Thrane & Thrane A/S

TT-5000 Aero-I System
User Manual

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2 INTRODUCTION

The TT-5000 Aero-I is a three-channel Satcom system. The channels comprise 2 voice/fax/PC-modem data channels and 1 text mode data channel. The latter is assigned for a Communication Management Unit (CMU), for instance interfaced to a Universal Avionics UniLink™ System.

The Aero-I (also known as an Airborne Earth Station or AES) exchange data with Ground Earth Stations (GESs) located all over the globe. The data exchange is made possible using Inmarsat Service Providers (ISPs), that are working with the International Maritime Satellite Organization (INMARSAT).

2.1 System Capabilities

The TT-5000 Aero-I is designed to operate on both INMARSAT Global Beam and Spot Beam satellites, utilizing advanced communication technologies. The Aero-I utilizes the INMARSAT defined Spot Beams for voice and data services (2400 bits per second (BPS)), and Global Beams for low speed text data services (600 and 1200 BPS).

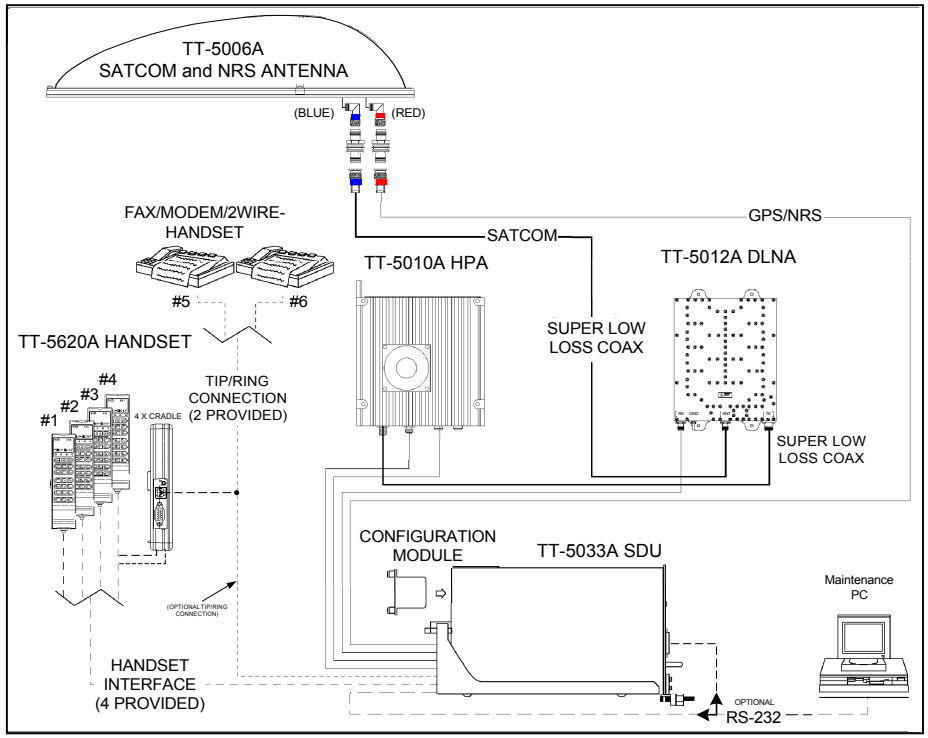
The INMARSAT Aero-I system is an evolution of the existing Satcom system. Summarized the improved Aero-I features are:

- Smaller Satcom antennas
- Significant reduction of system size and weight
- Reduction of input power
- Reduction of heat generation
- Increased number of voice channels on the satellite link
- Built-in Cabin Telecommunications Unit (CTU).

The user has a choice of three types of SATCOM antenna; two are mechanically steered while the third is electronically steered. As an option, a Navigational Reference System (NRS) may be included to enable the TT-5000 Aero-I to be operated independently of the aircraft's Inertial Reference Systems (IRS). The TT-5620A handset includes a built-in Liquid Crystal Display (LCD) for operational and diagnostic readout.

The Aero-I system can be interfaced with a PC, for operational and diagnostic readout as well as configuration setup. The TT-5000 Aero-I can also interface with a MagnaStar® telephone system, using two MagnaStar® Analog Interface Units (AIUs), to provide both Satcom and VHF communications.

Example of TT-5000 Aero-I System Components



2.2 System Features

By utilizing the latest technology, the TT-5000 Aero-I system provides a complete multiple channel SATCOM solution that offers the following key features:

- Simultaneous three channel system, two voice/fax/modem data channels and one text mode data channel
- Compact and lightweight system.
- Low power consumption (28VDC power typically uses 2 amps in Receive mode and 4.3 amps in Transmit mode).
- Designed to support up to 4 Full Feature Handsets and two Tip/Ring connections for Fax/Auxiliary Handset/PC-modem.
- Stand-alone operational with Navigational Reference System (NRS) option installed.
- Primary and secondary IRS input available by ARINC 429.
- Provides self-test and diagnostics (BITE).
- Menu driven user interface.
- 2 phonebooks: One private and one public stored editable phone book which provide storage for up to 99 phone numbers each.
- Local handset to handset calling.
- Call transfer and conference call capabilities.
- Last number(s) re-dial.
- Custom configurable logon, call restriction, and security access levels.
- A 'speed dial' feature that enables the user to dial any number stored in the electronic phone book with only two keystrokes.

2.3 The Inmarsat Aeronautical System

TT-5000 Aero-I Satellite Communication System provides multi-channel voice, fax, and data via the Inmarsat satellites. (Figure 1)

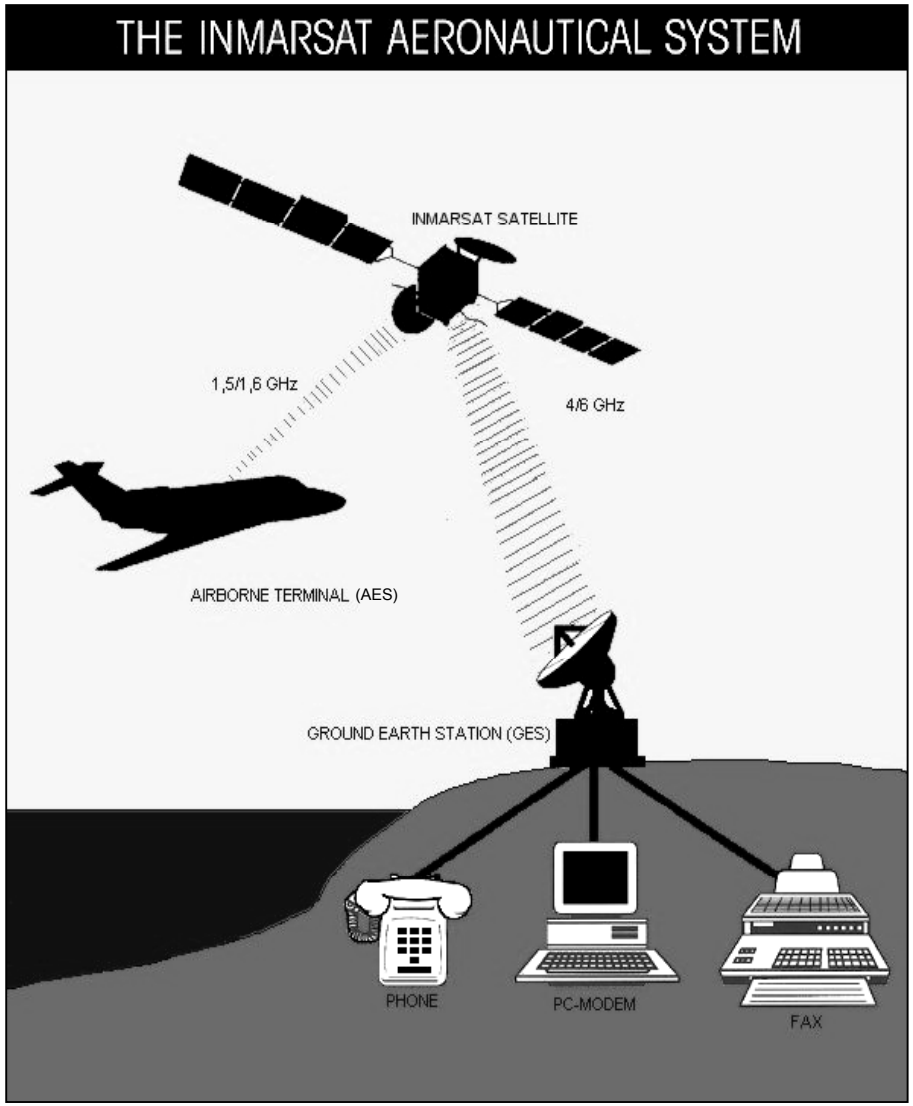


Figure 1

2.4 Common Used Terms & Abbreviations

Terms	Description
AERO-I	Aeronautical Service From INMARSAT Type I
AES	Aircraft Earth station
AIU	Analog Interface Unit (with Magnastar Handset)
Auxiliary Handset	2-wire TT handset without LCD display
BITE	Built-in Test Equipment
CMU	Communication Management Unit
CTU	Built-in Cabin Telecommunications Unit
DC	Direct Current
FM	Frequency Modulation
FMS	Flight management System
Full Feature Handset	4-wire TT handset with LCD display
GES	Ground Earth Station
Inmarsat	International Maritime Satellite Organization
IRS	Inertial Reference System
ISP	Inmarsat Service Provider
LCD	Liquid Crystal Display
LED	Light Emitting Diode
NC	Not Connected
NRS	Navigational Reference System
SATCOM	Satellite Communications
SDU	Satellite Data Unit
Text Mode Data	Data 2
TT	Thrane & Thrane
VHF	Very High Frequency

NOTE:

See also Appendix 10.1: Terms & Abbreviations.

Bite Error/warning definition:

BITE Warning:

Defined error level for a failure leading to system operational but some of the services might show minor reduced performances.

BITE Error:

Defined error level for a failure leading to system not operational or some of the services might be unavailable or show noticeable reduced performances.

NOTE:

BITE Error/Warning Codes are listed in Appendix 10.5.

Terms Definition:

Text mode:

Service availability definition for the AES, when the AES is logged on as Class 4, packet mode data only. This situation commonly occurs when the AES is outside spot beam coverage.

Circuit Mode:

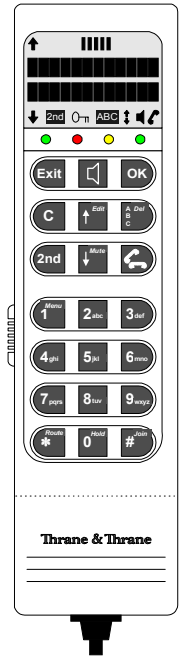
Service availability definition for the AES, when the AES is logged on as Class2, circuit mode only. It occurs commonly when an AES or GES is not designed to support packet data.

3 HANDSET CONTROLS & FUNCTIONS

3.1 Full Feature Handset (TT-5620A)

The TT-5000 Aero-I System uses the TT-5620A Full feature Handset as the main user interface. The TT-5620A handset contains a keypad with 21 separate function keys, a 2 x 12 character Liquid Crystal Display (LCD), four indicators Light Emitting Diodes (LEDs) and a volume control. The handset allows the user to:

- Navigate the User Menu.
- Place and receive calls.
- Call Handoff, transfer calls.
- Save and Recall phone book entries.
- Configure system parameters (password protected).
- Monitor system operations.
- View system errors as they occur.

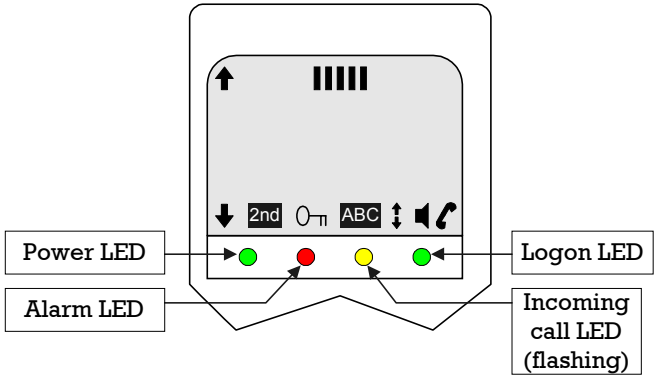


TT-5620A Full Feature Handset

3.2 Handset LED Indicators

The handset uses colored LEDs as indicators. These LEDs alert the user of the following indications (displayed from left to right respectively):

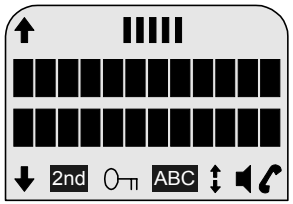
LED	Color	Definition
Power:	Green	When On indicates power to handset.
Alarm:	Red	Lights when error has occurred in the system.
Incoming Call	Amber	The LED will flash when a call is received.
Logon:	Green	System is logged on to satellite network. Calls can only be obtained when this LED is lit.



TT-5620A Aero-I Handset Display and LED's

3.3 Handset Display

The handset uses a LCD to display all data. The LCD is a 2 x 12 character alphanumeric display. Additionally, the LCD will display various operational symbols.



3.4 Handset Key Functions

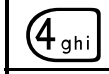
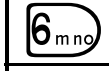
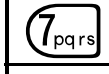
The handset keypad consists of 21 keys (12 numeric, and 9 function keys). These keys are designed to perform multiple functions, which are dependent on the selected mode.

The handset has three modes that determine the function of the keys:

- **Normal Mode**: Keys perform their primary functions.
- **Alpha Mode**: Keys perform alphanumeric functions.
- **2nd Mode**: Keys perform their alternate functions.

The following table lists all keys and defines their functions:

KEY	MODE		
	Normal	**Alpha** ABC	2nd 2nd
Exit	Exit present Menu/Cancel selection		
	Toggle Cradle/Handset Speaker.		
OK	Accept selection		Access User Menu
C Ins	Delete/Back space Delete Display (Hold 2 Seconds)		Insert entry
Edit	Move one selection up		Edit entry
A B C Del	Enable Alpha Mode	Disable Alpha Mode	Delete entry
2nd	Enable 2nd Mode	Enable 2nd Mode	Disable 2nd Mode
Mute	Move one selection down		Mute
	Toggle Hook	Toggle Hook	Toggle Hook
1 Menu	1	- ? ! , . : " ' $ ( ) + / 1	Access User Menu
2 abc	2	A B C 2	

	3	D E F 3	
	4	G H I 4	
	5	J K L 5	
	6	M N O 6	
	7	P Q R S 7	
	8	T U V 8	
	9	W X Y Z 9	
	*		Transfer call to specified handset
	0	<Space>	Places call on hold
	#		Joins other handsets to call

3.5 Handset Display Symbols

The handset display uses 9 display symbols to indicate operating status. The following table lists all display symbols and defines their meaning:

Symbol	Name	Description
	More Entries Above	Indicates that additional entries are available above and can be displayed by pressing the ↑ Edit key.
	Number of Callers on Hold	Each bar represents a caller on Hold, i.e., 3 bars represents 3 callers currently on Hold.
	More Entries Below	Indicates that additional entries are available below and can be displayed by pressing the ↓ Mute key.
	2nd Mode	Indicates that the 2nd key was pressed and that the 2nd mode is active. The next key pressed will perform its alternate function.
	Security Enabled	Indicates that the handset has been Locked and can only be accessed by entering a valid PinCode.
	Alpha Mode	Indicates that the ABC Del key was pressed and that the Alpha mode is active. The next key pressed will perform its Alpha Mode function.
	Toggle Field	Indicates that pressing ↑ Edit or ↓ Mute will toggle the current selection displayed to its alternate display(s).
	Speaker On	Indicates that the speaker in the handset's cradle is on.
	Handset Active	Indicates that the phone is activated to answer or place a call.

3.6 Auxiliary Handset Functions & Controls.

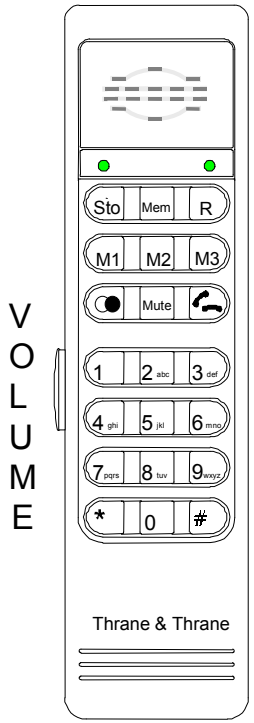
This Chapter describes the TT-5621B Auxiliary Handset. The Auxiliary handset provides an optional interface for voice calls used together with the TT-5000 Aero-I System.

Operations

This section will briefly introduce the TT-5621B Auxiliary Handsets operations.

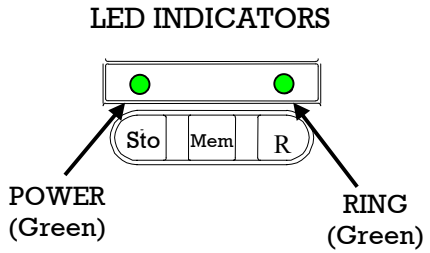
Operating the Auxiliary Handset is much the same as making direct international telephone calls from an ordinary telephone.

The Auxiliary Handset (Figure 2) contains LED indicators, keypad, microphone, earpiece and ringer with adjustable volume.



The Auxiliary Handset (Figure 2)

3.7 Auxiliary Handset LED Indicators



NAME	COLOUR	DESCRIPTION
POWER	GREEN	Lights steadily when the Auxiliary Handset is Off-hook.
RING	GREEN	Flashes green when ringing. Lights Off during call or standby.

3.8 Auxiliary Handset Keypad Functions

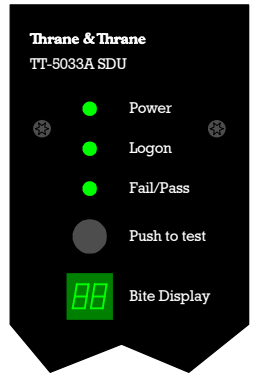
The keys on the keypad have single functions.

KEY	NORMAL MODE	ALPHA
STO	Storage	
MEM	Memory	
R	Transfer call	
M1	Memory Location 1	
M2	Memory Location 2	
M3	Memory Location 3	
	Last Number Redial	
Mute	Microphone Mute	
	Toggle Hook	
1	1	- ? ! , . : " ' $ ( ) + / 1
2 abc	2	A B C 2
3 def	3	D E F 3
4 ghi	4	G H I 4
5 jkl	5	J K L 5
6 mno	6	M N O 6
7 pqrs	7	P Q R S 7
8 tuv	8	T U V 8
9 wxyz	9	W X Y Z 9
*	*	
0	0	
#	#	

3.9 SDU Front Panel Indicators

The TT-5033A SDU (Satellite Data Unit) has one display and three LED's. The SDU front panel LED indicators and display are used in conjunction with the handset display and indicators to inform the user of system status.

LED	Color	Definition
Power LED:	Green	When On indicates power to system.
Logon LED:	Red	Acquired a communication satellite.
	Amber	System synchronizing with satellite.
	Green	Synchronized and logged on to satellite network.
Fail/Pass LED:	Red	POST/PAST/CM test parameter fail.
	Green	POST/PAST/CM test parameter pass.



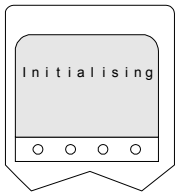
SDU Front Panel

The BITE Display on the front panel of the SDU is a two-digit numeric display. If a system Error/Warning occurs, a BITE code will be displayed. If the system is Error/Warning free the display on the SDU will finish the logon procedure by shortly placing 00 in the BITE display.

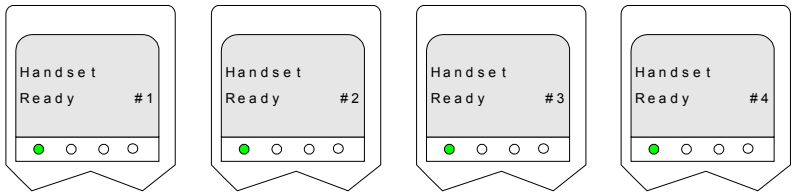
4 SATCOM OPERATION

This section will outline the necessary information and user menu options needed for setup, monitoring, and operation of the Aero-I system by the user.

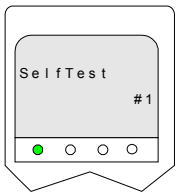
When the Aero-I system is powered-up, all handsets will show "Initialising."



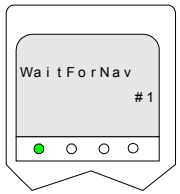
After the handset is initialised and for 3 seconds, each handset will display "Ready" and the corresponding handset number (in this case #1 to #4).



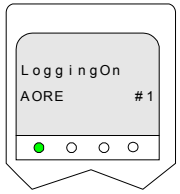
Then the system status is displayed. During a normal startup sequence, the Power On Self Test (POST) is executed and all handsets will show "SelfTest" until POST is accomplished.



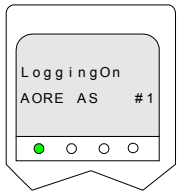
When a successful POST is accomplished, the system will search for navigation data and all handsets will display "WaitForNav" until data is available.



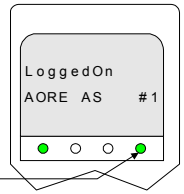
When navigation data is available the system starts searching for the satellite. While searching, all handsets will display "LoggingOn" and the corresponding satellite region_code (In this case Atlantic Ocean Region East (AORE)).



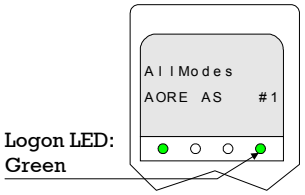
Satellite logon is now accomplished and the system starts requesting for logon with the Ground Earth Station (GES), in this case Aussaguel (AS).
While requesting for logon, all handsets will display the Satellite_region_code and the Ground Earth Station code.



When the system is logged on to the satellite and the GES, all handsets will display "LoggedOn" and the corresponding region code and GES_code.



After 3 seconds the system changes from LoggedOn to the Services available display (in this case "AllModes").



Services available

Services available are displayed as the default information when the Aero-I system is logged on.

Class	Services displayed	Pack data	Voice	Fax	Modem data
2	CircuitMode	Unavailable	Available	Available	Available
3	AllModes	Available	Available	Available	Available
4	TextOnlyMode	Available	Unavailable	Unavailable	Unavailable

List of Satellite name, Satellite Id, and Region code.

Satellite Name	Inmarsat Abbreviation	Satellite Id
Atlantic Ocean Region West	AORW	00
Atlantic Ocean Region East	AORE	01
Pacific Ocean Region	POR	02
Indian Ocean Region	IOR	03

List of GES (Ground Earth Stations).

Region Code	Sat Id	GES Id (decimal)	SatGes Code	Ges Code	GES_name
AORW	00	001	GHW	GH	Goonhilly **
AORW	00	002	SBW	SB	Southbury *
AORW	00	004	EKW	EK	Eik *
AORW	00	005	ASW	AS	Aussaguel *
AORE	01	065	GHE	GH	Goonhilly **
AORE	01	067	ASE	AS	Aussaguel *
AORE	01	068	EKE	EK	Eik *
AORE	01	069	FCE	FC	Fucino
POR	02	129	STP	ST	Sentosa
POR	02	130	SPP	SP	Santa Paula *
POR	02	131	YMP	YM	Yamaguchi
POR	02	133	PHP	PH	Perth *
IOR	03	193	EKI	EK	Eik *
IOR	03	194	NBI	NB	Nonthaburi
IOR	03	197	PHI	PH	Perth *
IOR	03	198	YMI	YM	Yamaguchi
IOR	03	200	STI	ST	Sentosa
IOR	03	202	FCI	FC	Fucino

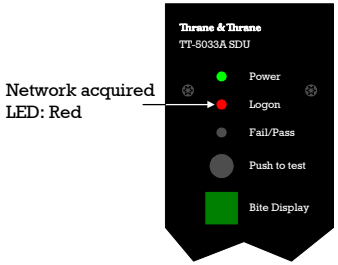
NOTE: * Ground Earth Station's currently supporting the AERO-I Service.

NOTE: ** Planned for 2002.

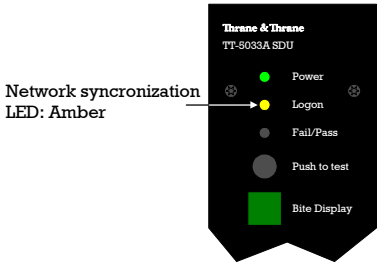
Logon

The Logon LED on the front panel of the SDU will illuminate in three different colors (Red, Amber, and Green). The colors represent different stages of the logon process.

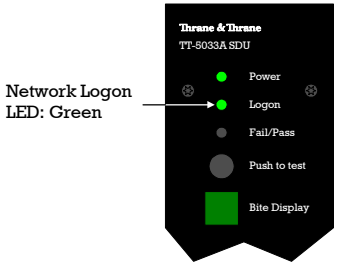
Acquired a network satellite: **Red**



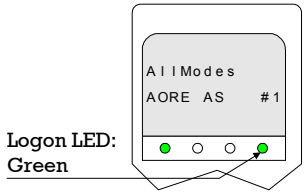
Synchronizing with a network satellite: **Amber**



Logged onto satellite network: **Green**



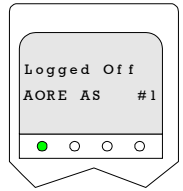
Once the system has logged onto the satellite network the SDU Logon LED and the handset logon LED illuminates green.



The Aero-I system is now able to initiate and receive calls.

Logged off

With Logon Policy set to Auto and no restrictions from Service provider, then "logged off" is only displayed when Aero-I system changes from one satellite Region to another.



Call management during handover

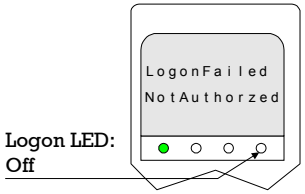
Logon Handover: from one spot to another spot on the same satellite:
If a call is on during a spot to spot handover, the call will remain a maximum of 10 minutes. After this time if the call is still on it will be rejected and a logon renewal to the new spot will be performed. During this time a new call can be performed with no time limitation on the new spot.

Satellite handover: If a call is on during satellite to satellite handover, the call will remain on a maximum of 3 minutes. During this time no other call will be accepted. After this time if the call is still on it will be rejected and the AES will logon to the new satellite.

Logon reject.

If a logon is rejected, the cause of the rejection is displayed as plain text in the handset. Logon reject is caused by a failure in the satellite network, and should not be mistaken for BITE Error/Warning codes.

In this example the Logon is rejected because of missing Aero-I authorization.



NOTE: Cause Codes are listed in Appendix 10.6.

4.1 Pre-Operational Requirements

- **BITE (Built In Test Equipment)**

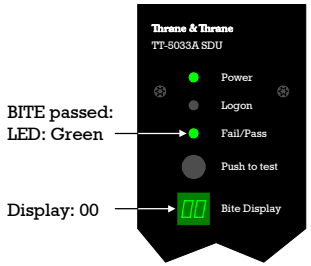
After the Aero-I System is powered up and initialized, the system runs a BITE test which checks predetermined system parameters. During operation the system also monitors essential operational parameters.

When the system is initialized and the BITE test is in progress the Fail/Pass LED on the SDU front panel will flash Green until all system parameters is passed. If all system parameters are passed, the Fail/Pass LED will illuminate Green and the BITE Display will show "00".

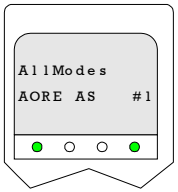
Now the system enters Continuous Monitoring mode (CM-mode).

CM-mode will monitor the system for specific Errors/Warnings.

BITE Display .

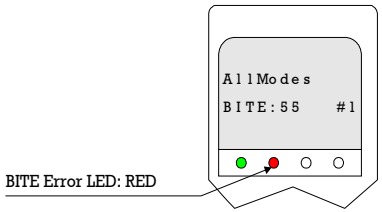


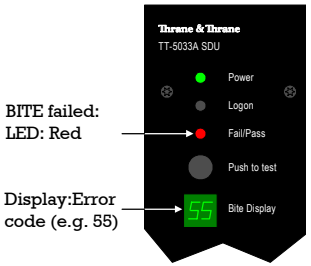
The handset will display.



If an Error/Warning is detected, the Fail/Pass LED in the front of the SDU illuminates Red and the BITE Display will show a BITE Error/Warning Code. The handset Alarm- LED will illuminate Red and the BITE Error/Warning Code will be shown in the display. If the system detects more than one Error/Warning, the BITE display of the SDU and the LCD of the handset toggles between the BITE Error/Warning Codes.

In this example "BITE Error Code 55" (IRS 2 unavailable) appears.

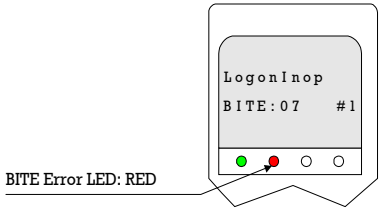




Once the error is corrected, the CM BITE Error/Warning will disappear.

If a BITE Error/Warning occurs during the **BITE Test**, logon could be impossible.

In this example "BITE Error Code 7" appears.



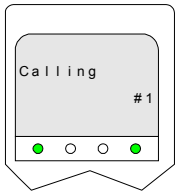
Once the Error/Warning is corrected press the Push To Test button on the front panel of the SDU to reset the Aero-I system. When the system is reset, a new BITE test will verify if the Error/Warning has been cleared.

Making an outgoing call.

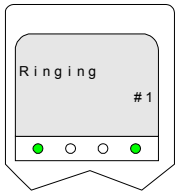
Before initiate or receive a call, the user must verify that the Aero-I system is logged onto the satellite network with "AllModes" or "CircuitMode."

Once the system is logged on to the satellite, an outgoing call can be placed.

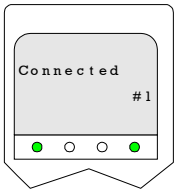
The time from initiation of an outgoing call until the ringing tone appears, will be displayed as "Calling" in the handset. .



Time from ringing tone to the call is released will be displayed as "Ringing."

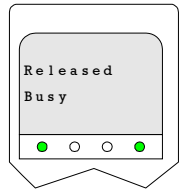


Time from call is released to call is terminated will be displayed as "Connected."



Rejected calls

If a call is rejected, the cause of the rejection is displayed for 3 sec. as plain text in the handset (e.g. “Busy”).



4.2 PinCodes

The Aero-I system utilizes a three level PinCode system. PinCode 1 represents a system access PinCode, PinCode 2 is the Super User code, and the Config PinCode is for configuration. For normal usage and operation you will only need PinCode 1.

PinCode 1 is used to control general access to the system. If PinCode 1 is enabled, the user will be prompted to enter PinCode1 when attempting to use the system after reset or power up, and the system can not be used before PinCode 1 is entered.

PinCode 2 is used to control access to "Super User" menu, from where access are controlled to:

- "Free dial"
- "Phone book dial"
- "Private Phone Book dial"
- "Allowed numbers”

If the “Super User” limits some of the features above the “Super User” must enter PinCode 2 to change the features.

Config PinCode is used to get access to the system configuration, such as handset setup and satellite selection/configuration.

The 3 factory PinCode can be expanded with 3 personal user codes; in this case both the user and factory codes will work.

PinCode 1 and PinCode 2 can be disabled, whereas Config Pin only can be changed to another 4 digit Config PinCode.

NOTE: If PinCode 2 is disabled, the user still needs to enter PinCode 2 to get access to PinCode 2 protected menus. However, PinCode 2 will be accepted by just pressing: OK

UNLOCK PHONE (the display shows the 🔑 symbol)		
Comment	Press Keys	Display readings
Power-up the system		AllModes AORE AS #1 🔑
Select PinCode menu	OK or 2nd 1 Menu	Pincode 1 Pincode 2
Select PinCode 1	OK	Enter Pin 1
Enter the 6 digit factory PinCode 1 or enter the 4 to 6 digit user PinCode 1	Press "4 - 6 digit code"	Enter Pin 1 ******
If accepted display will read:	OK	Pincode Accepted
If not accepted display will read:	OK	Pincode Incorrect

LOCK PHONE		
Comment	Press Keys	Display readings
1. Enter Access Main Menu	2nd 1 Menu	Phn Book Pvt Book
2. Scroll Down to <Pin setup>	Mute	Hndset Setup Pin Setup
3. Select Pin setup <Pin setup>	OK	Pincode 1 Pincode 2
4.Scroll Down to Lock Phone	Mute	Config Pin Lock Phone
5. and complete "lock" command	OK	Phone Locked

When the "Lock Phone" command has been issued, all three PinCodes becomes active again, i.e. the PinCodes must be entered again, in order to get system access.

HOW TO ENTER FACTORY OR PERSONAL USER PINCODE		
Comment	Press Keys	Display readings
Enter Access Main Menu	2nd 1 Menu	Phn Book Pvt Book
Scroll Down to <Pin Setup>	Mute	Hndset Setup Pin Setup
Select Pin setup <Pin Setup>	OK	Pincode 1 Pincode 2
<Pin Setup> has four options: PinCode 1 PinCode 2 Config pin Lock Phone Each PinCode is different and allows access to different portions of the User Menu. For this example PinCode 1 is used.		
Scroll to desired menu option	Edit or Mute	Pincode 1 Pincode 2
Select Pin setup option	OK	Enter Pin 1
Enter the six digit PinCode	Press "4 - 6 digit code"	Enter Pin 1 ******
And complete code entering. If accepted display will read:	OK	Pincode Accepted
If not accepted display will read:	OK	Pincode Incorrect

HOW TO ENTER OR CHANGE PERSONAL USER PINCODE		
Comment	Press Keys	Display readings
1. Enter Access Main Menu	2nd 1 Menu	Phn Book Pvt Book
2. Scroll Down to <Pin setup>	Mute	Hndset Setup Pin Setup
3. Select Pin setup <Pin setup>	OK	Pincode 1 Pincode 2
4. Select PinCode1, PinCode2 or Config Pin(scroll down)	Mute	
5. Edit PinCode (e.g. PinCode 1)	2nd Edit	Enter Pin 1
6. Enter the 6 digit factory code or the 4 to 6 digit user code	Press "4 - 6 digit code"	Enter Pin 1 ******
7. and complete code entering	OK	New Pincode
8. Enter new 4 - 6 digit user code	Press "4 - 6 digit code"	New Pincode ******
9. and complete code entering	OK	Reenter Pin
10. Reenter new 4 - 6 digit user code	Press "4 - 6 digit code"	Reenter Pin ******
11. and complete code entering	OK	Pincode Updated

HOW TO DISABLE PINCODE 1 or 2:		
Comment	Press Keys	Display readings
1. Repeat step 1 to 7 from previous page		New Pincode
2. Enter new code, use 4 zeros	0 0 0 0	New Pincode ****
3. Complete code entering	OK	Reenter Pin
4. Reenter new code, use 4 zeros	0 0 0 0	Reenter Pin ****
5. Complete code entering If accepted display will read:	OK	Pincode Updated
If not accepted display will read:	OK	Pincode Unalike

PinCode 1 disabled: The user needs not to enter PinCode 1 to get access.
PinCode 2 disabled: The PinCode 2 must be entered, but the PinCode is accepted by just pressing: OK

5 OPERATION

This section contains information on different types of calls and procedures for dialing and completing calls. The TT-5000 Aero-I System can complete four types of telephone calls:

Short code, Handset-to-handset, Conference call and Last number redial. These are described in section "System features".

Additional features are:

- Air to ground voice/fax/data
- Ground to Air Calls voice/fax/data

5.1 System Features

The following procedures describe Aero-I System features and instructions for initiating calls using these features.

- **Short Code (Speed Dialing)**

  The Public and the Private Phone book holds each up to 99 phone numbers and addresses, numbered with a Short Code from 1 to 99. The phone numbers can be accessed from the relevant phone book, using the Short Codes

  To recall a number from the:
  Public Phone book Press Route then one/two-digit code
  Private Phone book Press Route Route then one/two-digit code
  View the Phone book selection Press OK
  Initiate a call using the selection Press OK or ☎ or #Join

- **Handset to Handset calling (intercom)**

The Aero-I System features Handset to Handset calling, which allows a call to be initiated between two handsets. The most important thing to remember about handset to handset calls, is the handset number.

HANDSET	NUMBER and KEY
Handset #1 (Full Feature)	1 (1 Menu) (# Join)
Handset #2 (Full Feature)	2 (2 abc) (# Join)
Handset #3 (Full Feature	3 (3 def) (# Join)
Handset #4 (Full Feature)	4 (4 ghi) (# Join)
Fax/Data/Auxiliary handset #5	5 (5 jkl) (# Join)
Fax/Data/Auxiliary handset #6	6 (6 mno) (# Join)
To initiate a call to all handsets: Press (* Route) (* Route) (0 Hold _) (# Join)	

Example

To call Handset #2 from Handset #1:

Dial Handset #2 short code Press (2 abc)

Initiate call Press (# Join)

To Call Fax/Data/Auxiliary handset #6 from Handset #1:

Dial Fax/Data/Auxiliary handset #6 short code Press (6 mno)

Initiate Call Press (# Join)

- **Conference Call**

The Aero-I System features a Conference Call function that allows an incoming call, the handset the call was placed to, and another handset to be joined. In the following example Handset #1 is used.

Conference Call Setup:

An incoming call is received on handset #1.

Establish a connection by pressing [↩] or removing the Handset from the Cradle.

Place the Call on Hold	Press [2nd] [0 Hold]
Dial the desired handset short code	Press [2 abc]
Initiate Handset to Handset call	Press [# Join]

Now the Incoming call is on Hold and there is an active Handset to Handset call between handset #1 and Handset #2.

To join all three calls	Press [2nd] [# Join]

Call Handoff

Call Handoff is like call transfer on a standard telephone. It is possible to receive a call on a handset and transfer the call to the other handset. In the following example Handset #1 is used.

Call Handoff Setup:

An incoming call is received

Establish a connection by pressing [↩] or removing the Handset from the Cradle.

Place the Call on Hold	Press [2nd] [0 Hold]
Dial the desired handset short code	Press [2 abc]
Initiate Handset to Handset call	Press [# Join]

Now the Incoming call is on Hold and there is an active Handset to Handset call between Handset #1 and Handset #2.

Handoff Call to Handset #2 Press [2nd] [* Route] or place the handset in the cradle.

- **Last Number Redial**

  Each of the 4 handsets and Fax/Data interfaces has the ability to remember the last number dialed. The limitations to this feature are:

  - When the system is powered-up the last number dialed will be "0".
  - The Aero-I system will only store the last number dialed until the unit is powered-down.

NOTE: Handset to Handset, Conference calls, or Short Codes will not replace the last number dialed.

To use last Number Redial:

Specify Stored Last Number Dialed	Press 0 Hold
Initiate Call	Press ☎ or # Join

Last Number Redial (Short Code Form):

Alternately, the last number dialed can be recalled by using "0" as a Short Code and following the same steps as initiating a call from a stored Phone book entry.

Recall Last Number Dialed	Press * Route 0 Hold
Initiate Call	Press ☎ or # Join

To View the Last Number Dialed and Initiate a Call

It is possible for the user to recall the last number dialed and view it on the display and then initiate the call.

Recall the Last Number Dialed	Press 0 Hold
View Last Number Dialed	Press OK
Initiate Call	Press OK or ☎ or # Join

Management of background light in the handset

If the backlight configuration is set to Auto, the light is active when.

1. The handset is off cradle. (Until the handset is placed back in the cradle).
2. The handset/cradle is ringing. (Until the call is suspended).
3. The handset keyboard is activated. (Display will light up for approx. 15 seconds).

If backlight configuration is set to off, backlight is always off.
If backlight configuration is set to on, backlight is always on.

NOTE: Setup for Background light is unique for each handset.

5.2 Voice Calls from Air to Ground

The following paragraphs describe and provide examples for receiving voice calls and placing voice calls.
Any time during a call the user may adjust the audio volume, switch the call from the handset to speaker, and/or mute the microphone.

Volume:	To adjust the Volume, use the volume step button on the side of the handset. Sliding the button downwards will decrease volume and vice versa.	
Speaker:	To activate the speaker	Press [◁]
	When the speaker is activated, Speaker on Symbol will be displayed in the handset.	
Mute:	To mute the microphone	Press [2nd] [Mute]
Mute off:	To deactivate mute	Press [2nd] [Mute]

If a handset is receiving a call, the handset will ring, and the Yellow Ring LED will flash. To establish a connection the user can either:

- With handset in the Cradle:
  Lift the handset from cradle just like a standard telephone.
- With handset already removed from the Cradle:
  Press [☎] key and the call will be connected.

Upon termination of the call, press [☎] key again to release the call or place the handset back in the cradle.

Placing Calls from Air to Ground

In order to place a call from Air to Ground, the user must dial the desired telephone number including prefix [0 Hold] [0 Hold] in front of the country code and then the area code.

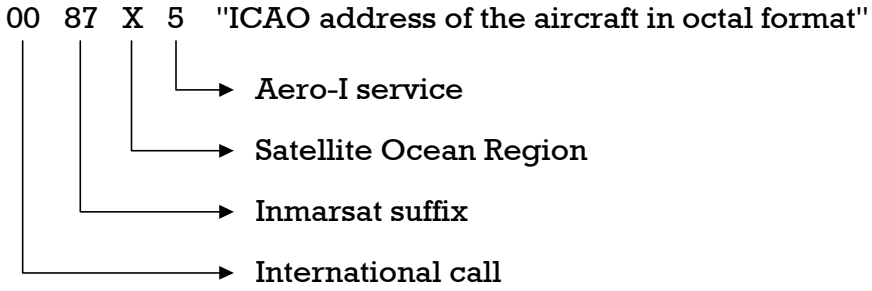
Example for dialing direct from Aero-I to USA:

Enter voice prefix	Press [0 Hold] [0 Hold]
Enter Country Code	[1 Menu]
Enter Number Area Code	[5 jkl] [2 abc] [0 Hold]
Enter phone #	[5 jkl] [7 pqrs] [3 def] [7 pqrs] [6 mno] [2 abc] [7 pqrs]
Initiate Call	Press [OK] or [☎] or [# Join]

NOTE: See country codes in appendix 10.8

5.3 Voice Calls from Ground to Air

All calls from Ground to Air must be placed as international calls. Each INMARSAT Satellite has a three-digit code assigned that is for all practical purposes, the area code for the satellite. It is necessary to first dial the international access code, followed by the satellite "area code" and the Aero-I service number and finally the ICAO address of the aircraft.



NOTE: In some countries the availability of Aero-I service depends on the local Public Switched Telephone Network (PSTN) provider.

Area codes for the INMARSAT Satellites are:

		suffix	X
Atlantic Ocean Region East	AORE	87	1
Pacific Ocean Region	POR	87	2
Indian Ocean Region	IOR	87	3
Atlantic Ocean Region West	AORW	87	4

Example of Ground to Air call from Denmark:

Dialing string for calling an Aero-I equipped aircraft from Denmark.

Dial the International Access Code [0 Hold] [0 Hold]

Dial the suffix and region [8 tuv] [7 pqrs] [1 Menu] (AORE)

Aero-I service and AES ICAO Number [5 jkl] + "8 digit ICAO (octal)"

Example of Ground to Air call from the U.S.A:

Dialing string for calling an Aero-I equipped aircraft from U.S.A

Dial the International Access Code [0 Hold] [1 Menu] [1 Menu]

Dial the suffix and region [8 tuv] [7 pqrs] [4 ghi] (AORW)

Aero-I service and AES ICAO Number [5 jkl] + "8 digit ICAO (octal)"

Important:

The service provider defines the call procedure and may use their own call center. The above example is the default INMARSAT Aero-I Ground to Air dialing procedure. Your service provider may have provided you with a separate telephone number for the Aero-I terminal. Please contact your service provider for more information.

Coverage maps for service areas of the satellites are depicted in Appendix 10.2 of this manual. The Aero-I spot beams are the highlighted areas of the coverage maps.

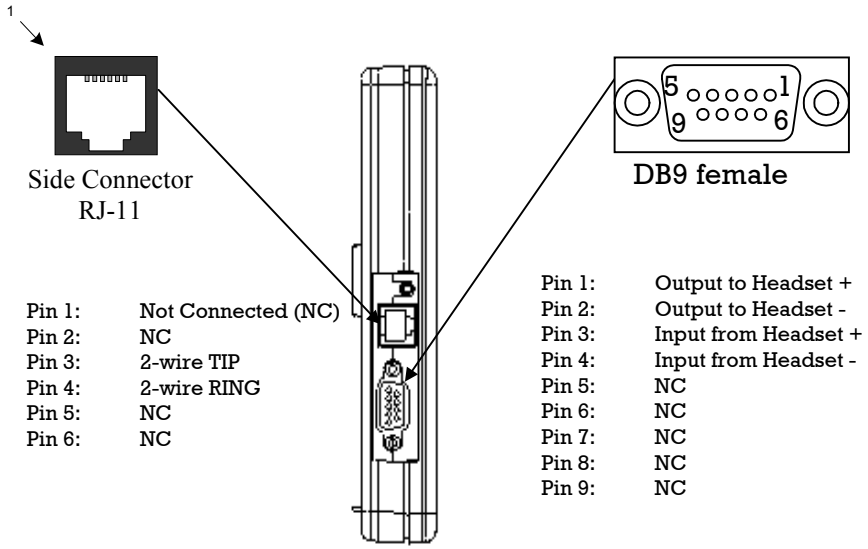
5.4 Cradle Connections

Headset connection

Headset connection can be obtained through the DB9 connector on the cradle. The connection for the headset is a galvanicly separated 600 Ω - balanced input/output connection.

Fax/Data/Auxiliary handset connection

Fax/PC-modem Data/Auxiliary handset connection can **"only"** be obtained through the Modular RJ –11 connector on the side of the cradle (Simple connection), or directly to the ARINC-connector of the SDU (Direct connection).



Side view of the TT-5622A

WARNING!

Never connect the auxiliary (2-wire) handset to the "bottom connector" of the full feature (4-wire, TT-5622A) cradle. The auxiliary handset will sustain serious damage.

6 FAX CALLS

The Inmarsat Aero-I system provides a group-III (G3) fax service. The G3 service is the same as used in any office or home.

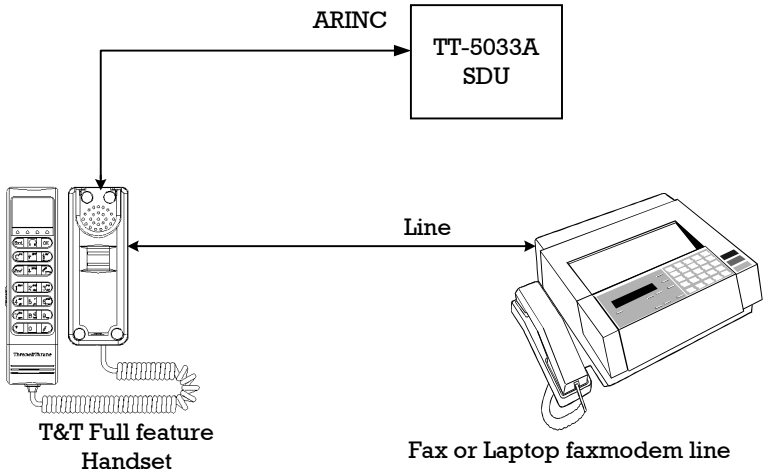
6.1 Fax Setup

A fax machine (or fax modem on your PC/laptop) may be connected to the Aero-I system in two ways, either:

- Using an ordinary telephone cord between the fax/laptop and the Aero-I cradle (simple connection) or
- Wired directly to the ARINC 404 plug on the rear of the SDU (fixed connection)

Simple Connection

Connect the fax machine/laptop's LINE plug (male) to the corresponding plug (female RJ11) on the side of one of the 4-wire handset cradles as illustrated below:



Please note that the Aero-I system supports up to four 4-wire (full feature) handsets with cradles (numbered #1 through #4) and two 2-wire (auxiliary) interfaces for fax/data/auxiliary phones (numbered #5 - #6). The numbers #1 - #6 are also known as TERMINAL IDs.

The 2-wire extensions are connected to the full feature handset cradles in the following way*:

- 2-wire extension connected to the Full-feature handset cradles #1 and #3 are numbered as #5.

- 2-wire extension connected to the Full-feature handset cradles #2 and #4 are numbered as #6.

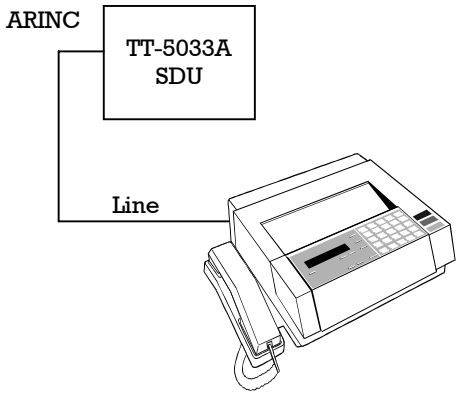
*Please refer to the Aero-I installation manual for further information.

Example:
If you connect two fax machines/modems to the full-feature cradles #1 and #3, the fax machines/modems will have identical terminal ids (namely #5); thus you will not be able to use the two fax machines/modems simultaneously. However, by connecting one of the two fax machines/modems to either of the 4-wire cradles #2 or #4, the fax/modem will now have terminal id #6 and you may use the two faxes/modems simultaneously.

IMPORTANT
For proper use and routing of voice, fax, and PC-modem data calls, it is important that your Inmarsat Service Provider (ISP) has information about the layout and configuration of your Aero-I system. Please contact your Aero-I installation center for further information.

Fixed Connection

In a fixed connection, the fax is directly wired to the ARINC 404 connector on the rear of the Aero-I SDU. Consequently, you do not need to manually insert the fax in the full-feature handset cradle (as in the Simple Connection-layout).



Fax or Laptop faxmodem line

Fixed Connection installation/modification must be accomplished by the installation center. Please contact your Aero-I installation center for further details.

6.2 Fax Configuration

For optimum fax performance, please ensure that both the sending and receiving fax machines are configured as follows:

- SPEED: 2400 bps (= 2.4 kbps)
- TIME OUT: maximum length
- PICK UP: immediate (after one ring)
- ERROR CORRECTION MODE (ECM): OFF

Please consult your fax manual for further information on configuration and operation.

6.3 Fax Calls From Air-to-Ground

The following section describes how to send a fax from a fax connected to the Aero-I Satcom to a terrestrial fax (i.e. a fax on the ground, connected to the local PSTN).

IMPORTANT

The Inmarsat Aero-I system uses the following Air-to-Ground prefixes:

- "00" for VOICE calls
- **"01" for FAX calls**
- "02" for PC-MODEM DATA calls.

In addition, all Aero-I FAX and PC-MODEM DATA calls must be concluded with the pound sign (#).

1. Ensure that the document you wish to send is properly loaded.
2. Simply enter the Aero-I FAX prefix (01), followed by the recipients fax number (country code + area code + subscriber number) and concluded with the pound sign (#).
3. Press START/SEND on your fax machine.

Example

Calling Thrane & Thrane's fax (55 8888) in Lyngby (39), Denmark (45) from your aircraft fax via the Aero-I:

Enter AERO-I FAX PREFIX	**01**
Enter country code (e.g. Denmark)	45
Enter area code (e.g. Lyngby)	39
Enter subscriber fax number	558888
Enter AERO-I FAX END-OF-STRING CHARACTER	**#**

Your fax should display 014539558888#

Press START/SEND on your fax.

Example
Calling Universal Avionics' fax (2952395), Arizona (520), USA (1) from your aircraft fax via the Aero-I:

Enter AERO-I FAX PREFIX	**01**
Enter country code	1
Enter area code	520
Enter subscriber fax number	2952395
Enter AERO-I FAX END-OF-STRING CHARACTER	**#**

Your fax should display 0115202952395#

Press START/SEND on your fax.

6.4 Fax Calls From Ground-to-Air

The following section describes how to send a fax from a terrestrial network (ground fax) to a fax connected to the Aero-I onboard an aircraft. You may place a Ground-to-Air fax call in one of two ways:

- using the default Inmarsat Aero-I procedure or
- as provided by your Inmarsat Service Provider (e.g. using a one-number dial procedure)

Default Inmarsat Aero-I Ground-to-Air fax calling procedure

Having commissioned your TT-5000 Aero-I system, you should have received a complete listing of all-relevant Aero-I phone, fax and PC-modem data numbers. The listing includes so-called Inmarsat Direct Dial-In (DDI) numbers, which are used to route the various types of calls (i.e. voice-to-voice, fax-to-fax, data-to-data), to the correct terminal ID. Before dialing using the default Inmarsat Ground-to-Air calling procedure, however, you need to have the following information:

- You must identify within which of the four **Inmarsat satellite ocean regions** that the aircraft (Aero-I system) is currently operating?

Satellite	**Satellite "Country code"**
Atlantic Ocean Region East (AORE)	871
Pacific Ocean Region (POR)	872
Indian Ocean Region (IOR)	873
Atlantic Ocean Region West (AORW)	874

- You must identify the correct **terminal ID** to which the Aero-I fax is connected (i.e. on which full-feature handset cradle is the fax connected or to which pins is the fax wired)?

Full-feature handset	Terminal ID
#1 and #3 (or wired to the ARINC 404 top plug pins 6 & 19)	#05
#2 and #4 (or wired to the ARINC 404 top plug pins 7 & 8)	#06

Please refer to the listing from your Inmarsat Service Provider.

1. Ensure that the fax has been properly configured for Satcom fax communication (see "Fax Configuration"-section) and that the document you wish to send is properly loaded.
2. Enter the international access code prefix, followed by the Inmarsat satellite ocean region "country code" (871, 872, 873 or 874), the Inmarsat Aero-I service number (5), the six-digit DDI number, concluded with the terminal ID number (05 or 06) for the Aero-I fax.
3. Press START/SEND on your fax.

Example:
From Denmark, calling an Aero-I fax connected to the full-feature #1 handset cradle in an aircraft operating within the Indian Ocean Region satellite (IOR):

Enter international access code from Denmark	00
Enter "country code" for the IOR satellite ocean region	873
Enter Aero-I service number	5
Enter six-digit DDI number (example number)	802411
Enter Aero-I fax location (terminal ID for fax on handset #1)	05

Your ground fax should display 00873580241105

Press START/SEND on your fax.

Example:
From the USA, calling an Aero-I fax wired directly to the ARINC 404 pins 7 & 8 in an aircraft operating within the Atlantic Ocean Region West satellite (AORW):

Enter international access code from the USA	011
Enter "country code" for the AORW satellite ocean region	874
Enter Aero-I service number	5
Enter six-digit DDI number (example number)	802411
Enter Aero-I fax location (terminal ID) for pins 7 & 8	06

Your ground fax should display 011874580241106

Press START/SEND on your fax.

Inmarsat Service Provider specific fax procedure

Depending on your Inmarsat Service Provider (ISP), the Ground-to-Air fax calling procedure may vary. Your ISP may have a specific fax calling procedure (e.g. a one-number direct dial feature) facilitating fax operations. Please contact your ISP for further information.

7 MODEM CONFIGURATION

Dialing using a modem on an Aero-I (e.g. to download e-mails or access the Internet) is similar to your home or office access, except for one important difference: the usual international prefix, "00" (or "011" from the USA), must be replaced by "02" (zero two) to initiate a modem data call via the Inmarsat Aero-I network.

With the TT-5000 modem connection, you can use any application supporting modem speeds at 2400 bps and a satellite delay of 200 ms. Examples of applications supported include UniLink™ Map uploading, X-, Y-, and Z-modem file transfers, e-mails using Internet Mail Access Protocol (IMAP), Wireless Application Protocol (WAP) with WINWAP® software. Examples of applications supported, but not recommended, include "web surfing" and e-mail using Post Office Protocol 3 (POP3).

Recommended setup using modem via TT-5000 Aero-I:

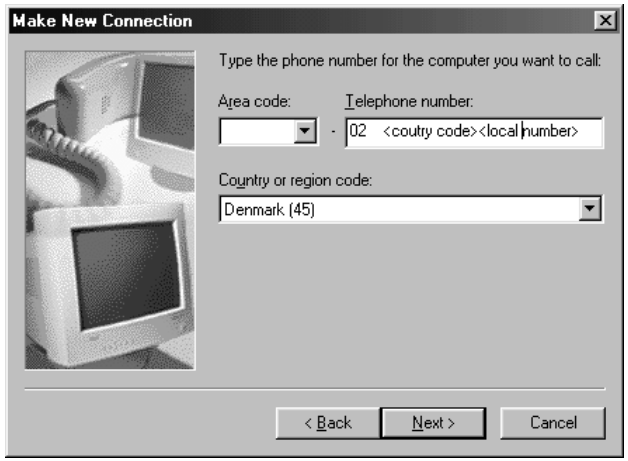
- Communication protocol V22bis and V42bis
- Error correction LAPM
- Guard tone OFF (if possible)

NOTE: AT commands can be preprogrammed in nearly all modems. Contact your modem manufacturer for further information.

Run the application via Aero-I at 2400 bps

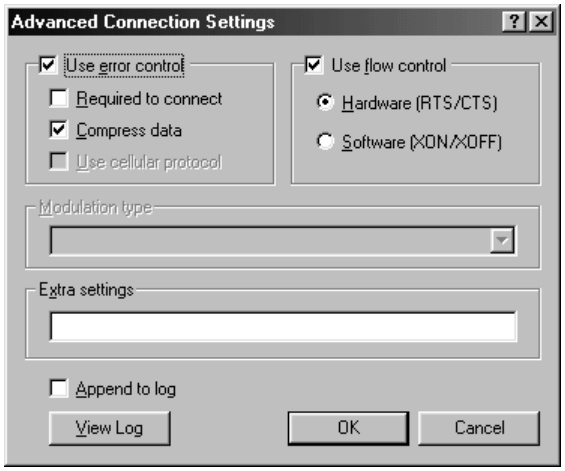
- Connect the modem to the Satcom (Satcom connection #5 or #6).
- On the desktop, double click on "My computer"
- Double-click "Dial-up networking"

- Double-click on "Make new connection".
- Type a name for the connection (e.g. "2400 BPS via AERO-I")
- Select the modem to use.
- Click next.



For an outgoing call, In the phone number, the international prefix, "00", must be replaced by "02" to indicate a modem data call.
Click next, Click finish.

Advanced settings for modem connection.



Type the AT command relevant for your modem to set the corresponding parameters in Extra settings window:

- Communication protocol V22bis and V42bis
- Error correction LAPM
- Guard tone OFF (if possible)

NOTE: Examples of PC-modem setup and a PC-modem data call in Appendix 10.4.

8 AUXILIARY HANDSET

Earpiece Volume

During off-hook mode the earpiece volume can be adjusted. The volume control is placed on the left side of the handset. When handset is on-hook the volume control have no effect.

Microphone Mute

During an end-to-end connection (incoming or outgoing satellite call) between the Aero-I System and a subscriber the microphone in the Auxiliary Handset can be muted.

Press [Mute]-key on the Auxiliary Handset to mute the microphone. Press [Mute]-key again and the Auxiliary Handset will set the microphone back to normal again.

Receiving Handset Calls

In the following an incoming call to the handset is described. The handset will ring and the green RING indicator will flash.

The call can be answered in two ways:

1. Lift handset out of the cradle. This will establish the connection and enable the microphone and earpiece. The RING indicator will go off and the POWER indicator will light steadily during the connection.

2. If handset not placed in cradle press the [📞]-key. This will establish the connection and enable the microphone and earpiece. The RING indicator will go off and the POWER indicator will light steadily during the connection.

During the call you can use the volume control at the side of the handset to control the earpiece level.

End Calls

Calls are cleared in two ways.

1. Pressing the [📞]-key.

2. Place the handset in the cradle.

If the call is cleared by the calling subscriber or cleared in an abnormal way you will hear a congestion tone in the earpiece as an indication of a

call clearing. Press the [phone]-key on the handset or place the handset in the cradle and the Auxiliary Handset will go ON-Hook.

Making Calls

It is necessary for the Auxiliary Handset to be Off-Hook before a call can be initiated.

A subscriber can be called entering the telephone number and accepted using the [#]-key. The telephone number may not exceed 20 digits including call prefix for automatic calls and country code.

During the call you can use the volume control at the side of the handset to control the earpiece level.

NOTE: The Auxiliary Handset doesn't support handsfree mode.

Manual Telephone Calls

Manual Telephone Calls to Ordinary Telephone Numbers Connected to the National PSTN (in this example Denmark).

Handset Off-hook	Power indicator will light steadily
Enter call prefix for automatic calls	[0] [0]
Enter country code	[4 ghi] [5 jkl]
Enter telephone number	[3 def] [9 wxyz] [5 jkl] [5 jkl] [8 tuv] [8 tuv] [0] [0]
Start the call	[#]

Local Call

A local call is a call between the TT-5000 Aero-I System handsets (Full Feature/Auxiliary). Calls can be initiated from both ends. Different from other types of calls it is not necessary to be in synchronisation with the NCS to make a local call.

The local call codes are one digit numbers.

Number	Unit
1	Full Feature Handset
2	Full Feature Handset
3	Full Feature Handset
4	Full Feature Handset
5	Auxiliary Handset/Fax/Modem
6	Auxiliary Handset/Fax/Modem

Enter local call code	[1]
Start the call	[#]

Clear Call

Wrong entered telephone numbers can be cleared in two ways before Auxiliary Handset is ready for new entries.

1. Pressing the [↩]-key twice.
2. Place the handset in the cradle and lift handset out of the cradle.

If the call is cleared by the calling subscriber or cleared in an abnormal way you will hear a congestion tone in the earpiece as an indication of a call clearing.

Telephone Number Memory

10 telephone numbers can be stored. The telephone number may not exceed 20 digits including call prefix for automatic calls and country code. 3 of the 10 numbers can be accessed through [M1], [M2] and [M3]

Storing Telephone Numbers

The store mode starts after going off-hook and depressing the [STO]-key. Numbers can be stored into a non-volatile memory via the one-key access or the two-key access method.

When entering the telephone number during storing mode, no DTMF will be transmitted. Instead there is a comfort single tone to support the user during the storing sequence and a completion melody indicating the end of a successful storing sequence.

One-key Storing Mode

Handset off-hook	Power indicator will light steadily
Enter store mode	[STO]
Enter call prefix for automatic calls	[0] [0]
Enter country code	[4 ghi] [5 jkl]
Enter telephone number	[3 def] [9 wxyz] [5 jkl] [5 jkl] [8 tuv] [8 tuv] [0] [0]
Enter location mode	[STO]
Select location	[M1], [M2] or [M3]

A completion melody indicating the end of a successful storing sequences.

Two-key Storing Mode

Telephone off-hook	Power indicator will light steadily
Enter store mode	[STO]
Enter call prefix for automatic calls	[0] [0]
Enter country code	[4 ghi] [5 jkl]

Enter telephone number	3def 9wxyz 5jkl 5jkl 8tuv 8tuv 0 0
Enter location mode	STO
Select location	0 to 9wxyz One digit real location

A completion melody indicating the end of a successful storing sequences.

Accessing Stored Telephone Numbers

10 numbers can be recalled in two ways with the M1 to M3 keys or by pressing the MEM-key followed by a numeric digit from 0 to 9wxyz.

1. Short Code

Handset off-hook	Power indicator will light steadily
Enter short code	M1, M2 or M3

2. Real Location

Handset Off-hook	Power indicator will light steadily
Enter memory	MEM
Enter location digit	0 to 9wxyz One digit only

Pressing MEM, 1 recalls the same number as pressing M1.

Last Number Redial

The Auxiliary Handset stores the last number dialled and can be accessed with the ◯● -key

The last number dialled has to end with the # -key to update Last Number Redial function.

Chain dialling

It is possible to use banking services, control of an answering machine or manual chain dialing.

Stored numbers can be dialed-out after or before entering manual dialing last number dialled and by recalling from the memory locations in successive order ('chain dialling').

During call of a number recalled from the memory location, the handset does not accept keyboard entries. Dialling can be continued as soon as the number under calling is completed.

NOTE: The last memory location that is transmitted is stored in the Last Number Redial register.

9 MENU SYSTEM

The TT-5000 Aero-I system provides a user-driven menu interface. The Menu is accessed and displayed via the system's Full Feature handset, and provides the user with the ability to select, display and/or change system operating parameters, installation configurations, phone book entries, etc.

The TT-5000 Aero-I System uses a Menu System as the primary interface between the User and the Aero-I SDU.

Public Phone Book and Private Phone Book

Both public phone book and private phone book are used to store, display and edit commonly used phone numbers, and names. The Private book provides access restriction for the storage of confidential numbers that are only accessible to certain pre-assigned super users. (See section 9.2)

Master Setup

Used for initial configuration of the system upon completion of installation. Access to the Master Setup sub-menus may be restricted to assigned users.

Handset Setup

Used to set the desired operational features of the handset, e.g. key beep, contrast in display etc.

Pin Setup

Used to setup and/or modify individual system PinCodes. The PinCodes restrict access to the System Configuration and Phonebook (see PinCodes chapter 9.3).

Ring Select

Used to store and modify custom handset ring setups. Ring select enables the user to select from a variety of pre-set ring parameters, i.e., during an incoming call, #1 handset may be set to ring while #2 does not, etc. Parameters may be set for up to a total of four handsets.

To navigate through the User Menu:

To Access Main Menu	Press 2nd 1 Menu or OK
To Scroll Up or Down through Menu	Press ↑ Edit or ↓ Mute
To go to top of the current Menu	Press 0 Hold _
To Page Down to next level	Press 1 Menu
To Page Down another level	Press 2 abc

The User can page down each Menu level by level using the numeric keys on the keypad. 0 Hold _ is top of the menu, 1 Menu is page down one level, 2 abc is page down another level and so on.

To Select a Menu Item — Press OK

If the User is in a Menu Option and has made any changes, Pressing OK will save changes

To exit current Menu — Press Exit

If the User is in a Menu Option and has made changes but does not want to save these changes, pressing Exit will Exit the Menu Option without saving these changes.

To return to the Main Menu from any Menu simply Press 2nd and 1 Menu or 2nd and OK.

9.1 Menu System Block Diagram

9.2 Phone Books

The TT-5000 Aero-I system provides two electronic Phone books that may be used to save and recall commonly used phone numbers. Any user can access the Public Phone book through the Main Menu (if the system is unlocked with PinCode 1).

The Private Phone book can be used to save and recall confidential numbers. PinCode 2 can protect access to the Private Phone book. The Pin Code 2 protection is a Super User Menu Option of the Master Setup menu.

Public and Private Phone book

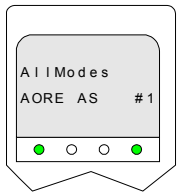
The Public and Private Phone books are used to store phone numbers along with a name. Each phone book holds 99 numbers, names, and "speed dial" short codes (1-99). A phone number is limited to a maximum of 24 digits, and a name is limited to a maximum of 24 characters.

PinCode 2 in the "Super User" menu can protect access to the phone books. If access to the phone book is protected by PinCode 2, the user must enter PinCode 2, please refer to section "PinCodes": HOW TO ENTER FACTORY OR PERSONAL USER PINCODE.

The typical setup is to protect the access to the Private Phone book by Pin Code 2, and leave the Public Phone book unprotected. In that case the user must always enter PinCode 2, before access to the Private Phone book is allowed.

ACCESSING PHONE BOOKS FROM ACCES MAIN MENU		
Comment	Press Keys	Display readings
Enter Access Main Menu	2nd 1 Menu	Phn Book Pvt Book
Scroll up/down to select: Public Phone book: <Phn Book> or Private Phone book: <Pvt Book>	Edit Mute	Phn Book Pvt Book
Enter Phone book (d=digit)	OK	_1 ddddddddd 2 ddddddddd

The access to the Phone books is very easy, if the handset is at top level menu e.g. handset #1 reads:



To access the Public Phone book: Press: [Edit]

To access the Private Phone book: Press: [Mute]

When access to the Public/Private Phone book is achieved, the numbers, names, and codes can all be Inserted, Deleted, Edited, and Recalled through the handset keypad. During these four operations the user may scroll up/down in the phone book, to view the contents. The short code is displayed together with the phone number or the name/address. Use the [Del] key to toggle between phone number and name/address. The first 9 letters of the name is displayed, or the last 9 digits of the phone number are displayed.

STORING NUMBERS		
Comment	Press Keys	Display readings
(Access phone book first!) Select Insert function	[2nd] [Ins]	Name _ ABC
Insert Name/Address, using the Keypads Alphanumeric Functions (max. 24 characters)		"Name + Address"
Save Name	[OK]	Number _
Input Number to store (Include all codes, max. 24 digits)		"Number"
Save Number (d=digit)	[OK]	Shortcode dd
Save one/two digit Short Code ("dd"). The next free location in the phone book is suggested, but the user may enter another. (d=digit). If the short code is occupied, the display reads: "No. in use"	[OK] or "dd" [OK]	_1 ddddddddd 2 ddddddddd

RECALLING NUMBERS		
Comment	Press Keys	Display readings
(Access phone book first!) Scroll up/down to select right number (e.g. short code 2). Press Del to view names instead of numbers.	Edit Mute (+ Del)	1 ccccccccc _2 ccccccccc
Press OK to initiate the call	OK	Call Established

DELETING NUMBERS		
Comment	Press Keys	Display readings
(Access phone book first!) Scroll up/down to select right number (e.g. short code 2). Press Del to view names instead of numbers.	Edit Mute (+ Del)	1 ccccccccc _2 ccccccccc
Select Delete function	2nd Del	_1 ccccccccc 3 ccccccccc

EDITING NUMBERS		
Comment	Press Keys	Display readings
(Access phone book first!) Scroll to Entry to Edit (e.g. short code number 2)	↑Edit ↓Mute	1 ddddddddd _2 ddddddddd
Select Edit function (c=character)	2nd ↑Edit	ccccccccccc ccccccccccc_ ABC
Edit Name, and confirm with OK. If no changes: Press OK	"new name + OK" or OK	ddddddddddd ddddddddddd_
Edit Number, and confirm with OK. If no changes: Press OK	"new number + OK" or OK	Shortcode _2
Edit Short Code Number, and confirm/save with OK. If no changes: Press OK. Returns automatic to Phone book menu after OK	"dd (short code) + OK" or OK	1 ddddddddd _2 ddddddddd

9.3 Super User Menu

The access to make calls through the Aero-I satellite network can be limited, so the user must enter PinCode 2 in order to get full access. The limitations are entered in the "Super User" menu (or in the Configuration program). There are four entries, which can be enabled or disabled:

Free Dial
Phn Bk Dial
Pvt Bk Dial
Allowed No.

The user must enter PinCode 2, before access to the "Super User" menu is possible. If the PinCode 2 has not been entered the display will read:

Please refer to section "PinCodes":
HOW TO ENTER FACTORY OR PERSONAL USER PIN CODE.

Free Dial:
Free Dial is used when the user enters a phone number direct from the keypad (not using phone books/short codes)

Enabled: <*Free Dial> PinCode 2 not needed (typical setting: enabled)
Disabled: < Free Dial> PinCode 2 needed

Phn Bk Dial:
The Public Phone book numbers are available for the user.

Enabled: <*Phn Bk Dial> PinCode 2 not needed (typ. setting: enabled)
Disabled: < Phn Bk Dial> PinCode 2 needed

Pvt Bk Dial:
The Private Phone book numbers are available for the user.

Enabled: <*Phn Bk Dial> PinCode 2 not needed
Disabled: < Phn Bk Dial> PinCode 2 needed (typical setting: disabled)

Allowed No.
In this menu, the user can enter a list of allowed numbers. If "Allowed No" is enabled, the user can only call numbers from the list, or numbers starting with the allowed number digits.

For example:
If the list only contains the number 0045, the user can only call numbers starting with 0045, unless PinCode 2 is entered.

Enabled: <*Allowed No.> PinCode 2 needed
Disabled: < Allowed No.> PinCode 2 not needed

ENTER and EDIT "SUPER USER" MENU		
Comment	Press Keys	Display readings
(First Enter PinCode 2) Enter Access Main Menu	2nd 1Menu	Phn Book Pvt Book
Scroll Down to <Master Setup>	Mute	Pvt Book Master Setup
Select <Master Setup>	OK	Super User Configure
Select <Super User>	OK	*Free Dial *Phn Bk Dial
Scroll up/down to select entry (e.g. Allowed No.)	Edit Mute	*Pvt Bk Dial *Allowed No.
Press Route to toggle the asterisk in the display: Enable = "*" (E.g. Allowed No. disabled)	Route	*Pvt Bk Dial _Allowed No.

To return to the top-level menu press: 2nd 1Menu Exit

Remember to lock the handsets for PinCode 2 re-activation.

INSERT, DELETE, AND EDIT "ALLOWED NO." LIST		
Comment	Press Keys	Display readings
(First Enter PinCode 2) Enter Access Main Menu	2nd 1 Menu	Phn Book Pvt Book
Scroll Down to <Master Setup>	Mute	Pvt Book Master Setup
Select <Master Setup>	OK	Super User Configure
Select <Super User>	OK	*Free Dial *Phn Bk Dial
Scroll down to < Allowed No.>	Mute	*Pvt Bk Dial *Allowed No.
Select <Allowed No.>	OK	0045 0046
Insert Allowed No. (max 24 digits)	2nd C Ins	Edit allowed
or scroll up/down to: Edit Allowed No.	Edit / Mute + 2nd Edit	Edit allowed
Enter new allowed (max 24 digits) and save with OK. Use C Ins as backspace while editing	"Number" + OK	0045 0047
or scroll up/down to: Delete Allowed No.	Edit / Mute + 2nd Del	0045

10 APPENDIXES

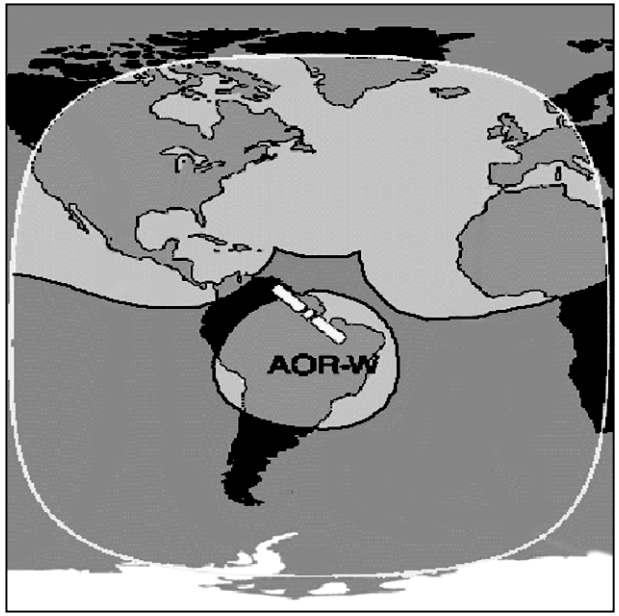
10.1 Appendix A: Terms & Abbreviations

A-BPSK	Aviation Binary Phase Shift Keying
A-QPSK	Aviation Quadrature Phase Shift Keying
ACARS	Aircraft Communication Addressing & Reporting System
ACP	Audio Control Panel
ACU	Antenna Control Unit
ADL	Airborne Data Loader
AERO-I	Aeronautical Service From INMARSAT Type I
AES	Airborne Earth Station
AMU	Audio Management Unit
AORE	Atlantic Ocean Region East
AORW	Atlantic Ocean Region West
ARINC	Aeronautical Radio Inc.
ATE	Automatic Test Equipment
AIU	Analog Interface Unit (with Magnastar Handset)
BITE	Built In Test Equipment
BPS	Bit Per Second
BSU	Beam Steering Unit
CCS	Cabin Communications System
CFDS	Centralized Fault Display System
CM	Continuous Monitoring (BITE test)
CMU	Communications Management Unit
CODEC	Coder / Decoder
CP	Cockpit
CPDF	Cabin Packet-mode Data Function
CTS	Clear To Send
CTU	Cabin Telecommunications Unit
dBi	decibel relative to isotropic
DC	Direct Current

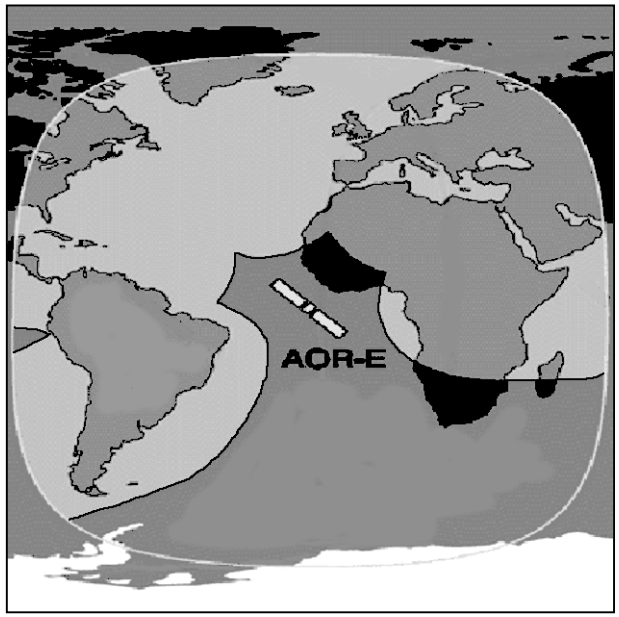
DITS	Digital Information Transfer Systems
DSP	Digital Signal Processor
DTMF	Dual Tone Multi Frequency
EEPROM	Electrical Erasable Programmable Read Only Memory
EIRP	Effective Isotropic Radiated Power
FMC	Flight Management Computer
FMS	Flight Management System
GES	Ground Earth Station
GSDB	GES Specific Data Broadcast
HGA	High Gain Antenna
HPA-C	High Power Amplifier class-C
HPA-L	High Power Amplifier - Linear
I/O	Input / Output
ICAO	International Civil Aviation Organization
ICAO ADDRESS	A 24 Bit Unique Aircraft Address
IF	Intermediate Frequency
IGA	Intermediate Gain Antenna
INMARSAT	International Maritime Satellite Organization
ISP	Inmarsat Service Provider
IOR	Indian Ocean Region
IRS	Inertial Reference System
KBPS	Kilo Bits Per Second
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LGA	Low Gain Antenna
LNA	Low Noise Amplifier
LRU	Line Replaceable Unit
MCDU	Multi-function Control and Display Unit
MMI	Man Machine Interface
MTBF	Mean Time Between Failure
NC	Not Connected

NCS	Network Coordination Station
NRS	Navigational Reference System
PABX	Private Automatic Branch Exchange
PAST	Person Activated Self Test
PBX	Public Branch Exchange
PCS	Passenger Communication System
PDL	Portable Data Loader
POR	Pacific Ocean Region
POST	Power On Self Test
PRN	Printer
PSTN	Public Switched Telephone Network
PTT	Push To Test
RF	Radio Frequency
RFDU	Radio Frequency Distribution Units
RFU	Radio Frequency Unit
RMP	Radio Management Panel
RTCA	Radio Technical Commission for Aeronautics
RTOS	Real Time Operating System
RTS	Request To Send
RX	Receive
RXD	Receive Data
SATCOM	Satellite Communications
SCDU	Satellite Control Display Unit
SDU	Satellite Data Unit
SELCAL	Selective Calling
SLIC	Subscriber Line Interface Connection
TX	Transmit
TXD	Transmit Data
UTC	Universal Time Coordinated (Greenwich mean time)

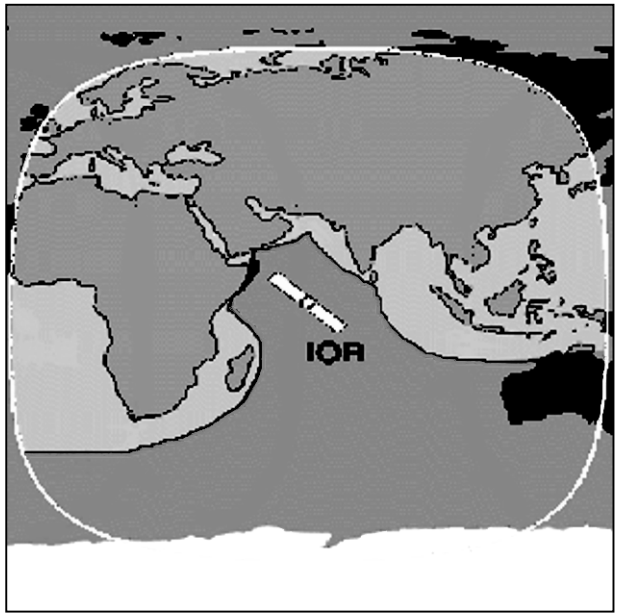
10.2 Appendix B: Inmarsat Coverage Maps



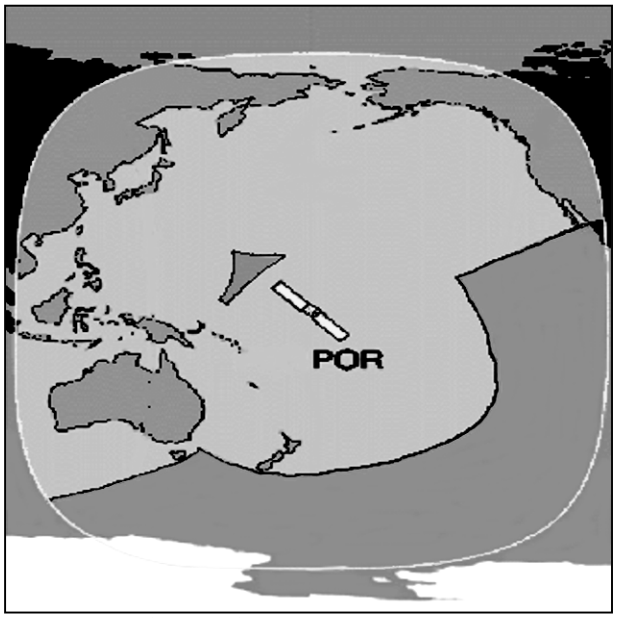
AORW (54°W) SPOT BEAM MAP



AORE (15.5°W) SPOT BEAM MAP



IOR (64°E) SPOT BEAM MAP



POR (178°E) SPOT BEAM MAP

10.3 Appendix C: Service Providers

Aero-I Service Providers

Universal Weather & Aviation, Inc.

8787, Tallyho
Houston, Texas 77061, USA
Phone: +1 (713) 944-1622
Fax: +1 (713) 943-4610
Web-site: www.univ-wea.com

Satcom Direct, Inc.

P.O. Box 372667
Satellite Beach, FL 32937-2667, USA
Phone: +1 (321) 777-3000
Fax: +1 (321) 777-3702
Web-site:www.satcomdirect.com

10.4 Appendix D: Example of PC-Modem Data Call

IMPORTANT

The following appendix includes references to hardware (e.g. modems), software and applications (e.g. Microsoft® Outlook™, Windows 98™ and Microsoft® HyperTerminal™) not developed, manufactured, nor supported by Thrane & Thrane. Thrane & Thrane A/S makes no guarantee whatsoever that the applications in this manual are fault-free nor can Thrane & Thrane in any way be held liable for any loss or consequences as to the use of or consequences stemming from the use of these products. **For support on these products, please contact your respective place of purchase, Inmarsat Service Provider, Internet Service Provider, or Aero-I installation center.**

Throughout the appendix, we refer to examples using Microsoft® Outlook 2000™ and Microsoft® Internet Explorer 5.5™. If you have any support issues or questions regarding the trouble-shooting, use, and operation of these products, please contact Microsoft Support.

The term "PC-modem data" is simply a technical designation for sending/receiving e-mails, transferring files, connecting to the Internet, uploading Universal Avionics UniLink™ weather maps etc.

"PC-modem data" calling is what you do from your home when collecting private e-mails or browse the Internet:

1. First, from your PC/laptop you dial up using a modem to a phone number (as provided by your Internet Service Provider)
2. Establish a connection
3. Connect to a server (as provided by your Internet Service Provider)
4. Send/receive e-mails, transfer files and/or browse the Internet
5. Disconnect

The only difference between the Aero-I and your home connection is the data rate and the fact that the Aero-I operates on satellites while your home connection uses fixed lines.

The term "PC-modem data" is simply used to differentiate between various means of transmitting data. For instance, another way of sending information using the TT-5000 Aero-I is used in the data communication between an aircraft (e.g. flight plan updates, revised ETA etc.) and a ground station (e.g. Air Traffic Control, aircraft operations HQ). This form of data communication is referred to as "Cockpit Communication", "Packet Data", or "Text Mode Data". One of the three Aero-I channels is dedicated to Cockpit Communications operating in the global beam.

Introduction

Just like your telephone wall socket at home, the TT-5000 Aero-I system provides you with the capability of sending and receiving various forms of data (e.g. e-mails) all around the World. You can run most applications that use a modem supporting 2400 bps and a satellite delay of 200 milliseconds.

The following applications are supported:

- Uploading of UniLink™ maps
- Windows® HyperTerminal™
- X-, Y-, and Z-modem file transfers
- e-mail using Internet Message Access Protocol (IMAP)
- Wireless Application Protocol (WAP) with WinWAP® software

The following applications are supported but not recommended at 2400 bps:

- e-mail using Post Office Protocol 3 (POP3)
- Internet/web browsing on content-heavy web sites

This appendix provides examples of three different ways of accessing the Internet or sending/receiving e-mails using the TT-5000 Aero-I. All of them require an Aero-I compatible modem.
The following examples are based on Internet Explorer 5.5™ and Microsoft® Outlook 2000™:

1. **E-mail and Internet access** using your home account where you dial-up and connect to your private (home) Internet Service Provider server or using an account with your Inmarsat Aero-I Service Provider.
2. **E-mail and Internet access via your company server** (known as Remote Access Server - RAS) where you externally access your company's server (if accessible from the outside).

Before we begin...

We need to ensure that:

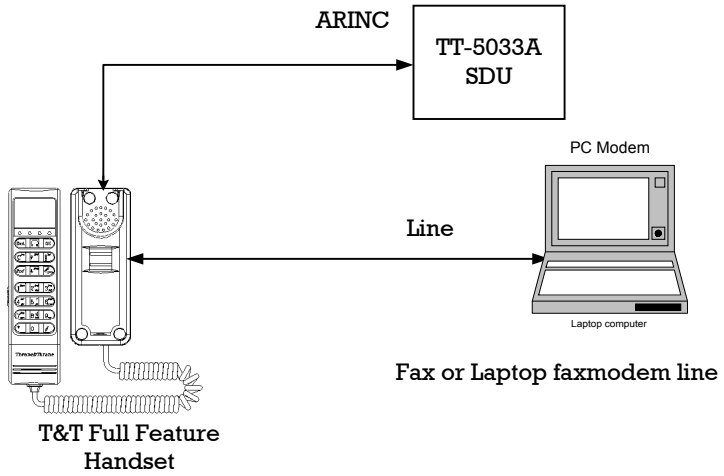
- the physical connection between the Aero-I and your PC/laptop modem is correct and that
- your modem is correctly configured

Similar to the fax setup, a PC/laptop modem may be connected to the Aero-I system in two ways, either:

- using an ordinary telephone cord between the PC/laptop and any one of the Aero-I full-feature handset cradle RJ11 sockets (simple connection) or
- wired directly to the ARINC 404 plug on the rear of the SDU (fixed connection)

Simple Connection

Simply insert the PC/laptop modem cable into any one of the RJ11 sockets on the side of one of the full-feature handset (i.e. handset with display) cradles as illustrated below:



Please note that the Aero-I system supports up to four full-feature handsets with cradles (numbered #1 through #4) and two 2-wire (auxiliary) interfaces for fax/data/auxiliary phones (numbered #5 - #6). The numbers #1 - #6 are also known as TERMINAL IDs.

The 2-wire interfaces are wired to the 4-wire handsets in the following way:

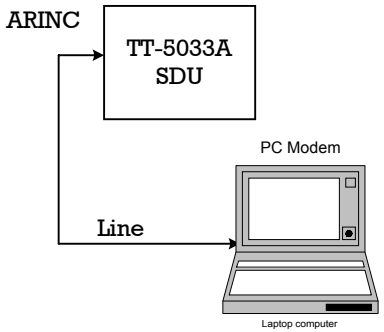
- Full-feature handsets #1 and #3 are wired in parallel with the 2-wire #5 interface.
- Full-feature handsets #2 and #4 are wired in parallel with the 2-wire #6 interface.

Please refer to the Aero-I installation manual for further reference.

> Example:
> If you connect two PC/laptop modems to the full-feature handsets #1 and #3, the modems will have identical terminal id's (namely #5), thus you will not be able to use the two modems simultaneously. However, by connecting one of the two modems to either of the full-feature handsets #2 or #4, the modem will now have terminal ID #6 and you may use the two modems simultaneously.

Fixed Connection

In a fixed connection, the PC/laptop modem is wired directly to the ARINC 404 connector on the rear of the Aero-I SDU. Consequently, you simply need to locate the modem cable outlet in the cabin and connect the cable to your PC/laptop modem.



Fax or Laptop faxmodem line

A fixed installation must be accomplished by the installation center. Please contact your Aero-I installation center for further details.

Modem Setup...

For successful operation, ensure that your modem complies to the following International Telecommunication Union (ITU) standards:

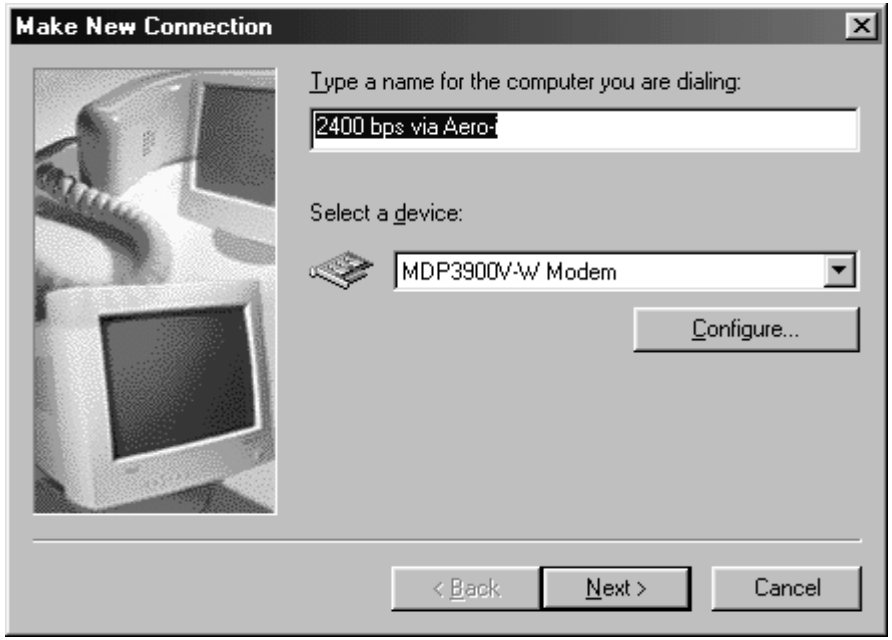
- ITU-V.22bis
- ITU-V.42bis.
- LAPM error correction.

Please contact your modem manufacturer for further information.

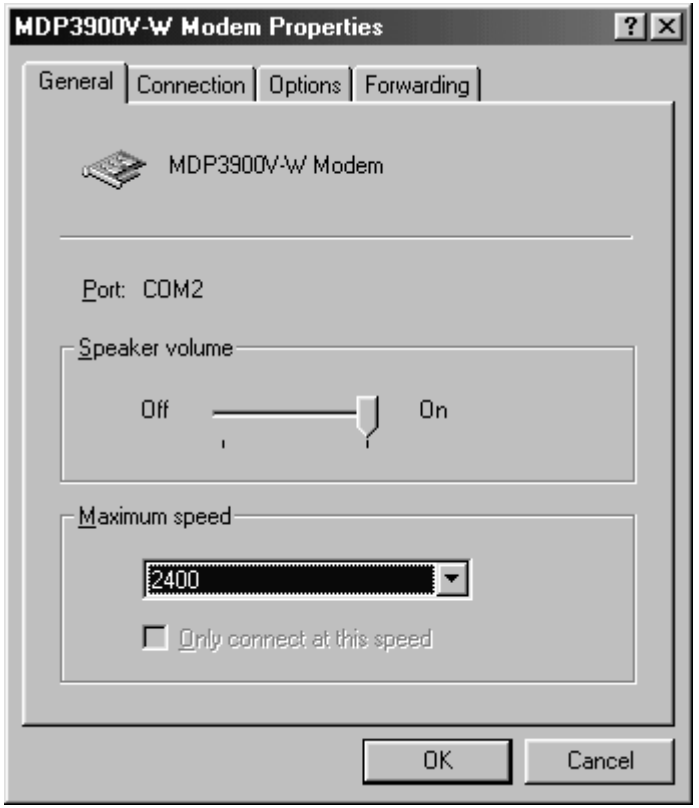
Make A New Dial-Up Connection...

For all three ways of E-mail/Internet access, you need to set up a Dial-Up connection in Microsoft® Windows 98™. For other operating versions or systems or applications, please contact the corresponding software manufacturer.

- Ensure that the Aero-I is powered up AND logged on in "ALL MODES" or "Circuit Mode".
- Ensure that the modem is properly connected to one of the side RJ11 jacks in any of the full-feature handset cradles.
- On the "Desktop" in Windows™ 98, double-click on the "My Computer"-icon.
- Double-click on "Dial-up Networking"
- Double-click on "Make New Connection"



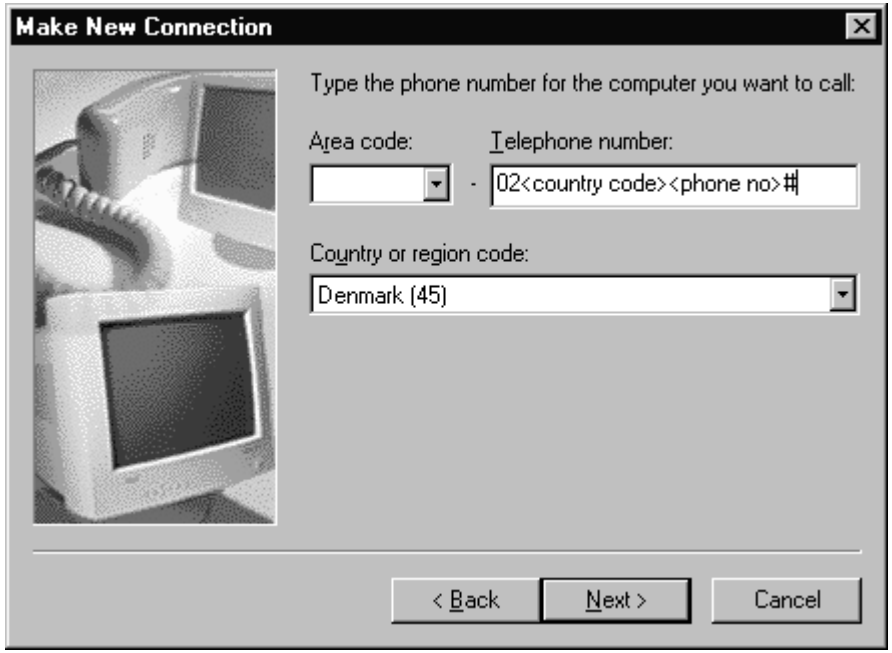
- Type a name for the connection (e.g. “2400 bps via Aero-i”)
- Select the modem from the "Select a device"-list
- Click “Configure…”.



- Ensure that "Maximum speed" is still 2400 bps
- Click "OK"


Make New Connection
Type a name for the computer you are dialing:
2400 bps via Aero-
Select a device:
MDP3900V-W Modem
Configure...
< Back
Next >
Cancel

- Click "Next >"



IMPORTANT

The Inmarsat Aero-I system uses the following Air-to-Ground prefixes:

- "00" for VOICE calls
- "01" for FAX calls
- **"02" for PC-MODEM DATA calls.**

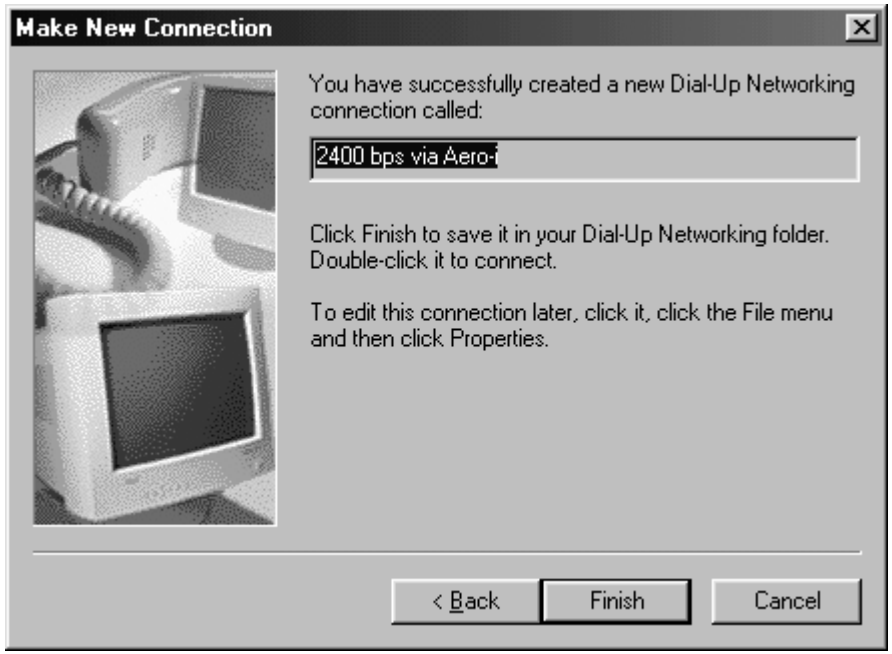
In addition, all Aero-I FAX and PC-MODEM DATA calls must be concluded with the pound sign (#).

For an outgoing Aero-I PC-modem data call, replace the usual international dialing prefix "00" (or "011" when dialing from the USA) with "**02**" and conclude the number with the pound sign (#).

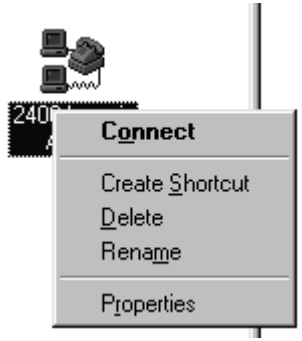
Enter AERO-I PC-MODEM DATA PREFIX	**02**
Enter country code (e.g. Denmark)	45
Enter area code (e.g. Lyngby)	39
Enter phone number of EITHER:	
❑ your private (home) e-mail/Internet account or	
❑ your e-mail account with an Inmarsat Aero-I Service Provider	
❑ the Remote Access Server (RAS)	(e.g. 331111)
Enter AERO-I END-OF-STRING CHARACTER	**#**


Make New Connection
Type the phone number for the computer you want to call:
Area code:
Telephone number:
024539331111#
Country or region code:
Denmark (45)
< Back
Next >
Cancel

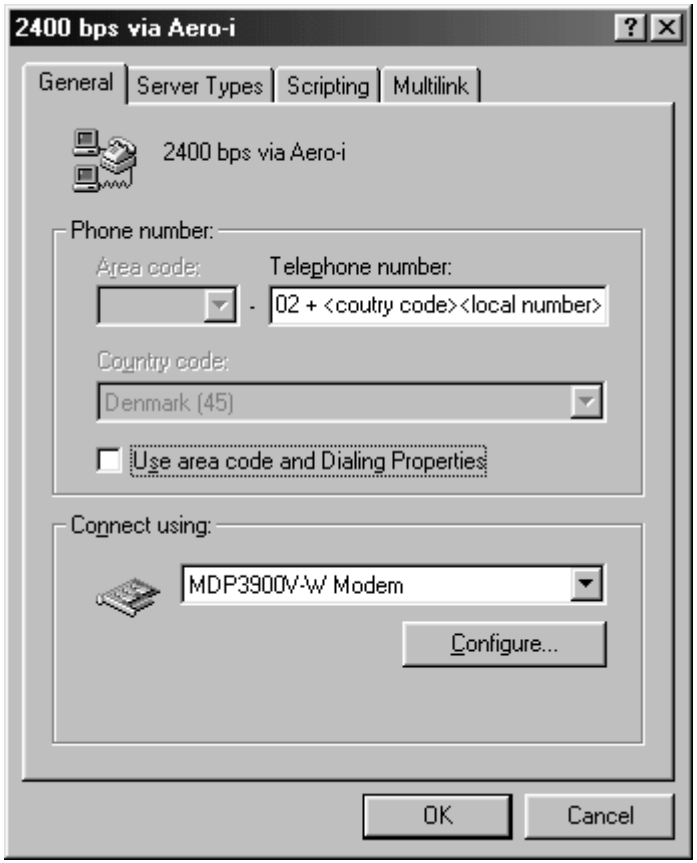
- Click "Next >"


Make New Connection
You have successfully created a new Dial-Up Networking connection called:
2400 bps via Aero-i
Click Finish to save it in your Dial-Up Networking folder. Double-click it to connect.
To edit this connection later, click it, click the File menu and then click Properties.
< Back
Finish
Cancel

- Click "Finish"
- On the "Dial-up networking" page, right mouse click once on the "2400 bps via Aero-I-icon.



- Select "Properties"



- **Untick** the "Use area code and Dialing Properties"-box (NOT to be activated!)
- Click "OK"
- Run your e-mail/file transfer software and specify the "2400 bps via Aero-I-connection.

NOTE
Some connections may take up to 30 seconds to establish. The quality of the ground telephone network varies from country to country.

Congratulations for setting up your modem correctly! You have now properly configured your modem for use with the TT-5000 Aero-I system.

However, if it does not work, it will be necessary to force the modem into the correct settings using so-called "AT commands".

The AT-commands must force the modem into the following settings:

- Maximum speed 2400 bps
- Communication protocol V22bis and V42bis
- Default speed 2400 bps
- Error control LAPM
- Guard Tone (if possible) OFF

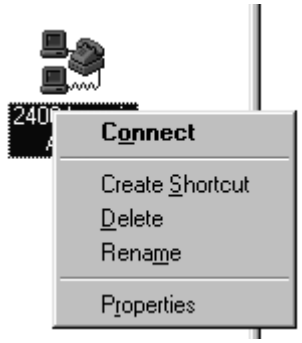
The AT commands vary from modem to modem so please contact your modem manufacturer for further information.

If the PC/laptop modem connection on the Aero-I does still not work, please contact your Aero-I service provider for further help.

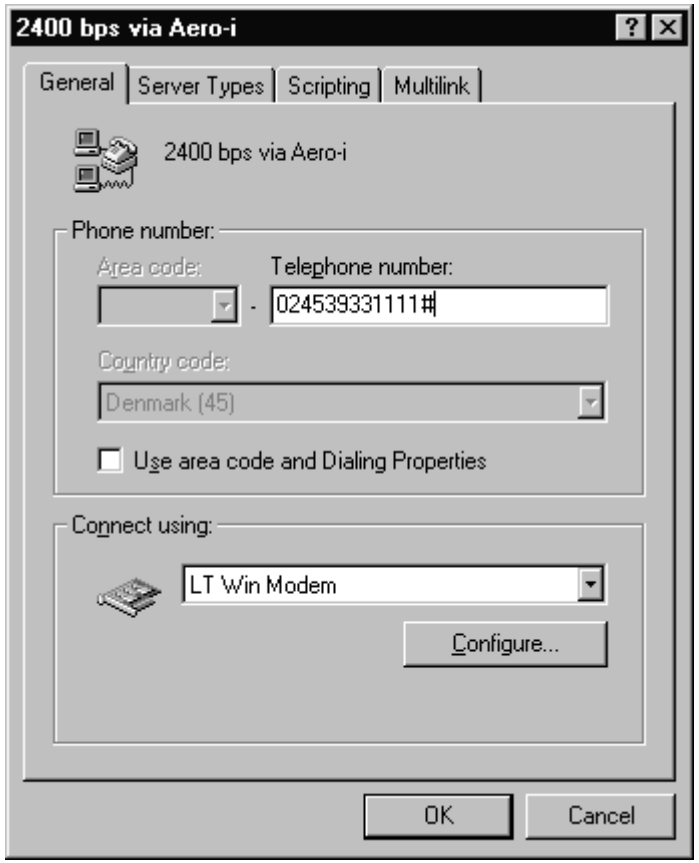
1. **E-mail and Internet access** using your home account where you dial-up and connect to your private (home) Internet Service Provider server or using an account with your Inmarsat Aero-I Service Provider.

Some Inmarsat Aero-I Service Providers also offer e-mail/Internet services. For optimum performance using Satcom, we recommend configuring your Outlook 2000™ only to download "headers" (i.e. only the contents of the e-mail subject line). Subsequently, you may select which e-mails you wish to download in their entirety. This way, you will not risk opening e-mail with a large attachment, taking a long time to download, unless you choose to do so.

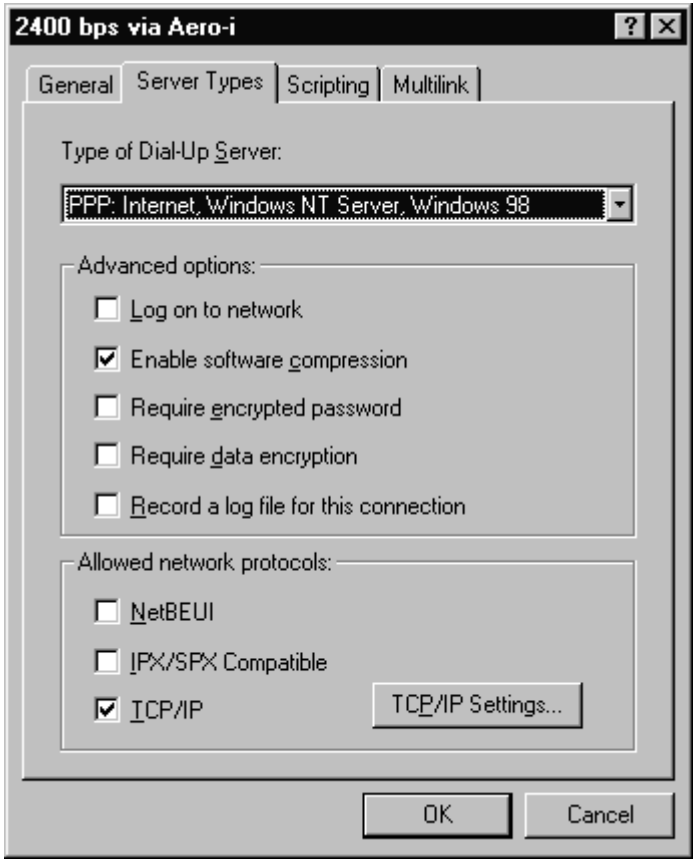
- Enter the "Dial-up Networking"-page.
- Right mouse click on the "2400 bps via Aero-I-icon



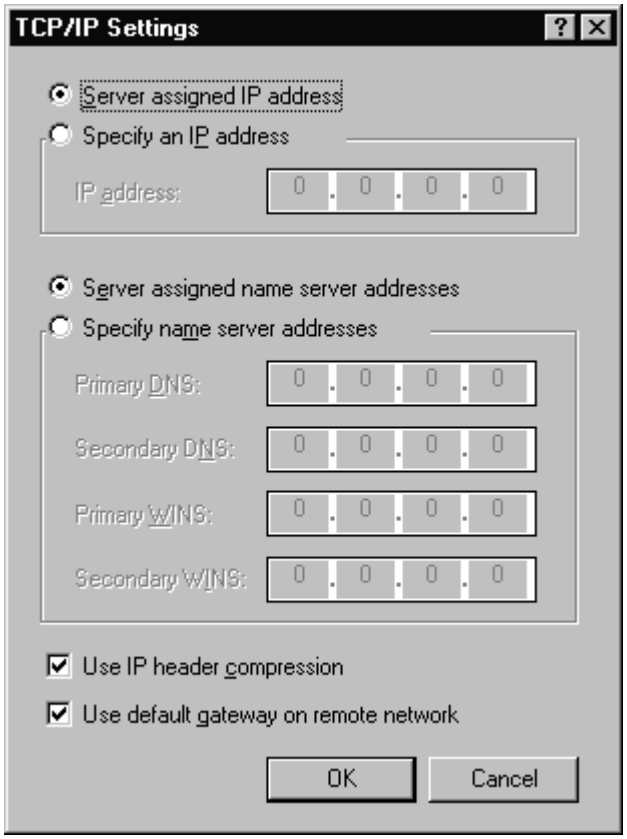
- Select "Properties"



- Select the "Server Types"-tab



- Ensure that the "Type of Dial-Up Server"-field begins with "PPP:" (Point-to-Point Protocol)
- Ensure that the "Enable software compression"-box AND the "TCP/IP"-box are both ticked
- Uncheck all other boxes
- Click "TCP/IP Settings..." (Transmission Control Protocol/Internet Protocol)

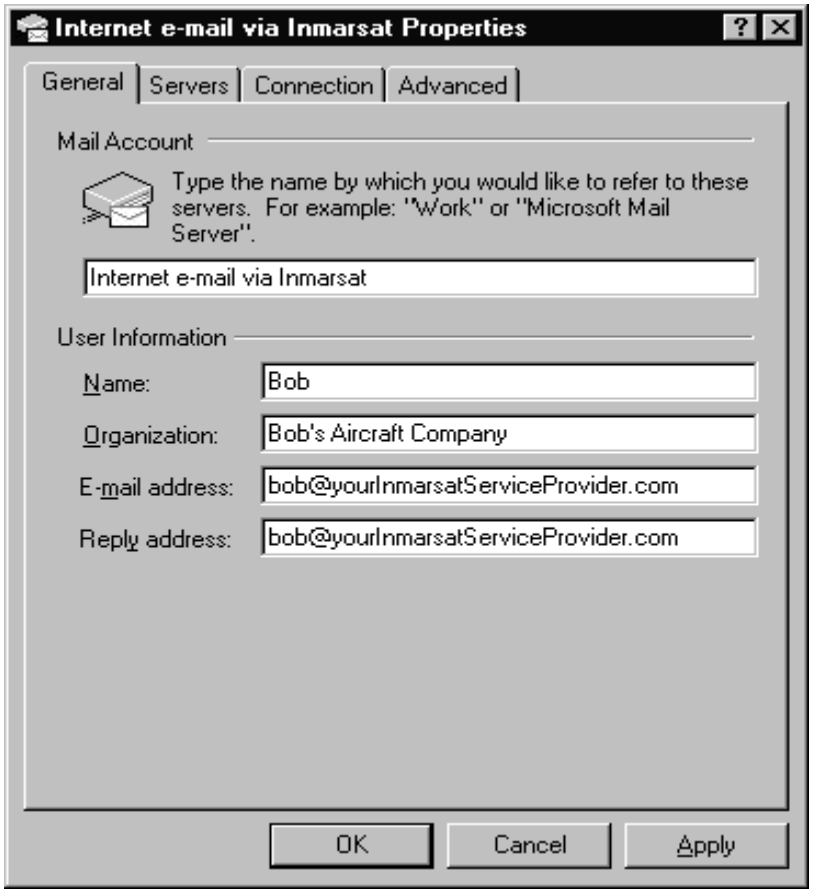


- Ensure that the "Use IP header compression"-box AND the "Use default gateway on remote network"-box are both ticked
- **If your Inmarsat/Internet Service Provider has provided you with an "IP address" (Internet Protocol),** check the box "Specify an IP address" and enter the IP address, otherwise, check the box "Server assigned IP address"
- **If your Inmarsat/Internet Service Provider has provided you with "DNS address(es)" (Domain Name Server)**, check the box "Specify name server addresses" and enter the DNS address(es). Otherwise, check the box "Server assigned name server addresses"
- Click "OK"
- Click "OK" again to exit to the "Dial-Up Networking"-page

- Now enter the Windows 98™ "Control Panel"-page (Click "Start" > Settings > Control Panel)
- Double-click on the "Mail"-icon

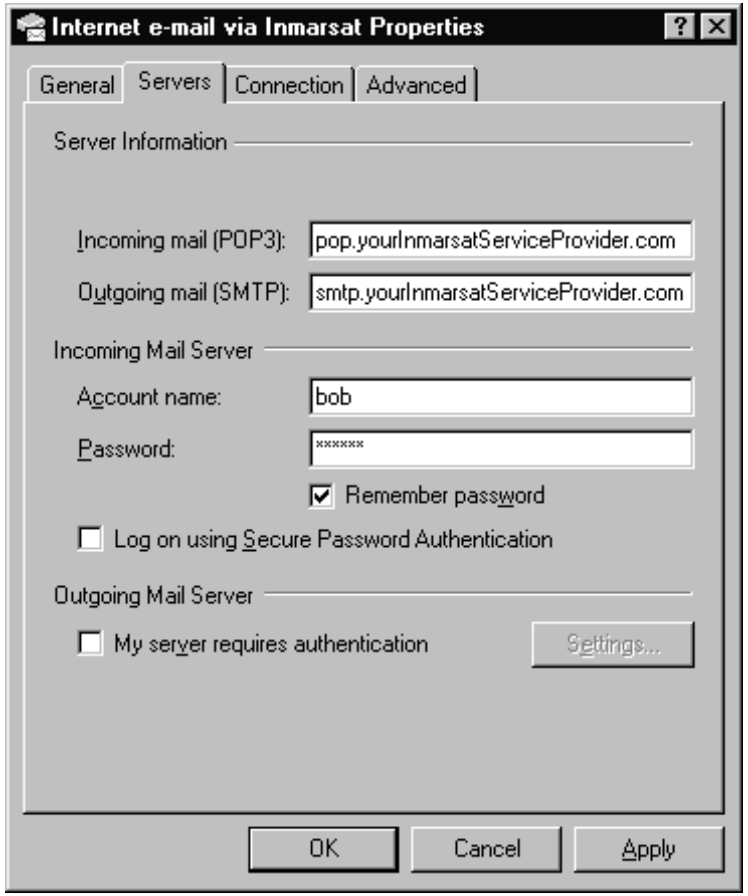
- Click "Add..."
- Select "Internet E-mail"

- Click "OK"
- Complete the fields as appropriate (please refer to relevant material from your Inmarsat/Internet Service Provider).

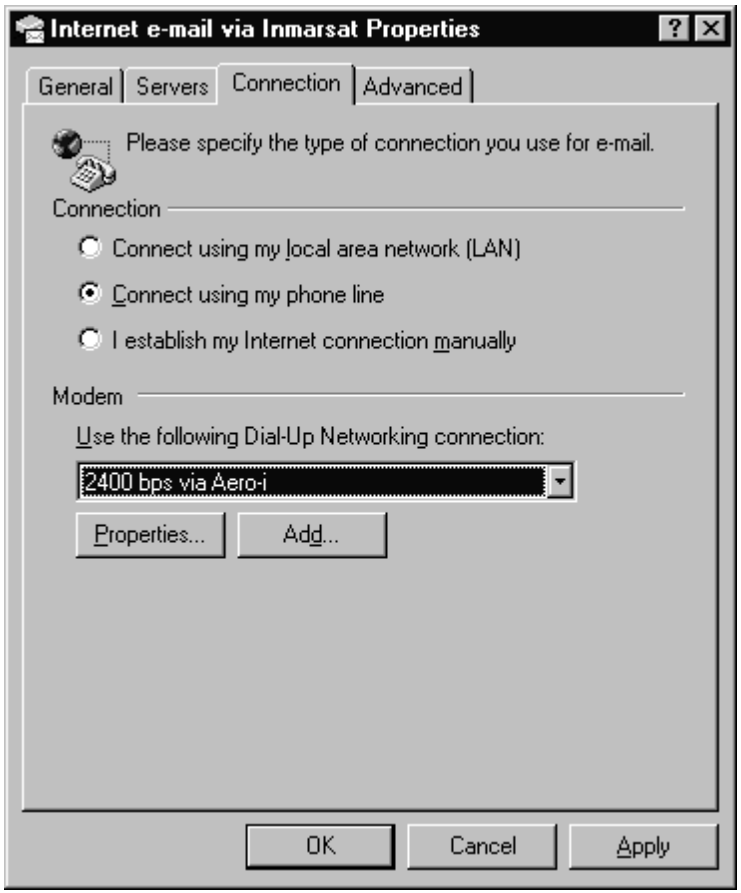


- In "Mail Account", enter a suitable name for your e-mail account (e.g. "Internet e-mail via Inmarsat")
- In "Name", enter your name (e.g. "Bob")
- In "Organization", enter the name of your company or organization (e.g. "Bob's Aircraft Company")
- In "E-mail address", enter your e-mail address (e.g. "bob@yourInmarsatServiceProvider.com")

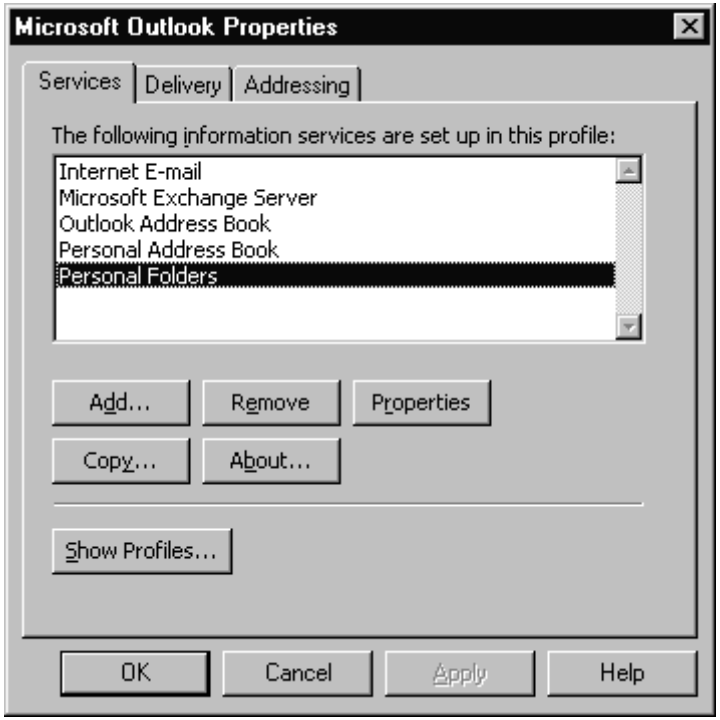
- In "Reply address", enter the e-mail address via which you wish people to reply to you. Normally the same as the above e-mail address (e.g. bob@yourInmarsatServiceProvider.com")
- Select the "Servers"-tab



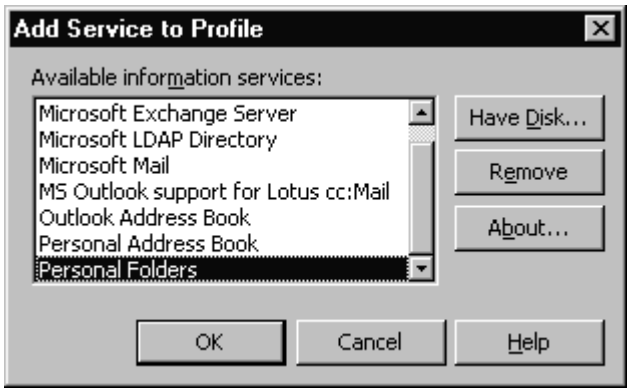
- Refer to the material from your Inmarsat/Internet Service Provider and enter as appropriate.
- Select the "Connection"-tab



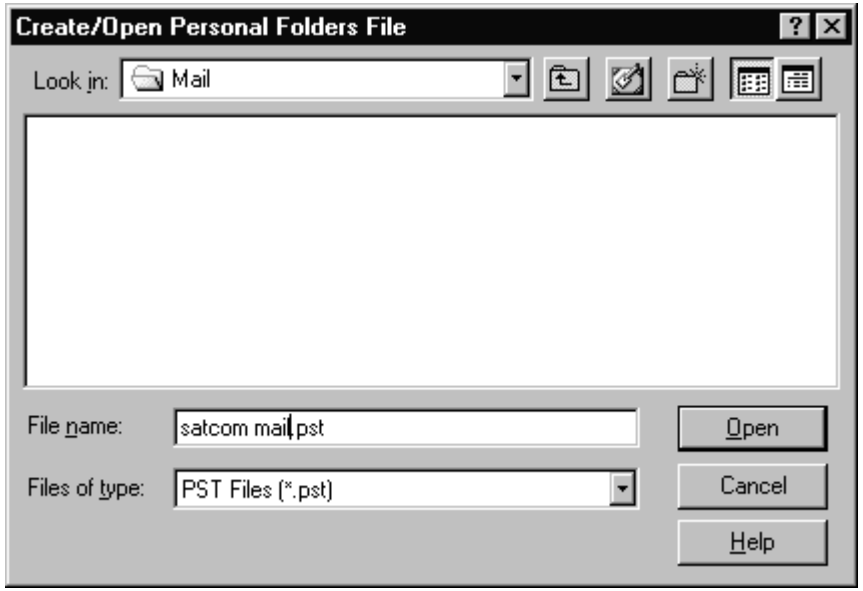
- In "Connection", select the "Connect using my phone line"-box
- In "Modem", select the "2400 bps via Aero-I"-connection from the drop down menu
- Click "OK" and the "Microsoft Outlook Properties"-window should appear



- Select "Personal Folders"
- Click "Add..."



- Click "OK"



- In "Look in", navigate to the location where you wish this Outlook mail/post file to be stored (e.g. C:\My documents\Mail).
- In "File name", give the Outlook post file a name (e.g. "Satcom mail.pst")
- Click "Open"

- In "Name", enter the name of your personal folder (e.g. Satcom Mail)
- Click "OK"
- In the "Microsoft Outlook Properties"-window, Click "OK" once more

Congratulations, you have now successfully configured your Microsoft® Outlook 2000™.

To send and receive e-mails...

- Ensure that the Aero-I is powered up AND logged on in "ALL MODES" or "CIRCUIT MODE."
- Ensure that the PC/laptop modem is properly connected to the Aero-I
- Ensure that the PC/laptop modem is properly configured
- Start Microsoft® Outlook 2000™ (Click "Start" > Programs > Microsoft Outlook) and the main Outlook window will appear.

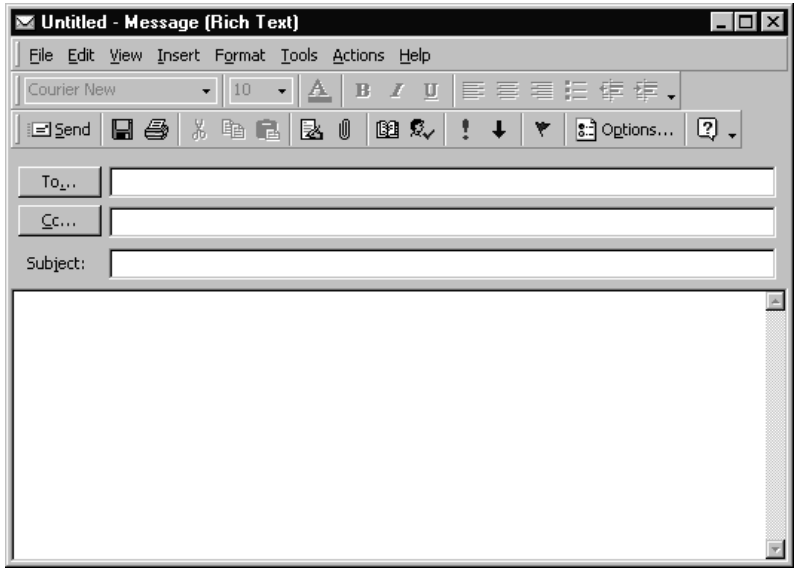
The following three underlined steps describe how to configure your Outlook 2000™ for REMOTE MAIL (i.e. to only download e-mail headers and subsequently choose which e-mails to download in their entirety). If you do not wish to only download headers, but simply to download all e-mails waiting for you - no matter the size - then please disregard the following three steps and continue with "In the "File"-menu..."

- From the "Tools"-menu, select "Remote Mail", then "Connect"
- Check the "Internet e-mail - Internet Via Inmarsat"-option, click "Next"
- The "While Connected"-screen will appear. Check the "Do Only The Following"-option. In the box below, ensure that "Retrieve Message Headers via Internet e-mail - Via Inmarsat"-option is checked, click "Finished"

IMPORTANT

If you use the "Remote Mail"-option, remember to use the "Remote Mail", and "Connect"-option under the "Tools"-menu instead of the normal "Send/receive"-option

- In the "File"-menu, select "New" and then "Mail Message" (or simply press Ctrl+N)



- In the "To..."-field, enter the recipients e-mail address or click the "To..."-button to select an address from the address book
- To save the address you have just entered into the address book, select the "Check Names"-option from the "Tools"-menu. The address will now appear underlined. With your mouse pointer on the underlined address, click the right-hand mouse button. A menu will appear. Select the "Add to Contacts"-option
- Enter a subject for the message in the "Subject"-field and enter the message in the message field below
- If you wish to attach a file click the paperclip-icon or select the "Insert"-menu, click "File..."
- To send the e-mail message, simply press the "Send"-icon or from the "File"-menu, click "Send"

Your message has now been placed in the Outbox but has not been sent yet.

You may now create more e-mail messages and store them in your Outbox for later transmission. It is more efficient to send a number of messages at once.

- Send the message(s) in your Outbox to the Internet by selecting the "Tools"-menu, select "Send/receive", select the "Internet via Inmarsat"-option. You may perform this step anytime to check for new messages.
- If you are using the "Remote Mail"-option, select the "Tools"-menu, "Remote Mail" and "Connect" to send e-mail/receive e-mail headers and to choose which e-mails to download.

Microsoft® Outlook 2000™ will now dial-up a connection to your Inmarsat/Internet Service Provider using the Aero-I. The "send/receive" process may take some time (< 1 minute). Outlook 2000™ will also check for any e-mail(s) awaiting collection from the Internet and download it into your Inbox.

At the end of this process, your Outbox should be empty. If e-mail has failed during sending, a new message will be in your Inbox next time reading e-mail with a subject of "Undeliverable". This message should contain a reason for the failure.

2. **E-mail and Internet access via your company server (known as Remote Access Server - RAS)** where you externally access your company's server (if accessible from the outside).

NOTE

For Remote Access setup, we strongly recommend that you contact your IT department for proper server and PC/laptop/Microsoft® Internet Explorer™ configuration as server types and setup may vary. We cannot guarantee operation of systems and applications not manufactured and/or supported by Thrane & Thrane A/S.

The following section describes how to access a company mail server (Microsoft® Exchange Server™) using Microsoft® Internet Explorer 5.5™ from the TT-5000 Aero-I. Consequently, you may:

- read e-mails sent to your company/business e-mail address
- send e-mails
- access the Internet (if the company server is connected to the Internet)

The setup and configuration is almost identical to remotely accessing the company server as you may have already done from a hotel suite or airport business lounge. The ONLY differences are the connection speed (2400 bps), satellite delay (200 ms) and using Microsoft® Internet Explorer 5.5™ for sending/receiving e-mails.

For RAS, The following is required:

- Server supporting a 2400 bps connection and a 200 millisecond delay
- Server USER NAME and PASSWORD
- Server DOMAIN NAME
- Server Phone Number
- Intranet address for the server
- Properly configured modem
- Properly configured PC/laptop with e.g. Microsoft® Windows 98™ for accessing the exchange server using e.g. Microsoft® Internet Explorer 5.5™

Procedure:

- Aero-I powered up AND logged on in "ALL MODES" or "CIRCUIT MODE."
- Properly setup and configured PC/laptop modem

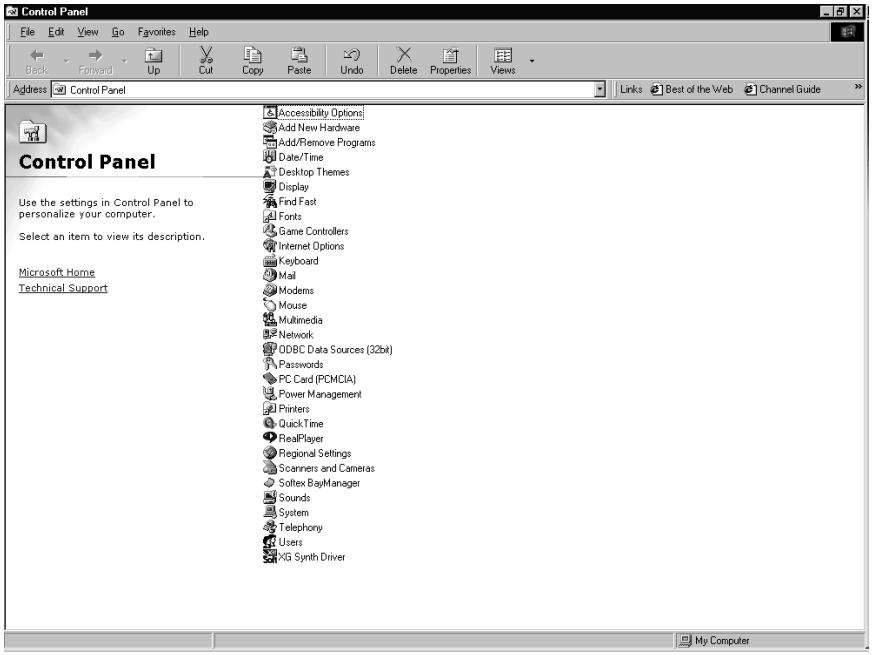
Configuration of Microsoft® Internet Explorer 5.5™

Microsoft® Internet Explorer 5.5™ may be used for browsing web pages on the Internet (World Wide Web). However, due to the relatively low Inmarsat connection speed (2400 bps), we recommend disabling all data-intensive applications (e.g. graphics). This can easily be done by entering the "Tools"-menu, selecting "Internet Options"-, click the "Advanced"-tab and enabling/disabling settings as applicable.

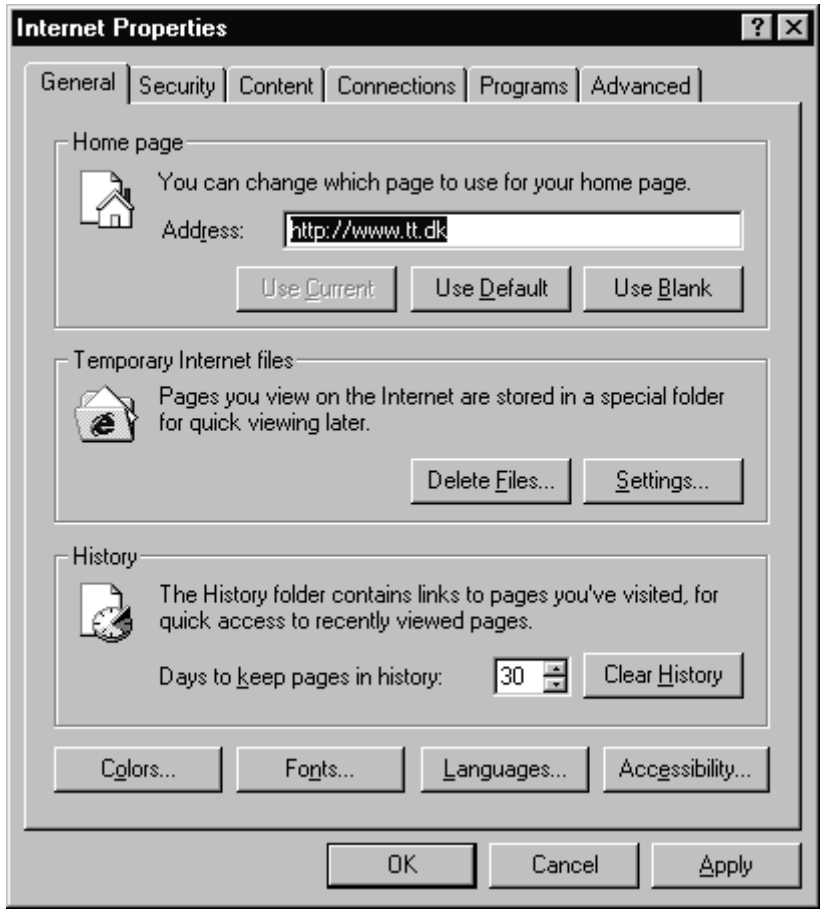
Also, as you will be connected across the Inmarsat network for the entire connection duration, substantial call charges may be incurred. The following section includes details on how to configure Windows 98™ to automatically drop the connection after a certain amount of idle time or inactivity. Naturally, you may choose not to include this option in your configuration.

For optimum performance using Satcom, we recommend the following configuration:

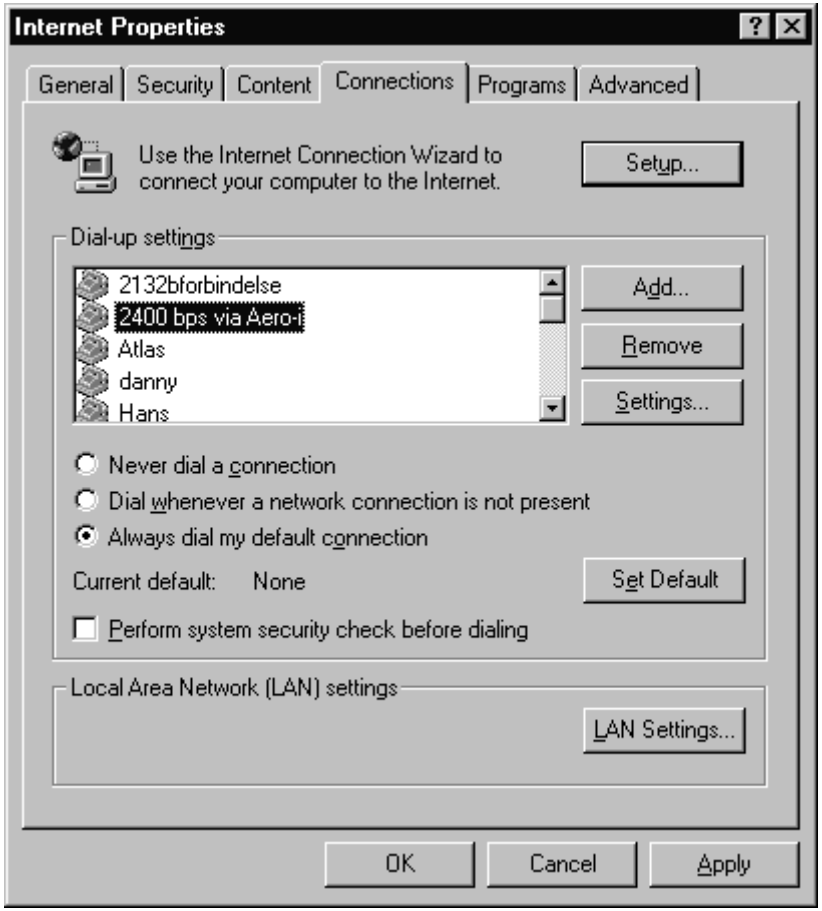
- Enter the Windows™ Control Panel (Click "Start" > Settings > Control Panel)



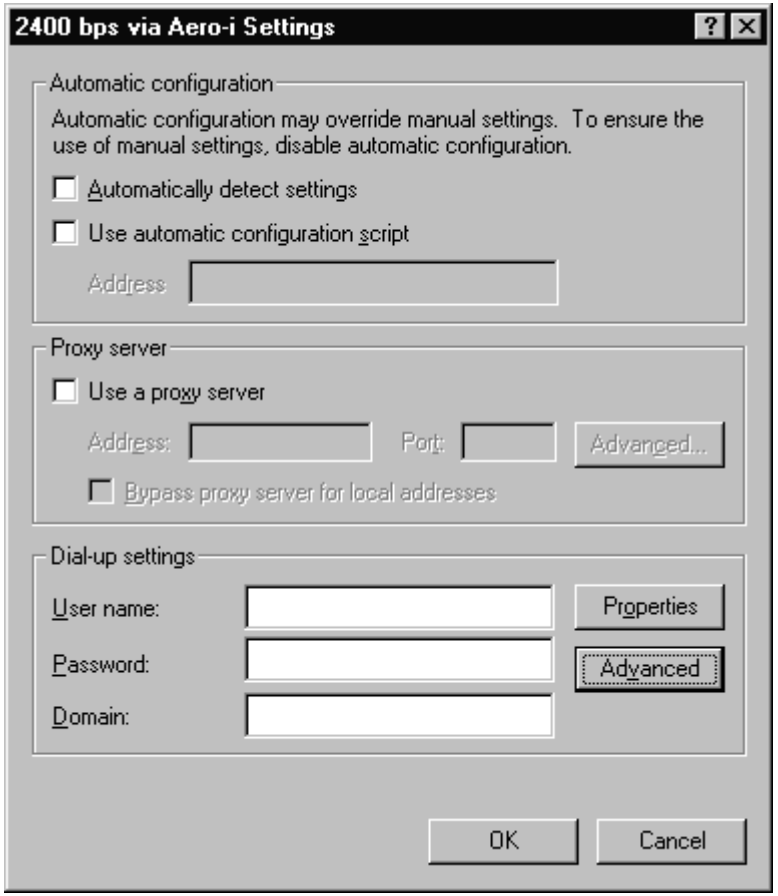
- Double-click on the "Internet Options"-icon.



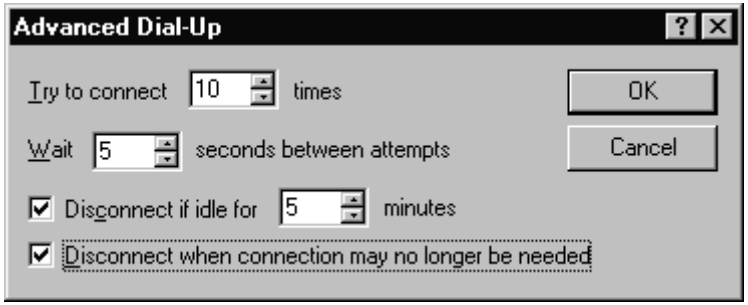
- Select the "Connections"-tab



- Check the "Always dial my default connection"-box
- In "Dial-Up Settings", click the "2400 bps via Aero-I-icon ONCE (to highlight)
- Click "Settings..."



- Click "Advanced"



- If so desired, check the "Disconnect if idle for"-box and enter the number of minutes (e.g. 5)

- If so desired, check the "Disconnect when connection may no longer be needed". This option specifies whether to automatically disconnect your modem when you have quit all Internet programs. This is useful if you are also using the connection for e-mail, chat rooms, or other Internet based programs.
- Click "OK" three times until you return to the "Control Panel"-page.

Congratulations! Now your Microsoft® Internet Explorer 5.5™ has been configured to:

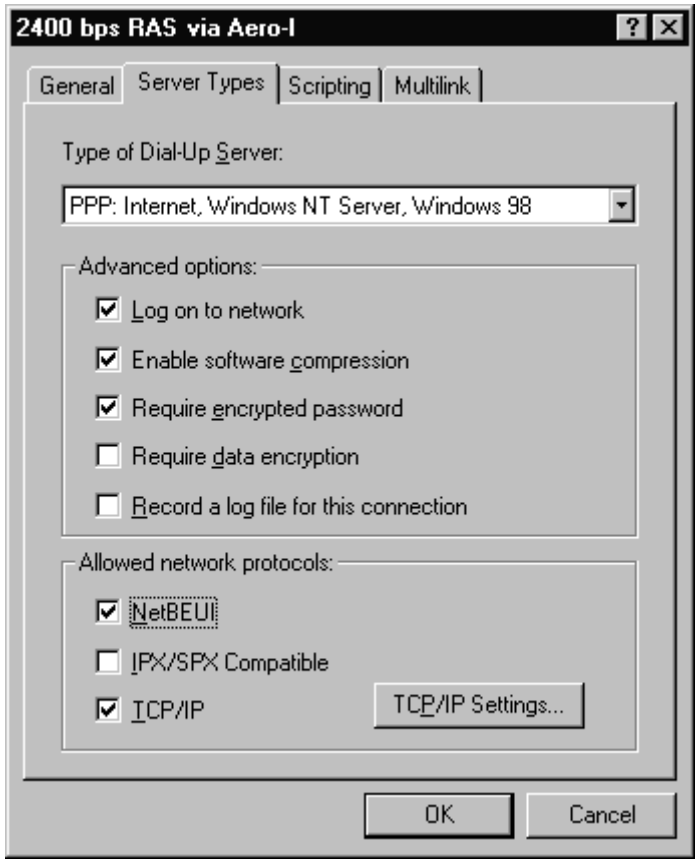
- Automatically connect to the Internet (via your Inmarsat/Internet Service Provider) when double-clicking on the Internet Explorer 5.5™ program icon using the "2400 bps via Aero-I"-connection as default
- Automatically disconnect if no data has been transmitted during the previous five- (5) minutes.
- Automatically disconnect when all e-mail, chat room, Internet etc. applications have been closed down

Network protocol setup:

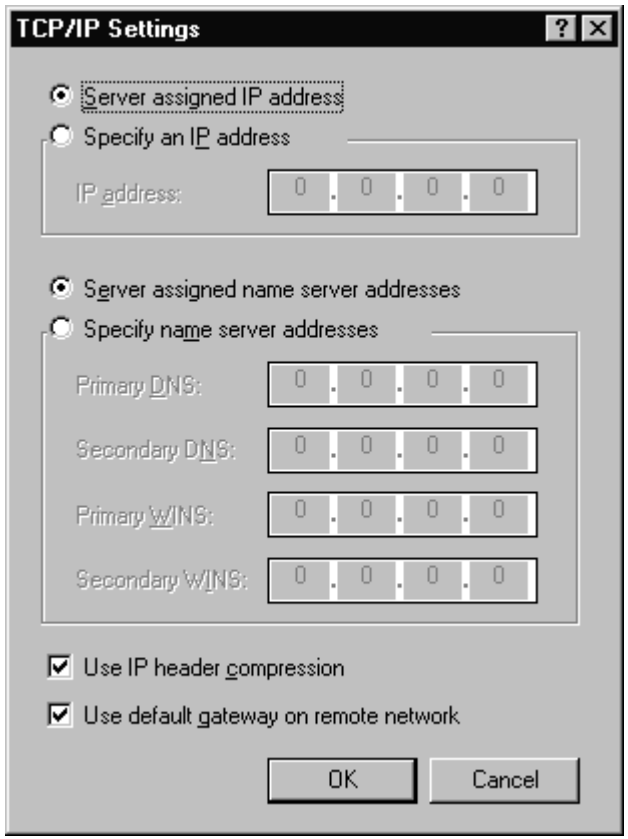
- Click "Start" > Settings > Control Panel
- Double-click on the "Network"-icon
- Click "Add", select "Adapter" and click "Add" once more
- Select "Microsoft" on the left and "Dial-up adapter" on the right and click "Ok"
- Select "Client for netware networks", and click "Remove"
- Select "IPX/SPX-compatible Protocol", and click "Remove"

- Dial-up Icon.
- Click "Start" > Programs > Accessories > Communications > Dial-up Networking.
- Double-click on "Make new connection", and make a new connection entitled e.g. "2400 bps RAS via Aero-I". (See earlier section on Dial-Up Networking setup). Or use a previously set-up Aero-I Dial-Up Networking icon.

- Having completed the connection setup, click "Properties" on the new dial-up-icon, and verify that it looks as follows:



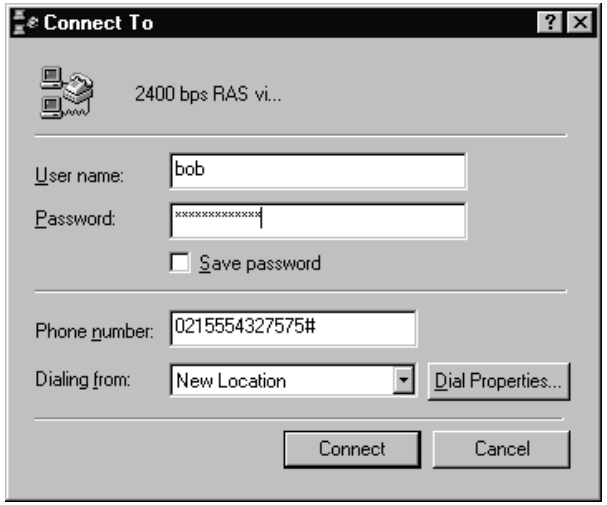
- Select "TCP/IP Settings" and verify that it looks as follows:



- Click "OK" twice to return to the Dial-Up Networking page

Dial-Up

- Double-click on the "2400 bps RAS via Aero-I"-icon.



- Enter RAS USER NAME, RAS PASSWORD, Aero-I Air-to-Ground data prefix (02), country code (e.g. 1 for the US/Canada), area code (e.g. 555), phone number for the server (e.g. 4327575), concluded with end-of-string character (#)
- Click "Connect"

Your "2400 bps RAS via Aero-I"-connection will now dial-up and establish a connection.

Log-in

Having successfully established a connection to the RAS:

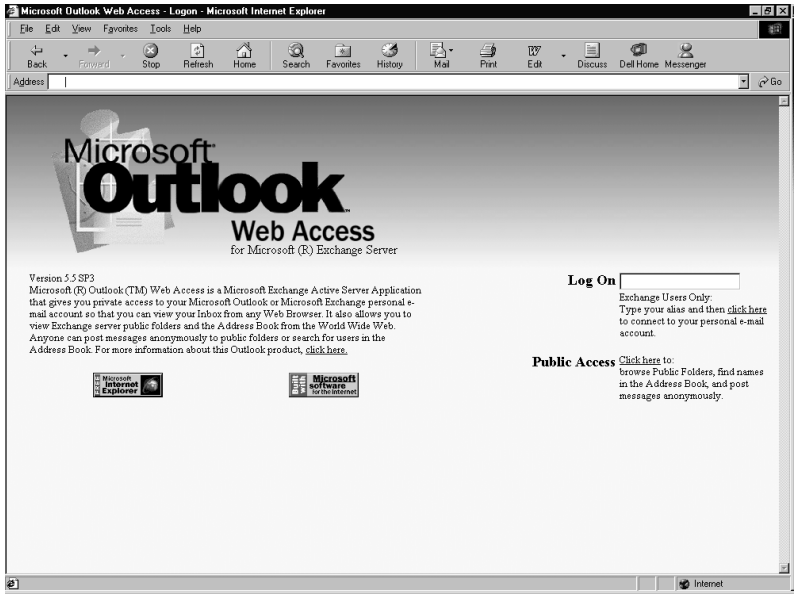
- Type in your COMPANY USER NAME, COMPANY PASSWORD and COMPANY DOMAIN NAME
- You should now be granted access to the company network (server)

Having successfully established a 2400 bps connection with your company server (RAS), you may now either browse the Internet (if your company server is connected to the Internet) or send/receive e-mails as sent to your business e-mail address. Both applications may be accomplished using Microsoft® Internet Explorer™ 5.5.

Web and e-mail access with Microsoft Internet Explorer 5.5™ using the RAS.

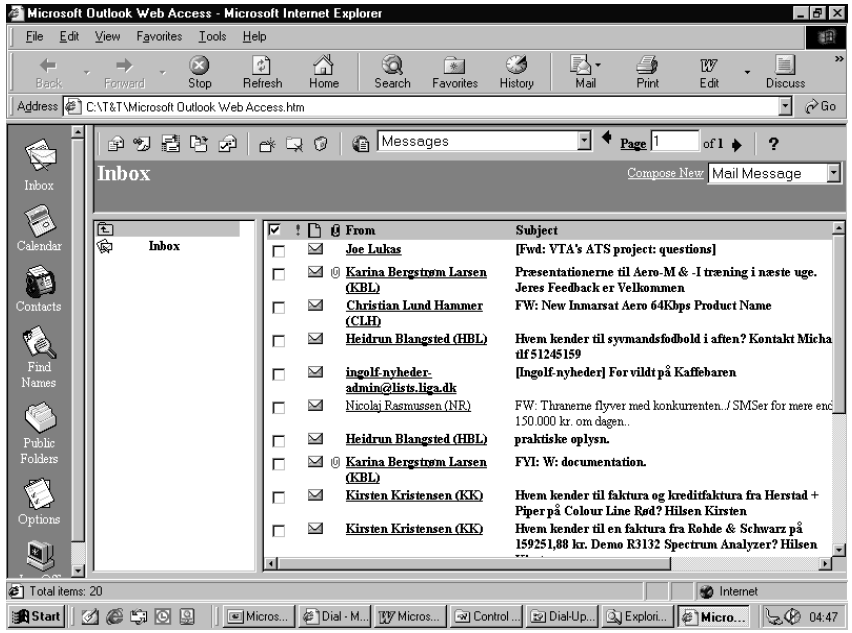
- Open Microsoft® Internet Explorer 5.5™

- In the "Address"-field, enter the Intranet address for the Microsoft® Exchange™ Server



- In the "Log On"-field, enter your COMPANY USER NAME and press enter.
- Subsequently, you may once again be prompted for your COMPANY USER NAME and COMPANY PASSWORD

- Click "Ok" and you will be presented with a RAS version of Microsoft® Outlook 2000™:



Notice that you are only presented with headers from the e-mails waiting for you on the company server. Upon selection (ticking the respective boxes on the left-hand column), the e-mail will be downloaded.

You may now send/receive e-mails using your company e-mail address.

PC-Modem Data Calls Ground-to-Air

PC-modem data calls from Ground-to-Air will normally be used for direct data transmission applications, such as Microsoft® HyperTerminal™.

The following section describes how to send data from a terrestrial network (modem) to a modem connected to the Aero-I onboard an aircraft. You may place a Ground-to-Air PC-modem data call in one of two ways:

- using the default Inmarsat Aero-I procedure or
- as provided by your Inmarsat Service Provider (e.g. using a one-number dial procedure)

Default Inmarsat Aero-I Ground-to-Air PC-modem data calling procedure

Having commissioned your TT-5000 Aero-I system, you should have received a complete listing of all relevant Aero-I phone, Fax and PC-modem data numbers. The listing includes so-called Inmarsat Direct Dial-In (DDI) numbers, which are used to route the various types of calls (i.e. voice-to-voice, fax-to-fax, data-to-data), to the correct terminal ID. Before dialing using the default Inmarsat Ground-to-Air calling procedure, however, you need to have the following information:

- You must identify within which of the four **Inmarsat satellite ocean regions** that the aircraft (Aero-I system) is currently operating?

Satellite	Satellite "Country code"
Atlantic Ocean Region East (AORE)	871
Pacific Ocean Region (POR)	872
Indian Ocean Region (IOR)	873
Atlantic Ocean Region West (AORW)	874

- You must identify the correct **terminal ID** to which the Aero-I PC/laptop modem is connected (i.e. on which full-feature handset cradle is the modem connected or to which pins is the modem wired)?

Full-feature handset	Terminal ID
#1 and #3 (or wired to the ARINC 404 top plug pins 6 & 19)	05
#2 and #4 (or wired to the ARINC 404 top plug pins 7 & 8)	06

Please refer to the listing from your Inmarsat Service Provider.

- Ensure that the modem has been properly configured for Satcom modem communication (see PC-modem Data Configuration-section).

- Enter the international access code prefix, followed by the Inmarsat satellite ocean region "country code" (871, 872, 873 or 874), the Inmarsat Aero-I service number (5), the six-digit DDI number, concluded with the terminal ID number (05 or 06) for the Aero-I modem.
- Initiate transmission.

Example:
From Denmark, calling an Aero-I modem connected to the full-feature #1 handset cradle in an aircraft operating within the Indian Ocean Region satellite (IOR):

Enter international access code from Denmark	00
Enter "country code" for the IOR satellite ocean region	873
Enter Inmarsat Aero-I service number	5
Enter six-digit DDI number (example number)	802411
Enter modem location (terminal ID for modem on handset #1)	05

Display: 00873580241105
Initiate transmission.

Example:
From the USA, calling an Aero-I modem wired directly to the ARINC 404 pins 7 & 8 in an aircraft operating within the Atlantic Ocean Region West satellite (AORW):

Enter international access code from the USA	011
Enter "country code" for the AORW satellite ocean region	874
Enter Inmarsat Aero-I service number	5
Enter six-digit DDI number (example number)	802411
Enter Aero-I modem location (terminal ID) for pins 7 & 8	06

Display: 011874580241106
Initiate transmission.

Inmarsat Service Provider-specific PC-modem data Ground-to-Air calling procedure

Depending on your Inmarsat Service Provider (ISP), the Ground-to-Air PC/laptop modem data calling procedure may vary. Your ISP may have a specific modem calling procedure (e.g. a one-number direct dial feature) facilitating modem operations. Please contact your ISP for further information.

10.5 Appendix F: BITE Error Codes

Error ID	Description	Error type	CM/ POST	LRU
00	System is OK		POST	
01	Main CPU Boot CRC Fail	Error	POST	SDU
02	Main CPU BIOS + application CRC Fail	Error	POST	SDU
03	Main CPU UART Fail	Error	POST	SDU
04	Main CPU RAM Fail	Error	POST	SDU
05	PBX DSP software	Error	POST	SDU
06	PBX DSP hardware	Error	POST	SDU
07	Parameter block	Error	POST	SDU
08	Reserved for future use			
09	Configuration module	Error	POST	SDU
10	GPS module internal error	Error	POST	SDU
11	GPS timemark interrupt error	Error	CM	SDU
12	NRS TX	Error	POST	SDU/NRS
13	ICAO address	Error	POST	SDU
14	ARINC communication	Error	POST	SDU
15	Communication with HPA	Error	POST/CM	SDU/HPA
16	Communication with PBX	Error	POST/CM	SDU
17	PBX digital switch	Error	POST	SDU
18	PBX DSP	Error	POST	SDU
19	PBX parallel port	Error	POST	SDU
20	PBX codecs	Error	POST	SDU
21	PBX UARTs	Error	POST	SDU
22	PBX Hook switch	Error	POST	SDU
23	PBX WH-10 ringer signal + codec	Error	POST	SDU
24	PBX SLICs	Error	POST	SDU
25	PBX 4-wire audio testing	Error	POST	SDU
26	PBX PCM bus interface to C-channel boards	Error	POST	SDU
27	PBX PCM bus accuracy	Error	POST	SDU
28	Main DSP software	Error	POST	SDU
29	Main DSP hardware	Error	POST	SDU
30	RF Mainboard PLL test	Error	POST/CM	SDU
31	RF C-channel board 1 PLL test	Error	POST/CM	SDU
32	RF C-channel board 2 PLL test	Error	POST/CM	SDU
33	RF Mainboard on/off test	Error	POST	SDU
34	RF C-channel board 1 on/off test	Error	POST	SDU
35	RF C-channel board 2 on/off test	Error	POST	SDU
36	RF Mainboard sweep test	Error	POST	SDU

Error ID	Description	Error type	CM/ POST	LRU
37	RF C-channel board 1 sweep test	Error	POST	SDU
38	RF C-channel board 2 sweep test	Error	POST	SDU
39	RF Mainboard AGC/ALC test	Error	POST	SDU
40	RF C-chan. board 1 AGC/ALC test	Error	POST	SDU
41	RF C-channel board 2 AGC/ALC test	Error	POST	SDU
42	BITE display failure	Warning	POST	SDU
43	Battery failure	Warning	POST	SDU
44	FPGA version	Warning	POST	SDU
45	PBX Power interrupt detect by Codec	Warning	CM	SDU
46	PBX Codec lost PCM synchronization	Warning	CM	SDU
47	Communication with GPS	Error	CM	SDU
48	Communication with NRS	Error	CM	SDU
49	NRS magnetic distortion	Error	CM	SDU/NRS
50	NRS Inclinometer out of range	Error	CM	SDU/NRS
51	NRS Magnetometer out of range	Error	CM	SDU/NRS
52	NRS internal error	Error	CM	SDU/NRS
53	NRS/IRS data valid	Error	CM	SDU/NRS/IRS
54	IRS1 unavailable	Error	CM	SDU/IRS1
55	IRS2 unavailable	Error	CM	SDU/IRS2
56	Control voltage ref. osc.	Error	CM	SDU
57	Control voltage ref. osc.	Warning	CM	SDU
58	DLNA current	Warning	CM	SDU/DLNA
59	NRS current	Warning	CM	SDU/NRS
60	RF Main board ALC level	Warning	CM	SDU
61	RF C-channel board 1 ALC levels	Warning	CM	SDU
62	RF C-channel board 2 ALC levels	Warning	CM	SDU
63	Software version check	Warning	POST	SDU
64	No connection to DLNA	Error	POST	RX SDU/DLNA
65	SDU to HPA cable cutoff	Error	CM	SDU/HPA
66	SDU to HPA cable shorted / Old HPA HW	Error	CM	SDU/HPA
67	NRS modem loop back failed	Error	CM	SDU/NRS
68	Maximum HPA output power reached.	Error	CM	HPA/SDU
69	Reserved for future use			
70-84	Antenna specific error ID's (see tables below)			
85-99	Stand alone specific error ID's (see tables below)			

Antenna specific BITE Error Codes

TT-5002A/B antenna specific error ID's:

Error ID	Description	Error type	CM/ POST	LRU
70	Reserved for future use			
71	Antenna temperature	Error	CM	Antenna
72	Antenna ROM	Error	POST	Antenna
73	Antenna RAM	Error	POST	Antenna
74	Antenna steering	Error	POST/CM	Antenna
75	Antenna any internal parameters	Error	POST	Antenna
76-84	Reserved for future use			

TT-5004A antenna specific error ID's:

Error ID	Description	Error type	CM/ POST	LRU
86	Antenna current high	Error	CM	HPA/Antenna
87	85V	Error	CM	HPA/Antenna
92	8V antenna voltage low – high	Warning	CM	HPA/Antenna

TT-5006A antenna (with built-in NRS) specific error ID's:

Error ID	Description	Error type	CM/ POST	LRU
70	Reserved for future use			
71	Inclinometer failure	Error	POST/CM	Antenna
72	Magnetometer failure	Error	POST/CM	Antenna
73	Motor failure	Error	POST/CM	Antenna
74	Motor thermal failure	Error	POST/CM	Antenna
75	End stop sensor failure	Error	POST/CM	Antenna
76	AAU FLASH memory failure	Error	POST/CM	Antenna
77	AAU SRAM failure	Error	POST/CM	Antenna
78	AAU EEPROM failure	Error	POST/CM	Antenna
79	Supplied power failure	Error	POST/CM	Antenna
80	Floating point error	Error	POST/CM	Antenna
81	Flash memory checksum Error	Error	POST/CM	Antenna
82	EEprom memory checksum Error	Error	POST/CM	Antenna
83-84	Reserved for future use			

Component specific BITE Error Codes

TT-5010A High Power Amplifier (HPA) Specific error ID's:

Error ID	Description	Error type	CM/ POST	LRU
85	ADC	Error	CM	HPA
86	Antenna current high	Error	CM	HPA
87	85V	Error	CM	HPA
88	Antenna Numeric Link-down	Error	CM	HPA
89	High Temperature	Error	CM	HPA
90	1 of 2 RF output transistors has failed	Warning	POST	HPA
91	High Temperature	Warning	CM	HPA
92	Antenna voltage	Warning	CM	HPA
93	More than 4W RF return power	Error	CM	HPA
94	2 of 2 RF output transistors has failed	Error	POST/CM	HPA
95	EEPROM Checksum	Error	POST	HPA
96	RF 26V	Error	CM	HPA
97	65V Holdup Voltage	Error	CM	HPA
98-99	Reserved for future use			

10.6 Appendix G: Logon Cause Coding List.

Display text	Reason ID	Description	Guidance
ClassReject	0x88	Class rejected	GES proposes class not supported
GlobChanLoss	0x82	Global channel loss	
GlobCunavlb	0x09	Global C channel not available at GES	
ManualLogRej	0x89	Manuel login rejected	Manual logon is not allowed when logon policy is automatic
NetworkFail	0x03	Network Failure	
NoGesSignal	0x81	No GES signal	
NoInitData	0x86	No valid system table available	
NoSatSignal	0x80	No satellite signal	Verify if there is no obstacle between Satellite and AES antenna
NotAuthorizd	0x0F	AES not authorized	Verify that the ICAO address used is correct; if it is, contact service provider to verify that the ICAO address is registered.
OtherReason	0x0E	Other Reason	
OutsideCover	0x84	Outside spot beam coverage	The AES is not under a spot beam of the specified GES
P/R/Tunavlb	0x07	Packet data channel unavailable	
PkdtaUnavlb	0x08	Packet data service unavailable	
SDUfailure	0x8A	SDU failure	Check the current bite errors
SpotChanLoss	0x83	Spot channel loss	
TableFull	0x00	Table Full	
UserLogoff	0x87	User logoff	
VCC&dUnavlb	0x0A	Voice not available at GES	
VoiceUnavlb	0x01	Voice Unavailable	
WrongGES	0x85	GES not existing	Check GES id validity
WrongGESid	0x06	Wrong GES identifier	Check GES id validity
WrongParam	0x02	Wrong Parameter	
WrongSatID	0x05	Wrong Satellite identifier	Check satellite id validity

NOTE: CAUSE Codes should not be mistaken for BITE Error Codes.

10.7 Appendix H: Reject Cause Coding List.

Text displayed	Coding Standard	Cause Class	Cause Value	Inmarsat description
	0	1	0	Normal clearing
AddrComplete	1	0	1	Address complete
AESabsent	1	7	3	AES absent
AnalogFail	1	2	3	Analogue data equipment not available
AnalogRate	1	6	2	Required analogue data rate not supported
Busy	0	1	1	User busy
CallBared	1	4	3	Incoming calls barred
CallPreempt	1	1	1	Call preempted
CallRejected	0	1	5	Call rejected
CardInvalid	1	6	1	Credit card type not supported
CardRejected	1	3	1	Credit card number rejected
ChanAbsent	0	4	2	Channel type not implemented
ContFailure	1	5	1	Continuity failure
DigitalFail	1	2	4	Digital data equipment not available
DigitalRate	1	6	3	Required digital data rate not supported
GndDestFail	0	1	11	Destination out of service
Handover	1	7	4	Spot beam handover
InvalidAddr	1	3	2	Invalid/incomplete address
InvalidNumbr	0	1	12	Invalid number format

Text displayed	Coding Standard	Cause Class	Cause Value	Inmarsat description
NetworkFail	0	2	6	Network out of order
NoAnswer	0	1	2	No user responding
NoChanAvail	1	2	1	No channel available
NoCircuit	0	2	2	No circuit/channel available
NoRoute	0	0	3	No route to destination
NoUnitAvail	1	2	2	No channel unit available
SatDestFail	1	4	1	Destination out of service
ServiceType	1	6	5	Service type not supported
SwitchBusy	0	2	10	Switching equipment congestion
UnassignedNo	1	7	2	Unassigned number
Unauthorized	1	4	2	AES not authorised
Undefined	1	7	15	Undefined cause
Unspecified	0	1	15	Normal, unspecified
User Busy	1	7	1	User busy
VoiceTypeErr	1	6	4	Voice channel type not supported
WrongNumber	0	0	1	Unassigned number

Failures are most often caused by a problem in the satellite network.

NOTE: Cause Codes should not be mistaken for BITE Error Codes.

10.8 Appendix I: International Country Codes

Country	Code	Country	Code
Argentina	54	Jordan	962
Aruba	294	Kenya	254
Australia	61	Kuwait	965
Austria	43	Lebanon	961
Bahamas	1-242	Liechtenstein	41
Belgium	32	Luxembourg	352
Bolivia	591	Macao	853
Brazil	55	Malaya	60
Bulgaria	359	Malta	356
Byelorussia	375	Mexico	52
Cameroon	238	Morocco	212
Canada	1	New Zealand	64
Cayman Islands	1-34	Nicaragua	505
Chile	56	Nigeria	234
China	86	Norway	47
Colombia	57	Pakistan	92
Costa Rica	506	Panama	507
Croatia	385	Paraguay	595
Cuba	53	Philippines	63
Czech Republic	420	Poland	48
Denmark	45	Portugal	351
Ecuador	593	Puerto Rico	1-787
Egypt	20	Rumania	40
El Salvador	503	Russia	7
Finland	358	Saudi Arabia	966
France	33	Singapore	65
Germany	49	South Africa	27
Ghana	233	South Corea	82
Greece	30	Spain	34
Guadeloupe	590	Sri Lanka	94
Guatemala	502	Sweden	46
Haiti	509	Switzerland	41
Holland	31	Taiwan	886
Honduras	504	Thailand	66
Hong Kong	852	Trinidad & Tobago	1-868
Hungary	36	Tuvalu	688
India	91	U.S.A.	1
Indonesia	62	Ukraine	380
Ireland	353	United Kingdom	44
Israel	972	Venezuela	58
Italy	39	Vietnam	84
Jamaica	1-876	Yugoslavia	381
Japan	81		