disablement contact your Service Provider to have the equipment put back into operation.
- Air Interface encryption (optional)  
This service protects communication between the radio equipment and the infrastructure from possible undesired listening in. This encryption is only carried out in networks that support this service.  
The encryption algorithms for the Air Interface encryption which are available in the MDT-400 are: TEA1, TEA2, and TEA3.
- End-to-end encryption (optional)

This functionality is particularly interesting for those users who regard their transmissions as very sensitive, and whose Security Policy requires all such data to be appropriately encrypted whilst in transit between the end terminals in any system.

End-to-end encryption addresses these concerns by encrypting data within the transmitting terminal, and only decrypting it within the receiving terminal(s). The plain text user data is never exposed within the infrastructure.

### ***Batteries and accumulators***



***If your terminal includes End to End Encryption option, it may have a 3.6 V lithium battery, with low self-discharge rate.***

***In case you need to extract the battery from the terminal, consult your official dealer.***

***Don't dispose of these products as unsorted domestic waste.***

To install or change the codes you must contact your Service Provider.

## **8.6 Network selection**

Whenever you turn on the equipment, it will always try to register in your programmed local network. The **Operating Modes** submenu in the **Main Menu** includes the 'Network selection' option, provided that this option has been pre-programmed. You may choose a new work network from the list of permitted networks available.

## 8.7 Supplementary services


The following TETRA supplementary services are also available in your MDT-400 / DT-410 terminal (none of them requires any additional action on the part of the user in the Options menu):

- Late entry:  
This supplementary service enables the device to join a group call that is already in progress.
  - Ambience listening:  
Ambience listening enables a control centre or dispatcher to listen in to a unit and hear what is going on around it, without giving the user any visual or acoustic indication of this call. Ambience listening is only possible if the unit is not already occupied with another call. Likewise, the supplementary ambience listening service does not prevent the affected user from making or receiving other calls.
  - DGNA: Dynamic group assignment.  
Both individually and group addressed DGNA groups are supported
  - Call Authorized by Dispatcher (SS-CAD)  
This service allows a third entity to authorize the call request before it is processed (outgoing calls and incoming calls can be restricted).
  - Fallback mode (local mode):  
MDT-400 / DT-410 support working in a cell in local mode (disconnected from the rest of the system) indicating this situation to the user through the MMI.  
The equipment will avoid registering in local mode cells unless there is no other available cell. The services available in this mode will depend on the system configuration.
- Consult your supplier about other services and special options available.



## 8.8 Data services

MDT-400 / DT-410 include a data packet service (single and multi-slot) based on IP version 4.

While the data packet context is active, the symbol  appears in the icon area of the display.

The MDT-400 / DT-410 supports AT and TNP1 commands of the PEI protocol for connecting to external devices and the remote control of the equipment.

For more information about these services, consult your Service provider.

## 8.9 GPS receiver

The MDT-400 / DT -410 can incorporate an internal GPS receiver that will enable you to know your exact position at all times and transmit your position to a base station.

If the equipment has this option, you can access this information through the **GPS info** menu from the **Main Menu**.

By programming, you can configure different parameters for sending GPS positions to a central application to manage this location information.

Consult your service supplier about how to configure your equipment for this service.



#### **Batteries and accumulators**

***If your terminal includes GPS option, it may have a 3.6 V lithium battery, with low self-discharge rate.***

***In case you need to extract the battery from the terminal, consult your official dealer.***

***Don't dispose of these products as unsorted domestic waste.***

### **8.10 GSM option**

The MDT-400 can incorporate an **internal GSM** module.

By default, the equipment will work with the TETRA network, and when it detects that it is not possible to operate under TETRA, it **automatically switches** (if the equipment is configured in this way) to GSM mode.

It is also possible to select **GSM mode through the menu**, accessing the **Working mode** submenu from the **Main Menu**. This screen shows the options V+D, DMO, DMO-GATE and GSM, not allowing direct changes between GSM <-> DMO.

While the equipment operates in GSM, TETRA services will remain active: If TETRA calls are received, they are rejected with the "User called engaged" cause. The messages received are stored in the memory and can be consulted on returning to TETRA.

As soon as the equipment detects the recovery of TETRA coverage, it again returns to this mode.

## 8.11 I/O Programmable option

This option can be chosen to replace the vehicle option installed by default.

When this option is enabled, the 'I/O Programmable' screen enables the selection of the desired functions for each of the external lines of the rear connector.

It will be possible to access the programmable parameters in this option through the programmer screen 'Options \ Programmable I/O lines'.

By configuring these 4 input lines (IN1, IN2, IN3, IN4) and 2 output (OUT1, OUT2) it is possible to configure the following functions:

- **Control mute** of an external device. Audio will be disabled during voice calls.
- **Ignition control** controls the switching off of the terminal depending on the status of the vehicle's engine.
- **Control of external horn relay** enables the MDT-400 to activate an external relay for the horn of the car or any other device. This option is incompatible with the Control mute option.
- **Line interface** provides the terminal with a balanced audio input and output as well as two additional basic signalling lines (one input line 'E' and one output line 'M'). This option is incompatible with the Control ignition option.

**Inputs:**

- Signal IN (IN4)
  - No function
  - Line interface (wire E)
  - Ignition control
  - Another event
- Input 1 (IN1/PTT):
  - PTT external
  - Another event
- Input 2 (IN2/AUX):
  - External AUX (disconnect the current call or begin a private hook call)
  - Another event
- Input 3 (IN3/HANG):
  - External HANG (HANG UP)
  - Another event

**Outputs:**

- Relay out (OUT1)
  - No function
  - External horn relay
  - Mute
  - Another event
  - Call type notification
  - PEI connection loss
  - DCD
- Signal out (OUT2):
  - No function
  - Line interface (wire M)
  - Another event
  - Call type notification
  - PEI connection loss

## 9 OTHER FUNCTIONS

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### 9.1 *Phone book*

From the **Phone Book** menu you can configure your lists of contacts. You can consult memory status, add new contacts and delete or modify editable contacts. You will access all the equipment phone books:

- Private
- Group
- Telephone (PSTN)
- Telephone extension (PABX).

If you receive a call from any of the addresses corresponding to a contact stored in the phone book, its name will be displayed on the screen.

MDT-400 / DT-410 supports “Scanning of priority groups” mode. If the scanning list is active, this option will be displayed in the groups phone book, which enables the adding or deleting of groups (up to 15) from the scanning list.

### 9.2 *Call history*

From this menu you can access the following options: calls **Dialled**, **Received**, **Missed** and **Erase All** call records.

### 9.3 *Display options*

In the User Settings/Display menu, you can select the desired brightness and contrast of the screen. You can modify it using the arrow keys or with the rotating switch.

By default the equipment is configured with an automatic backlight mode. The screen will always be illuminated when a key is pressed or a call is received, and will remain lighted for some seconds (time established by programming).

### 9.4 *Languages*

The MDT-400 / DT-410 terminal has a programmable multilingual interface.

The **User settings\Language** submenu enables you to choose between the languages available in the MDT-400 / DT-410. Using the arrow keys, you can select the language you wish to use.

You can select directly the English language on your terminal dial the sequence \*#0001#.

Consult your supplier about the languages available for your terminal.

### 9.5 *Audio Settings*

From the **Audio Settings** submenu, you can carry out the following actions:

- Select the predetermined audio profile.
- Modify the volume of the call sound.
- Select the call tone that will be heard when receiving a call.
- Select the message tone that will be heard when receiving a message.
- Select the accessories you wish to use.
- Enable / disable independently the following acoustic warnings:


- Keys.
- Control: service / no service tone.
- Call.
- Message received.
- Message sent.
- TX permission.
- RX permission.
- All tones.
- TX permission in DMO mode.
- Frequency TX changes in DMO.

You can also enable by programming the *Unread message tone*.

## 9.6 Using audio accessories

The user can select the configuration for audio accessories regardless of the default program configuration.

Access **Audio Settings** submenu from the **Main Menu** and choose the option “Accessories”.

It is also possible to access this screen with a combination of **rapid access** keys:  + 9 + 7.

If your equipment is the mobile **MDT-400**, you can choose between the following configurations:

- **Standard:** Handheld microphone / Micro loudspeaker / Desktop microphone and External microphone
- **Handset:** Micro-telephone with PTT, used to maintain private calls
- **Hands free kit:** Ambient microphone and External loudspeaker
- **Auto:** Ambient microphone & External loudspeaker & Micro-telephone with PTT. In this configuration, the audio will switch from the hands free kit to the micro-telephone when it is unhooked

- **PTT Detection:** Switch between **Standard** and **Hands free kit** automatically depending of which PTT is being pressed

If your equipment is the **DT-410 desktop unit**, you can choose between the following possibilities:

- **Standard:** identical configuration to the standard on the MDT-400
- **Handset:** identical configuration to the standard on the MDT-400
- **Headphones:** Micro-headphones and External loudspeaker
- **Auto:** identical auto configuration to that described for the MDT-400

If the handset or headphones are selected, using the menu you can also enable or disable the external loudspeaker ('**Loudspeaker**' option in the **Audio Settings** submenu), thus enabling the private conversation in progress to be heard by other people.

## 10 USA AND CANADA REGULATIONS

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### 10.1 Operational features

The tables below show the MDT-400 models that are granted for operation in the USA and Canada territories, together with the permitted frequency ranges and modulations according to the respective FCC and IC rules:



Terminal Code	FCC ID	Modulation	
		TETRA	TI D-LMR
D262Z28PT	WT7PTRKTMDT400410	Not Available	421-430 MHz
	WT7PTMDT410B		
D262928PT	WT7PTRKTMDT400450	450-470 MHz	450-470 MHz
D262N28PT	WT7PTRKTMDT400800	809-824 MHz 854-869 MHz	809-824 MHz 854-869 MHz

Terminal Code	IC Identifier	Modulation	
		TETRA	TI D-LMR
D262Z28PT	8624A-PTMDT410	409-430 MHz	409-430 MHz
	8624A-PTMDT410B		
D262928PT	8624A-PTMDT450	450-470 MHz	450-470 MHz
D262N28PT	8624A-PTMDT800	806-824 MHz 851-869 MHz	806-824 MHz 851-869 MHz
	8624A-PTMDT801		

The MDT-400 mobile radio may contain functions that are not operational in U.S Territories except as noted in the certification filing. As per compliance with 47 CFR Part 90.203 (e), the operator cannot directly program the transmission frequencies using the normal accessible external controls.

TETRA and TI D-LMR are digital communication systems that provide a high spectral efficiency by operating with a 4-slot TDMA access scheme (Time Division Multiple Access) in which four physical channels are assigned to every single RF channel.

Both TETRA and TI D-LMR operate with a channel spacing of 25 KHz. They are also supported by a  $\pi/4$ -shifted Differential Quaternary Phase Shift Keying ( $\pi/4$ -DQPSK) digital modulation with a rate of 18 Ksym/s that is equivalent to 36 Kbits/s.

In terms of spectral efficiency and considering the 4-slot TDMA scheme, one voice and data physical channel (TDMA time slot) with a data rate of 9000 bits/s is allocated a 6.25 KHz equivalent channel bandwidth.

## 10.2 Identification labels

The equipment is supplied with an identification label in which the model, the IC Certificate number and the FCC ID are displayed depending on the working frequency band.



### **10.3 Information on safety and electromagnetic compatibility**

The equipment has been designed to fulfil the applicable compliance regulations.

The equipment complies with the applicable Parts of the FCC Title 47 of the Code of Federal Regulation and Industry Canada (IC) RSS-119 Standard.

This device complies with part 15 of the FCC Rules and Industry Canada ICES-003. Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

To show compliance of all models of MDT-400 with Part 15 of the FCC rules, the following label is located on a prominent place of the chassis:

THIS DEVICE COMPLIES WITH  
PART 15 OF THE FCC RULES.  
OPERATION IS SUBJECT TO  
THE CONDITION THAT THIS  
DEVICE DOES NOT CAUSE  
HARMFUL INTERFERENCE.

To show compliance of DT-410 with Part 15 of the FCC rules, the following label is located on a conspicuous place of its chassis:



Besides, both MDT-400 and DT-410 bear a specific label to prove compliance with ICES-003 rules:

CAN ICES-3 (B)/NMB-3(B)

### RF Exposure and SAR Requirements

Under Industry Canada regulations and FCC rules, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada or FCC. To reduce potential radio interference to other users, the antenna type and its gain should be chosen so that the equivalent isotropic radiated power (e.i.r.p.) would not be more than that necessary for successful communication.

The antenna used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. Besides, it must be installed providing a safety distance of at least 35 cm (14 in.) from any person(s) during normal operation in order to comply with FCC or IC RF exposure requirements. Though this applies to all models under consideration, two extreme cases are worth to be noted:

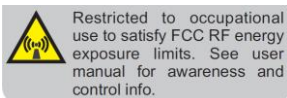
- For D262Z28PT and D262928PT models when used with an 8 dBi gain antenna.
- For D262N28PT model when used with a 14.1 dBi gain antenna.

Failure to observe these restrictions will result in exceeding the FCC or IC RF exposure limits.

All instructions detailed in this manual must be followed in order to ensure compliance with SAR and RF exposure limits.

Users can obtain Canadian information on RF exposure and compliance at the Industry Canada RSS-102 standard text.

The following label will be placed in a conspicuous place on the MDT-400 / DT-410:



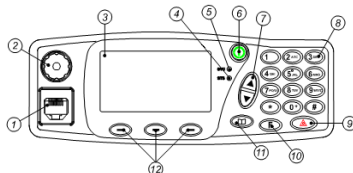
***MDT-400 / DT-410 is restricted to occupational/controller use to satisfy RF energy exposure limits. This radio is NOT authorized for general population.***



***Use only accessories, batteries and antennas approved by PowerTrunk Inc. Use of non-approved accessories, batteries and antennas may exceed RF energy exposure limits and/or occupational SAR values.***

Unapproved modifications or changes to this equipment may cause harmful interference unless the modifications are expressly approved by PowerTrunk Inc. In this case, the user could lose the authority to operate with this equipment.

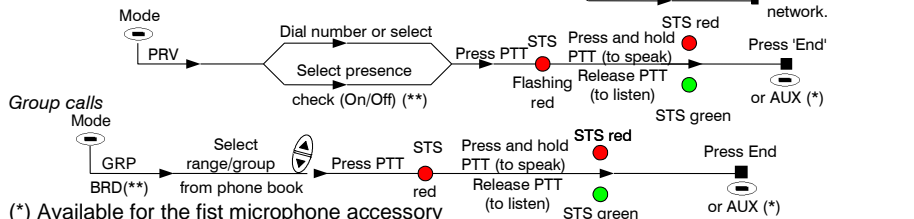
## 11 QUICK REFERENCE GUIDE



1. First microphone, handset or desktop (DT-410) microphone connector. Programming cable connector.	5. SVC Service indicator. Green: in service Red: out of service	9. Emergency key
2. Volume control	6. ON/OFF key	10. Function key
3. Display	7. Navigation keys	11. Menu key
4. STS Call-state indicator	8. Alphanumeric keyboard	12. Soft keys

### CHANGING WORKING MODE

#### MAKING DMO CALLS Private calls



(\*) Available for the fist microphone accessory

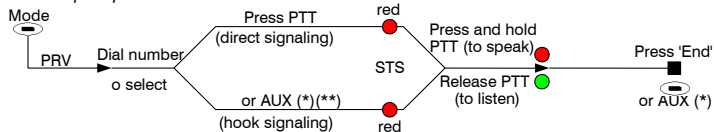
(\*\*) Available if programmed (contact your official dealer for more information)

## POWERING ON AND OFF

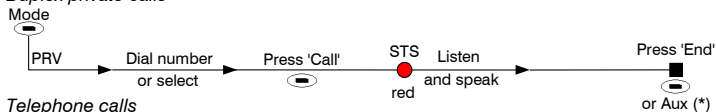
Keep key  pressed for a few seconds.

## MAKING V+D CALLS

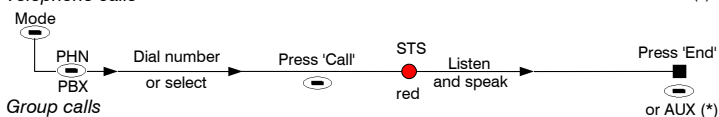
### Semi-duplex private calls



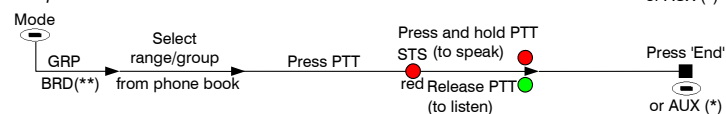
### Duplex private calls



### Telephone calls



### Group calls



(\*) Available for the first microphone accessory

(\*\*) Available if programmed (contact your official dealer for more information)

## RECEIVING CALLS

*Direct (Individual or group calls)*

You hear a beep and the STS indicator comes on green. Press PTT to speak.



*Hook (Private or telephone calls)*



You hear a bell and the STS indicator comes on orange. To accept the call, press PTT or the 'oft key 'OK'. To reject the call, press the soft key 'Hang' or the AUX button (\*).


## RAPID ACCESS KEYS



**QUICK CHANGE OF WORK MODE (V+D <-> DMO):**

Keep the key  pressed.

**REDIAL:** Press  +  to access the calls made screen (Only for private and telephone calls, mode V+D).

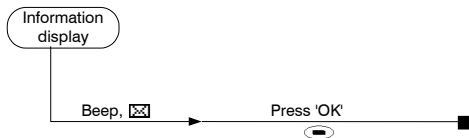
**QUICK SENDING OF STATUS:** Press  +  + Status message N° (2 digits) to send it to a predefined phone number.

**SELECTION OF ACCESSORIES:** Press  + 9 + 7 to quickly access the accessory selection menu.

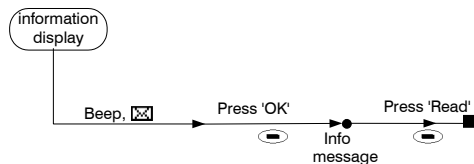
**ALPHABETICAL SEARCH:** Press  +  to enable and disable it.

## RECEIVING MESSAGES

*Status messages*



*Text messages (SDS)*



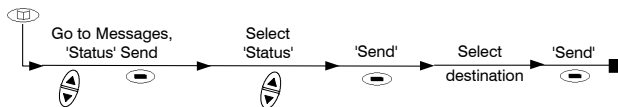
(\*) Available for the fist microphone accessory



### SENDING MESSAGES (V+D/DMO)

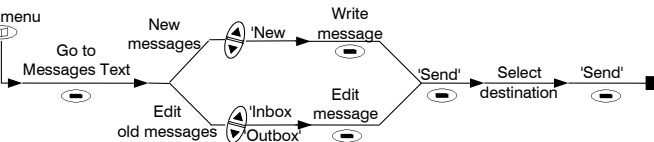
#### Status messages

Main menu



#### Text messages

Main menu



### EMERGENCY CALL (V+D / DMO)

Press and hold for a few seconds.

### DESCRIPTION OF THE MAIN MENU

Press to access the Main Menu. To navigate through it, use the navigation key . You can access the following screens: Phone Book, Encryption (if E2EE option is installed), GPS Info (if the option is installed), Working mode, Audio Settings, User Settings, Operating modes, Call history, Messages.

To access the submenus, press the soft keys .

**ATTENTION!!** Configuration of menus and some options can vary according to the programming of the radio. Consult your service supplier.



User Guide  
TETRA mobile terminal  
**MDT-400**



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