Capsat® Messenger

TT-3080A

User Manual

Thrane & Thrane

Capsat® Messenger

TT-3080A

User Manual

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Safety Summary

The following general safety precautions must be observed during all phases of operation, service and repair of this equipment. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture and intended use of the equipment.
Thrane & Thrane A/S assume no liability for the customer's failure to comply with these requirements.

GROUND THE EQUIPMENT

To minimise shock hazard, the equipment chassis and cabinet must be connected to an electrical ground

DO NOT OPERATE IN AN EXPLOSIVE ATMOSPHERE

Do not operate the equipment in the presence of flammable gases or fumes. Operation of any electrical equipment in such an environment constitutes a definite safety hazard.

KEEP AWAY FROM LIVE CIRCUITS

Operating personnel must not remove equipment covers. Component replacement and internal adjustment must be made by qualified maintenance personnel. Do not replace components with the power cable connected. Under certain conditions, dangerous voltages may exist even with the power cable removed. To avoid injuries, always disconnect power and discharge circuits before touching them.

DO NOT SERVICE OR ADJUST ALONE

Do not attempt internal service or adjustments unless another person, capable of rendering first aid resuscitation, is present.

DO NOT SUBSTITUTE PARTS OR MODIFY EQUIPMENT

Because of the danger of introducing additional hazards, do not substitute parts or perform any unauthorized modification to the equipment.

SAFETY DISTANCE FOR THE ANTENNA UNIT

Minimum safety distance from the Antenna on the focal line is 1.8 m

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1 Introduction

Congratulations on purchasing your TT-3080A Capsat® Messenger. This terminal makes it possible for you to communicate from any country in the world using the Global Area Network service established by Inmarsat. The Capsat® Messenger supports high-speed data (64 kbit/s circuit switched and packet data) and high quality voice as well as inexpensive voice, data and fax services. This manual has the following chapters.

Chapter **2 Description of the service** - an overview of the Global Area Network system and its services.

Chapter **3 The Capsat® Messenger** - a brief description of the terminal and how to utilise the services of the Global Area Network.

Chapter **4 Getting started** - a description of how to set-up the terminal.

Chapter **5 Making calls** - a quick step-by-step guide that describes how to make and receive phone calls, data calls and fax calls.

Chapter **6 Basic functions** - a more detailed description of the features that are available in the terminal.

Chapter **7 Using MPDS –** What is MPDS and step by step configuration.

Chapter **8 Configuration -** a description on how to use the accompanying configuration PC software (MesCP).

Chapter **9 Technical Specifications -** contains detailed technical specification of the terminal including electrical, mechanical and protocols supported.

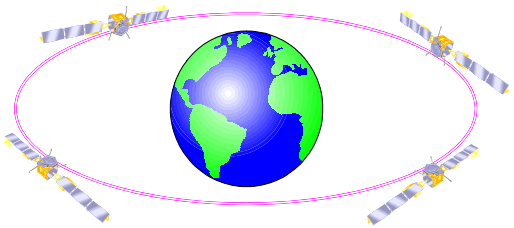
Chapter **10 Elevation and Azimuth** - enclosed maps to assist you with pointing the antenna.

Please note that different software versions support different features, and your terminal may not support all the features described in this manual. We recommend that you contact your hardware provider for the latest software release, in case the described feature is not supported by your terminal.

2 Description of the service

The Inmarsat Global Area Network service is based on 4 Geo-stationary satellites situated above the equator. Geo-stationary means that the satellites are always located in the same position, i.e. they move at the same speed as that of the earth. Each satellite covers a certain area (footprint) and each satellite supports a number of powerful spot-beams making the service available on virtually all land masses on the earth between approximately 70°N and 70°S. Please see Chapter 10 for more detailed maps.

The Four Geo-Stationary Inmarsat Satellites



The satellites are your connection to the world wide networks, and they are managed by the Network Co-ordination Stations (NCSs), run by Inmarsat. The primary functions of the NCSs are to constantly keep track of which terminals are logged on to the system, and assign a free channel when a call is made.

The gateway between the public network and the satellites are operated by Land Earth Stations (LES). The LESs are run by different operators, around the world.

The services supported by the Global Area Network encompasses:

- **High Speed Services (64 kbit/s)**
  - 64 kbit/s universal data
  - 56 kbit/s universal data
  - Speech
  - 3.1 kHz audio
  - MPDS (Mobile Packet Data Service)

- **Low speed services (2.4 kbit/s)**
  - mini-M voice
  - mini-M fax
  - mini-M data

For a detailed service explanation, please refer to the last section of this chapter.

The above mentioned services allow for a wide range of applications. Examples are shown below.


Mini-disc


Camera


Dect-phone


Video - Camera


Videophone


Notebook


Fax

Important Notice: Before a terminal can be used on the network, it has to be commissioned by one of the Inmarsat Service Providers (ISP's). In order to use the different Global Area Network services it is necessary to have at least one Inmarsat Mobile Number (IMN) for each of the above mentioned services. In case all 8 services are commissioned on your terminal, you will have 8 IMN numbers.

Calling a Global Area Network terminal is equal to making international calls. If the satellite region/area is not known for the terminal the "country" code for a terminal is 870. When you dial a Global Area Network terminal through the public network, you have to dial the IMN number in addition to the international access code for Inmarsat, e.g.:

+870 762 555 555

Making calls from a Global Area Network terminal is equal to making international calls as the country code always has to be dialled

Service Explanation:

The mini-M services have a lower tariff than the high speed services, as these are high quality audio or high speed data services and thus require more bandwidth.

The **64 kbit/s UDI** (Unrestricted Digital Information) service enables the bi-directional transmission of data to and from terrestrial 64 kbit/s **ISDN** networks. The **56 kbit/s UDI** service is similarly used to make a connection to 56 kbit/s ISDN networks, which are primarily used in North America.

The **Speech** and **3.1 kHz audio** services make it possible to establish high quality analogue connections with quality equal to terrestrial analogue connections via digital networks/switches. The **Speech** service is used for high quality voice connections, whereas **3.1 kHz audio** can be used to transfer analogue signals

between faxes and modems with an analogue 2-wire interface. The 3.1 kHz audio service is transparent, and is suitable for all analogue applications including secure telephones.

The **MPDS service** is a packet data service where the tariff depends on the amount of data transmitted. This service is a more cost-effective solution for web browsing, and other applications where there is no need for constant transmission of data in both directions. It is also suitable for applications where a constant connection is required, because the user is no longer charged the "per minute rate".

The **mini-M voice** service is only for voice transmission. The voice transmitted over the satellite is subject to a compression process down to 4.8 kbit/s, which reduces the bandwidth use and subsequently the cost.

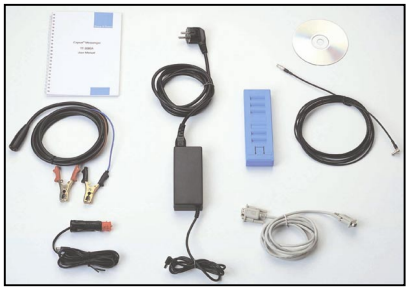
The **mini-M fax** service supports fax transmission at 2.4 kbit/s. This can be useful and cost effective in case your fax is received at a low speed.

The **mini-M data** service is used to transmit data at 2.4 kbit/s. This can be a benefit when small amounts of data are sent or received, e.g. when a short e-mail is sent.

3 The Capsat® Messenger

The Capsat® Messenger System includes the following system components:

- TT-3038A Capsat® Messenger Electronics Unit
- TT-3620D Capsat® Messenger Handset
- TT-3686C Capsat® Messenger NiMH Battery (supplied as default)
  or
- TT-3686D Capsat® Messenger NiCd Battery Pack
- TT-3682C Capsat® Messenger AC adapter
- TT-3008A Capsat® Messenger Antenna
  or
- TT-3008B Capsat® Messenger Big Dish Antenna
  or
- TT-3008D Capsat® Messenger Small Dish Antenna
  or
- TT-3008E Capsat® Messenger Land Mobile Antenna
- TT-10226A Capsat® Messenger PC Configuration Software
- Accessories (cables, carry case, manual, etc.)



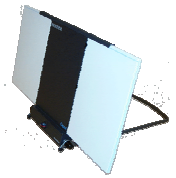
Before using the terminal, it is necessary to unpack and connect the handset to the electronic unit. The handset connects at the bottom of the electronic unit. After inserting the handset cable a small plastic lid is placed on top of the cable connector to protect it.

TT-3620D Handset connected to the TT-3038A Transceiver

The terminal can be powered by means of battery, if inserted, and/or an external DC power source connected at the rear of the electronic unit. As DC power source the accompanying TT-3682C Adapter is recommended.

TT-3682C AC Adapter

The TT-3008A Antenna, connected at the rear, radiates micro wave signals during a call with the strongest radiated signal in front of the antenna (on the focal line) and drops off fairly quickly. It is therefore important that no persons or animals are within the safety distance, which is approx. 2 meters.



TT-3008A Antenna

If another DC-source is used and/or another non-Thane & Thrane antenna cable is used, please make sure that the necessary precautions described in section 9.1.2, DC input and in section 9.1.1 Antenna, respectively are taken. Thrane & Thrane offers a wide range of antenna cables from 4 meters up to 200 meters.

Battery capacity: 2h High quality voice/4h Mini-M voice, 35 min. high speed data/fax or 2h Mini-M data/fax, 100h standby.

The battery pack must be handled in a certain way to maximize its capacity, please see the details in section 3.5, Handling of the battery pack.

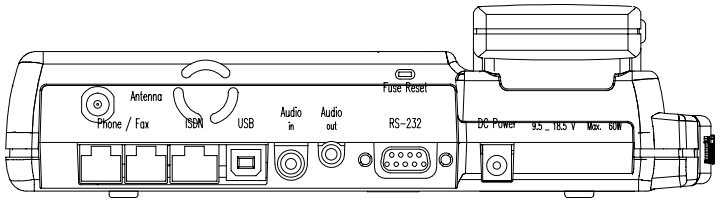
TT-3686C/D Batteries

3.1 Hardware interfaces

The Electronic Unit of the Capsat® Messenger has the following hardware interfaces:

- Handset
- Analogue 2-wire RJ11 number 1
- Analogue 2-wire RJ11 number 2
- ISDN (**I**ntegrated **S**ervices **D**igital **N**etwork)
- USB (**U**niversal **S**erial **B**us)
- Audio input/output
- RS-232
- PCMCIA Card

Except for the Handset and the PCMCIA Card, the connectors for these interfaces are found on the rear of the Electronic Unit:



These interfaces can be used for the different Global Area Network services.

The **handset** can be used to setup the terminal and it can be used to make or receive phone calls utilising one of the following services:

- Speech
- 3.1 kHz audio
- mini-M voice

The handset may also be used as dial pad for devices connected to the terminal, that do not have a key pad to enter the phone number. Please see section 5.5 Call from a connected fax and 5.6 Call via RS-232 for more information.

The two analogue 2-wire interfaces:

The RJ11 ports as shown above can be used for connection of analogue phones, secure phones, modems or group III fax machines. For both interfaces the following services can be used

- Speech
- 3.1 kHz audio
- mini-M voice
- mini-M fax

Selection of service for the two is independent of each other.

Transmission speed of modem and fax depends on the attached equipment and how they can cope with the delay.

If the mini-M voice is selected a phone must be connected as only voice connections can be established. If the mini-M fax service is selected a group III analogue fax must be connected and it will always run at 2.4 kbit/s.

ISDN interface:

This interface can be used for connection of ISDN equipment – data as well as voice/picture based equipment (phones, audio codecs or video conferencing equipment).

The only exception is that normal terrestrial Basic Rate ISDN (BRI) is based on 2 channels (128 kbit/s Data) and 1 D channel (16 kbps Signalling). The Capsat® Messenger has 1 B channel (Data) and 1 S channel (simulated D channel) which combined equals a total bandwidth of 64kbps. Please ensure that your ISDN equipment has the possibility of supporting 1 B channel, otherwise it will not work.

The following services may be used on the ISDN interface:

- 64 kbit/s UDI
- 56 kbit/s UDI
- Speech
- 3.1 kHz audio
- mini-M voice

Equal to the terrestrial ISDN network the terminal offers the possibility to have more than one device connected to this interface. Each device can be individually addressed when called and the service type can be selected individually. This requires that the attached equipment supports MSN (Multiple Subscriber Number). Depending on the brand of equipment it may be possible to program the equipment with more MSNs. If a device should respond to a certain IMN number, it must be programmed in the ISDN equipment using the IMN as MSN. Note that the equipment will only react if both MSN as well as service type (speech, 3.1 kHz audio, 64 kbit/s or 56 kbit/s) fits with the ISDN equipment.

Please note that the ISDN interface supports data transmission of 64 kbit/s (one B-channel) as opposed to 2 times 64 kbit/s (two B-channels) available on the terrestrial ISDN network and that the delay is also greater. Not all standard ISDN devices are equally good at coping with these differences.

RS-232 interface:

The RS-232 port is a standard 9 pin serial port, the maximum port speed is 115.2 kbps. It can be used for the following service types

- Mini-M data service
- MPDS service
- Configuration of the terminal via MesCP software
- Various printing functions

The printer function makes it possible to print different internal settings of the terminal (such as the phone book, call log, and status messages) via the handset. The serial printer is to be connected to the RS-232 interface when activating a print command.

When installing the configuration program you should connect your PC to the RS-232 interface.

USB Interface:

USB - the Universal Serial Bus – shown above is a popular technology that allows a single universal plug to connect PCs and peripherals of all kinds to each other. USB replaces all of the different serial and parallel PC connections with one standard plug and port.

The USB port is currently not functional

Facts about USB:

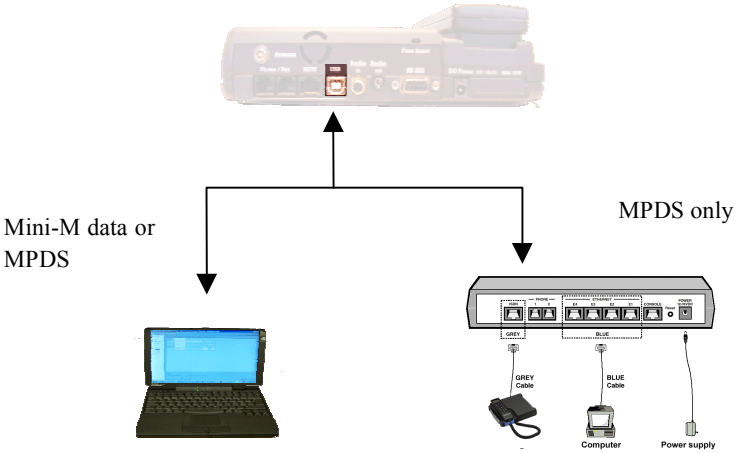
1. USB is 100 times faster than a serial port
2. Transfer rates up to 12 megabits/second
3. Up to 127 peripherals can be connected to one computer with the use of multiple-port USB hubs
4. Every desktop and notebook computer sold today features at least one built-in USB port
5. The following operating systems support USB: Windows® 98, Windows® 2000, Windows® Millennium Edition, Macintosh OS 8.5, and above.
6. Uses a standard plug and play port.
    1. USB-based hardware is hot-swappable, allowing users to quickly and easily attach and detach peripherals
    2. After plugging in a USB peripheral, the computer system automatically loads or asks for appropriate device drivers

The Messenger, when connected to a PC via the USB, is considered a peripheral much like a modem. This limits the possible service types available to the following:

Services available:	Devices that can be connected:
Mini-M Data	Personal Computer
MPDS (Mobile Packet Data Service)	Personal Computer, LAN Router

(The list of devices is not all-inclusive, but is provided to illustrate possible uses)

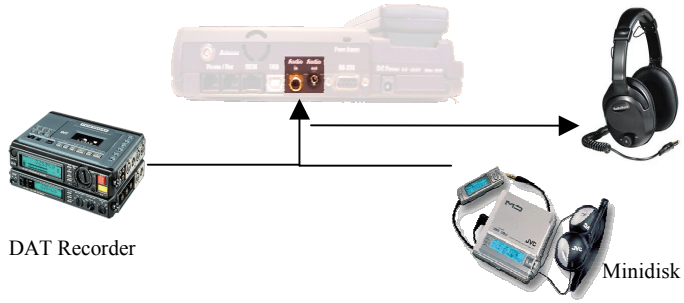
TYPICAL USB APPLICATIONS



Audio input/output interface:

This interface can be connected with a headset and a digital recorder (e.g. Mini Disc or DAT). The handset is used to establish a connection. Hereafter it is possible to toggle between handset microphone/ speaker and audio input/output.

Typical Audio IN/OUT application:



See section 6.7

for more information on how to route incoming calls to the hardware interfaces and how to setup the default service for outgoing calls.

3.2 The handset

The TT-3620D Handset is the primary interface for the TT-3080A Capsat® Messenger. It enables the user to dial numbers, it displays error and status messages, and is used to configure the transceiver.

The ⏻ is used to turn the terminal on and off. Turning off the terminal requires that the key is held down for **4** seconds. The display will show a countdown and the display will instruct the user when to release the button.

The handset is divided into 3 distinct and inter-working sections.

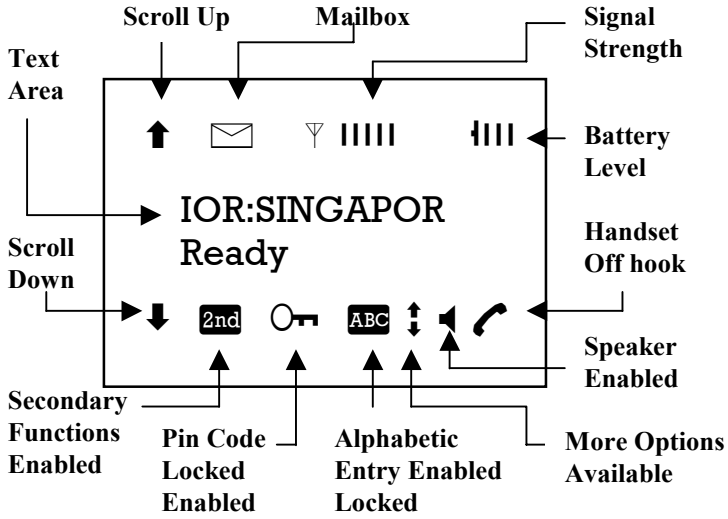
1. The first is the Liquid Crystal Display (LCD) and Light Emitting Diodes (LED) section. This section gives the user visual indications about the operation and status of the system.

2. The second section is the Function buttons section. This section enables the user to interact with the software menu system of the transceiver.

3. The third section is the Alpha-Numeric section. This section enables the user to dial and perform data entry functions into the transceiver.

All three sections working together, gives the user in the field the flexibility and operability required for mobile communications.

As shown in the picture above, the top of the handset contains the LCD for displaying information to the user. It can be adjusted for contrast and is backlit for viewing in dimly lit areas or night operations. The LCD display is graphically shown below:



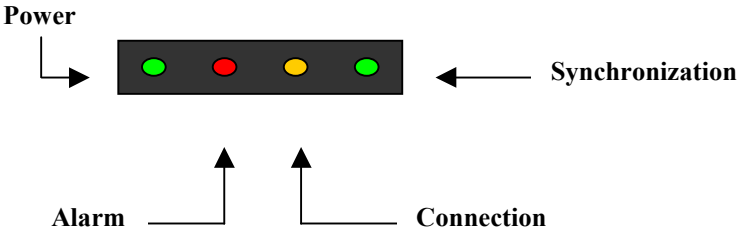
The display contains a set of symbols which together with the 4 indicators situated below the display gives continuous indication of current status.

Above the Text Area you find the signal strength meter, top center, and the battery level meter, top right. The signal strength will range from 0 to 5 bars of signal. 5 bars being the maximum. The signal strength will appear in the display as:

The battery level is divided into fourths. The level of the battery will appear in the top right of the display as:

The battery level will cycle from left to right when the transceiver is powered by the AC adapter to indicate that the battery is charging.

There are four LED's under the LCD display (see below). From left to right they are Power (GREEN) – Alarm (RED) – Connected (AMBER) – Synchronization (GREEN).



POWER LED (GREEN): The Power LED indicates that the system has power. When operating on battery, the LED will flash when the battery level is getting low. The LED will also flash when in Sleepmode (see section 6.7.5).

ALARM LED (RED): The Alarm LED will illuminate when the system detects a fault. A fault code will also be displayed in the LCD.

CONNECTION LED (AMBER): The Connection LED will flash when a call is ringing at the receiving end and will illuminate steady when a connection is made.

SYNCHRONIZATION LED (GREEN): This is a dual function LED. Initially, the LED will illuminate when the system has synchronization with a satellite. When the system has established a data call, the LED assumes its secondary function as a data transfer light. When data is being transferred (sent or received), the LED will light. This is a quick visual reference during data communications.

Function Buttons:

The Function Buttons, as shown above, enables the user to enter the menu system of the transceiver and manipulate various settings. Each button is described in detail below.

Symbol	Meaning
⏻	Power ON/OFF button. Initial depression will power up the system. To power off the terminal the button must be depressed for **4** seconds. The display will show a countdown and the display will instruct the user when to release the button.
Exit	EXIT Button: Similar in function to the ESC key on a PC. While in the Menu system, pressing Exit will bring the user back one level until the Menu is completely exited. When asked YES or NO by the system, pressing Exit will be interpreted as a NO response. When entering data into the transceiver, depressing exit will cancel the entry.
OK	The OK button: is the inverse of the Exit button. It is similar in function to the Enter key on a PC. When in the main screen display, pressing OK will enter the menu system. While in the menus, pressing OK will enter the selected menu. When entering data, such as phone numbers or PIN codes, pressing OK will accept the entry.
C *Ins*	The Clear button: This is a dual function button. The primary function is to clear the last entered digit. It is similar in function to the backspace key on a PC. Secondary function: INSERT. This function is accessed by first pressing and releasing the 2nd Button and then pressing the C *Ins*.The insert function is used to insert new Inmarsat Mobile Numbers (IMN's) into the terminal, insert Phonebook entries, etc.
⬆ *Edit*	SCROLL UP button: Also a dual function button. The primary function is to enable the user to scroll up to menu items not shown on the 2-line display of the LCD. Secondary function: Edit. Allows users to edit previously entered information in the transceiver.

✉	Short message stored at a LES – see section 6.5 for further information.
Y	The number of bars (I) following this antenna symbol indicates received signal strength. Up to 5 bars.
▮	The number of bars (I) following this battery capacity symbol indicates the remaining capacity of the battery. Up to 4 bars.

Symbol	Meaning
⬇	More menu entries below
2nd	The 2nd function of the next key pressed will apply
O╤	If lit it indicates that a valid PIN code is required to use the terminal
ABC	Turned on when the keypad is in alpha mode. Alpha mode is used to enter letters (for example names in the phone book).
↕	The value in a menu must be selected between certain predefined values by means of the ↑ Edit and ↓ Print keys.
◂	The speaker. The user can turn the external speaker on and off by by pressing 2nd 8 tuv. The ◂ symbol is displayed in the LCD when on.
✆	The handset is off hook

A number of keys have a 2nd function. A total overview of these are given in the following table.

Key	Function
2nd [Print]	Toggle audio interface between handset microphone/speaker and audio input/output
2nd [1 Memo]	Enter the top level of the menu system. See section 6 Basic functions.
2nd [2 Lock abc]	Forces the next user to enter PIN code before it is possible to use the terminal.
2nd [3 Area def]	Shortcut to the area selection submenu, see section 6.6
2nd [4 Fax ghi]	Establish a fax call from the handset if fax does not have a keypad. See section 5.5 Call from a connected fax.
2nd [5 jkl]	Transfer an incoming call to another hardware interface. See section 5.2 Transferring incoming calls.
2nd [6 Mute mno]	Turns the handset microphone on/off.
2nd [7 Data pqrs]	Establish a data call from the handset if data device does not have a keypad. See section 5.6 Call via RS-232.
2nd [8 tuv]	Turn speaker in electronics unit on/off
2nd [9 Ant wxyz]	Turn "signal strength" beeper in antenna on/off. See section 4.3 NCS/LES connectivity.
2nd [*]	Short cut to the SIM lock submenu. See section 6.7.4 Security.
2nd [0]	Short cut to the Help desk menu. See section 6.3 Help Desk
2nd [#]	Future use
[A/a Del C]	Toggle between normal mode and alpha mode Toggle between displaying LES name or C/No.
2nd [C Ins]	Insert an entry (for example in phone book)
2nd [Edit]	Edit an existing entry (for example in phone book)
2nd [A/a Del C]	Delete an existing entry (for example in phone book)

ALPHA-NUMERIC Buttons:

The keypad can be in normal (numeric) mode or alpha mode. Normal mode is used to enter digits (phone numbers) whereas alpha mode is used to enter letters (names in the phone book). The [Del] is used to switch between the two modes and the display indicates if in alpha mode. In alpha mode each of the numeric keys (plus [#]) can be used to select between subsets of the alphabet (and certain special characters) by pressing the key a number of times until the wanted letter/character is shown on the display. To insert the letter C it is necessary to press [2 Lock abc] 3 times in alpha mode. Below is an overview of the relevant keys in alpha mode.

Key	Toggles between when pressed in alpha mode
1 Memu	- ? ! , . : ' $ ( ) + / 1
2 Lock abc	A B C 2
3 Area def	D E F 3
4 Fax ghi	G H I 4
5 jkl	J K L 5
6 Mute mno	M N O 6
7 Data pqrs	P Q R S 7
8 tuv	T U V 8
9 Ant wxyz	W X Y Z 9
0	Move cursor (forced)
#	<space>

The following table shows the function of the keys, which are used to utilise the menu system. The menu system is entered by pressing 2nd 1 Memu. A description of all menus is given in section 6 Basic functions.

Key	Function
Edit	Scrolling up – menu or predefined values
Print	Scrolling down – menu or predefined values
Exit	Exit menu and cancel selection
OK	Accept selection
C Ins	Delete/backspace
Del	Toggle between alpha mode and normal mode
2nd C Ins	Insert an entry (for example in phone book)
2nd Edit	Edit an existing entry (for example in phone book)
2nd Del	Delete an existing entry (for example in phone book)

3.3 SIM card

The terminal also supports usage of a SIM card. If inserted the terminal will have a new identity (a new set of IMN numbers and a new set of allowed LES Operators) on the Global Area Network corresponding to the information stored on the SIM card. If the SIM card is removed the terminal will have the same configuration as before.

Depending on the configuration of the terminal it may be mandatory to insert a SIM card before operation can begin. In case the SIM card is lost or not working you can configure the terminal so that you are able to make one call through the Help Desk. This is done by pressing 2nd 0. The Help Desk contains phone numbers for the ISP.

Take care to insert the SIM card face down: The SIM Card is inserted with the golden contact area pointing *upwards* and heading towards the card slot.

3.4 PCMCIA card

Ordinary PCMCIA cards can not be used. The purpose of the PCMCIA slot is to enable Thrane & Thrane to develop new hardware for the Capsat® Messenger.

3.5 Handling of the battery pack

Please observe that the battery pack is sensitive to how it is charged and discharged. To keep the battery capacity high and to avoid memory effects, the battery should be fully discharged occasionally.

Generally it is sufficient to discharge the supplied NiMH battery pack completely when the battery pack has been partly discharged and charged 50 to 70 times. For NiCd battery packs a

complete discharge should be performed after 5-10 partly discharges.

Avoid exposing the battery pack to direct sunlight, as high temperature will reduce battery lifetime.

Pull the battery pack out before long-time storage (months), as this action prevents battery pack degradation.

Please note that the high capacity NiMH-batteries (TT-3686C) are not recommended for use at temperatures below approximately 5 degrees C. For such low temperature applications the NiCd-battery (TT-3686D) pack is recommended instead.

Charge indicator:

The battery pack charge status is shown on an LED located on the right side of the front of the electronics unit. The LED has the following interpretation :

Constant green light : Fast charging. Charge time is approx. 3h for NiMH and 2h for NiCd.

Slow flashing green light: Charge pending. This happens when the battery voltage is too low, i.e. below approx. 10V. Low battery voltage can occur if the battery has not been used for a long period of time. Charge pending is proceeded by fast charging.

Fast flashing green light: Maintenance charge. Indicates that the battery pack is fully charged.

Constant red light : No charge. If the battery pack temperature exceeds +55°C or drops below 0°C the charge is suspended.

Constant yellow light : Slow charge for NiCd only. If the battery pack temperature drops below 0°C the charging is slowed down. Charge time is 10–20 hours.

4 Getting started

Turn on the Capsat® Messenger and insert the SIM card if you have this.

The SIM Card is inserted with the golden contact area pointing upwards.

It is necessary to configure the terminal with respect to the different IMN numbers which have been assigned to this terminal. The terminal supports 8 different services, which may have 1 or up to 16 IMN numbers assigned. The terminal has 6 hardware interfaces of which the ISDN interface may have 8 devices attached.

For each hardware interface it is necessary to setup a default IMN, which should be used for billing if a call is initiated from here. As all IMN's are associated with one service type the default service type for calls initiated from this interface is thus also defined if the device attached makes a call.

Normally this is only done once by your distributor. Details of how to setup the phone can be found in section 6.7.

The terminal has a directional antenna and it is necessary to point the antenna in the direction of the satellite.

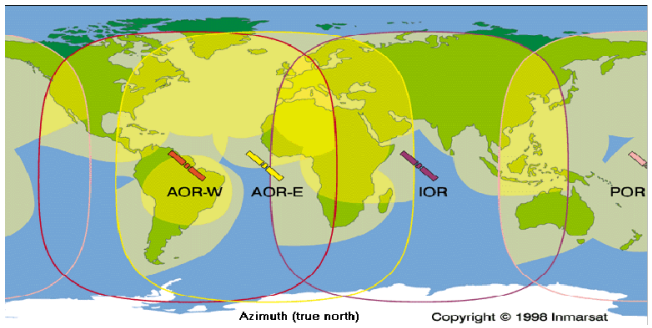
In order to install the terminal correctly, and to establish a connection via the Global Area Network the following steps must be followed:

- Select a satellite region/area dependent on your position.
- Point the antenna towards the satellite. This is described in detail in section 4.2
- Fine align the antenna until the terminal communicates correctly with the NCS and the LES. To search for the maximum signal strength use either the audible signal strength indicator on the antenna or look at the display on the Capsat® Messenger.

The steps will be described in detail in the following sections.

4.1 Select satellite

Before pointing the antenna, it is necessary to select which of the four satellites to point at. The four satellite regions/areas are labelled after the ocean, which they are placed above and they are:



- Atlantic Ocean Region East (AORE)
- Atlantic Ocean Region West (AORW)
- Indian Ocean Region (IOR)
- Pacific Ocean Region (POR)

It is recommended to use the auto search function in order for the Capsat® Messenger terminal to recognise a satellite in that region.

It is for example not possible to "see" the POR satellite in Europe and thus this should not be chosen. Depending on the exact position in Europe either AORE or IOR may be chosen.

In order to evaluate which satellite to use you need to look at the coverage maps. They show the coverage area of each satellite together with elevation/azimuth. The maps are placed in chapter 10.

Azimuth is the angle between geographical north and the direction towards the satellite (clock wise). An azimuth of 90° is the direction east and 270° is the direction west.

Elevation is the angle between horizontal and the direction towards the satellite. At equator the elevation is 90° and it will decrease when moving away from equator (north or south).

If two or more satellites can be "seen" the best choice will be the one with the highest elevation.

Read your elevation/azimuth position on earth on the coverage maps.

4.2 Pointing the antenna

Se either chapter 4.2.1; 4.2.2; 4.2.3 or 4.2.4 for detailed information, depending on your type of antenna.

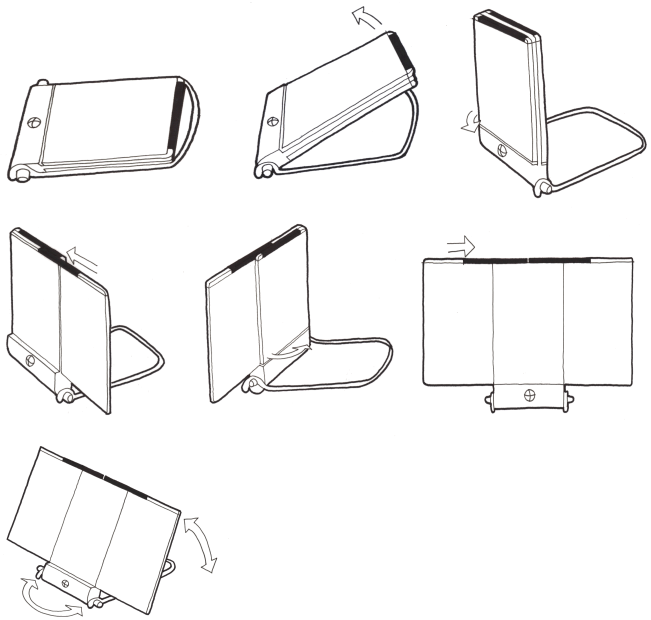
Note

Due to the increased sensitivity of the antenna, the antenna must be aligned very carefully for maximum signal strength. When the antenna is adjusted for maximum signal strength, the RF-power amplifier automatically reduces its output power level to a level that is required for a stable satellite connection. This results in an

immense reduction of the power consumption and the battery capacity can increase with up to 100 %, compared to the battery capacity at maximum RF power level which is stated in the specifications chapter 9.2 !

4.2.1 TT-3008A Foldable antenna

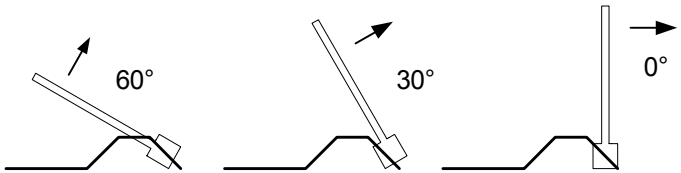
The first step is to unfold the antenna, position the antenna so it makes a 90^0 angle with the bracket. Unfold the side panels and slide the locks in place by pushing them against each other in the middle.



Remember to move the two slides at the top of the antenna aside before trying to fold the antenna.

The frictional joint between antenna-part and bracket will ensure that the angle between the two is kept fixed after manual adjustment of the angle is finished.

To find the correct vertical angle to the satellite, try with the antenna adjusted to 60° , 30° or 0° as indicated on the next drawing.



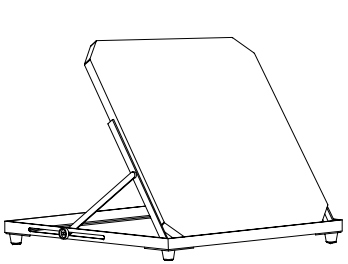
Aim the antenna towards the estimated position of the satellite with **free line of sight**.

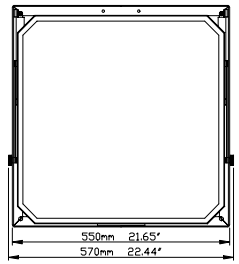
Using the compass on the front of the antenna adjust the antenna so that azimuth and elevation approximately fits the read values on the coverage maps.

Use the audible signal strength indicator on the antenna to search for the maximum signal. See detailed information on how to use the audible signal strength indicator in chapter 4.4

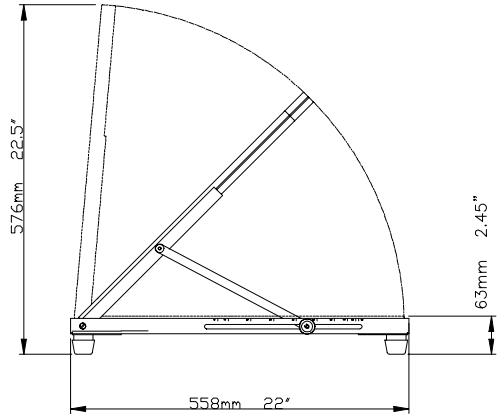
4.2.2 TT-3008B Big Dish antenna

Below is shown an overview of the optional 3008B Big Dish antenna, which consists of a flat panel antenna element and a supporting frame. The HPA-LNA is mounted on the back of the antenna element.





Position the antenna on a flat surface, with a clear line of sight towards the satellite. The azimuth orientation can be adjusted by turning the antenna so that the sides of the mounting frame are pointing towards the satellite. Set the elevation angle by raising or lowering the antenna panel and locking it by means of the two brass knobs. The elevation markings on the side of the frame will assist you in setting the correct position.



Use the audible signal strength indicator on the antenna to search for the maximum signal. See detailed information on how to use the audible signal strength indicator in chapter 4.4

Pole Mounting:

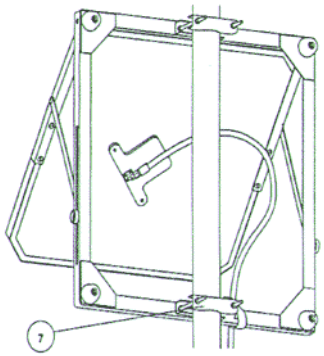
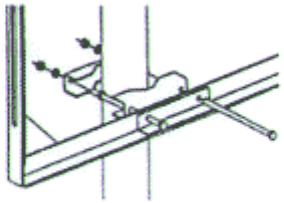


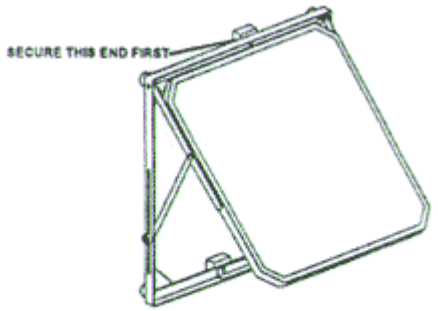
Figure 2 POLE MOUNTED INSTALLATION



POLE MOUNTED INSTALLATION DETAIL

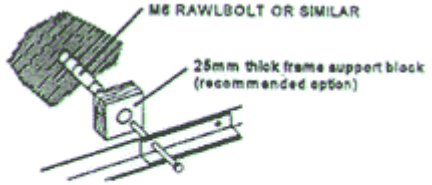
The antenna can be mounted on a pole as shown in the figure above. The four pole mounting brackets and fixings must be used to secure the frame to the pole. The antenna can then be aligned with the satellite by simply rotating it around the pole and setting the elevation angle on the frame. For pole mounting the marking corresponding to (90° minus the required elevation angle) must be selected on the frame of the antenna.

Wall Mounting:



WALL MOUNT INSTALLATION

Select a suitable wall with a surface exposed to the satellite. Attach the top edge of the frame to the wall, allowing the frame to rotate against the wall. Then point the antenna towards the satellite by simultaneously raising and lowering the panel in the frame and rotating the frame against the wall.



WALL MOUNT INSTALLATION DETAIL

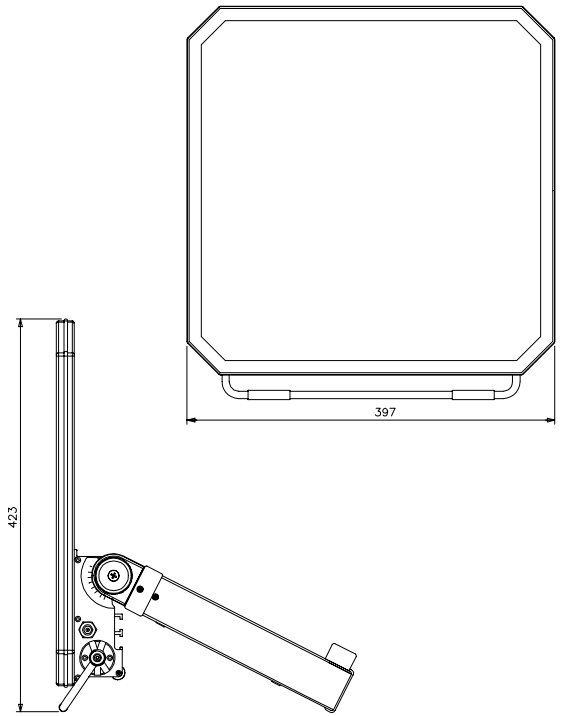
Antenna Cable Installation

Carefully unroll the cable, taking care not to twist or bend it. After the antenna has been positioned, the cable can be connected to the HPA/LNA-box at the rear of the antenna.

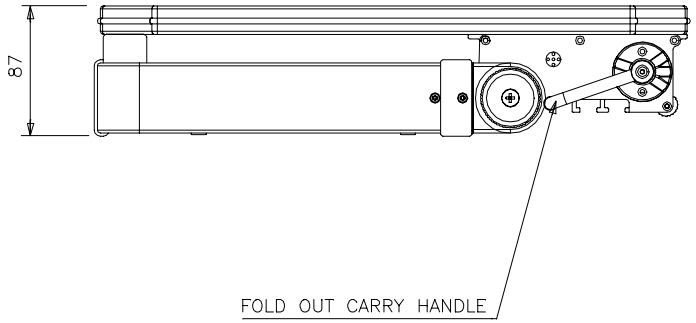
Notes

- The antenna radiates RF signals during a call, therefore a safety distance must be observed. Allow a passage distance of approx. 2 meters from the antenna. The radiated signal is strongest on the focal line of the antenna and drops off quickly! The antenna can be secured to the ground by loading the frame with sandbags, bricks or other suitable weights. Keep the front panel of the antenna free from obstructions!
- Precise adjustment of the antenna will make it possible for the RF power amplifier to reduce the transmitted power automatically to the required minimum for a reliable satellite connection. This will result in an extension of the battery capacity with up to 100%, depending on the exact application.

4.2.3 TT-3008D Small Dish antenna



Below is shown an overview of the optional 3008D Small Dish antenna, which consists of a compact flat planar antenna element and a supporting frame. The HPA-LNA is mounted on the back of the antenna element. The M4 Transceiver fits in a cradle within the antenna mounting frame. The fold out frame and handle provides support for all angels from 0˚ to 90˚ elevation angle. An indicator label on the side provides indication of the elevation angle. A compass is provided to indicate Azimuth angle.



The Antenna must be aligned to the relevant satellite before use.

Portable:

(no tools required)

- Point the antenna towards the horizon, such that the compass is in a horizontal position.
- Rotate the antenna in azimuth to the approximate compass angle.
- Adjust the elevation of the antenna to the approximate elevation, using the indicator label as a guide.
- Using feedback from either the handset display or the buzzer in the FEU, adjust both azimuth and elevation to optimise the signal strength.
- Tighten knurled adjustment fasteners to lock antenna into position.

Pole Mount:

(tools required: 10mm spanner)

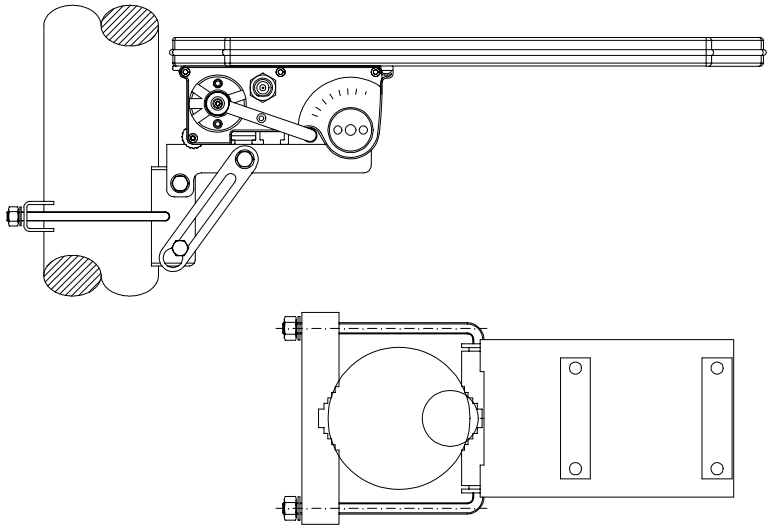
Fit Pole Mount Bracket onto the FEU, securing with a 10mm spanner in four positions.

Fit the bracket onto the pole. **Suitable pole size is 30mm - 76mm**.

Adjust the Azimuth angle by rotating the antenna around the pole, then tighten fasteners using a 10mm spanner.

Ensure the elevation struts are placed into position, adjust elevation angle and tighten fasteners using a 10mm spanner.

Using the feedback from either the handset display or buzzer in the FEU, adjust both azimuth and elevation to optimise the signal strength and lock the fastening screws to secure the antenna in position.



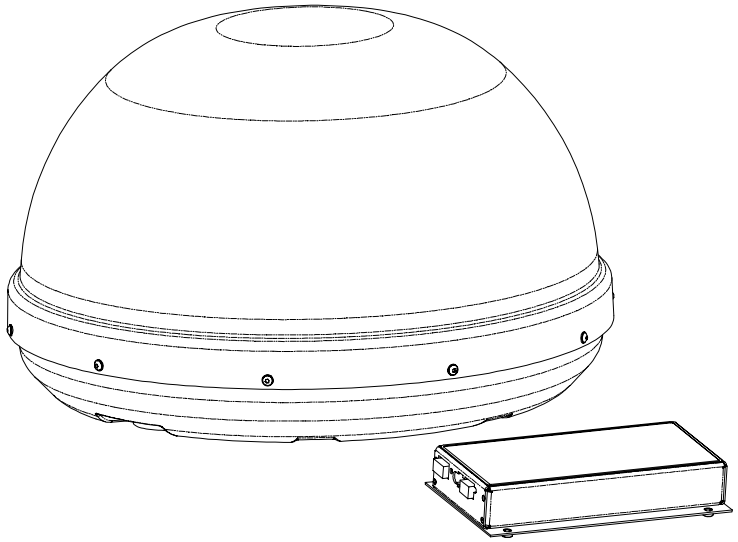
Notes

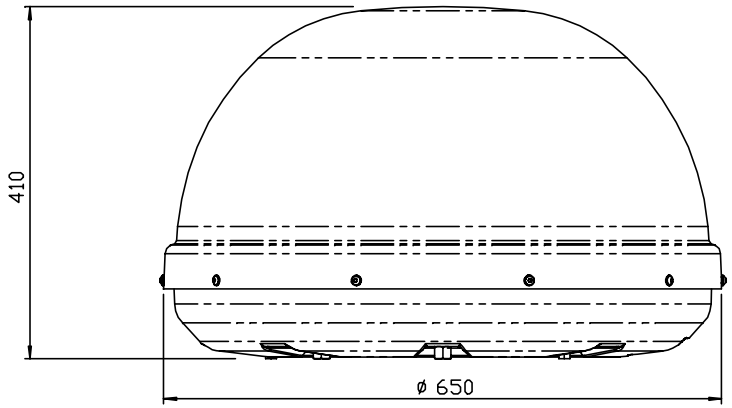
- The antenna radiates RF signals during a call, therefore a safety distance must be observed). Allow a passage distance of approx. 2 meters from the antenna. The radiated signal is strongest on the focal line of the antenna and drops off quickly! The antenna can be secured to the ground by loading the frame with sandbags, bricks or other suitable weights. Keep the front panel of the antenna free from obstructions!

- Precise adjustment of the antenna will make it possible for the RF power amplifier to reduce the transmitted power automatically to the required minimum for a reliable satellite connection. This will result in an extension of the battery capacity with up to 30%, depending on the exact application.

4.2.4 TT-3008E Land Mobile antenna

The system consists of a sensor stabilised platform with directional RHCP antenna, a power supply with sense input and a M4 Transceiver. The antenna works without cable unwrap.





The unit is mounted either by bolting onto a rigid structure using M6 bolts, or mounted magnetically onto a rigid mild steel surface using magnetic mounts.

Hard mounting

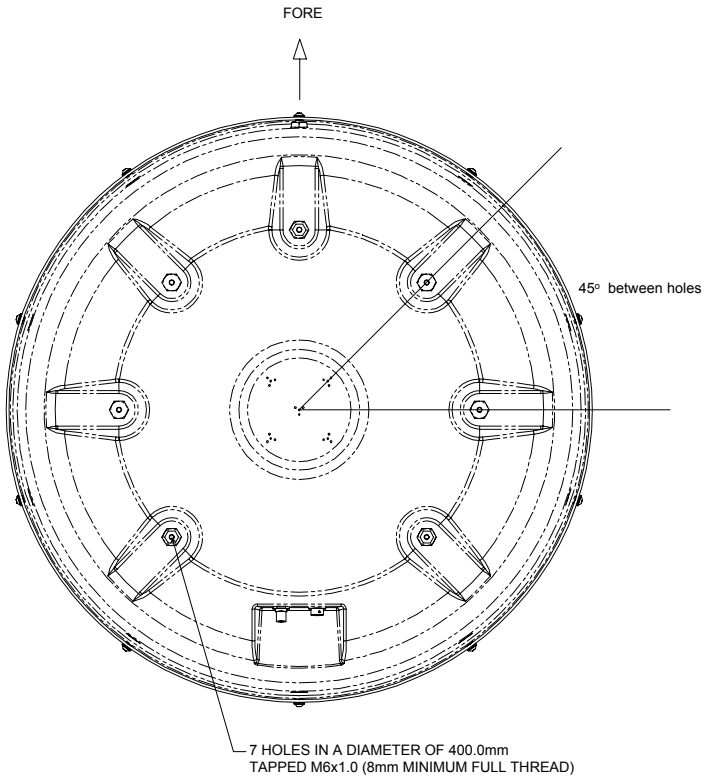
The Antenna is hard mounted onto a vehicle by bolting onto either the vehicle roof or onto a roof-rack type structure. Seven mounting points are provided on the base of antenna, each of which is tapped M6.

The Antenna may be mounted as follows:

- Seven Point mount - Using all seven mounting points
- Three Point mount - Using the front mounting point (opposite the connectors) and the two rear mounting points
- Four Point Mount – using four mounting points, each equally spaced at 90° intervals.

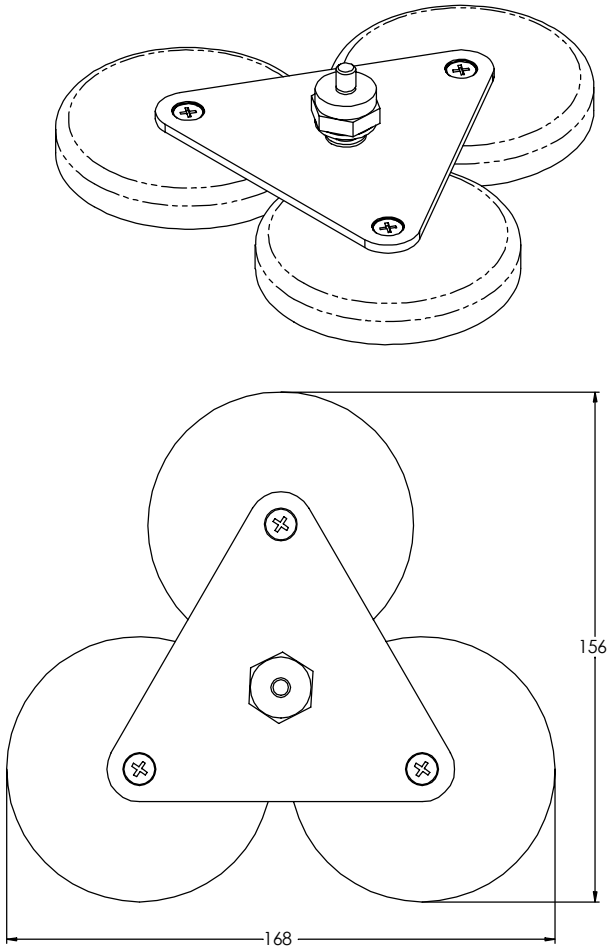
The antenna must be installed on a flat surface such that when the bolts are tightened the antenna is not distorted.

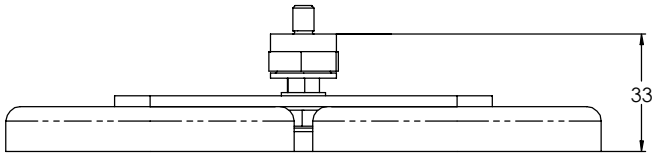
Should the mounting surface not be flat, then flat washers should be added between the mounting boss of the antenna and the mounting surface to fill any gaps. This is to ensure that the antenna is not distorted when the bolts are tightened.

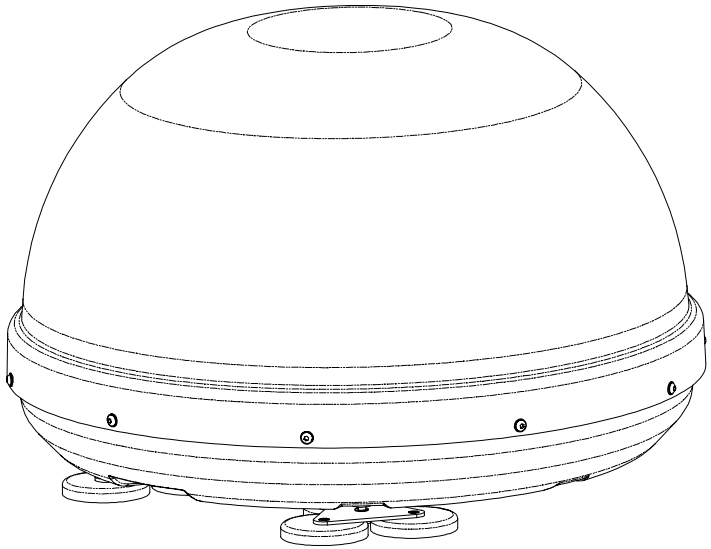


Magnetic mounting

Three magnetic mounts are used to mount the antenna. The magnets are connected to the antenna using ball joints. Using the ball joints and three mounts allows the antenna to be placed on surfaces with a slight curve.

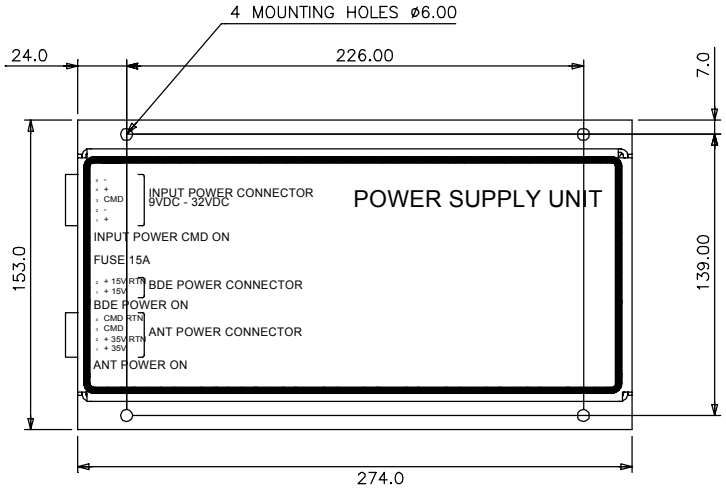



33



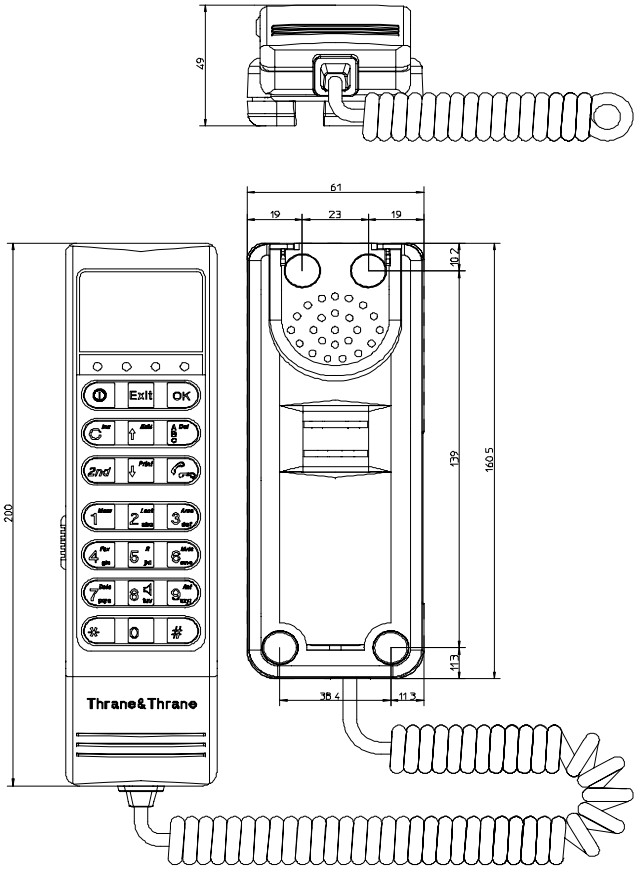
Power supply.

The power-supply, supplies the antenna and transceiver with each a regulated DC voltage. The on/off function of the power-supply is controlled with a CMD signal from the ignition switch. The CMD signal between the antenna and the power-supply, is used to detect if the transceiver is powered on. Antenna power will be turned off, as long as the transceiver is turned off.



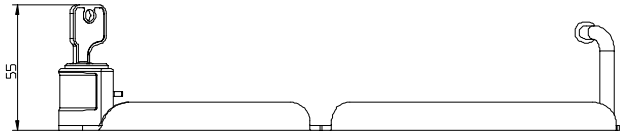
Handset Cradle.

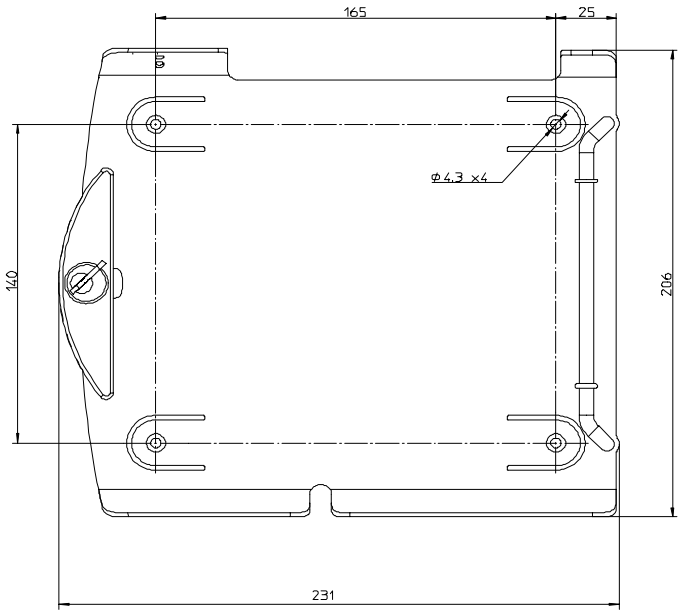
The Handset Cradle extends the standard handset cable, making it possible to place the Transceiver up to 5 meter from the handset.



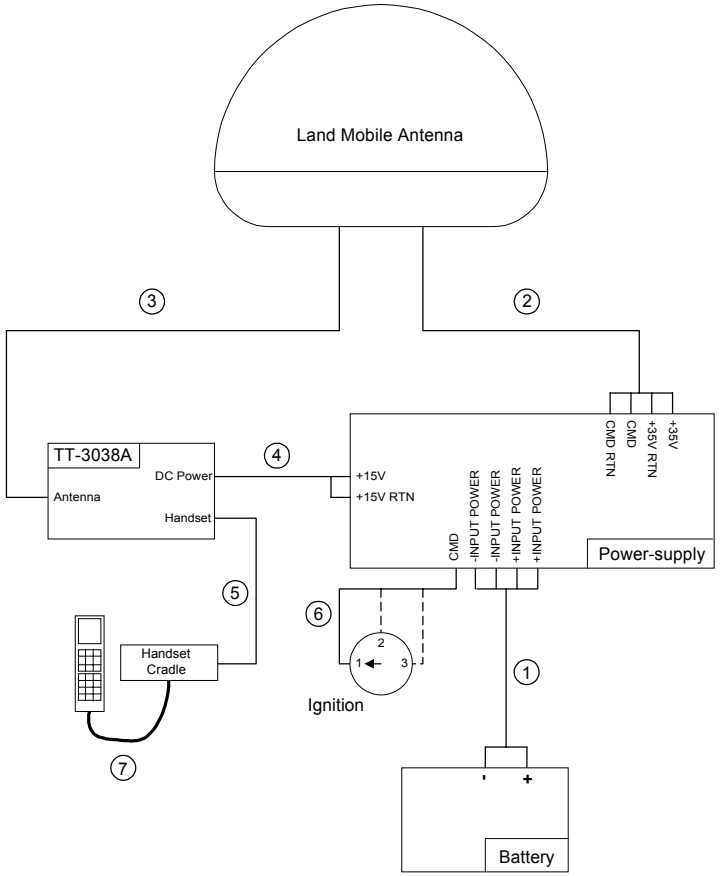
Transceiver Cradle.

The Transceiver Cradle is a convenient way of fixing a transceiver to a floor, dashboard, wall etc. The transceiver is hold in place with a key lock.





Installation guide.



1. 4 wire Input power cable.
   - Connect yellow/green wire to Input power connector 1
   - Connect blue wire to Input power connector 4
   - Connect brown wire to Input power connector 2
   - Connect black wire to Input power connector 5
   - Connect brown and black wire to - on the battery
   - Connect blue and yellow/green wire to + on the battery

2. 4 wire Antenna Power Cable. Insert Hirose connector in antenna.
   - Connect brown wire to Ant power connector 1
   - Connect black wire to Ant power connector 2
   - Connect yellow/green wire to Ant power connector 3
   - Connect blue wire to Ant power connector 4
3. RF coax antenna cable. Insert QLA connector in M4 terminal and TNC connector in antenna.
4. 2 wire BDE Power Connector. Insert DC connector in M4 terminal.
   - Connect brown wire to BDE power connector 1
   - Connect blue wire to BDE power connector 2
5. Handset cradle cable. Disconnect handset from M4 terminal. Connect handset to cradle. Connect cradle cable to connector on the bottom of M4 terminal.
6. Single white wire. Can be connected individually to power up the antenna in several ways, e.g., before ignition, after ignition but before engine start or only when the engine is running. The power-supply is tuned on when the CMD input goes high.
   - Connect one end to Input power connector 3 (CMD)
   - Connect other end to preferred point on ignition switch.
7. Connect handset cable to handset cradle.

Notes:

- The magnetic mounts may be used on a mild steel surface, thicker than 2mm. When using the magnetic mounts, do not exceed a vehicle speed of 110km/h, as the wind drag resulting from higher speeds may cause the antenna to come loose from the vehicle.
- The antenna radiates RF signals during a call, therefore a safety distance must be observed). Allow a passage distance of approx. 2 meters from the antenna. The radiated signal is strongest on the focal line of the antenna and drops off quickly!

4.3 NCS/LES connectivity

After setting up the antenna, turn on the terminal by pressing the [ⓘ] key. If the terminal is protected by a PIN code (PIN1, security is described more in detail in section 6.7.4 Security), you will be prompted to enter the PIN-code on the handset before you can proceed.

After a while the display reads "Search for satellite". This is due to the fact that the antenna alignment seldom gives an adequate signal quality. It is necessary to fine align the antenna. For this purpose it is possible to activate an audible tone in the antenna, which indicates the received signal quality. It is activated on the handset by pressing [2nd][9]. This also implies that the C/No value is shown (signal quality) in the display on the handset. Now fine align the antenna for maximum received signal strength, it should read at least 53 dB/Hz in order to make it possible to use the high speed services.

Now turn off the audible tone by pressing [2nd][9] and turn off the C/No indication by pressing [Exit].

The terminal now receives the signal transmitted by one of the NCS's. This signal contains information about which satellite (area) you are connected to and the handset will now prompt you to accept this area (AORE, AORW, IOR or POR). Accept by pressing [OK].

If the terminal previously with success has been used in this ocean region. It will automatically select the same LES operator again as gateway to the terrestrial network. Ocean region and LES operator is indicated on the handset display.

The terminal is now ready for making and receiving calls.In case the terminal has never been used in a ocean region the terminal requires that you either acknowledge the LES operator, which the terminal suggests, or that you setup a default LES operator for this ocean region. This is done in the Satellite setup menu, which is described in more detail in section 6.6.

5 Making calls

5.1 Calling the terminal

Calling the terminal or a device connected to the terminal is similar to making international calls. The specific IMN-number (a terminal may have more numbers as different services exist and more devices may be connected to the different hardware interfaces of the terminal) has to be preceded by one of the five possible international access codes for the Global Area Network. This depends on whether you know which area the terminal is within or not:

870: Area of terminal not known
(requires that the LES supports Mobility Management).
871: AORE
872: POR
873: IOR
874: AORW

To call the IMN-number on a terminal situated in IOR dial

+873 followed by the IMN number

5.2 Transferring incoming calls

In case an incoming call is routed to more hardware interfaces and is answered on a wrong hardware interface it is possible to transfer the call to another interface by using the 2nd 5 jkl followed by a number indicating the hardware interface. The hardware interfaces have the following numbers or local extensions:

Handset	0
1st 2-wire	1
2nd 2-wire	2
RS232	3
ISDN	4
USB	5

It is possible to address a specific device on the ISDN interface if more devices are connected in parallel to this interface. This requires that the IMN-number has been programmed into the ISDN device as a so called MSN (Multiple Subscriber Number). To address a specific device on the ISDN interface press [2nd] [5 jkl] followed by the IMN number.

5.3 Call from handset

When making calls from the handset just type in the phone number as if you were making an international call (with prefix for automatic international calls equal to 00).

To make a call you need to follow the steps below.

Example:

1. Press [ⓘ]:
for start and wait while initialising.

2. Press [2nd] [9 wxyz]:
to turn off the antenna beep

3. Wait for Ready

4. Then dial the number: [0][0] for international calls [4][5] for country code then [3][9][5][5][8][8][0][0] (which is Thrane & Thrane).
Preceded by [📞] or [OK] or [#]. The display on the terminal handset will show how the call proceeds.

You hang up by pressing [📞]. After hanging up the display will show how long the call lasted.

Example:

The service type (mini-M voice, Speech or 3.1 kHz) used and the LES operator used will be the default setting as configured. Chapter 7 contains more information how to override the default selection without changing the default setting.

The phone book can be used to dial from either by selecting an entry in the phone book and then pressing [📞] or by using the short code. In the latter situation press [*] followed by the short code. Pressing [📞] afterwards will establish the call. Pressing [#] instead will show the actual number and the call can then be established by pressing [📞] or [OK] or [#].

Short code 0 contains the last dialled number. Thus [*][0] followed by [📞] will redial the last number.

5.4 Call from a connected phone

Making a call from a phone connected to either one of the analogue 2 wire interfaces or the ISDN interface is done the same way as when calling from the handset, just keeping in mind to press #. Calling Thrane & Thrane in Denmark (country code 45) is done by pressing the following keys on the phone:

[0][0][4][5][3][9][5][5][8][8][0][0][#]

When using one of the 2 wire analogue interfaces please make sure that the selected interface is configured for a service which supports voice (mini-M voice, speech or 3.1 kHz audio).

The display on the terminal handset will show how the call proceeds.

After hanging up the display will show how long the call lasted.

5.5 Call from a connected fax

Fax calls can be made whether or not the fax has got a keypad.

Making calls from a fax (with keypad) connected to either one of the analogue 2w interfaces are done as international calls followed by #. Calling Thrane & Thrane in Denmark (country code 45) press the following keys on the fax:

0 0 4 5 3 9 5 5 8 8 8 8 #

Please make sure that the selected analogue 2-wire interface is configured for a service which supports fax (mini-M fax or 3.1 kHz audio).

The display on the terminal handset will show how the call proceeds.

After hanging up the display will show how long the call lasted.

Making fax calls when the fax has not got a keypad is done by using the keypad on the terminal in the following way. Calling Thrane & Thrane in Denmark (country code 45) press the following keys on the Capsat® Messenger terminal:

0 0 4 5 3 9 5 5 8 8 8 8 2nd 4 Fax ghi

After this the terminal asks which service to use:

1: mini-M fax (2.4 kbit/s)
2: 3.1 kHz audio (high speed).

Press either [1] or [2] depending on your selection and then press the start-button on the fax.

To hang up after faxing. See the user manual for the fax.

5.6 Call via RS-232

The terminal can be used as a Hayes compatible data modem by using the RS-232 interface. If the device attached to the RS-232 interface does not have the possibility to issue dialling commands the handset keypad may be used for this.

The RS-232 interface of the terminal has automatic baudrate and framing detection so it is not necessary to configure this in the terminal before usage. It is important that the wiring between the RS-232 interface of the terminal and of the attached device (a PC for example) is correct. The terminal is of type DCE (Data Communication Equipment) whereas PC's for example are of type DTE (Data Terminal Equipment). DCE's and DTE's are connected by a one-to-one cable. It is also important that the type of data flow control is known and identically configured in both devices. This cable is supplied as standard device.

The AT-command to establish a call to a modem with phone number 39661010 situated at Thrane & Thrane in Denmark is as follows:

ATD004539661010<CR>

Hereafter the modems can exchange data with each other.

The display on the terminal handset will show how the call proceeds.

Hanging up is done by switching the terminal from data mode to command mode and then giving the AT hang up command:

+++

ATH<CR>

There are special AT-commands to setup certain parameters relevant for data transmission via the Global Area Network.

If the attached data device does not have an AT-command capability the handset keypad can be used. To call the same number as before press the following key sequence on the handset:

0 0 4 5 3 9 5 5 8 8 8 8 2nd 7 Data pqrs

and the connection will be established. Hang up by pressing .

5.7 Call via USB

To be defined.

6 Basic functions

6.1 Top level menu

The different functions of the terminal are divided into the following categories, which follow the menu-structure on the handset:

- Phone Book
- Print Phoneb
- Help Desk
- Call Log
- Mailbox
- Sat. Setup
- Phone Setup
- Status

The **Phone Book** menu can be used to insert, edit and delete entries in the phonebook. Each entry contains name, phone number and a short code, which can be used directly from the handset keys instead of selecting the entry in the phonebook.

The **Print Phonebook** can be used to print the contents of the phone book to a serial printer connected to the RS-232 interface.

The **Help Desk** menu can be used to select and initiate calls to certain numbers which may provide help in case you have lost the SIM card and the terminal is configured to require a SIM card.

The **Call Log** menu gives the possibility to view and print a log containing information about the last calls made on the terminal (which number is called using which service, time/date, duration etc). Furthermore it is possible to view the total call time. The call log can contain up to 100 calls.

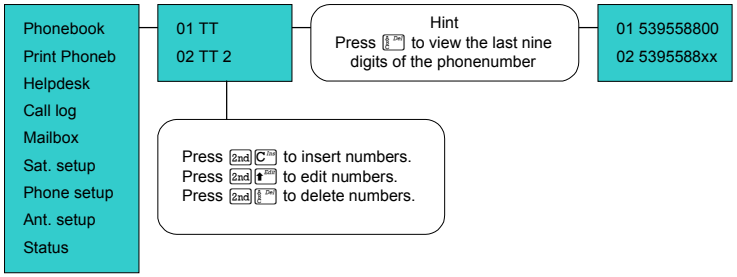
The **Mailbox** menu gives the possibility to inspect if a short voice mail has been stored for you while the terminal was inaccessible. It requires that the LES operator used supports this service.

The **Sat. Setup** menu is used to select LES operator and to configure the selection of ocean region (Automatic, POR, AORE, AORW or IOR).

The **Phone Setup** menu is used to configure the terminal. The terminal may have more IMN numbers (one or more for each service type) and each of these IMN numbers must be routed to one or more of the hardware interfaces (handset, the two 2-wire interfaces, the RS-232 interface, USB or the ISDN interface). Furthermore, each hardware interface can be configured to a default service type when making outgoing calls from this interface. Apart from this it is also possible to select the ringing tone and volume, to set time and date and to configure the security setup (PIN codes).

The **Status** menu can be used to inspect information about status/version of the internal hardware blocks. Furthermore it contains a log of the last alarms which may have occurred.

6.2 Phone Book



The phone book of the terminal contains 99 entries. Each entry contains the following information:

- Short code
- Telephone number
- Name

The short code can be used for quick access when dialling.

The telephone number includes call prefix for automatic calls and international access code. The telephone number can hold up to 22 digits.

The name can hold from 0 to 16 characters.

The list of entries in the phone book is sorted according to short code.

An entry in the phone book is displayed as short code and name if in alpha mode or as short code and telephone number if in normal mode.

Inserting an entry in the phone book can be done in two ways either directly (when not in the menu system):

0 0 4 5 3 9 5 5 8 8 0 0
2nd C
THRANE□
1 4 OK

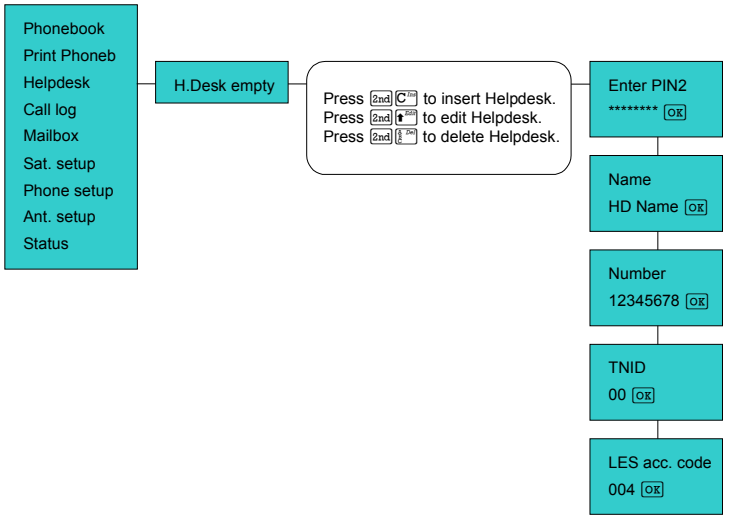
or when having selected the phone book menu

2nd C
0 0 4 5 3 9 5 5 8 8 0 0
OK
THRANE□
1 4 OK

Editing or deleting an entry is done by selecting the entry in the phone book and press 2nd Edit and 2nd Del respectively.

How to dial using the phone book is described in section 5.3 Call from handset.

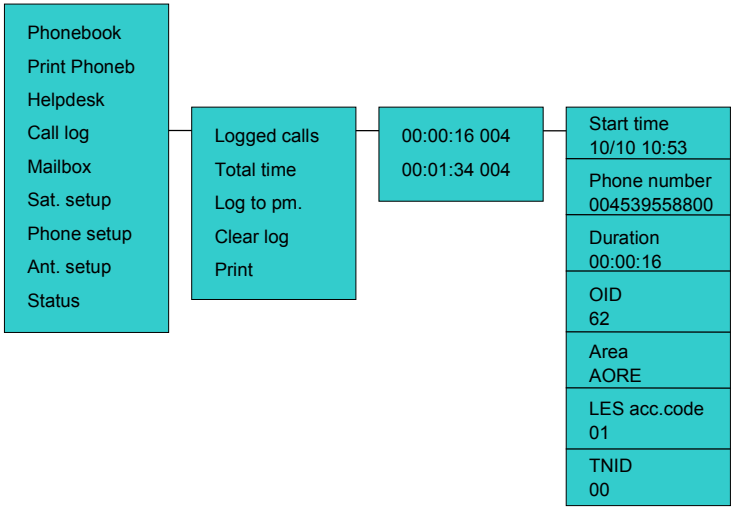
6.3 Help Desk



The Help Desk menu can be used to select and initiate calls to certain numbers which may provide help in case you have lost the SIM card or forgotten your PIN code. In this case it is done by pressing 2nd 0.

Editing/inserting and deleting entries is done in exactly the same way as with the phone book, but it can only be done if the MES PIN2 pin-code is known. Normally this is only known by the ISP. See section 6.7.4 Security for detailed information about this.

6.4 Call log



The Call log menu has got the following sub-menus

- Logged calls
- Total Time
- Log to prn.
- Clear log
- Print

By entering the **Logged calls** menu it is possible to inspect information about each of the logged calls made on the terminal. The following information is logged for each call:

- Date of call
- Time of call
- IMN number
- Number called
- Duration
- Service
- Ocean region
- LES operator
- Terrestrial Network Identity

Single entries in the call log can be deleted by selecting the entry and then pressing 2nd Del. The total content of the call log is deleted by pressing 2nd Del when the cursor indicates that Calls can be selected by pressing OK.

Total Time shows the total accumulated call time since last reset. Resetting is done by pressing 2nd Del when the cursor indicates that Total Time can be selected by pressing OK.

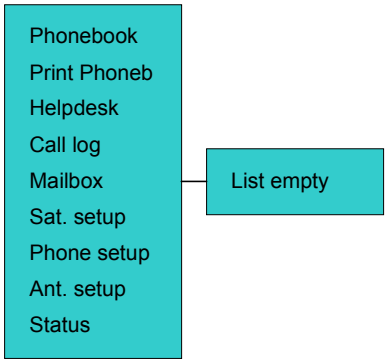
In the **Log to prn** menu it is possible to select between the following ways to automatically print.

- Full log
- Each call

If **Full log** is selected the call log will automatically be printed when the log reaches 100 entries. **Each call** implies that the log information for a call is printed immediately after the call has been finalised.

By activating the **Print** menu the total call log can be printed.

6.5 Mailbox



The mailbox feature handles messages being sent from the LES operator. If a call is made to a terminal, which is busy, switched off, etc. the LES operator may offer the facility to record a short message. When the terminal again becomes operational a message is sent indicating that the LES operator has recorded a short message for the terminal.

The ✉ symbol in the handset display indicates the presence of such messages.

Each message can be seen in the Mailbox menu and contains the following information:

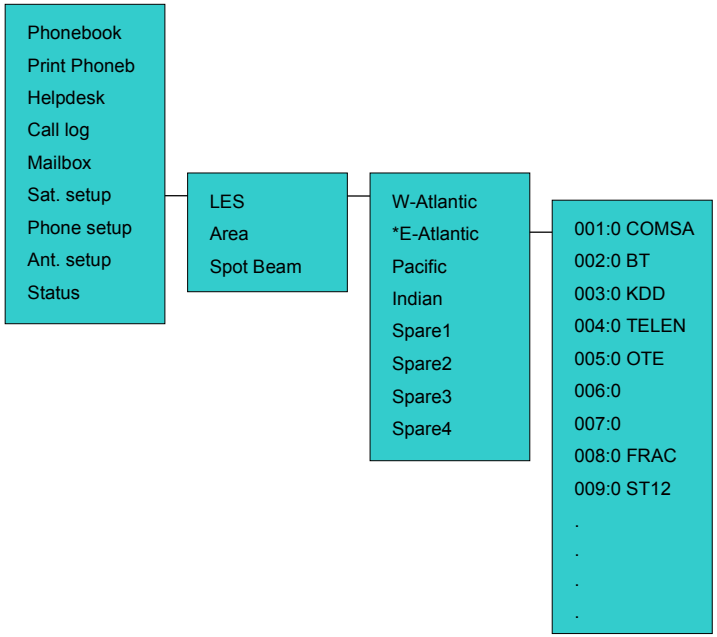
- LES Access Code
- Service type (voice, fax, data).

The following operations are possible:

- View entries
- Delete entries.

NOTE: If a terminal can operate with and without SIM cards, one should be careful to check for new messages *before* removing the SIM card. Mailbox messages received with the SIM card inserted will be *deleted* when the card is removed from the terminal.

6.6 Satellite setup



This menu is used to select area and LES operator. It contains the following sub menus:

- LES
- Area
- Spot-beam

The **LES** menu contains the following sub menus:

- Default LES
- Prefer LES
- Allowed LES
- Std def LES
- Std pref LES
- Std all LES

The **Default LES** list contains a list of those LES operators which may be selected as gateway to the terrestrial network. The last used LES will be marked with * and this LES will also be the first LES tried next time the terminal is logged on. Use [OK] to select.

The **Allowed LES** list contains all available LES operators. Those operators marked with * can be used as Default LES operator and thus appears in the Default LES list above. If all LES operators are allowed and can be used there are no markings.

As there are many operators, you can use **Prefer LES** to make selection easier. The **Prefer LES** list can be used to indicate in which order LES operators should appear on the Default LES list. This is done by entering a number for each LES in the list – number 1 will appear first in the default LES list.

These lists can only be read and changed when the terminal is in contact with the NCS – receiving the signal from the NCS. And the allowed LES operators can only be selected when PIN2 is known – see section 6.7.4 Security.

To edit/insert and delete entries in these lists require knowledge of PIN2 pin-code (MES PIN2 if no SIM card is inserted and SIM PIN2 if SIM card is inserted). Normally PIN2 is known by the ISP. This is due to the fact that the ISP may have agreements with specific LES operators.

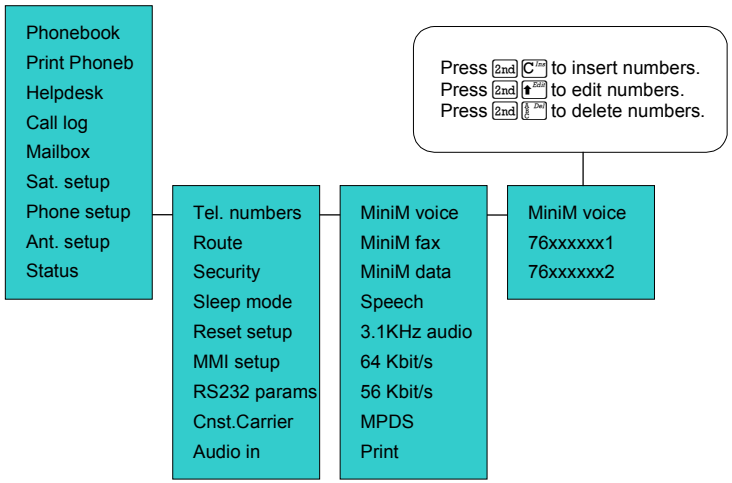
The **Std def LES**, **Std pref LES** and **Std all LES** are used if the Global Area Network is in the Stand Alone mode where no NCS is available and one of the LES's take over. In these menus it is possible to setup the default, preferred and allowed LES in the same way as when the Global Area Network is in normal operation.

The **Area** menu has got the following list of possible choices:

- Automatic
- AORW
- AORE
- IOR
- POR
- Spare 1
- Spare 2
- Spare 3
- Spare 4

The selection is marked with an *. If Automatic is selected the terminal will determine the area if the antenna is correctly pointed towards the corresponding satellite. The selection is changed by choosing an area and then pressing OK.

6.7 Phone setup



The Phone setup menu has got the following sub menus:

- Tel. numbers
- Route incom.
- Route outg.
- Security
- Sleepmode
- Reset setup
- MMI setup (Man Machine Interface)
- RS-232 parameters

The **Tel. numbers** menu stores all of the IMN numbers which this terminal has been commissioned for. It is necessary to enter all of these before it is possible to define the internal routing of these numbers to the different hardware interfaces.

The **Route incoming** menu is used to configure the terminal with the IMN numbers (handset, 2-wire analog interfaces, ISDN etc).

The **Route outgoing** menu is used to select which IMN-number should be used for billing for each of the different hardware interfaces and thus a default service type is also selected. An example: The handset is configured to always use inexpensive mini-M voice, if a call is initiated from here, whereas one of the analogue phone interfaces is configured to always use "3.1 kHz audio" when a call is initiated from here.

To give a better overview of these three submenus the figure below indicates the routing matrix representing all three menus as can be seen in the PC configuration software. The X's indicates which IMNs are routed to which hardware interface, whereas # indicates default IMN for billing and thus service type for each hardware interface.

Service	IMN Number	ID	Handset	1st RJ11	2nd RJ11	RS-232	ISDN	USB
mini-M voice	678015389	01h	X #					
mini-M fax	578013128	11h			X #			
mini-M data	547567457	21h				X #		
Speech	424013735	91h		X #				
3.1 kHz audio	011836185	61h					X #	
64 kbits/s UDI	456346346	51h					X	
56 kbits/s UDI	265235626	71h					X	
IPDS	986976987	A1h				X		

The **Security** menu is used to insert/edit/activate/deactivate PIN codes and to confine the usage in different ways. You can for example lock the terminal so that only the phone numbers stored in the phone book may be dialled.

The **Sleep mode** menu is used to enable/disable the sleep mode functions, which saves battery power and thus prolongs the standby time.

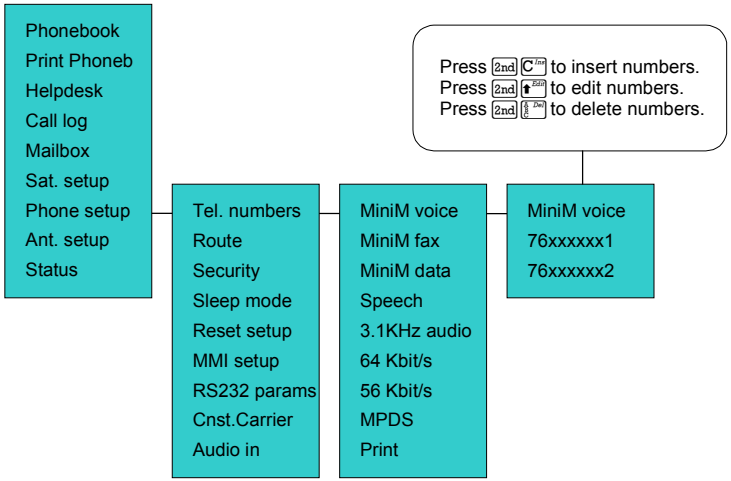
The **Reset setup** menu resets all setups to the factory default. This also implies that all entered IMN's and phone book entries are deleted.

The **MMI setup** menu is used to choose between different ways of ringing etc.

The **RS-232 parameters** menu is used to setup the communication parameters for data transmission via the RS-232 interface and certain parameters for the mini-M data service.

6.7.1 Tel. numbers

The Tel. numbers menu has been divided into the different types of services available plus a print menu:



- mini-M voice
- mini-M fax
- mini-M data
- Speech
- 3.1 kHz audio
- 64 kbit/s UDI (Universal Data Interface)
- 56 kbits UDI
- MPDS
- Print

In each menu all IMN's associated with a specific service should be inserted. The IMN's are given by the ISP when commissioning the terminal. After inserting an IMN number and pressing OK the handset will show "ID" and a number. The ISP may also have

indicated the corresponding ID's along with the IMN-numbers. If the ID shown by the terminal corresponds with the ID given by the ISP press [OK]. If not, then correct the ID and then press [OK]. If the ISP has not indicated the ID for each IMN number two situations exist:

If there is not more than one IMN-number pr. service the ID shown by the terminal will always be correct and thus just press [OK].

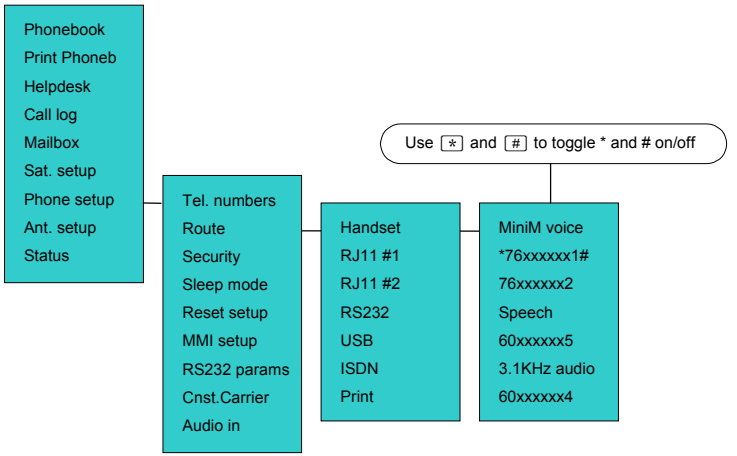
If there is more than one IMN-number pr. service the normal rule is that the first (or upper) IMN on the returned commissioning form will have the lowest ID and each subsequent IMN-number will have an ID which is 1 higher than the predecessor. Please remember that the ID's are hexadecimal numbers. In case the IMN's are combined with the wrong ID's the wrong interface may be activated for incoming calls. Furthermore, reference IMN for an hardware interface when making outgoing will be wrong. Thus service type and billing will be otherwise than expected. The ISP may help you with this.

ID's are entered as decimal and the allowed range pr. service type is as follows:

Service	ID – range
Mini-M voice	1-15
Mini-M fax	17-31
Mini-M data	33 – 47
Speech	145 – 159
3.1 kHz Audio	97 – 111
64 kbit/s UDI	81 - 95
56 kbit/s UDI	113 – 127
MPDS	161 – 175

Activating the print-menu will imply that all information herein will be printed to the RS-232 interface.

6.7.2 Route incoming



This menu has been divided into a submenu pr. interface plus a print menu:

- Handset
- 1st RJ11
- 2nd RJ11
- RS 232
- USB
- ISDN
- Print

When entering one of the above submenus it is possible to scroll through a list of all relevant IMN-numbers for the interface. In the handset menu you will see all IMN's associated with voice: mini-M voice, speech, 3.1 kHz audio. If an IMN is routed to an interface it is marked with "*". It is possible to change the routing-status for each IMN to the opposite by pressing * on the handset.

It is possible to route one IMN to more interfaces. The only exception is that the same IMN can not be routed simultaneously to both analogue 2-wire interfaces (RJ11 interfaces).

The print-menu is used to print all this information to the RS-232 interface.

6.7.3 Route outgoing

This menu has got the following submenus:

- Handset
- 1st RJ11
- 2nd RJ11
- RS-232
- USB
- ISDN
- Print

For each interface it is necessary to select which IMN-number should be used for reference (billing) and thus which default service type should be used.

Pressing [#] implies that this IMN is now the selected one and the previous IMN is deselected. A * is used to define which interface should be used for incoming calls and a # is used to define which interface should be used for outgoing calls.

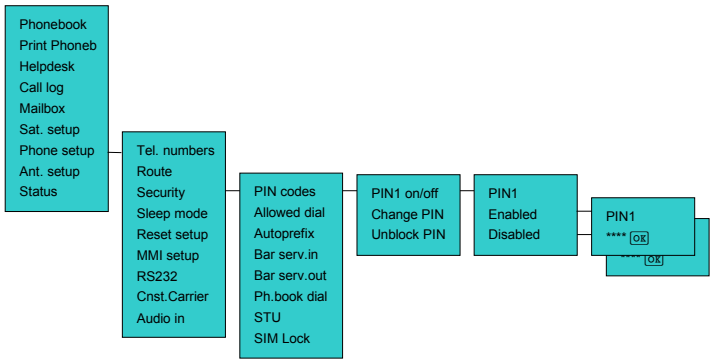
Each of the two RJ11 menus gives the possibility to select the default service to be used for these two 2-wire interfaces:

- mini-M voice
- mini-M fax
- Speech
- 3.1 kHz audio

The ISDN-menu is used for the same except that it is possible to specify a default IMN number for each service type relevant for ISDN.

Activating the print-menu will imply that all information herein will be printed to the RS-232 interface.

6.7.4 Security



The Security menu has got the following submenus:

- PIN codes
- Allowed Dial
- Autoprefix
- Bar serv in
- Bar serv out
- Ph. Book dial
- SIM lock
- STU (if option installed)

The **PIN codes** menu gives the possibility to change the different PIN codes. There are four PIN codes:

- PIN1 (4-8 digits)
- PIN2 (4-8 digits)
- CONFIG PIN (4-8 digits)
- SIM lock PIN (10 digits)

If a SIM card is inserted the PIN1 and PIN2 codes will be the ones stored on the SIM card. If there is no SIM card, the two PIN codes will be the ones stored in the terminal.

The **PIN1** code controls general access to the terminal. If enabled it is only possible to use the terminal if PIN1 is entered when the terminal prompts for it. The PIN1 code in the terminal when delivered from the factory is equal to the PIN1 unblock code (8 digits). The PIN1 unblock code is used to unblock the terminal when it blocks due to 3 attempts with wrong PIN1 codes.

The PIN1 can be unblocked within 10 attempts. After the 10. attempt the SIM card is permanently blocked and has to be returned to the ISP.

Note that the terminal can be protected by PIN1 after it has been turned on and the PIN1 code has been entered the first time. This is done by pressing 2nd 2 Lock abc on the handset keypad. The next person who tries to use the terminal will be prompted to enter the PIN1 code.

The **PIN2** code controls access to editing the Allowed LES list and to edit entries in the Helpdesk. In the Allowed LES list it is possible to select the subset of LES operators which this terminal may use. The PIN2 code in the terminal when delivered from the factory is equal to the PIN2 unblock code (8 digits). The PIN2 unblock code is used to unblock the terminal when it blocks due to 3 attempts with wrong PIN2 codes. PIN2 is typical used by ISP's to make sure that this terminal utilises the LES operators which the ISP has got an agreement with.

The PIN2 can be unblocked within 10 attempts. After the 10. attempt the SIM card is permanently blocked and has to be returned to the ISP.

The **CONFIG PIN** controls access to the following features:

- Allowed Dial
- Autoprefix
- Phone Book dial
- Bar Services

There is no CONFIG PIN programmed in terminals delivered from factory. When prompted for CONFIG PIN just press [OK].

The **SIM lock PIN** code is used to control access to the capability of locking /unlocking the terminal to SIM card usage.

There is no SIM lock PIN programmed in terminals delivered from the factory, but typically the ISP has entered a SIM lock PIN code and the ISP is the only one who knows this PIN code. If no SIM lock PIN code is present in the terminal just press [OK] when prompted for the SIM lock PIN code.

The **Allowed Dial** menu gives the possibility of entering a number of "masks" which consist of 1 to 22 digits or which consist of an * followed by 1 to 22 digits. Whenever a call is made via the terminal the dialled number is compared to all masks. Only if the dialled number fits one of the masks starting without * the call is initiated. If a mask is for example 3 digits long only the 3 first digits of the dialled number is compared with the mask.

The **Autoprefix** menu is used to enter a string of digits (including *) which will automatically be inserted in front of every telephone number entered for making calls except for 2-digit Inmarsat Service codes. This includes numbers used from the phonebook. If for example all calls are to be made for Denmark enter the following autoprefix:

[0] [0] [4 ghi] [5 jkl]

In the **Bar Serv. In** menu it is possible to bar certain services for incoming calls in order to prohibit any users of using these types of services.

In the **Bar Serv. Out** menu it is possible to bar certain services for outgoing calls in order to prohibit any users of using these types of services.

If **Ph Book dial** is enabled it implies that it is only possible to dial the numbers in the phonebook. The options are:

- Disabled
- Enabled for terminal only (MES Only)
- Enabled for both terminal and SIM cards (MES/SIM).

In the **STU menu** it is possible to enable/disable the STU-option. This requires a special Thrane & Thrane PIN-code, which enables the STU operation.

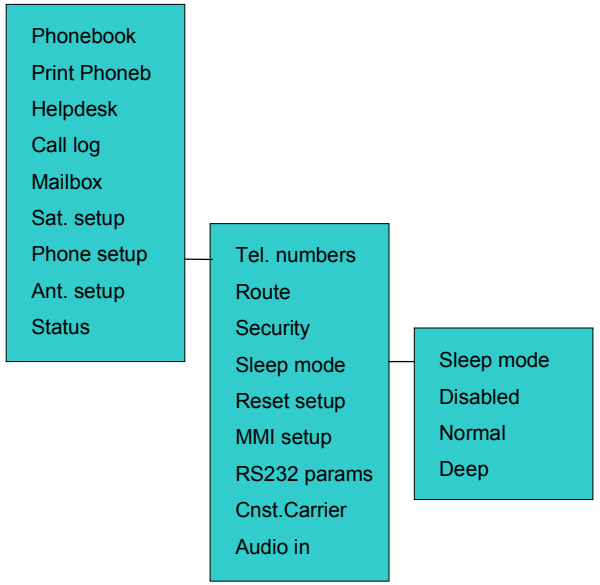
The **SIM lock** menu is used to specify whether the terminal is locked to operate with SIM cards or not. When locking the terminal to use SIM cards, then a SIM card ID must be specified. The options are:

- Disable
- ICC ID
  The Inmarsat defined SIM card serial number which includes the identity of the service provider. With this option the service provider's identity number should be entered.
- GID 1
  This option requires SIM cards which in addition to the Inmarsat specification also supports the GID 1 file as defined in the coming GSM standard, GSM 02.22 section 6.
- Semi lock
  Enabling this feature makes it possible to use the terminal either without a SIM card or with a SIM card but only from a

specific service provider. The feature can only be enabled after entering a GID1 or ICCID.

In case the terminal is locked to SIM card and you do not have the SIM card this sub menu can be accessed by pressing 2nd *.

6.7.5 Sleep mode



The sleep mode menu is used to either disable the sleep mode function or to activate one of two sleep modes:

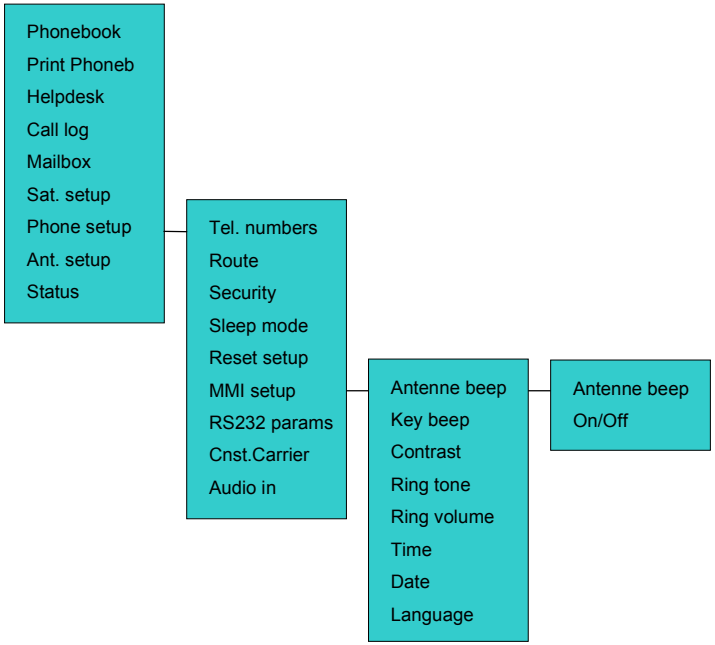
- normal sleep
- deep sleep

The sleep mode gives the possibility to prolong the standby time without loosing the ability of receiving or making phone calls. The terminal turns off everything unnecessary, which includes the display and key illumination.

In normal sleep mode the terminal wakes up instantly when activating a key.

In deep sleep mode it takes about 1-2 seconds before the terminal is ready for use. The standby time for deep sleep mode is longer than for normal sleep mode. Use of external equipment, except the handset, will not wake the terminal from deep sleep.

6.7.6 MMI setup



The MMI setup menu has got the following submenus:

- Antenna Beep
- Key beep
- Contrast
- Ring tone
- Ring volume
- Time
- Date
- Language

The **Antenna beep** menu is used to turn the audible tone in the antenna on/off. The antenna beep indicates the quality of the received signal. This is used during antenna fine alignment.

The **Key beep** menu is used to turn the key beep on/off. If on, a beep will be heard every time a key on the handset is pressed.

The **Ring tone** menu is used to configure the type of ring signal and the **Ring volume** menu is used to set the ring volume.

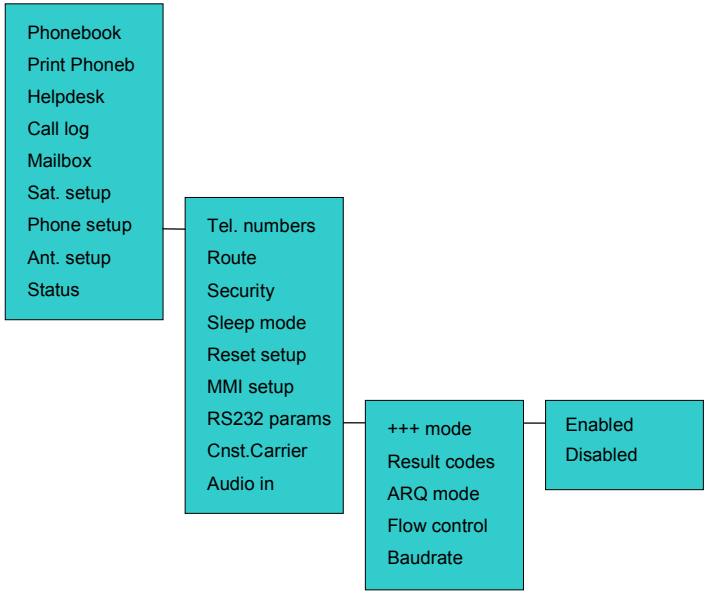
There are 8 ring types to select between and 8 volume levels.

The **Date** and **Time** menu is used to read and set the internal clock and calendar (date: yyyy-mm-dd, time: hh:mm).

The time is used as time-stamp for the call and alarm log and it is recommended to enter UTC so that the chronological order is maintained even though travelling between time zones.

The **Language** menu is used to switch the menu-text to appear in another language – (English, French, German, Portuguese, Spanish). Note that when entering this menu it implies that the "Select language" will also be translated to the new selected language.

6.7.7 RS-232 parameters



This menu is used to set the baudrate and dataflow control for the RS-232 interface and different parameters for mini-M data:

- Baudrate
- +++mode
- result codes
- ARQ mode
- flow control

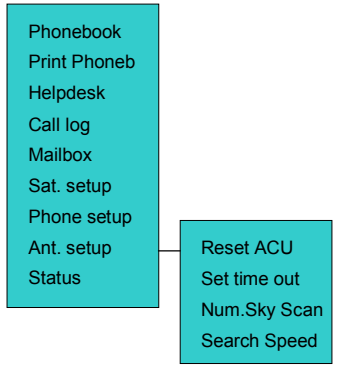
6.7.8 Cnst.Carrier

The **Cnst.Carrier** menu is used to turn on/off the constant carrier. Turning on the constant carrier will suppress the noise inserted in the time span where there is no speech.
NOTE: This feature is draining the battery faster than in normal mode

6.7.9 Audio in

The **Audio in** menu is used to switch the audio input sensitivity between line- and microphone input.

6.8 Ant. Setup



The Ant. Setup menu has got the following sub menus:

- Reset ACU
- Set time out
- Num. Sky Scan
- Search Speed

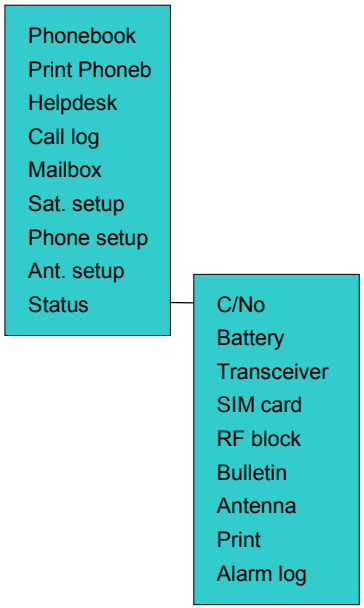
The **Reset ACU** (Only for TT-3008E Land Mobile Antenna). This function will reset the ACU (Antenna Control Unit) in case the antenna gets into an unknown state, locks up or freezes.

The **Set time out**
This value is the time in seconds the system can stay alive without a signal. Valid range is 1-9999 seconds.

The **Num. Sky Scan** (Only for TT-3008E Land Mobile Antenna). Enables the user to define the number of sky scans.

The **Search Speed** (Only for TT-3008E Land Mobile Antenna). This menu enables the user to set the antenna speed in the range of 10 to 40 degree/second.

6.9 Status



The Status menu has got the following sub menus:

- C/No
- Battery
- Transceiver
- SIM card
- RF block
- Bulletin
- Antenna
- Print
- Alarm log

Single entries in the Alarm log can be deleted by selecting the entry and the pressing 2nd Del.

The total contents of the Alarm log is deleted by pressing 2nd Del when the cursor indicates that entries can be selected by pressing OK.

Print implies that the total status is printed.

7 Using MPDS

7.1 What is MPDS?

Mobile Packet Data Service (MPDS) is a service that enables the mobile user to connect to the Internet. The maximum data transfer rate is 64 kbit/s like Mobile ISDN, which the TT-3080A also supports. The difference between the Mobile ISDN and MPDS is that whereas Mobile ISDN is charged by connection time MPDS is charged by Mbits transferred. This means that for applications like Web browsing, email services, IP/LAN connectivity, small to medium size file transfer, the MPDS will be the most economic and convenient solution.

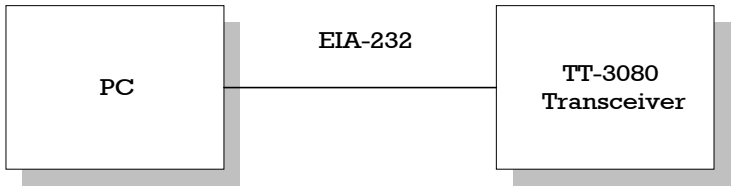


Figure 7.1 System setup.

While in MPDS mode the TT-3080A is flagged busy in the Inmarsat-M system, i.e. it is not able to receive any calls, e.g. mini-M or ISDN, until it leaves MPDS mode and returns to normal idle mode.

The TT-3038 transceiver is connected to a PC or similar equipment via a standard RS-232 cable. In this manual, the setup of a PC running a MS-Windows operating system is described.

7.2 Configuring TT-3080A

The transceiver shall be configured for the right ocean region and LES operator that provides the MPDS service. This is done using the TT-3080A handset user interface.

The transceivers RS-232 configuration shall be (using the handset user interface):

- Baud rate: 115200 baud
- Flow control: Hardware

Before being able to use MPDS with the transceiver, it must be enabled by entering the MPDS PIN code. The MES manufacturer supplies the PIN code on basis of the MES forward id.

To enter the PIN code, do the following:

1. Enter the handset menu by pressing [2nd] [1 Menu]
2. Select the Phone setup menu and press [OK]
3. Select the Security menu and press [OK]
4. Select MPDS and press [OK]
5. Enter the PIN code and press [OK]
6. Select Enabled and press [OK]
7. Press [Exit] until all submenus have been exited

7.3 Setting up your PC

In this section the setting up of a MS-Windows based PC is described in general terms covering Windows 95, 98, 2000 and NT. For a detailed description with screen dumps of the installations, you are referred to the Application Note "Configuring M4 MES for MPDS" on your MES Software distribution disk or at our web site WWW.TT.DK

Step 1: Install a standard modem

- In the Control Panel you choose Modems and add a Standard modem. You choose Windows not to detect the modem and you choose a standard 28800 bps Modem.
- You select the appropriate COM port (i.e. the COM port that is connected to the TT-3080A serial port.
- You choose maximum speed equal ti 115200
- You choose Data bits = 8, Parity=None, Stop bits=1

Important:

- In Advanced settings you chose Hardware flow Control and Extra settings/Extra initialization commands = AT+WS45=4. This string is transferred to the TT-3080A transceiver when setting up a connection. If you want the MPDS connection to use another LES than already selected, you use the initialization command = AT+WS45=4;+WLES=XXX, where XXX is the LES number.
- If you plan to use MPDS in such a way, that your terminal stay in MPDS mode for longer periods of time, with no activity, then you must disable the automatic "disconnect when idle" setting in Windows. Refer to your Windows manual on how to do this.

Step 2: Create a Dial-up connection

Now you create a new dial-up connection (e.g. My computer -> Dial up networking)

- You choose the standard modem defined during step 1 as the dial up device
- You enter a dummy telephone number (the number is not used but has to be defined – write e.g. "1" as the phone number
- Give the recognisable name e.g. MPDS connection
- Include TCP/IP as allowed network protocol and use default TCP/IP settings (Server assigned IP address, Server assigned name server addresses etc.)

7.4 Running an MPDS Session

To start an MPDS session:
(The procedure might differ slightly on different installations.)

1. Make sure all cables are connected correct from transceiver to antenna and from transceiver to PC equipment.
2. Power on the transceiver and the PC.
3. Direct the TT-3080A antenna towards the satellite until a carrier to noise ratio of minimum 54 dBHz is achieved reading the TT-3080A handset display.
4. Wait for the TT-3080A to do spot beam selection. The display reads 'Busy' while spot beam selection is in progress. When spot beam selection is done the display reads 'Ready'.
5. Go to the PC 'Dial-Up Networking'. Select the MPDS connection. Enter username and password, if necessary. Select the button 'Connect'.
6. Wait for the TT-3080A to establish an MPDS connection. The handset display reads 'MPDS Mode Calling' while the TT-3080A establishes the MPDS connection. When the MPDS connection is established the TT-3080A handset display reads 'MPDS Mode CONNECTED'.
7. Wait for the PC to negotiate an IP address and validate the user name and password.
8. When the window disappear, the Internet access is available. This is indicated on the PC with a 'Dial-Up Networking' icon in the task bar icon tray.

Now Internet applications can be started, e.g. FTP or Web browsing.

Following these steps stops an MPDS session:

1. Select the 'Dial-Up Networking' icon in the task bar icon tray. A window appears showing the connection time and the number of bytes transmitted and received.
2. Select the button 'Disconnect'. Wait for the window to disappear. The TT-3080A is now disconnected and is back in normal idle mode.

7.5 What if?

What if the MPDS connection setup is unsuccessful?

Please check that the PC and the MES is set-up as described in the previous sections and in the Application Note "Configuring M4 MES for MPDS" on your MES Software distribution disk.

Please observe the following:

- The states of the LED's on the handset. LED no. 2 from left lights up if no antenna is detected. LED no 4 from left indicates when the MES detect a carrier signal.
- What the handset display show during and after the dial-up attempt. When you attempt to log onto the MPDS system, the MES handset display will show the following text: "registering", "calling" and "CONNECTED" if the connection succeeded. If the handset display does not show any of these texts, then the problem is probably the communication between the MES and the PC, wrong version of antenna SW or that MPDS is not enabled in the MES.
- The time from the dial-up is initiated until a Windows 9x or Windows 2000 error message is displayed and the error number from it. If the interval is only a few seconds, this could indicate that:

1. The Mes and PC do not communicate properly. This could be due to a wrong setting of flowcontrol or baudrate.
2. No antenna or wrong antenna SW version is detected.
3. That MPDS in the MES is not enabled.

- After turning on the MES, observe the signal strength in the handset. This should be above 54dbHz, but in general as high as possible. Adjust the direction of the antenna for a stronger signal if it's below 54dbHz.

If the handset display show 'MPDS Mode Error ####', the #### is a number identifying the error or reason.

Here is a list of the most common reasons:

####	Explanation
0000	Unspecified. Typically this occur if the MES times out while registering. Please observe that the rightmost LED on the handset is turned on while the display say 'MPDS mode Registering'.
0001	Data connection released by SBS
0002	MES de-registered by SBS.
0003	MES rejected by SBS
0011	The Idle timer in the MES expired and the MES either de-registered or released the data connection.
0016	The maximum connection timer expired and the MES either de-registered or released the data connection.
0090	Satellite link was interrupted and the MES de-registered itself from the MPDS network.
0091	The MES did not find a opportunity to register with the MPDS network.
00F0	The MES did not get any response on its attempts to register with the MPDS network.
00F1	Data connection establishment did not succeed.

8 Configuration Software

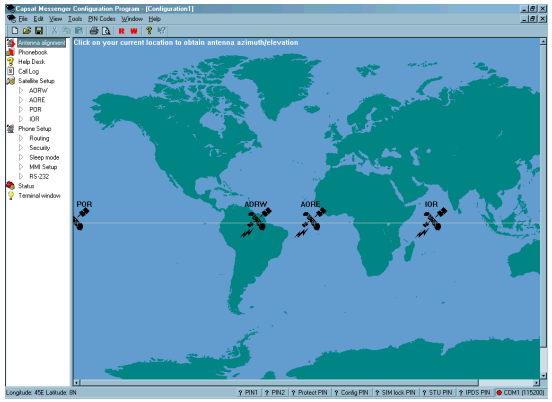
The PC Configuration Software requires a PC running either Windows 95/98, Windows NT or Windows 2000.

The Configuration software gives the possibility of configuring the terminal via your PC instead of using the handset menu system.

The Configuration software communicates with the terminal via the RS-232 interface.

The menu structure of the configuration software is similar to the menu-structure of the handset. Certain functions have been added to the program:

- An Antenna Alignment menu is available. By clicking at a geographical position on a world map azimuth/elevation is shown for the available satellites at that position.



- It is possible to save and open files with complete terminal configuration.
- It is possible to export the read call log, phone book and status information to text-files with tab-separated fields.
- It is possible to import a phone book, if the file format is the same as the export file format.
- By a single click it is possible to start Microsoft Exchange with a complete configuration file attached.

9 Technical Specifications

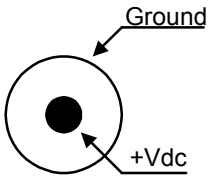
9.1 Interfaces

9.1.1 Antenna

Please observe that the antenna cable carries the RF-signals as well as power for the HPA/LNA front end situated in the antenna. The antenna cable may as maximum have a cable loss of 10 dB at 1.66 GHz and a DC resistance of maximum 0.7 Ohm.

9.1.2 DC input

The polarity of the DC connector is as follows:



Please observe that DC-input voltage should be within the rated input range *measured at this connector* under all conditions including at start-up in order for the equipment to function correctly. Low resistance leads should be used as the maximum power consumption could be as high as 65 Watts.

9.1.3 Handset interface

The pin out of the handset interface connector is as follows:

Pin no.	Pin Function	Signal Direction
1	+ earpiece	Output
2	- earpiece	Output
3	+ microphone	Input
4	- microphone	Input
5	+ 5 V	Output
6	GND	Input
7	Serial Data	Bidirectional
8	- Serial Data,	Bidirectional
9	Buzzer	Output
10	ⓘ key	Input

9.1.4 Analogue 2-wire interfaces

The pin out of the two 2-wire interfaces is as follows:

Pin no.	Pin Function	Signal Direction
1	Not used	—
2	Not used	—
3	Signal A (Ring)	Input / Output
4	Signal B (Tip)	Input / Output
5	Not used	—
6	Not used	—

9.1.5 ISDN

The pin out is as follows:

Pin no.	Pin Function	Signal Direction
1	Not used	—
2	Not used	—
3	RxP	Input
4	TxP	Output
5	TxN	Output
6	RxN	Input
7	Not used	—
8	Not used	—

9.1.6 RS-232 interface

The RS-232 is a DCE type of interface and the signals are as follows:

Pin Number	Pin Function	Signal Direction
1	DCD	Output
2	RXD	Output
3	TXD	Input
4	DTR	Input
5	Ground	—
6	DSR	Output
7	RTS	Input
8	CTS	Output
9	RI	Output

9.1.7 USB

To be written.

9.1.8 Audio input/output

To be written.

9.2 Specifications

General: Meets or exceeds current and proposed INMARSAT specifications for Inmarsat-phone spot-beam operation.

Antennas: Directional patch array antennas. Manually adjustable elevation setting. Foldable type 3008A, Big Dish type 3008B or Small Dish type 3008D depending on application.

Self tracking antenna: Mobile type 3008E.

Voice: 4.8 Kbps AMBE, 64 kbps broadcast.

Data Rates: 2.4 kbps, 56 kbps and 64 kbps.

Phone Interface: 2-wire 600Ω CCITT Rec. G.473, standard DTMF telephones, RJ-11 modular jack.

Fax Interface: 2-wire 600Ω CCITT Rec. G.473, T.30 Groups III Fax, RJ-11 modular jack.

Data Interface: Serial EIA compatible standard RS-232E, built-in Hayes compatible modem, up to 115 kbps, DB-9 female connector.

Euro ISDN Interface: ISDN NT1 S/T bus, ITU-T I.430, ISO 8877 compliant RJ 45 connector.

Audio Input: Phono connector, broadcast quality voice. Max. ratings: line 2.0 Vrms/5.6pp, Mic. 0.2Vrms/560mVpp Rin: 47Kohm.

Audio Output: Headphone stereo jack, 48 Ohm, Ø 3.5mm.

SIM Card Interface: Standard plug for user PID card, ISO-7816.

PCMCIA Interface: Type II, 3.3 volt, max 300 mA.

USB Interface: USB slave interface.

Power Consumption:
Rx Idle < 0.1 W from battery, < 0.8 W from DC-Input.
Tx active 40 W, average at high speed data operation (Max. 60 W).

Battery Capacity (NiMH):
2h broadcast quality voice,
4h Mini-M voice,
35 min. high speed data/fax or
2h Mini-M data/fax
70h standby.

Standard AC adapter: 90-264 VAC, 47-63 Hz, 90 W.

Ambient Temperature:
-25°C to +55°C operating.(Using NiCd –battery pack TT-3686D)
App. +5°C to +55°C operating.(Using NiMH –battery pack TT-3686C)
-40°C to +80°C storage.

Relative Humidity:
IME: 95% non-condensing at +40°C
EME: 100% condensing.

Vibration Survival:
Random 5-20 Hz 0.05 g^2/Hz, 20-150 Hz -3dB/Oct. (1.7g RMS).

Mechanical Shock: 20g/11ms half-sine.

G/T: -7 dB/K minimum.

EIRP:
Mini-M: 8-14 dBW in 2 dB steps.
HSD: 19-25 dBW in 2 dB steps.

Antenna Cable:
max. cable loss 10 dB at 1.66 GHz and 0.7Ω at DC.

Rx Freq. Band: 1525.0 - 1559.0 MHz.

Tx Freq. Band: 1626.5 - 1660.5 MHz.

Channel Spacing: 1.25 kHz.

Rx Modulation: 5.6 kbps O-QPSK, SCPC (voice, data, fax), 6 kbps BPSK - TDMA, 134.4 kbps 16QAM, SCPC (data).

Tx Modulation:
5.6 kbps O-QPSK, SCPC (voice, data, fax)
3 kbps BPSK – TDMA
134.4 kbps 16QAM, SCPC (data).

Dimension of Electronics Unit: HxWxD: 43mm x 205mm x 200mm

Weight of Electronics Unit: 1.7 kg (including battery and handset).

9.2.1 TT-3008A Foldable antenna

Type: Directional patch array antennas. Manually adjustable elevation setting

Connectors: 50 Ohm QLA/female

Transceiver Power Supply: 9.5 V - 20 VDC.

Power Consumption:
Rx Idle < 0.1 W from battery, < 0.8 W from DC-Input. Tx active 40 W, average at high speed data operation (Max. 60 W).

Ambient Temperature:
-25°C to +55°C operating.
-40°C to +80°C storage.

Relative Humidity:
IME: 95% non-condensing at +40°C
EME: 100% condensing.

Vibration Survival:
Random 5-20 Hz 0.05 g^2/Hz, 20-150 Hz -3dB/Oct. (1.7g RMS).

Mechanical Shock: 20g/11ms half-sine.

G/T: -7 dB/K minimum.

EIRP:
Mini-M: 8-14 dBW in 2 dB steps.
HSD: 19-25 dBW in 2 dB steps.

Dimension::
HxWxD Closed: 437mm x 271mm x 41mm
HxWxD Opened: 414.5mm x 753mm x 12mm

Weight: 3.5 Kg.

9.2.2 TT-3008B Big Dish antenna

Type: Flat Panel RHCP antenna. 5˚ to 90˚ marked manual elevation adjustment. Pole or wall mountable.

Connectors: 50 Ohm QLA/female

Transceiver Power Supply: 9.5 V - 20 VDC.

Power Consumption:
Rx Idle < 0.1 W from battery, < 0.8 W from DC-Input.
Tx active 35 W, average at high speed data operation (Max. 55 W).

Ambient Temperature:
-40°C to +80°C storage.
-25°C to +55°C operational.

Relative Humidity:
IME: 95% non-condensing at +40°C

Spray: Solid droplets from any direction.

Ice Survival: Up to 25mm of ice (non operational).

Rain: 50mm/h. with a wind of 55km/hr, droplets size between 0.5 to 4.5 mm.

Wind: 100Km/h (with frame secured).

Solar Radiation:
UV @ 54W/m^2
IR @ 500W/ m^2

Vibration Survival:
Random 5-20 Hz 0.05 g^2/Hz, 20-150 Hz -3dB/Oct. (1.7g RMS).

Mechanical Shock: 20g/11ms half-sine.

G/T: -7 dB/K minimum.

EIRP:
Mini-M: 8-14 dBW in 2 dB steps.
HSD: 19-25 dBW in 2 dB steps.

Dimension:
HxWxD Closed: 558mm x 550mm x 63mm
HxWxD Opened: 576mm x 570mm x 558mm

Weight: 3.5 Kg.

9.2.3 TT-3008D Small Dish antenna

Type: Compact Flat Panel RHCP antenna. Transceiver fits within the antenna mounting frame.

Connectors: 50 Ohm TNC/female

Transceiver Power Supply: 9.5 V - 20 VDC.

Power Consumption:
Rx Idle < 0.1 W from battery, < 0.8 W from DC-Input.
Tx active Max. 55 W

Ambient Temperature:
-40°C to +80°C storage.
-35°C to +55°C operational.
Relative Humidity: IME: 95% non-condensing at +40°C

Spray: Solid droplets from any direction.

Salt spray corrosion: Coastal conditions.

Ice Survival: Up to 25mm of ice (non operational).

Rain: 50mm/h. with a wind of 55km/hr, droplets size between 0.5 to 4.5 mm.

Wind: 180Km/h. Pole mount (operation).

Solar Radiation:
UV @ 54W/m^2
IR @ 500W/ m^2

Vibration Survival:
Random 5-20 Hz 0.05 g^2/Hz, 20-150 Hz -3dB/Oct. (1.7g RMS).

Vibrations Operational:
Random 5-20 Hz 0.02 g^2/Hz, 20-150 Hz -3dB/Oct. (1.05g RMS)

Mechanical Shock: 20g/11ms half-sine.

G/T: -7 dB/K minimum.

Transmit EIRP:
25 to 19 dbW (16QAM)
14 to 8 dbW (OQPSK)
14 dbW (BPSK)

EIRP stability: within 1 db of nominal

Dimension :
HxWxD Opened: 87mm x 397mm x 397mm

Weight: 3.65 Kg

9.2.4 TT-3008E Land Mobile antenna

Type: Sensor stabilised platform with directional RHCP antenna. No cable unwrap.

Connectors: 50 Ohm TNC/female

Power Supply: 9-32V input range, 15V output for TT-3038A, 35V output for TT-3008E.

Power Consumption:
Rx Idle < 0.1 W from battery, < 0.8 W from DC-Input.
Tx active Max. 103 W

Ambient Temperature:
-25°C to +55°C operating.
-40°C to +80°C storage (Power on).

Relative Humidity:
IME: 95% non-condensing at +40°C

Spray: Solid droplets from any direction.

Ice Survival: Up to 25mm of ice.

Rain: Up to 50mm/h.

Wind: 200Km/h relative wind speed (operation).

Vibration Survival:
Random 5-20 Hz 0.05 g^2/Hz, 20-150 Hz -3dB/Oct. (1.7g RMS).

Vibrations Operational:
Random 5-20 Hz 0.02 g^2/Hz, 20-150 Hz -3dB/Oct. (1.05g RMS)

Mechanical Shock: 20g/11ms half-sine.

Vehicle motion:
Turning rate: 40 deg/s.
Turning acceleration: 50 deg/s^2
Induced acceleration: 0.5g.
Tilting rate: 30 deg/s.
Tilting acceleration: 100 deg/s^2
Coverage limits: 5-80 deg, 360 deg azimuth. (No cable unwrap)
Pitch/Roll: 5 deg past coverage limits.

G/T: -7 dB/K minimum.

EIRP:
Mini-M: 8-14 dBW in 2 dB steps.
HSD: 19-25 dBW in 2 dB steps.

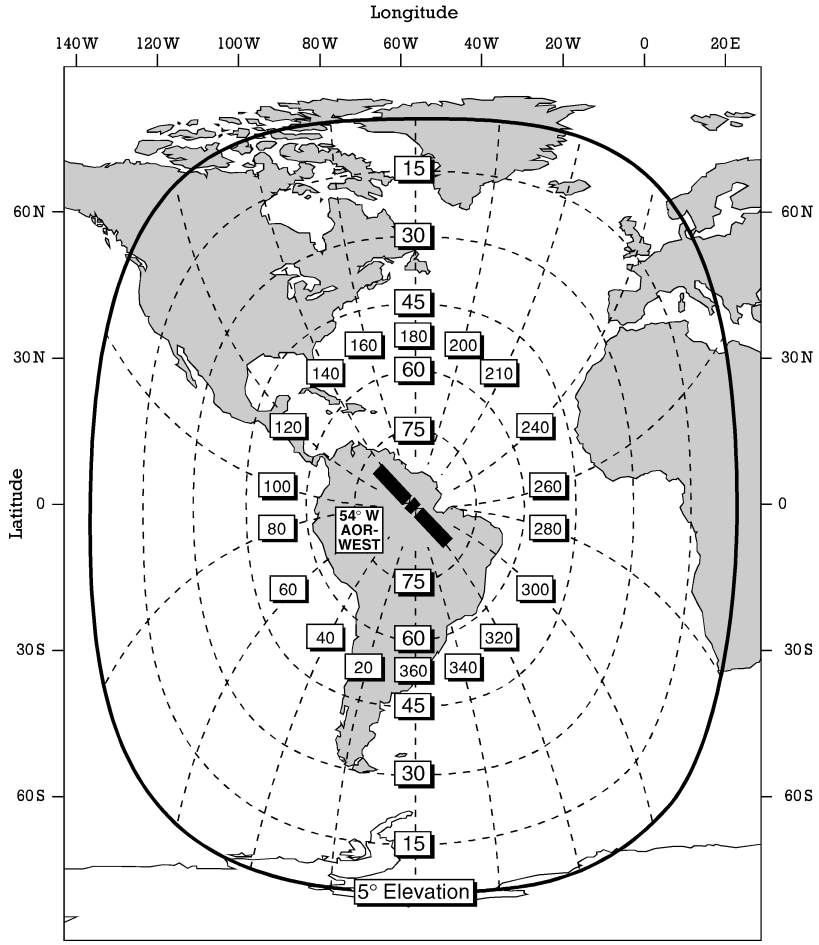
Dimension:
HxD: 400mm x 650mm

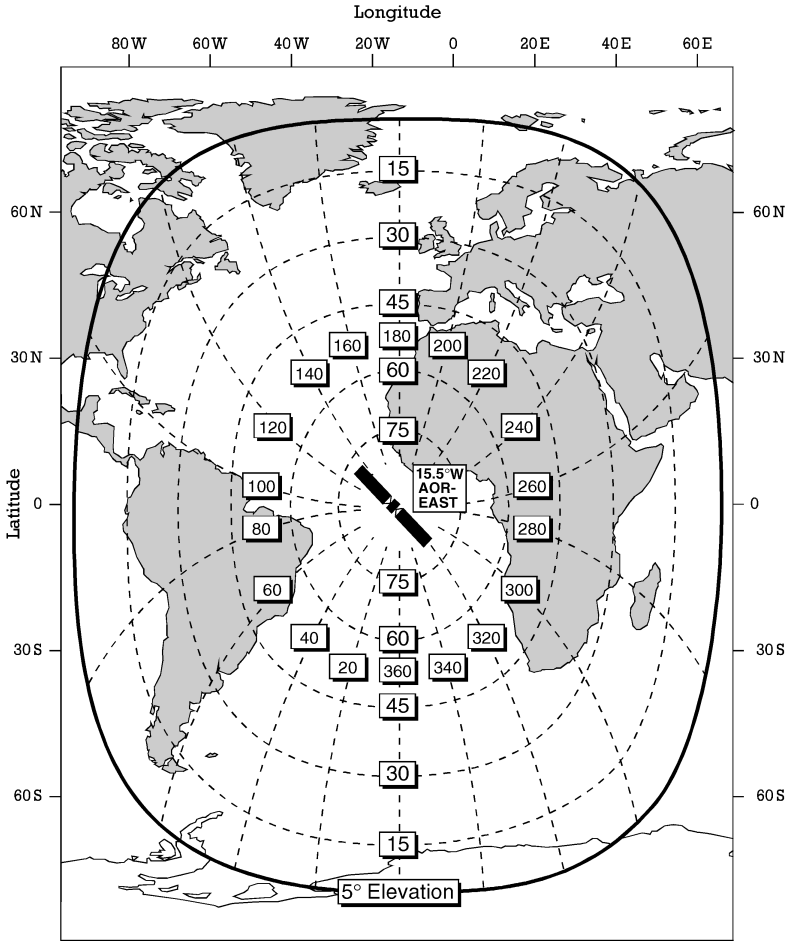
Weight: 12 Kg.

Power supply TT-3682N Dimensions.
HxWxD: 164mm x 285mm x 50mm

Weight of TT-3682N: 1,35 Kg.

10 Azimuth and Elevation

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80W
60W
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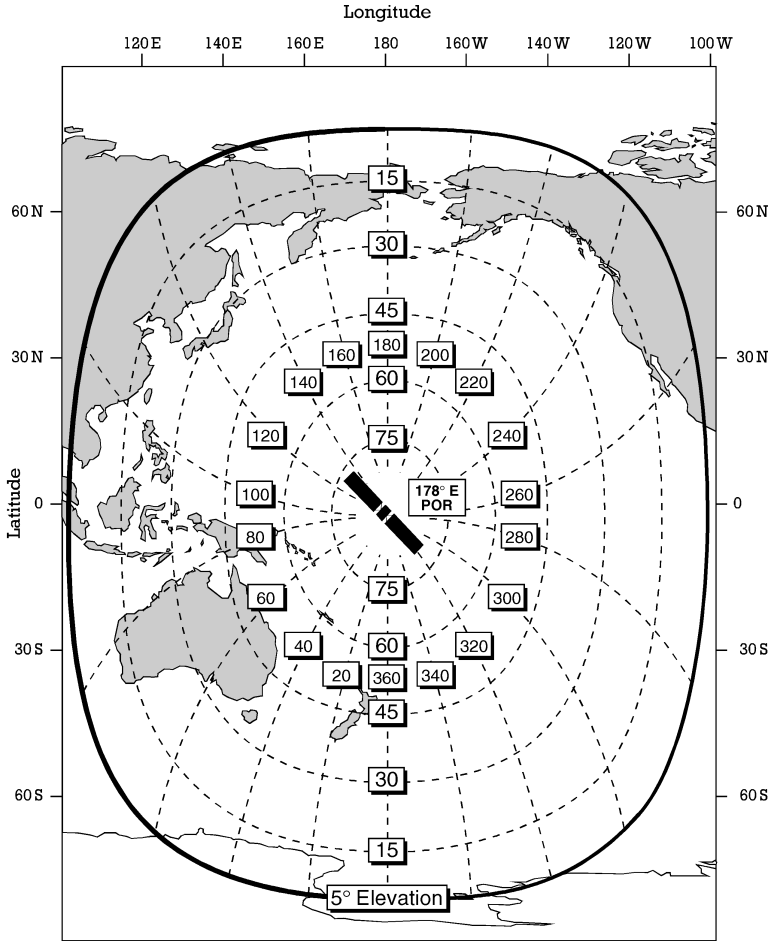
15.5°W
AOR-
EAST
5° Elevation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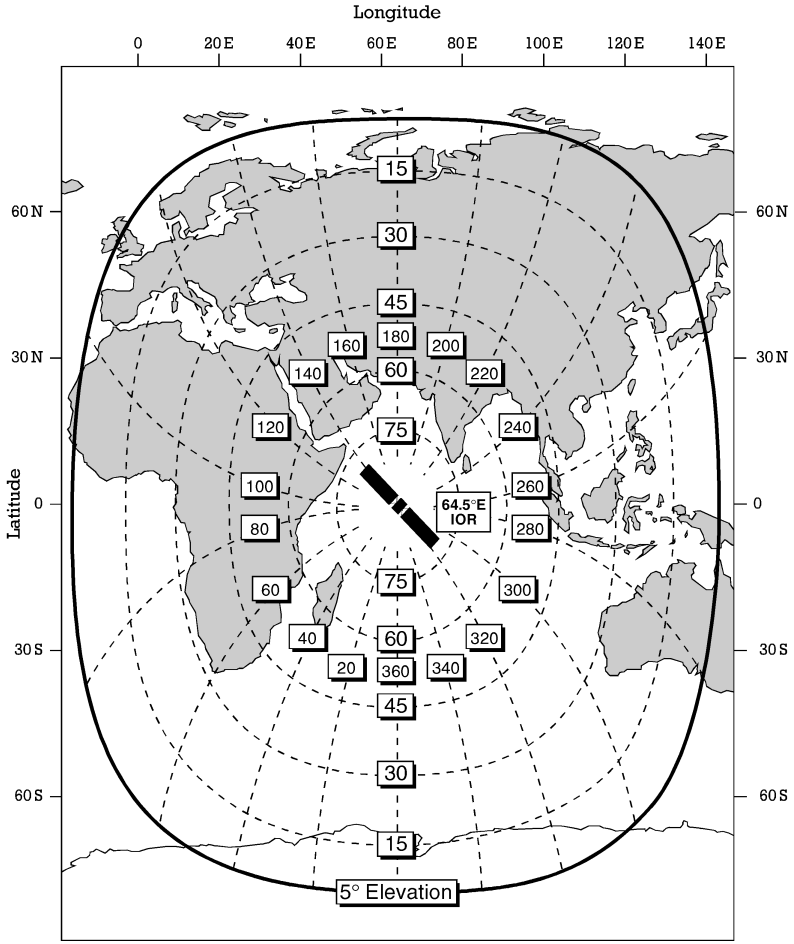
Longitude
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5° Elevation