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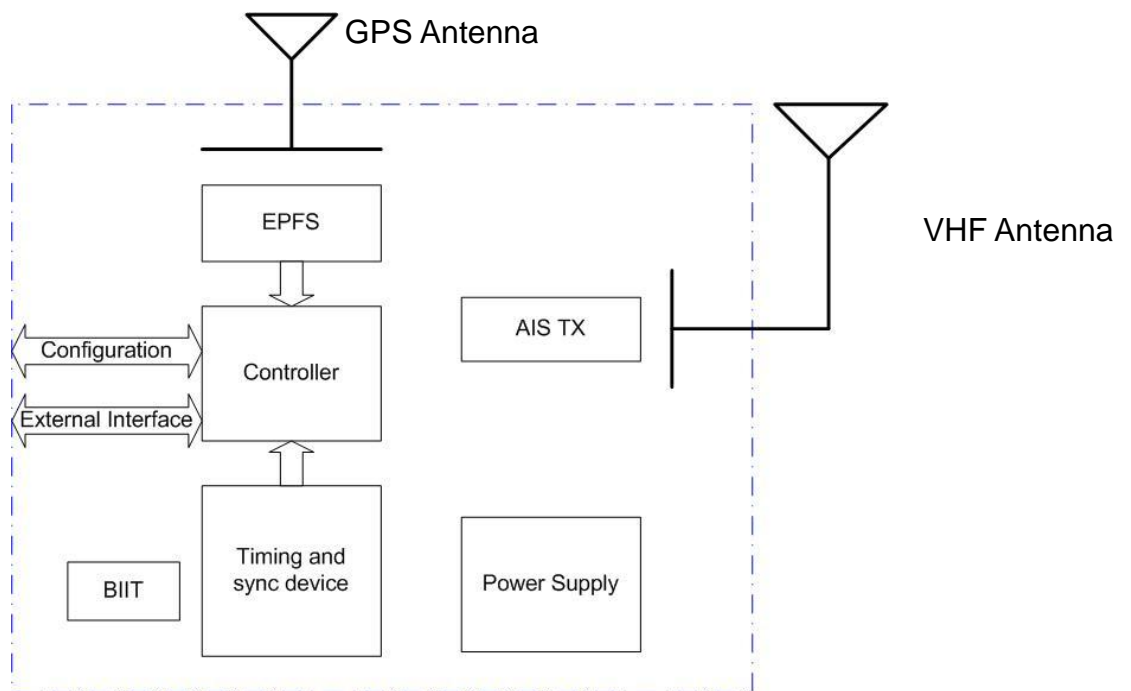
Figure 1-1-1 AIS AtoN Type 1 Block Diagram

- Type 3 (MANDO-303) – It has AIS receive and transmit capabilities in accordance with Recommendation ITU-R M.1371. Using FATDMA/RATDMA.
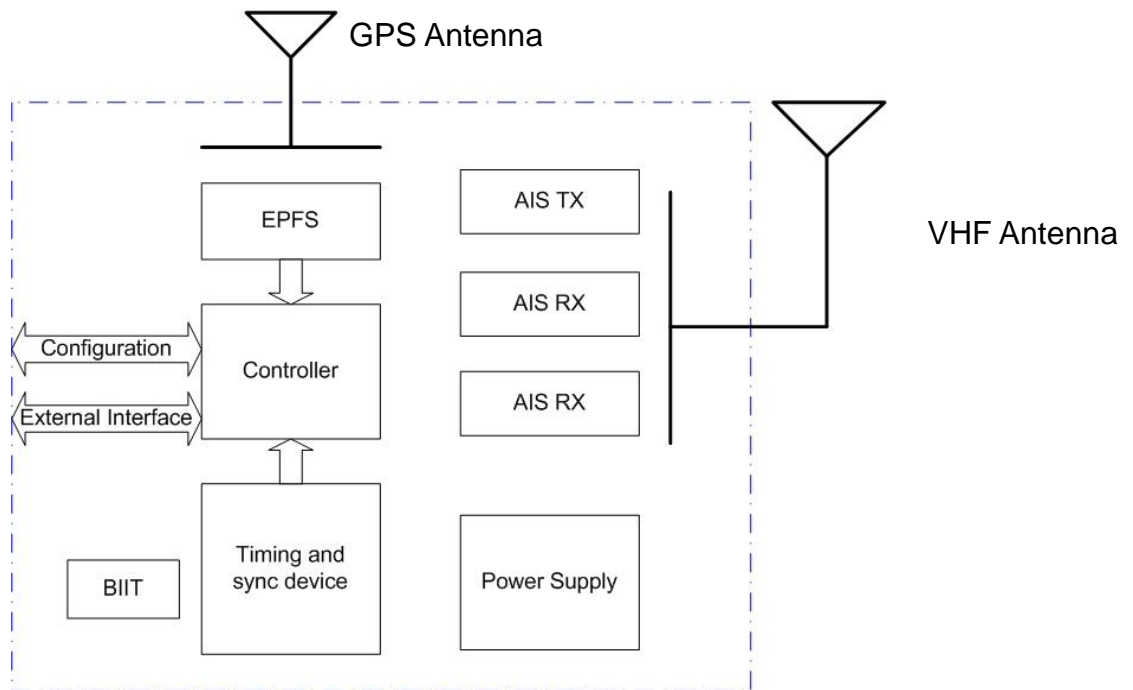
Figure 1-1-2 AIS AtoN Type 3 Block Diagram

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.