Operation Manual

M-2 AIS Transponder System

Applicability of this manual

This manual illustrates the operation of Display model V01.02.xx

In accordance with McMurdo's policy of continual development and product improvement, equipment may be upgraded from time to time and future versions may therefore not correspond exactly with this manual. When necessary, upgrades will be accompanied by updates or addenda to this manual.

Disclaimer

Information contained in this manual is supplied in good faith, but is liable to change without notice. McMurdo Limited disclaims any liability for consequences arising from omissions or inaccuracies in the manuals and documentation provided with this product.

IMPORTANT: Please take time to read this manual carefully and to understand its contents fully, so that you can operate your Transceiver correctly.

Safety Summary

WARNING: ENSURE THAT THE M-2 AIS HAS BEEN CORRECTLY INSTALLED IN ACCORDANCE WITH IMO GUIDELINES AND THE SUPPLIED INSTALLATION MANUAL BEFORE POWERING ON THE SYSTEM.

WARNING: The M-2 has no ON/OFF or power switch. It will automatically start operation within 2 minutes of applying power to the transponder unit.

WARNING: Transponder chassis can become hot during extended periods of operation. Avoid touching this when the transponder is operating. The plastic dust cover must be fixed in place before setting the equipment to work.

WARNING: Do not touch the VHF antenna or connecting cable when the transponder is in operation.

WARNING: Unauthorised opening of the transponder access covers may invalidate the manufacturer's warranty.

WARNING: Avoid using chemical solvents to clean the Display or transponder dust cover as they can damage the casing material.

WARNING: The use and operation of an AIS transponder is legislated and forms a part of the ship's mandatory navigation equipment under SOLAS regulations. It is therefore necessary that the installation is certified (commissioned) and that certain information has to be available before full operation of the transponder can take place. The ship's IMO and MMSI numbers and other important information must be entered as part of the installation and commissioning procedure, and before the equipment is used at sea.

WARNING: This product is sold or provided as merely an aid to navigation. It is the responsibility of the user to exercise discretion and proper navigational and seamanship skills.

WARNING: NOT ALL SHIPS CARRY AIS. The Officer of the Watch (OOW) should always be aware that other ships and, in particular, leisure craft, fishing boats and warships, and in some cases coastal shore stations (including Vessel Traffic Systems (VTS) centres), may not be fitted with AIS. The OOW should always be aware that AIS fitted on other ships as a mandatory carriage requirement may, under certain circumstances, be switched off based on the Master's professional judgement.

WARNING: The use of a Megger (High Voltage Insulation Tester) may damage the equipment and therefore should not be used.

WARNING: Do not operate the equipment when persons are closer than 3 metres from the antenna. If any person (e.g. the operator) must be closer, then a grounded RF shield should be interposed between that person and the antenna.

AIS Operation Licensing

IMPORTANT: Operation of the AIS Transponder is covered by international radio regulations and therefore the ship must possess a valid ship's radio licence. The AIS equipment must be correctly registered (Call Sign and MMSI number). Operation of AIS equipment without a valid MMSI number contravenes international radio regulations and must be avoided. Please contact the relevant authority in your country for further information regarding ship's radio licensing requirements.

Disclaimer

Information contained in this manual is correct at time of going to print but is liable to change without notice. McMurdo Limited disclaims any liability for consequences arising from omissions or inaccuracies in the manuals and documentation provided with this product.

Equipment may be upgraded and features added at any time; however, the basic principles given in this document will remain unchanged.

Contents

Introduction

About this Manual

This operation manual has been designed to help the user understand how to operate the M-2 AIS transponder system. Before attempting operation for the first time, please read this manual thoroughly. The first sections are an overview of the most commonly used features and a description of the various modes of operation; the remainder of the sections have a full explanation of all the features and user settings.

It is assumed that the M-2 installation is complete and all appropriate external equipment is connected and working as intended. A separate M-2 installation manual is supplied with the equipment; this details full installation procedures and provides routine service information.

This manual provides a step by step guide to the procedures typically required to operate the M-2 as a Class A shipborne equipment.

It explains how to:

- Review and update own vessel static and voyage related information
- Check the current status of the AIS system and connected sensors
- List other AIS targets and view as a geographic plot overview
- View and set VHF AIS regions
- View and create safety text Messages
- Check status of alarms and view the system security log
- Respond to Long Range requests
- Troubleshoot

Product Definition

AIS overview

The Automatic Identification System (AIS) system provides for communication, navigation and surveillance capabilities for vessels and for fixed coast radio stations. The AIS transponder offers high-speed automated communication from ship to ship and ship to shore of vessel-, voyage- and safety-related information.

Own vessel navigational data is automatically transmitted directly to surrounding vessels and shore based VTS systems utilising marine VHF channels. The AIS gives mariners the ability to vie w at a glance the status of AIS equipped vessels and aids to navigation around them and provides access to a host of detailed navigation information.

The M-2 is primarily designed for use as a shipborne AIS mobile station, and comprises of two main parts:

Transponder
The M-2 AIS transponder has an integral Global Navigation Satellite System (GNSS) engine used for timing, one radio transmitter, three radio receivers and a computer unit. The AIS equipment should be interfaced to the vessel's primary GNSS navigation receiver, connected to a marine antenna and be interfaced to the vessel's gyro compass.

As appropriate to the class and use of vessel, there is provision for additional interface connections: Rate of Turn (ROT) indicator, bottom track speed log, differential beacon Global Positioning System (GPS) receiver, Electronic Chart Display Information System (ECDIS) or Automatic Radar Plotting Aid (ARPA) system, Pilot Plug and Long Range port.

Display
The Display is used to input vessel details, configure the system and to display AIS target information.

An IMO pilot plug socket box may be attached to a socket on the rear of the display or connected directly to the transponder.

AIS in use

The AIS Transponder transmits information which is separated into three groups:

Static data - Vessel name, type, length and breadth, MMSI and IMO numbers and GNSS antenna location.

Dynamic data – Position, accuracy and integrity of the position, time, course and speed over ground and navigational status.

Voyage data – Cargo, draught, port of destination and estimated time of arrival.

In addition, the AIS can transmit and receive Safety Messages. These may include navigation safety information, warnings of floating objects, collisions, meteorological situations, etc.

Differential correction information for GNSS can be processed by the AIS, increasing the accuracy of positional information and hence the safety of the vessel. Differential correction information can also be provided by connection of a supplementary differential beacon differential receiver.

M-2 Key AIS Functions

- Automatic identification of other AIS equipped stations.
- Self-organising control of access to the radio channels.
- Reception of data from other vessels and coast radio stations.
- Transmission of own vessel data for use by other vessels and coast stations.
- Storage of static data intended for automatic transmission via the radio channels.
- Output of data received via the radio channels from other AIS targets for presentation on the Display or other visual display equipment.
- Determination of the position and motion of own vessel if the external GNSS receiver fails, by utilising the internal GNSS receiver.
- Application of GNSS differential corrections using information supplied from a supplementary differential beacon receiver.
- Application of GNSS differential corrections using information received from a controlling station via Message 17 over the AIS VHF Data Link (VDL) channel.
- Display of bearings and distances to the vessels, calculated from their co-ordinates, obtained via the AIS VDL channels.

Operation

Please read all the warning notices at the front of this manual before applying power to the AIS Transponder and setting the equipment to work.

Activation

It is recommended that AIS should not normally be powered down and should always remain in operation continuously. However, based on the Master's professional judgement, either transmissions may be inhibited by selecting 'Silent mode' or the AIS may be powered down entirely if continuous operation might compromise the ship's safety or security. This might be necessary in waters where pirates or armed robbers are known to operate or during some cargo handling or maintenance operations.

Actions of this nature should always be recorded in the ship's logbook. Reactivation of the AIS should take place as soon as the reason for deactivation has passed.

Compliance

The M-2 AIS complies with international standards and is type approved in accordance with the European Marine Equipment Directive. The EU Declaration of Conformity, shown on the rear pages, lists the relevant approval standards. Details of other Worldwide type approvals are listed on the McMurdo website *www.mcmurdo.co.uk*

M-2 Product description

M-2 Display controller and Transponder unit

Key features

- Shipborne Class A AIS
- Versatile Keyboard and Display Unit
- Clear presentation of targets as graphics and text
- Integral 16 channel Space-Based Augmentation System (SBAS) -enabled GPS receiver
- Differential GNSS (DGNSS) correction
- Interfaces to ECS, ECDIS, ARPA
- Pilot plug connection
- Integral ship's cable termination board
- Four sensor interfaces
- Long Range port

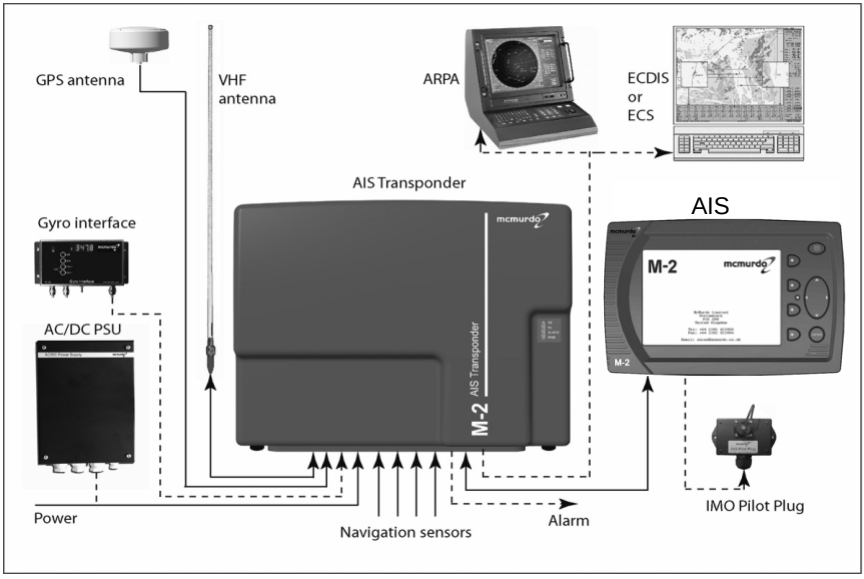
The M-2 gives a clear indication of identity, proximity and bearing of surrounding AIS targets. By providing this information in both graphic and text formats the need for 'bridge to bridge' radio voice contact between vessels is much reduced.

AIS targets are unaffected by radar shadow effects and remain visible even when targets may be lost to the vessel's radar.

Own vessel static and voyage related information is broadcast automatically every six minutes. Depending on the speed the vessel is making, dynamic factors (speed, course, heading and rate of turn) are transmitted at intervals of between two and twelve seconds or every three minutes when moored.

The M-2 Display unit features a large, high contrast, backlit Liquid Crystal Display (LCD) graphic display. AIS target information may be displayed as an ordered list or plotted on a latitude/longitude grid overlay. The clear graphical target presentation gives the officer of the watch a clear overview and best visual understanding of a developing hazard to navigation situation. The AIS target list has a split screen view; detailed AIS target information is clearly displayed in the lower section. Menu 'Soft Keys' provide for an intuitive user interface and give direct and easy access to all aspects of system operation.

Entry of alphanumeric text information is both easy and straightforward using the on-screen 'pop-up' keyboard together with an intuitive four way navigation pad key. Standard text phrases may be edited and re-used when composing text based safety messages or when updating own vessel voyage, route, and destination details.



Comprehensive interfaces are provided for the connection of the vessel's primary navigation sensors, Integrated Bridge System (IBS) or Electronic Chart System (ECS).

Quick Start - setting to work

WARNING: The M-2 has no ON/OFF switch. It will automatically start operation within 2 minutes of applying power to the transponder unit.

Caution: Read the warning notices at the front of this manual before powering up the AIS Transponder.

When setting the M-2 to work, always review your vessel's voyage related information and update as required.

Starting the M-2

Apply the power source to the Transponder. This procedure will depend on the vessel's actual installation arrangements but would generally involve closing a switch panel circuit breaker or switching on the AC / DC rectifier power unit (if fitted).

After a short delay the Display Alert indication lamp (red LED) will start to flash and shortly after that the Display start up welcome screen will be displayed.

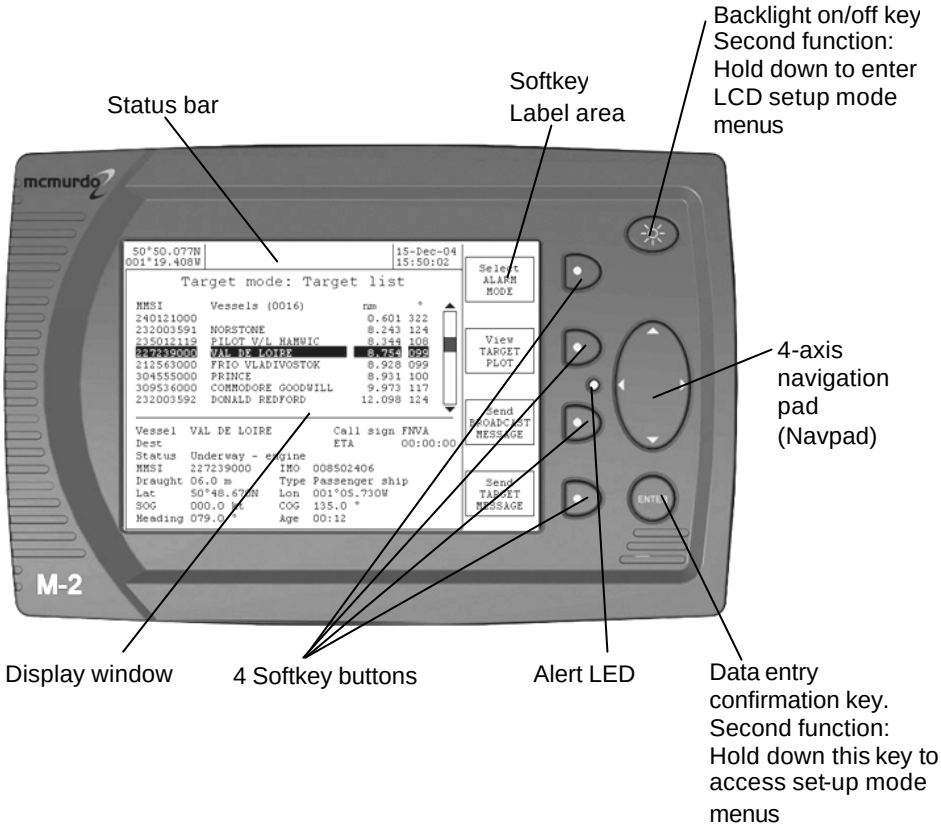
Review and update your vessel's voyage related information.

Check that the vessel's navigation sensors are providing valid navigation information.

Take particular notice that the heading information is in correct alignment with the vessel's master steering compass.

Consult the following sections for detailed system operation information.

Display and controls



Setting the display backlight and contrast level

One short push of the backlight key toggles the backlight ON and OFF.

To adjust the brightness or contrast of the display, hold down the backlight key until the screen changes to the LCD setup page. Adjust the LCD backlight and contrast settings using the four way navigation pad. Return to the previous page by holding down the backlight key until the screen changes .

Enter key and Setup mode

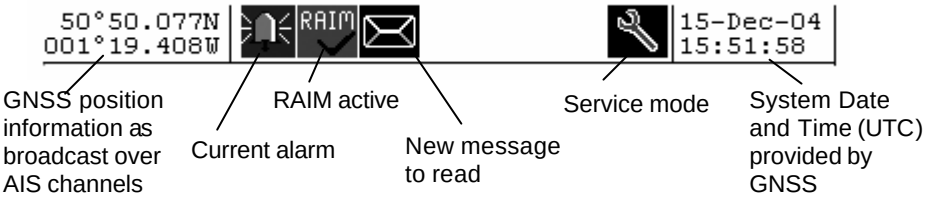
The ENTER key confirms the entry of new data, and provides additional functions:
Text entry mode, to activate the popup keyboard
Setup Mode; enter System Setup Mode by holding down the ENTER key for more than five seconds.

Navpad

The four-way 'Navigation Pad' moves the cursor around the screen.

It is also used to change data:
UP/DOWN selects the field
LEFT/RIGHT changes the value

Status bar
The information bar at the top of the display shows the current system status.



Alarm window
Alarms relate to own vessel conditions. A new alarm state is announced by a popup text box

Use the ENTER key to acknowledge the alarm state and clear the alarm window box from view. Alarm boxes persist until acknowledged, thus several boxes may be stacked on top of each other.

Alert LED
The red Alert LED can be set to indicate various functions.
It will start to flash while the system is in the process of initialising after power up and before setting to work.
Refer to the setup options section for further information.

Using Softkey menus

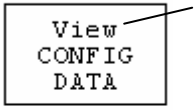
The **Select** softkey switches the display between the three main Modes of operation: **Voyage** ® **Target** ® **Alarm**

The **View** softkey switches the display between different pages within each main mode. A **View** can have several **Pages** associated with it; these may be scrolled using the **Page** softkey. Some pages have further options which can be selected by other softkeys.

Operate the softkeys in this order to get to the selection that you want:
Select → Most significant
View → significant
Page → least significant
Enter or Clear → Action confirmation

Softkey labels display the next function of each softkey that is available in the current Mode, View or Page.

This example shows the M-2 in **SETUP** mode.
VOYAGE mode will appear if the key is pressed.

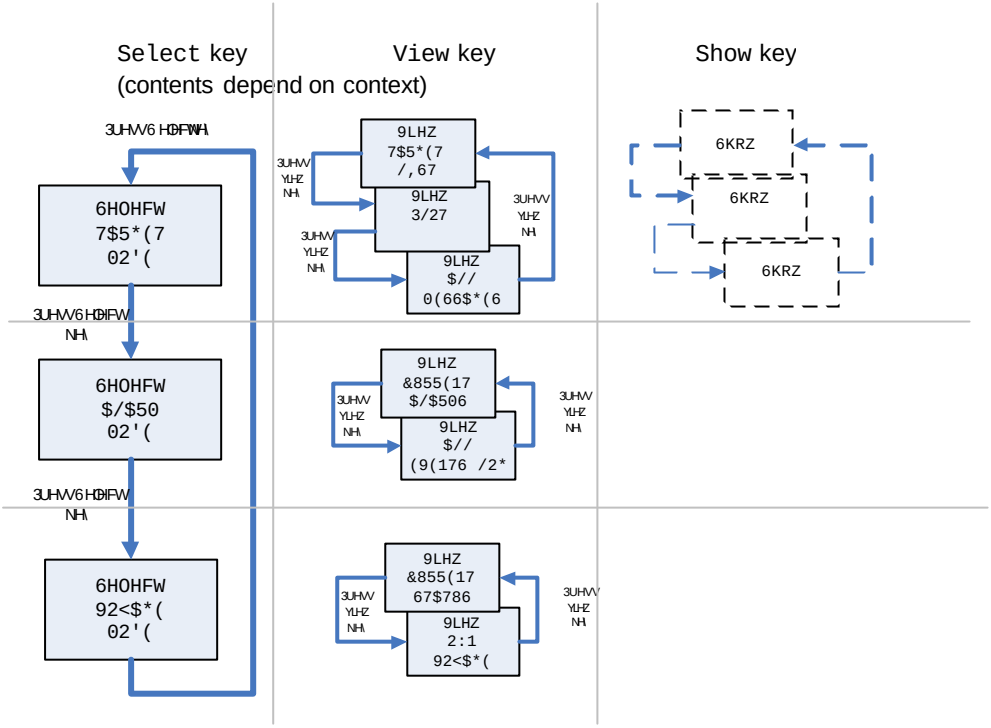


The top line of each softkey label indicates the function of the associated softkey.
In this example, operating the softkey will change to the next **View**, which is **CONFIG DATA**

The lower text of a softkey label indicates the information or use that is associated with the next softkey action; in this example, **CHANNEL REGION**

Softkey menu options cycle repeatedly through all available selections.

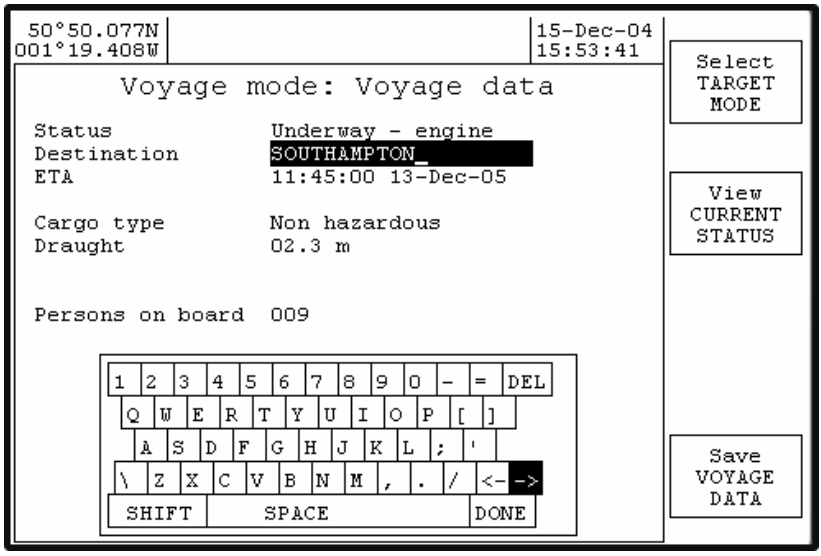
Softkey cyclic actions



General operation

Entering text

A pop-up QWERTY keyboard appears when updating or inputting new information into the M-2.



Updating text

Push the **EDIT** softkey. The data edit cursor will appear highlighted on the topmost field of the page.

Push the ENTER key to activate the popup keypad.

Move the cursor over the field to enter or edit using the navigation pad.

Move the edit cursor around the keyboard using the navigation pad to highlight the required character.

Select SHIFT to access lower case characters and symbols.

Select DEL to delete a single character.

The <- and -> keys move the cursor over existing characters, allowing errors in the middle of text to be corrected without deleting the entire text from the end.

Push the ENTER key to confirm the character.

Repeat these actions until the data field is correct.

Close the edit keyboard by selecting DONE and pushing the ENTER key.

Finally, review all the information shown on screen. When correct, save the new information and exit to the main menu level using the **SAVE** softkey.

Entering numbers

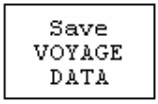
Select edit mode using the **EDIT** softkey, The data edit cursor will appear highlighted on the topmost data field.

Position the edit cursor over the numeric field to be changed. The current value will be highlighted.

This example shows the vessel draught field in edit mode.

Change the value by pressing LEFT or RIGHT on the navigation pad to increase or decrease the value displayed.

Once the new value is set, use the UP or DOWN navigation pad keys to move to the next item, or exit and save the changes with the **SAVE** softkey.



To cancel an entry, close the keyboard by selecting DONE and then push the View key. When the display is cycled back to the original page, the entry will be unchanged. (In other words, the new entry is only saved by pressing the Save key. It will still display as long as that view is displayed, but will revert to the previous data when the view is re-selected.)

Password access control

The M-2 AIS unit has three levels of access control - each of which is protected by its own password. The three levels are:

User level	protects voyage-related data such as that displayed on the **Voyage mode: Own voyage** page.
Operator level	protects operational data such as the channel regions shown on the **Setup mode: Channel regions** page.
Service level	this level of access is available only to authorised service agents and protects ship's static data (such as the MMSI and IMO numbers) which must be programmed into the unit.

The user and operator passwords are optional. If either of them is not required (permitting any user to change the voyage or operating data) then they may be set to the special password "NONE" (which is the default setting). It is recommended that the operator password is set, and that the user password is not used.

If a user password is configured, but the operator password is left as "NONE" then the user password will not be effective since the system will grant operator-level access without requiring a password.

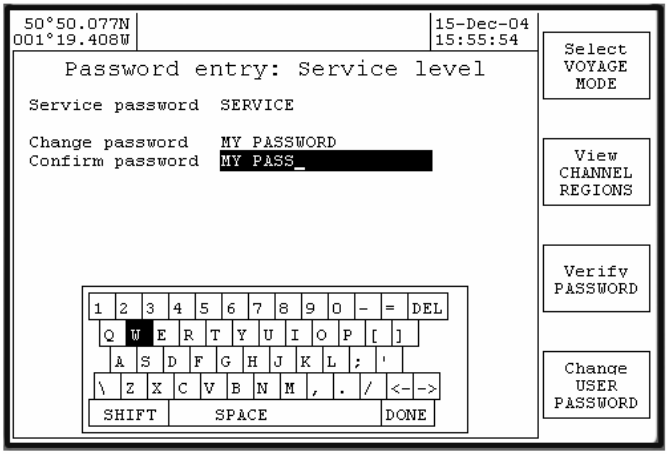
Each page protected by a password has an **Edit** softkey - for instance the **Own Voyage** page displays the **Edit VOYAGE DATA** softkey whilst the **Channel Regions** page displays the **Edit CHANNEL REGIONS** softkey. When the **Edit** softkey is activated, the user is prompted to enter the corresponding password.

Press the 'Enter' button to bring up the on-screen keyboard, and then enter the appropriate password into the top field. Then activate the **Verify PASSWORD** softkey in order to check the password. If the password is correct, you will be granted access to the preceding page.

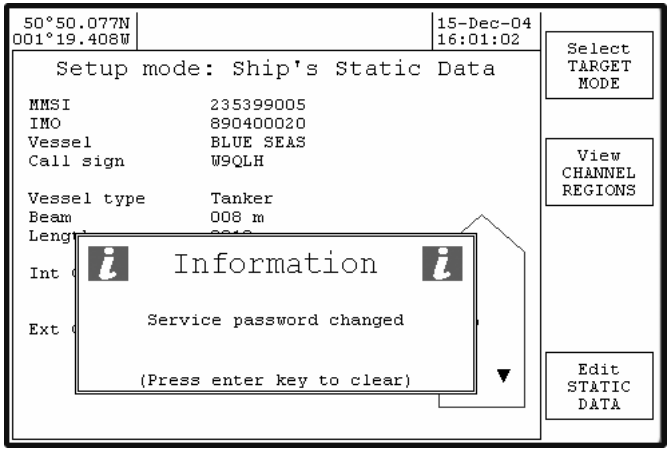
When the password is set to "NONE" then the user is permitted to edit the corresponding page immediately without being prompted to enter the password.

Changing passwords

Any password can be changed by using the **Edit STATIC DATA** softkey on the **Setup mode: Ship's static data** page. Since the static data is protected by the Service password, this softkey always causes the password prompt to be displayed.



To change any password, select the desired password entry page (the **Change XXXXX PASSWORD** softkey cycles through these pages) and enter the current password, then enter the new password in each of the two fields, **Change password** and **Confirm password**. Finally, press the **Verify PASSWORD** softkey. Provided that the two new password entries are identical, an acknowledgement is displayed on screen and the new password takes immediate effect.



If the new passwords are not identical, a warning message is displayed. The original password remains valid.

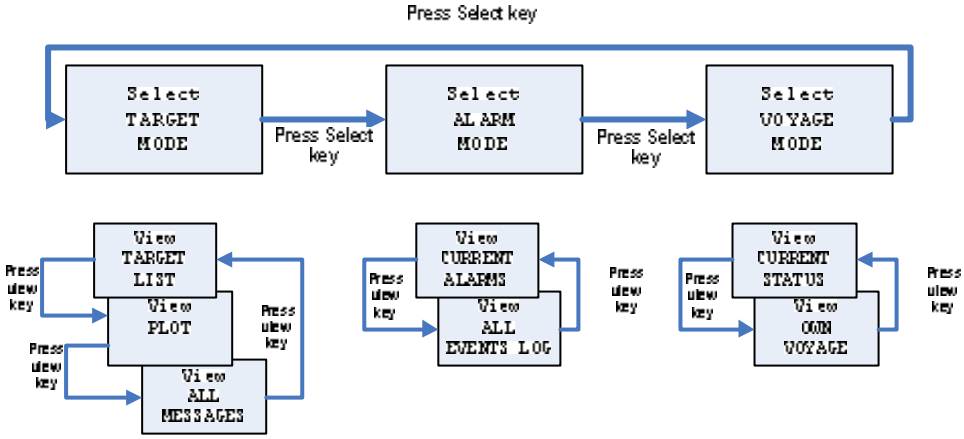
Resetting lost passwords

If the user password is forgotten, the operator or service passwords may be entered into the **User password** field instead, in order to allow the user password to be re-set. Similarly, the operator password can be reset by entering the service password as the **Operator password**.

The service password cannot be overridden. If this password is changed and then forgotten, then only a Service Agent can reset the AIS to restore the default passwords.

Detailed operation

Menu cyclic structure

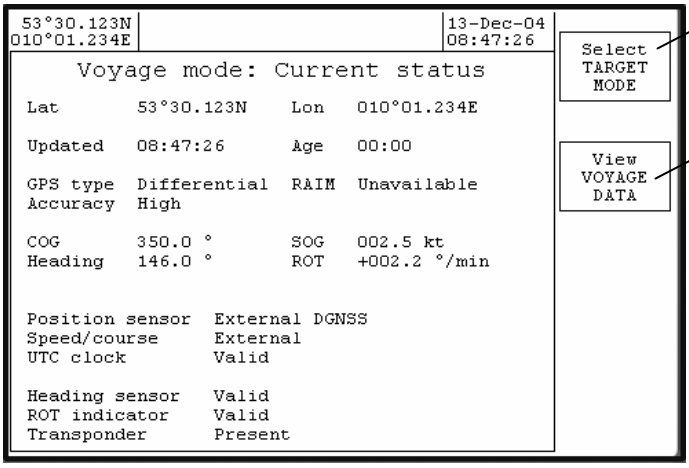


Other softkeys display options depending on the page selected.

VOYAGE Mode: Current Status

VOYAGE Mode: Current status page provides an overview of the vessel's current navigational status . The information is updated automatically by the onboard navigation sensors.

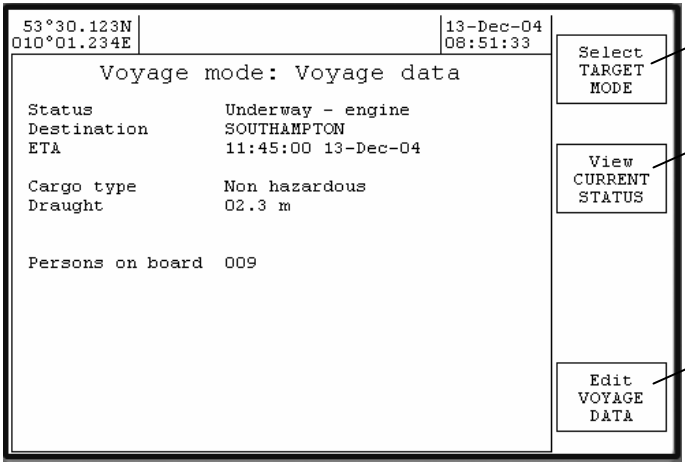
The Latitude and Longitude shown are the values which are transmitted to other vessels. Updated is the time when the last transmission occurred; Age is the length of time since the update occurred.



The **MANUAL POSITION ENTRY** key is not shown while the internal or external GNSS is providing a valid navigation fix, but appears to allow this information to be entered when necessary.

VOYAGE Mode: Own Voyage

Manually enter own voyage information, as previously described



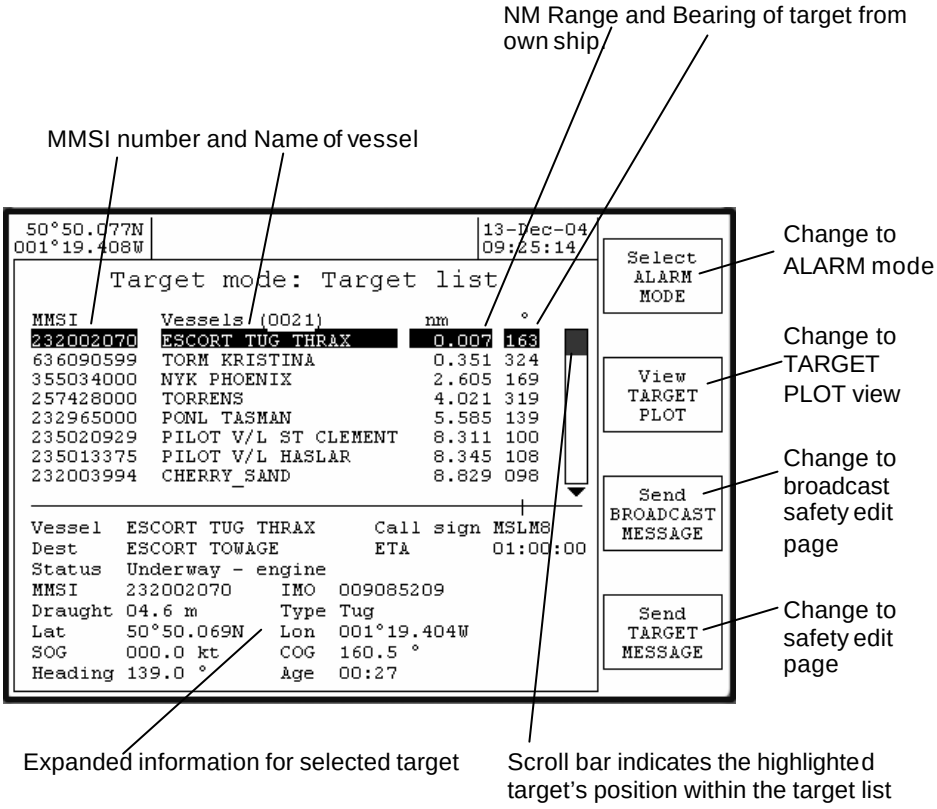
In an installation that contains another device (such as an integrated charting system) which is also capable of entering Voyage and Static data, consideration must be given to the interaction between the other device and the M-2 transponder. Information entered via the M-2 display unit may be overridden by data entered by the integrated system ; if this is the case, the integrated system should be used as the main input device.

Voyage mode: Own Voyage		
Item	Description	Notes
Status	Not specified Underway – engine At anchor Not under command Restricted movement Constrained by draught Moored Aground Fishing Underway – sail	Select the current navigation status from list.
Destination		Preferably §UN/LOCODE format
ETA	HH:MM:SS DD-MM-YY	Enter UTC arrival time, Month will auto select

		by first letter, J=Jan, F=Feb etc.
Cargo Type	Fixed by vessel type Non hazardous IMO hazard cat A IMO hazard cat B IMO hazard cat C IMO hazard cat D Unknown	'Fixed by vessel type' is the auto selected value according to own vessel type. Where vessel type allows other cargo types can be picked from list.
Draught	– 99.9 (Set value)	Own vessel's water draught in meters.
GNSS in use	Ext A Ext B	Select the source of external GNSS data
Persons on Board	000 - 255	Set number value using the Navpad keys only

§UN/LOCODE codings for locations worldwide may be found on the webpage: ***www.unece.org/cefact/locode/service/main.html***

Target Mode: Target list



Targets are sorted according to range from own ship.

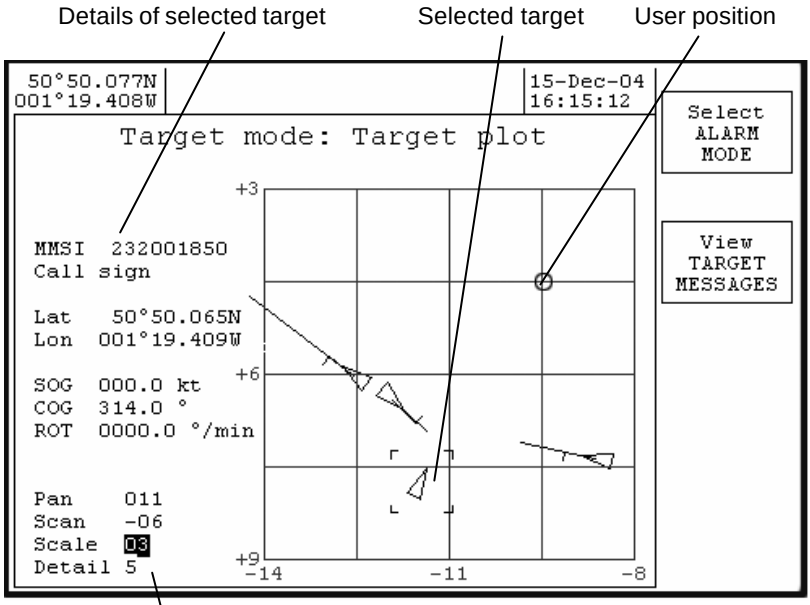
The destination (Dest) is preferably shown in its §UN/LOCODE format.

Age is the time since the information was updated.

§UN/LOCODE codings for locations worldwide may be found on the webpage:
www.unece.org/cefact/locode/service/main.html

Target Mode: Target Plot

Use Navpad to step around data fields and change values



The display control section operates by selecting the desired field using the Navpad up and down keys, then using the Navpad left and right keys to change the parameter.

Pan shifts displayed user position East or West
Scan shifts displayed user point North or South
Scale changes the area of view (0.75 nm – 50 nm)
Detail sets the level of graphics detail associated with targets (1-5)

Repeatedly pressing the up or down Navpad key moves the cursor through the display fields, then changes to the target cursor display, then changes back to the display fields.

Selecting target

Use the up or down Navpad keys to change the cursor to the target display.

Target box icon will appear.

Use the Navpad to select the target of interest. The left key steps through the targets in increasing range order, right key in decreasing range order.

Target icons detail

X

Level 1
Target is shown as a simple cross

Level 2
Vessel outline triangle is oriented by heading

Level 3
Vessel outline triangle is oriented by heading
COG / SOG vector (fixed length)

Level 4
Vessel outline triangle is oriented by heading
COG / SOG vector (fixed length)
Turn indicated by ROT flag of fixed length

Level 5
Vessel outline triangle is oriented by heading
COG / SOG vector (fixed length)
Turn indicated by ROT flag of fixed length
Radio Call sign

Reading and sending safety messages

A new incoming safety text message is first announced by the new message popup notification window

Use the Enter key to clear the new message notification window from view.

The 'envelope' icon is displayed in the status bar area, indicating that a new message is ready to read.

Working with safety text messages

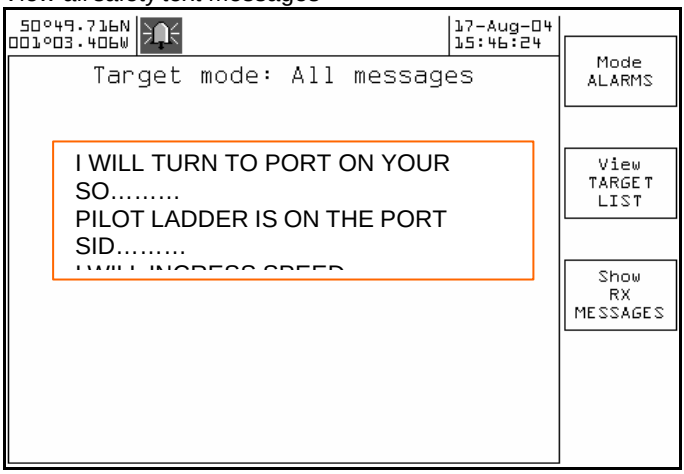
Received and transmitted safety text messages are stored ready for reading, editing or re-transmission within the **All messages** list.

The message list may be further sorted into message types using the **Show Rx MESSAGES** or **Show Tx MESSAGES** softkeys.

The message list displays the beginning part of a message text. To read the complete message, place the highlight bar over the required message; the full text of the message will be shown in the lower section of the display.

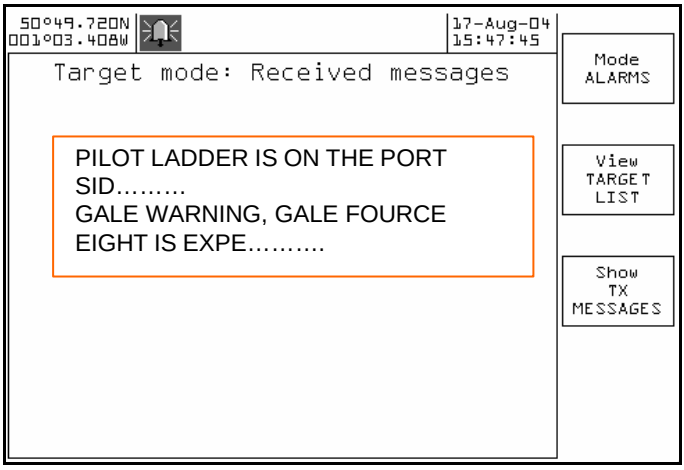
Target Mode: All messages

View all safety text messages



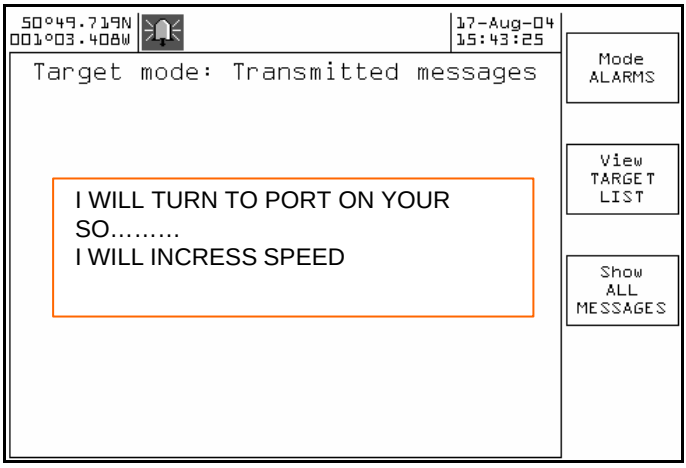
Softkey actions, Target mode: All messages View all safety text messages		
Softkey	Function	Description
Mode	**ALARM MODE**	Change to ALARM mode.
View	**TARGET LIST**	Change to TARGET LIST view.
Page	**Show Rx MESSAGES**	Re-sort the message list to show only incoming received messages.
Action		

View Rx text messages



Softkey actions, Target mode: Received messages View all received safety text messages		
Softkey	Function	Description
Mode	**ALARM MODE**	Change to ALARM mode.
View	**TARGET LIST**	Change to TARGET LIST view.
Page	**Show TX MESSAGES**	Re-sort the message list to show only outgoing transmission messages.
Action		

View Tx text messages

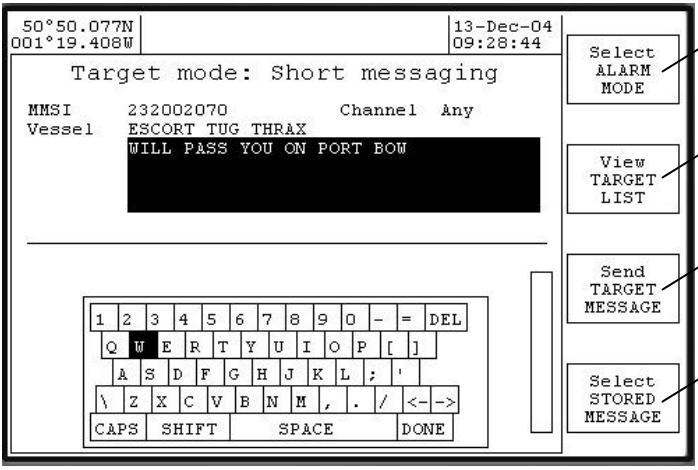


Softkey actions, Target mode: Transmitted messages View only sent safety text messages		
Softkey	Function	Description
Mode	**ALARM MODE**	Change to ALARM mode.
View	**TARGET LIST**	Change to TARGET LIST view.
Page	**Show ALL MESSAGES**	Re-sort the message list to show all messages.
Action		

Target Mode: Short messaging, Target message

Send a target MMSI (or vessel) a safety text message.

Push the ENTER key to access the popup keyboard and start a new safety text preparation or 'select STORED MESSAGE' to access previously saved messages for reuse.



Change to ALARM mode

Change to TARGET LIST

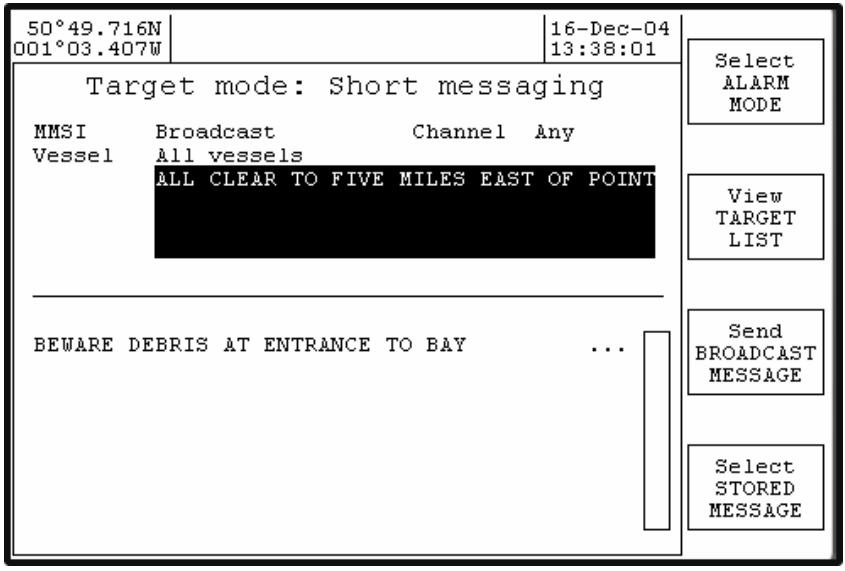
Transmit the set safety message to target MMSI.

Pick a prepared safety message from list. Can be sent 'as is', or edited and resaved as a new message.

Target mode: short messaging Send target MMSI a safety text message		
Subject	Value	Notes
MMSI	Defaults to highlighted targets MMSI number	Enter key to change or 'Navpad down' to move to next item.
Vessel	Target's name	Can't change
Message	Message text	Max 156 characters ..
Channel	Any AIS A AIS B Both	Set safety transmission channel selection.
Type	Addressed	Can't change, fixed by selection of Target MMSI.
Add new message	Message text	Prepare and save safety message text for later usage.

Target mode: Short messaging, BROADCAST message

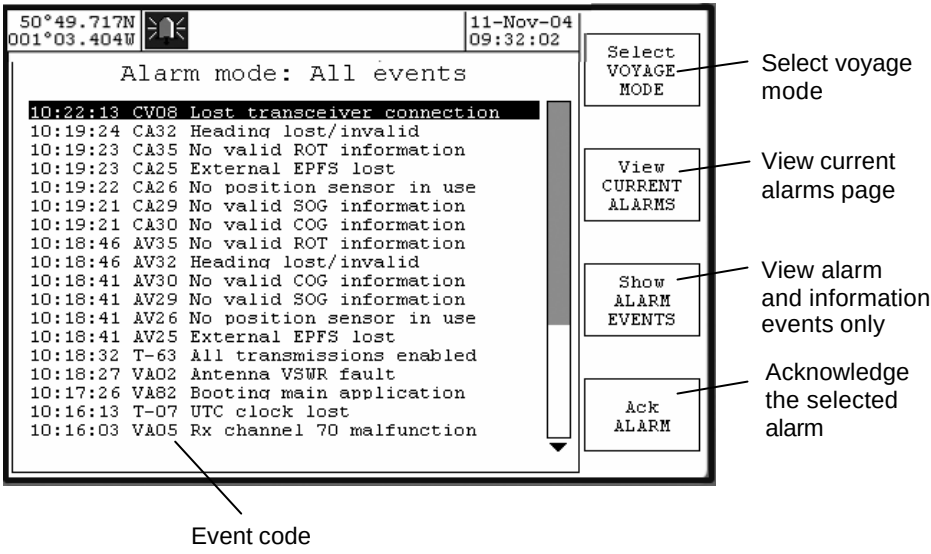
Send an all ships BROADCAST safety text



Push the ENTER key to access the popup keyboard and start a new safety text preparation or select ‘STORED MESSAGE’ to access previously saved messages for reuse.

Alarm mode: All events log

This page lists all the alarm, information and security events, with the most recent events at the top.



Acknowledging alarms

Normally, alarms are acknowledged by using the ENTER button to clear the popup message box, which acknowledges the alarm. Unacknowledged alarms may also be acknowledged by moving the cursor down the list to select the unacknowledged alarm - and then using the **Ack Alarm** softkey.

Event codes

Codes are divided into two categories – alarm codes and log entries. Alarm codes relate to generated alarms; event codes, distinguished by a dash (-), relate to log entries only.

Alarm codes

Each alarm is preceded by a 4-character ID code.

The first character indicates the state of the alarm and may be 'A' for activated, 'V' for inactivated or 'C' for current.

A current alarm is an alarm which is ongoing at the present time. (Current alarms are also shown on the current alarms page.)

An activated alarm is an alarm that occurred at the time indicated in the first column of the alarm log, and has subsequently cleared. The ‘A’ indicates that the record refers to the time when the alarm occurred.

An inactivated alarm is an alarm which has cleared at the time indicated. This is the second entry for a particular alarm – the times when it occurred and when it cleared are recorded separately. The 'V' indicates that the record refers to the time when the alarm cleared.

The second character indicates whether the alarm has been acknowledged or not - 'A' indicates that it has been acknowledged and 'V' that it has not.

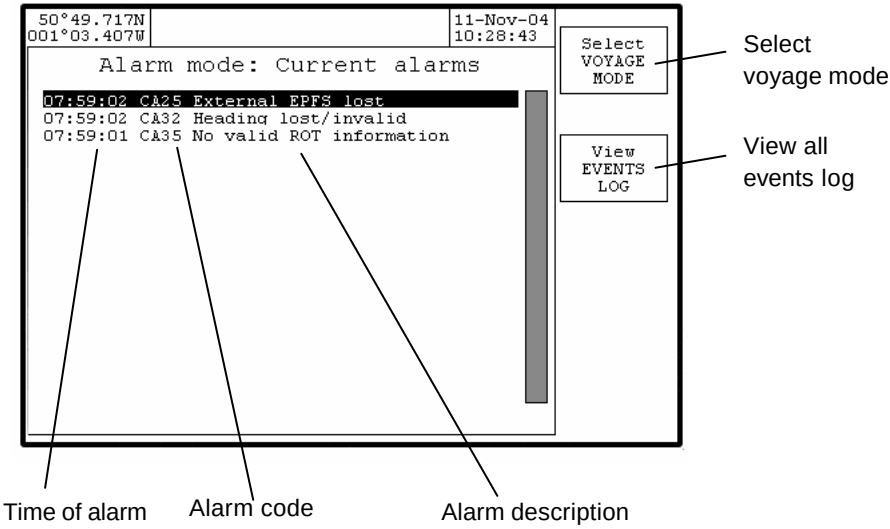
The two numeric digits are a unique code for each alarm type.

Log entry codes
Log entry codes are of two types – Security and Text. Neither event requires acknowledgment.

Security codes are explained in the Security Log section.

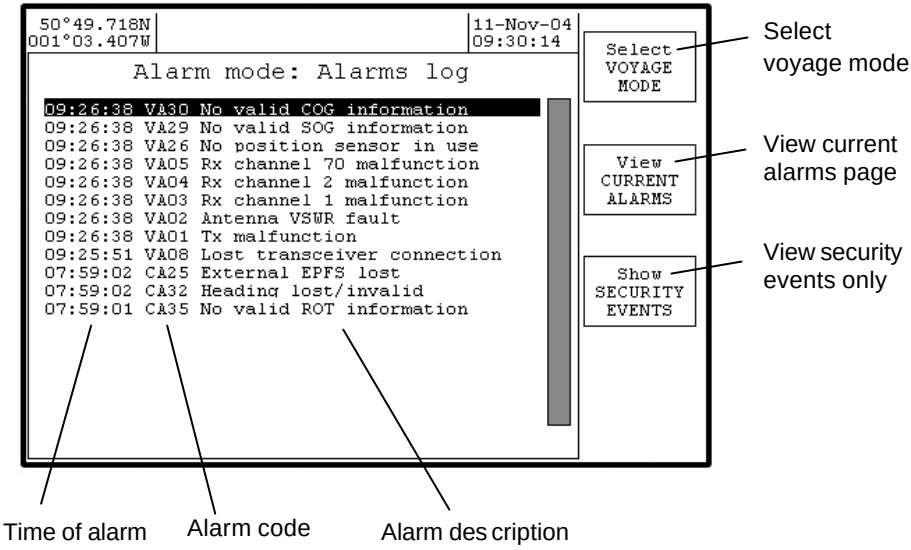
Text codes denote entries in the log which may be used for fault determination and servicing. Each text entry is preceded by a 4-character ID code. The first character is always an 'T' for text entries, and the second character is always '-' to indicate that acknowledgement is not required. The two numeric digits are a unique identifier in accordance with AIS specifications.

Alarm mode: Current alarms



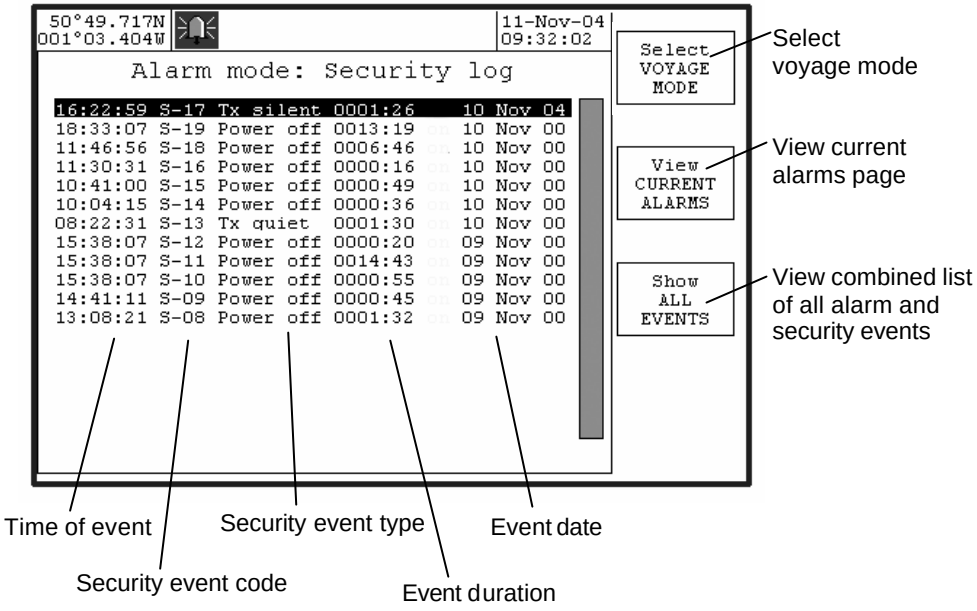
Alarm mode: Alarms log

This page lists the alarm and information events, with the most recent events at the top. Note that these events are lost when the display unit is switched off and therefore only reflect events that have occurred since the display was last switched on. Events are retained for a maximum of 24 hours .



Alarm mode: Security log

This page lists the events stored in the security log. The security log stores any event which results in the AIS transmitter being disabled for more than 15 minutes. The events in this log are retained permanently and are only deleted when the log has reached its maximum size of 30 events.



Security event codes

Each security event is preceded by a 4-character ID code. The first character is always an 'S' for security events, and the second character is always '-' to indicate that acknowledgement is not required. The two numeric digits are an index value indicating the relative position in the log of each entry.

Security event types

Tx silent - this indicates that the transponder has been placed into a silent mode as a result of being in a location where regional channel management has specified that the transponder should not transmit.
Tx quiet - this indicates that the transmitter has been disabled as a result of an operator command. This is a special function that is not available on all units.
Power off - this indicates that the M-2 transponder was switched off.
Tx alarm - there has been a persistent fault with the transmitter.
VSWR alm - there has been a persistent fault with the antenna. This has not stopped the transponder from transmitting, but performance may have been impaired

Rx1 alarm - there has been a persistent fault with the AIS channel A receiver.
Rx2 alarm - there has been a persistent fault with the AIS channel B receiver.
DSC alarm - there has been a persistent fault with the DSC receiver.

Security event durations
Each security event covers a period of time indicated by the "duration" shown on screen. The time at which the event started (eg when the transponder was switched off) is given by the time and date displayed. The duration for which the event persisted (eg for how long the transponder was switched off) is given by the duration in hours and minutes. The time at which the event finished (eg when the transponder was switched back on) can be determined by adding the duration to the start time/date.

System configuration

Select **Setup Mode** by holding down the ENTER key for more than three seconds.

Use the **VIEW** softkey to step through the following information pages in this order:

User Preference – set Display and transponder user options

Ship's Static Data – set own vessel's static information

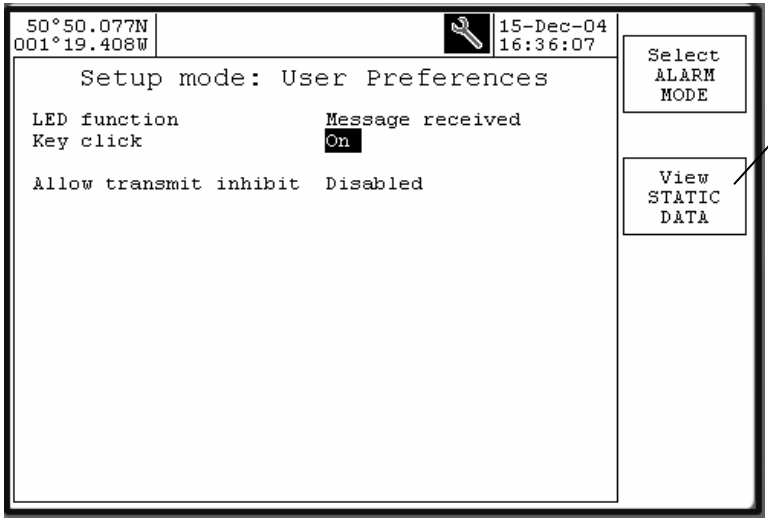
Channel regions – set AIS region boundaries and options

Alarm selection – enable / inhibit alarms

Configuration – view system information and data port options

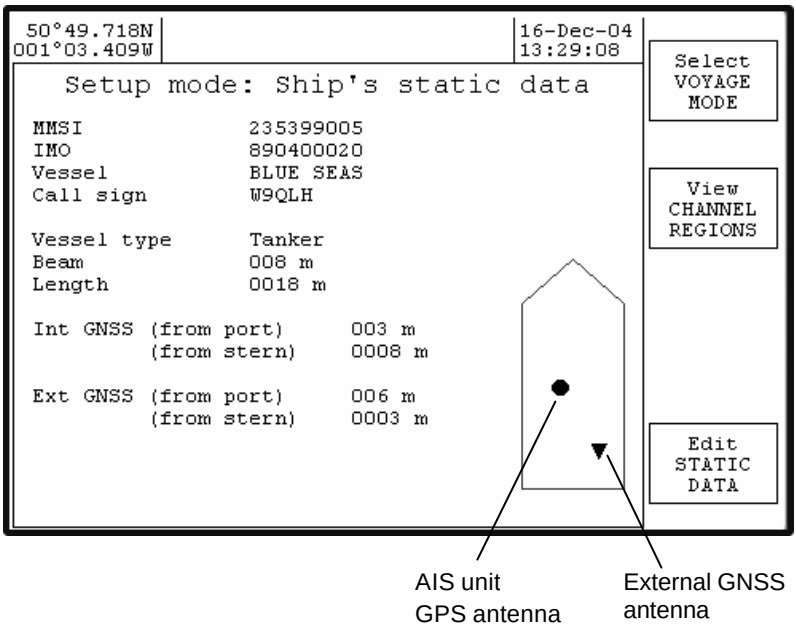
Serial Monitor – view diagnostic data

User Preference



Setup Mode: User Preferences		
Option	Setting	Notes
LED function	Off Message received Alarm active	Usage of Display Annunciator LED
Key click	On Off	Enable / disable Display key press sound signal
Audible alarm	On Off	Enable / disable Display audible alarm
Auto-dim backlight	**00** – 15	Display LED Backlight timeout period in minutes 00 = disable
Own reports	Enable Disable	Automatic transmission of own vessel AIS reports Disable = silent mode
Factory default settings are shown in bold		

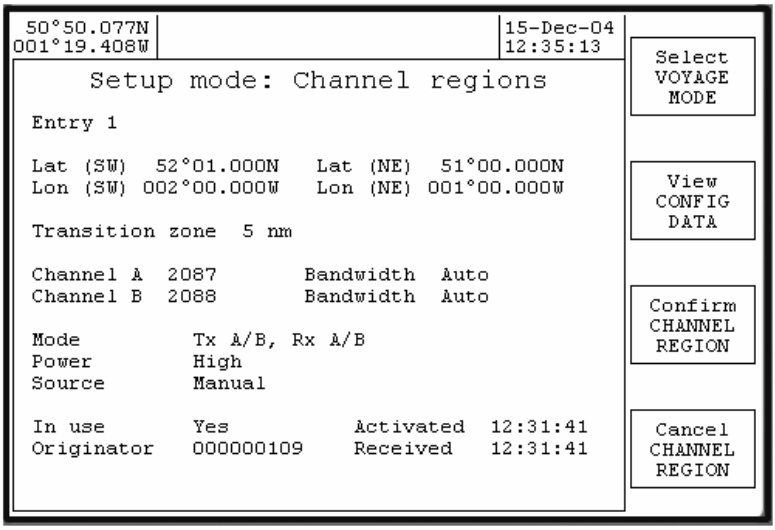
Ship's Static Data



Setup Mode: Ship's Static Data		
Option	Setting	Notes
MMSI	9 digit number	From radio licence
IMO	9 digit number	From radio licence
Vessel	20 characters	From radio licence
Call sign	7 character alpha numeric	From radio licence
Vessel type	Select from list	Unknown WIG craft Fishing vessel Towing (small tow) Towing (large tow) Dredging Diving operations Military operations Sailing Pleasure craft High speed Pilot vessel Search and rescue Tug Port tender Anti-pollution Law enforcement Medical transport Res 18 vessel Passenger ship Cargo ship Tanker Other type
Beam	3 digit number	Set in meters
Length	4 digit number	Set in meters
AIS unit From port From Stern	 3 digit number 4 digit number	AIS GNSS antenna reference position in meters from Port side and Stern
Ext GNSS From port From Stern	 3 digit number 4 digit number	GNSS antenna reference position in meters from Port side and Stern

Channel Regions

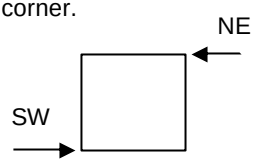
Used to set geographic areas which have specific AIS channels requirements.



When entering a new channel region, the new values may be entered on any one of the channel region pages (including region 0 - the "High Seas" region). Once the new information has been saved and confirmed (by using both the "Save CHANNEL REGION" and "Confirm CHANNEL REGION" softkeys) then the new region will be allocated to a particular page according to the following rules:

If the geographic co-ordinates match or overlap with an existing region then the old region will be replaced by the new one.

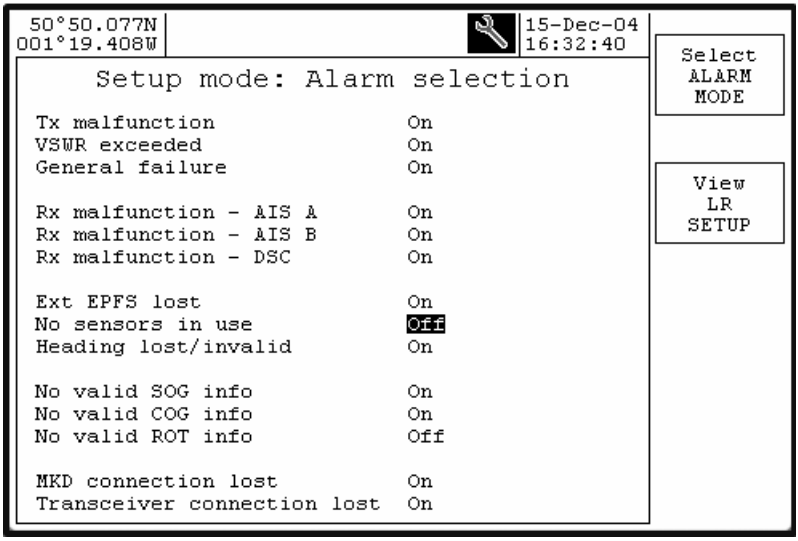
Otherwise, the new region is stored in page 1 and the other pages are moved downwards. If all the pages are used, the oldest region is deleted.

Setup Mode: Channel Regions		
Option	Setting	Notes
Entry 0 - 8	LATtitude (SW) LONgitude (SW) LATtitude (NE) LONgitude (NE)	Enter the coordinates of South West box corner then North East box corner. 
Transition Zone	1 - 8	Select ID number for zone
Chan A	1 - 2261	Set channel number *
Chan B	1 - 2261	Set channel number *
Mode	Tx A/B, Rx A/B Tx A, Rx A/B Tx B, Rx A/B Rx A/B, only Rx A only Rx B only	Select appropriate Transmitter and Receiver response for AIS region
Power	High Low	Select appropriate Transmitter output for AIS region
Source	VDL addressed	Region information automatically received over the AIS data channel
In Use	Yes No	Activate region
*Refer to ITU R M 1084-4. Not all channel numbers are valid. UP/DOWN scrolls through valid numbers only.		

Zone “0” always indicates the “High Seas” region which has no defined geographical coordinates. Zone “0” cannot be edited.

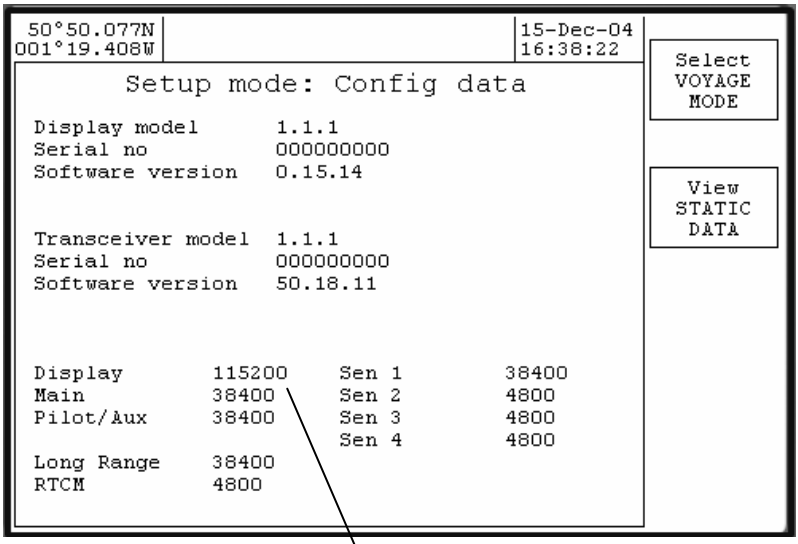
Alarm filter selection
The operation of individual system alarms may be enabled or disabled to match system installation requirements.

If, for example, an external GNSS is not installed, then to prevent activation of the Ext EPFS alarm set its selection to OFF in the Alarm selection page.



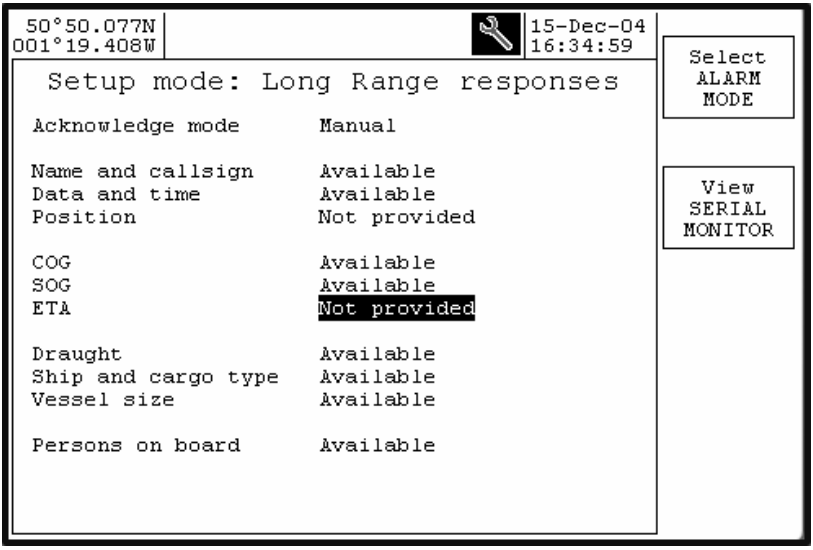
Configuration

View system version information and set data port options.
Caution: incorrect configuration of data port baud rate will stop correct operation. A full explanation of M-2 interface protocol is printed in the separate M-2 installation manual.



Communication baud rates
Display 115200/38400, all others 38400/4800 baud only

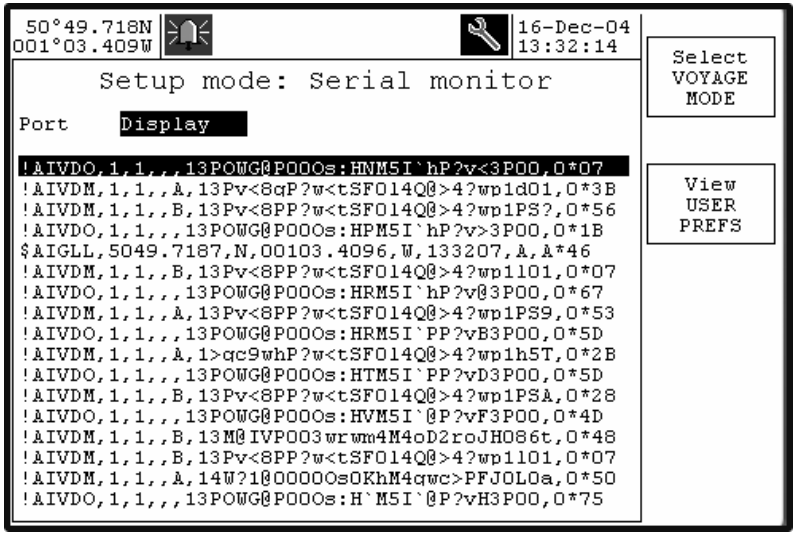
Setup mode: long range responses



Serial Monitor
Used to view communications port data in real time, provides diagnostic information for service technician.

Scroll Navpad left / right to select the required port data.

A full description of M-2 interface protocol is printed in the separate M-2 installation manual.



NOTE: This feature requires the display unit to be connected to both the transponder Display and Aux/Pilot connectors , and consequently cannot be used when the Aux/Pilot connector is required for the Pilot Plug. .

Maintenance and Servicing

Preventative Maintenance

The UAIS transponder system is an essential part of the ship's navigation system and is a vital component for the safety of the ship and its crew. It is therefore very important to maintain the system and its installation to a very high standard. The design of the AIS transponder ensures that maintenance can be kept to a minimum.

Display and transponder unit

To optimise performance ensure they are kept clean and grease-free. Use a clean damp cloth, or for heavier deposits use a clean, damp cloth and a mild solution of dish washing detergent and water. Do not use any spirit or alcohol based solvents, gasoline or oils.

Electrical Connections

Periodically check the electrical connections; ensure that no cables are frayed or worn, and that all connections are tight and sound.

Repair and Service

With the exception of the fuse located under the transponder cover, there are no user serviceable parts.

Removal of the metal inspection covers other than by an Authorised Service Technician will void warranty. If having followed the Troubleshooting Guide the AIS is still inoperable, please call your local Service Centre.

Spare Parts

Use only manufacturer's genuine spare parts. No liability can be accepted for equipment failure due to incorrect replacement parts being used.

Worldwide Sales and Service

For a complete list of worldwide sales and service agents, please contact your product supplier.

Troubleshooting

Transponder status indicators

Remove the transponder dust cover to view status of indicator lamps (LED).

Rx red LED flashes when a signal is received

Tx red LED flashes when transmitter is active

OK LED on when BITE remote alarm relay is deactivated (no alarm active)

PWR LED on whenever power is applied and the system fuse is good.

Rx LED ON continuously	System fault
Rx LED OFF continuously	Check antenna connection Check for targets in range System fault
Tx LED ON continuously	System fault
Tx LED OFF continuously	Check for “No own reports” setting (silent mode) System fault
OK LED ON continuously	System healthy
OK LED OFF continuously	Check error code on Display
PWR LED ON continuously	System healthy
PWR LED OFF continuously	Check fuse Check ship’s supply System fault

For all system faults, contact the nearest Service Centre.

Reviewing Alarm Mode information
Alarm Mode: All events log
View a list of all system alarm events and UTC time of alarm event activation.

Alarm Mode: View current alarms page
View a list of alarm events that are still active and the UTC time of activation.

Before calling an authorised Service Centre perform the following checks and note detail of any alarm events:

Symptom	Cause	Cure
Display will not power up	No power to the transponder unit Cable or plug fault System fault	See below Also check cabling and plug connections.
Transponder PWR (power) LED (under dust cover) is OFF	No power to transponder Transponder fuse is blown.	Verify that power supply is available at the transponder power input connector Check / replace transponder fuse.
No text on Display screen or too dark or lacking in contrast	Poor LCD backlight and/or contrast adjustment	Adjust LCD backlight and/or contrast. Hold Display dimmer key for 5 seconds to enter display setup mode.
Antenna VSWR fault alarm activates	VHF Antenna installation	Check the VHF coaxial cable/connections Check VHF antenna for damaged.
Tx malfunction alarm activates	System fault	Contact Service Centre
Tx or Rx channel 1, 2, DSC malfunction alarm	System fault	Contact Service Centre
Position sensor not available alarm	Internal and external GNSS / GPS signal lost	Check AIS GNSS /GPS antenna coaxial cable/connections Check GPS antenna for damage Check that external GNSS is working correctly
External EPFS lost alarm	GNSS / GPS signal lost	Check that external GNSS is working correctly
No Valid COG and SOG alarm	GNSS / GPS signal lost	Check that external GNSS is working correctly
No Valid SOG alarm	Bottom track log	Check function of Bottom

Symptom	Cause	Cure
		track log
No Valid ROT alarm	Gyro compass	Check gyro compass
Heading lost/invalid alarm	Gyro compass	Check gyro compass or gyro interface unit
Lost transceiver connection	Display / transponder connection fault System fault	Check Display connections Contact Service Centre

Alarm Messages

The transponder may generate various alarm and information messages that appear as pop-ups on the display. Messages categorised as "alarms" also cause the transponder to generate an audible or visual alarm (depending on the installation) and must be acknowledged on the display unit in order to clear the alarm. Messages categorised as "information" do not require any specific action and the pop-up window on the display unit will automatically disappear after 30 seconds. All these messages are stored in the "alarms list" that can be viewed on the "Alarm mode: Alarms log" page on the M-2 display unit.

The messages which may appear are listed in numeric order.

Tx malfunction (Alarm 01)
This indicates that there is a problem with the transponder. The occasional occurrence of this alarm may be caused by transient conditions and does not necessarily indicate a permanent problem. However, if this alarm occurs on a regular basis you should take action to have your installation checked by an authorised service agent.

Antenna VSWR exceeds limits (Alarm 02)
This indicates that there is a problem with the antenna. The transponder is likely to be still operational, although its performance may be impaired. The occasional occurrence of this alarm may be caused by transient conditions and does not necessarily indicate a permanent problem. However, if this alarm continues to occur you should take action to have your installation checked by an authorised service agent.

Rx Channel 1 malfunction (Alarm 03)
Rx Channel 2 malfunction (Alarm 04)
Rx Channel 70 malfunction (Alarm 05)
These messages indicate that there is a possible problem with the receiver for AIS channel A, AIS channel B or the DSC channel 70 respectively. Again, the occasional occurrence of this message should not be cause for alarm, but the regular occurrence of these messages is likely to indicate a permanent problem which should be investigated by an authorised service agent.

Transceiver connection lost (Alarm 08)
This message indicates that the M-2 display unit can no longer communicate with the M-2 transponder. This may indicate a problem with the connections, or may indicate that the transponder is no longer operating correctly. This fault should be investigated immediately. It is important to note that there is a safety timer in the transponder which causes it to shut down automatically if the transmitter should remain on for too long. In this event, the transponder will shut down and this alarm will be raised by the display unit. The situation can be resolved by disconnecting the power from the transponder for a short time and then re-connecting it again.

External EPFS lost (Alarm 25)
This message indicates that the transponder is no longer receiving data from the vessel's on-board GPS system. This message should be investigated immediately.

No position sensor in use (Alarm 26)
This message indicates that the M-2 transponder is unable to obtain a location fix from either the internal GPS module or from the ship's own GNSS system. This message may occur during the first few minutes of operation while the transponder waits to obtain its location, and may safely be ignored during this time. If the message occurs at any other time, it indicates a possible problem with the GNSS antennae or wiring and should be investigated immediately

No valid SOG information (Alarm 29)
No valid COG information (Alarm 30)
Heading lost/invalid (Alarm 32)
No valid ROT information (Alarm 35)
These messages indicate that information from various sensors - ie the Speed over Ground, Course over Ground, heading and Rate of Turn respectively - are not available. In a full installation it is expected that all this information will be available permanently and the display of one or more of these messages is an indication that there may be problems either with the other sensors or with the connections between the sensors and the M-2 transponder unit. Such messages should be investigated immediately.

UTC clock lost (Information 07)
This message indicates that internal GPS module within the M-2 transponder is unable to obtain a valid time signal. If this message appears on a regular basis it may indicate a problem with the GNSS antenna connection, but it is possible for this message to occur temporarily in certain locations or in extreme weather conditions where the GNSS module is unable to receive transmissions from a sufficient number of satellites.

External DGNSS in use (Information 21)
External GNSS in use (Information 22)
Internal DGNSS in use (beacon) (Information 23)
Internal DGNSS in use (msg 17) (Information 24)
Internal GNSS in use (Information 25)
These messages indicate which source of GNSS information is currently in use by the transponder. The external GNSS information from the ship's main on-board systems may or may not be augmented by differential correction information - in which case the messages show "DGNSS" rather than "GNSS". When the external GNSS signals are not available, the M-2 transponder uses GNSS information from its own internal GNSS module and the message changes to "Internal GNSS". This information may be augmented by the receipt of differential correction data from a beacon receiver or by VHF transmissions from a base station - in which case the status message shows "DGNSS" and

"beacon" or "msg 17" respectively to indicate the source of the differential data being used.

External SOG/COG in use (Information 27)
Internal SOG/COG in use (Information 28)
These messages indicate whether Speed over Ground and Course over Ground are being supplied by the external sensors or are being calculated from the internal GNSS module.

Heading valid (Information 31)
This message is received when a valid heading is first received from the ship's sensors.

Rate of Turn indicator in use (Information 33)
Other ROT source in use (Information 34)
The first of these messages indicates that the M-2 transponder is using Rate of Turn information from an on-board device which directly calculates the rate of turn - such as a gyro compass. The second message indicates that the rate of turn is being calculated from changes in the ship's heading.

Chan management params changed (Information 36)
This message is issued each time that any of the channel management parameters are altered. These may be altered by the receipt of specific VHF or DSC messages from base stations and can also be modified directly by using the "Channel Regions" page on the M-2's display unit.

All transmissions enabled (Information 63)
All transmissions disabled (Information 64)
These two messages indicate that all transmissions by the transponder have been enabled or disabled as appropriate. When the transponder is first powered up it is not allowed to transmit for a period while it listens to transmissions from nearby vessels in order to ensure that it does not interfere with them. The message "All transmissions disabled" is displayed as a reminder that the AIS is not operational for this time. After approximately 90 seconds, the transponder will begin transmissions and the message “All transmissions enabled" is displayed.

These messages are also generated if the transmitter is inhibited while the AIS unit is in operation.

Own reports enabled (Information 65)
Own reports disabled (information 66)
These messages are displayed when the transmission of AIS "Own Vessel" reports are enabled or disabled as a result of moving across the boundary of channel management region. When moving into a channel management region

in which AIS transmissions are disabled, the message "Own reports disabled" is displayed as a reminder that no AIS information is being transmitted. When the vessel moves out of that channel region (or the transmission mode with in that region is updated) the message "Own reports enabled" is displayed as a reminder that normal operation has been restored.

Area setting uses invalid mode (Information 67)
This message is output by the transponder when an attempt is made to configure a channel management region which has value for the 'mode' field which is greater than 5 (the maximum permitted by IEC 61162-1).

Area setting uses unsupported mode (Information 67)
This message is output by the transponder when an attempt is made to configure a channel management region which has value for the 'mode' field of either 3 or 4, as these modes are not supported by this transponder.

Area is too small (Information 67)
Area is too large (Information 67)
One of these two messages will be output by the transponder when an attempt is made to configure a channel management region which has at least one side which is shorter than 20 nm longer than 200 nm.

Transition zone is too large (Information 67)
This message is output by the transponder when an attempt is made to configure a channel management region which has a transition zone size of more then 5 nm.

Area setting has corner conflict (Information 67)
This message is output by the transponder when an attempt is made to configure a channel management region of which one corner lies to close to the corners of existing regions. It is not permissable to have more than two regions sharing a common corner, or for three or more reigons to have corners within 8nm or each other.

Area overruled by prior command (Information 67)
This message is output by the transponder when an attempt is made to configure a channel management region which overlaps with a region which has been set by either DSC tele-comand or by a VHF message within the last two hours. Regions received by these means cannot be changed by manual editing until at least two hours after they have been received.

Area setting uses invalid channels (Information 67)
This message is output by the transponder when an attempt is made to configure a channel management region in which either (or both) of the specified AIS channels are not valid channel numbers as defined in ITU-T M.1084 Annex 4.

Declaration of Conformity

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mcmurdo

EC DECLARATION OF CONFORMITY

The following products comply with the essential requirements of Council Directive 96/98/EC on the approximation of the laws of the member States relating to Marine Equipment as amended by Commission Directives 98/85/EC, 2001/53/EC, 2002/75/EC and 2002/84/EC, and by the application of an EC Type Examination Certificate as detailed overleaf.

Products covered by this Declaration

Product Type: **Automatic Identification System (AIS)**

Models: **McMurdo M-2**

Intended usage of products
All vessels which must comply with IMO SOLAS regulations in coastal or International waters.

Surveillance conformity assessment is undertaken in accordance with Production Quality Assurance Module D by:

Bundesamt für Seeschifffart und Hydrographie (No. 0735)
Bernhard-Nocht-Str. 78, 20359 Hamburg
Germany

The product will carry this Conformity Marking:

0735

XX

Issued on behalf of McMurdo Limited

Signed :

Name: **C P Hoffman**
Title: **Technical Director**

Date: 17 DEC 2004

See overleaf for technical information

Page 1 of 2

Technical Construction File held by:

McMurdo Limited
Silver Point, Airport Service Road, Portsmouth PO3 5PB UK

Regulations and Standards applied:

IMO MSC.74(69) Annex 3
ITU-R M.1371-1 (Class A)
IALA Technical Clarifications of Reg ITU-R M.1371-1 (Edition 1.4)
ITU-R M.825-3
ITU-R M.1084-3
IEC 61993-2 (2001)
IEC 61162-1 (2000), -2 (1998)
IEC 60945 (2002)
IEC 61108-2 (2003)

EC Type Examination Certificate:-

Name of Notified Body	**:**	**Bundesamt für Seeschifffart und Hydrographie (No. 0735)**
Address of Notified Body	**:**	**Bernhard-Nocht-Str. 78, 20359 Hamburg, Germany**
EC Type Examination Certificate :		**734.2/0066/2004 5 December 2004**

ATTENTION

The attention of the specifier, purchaser, installer, or user is drawn to special measures and limitations to use which must be observed when the product is taken into service to maintain compliance with the above directive. Details of these special methods and limitations to use are available on request, and are also contained in the product installation and operator manuals.

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