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MANDO-301/303

[AIS AtoN]

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Version 1.42

WARNING!

Please carefully read this manual before start using the AIS AtoN device. This product is an auxiliary monitoring device, and it should not be relied upon as the sole monitoring navigation system. Failure to operate this system in accordance with the operating instructions specified in this manual may result in unreliable or reduced system performance. Improper operation or installation may cause damage to the equipment or injury to personnel. AMEC shall in no event be liable for any loss of profit, personal injury, unpredictable damage arising out of incorrect operation or installation or any kind of product misuse or abuse.

SAFETY INSTRUCTIONS

WARNING
ELECTRICAL SHOCK HAZARD. Do not open the case of the equipment. Only qualified personnel should work inside the equipment.
TURN OFF THE POWER IMMEDIATELY IF WATER LEAKS INTO THE EQUIPMENT OR OBJECT DROPS INTO THE EQUIPMENT. Continue operating the equipment could cause electrical shock or fire. Contact your nearest distributor for service.
DO NOT DISASSEMBLE OR MODIFY THE EQUIPMENT. Improper disassemble or modification could cause electrical shocks, fire, or personal injury.
AVOID OPERATING THE EQUIPMENT WITH WET HANDS. Electrical shocks could be resulted if operating with wet hands.
PLEASE USE THE PROPER FUSE. Damage to the equipment or fire could be resulted if using the wrong fuse.

WARNING
TURN OFF THE POWER IMMEDIATELY IF THE EQUIPMENT IS EMMITTING SMOKE OR FIRE. Continue operating the equipment could cause electrical shock or fire. Contact your nearest distributor for service.
EVEN THOUGH THE EQUIPMENT IS WATERPROOF, PLEASE AVOID DIRECT CONTACT WITH RAIN FALLING OR WATER SPLASH. Electrical shock or fire could be resulted if water leaks into the equipment.
DO NOT PLACE ANY LIQUID-FILLED CONTAINER ON TOP OF THE EQUIPMENT. Improper disassemble or modification could cause electrical shocks, fire, or personal injury.

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1 INTRODUCTION

1.1 MANDO-301/303 Overview

Aids to Navigation (AtoN) AIS is one of the latest applications of AIS technology. The AIS AtoN transponder can be installed in lighthouse, lantern, buoy, other fixed and floating aids, or offshore platforms to transmit warning, navigational, and meteorological data to approaching vessels and/or to shore stations. AMEC offers two types of AIS AtoN: MANDO-301 (Type 1) and MANDO-303 (Type 3).

- Type 1 (MANDO- 301) – It transmits on FATDMA slots given in its configuration and has no receiver. The FATDMA slots must be pre-configured by base station.

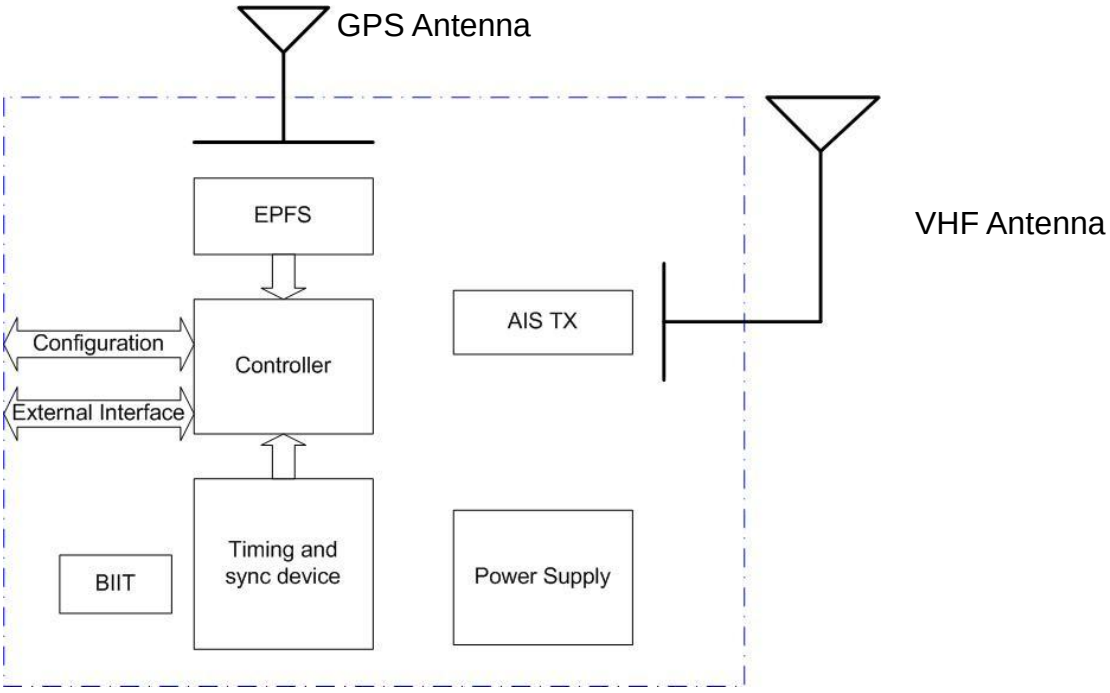

Figure 1-1-1 AIS AtoN Type 1 Block Diagram

- Type 3 (MANDO-303) – It has AIS receive and transmit capabilities in accordance with Recommendation ITU-R M.1371. Using FATDMA/RATDMA.

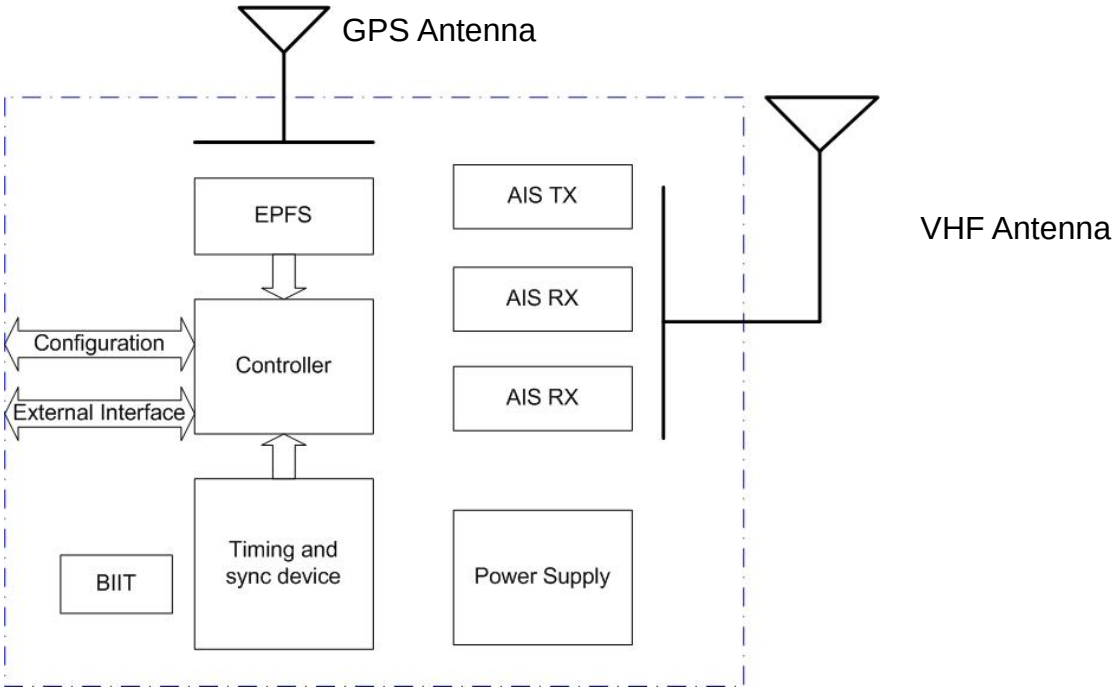

Figure 1-1-2 AIS AtoN Type 3 Block Diagram

A pre-programmed transmitting schedule can be configured to broadcast AtoN messages through FATDMA or RATDMA. The MANDO-301/303 AtoN transponder is designed to broadcast the following messages:

- Current position;
- AtoN status;
- Control information;
- Support Synthetic, Virtual and Chaining functions;
- Meteorological / hydrological information

In normal conditions, the unit transmits a report with AIS AtoN position in an ITU-R M.1371 message 21. In addition, the AIS AtoN broadcasts AIS Message 6, which enables the operator to monitor the AtoN device for solar/battery voltage, flash setting and light status. Subject to the fitting of appropriate measuring devices, meteorological/hydrological data and other parameters can be obtained via Message 8. A brief summary of all the messages processed by the AIS AtoN are defined in section 1.4.

MANDO-301/303 AIS AtoN are fully IALA and IEC compliant devices, and provide users choices from basic PCB modules to rugged aluminum enclosed unit. The compact PCB module (102mm x 105mm x 49mm) is giving a great flexibility for users to integrate AIS AtoN transceiver into their floating lantern or buoy. The weatherproof anodized aluminum housing (140mm x 155mm x 60mm) offers user the variety of mounting methods.

Moreover, AMEC's MANDO series is one of the most power-saving AtoN transceivers with the low power consumption while offshore power resources are limited.

MANDO-303 is also equipped with multiple digital/analog interfaces, which provides user the flexibility to connect other communication devices, hydraulic, and metrological sensors.

1.2 MANDO-301/303 Features

- Low power consumption
  Operation condition: 12V DC, reporting interval 3 minutes.
  - MANDO-301: FATDMA: < 0.288 Ah/day
  - MANDO-303: FATDMA: < 0.432 Ah/day
    RATDMA: < 1.656 Ah/day
- Multiple interfaces:
  - Analog input x 4
  - Digital output x 1
  - Digital input x 1
  - RS-232 x 2
  - 1 pps from internal GPS output
- Support remote configuration (for MANDO-303 only)
- Support meteorological & hydrological data
- Customer design flexibility upon request

1.3 Type of AIS

The marine Automatic Identification System (AIS) is a location and vessel information reporting system. Some elements of AIS networks are illustrated in the following table:

Table 1-3 Type of AIS elements

Class A AIS Transponder	• Transmits and receives AIS signal. • Intended for vessels meeting the requirements of IMO AIS carriage requirement. • It is mandatory for all commercial vessels that exceed 300 tons to be equipped with Class A AIS.
Class B AIS Transponder	• Transmits and receives AIS signal. • Not necessarily in full accord with IMO AIS carriage requirements. • It is not mandatory for vessels to be equipped with Class B AIS. • Suitable for recreational vessel, in enhancing its safety at sea.
AIS Receiver	• Only receives AIS signal. • Does not have transmitter to send out AIS signal. • Suitable for recreational vessel that does not want to send out its vessel information.
AIS AtoN	• AIS Aids to Navigation Station • Transmits AIS AtoN signal. • Receives .AIS AtoN signal. (Type 2 and Type 3 only) • Capable of supporting synthetic and virtual AtoN. • Can be installed in lighthouses, lanterns, buoys. • Support lantern monitoring. • Support meteorological and hydrological messages.

1.4 AIS AtoN Message

Table 1-4 Summary of AIS AtoN Messages supported by Mando Series

Message ID	Message Type	Slot Length	Description
6	Addressed Binary Message	1 to 5 (varies)	Binary payload that contains the MMSI, usually of a base station, which is designated to receive the message that is sent until it is acknowledged; May contain information about the AtoN equipment, such as meteorological and hydrological information that is obtained from a daughterboard or external sensors.
8	Broadcast Binary Message	1 to 5 (varies)	Binary payload that broadcasts to any equipment that can receive it; May contain information about the AtoN equipment, such as meteorological and hydrological information that is obtained from a daughterboard or sensors.
12	Addressed Safety Related Message	1 to 5 (varies)	Safety-related text that is addressed to a specific MMSI, usually a base station; Message is sent until it is acknowledged; Warns of an AtoN malfunction.
14	Broadcast Safety Related Message	1 to 5 (varies)	Safety-related text for broadcast communication that is received by all units that can receive the message; Warns of an AtoN malfunction.
21	Aids to Navigation Report	2 slots	AtoN position report that is usually transmitted every 3 minutes and is meant to be seen by all AIS transponders; Contains information about the AtoN, such as the origination MMSI, name of the AtoN (if applicable), and the type of AtoN (fixed or floating); Sends the Aids to Navigation Report and a warning to approaching vessels.
25	AtoN Position Report	1 to 5 (varies)	Intended for short, infrequent data transmissions and is designed to save bandwidth; Used for chaining.

1.5 About This Manual

The manual contains installation instructions and operating information for MANDO-301/303. While most of the installation can be performed by the user, a final commissioning can be done by your local agent/dealer where needed or required. AMEC and the local agent/dealer will not bear any responsibilities over any damages resulted in improper installation by unauthorized agent/dealer.

2 INSTALLATION

2.1 General

2.1.1 Safety Instructions

Before proceeding with installation, please take note of the following safety instructions and read through this installation manual carefully.

SAFETY INSTRUCTIONS

WARNING

ELECTRICAL SHOCK HAZARD
Do not open the case of the equipment. Only qualified personnel should work inside the equipment.

TURN OFF THE POWER BEFORE PROCEEDING WITH INSTALLATION.
Proceeding with installation with the power on could cause electrical shock or fire.

AVOID INSTALLING THE EQUIPMENT WHERE THERE IS DIRECT CONTACT WITH RAIN FALLING OR WATHER SPLASH.
Electrical shock or fire could be resulted if water leaks into the equipment.

MAKE SURE THE POWER SOURCE AND THE POWER INPUT OF THE EQUIPMENT ARE COMPATIBLE.
Damage to the equipment and fire could be resulted if the power sources are not correct. Please check the correct power input on the adaptor.

PLEASE FOLLOW THIS INSTRUCTION MANUL TO PROCEED WITH THE INSTALLATION.
AMEC and your local agent/dealer will not bare any responsibility of equipment damage or personnel injury due to improper installation.

WARNING

Warning Label
A warning label (Figure 2-1-1) is attached underneath the equipment. Warranty of the equipment will be invalid if this label is detached or broken. AMEC and your local agent/dealer will not bare any responsibility of any damage to the equipment, or damage in related to the equipment, personnel injury, and etc. Reject the equipment if this label is detached or broken. Please contact your local agent/dealer if this label is missing.

Figure 2-1-1 Warning label

2.1.2 Items in the Package

Table 2-1-2 Items in the Package

No.	Description		Qty
1	MANDO-301/303 AIS AtoN main unit		1
2	Installation Kit	Power cable 1.5M, AWG 16	1
		8 pin connector with waterproof cup, cable 1M, AWG 24	1
		12 pin connector with waterproof cup, cable 1M, AWG 26	1
		M4×6 Screw	8
		1/4×3/4 Screw	4
3	CD-ROM: AMEC AtoN Configuration and Operation Manual		1

2.2 Installation Procedure

Please complete the AtoN installation by the following steps:

- Unpacking
  Unpack the standard package and verify all components.

- Initial Inspection
  Inspect all hardware for damage. If there is any damage, please consult directly with AMEC or authorized local distributor/dealer. Retain original packing material for possible future use in shipping the AIS Monitoring System.

- Installing the AtoN device
  Please survey a suitable place for device installation.
  Firmly screw the four M4×6 screws from the standard package to the hole.

Installation: Horizon Type

A. Fix the mounting plat
B. Use the self drilling screw
C. Finish the installation the Device

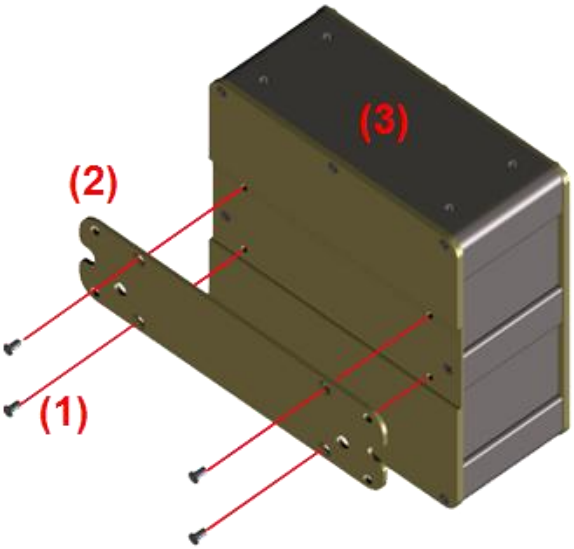

Figure2-2-1 Installation: Horizon Type

Figure2-2-2 Installation: Horizon Type

Installation: Vertical Type

D. Fix the mounting plat
E. Use the self drilling screw
F. Finish the installation the Device

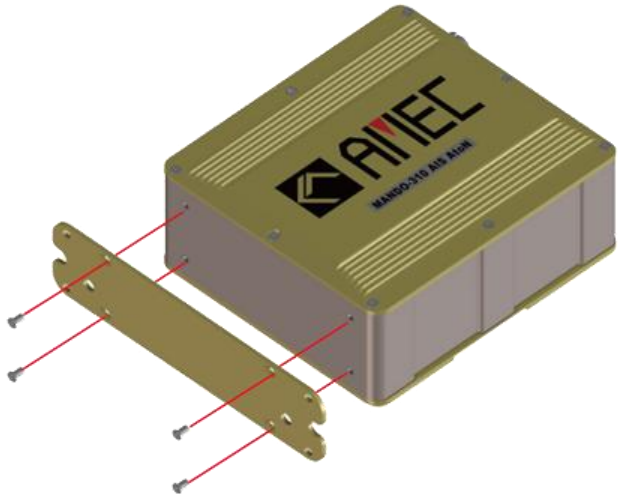

Figure2-2-3 Installation: Vertical Type

Figure2-2-4 Installation: Vertical Type

2.3. MANDO-301/303 External Connections

***NOTE:** CON1 and CON2 can be alternately used.

2.4. Installing VHF Antenna

Installation of a VHF antenna is as important as the transceiver for reliable communications. Please check the following picture and caution for your installation references.

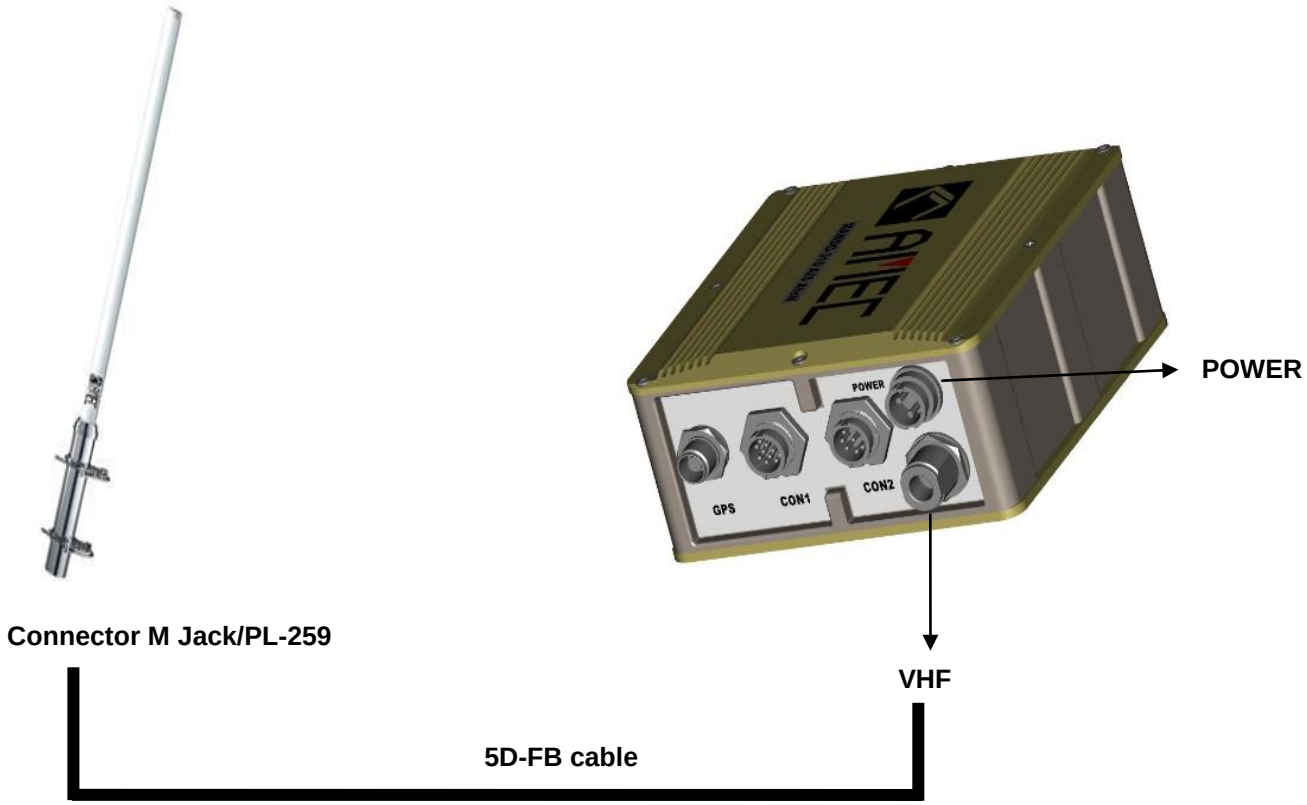

Figure2-3 Installing VHF Antenna

When installing VHF antenna, please follow all of the manufacturer's instructions with particular attention to the cable routing and connection. (For better product performance, AMEC VHF antenna is highly recommended.)

- Ensure the cable connector is carefully secured.
- Place the antenna as high as practical on the buoy and separate as much as possible.
- Ensure the antenna is installed vertically with a minimum of 2 meters of clearance from all conductive material.
- Ensure the antenna has a 360° line of sight to the horizon.

- Avoid the antenna be surrounded by any obstacle or metal object due to signal interference.
- Do not stabilize the VHF antenna with metal holder.
- The bottom of the VHF antenna is the signal receiving blind spot.
- Keep the antenna cable as short as possible.
- The antenna cable diameter should be 5D/8D or even better ones.
- Avoid bare wire winding & insulating tape wrapping when connecting with extended antenna cable.

Installation Process

1) Place the VHF antenna mounting bracket on a rigid surface and install the antenna.
2) Install the coaxial cable from the antenna to the AtoN location.
3) Connect the cable to the AtoN device.

Surge absolver

Lightning arrestors should be used in all antenna cables if there is a risk of lightning strike.

2.5. Installing GPS Antenna

Since the punctuality of internal transmission of the AtoN device relies on the accuracy of the time signal obtained from the GPS system, the correct installation of GPS antenna is essential. When installing GPS antenna, please follow all of the manufacturer's instructions with particular attention to the cable routing and connection. (For better product performance, AMEC GPS antenna is highly recommended.)

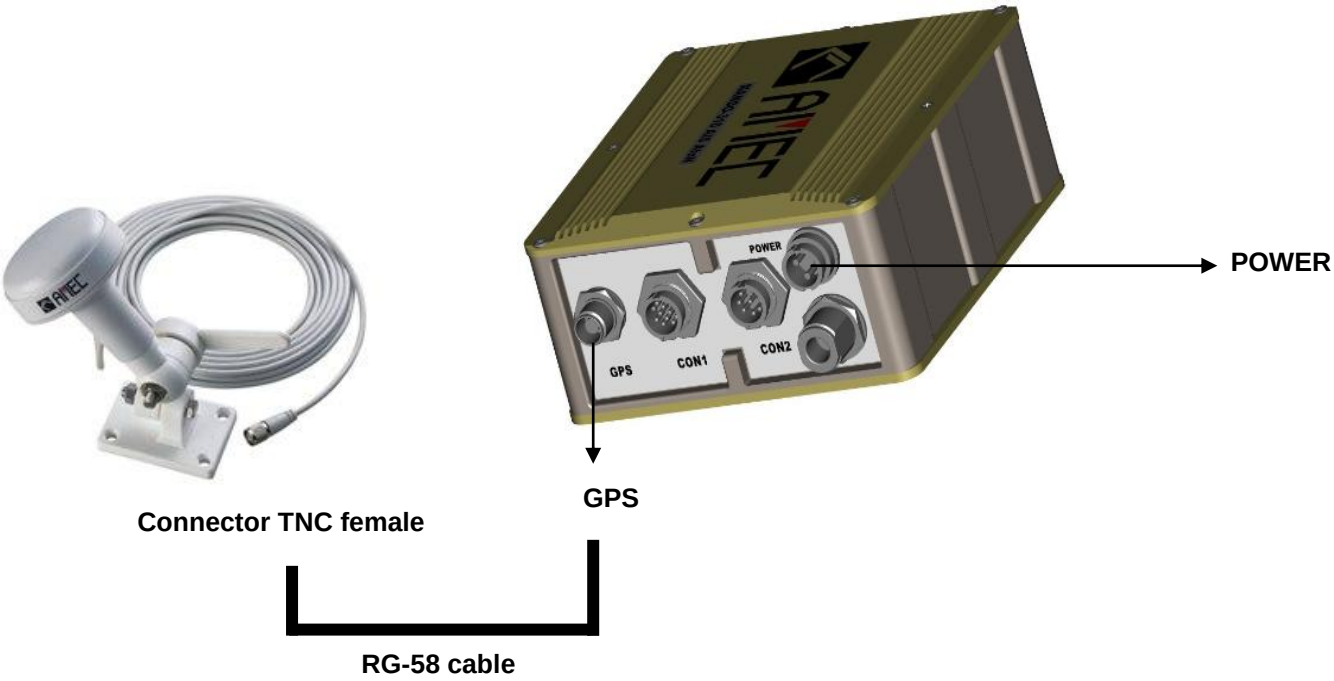

Figure 2-4 Installing GPS Antenna

When installing the GPS antenna, follow the cautions below.

- Ensure the cable connector is carefully secured.
- Position the antenna as high as possible to prevent ice or spray from negatively affecting signal reception.
- Be sure no obstructions are between the GPS antenna and the sky.
- Place the GPS antenna at least 3m from the VHF antenna due to signal interference.

Installation Process

1) Place the GPS antenna mounting bracket on a rigid surface and install the antenna.
2) To reduce signal interference, use only high quality coaxial cable and keep the cable length as short as possible.
3) Install the coaxial cable from the antenna to the AtoN device location.
4) Connect the cable to the AtoN device.

Surge absolver

Lightning arrestors should be used in all antenna cables if there is a risk of lightning strike.

3 WIRING DIAGRAM/PIN DEFINITION

■ Power Connector

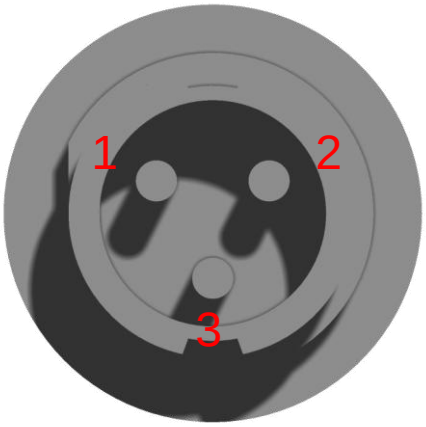

Figure 3-1 Pin Assignments Front View

Pin number	Pin definition	Description	Color
1	PWR	Positive (+), the input should be 12V DC	Red
2	N/A	N/A	N/A
3	GND	Power ground	Black

■ **Con1: (ADC & RS-232)**

Figure 3-1 Pin Assignments Front View

(Part No.: LTWBU-12BFFM-LL7A01 by Amphenol LTW)

Pin number	Pin definition	Description	Color
1	RS232 TX	Communication interface	Brown
2	GND	Signal ground (RS-232)	Blue
3	1 pps	1 pps (1 pulse per second from GPS) *	White
4	GND	Ground(GPS)	Green
5	ADC4	Analog to Digital input 4	Yellow
6	ADC3	Analog to Digital input 3	Gray
7	ADC2	Analog to Digital input 2	Pink
8	ADC1	Analog to Digital input 1	Red
9	RS232 RX	Communication interface	Black
10	GND	Ground	Orange
11	NC	Not connect	Purple
12	NC	Not connect	Light Green

* 1pps will be sent out when the GPS is power on and in 3D fix.

*NOTE: Analog to digital input (Pin 5~8) are used to measure voltage between 0V~36V range.

■ **Con2: (Control, Monitor & RS-232)**

Figure 3-2 Pin Assignments Front View

(Part No.: LTWBD-08BFFM-LL7A01 by Amphenol LTW)

Pin number	Pin definition	Description	Color
1	RS232_RX	Configuration interface	Black
2	RS232_TX	Configuration interface	Brown
3	GND	Signal ground (RS-232)	White
4	ALM_C	ALARM C	Blue
5	ALM_B	ALARM B	Red
6	ALM_A	ALARM A	Orange
7	CTL_IF	Digital in signal	Yellow
8	V_CTL	Digital in power	Green

***NOTE :**

1. RS-232 Tx & Rx should be reversed when connecting to PC. (Tx→Rx; Rx →Tx)
2. Software will change depend on customer's application.
3. Digital in (Pin 7&8) is used to inform MANDO for event was happened. Only need connect V_CTL to the voltage (0V~36V), and connect the CTL_IF to GND.
4. Under normal operation, ALM_A will be connected to ALM_B. When MANDO works improperly or out of power, ALM_A is connect to ALM_C to notice user.

4 MANDO-301/303 CONFIGURATION

4.1 Configuration Start-up

Step 1: Connect the AtoN device with PC/Laptop via RS-232 serial port. Prepare a RS-232/USB converter when RS-232 serial port is not supported by your PC/Laptop.

Step 2: Connect the AtoN device with 12V DC (10A) power source. It is highly recommended to use a power adapter stabilizing the power source.

Step 3: Power on the AtoN device.

Step 4: Turn on PC and load AMEC Configuration Program CD. And make sure it has been properly installed on your PC/Laptop.

Step 5: Double click

and start AMEC Configuration Program.

<u>*NOTE:</u> All message assignments and intervals must be defined and approved by the appropriate competent authority, such as the local port authority where the AtoN device is installed.

4.2 Serial Port Searching

■ Windows VISTA version

Click on “Start” → Select “My Computer” → Mouse right click “Properties” → Select “Device Manager” → Click Port (COM&LPT)

■ Windows XP version

Click on “Start” → Select “My Computer” → Click “Control Panel” → Select “System” → Choose “Hardware” → Select “Device Manager” → Click Port (COM&LPT)

Choose the Prolific RS-232-to-Serial Com Port (Com3) as designated port numbers.

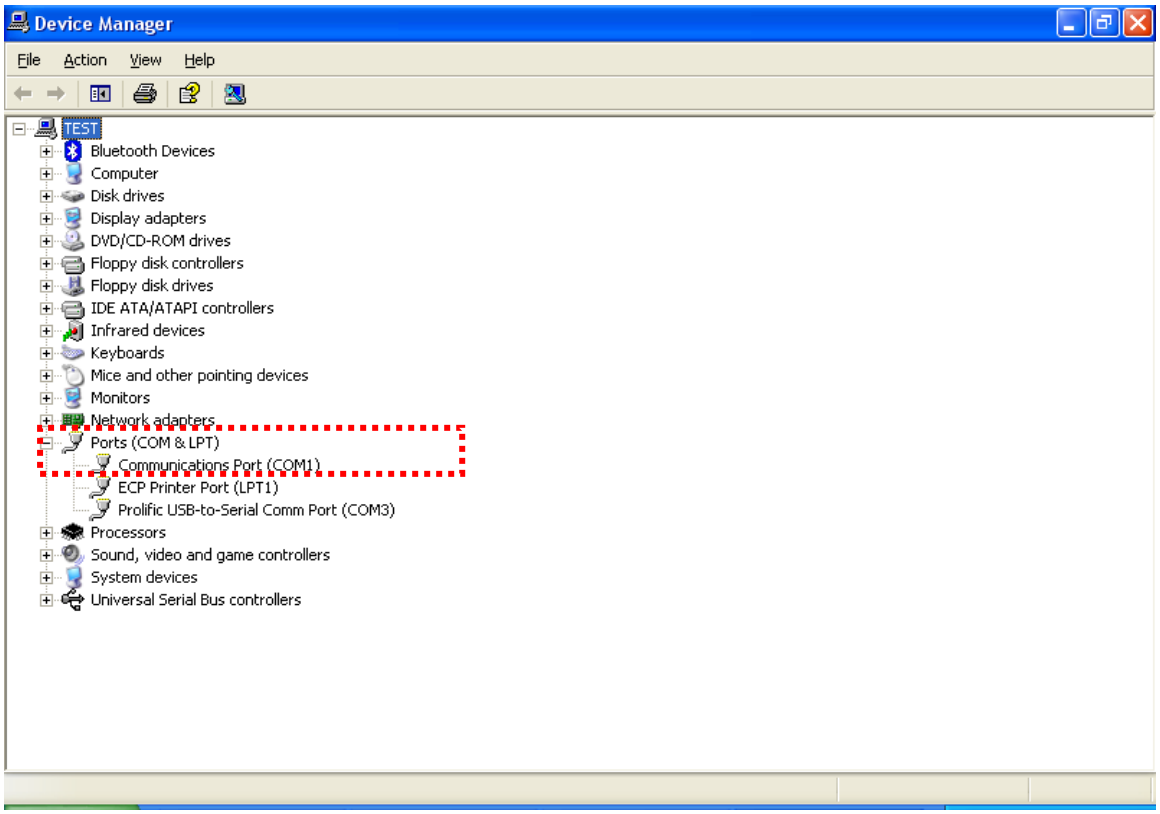

Figure 4-2 Serial Port Searching

4.2.1 Serial Port Setting

Step 1: Start AMEC MANDO-301/303 Configuration Program.
Step 2: Enter the corresponding Serial Port & Baud Rate information.
Step 3: Click “Connect” to complete and save the setting.

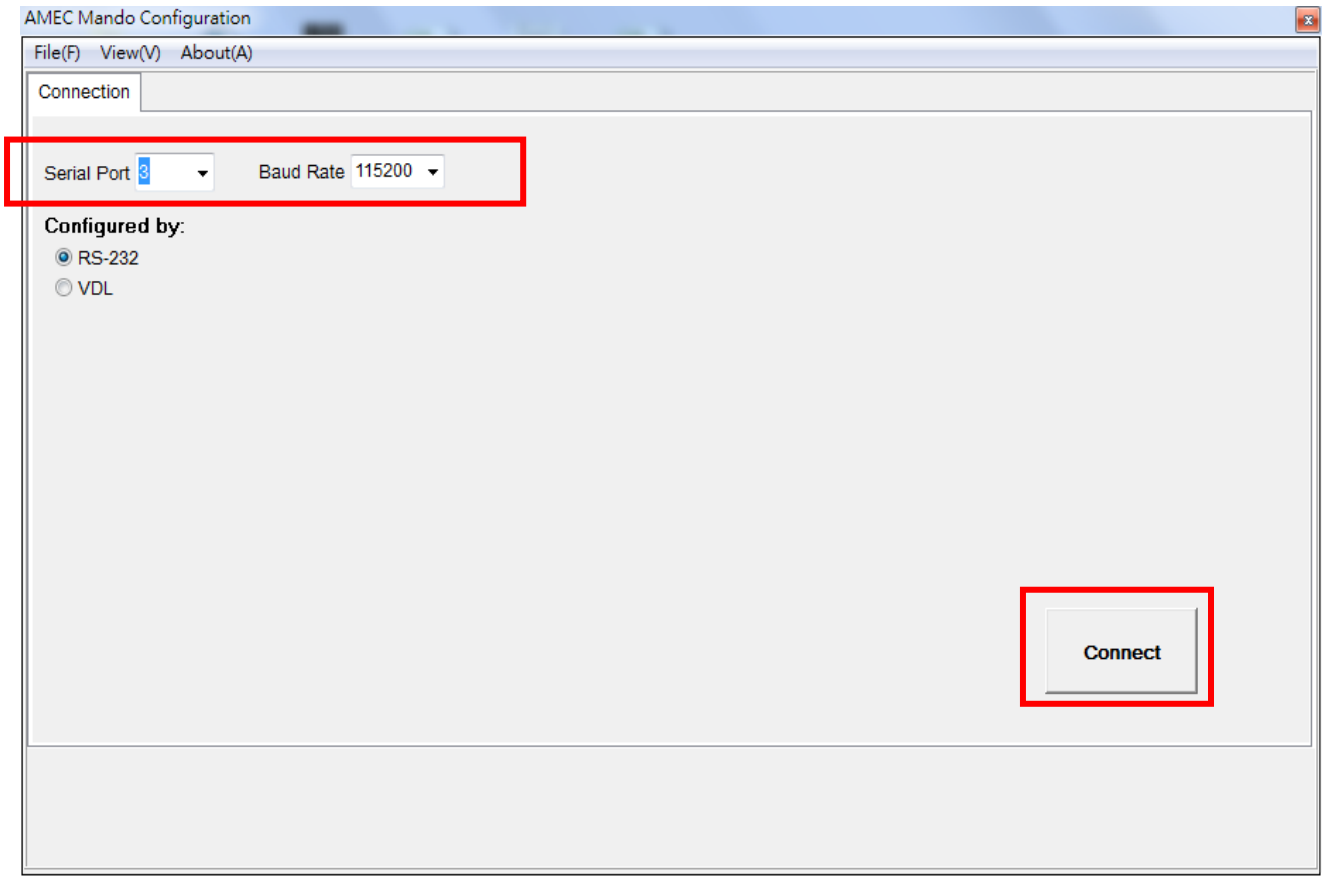

Figure 4-2-1-1 Serial Port Setting

<u>*NOTE:</u> Only “Serial Port” and “Baud Rate” need to be set, other parameters are default.
AMEC MANDO-301/303 default Baud Rate is 115,200-bps.

If you key-in wrong Serial Port, you could not enter in and PC/Laptop will jump up a window to

remind you to re-check Serial Port.

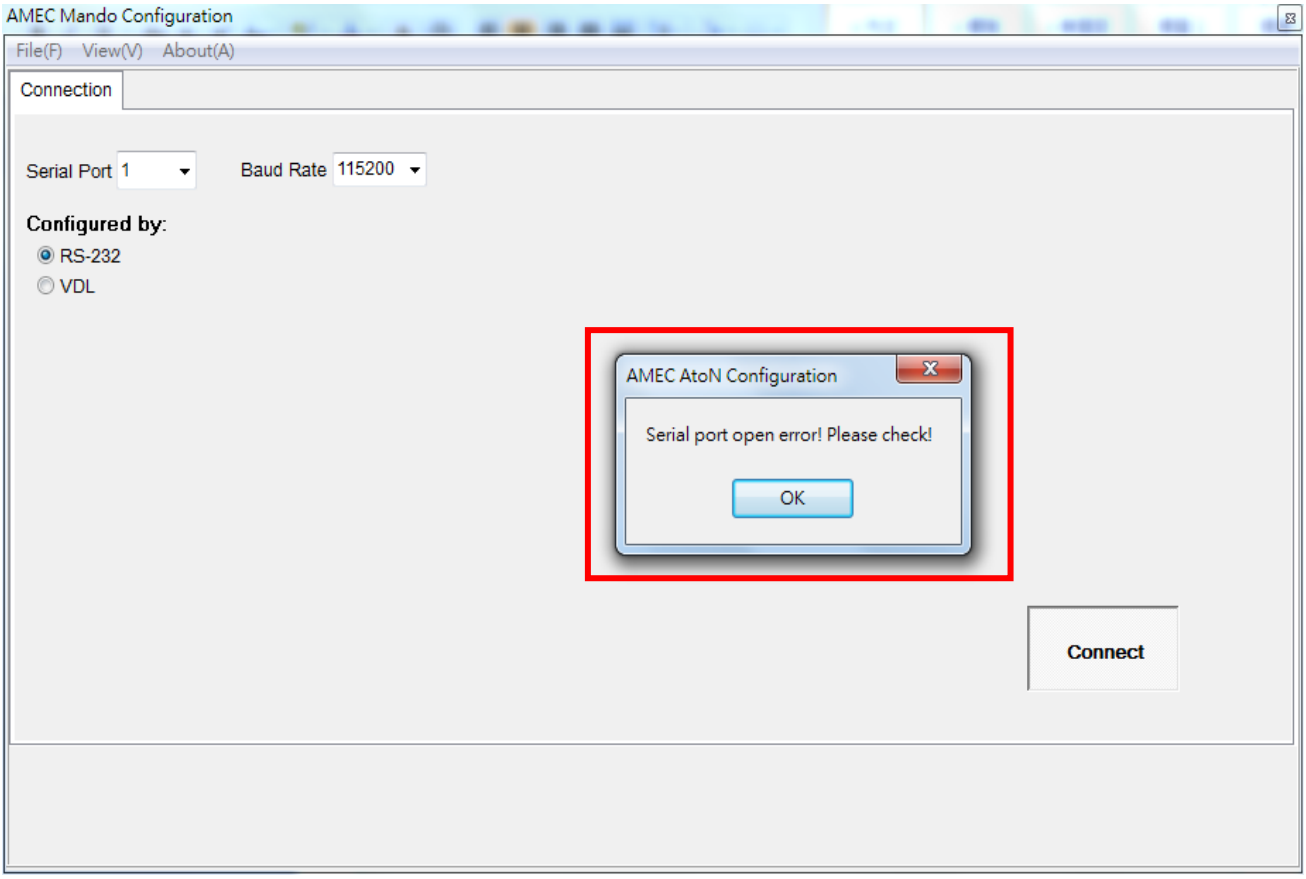

Figure 4-2-1-2 Error Serial Port

If you do not connect Power or other problem, PC/Laptop will jump up a window to remind you to re-check all connection.

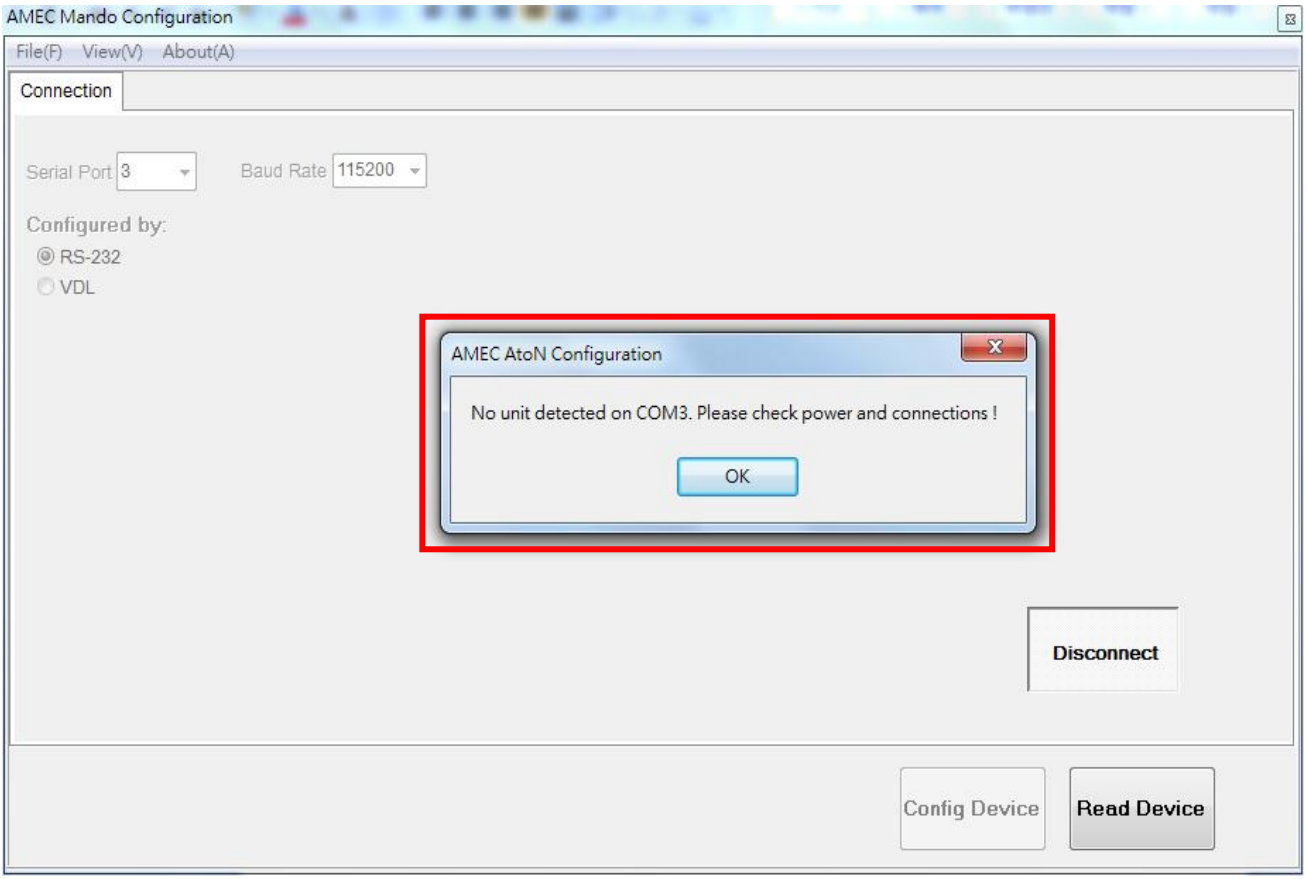

Figure 4-2-1-3 Connections failed

4.2.2 VDL Setting

If your device is MANDO-303 (Type 3), you could remote other MANDO-303(Type 3) via VDL.

Step 1: After setting Serial Port and connecting with PC/Laptop, please choose “VDL”.

Step 2: Enter desired MMSI which you would like to remote control.

Step 3: Click “Connect” to complete and save the setting.

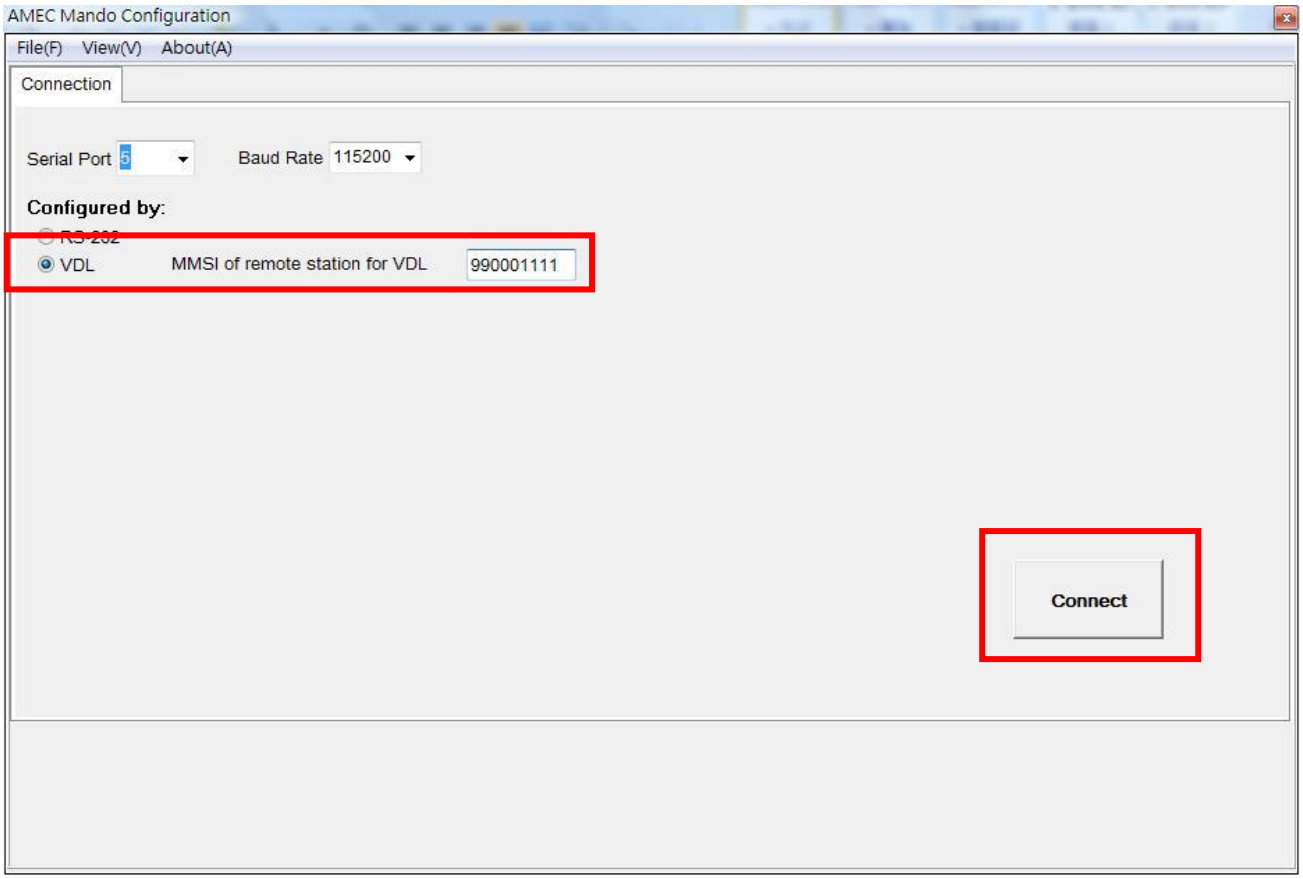

Figure 4-2-2 VDL Setting

***NOTE:** After setting the “VDL”, you can continue setting the following tabs.*

4.3 AtoN MMSI Setup

Step 1: Enter the valid MMSI number under “MMSI” column.
Step 2: Select “Real AtoN” under the “Real / Virtual” column.
Step 3: Click “Create” to save and create the new MMSI.
Step 4: Press “Read Device” to confirm and review the MMSI setting.

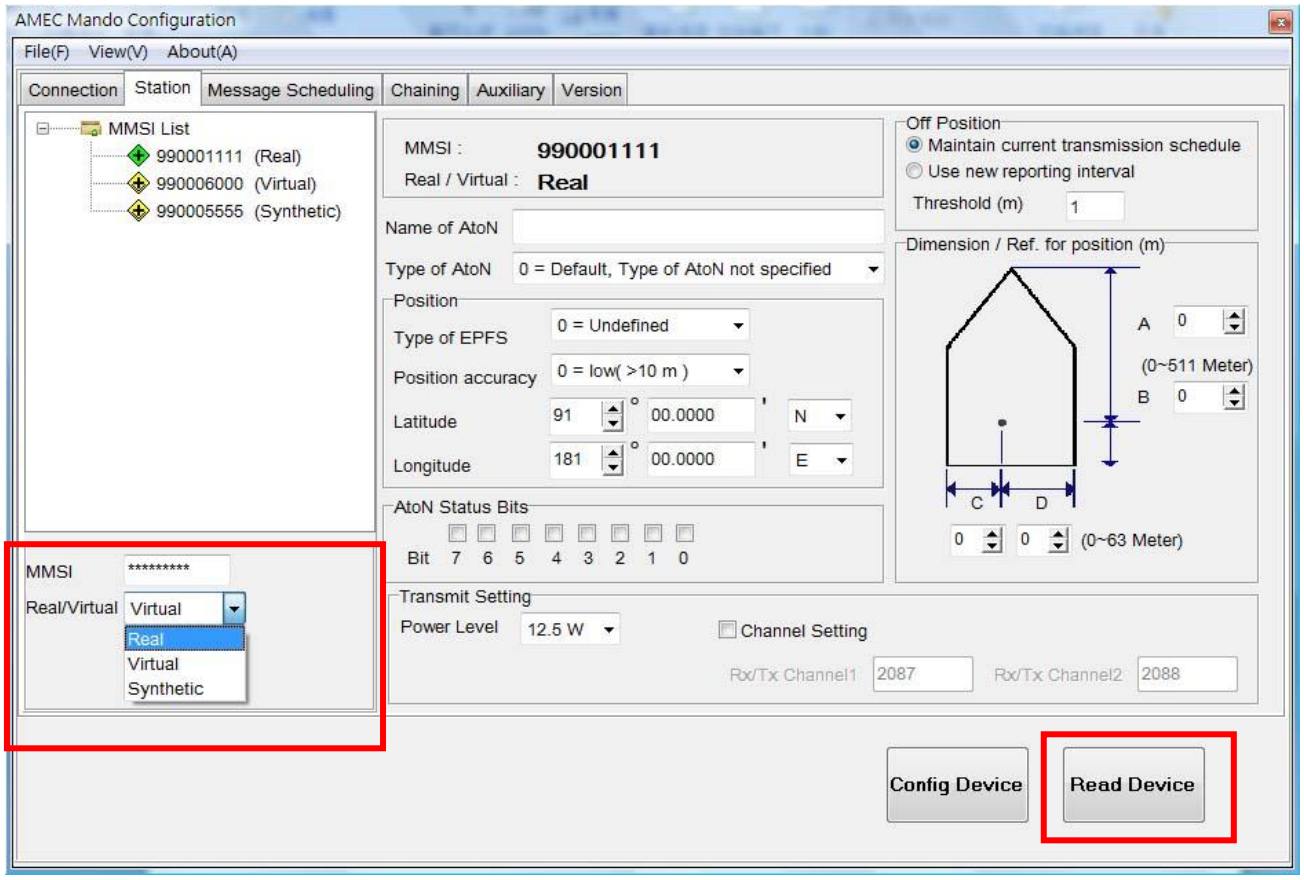

Figure 4-3-1 AtoN MMSI Setup

<u>*NOTE 1:</u> The MMSI number is controlled by a competent authority and must be a legitimate number.

<u>*NOTE 2:</u> The default MMSI number is *000000000*. A MMSI number for Real AtoN must be setup first before creating other MMSI for Virtual or Synthetic AtoN .

Please follow all steps above to create Virtual MMSI or Synthetic MMSI.
Check if there are all correct MMSI data saved in the “MMSI” column.

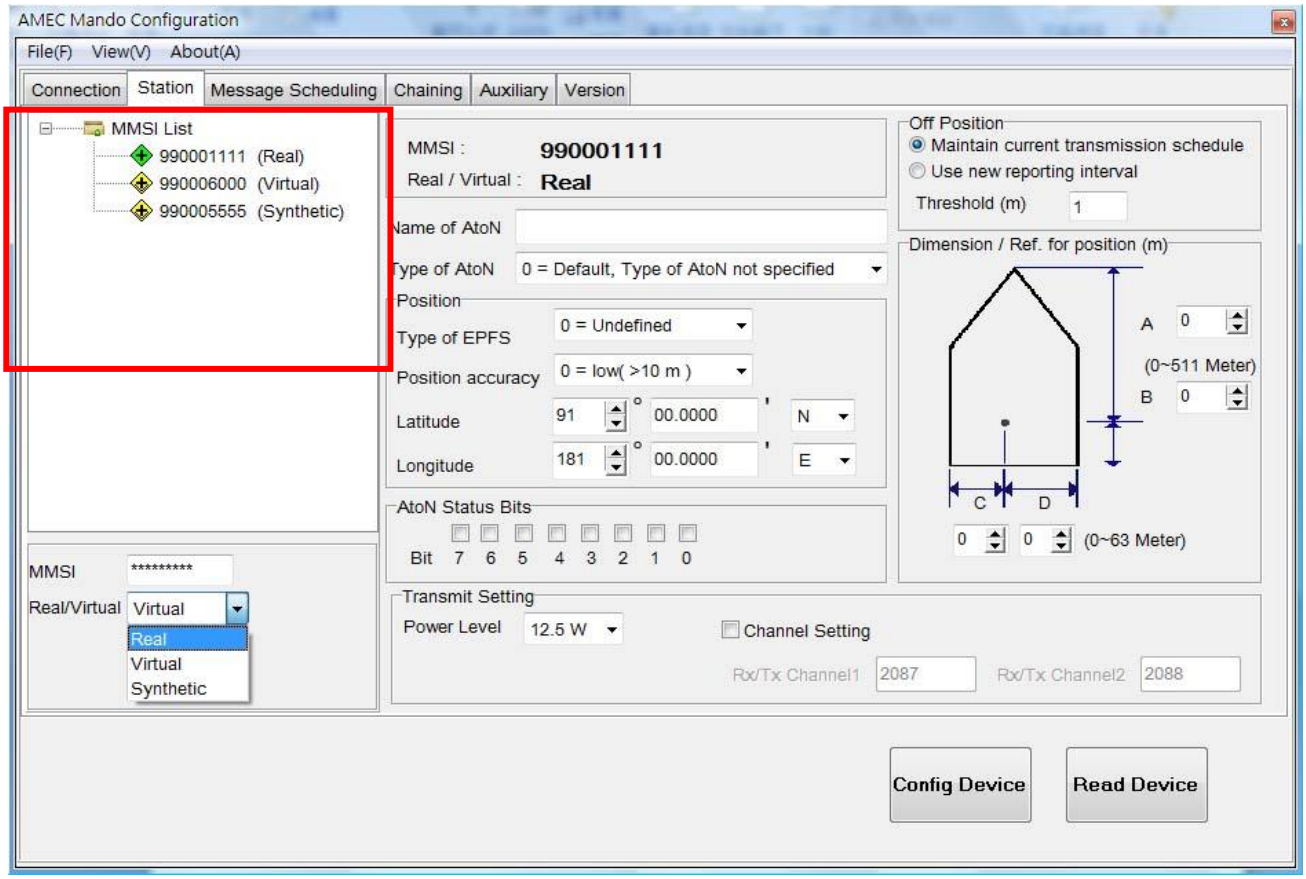

Figure 4-3-2 AtoN MMSI Setup

4.4 Delete Selected MMSI

- Select the desired MMSI to be deleted under the “MMSI” column.
- Right-click and it will jump up window written “Delete”.
- Click “Delete” to erase all setting of this MMSI number.

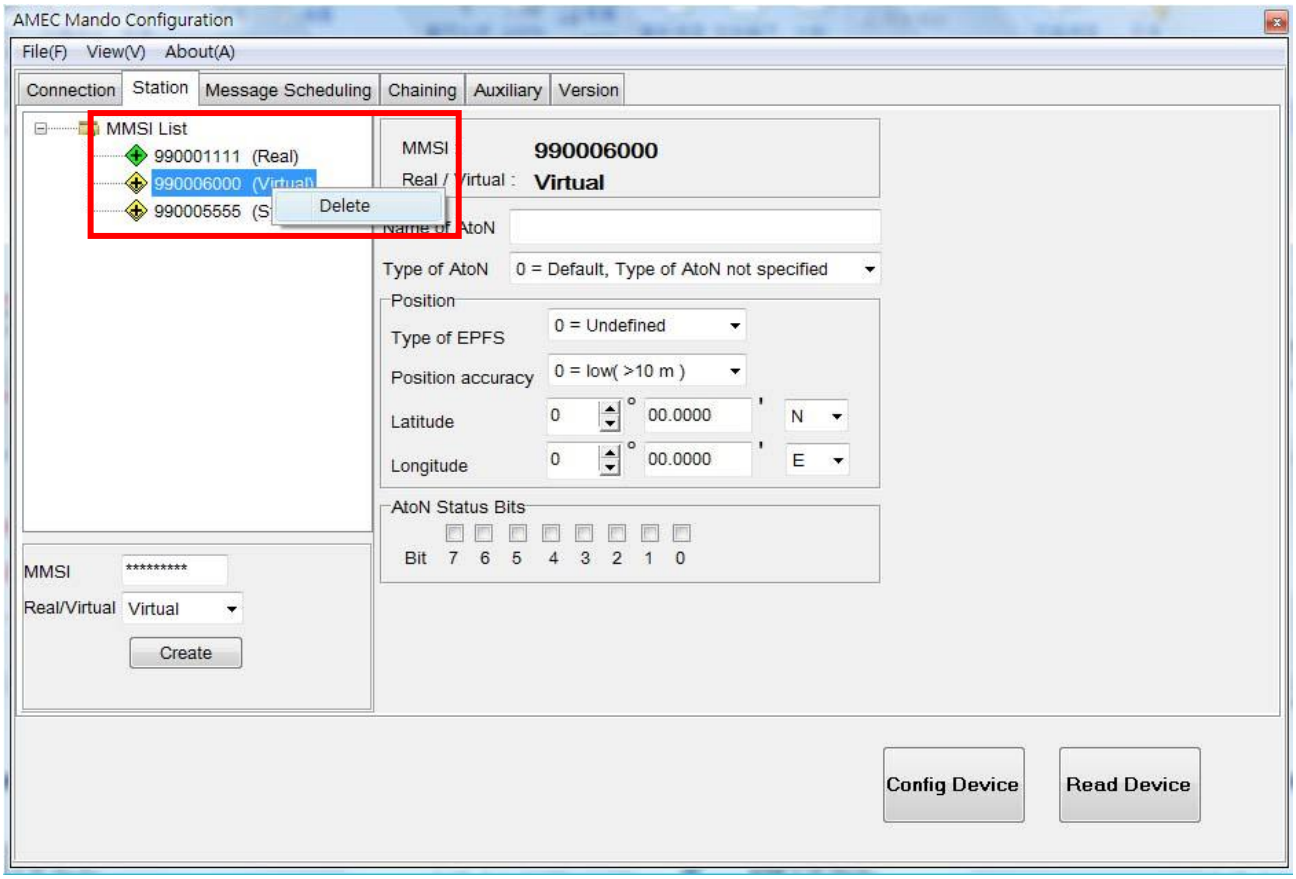

Figure 4-4 Delete Selected MMSI

4.5 AtoN Station Data Setting

Step 1: After the MMSI (Real/Virtual/Synthetic) is successfully setup, user can continue with rest of AtoN station data setting.

Step 2: After all AtoN device data setting, please click “Config Device” button to save the data when all settings are completed. PC/Laptop will pop-up window said “Configuration done!”. Then press “OK” to complete the setting.

Step 3: Click “Read Device” to check and make sure all AtoN settings are correct.

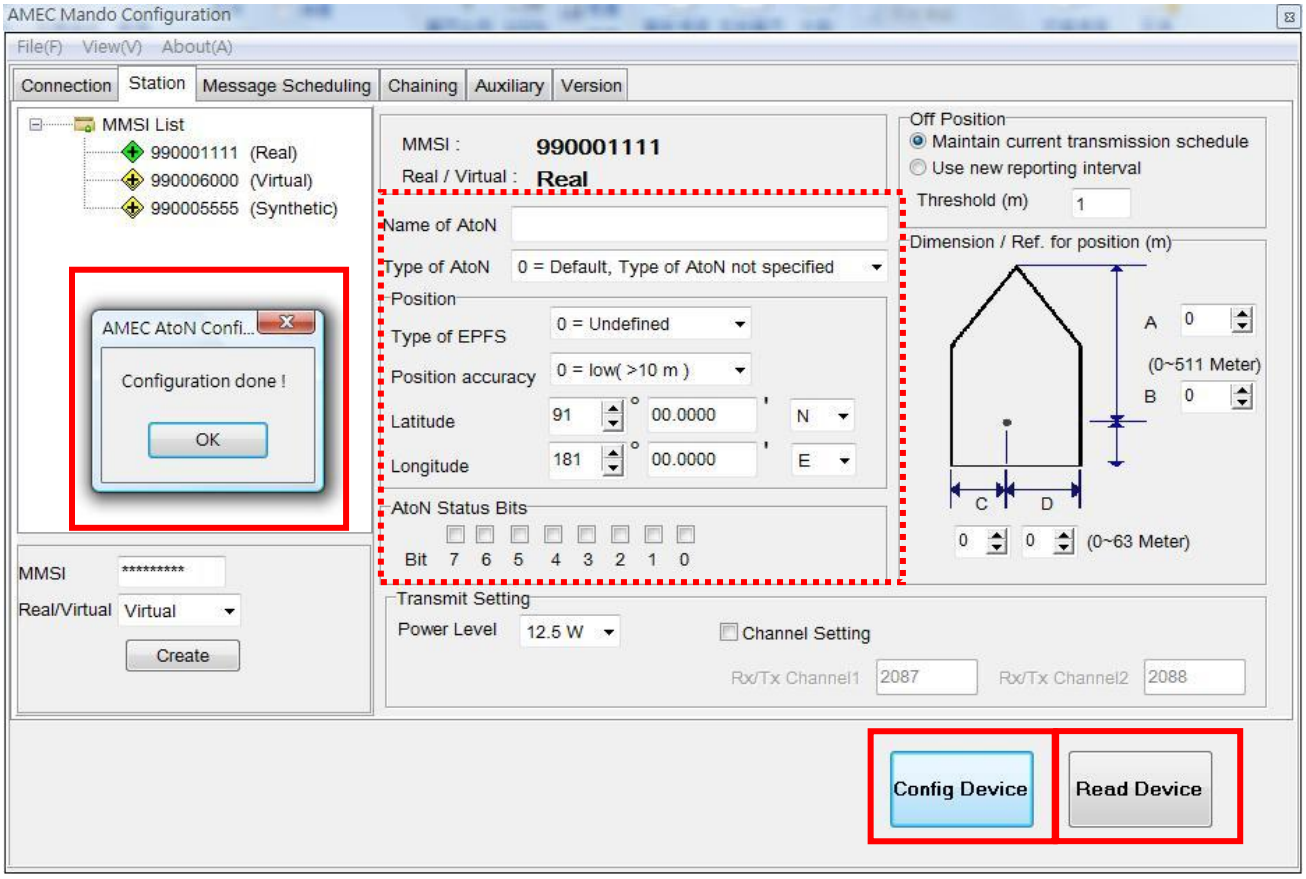

Figure 4-5 AtoN Station Data Setting

4.5.1 Name and Type of AtoN Device

Step 1: Enter the name of AtoN device.

Step 2: Select the correct type for the AtoN device.

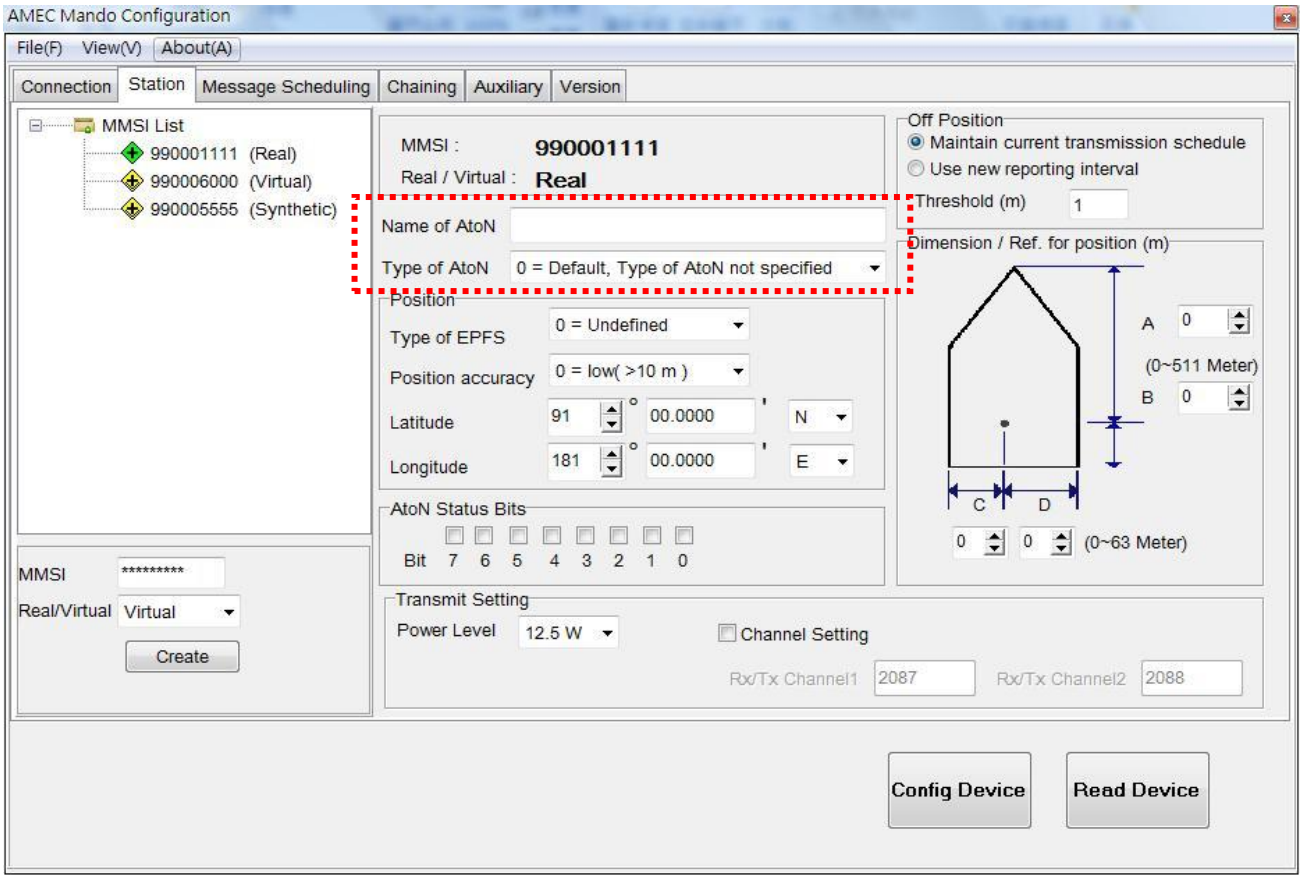

Figure 4-5-1 Name and Type of AtoN Device Setting

4.5.2 Position Information

Step 1: Select the type of EPFS and position accuracy information.
Step 2: Enter the Latitude and Longitude of the AtoN position.
Step 3: Choose 8-bit data for AtoN Status. (“V” means 1; Empty means 0.)

1. Bit 7, 6, 5 mean Page ID. For example: Page 7 (binary 111);
2. Bit 4, 3 mean RACON status;
3. Bit 2, 1 mean Light Status;
4. Bit 0 means status. Ex: 0= good health; 1=alarm

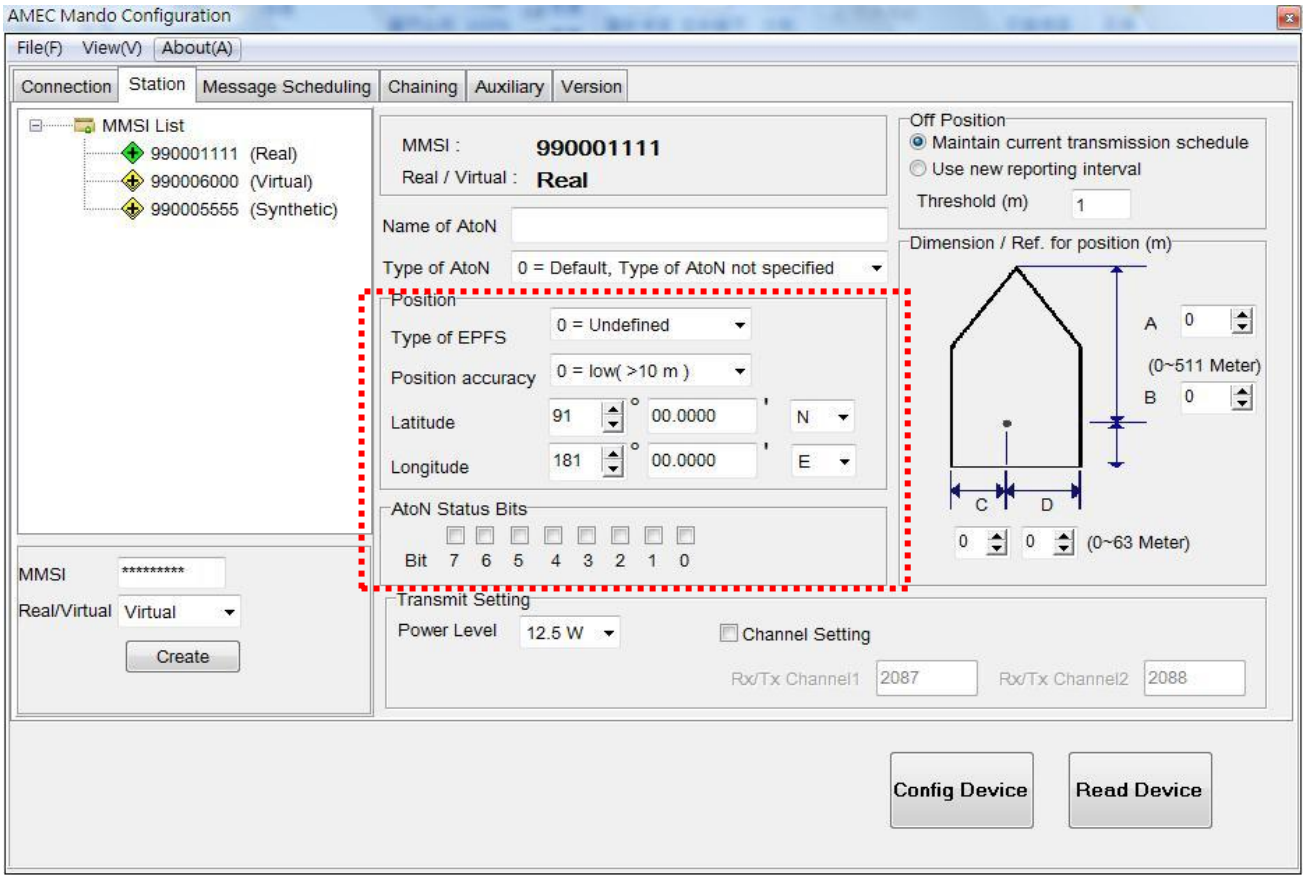

Figure 4-5-2 Position Information

4.5.3 Transmit Setting

Step 1: Choose the desired output power of 2W, 5W, or 12.5W.

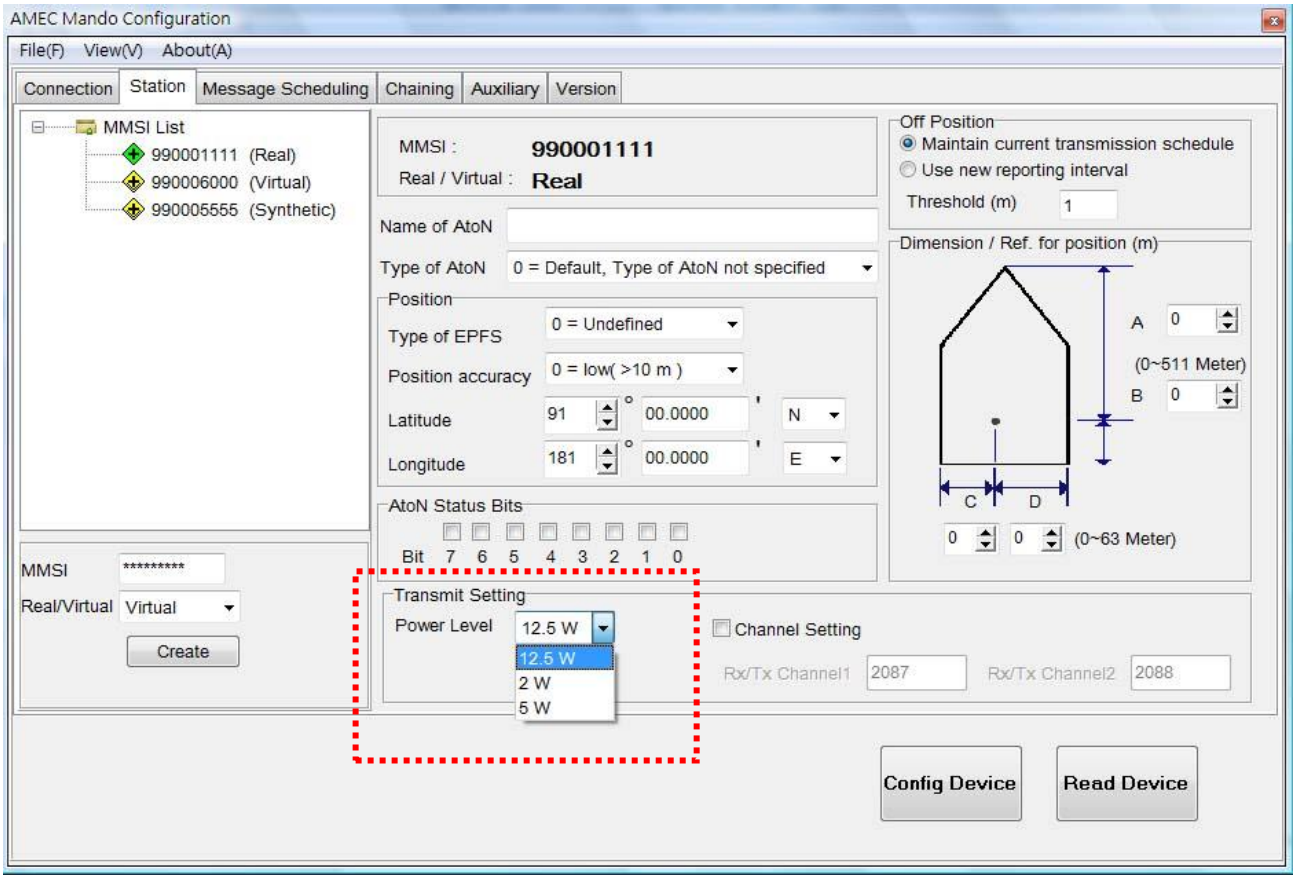

Figure 4-5-3-1 Transmit Setting

***NOTE: The output power can only be setup at the Real AtoN.**

NOTE: If user makes configuration via the configuration port using the ACF sentence below:

" $--ACF,xxxxxxxxx,x,llll.llll,a,yyyyy.yyyy,a,x,xxxx,xxxx,xxxx,xxxx,**x**,xx,x,a*hh<CR><LF>", the manufacturer "Power level code" are defined as follows:

Power level of ACF sentence (Note 5)*	Tx power (Watt)
0	12.5 (default)
2	2
5	5

*Please refer to IEC 62320-2

Step 2: Adjust the frequency of Channel 1 and Channel 2.

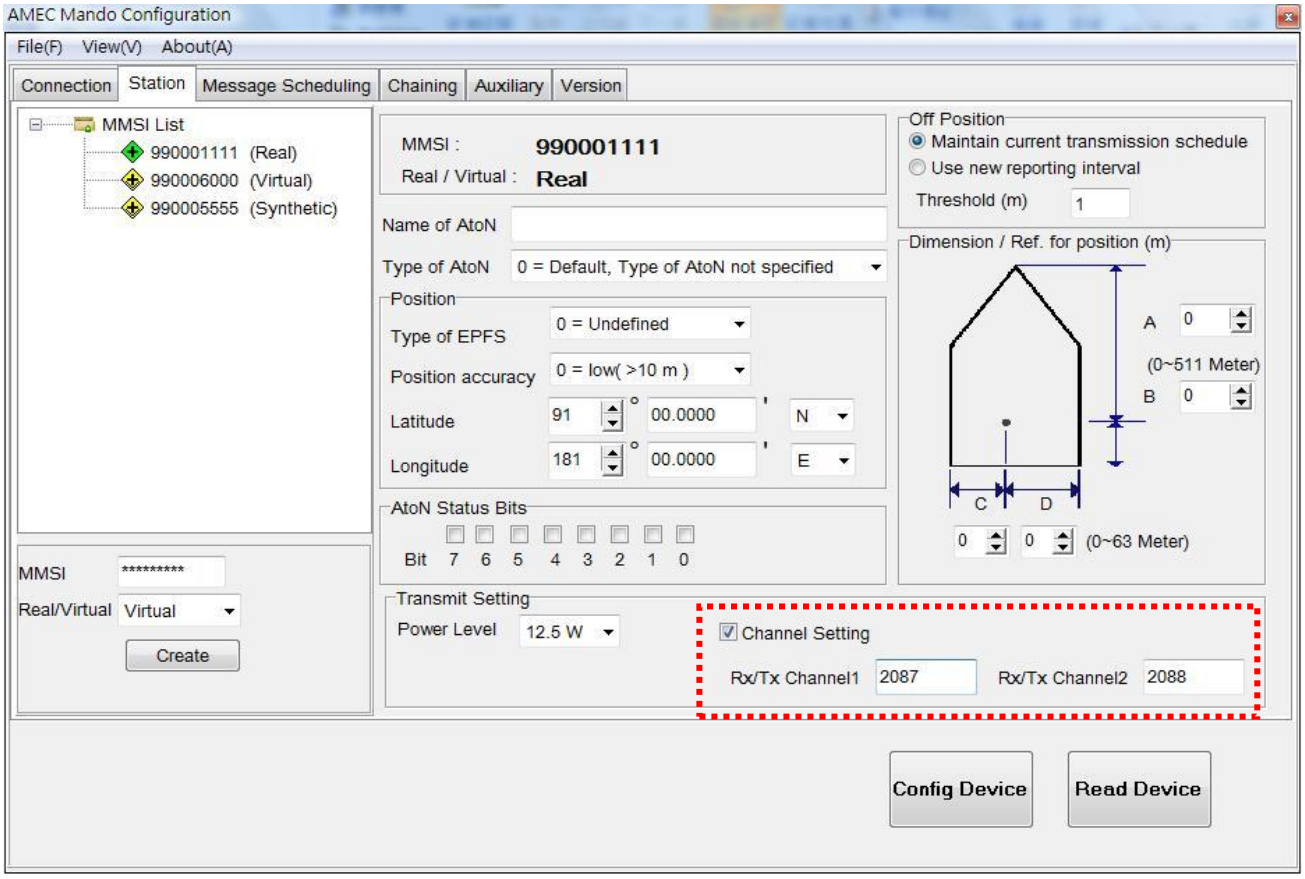

Figure 4-5-3-2 Transmit Setting

***NOTE:** The Channel Setting can only be setup at the Real AtoN.*

4.5.4 Off Position

Step 1： Enter the desired meter of Threshold. When the position of buoy exceeds the Threshold, MANDO will enter into the off position status.

Step 2： Please select transmission schedule when it is off position. (If user choose “Use new reporting interval”, user has to set Msg 21“Off-Pos” on “Message Scheduling” tab.)

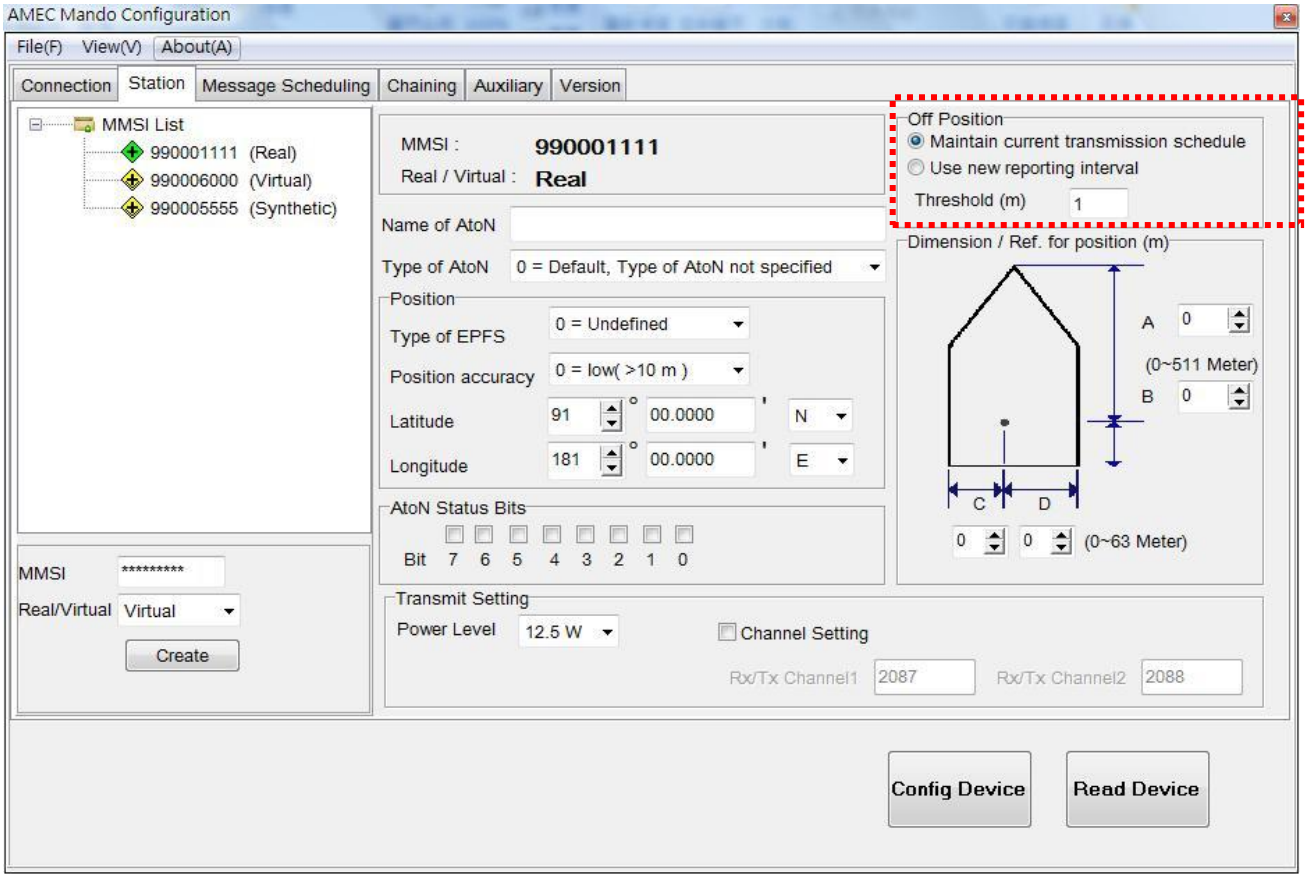

Figure 4-5-4 Off Position

4.5.5 Dimensions

Enter the distance of relative position between the GPS antenna and buoy at the Dimension/ Ref. for position column, while the black spot in the picture represents the location of GPS antenna. (Unit: Meter)

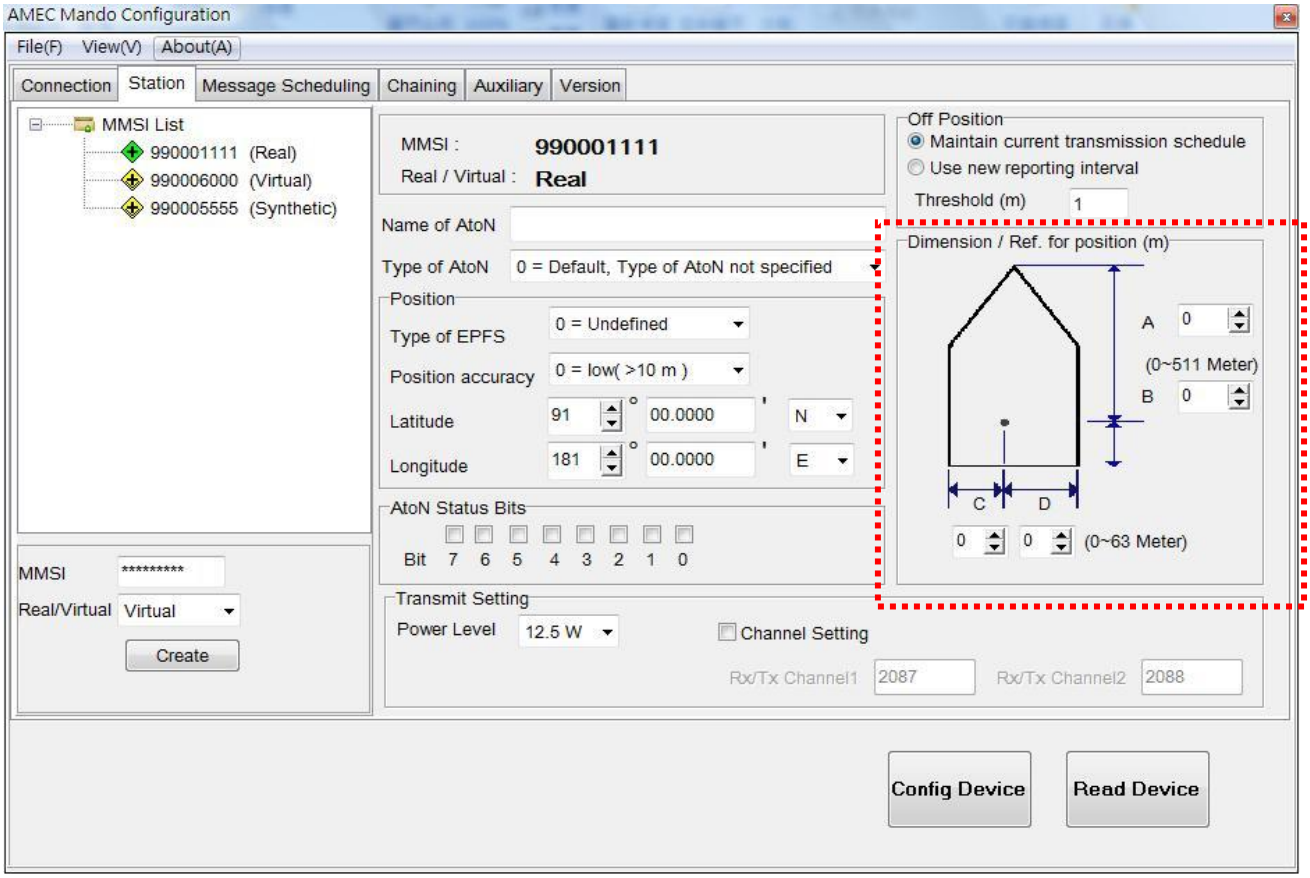

Figure 4-5-5 Dimensions

<u>*NOTE 1:</u> The dimensions are NOT allowed to configure at Virtual/ Synthetic AtoN.

<u>*NOTE 2:</u> The dimension diagram shows a vertical view which indicates the distance between the GPS antenna and periphery of the buoy. For ordinary buoys, the values of A, B, C, D should be the same.

4.5.6 All Settings Complete

Step 1: Click on “Config Device” to finish and save all AtoN settings.
Step 2: Select “Read Device” to review and confirm all settings.

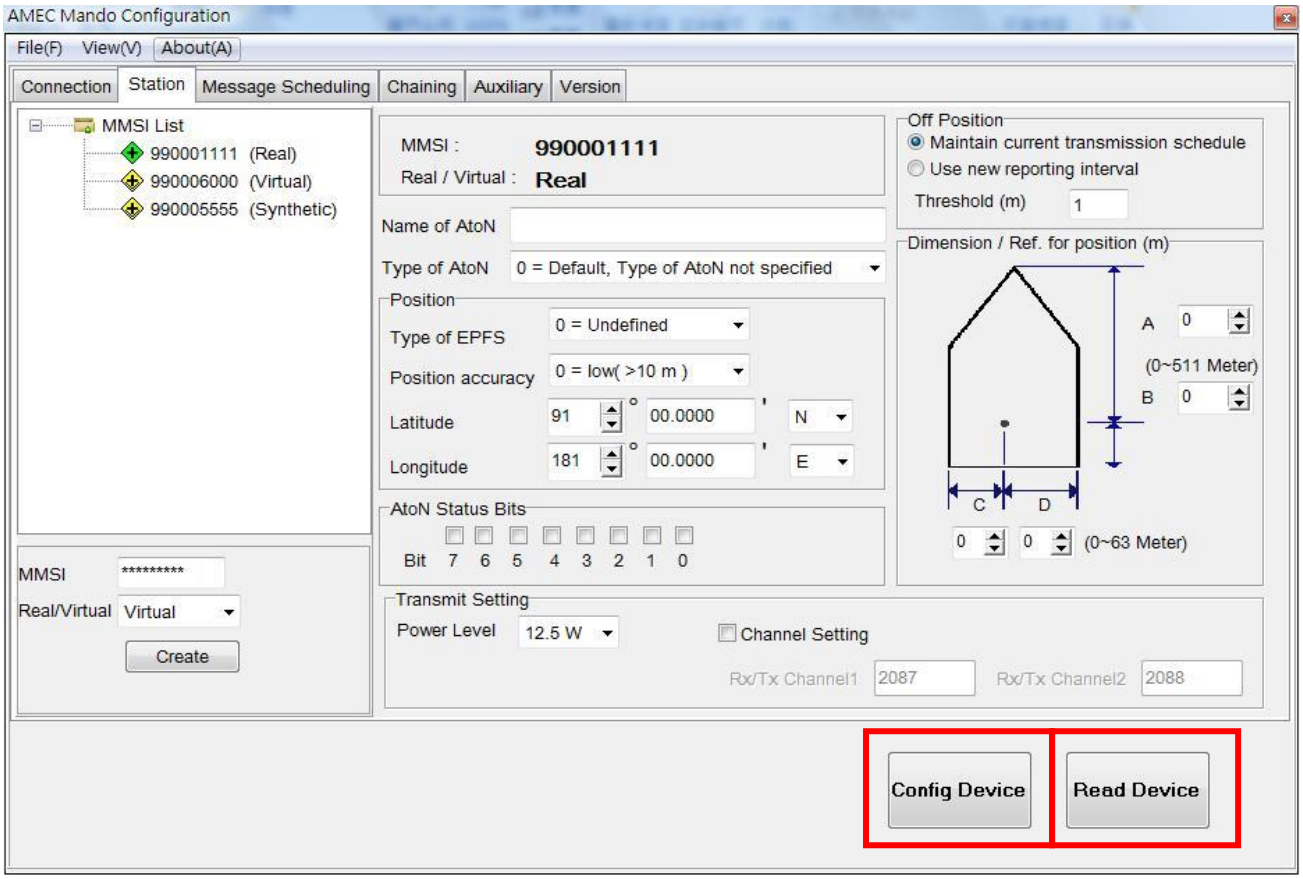

Figure 4-5-6 All Settings Complete

4.6 Message Scheduling

Step 1: Choose the desired MMSI number (Real/ Virtual/ Synthetic) to be scheduled under the "MMSI List" column for further message scheduling.

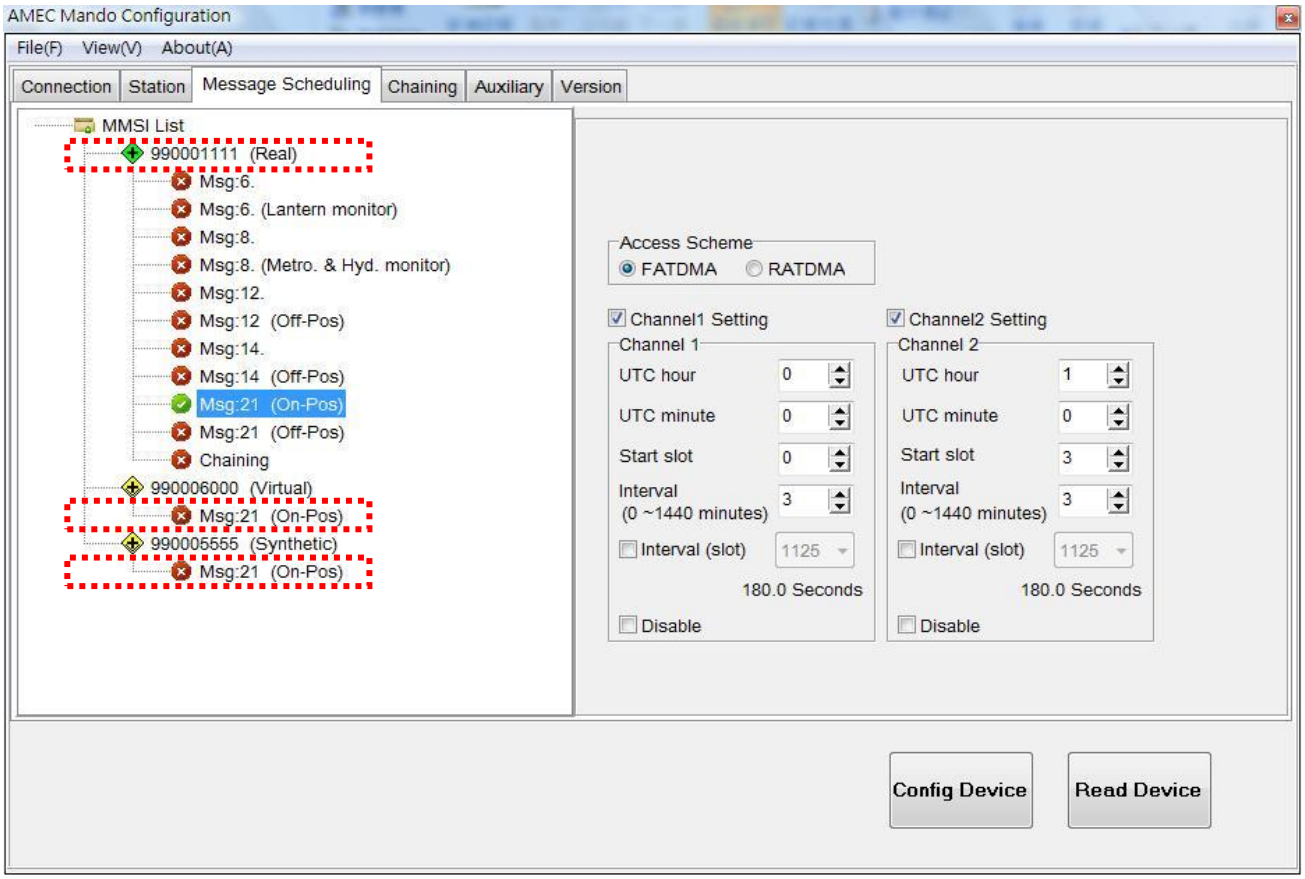

Figure 4-6-1 Message Scheduling

<u>*NOTE:</u> Please setup the MMSI number before starting message scheduling settings.

Step 2: For Real AtoN, select the Message ID to be scheduled from the following: Message 6, 6 (Lantern Monitor), 8, 8(Metro. & Hyd. monitor), 12, 14, 21(On-Pos), 21(Off-Pos) and Chaining. Please refer to Figure 4-6-2.

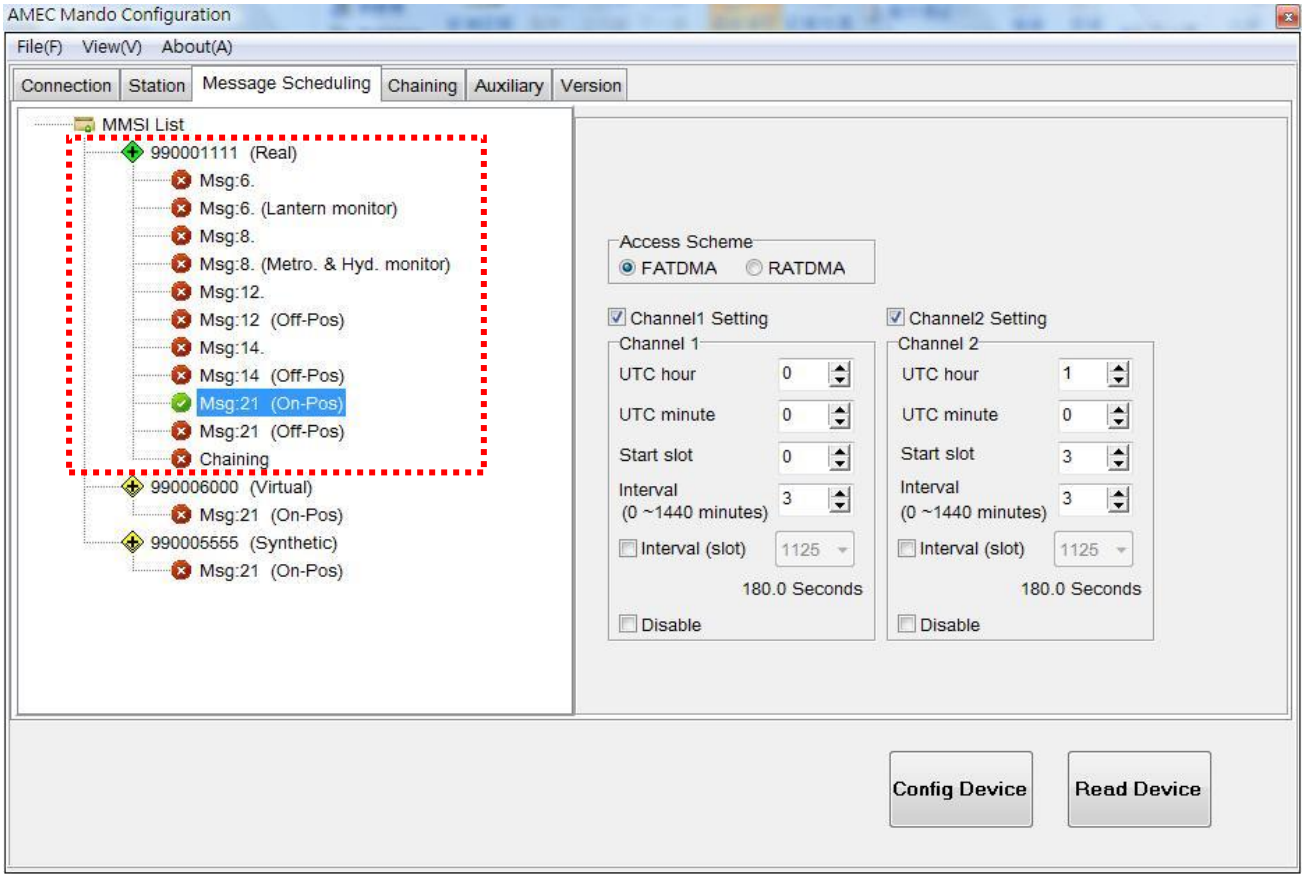

Figure 4-6-2 Message Scheduling

Step 3: For Virtual or Synthetic AtoN, one could select only Message 21(On-Pos) to be scheduled.

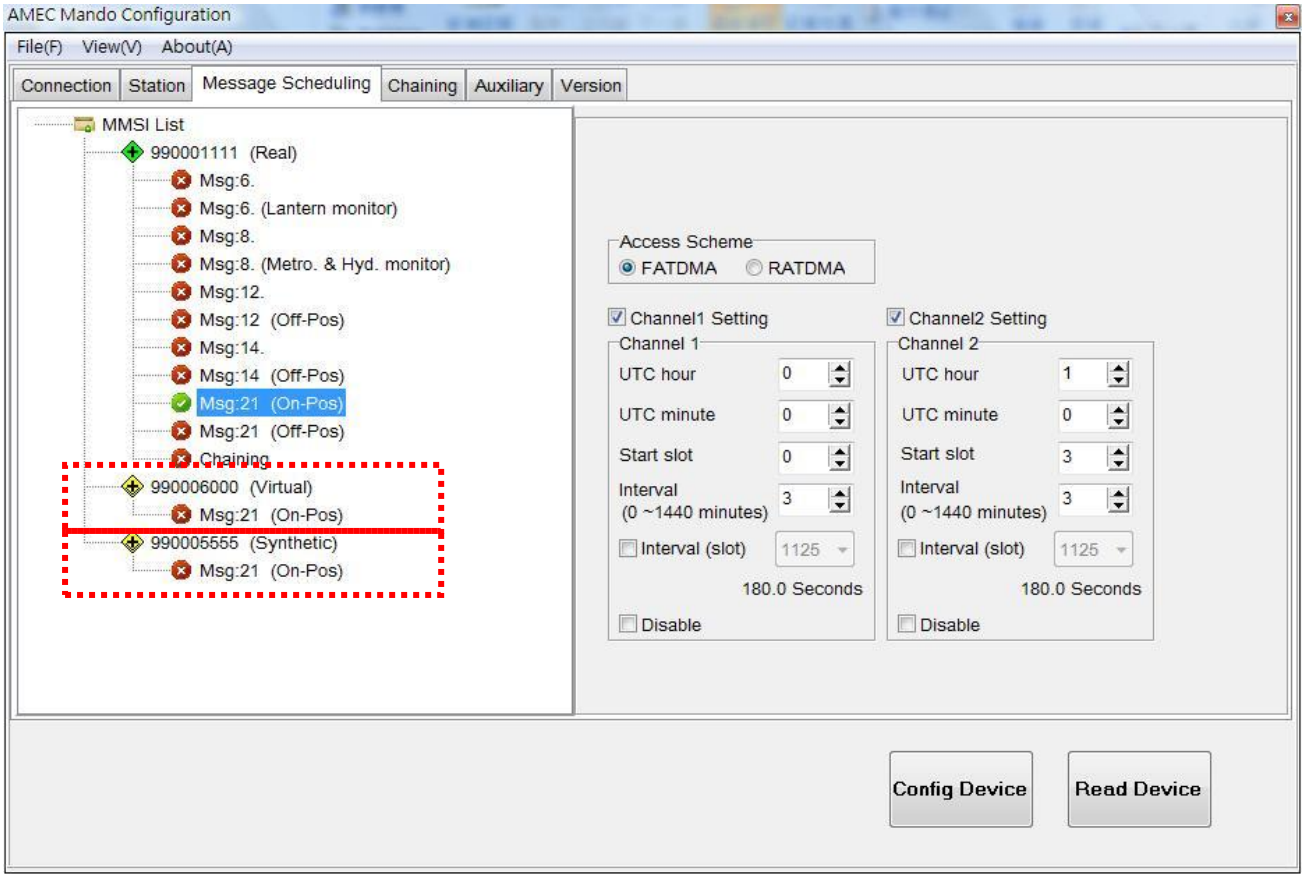

Figure 4-6-3 Message Scheduling

Step 4: Select the desired Access Scheme: FATDMA or RATDMA (For MANDO-303 only)

Step 5: Click the checkbox of “Channel 1 Setting” and “Channel 2 Setting” to setup the broadcast timing and period parameters (User could choose Single Channel or Dual Channels).

Step 6: Use the arrow keys to adjust each parameter to setup report rate.

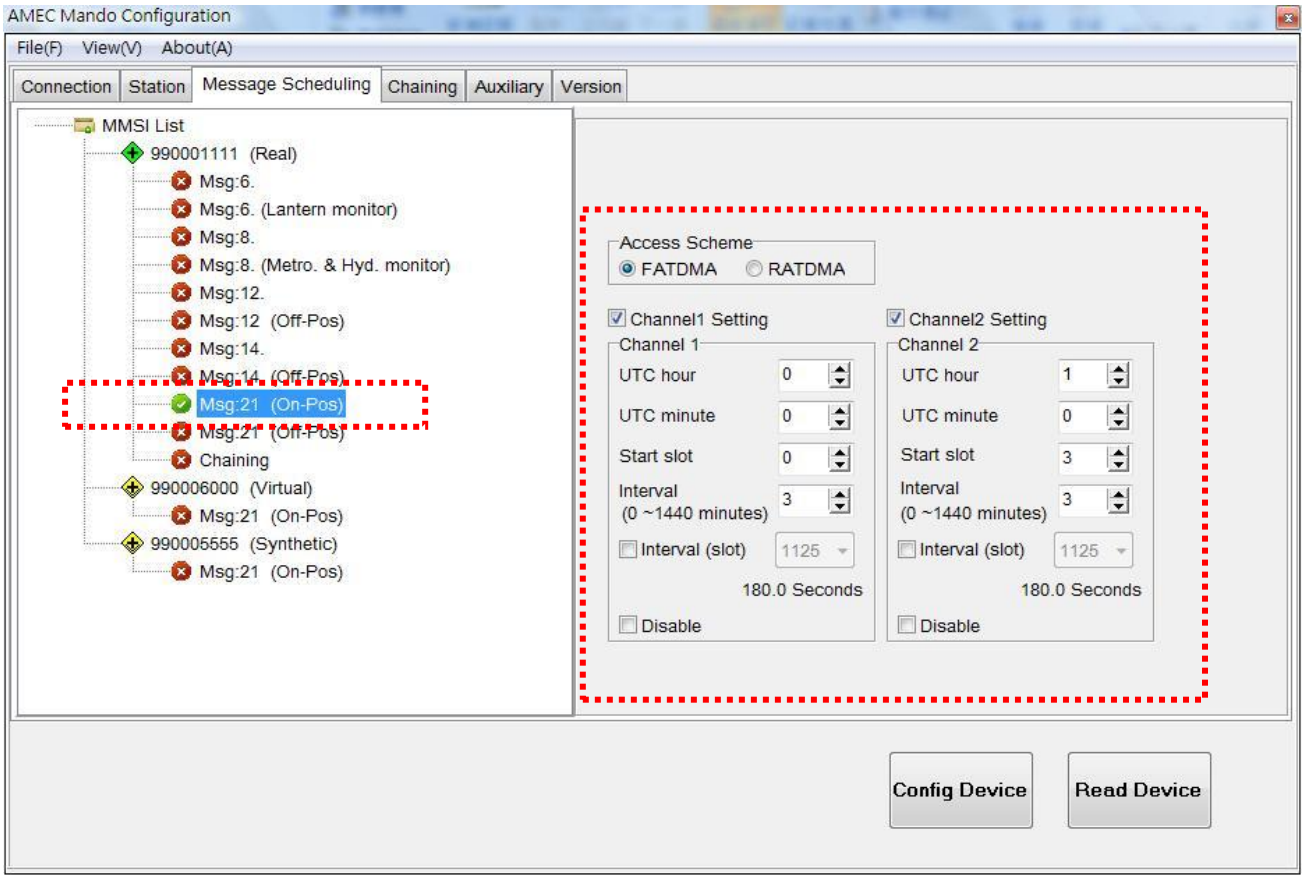

Figure 4-6-4 Message Scheduling

<u>*NOTE1:</u> To stop broadcasting the message, please click on the “Disable” checkbox.
<u>*NOTE2:</u> FATDMA could choose “Start Slot” parameters. RATDMA could not choose it.

For UTC Hour, Minute, Start Slot and Interval, these are for starting (initial) UTC time for your message scheduling report. MANDO-301/303 will follow the UTC time from GPS and according to your message scheduling settings (UTC hour, UTC minute, Start Slot, Interval) to calculate the nearest next transmitting time.

Example 1, FATDMA: UTC hour: 0 ; UTC minute : 1; Start Slot : 150 (4 seconds); Interval : 10 minutes. (If the UTC time from GPS is 18:03:00 – according to the Example 1. The message will be sent at UTC time 18:11:04; 18:21:04; 18:31:04...etc)

Example 2, FATDMA: UTC hour: 1 ; UTC minute : 1; Start Slot : 300 (8 seconds); Interval : 70 minutes (1 hour 10 minutes) (If the UTC time from GPS is 18:03:00 – according to the Example 2. The message will be sent at UTC time 18:31:08; 19:41:08; 20:51:08...etc)

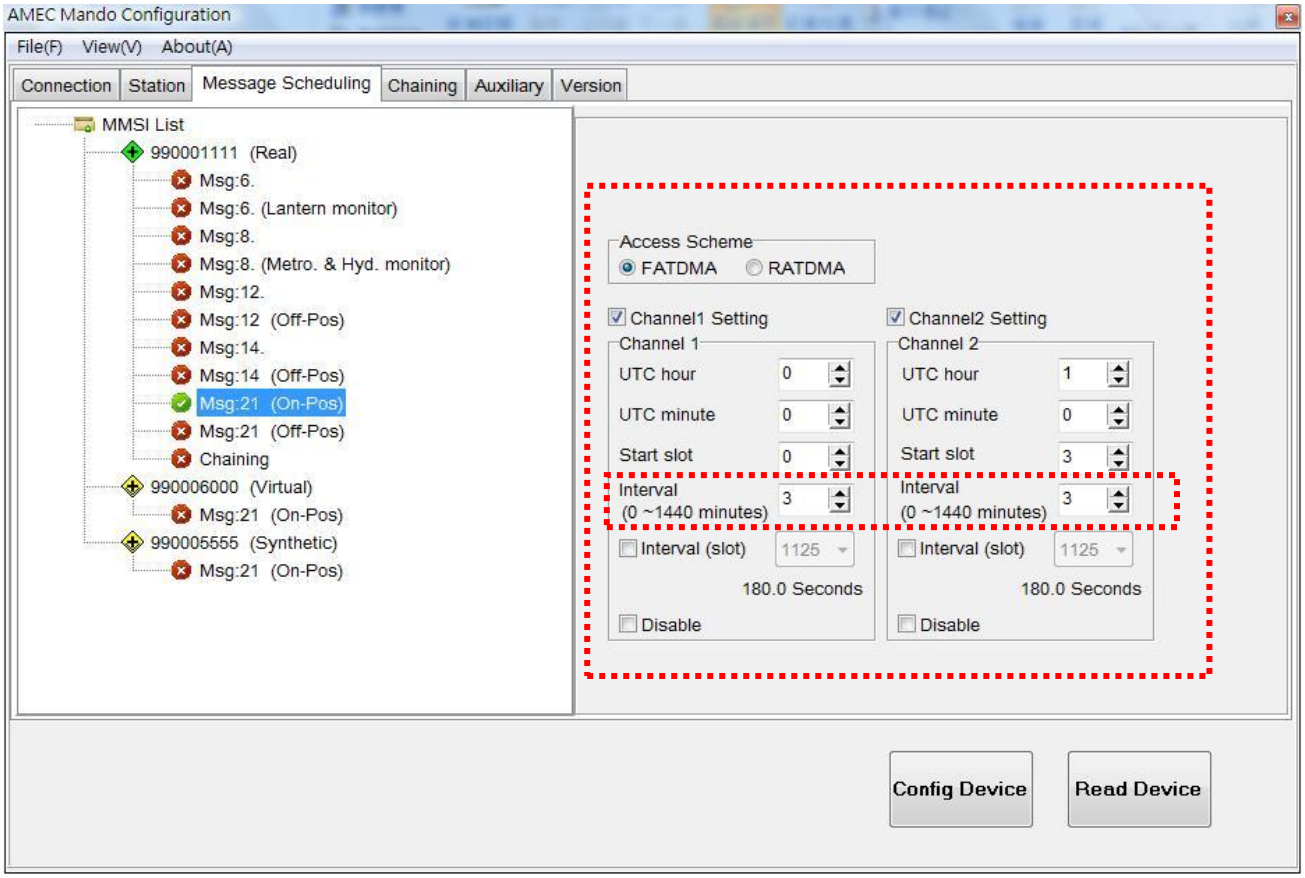

Figure 4-6-4 Message Scheduling

<u>*NOTE:</u> For Msg 21, each channel occupies 2 adjacent slots. Therefore for setting Channel 2, please select two different slots from Channel 1.

- Select “Config Device” to save and input the settings into the AtoN device.
- It will pop up a window said “Configure done!” Now press “OK” to complete it.
- Press “Read Device” to confirm and review the current device scheduling status.

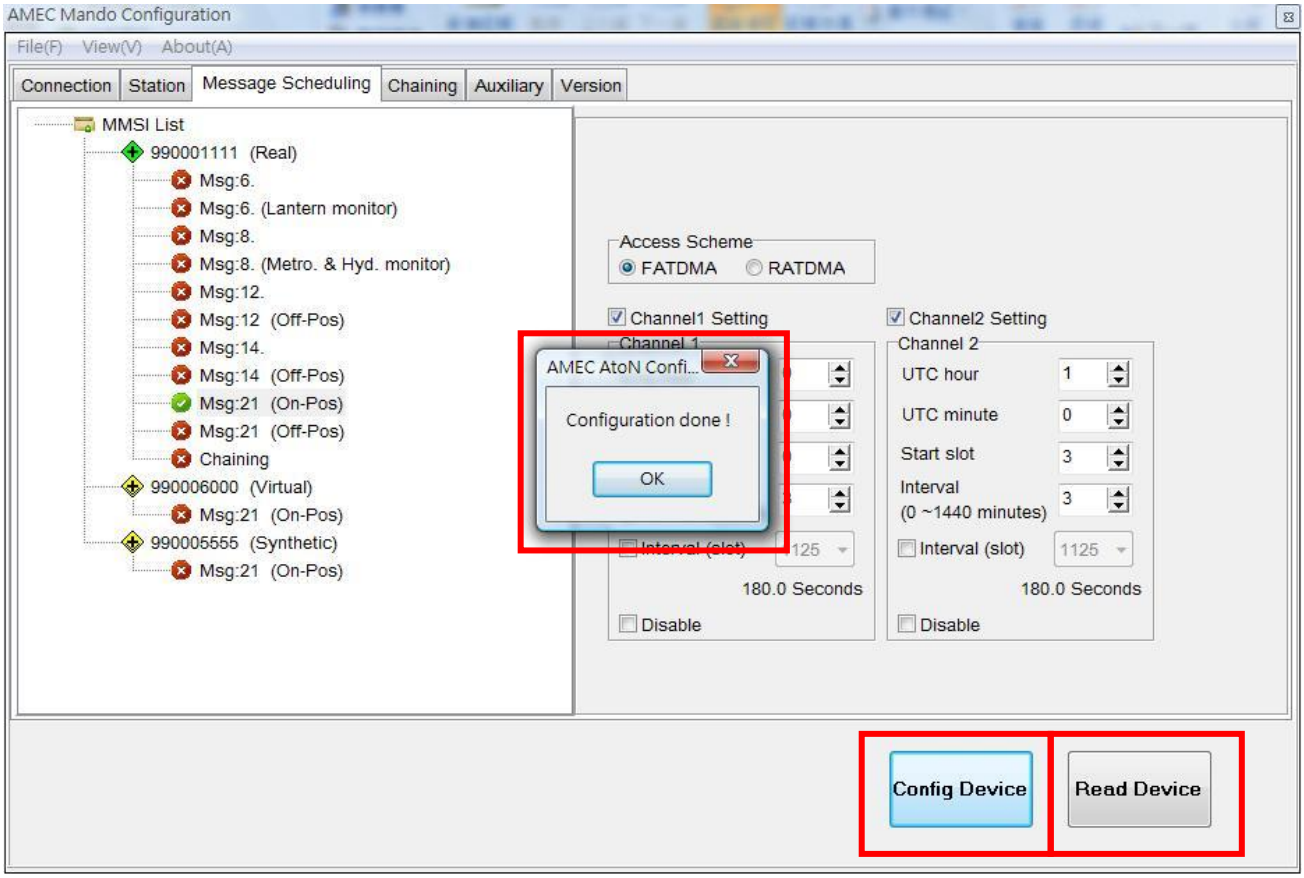

Figure 4-6-5 Message Scheduling

<u>*NOTE:</u> On the MMSI List, if Msg is with , it means this message schedule is set already.

If Msg is with , means this message schedule is not set yet.

4.7 Chaining Configuration

Chaining Configure is for MANDO-303 (Type 3) only. If the device is not MANDO-303 (Type 3), the tab will be closed automatically.

For MANDO-303, please follow steps as below:

Step 1: Enter the desired MMSI number on “Chaining MMSI” column.
Step 2: Select Parent MMSI or Child MMSI on “Parent/ Child” column.
Step 3: Click on “Create MMSI” first to create and save this chaining.
Step 4: Click on “Read Device” to ensure all settings are properly saved.

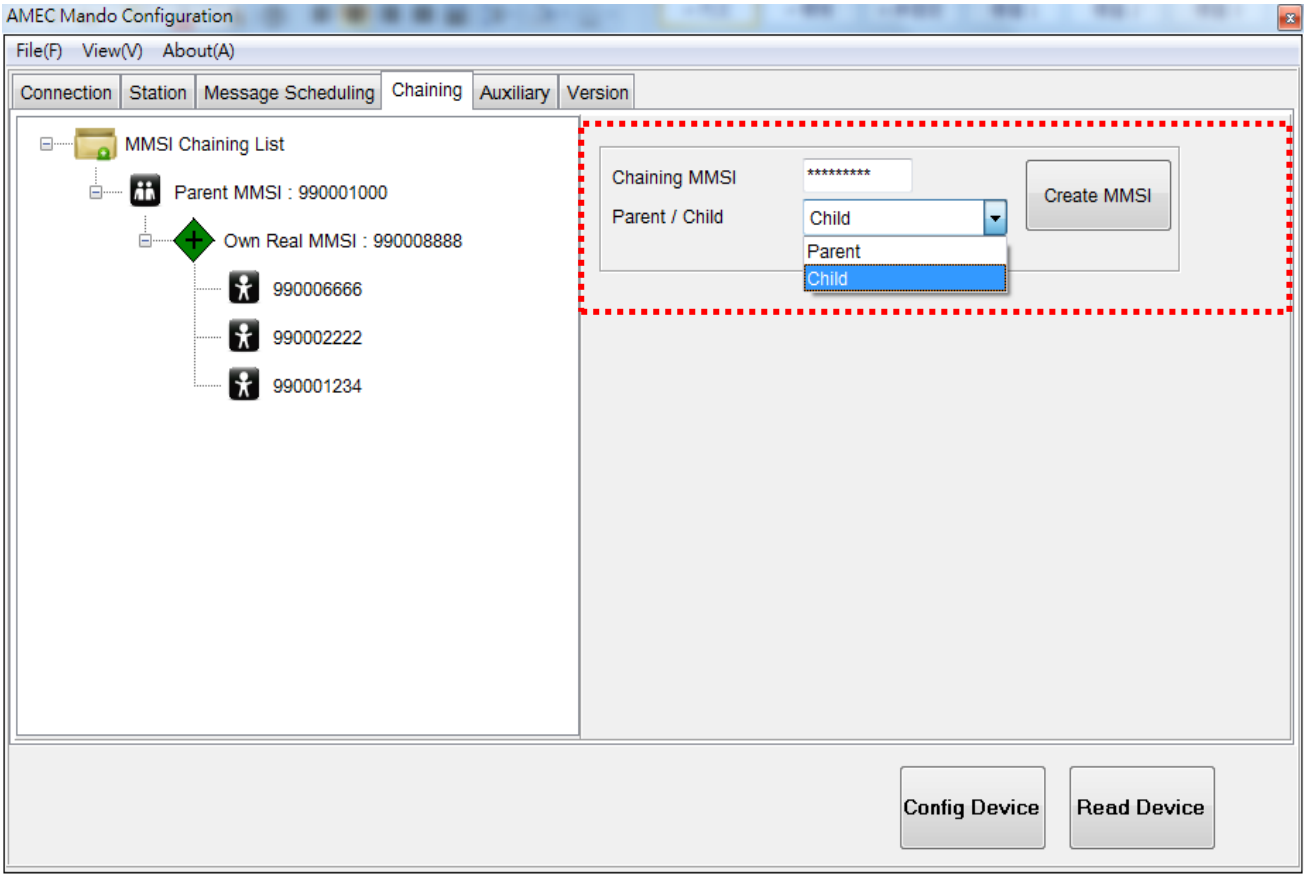

Figure 4-7-1 Chaining Configuration

***NOTE:** **Please noted that “Parent MMSI” only could be set one MMSI.**

After setting Chaining, please choose “Message Scheduling” tab, and select Msg “Chaining” under Real AtoN Station to set up for further transmitting report rate.

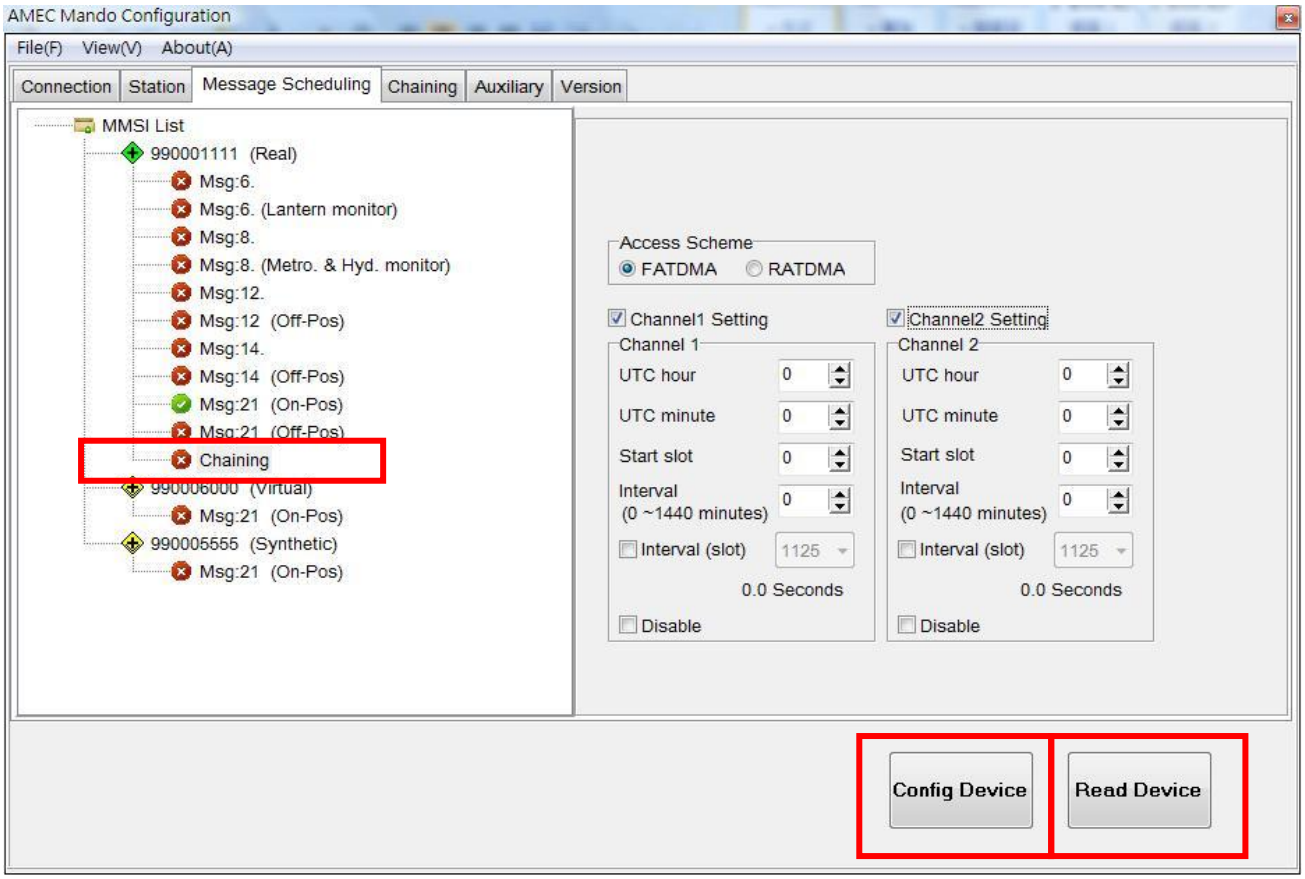

Figure 4-7-2 Chaining Configuration

<u>*NOTE:</u> All steps are the same as setting “Message Scheduling” when you complete the “Chaining” Setting.

4.8 Delete Selected Child/Parent MMSI

Step 1: Select the desired MMSI to be deleted under the “MMSI Chaining List” column.
Step 2: Right-click and press “Delete” to erase all setting of this certain MMSI number.

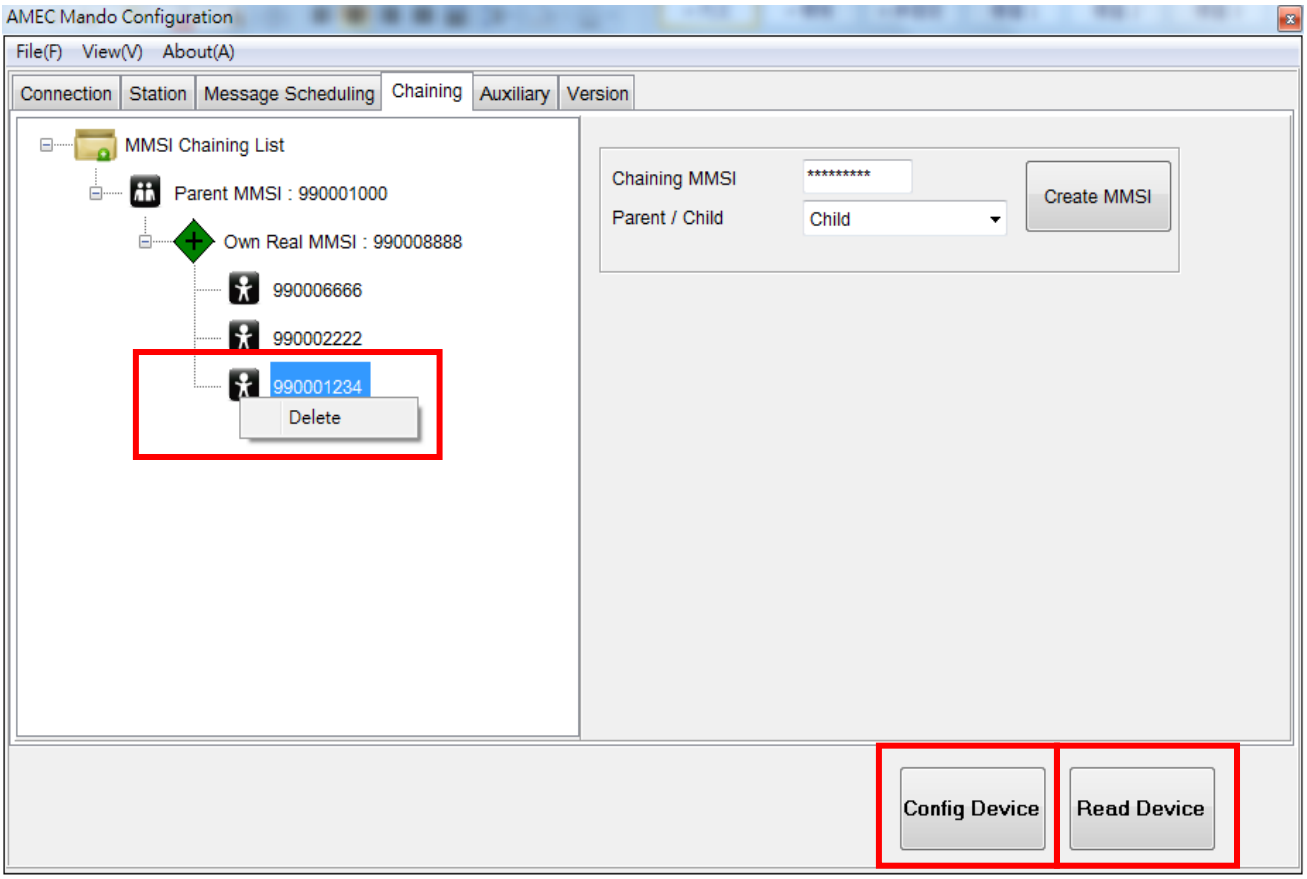

Figure 4-8 Delete Selected Child/Parent MMSI

4.9 Auxiliary

There are three different parts in this column. User could set those items one by one.

Standby Mode: Please choose desired wake up time on “Standby Mode”. Please use the arrow keys.

Off-Pos MSG: Please write down the desired words/characters on each Message Test Content that is used for SRM Message while it is off position. (There are 50 characters limited)

Repeat: User could choose the desired Message – Message 6, Message 8, SART – to repeat these three Messages for other AIS AtoN Device. (Only for MANDO-303 (Type 3)

After setting all parts, please click “Send” to complete all setting. And click “Read” to save all setting.

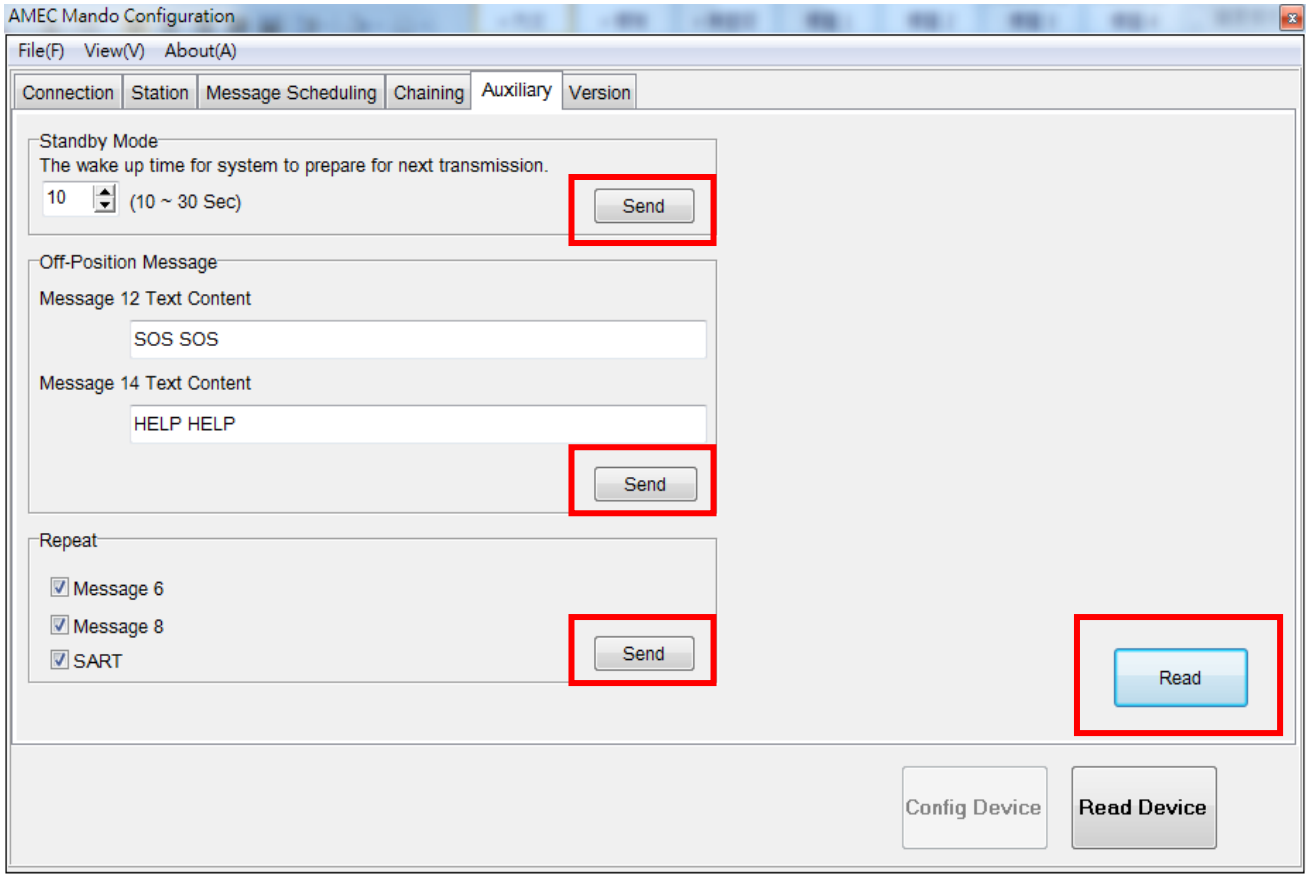

Figure 4-9 Auxiliary

4.10 Version

Please press “Read Device” to confirm and review the current device information, including Device Type, Vendor ID, Manufacturer Serial Number, Software and Hardware Version (Revision).

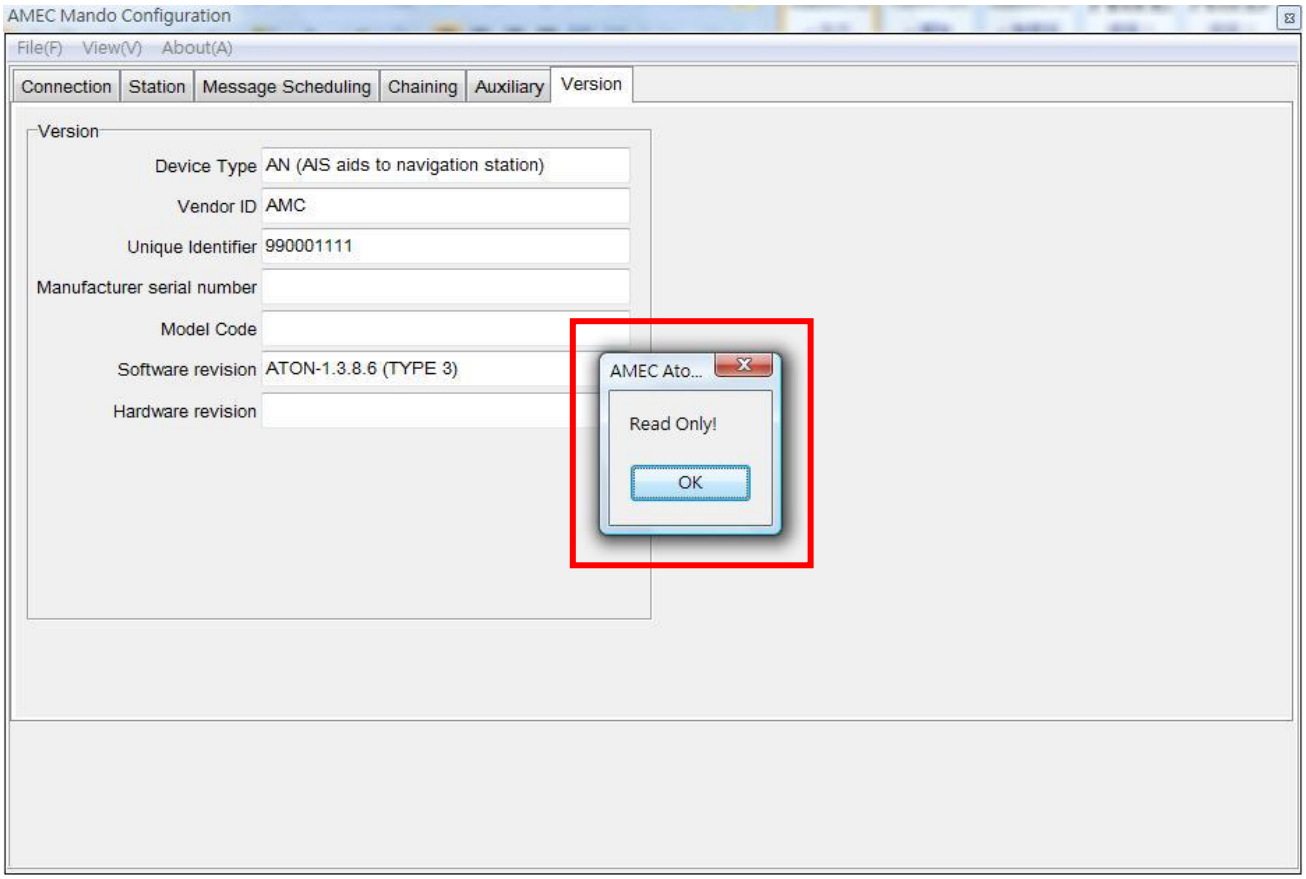

Figure 4-10 Version

5 APPENDIX

5.1 Product Specifications

APPLICABLE STANDARDS	
IEC 60945 Ed. 4	(2002-05)
IEC 61162-1 Ed. 3	(2007-04)
IEC 62320-2 Ed.1	(2008-03)
IEC 61108-1 Ed. 2	(2003-07)
IEC 61108-2 Ed. 1	(1998-06)
ITU-R M.1371-4	(2010-04)
IALA A-126 Ed 1.4	(2008-06)

POWER SUPPLY	
Input Voltage	12V DC nominal (at Power Connector)

POWER CONSUMPTION @ 12V DC	
MANDO-301	FATDMA＜ 0.288 Ah/day *
MANDO-303	FATDMA＜ 0.432 Ah/day *
	RATDMA＜ 1.656 Ah/day *

* At 12.5W, reporting interval 3 minutes

TRANSMITER PERFORMANCE	
TX Frequency Range	156.025 MHz ~ 162.025 MHz
Frequency Accuracy	±500 Hz
Channel Space	25 KHz
Channel Protection	1 Sec max on air
Modulation	GMSK / FM
Data Rate	9,600 bps
TX Power Control	2 / 5 / 12.5 Watt (programmable)
Carrier Power Error	±1.5 dB (normal)
Nominal Impedance	50Ω

RECEIVER PERFORMANCE (Type 3 Only)

Numbers of Receivers	2
RX Frequency Range	156.025MHz ~ 162.025 MHz
Sensitivity	PER 20% at -107 dBm
Data Rate	9,600 bps
PER	20% at -107 dBm
Co-Channel Rejection	10 dB at 1 KHz offset
Adjacent Channel Rejection	70 dB at 25 KHz
Nominal Impedance	50Ω

GPS RECEIVER

Receiving Channels	50 channels
Tracking &Navigation Sensitivity	≧ -159 dBm
Reacquisition Sensitivity	≧ -159 dBm
Horizontal Position	＜ 2.5 m Autonomous
	＜ 2.0 m SBAS
Receiver Type	SBAS: WAAS, EGNOS.MSAS, GAGAN

ENVIRONMENTAL

Product Category	IEC 60945 “Protected”
Operating Temperature	-20℃ ~ +55℃
Storage Temperature	-30℃ ~ +70℃
Humidity	95% relative humidity at 40℃

SOFTWARE TOOL

AMEC AtoN Configuration	PC configuration utility, standard supply in CD

INPUT / OUTPUT

1) One RS-232 port for configuration
2) One RS-232 port for communication
3) One isolated control output – N.C. relay for alarm indication (default) or other control usages
4) One isolated status input channel with 5 mA constant current sink for external device status input (e.g. read light fault, light on/off, etc.)
5) Four ADC channels for external sensors
6) VHF connector (M Type)
7) VHF connector (TNC Type)
8) More extra I/O interfaces can be supplied via optional extension I/O board

CONNECTOR

1) VHF connector (M type)
2) GPS connector (TNC type)

PHYSICAL

Size in mm (w)	140 mm
Size in mm (h)	155 mm
Size in mm (d)	60 mm
Weight	≦1.5 kg
Case Material	Aluminum Alloy

5.2 Dimensions

The basic dimensions of the AMEC AtoN device are illustrated in the following pictures:

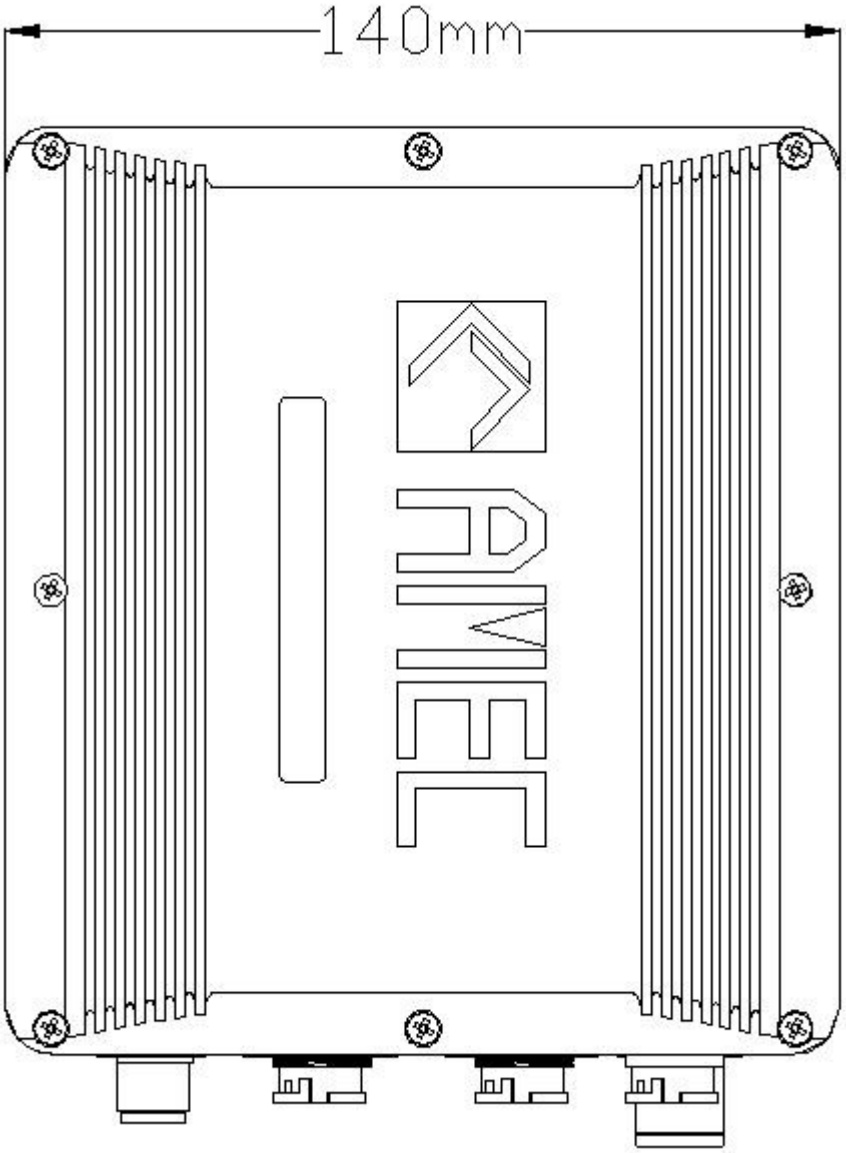

Figure 5-2-1 Top View of AIS AtoN

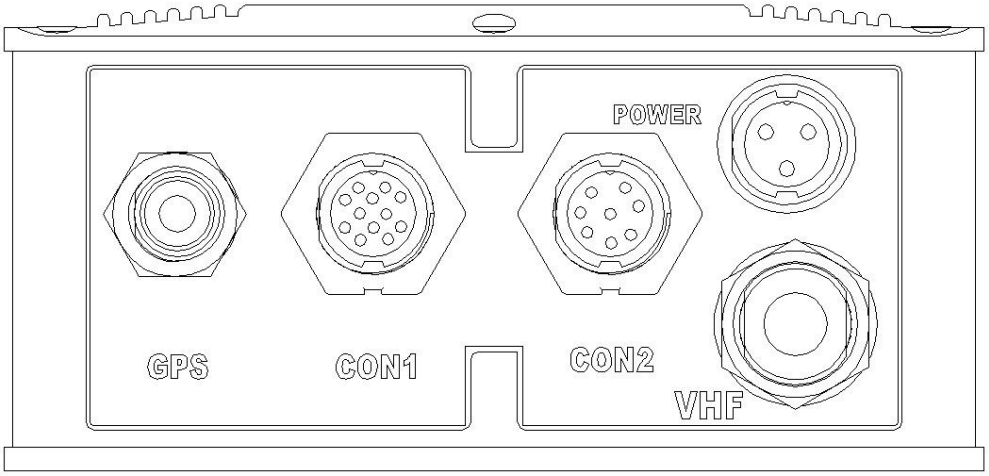

Figure 5-2-2 Interfaces of AIS AtoN

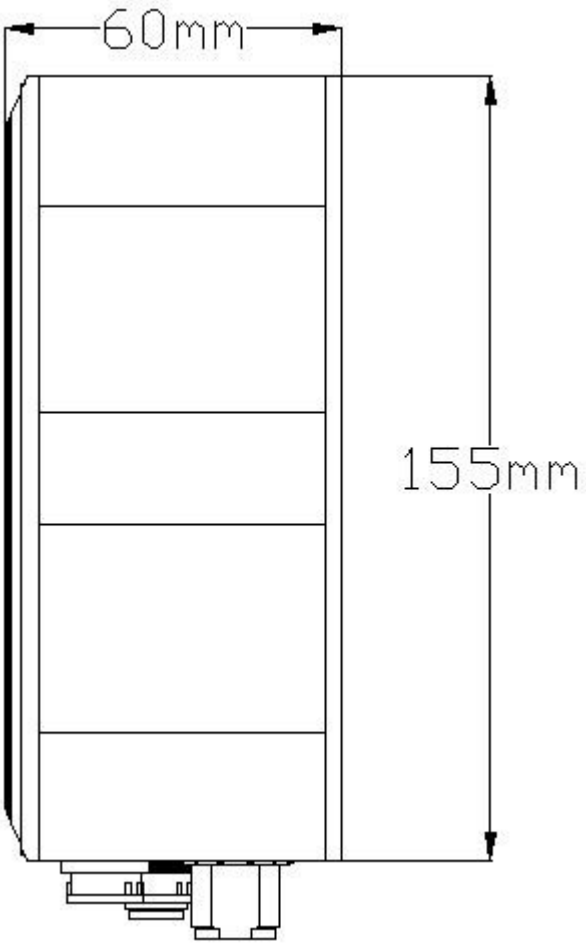

Figure 5-2-3 Side View of AIS AtoN

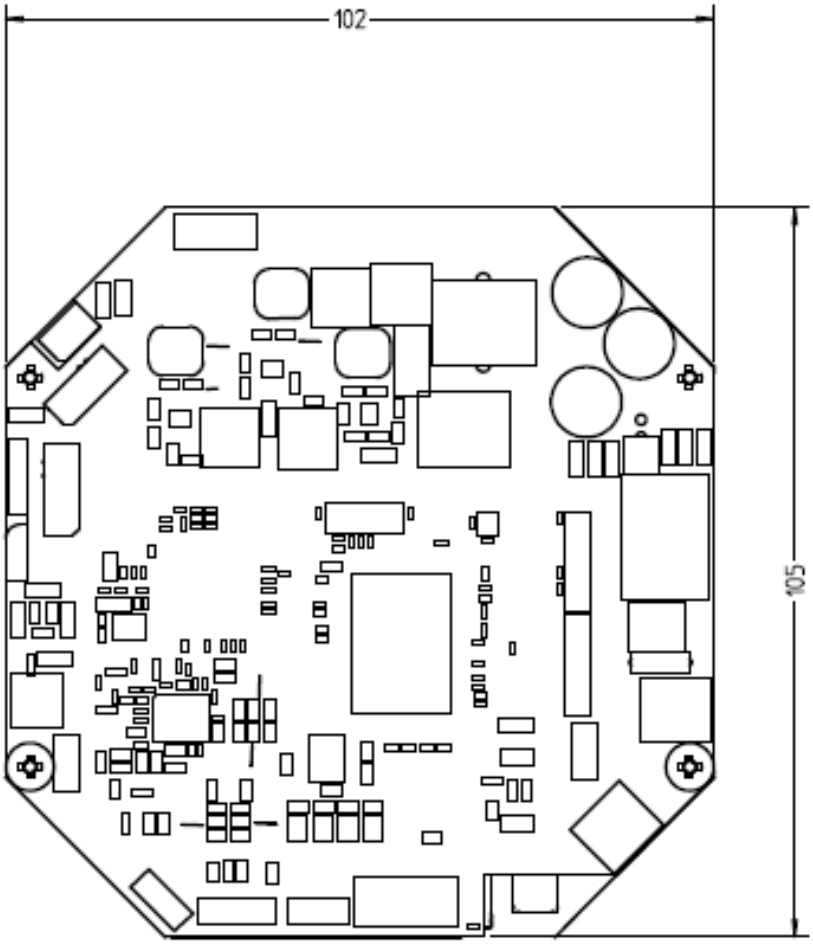

Figure 5-2-4 AIS AtoN Module

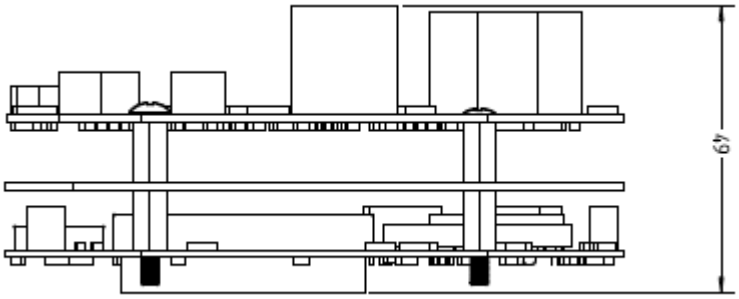

Figure 5-2-5 AIS AtoN Module

5.3 Accessories

The following accessories are available from AMEC. Contact our local dealer/agent for more details.

Table 5-3 Accessories

Item	Description	Product Code	Remark
1	VHF Antenna	TENTA-11	Length: 1,200 mm
2	GPS Antenna	AGGRESSOR-111-C	Dimension: 90.5 mm(Diameter) x 108.5 mm(H)

1. VHF Antenna TENTA-11 SPECIFICATIONS

GENERAL

Frequency Range	**156 MHz ~ 163 MHz**
Gain	**3 dBi**
Polarization	**Vertical**
VSWR	**1.2 typical (1.5 max).**
Impedance	**50Ω**
HPB	**65.77 degree**
FBR	**1.81 dB**

ENVIRONMENTAL

Product Category	**IEC 60945 “Exposed”**
Operating Temperature	**－30°C to ＋75°C**
Relative Humidity	**95% RH at 40°C, non-condensing**
Storage Temperature	**－40°C to ＋85°C**

PHYSICAL CHARACTERISTICS

Dimensions	**36 mm (ψ) x 1,200 mm (L)**
Weight	**860g (w/o mount)**
Connector	**M Jack/ PL-259 (female)**
Cable	**5D-FB cable**

2. GPS Antenna AGGRESSOR-111-C SPECIFICATIONS

GENERAL

Center Frequency	**1575.42 ± 2 MHz**
Gain	**30 dB, typical**
Noise Figure	**1.5 dB, typical**
Bandwidth	**2 MHz min.**
Axial Ratio @ Zenith	**3 dB max.**
VSWR	**1.2 typical (1.5 max)**
Output Impedance	**50Ω**

ENVIRONMENTAL

Product Category	**IEC 60945 “Exposed”**
Operating Temperature	**－25°C to ＋55°C**
Relative Humidity	**40% to 95% non-condensing**
Storage Temperature	**－25°C to ＋70°C**

PHYSICAL CHARACTERISTICS

Dimensions	**90.5 mm (diameter) × 108.5 mm (H)**
Ground Size	**74 mm (diameter)**
Weight	**150 grams (without cable)**
Connector	**TNC female**
Cable	**10 m, RG-58 cable included**

5.4 Built-in Integrity Test (BIIT)

With BIIT (Built-in Integrity Test), the MANDO-301/303 is constantly monitoring and testing the integrity itself.

5.4.1 BIIT Function for Antenna Disconnect

There is a built-in RF output power detector, which is used to monitor the VSWR of VHF antenna port. If there is any abnormal condition (open or short) at VHF port of MANDO-301/303, MANDO-301/303 will cease transmission at next transmission phase.

5.4.2 BIIT Function for Receiver Channel 1 and/or Channel 2 Failure

Receiver at MANDO has built-in receiver signal strength indication (RSSI), which is designed under pre-defined threshold to judge receiver operating status. If the RSSI level is over pre-defined threshold, MANDO-301/303 will reflect receiver failure and cease transmission during next transmission phase.

5.5 Troubleshooting

Please find accordance with above procedure while setting MANDO-301/303. If there is any problem, please do not hesitate to contact us or our local agent.

5.6 Type of AtoN

Table 5-6 The nature and type of AtoN can be indicated with 32 different codes

	Code	Definition
	0	Default. Type of A to N not specified
	1	Reference point
	2	RACON
	3	Fixed structure off shore, such as oil platforms, wind farms. (Note: This code should identify an obstruction that is fitted with an AtoN AIS
	4	Spare. Reserved for future use.
Fixed A to N	5	Light, without sectors
	6	Light, with sectors
	7	Leading Light Front
	8	Leading Light Rear
	9	Beacon, Cardinal N
	10	Beacon, Cardinal E
	11	Beacon, Cardinal S
	12	Beacon, Cardinal W
	13	Beacon, Port hand
	14	Beacon, Starboard hand
	15	Beacon, Preferred Channel port hand
	16	Beacon, Preferred Channel starboard hand
	17	Beacon, Isolated danger
	18	Beacon, Safe water
	19	Beacon, Special mark
Floating A to N	20	Cardinal Mark N
	21	Cardinal Mark E
	22	Cardinal Mark S
	23	Cardinal Mark W
	24	Port hand Mark
	25	Starboard hand Mark
	26	Preferred Channel Port hand
	27	Preferred Channel Starboard hand
	28	Isolated danger
	29	Safe water
	30	Special mark
	31	Light Vessel/ LANBY/ Rigs

***NOTE1:** It is based on the IALA A-126

***NOTE2:** It may be confused when it is decided whether the Aid is lighted or unlighted. Therefore competent authorities may prefer to use the regional section of the message to dedicate this.

6 WORLDWIDE WARRANTY

Limited warranty

Subject to the terms, conditions and limitations set forth in this Worldwide Limited Warranty (hereinafter the "Warranty"), AMEC warrants that its products, when properly installed and used, will be free from defects in material and workmanship for a period of twelve (12) months, from the date of first purchase (the 'Warranty Period')

For the purposes of this warranty, 'date of first purchase' means the date that the product was purchased by the first retail customer, or by the institutional customer, or in the case of a product installed on a new vessel or any other marine related platform by a certified AMEC original equipment manufacturer (a 'AMEC OEM'), the date that such vessel was purchased by the first retail customer.

AMEC will, at its sole option, repair or replace any defective products or components returned during the Warranty Period in accordance with the terms, conditions and limitations set forth below. **Such repairs or replacement will be the sole remedy of the customer under this Warranty.**

Limited to Original Purchaser

This Warranty is for the sole benefit of the original purchaser of the covered product and shall not extend to any subsequent purchaser of the product.

Miscellaneous

Apart from the specific warranties provided under this warranty, all other express or implied warranties relating to the above product is hereby excluded to the fullest extent allowable under law. The warranty does not extend to any lost profits, loss of good will or any indirect, incidental or consequential costs or damages or losses incurred by the purchaser as a result of any defect with the covered product.

Standard Warranty Service

To qualify for standard warranty service the product must be returned to a AMEC-certified service agent (i) within the Warranty Period, and (ii) within thirty (30) days of the alleged product failure. Any products returned must be securely packaged and sent pre-paid and insured to AMEC or to a AMEC-certified service agent. All products returned must be accompanied by a copy of the original sales receipt to be eligible for standard warranty service.

Obtaining Warranty Service

A list of AMEC-certified service agents is available from AMEC Technical Support at **www.alltekmarine.com**

Other conditions

This Warranty is fully transferable provided that you furnish the original proof of purchase to the AMEC -certified service agent. This Warranty is void if the label bearing the serial number has been removed or defaced.

Limitation and Exclusions

In addition to any other limitations and exclusions set forth herein, AMEC is not responsible for, and this Warranty does not cover:

- Failure due to abuse, misuse, accident, unauthorized alteration, modification or repair, improper installation or operation (whether or not by a AMEC-certified service agent) or improper storage, shipping damage or corrosion;
- Costs associated with routine system checkouts, alignment/calibration, sea trials or commissioning;
- Defects or damage that result from the use of non-AMEC branded or certified products, accessories or other peripheral equipment, including without limitation housings, parts, or software;
- Aftermarket software (i.e. all software other than the original operating software sold with the products);
- Products that have been refurbished, reconditioned, or remanufactured (The foregoing does not apply to products repaired or replaced pursuant to the terms of this Warranty).
- Products that have been dismantled resulting in the broken label on the Products;
- costs associated with overtime or premium labor costs;
- differences in material, coloring or size that may exist between actual products and the pictures or descriptions of such products in our advertising, advertising literature or on the Internet;

TO THE EXTENT PERMITTED BY APPLICABLE LAW, THE FOREGOING WARRANTY IS AMEC'S SOLE WARRANTY AND IS APPLICABLE ONLY TO NEW PRODUCTS PURCHASED WORLDWIDE. THE PROVISIONS OF THIS WARRANTY ARE IN LIEU OF ANY OTHER WRITTEN WARRANTY, WHETHER EXPRESSED OR IMPLIED, WRITTEN OR ORAL, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

THE LIABILITY OF AMEC TO A CUSTOMER UNDER THIS WARRANTY, WHETHER FOR BREACH OF CONTRACT, TORT, BREACH OF STATUTORY DUTY OR OTHERWISE SHALL IN NO EVENT EXCEED AN AMOUNT EQUAL TO THE TOTAL PURCHAE PRICE OF THE PRODUCT GIVING RISE TO SUCH LIABILITY AND IN NO EVENT SHALL AMEC BE LIABLE FOR SPECIAL, INCIDENTAL, CONSEQUENTIAL OR INDIRECT DAMAGES OR LOST OF GOODWILL, REPUTATION, LOSS OF OPPORTUNITY OR INFORMATION, DATA, SOFTWARE OR APPLICATIONS.

SOME JURISDICTIONS DO NOT ALLOW EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES SO THE ABOVE LIMITATIONS OR EXCLUSIONS MAY NOT APPLY TO YOU. THIS WARRANTY GIVES YOU SPECIFICLEGAL RIGHTS AND YOU MAY ALSO HAVE OTHER RIGHTS, WHICH VARY FROM JURISDICTION TO JURISDICTION.

This Warranty supersedes and replaces all previous Warranties.

In the event that any term or provision contained in this Warranty is found to be invalid, illegal or unenforceable by a court of competent jurisdiction, then such provision shall be deemed modified to the extent necessary to make such provision enforceable by such court, taking into account the intent of the parties.

No oral or written representations made by AMEC or any seller, reseller or distributor of the products, including employees and agents thereof, shall create any additional warranty obligations, increase the scope, or otherwise modify in any manner the terms of this Warranty.

All AMEC products sold or provided hereunder are merely aids to navigation. It is the responsibility of the user to exercise discretion and proper navigational skill independent of any AMEC product.

7 DECLARATION OF CONFORMITY

Hereby, Alltek Marine Electronics Corp. (AMEC) declares that this PASO-350 is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.

8 ACRONYMS

ABM	AIS addressed binary and safety related Message
ACK	Acknowledgment Message
AIS	Automatic Identification System
AtoN	Aids to Navigation
BBM	AIS broadcast binary message
COG	Course Over Ground
DGNSS	Differential Global Navigation Satellite System
DGPS	Differential Global Positioning System
DSP	Digital Signal Processor
ECS	Electronic Chart System
EPFS	Electronic Position Fix System
FATDMA	Fixed Access Time Division Multiple Access
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
IEC	International Electrotechnical Commission
IMO	International Maritime Organization
MMSI	Maritime Mobile Service ID
NMEA	National Marine Electronics Association
RATDMA	Random Access Time Division Multiple Access
RF	Radio Frequency
SART	Search and Rescue Transponder
SOG	Speed Over Ground
SRM	Safety Related Message
TDMA	Time Division Multiple Access
TNC	Threaded Neill-Concelman Connector
TX	Transmitter
VDL	VHP Data-link Other Vessel Message
VDM	AIS VHF data-link message
VDO	AIS VHF data-link own-vessel report
VHF	Very High Frequency
VSD	Voyage Static Data
VSWR	Vertical Standing Wave Ratio
VTS	Vessel Traffic Services