

OPERATORS HANDBOOK



MANTADIGITAL

PART 2 of 2

Chart Maintenance

Route planning

Ancillary information

V2.6 software

HBK-4001

Issue 3 April 2012

SITUATIONAL INTELLIGENCE, THE WORLD OVER


**KELVIN
HUGHES**
marine systems

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2 Safety notices and warnings

2.1 Electrical warnings



WARNING: ELECTRICAL HAZARD

This equipment is not fitted with safety interlocks. Lethal voltages are present within the unit



WARNING: MAINS VOLATGES

Mains voltages are present within systems. Power supplies to equipment must be fully isolated before accessing any part of the system or its sub-assemblies.



WARNING: *To avoid the risk of shock, ensure the mains power to the processor and display are switched off prior to cleaning the screen.*



Caution: Mains voltages

Unless otherwise stated on labels attached to the equipment, all Kelvin Hughes equipment is supplied with the mains voltage set for 220VAC operation.

2.2 General warning notices



WARNING: *This equipment contains material which produces toxic fumes when burnt.*



WARNING: *Navigation systems and equipment supplied by Kelvin Hughes comply with the relevant SOLAS regulations and are provided as aids to navigation and should be used in accordance with the SOLAS regulations.*


2.3 Equipment servicing



Service and equipment repair must only be undertaken by Kelvin Hughes or authorised Kelvin Hughes service agents and engineers.

Un-authorised repair or servicing of equipment during the warranty period will invalidate the warranty status of the equipment.

2.4 Radar radiation hazards



WARNING: NON-IONISING RADIATION HAZARD

Avoid exposure to the main beam of a radar antenna.

Avoid standing close to the central front face of the antenna; see the chart below for additional information.


It is accepted in most countries that no significant hazard is presented by radio frequency mean power density levels up to 10mw/cm. RF power levels in excess of this may cause harmful effects, particularly to the eyes.

Users of cardiac pacemakers should be aware of the possibility that radio frequency transmissions can damage some devices or cause irregularities in their operation. Anyone using such devices should understand the risks present before exposure.

X band systems	Distance from antenna face where mean power flux density on beam-peak falls below:	
	50 W/m ²	10 W/m ²
CAE-A12-20: Mk4 upmast transceiver LPA-A19: 1.9 metre low profile antenna	1.0 Metres	3.5 Metres
CAE-A30-20: Mk5 upmast transceiver LPA-A19: 1.9 metre low profile antenna	0.5 Metres	1.7 Metres
CAE-A30-21: Mk5 upmast transceiver LPA-A19: 1.9 metre low profile antenna	0.5 Metres	1.7 Metres
CTX-A8: Mk7 downmast transceiver LPA-A13: 1.3 metre low profile antenna	1.3 Metres	4.5 Metres

S band systems	Distance from antenna face where mean power flux density on beam-peak falls below:	
	50 W/m ²	10 W/m ²
CTX-A9: Mk7 downmast transceiver LPA-A3: 3.9 metres low profile antenna	1.0 Metres	3.5 Metres
GTX-A16: Mk7 upmast transceiver LPA-A3: 3.9 metres low profile antenna	1.0 Metres	3.5 Metres
DTX-A1: SharpEye [™] transceiver LPA-A3: 3.9 metres low profile antenna	1.0 Metres	3.5 Metres

2.5 Anti-Static handling

	<p style="text-align: center;">CAUTION</p> <p>Handling of electrostatic-sensitive semiconductor devices</p> <p>Certain semiconductor devices used in the equipment are liable to damage due to static voltage. Observe the following precautions when handling these devices in their un-terminated state, or sub-units containing these devices:</p> <p>Persons removing sub-units from equipment containing these devices must be earthed by a wrist strap and a resistor at the labelled point provided on/ within the equipment.</p> <p>Soldering irons used during authorised repair operations must be low voltage types with earthed tips and isolated from the mains voltage by a double insulated transformer.</p> <p>Outer clothing worn must be unable to generate static charges.</p> <p>Printed circuit boards fitted with these devices must be stored and transported in anti-static containers.</p> <p>New devices must be fitted in a special antistatic safe handling area.</p>
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2.6 Software licensing and virus protection

2.6.1 Approved software

Only approved software may be used on Kelvin Hughes equipment. The use of unapproved or unlicensed software on any Kelvin Hughes equipment is strictly prohibited. The use of such software voids the warranty status of the unit.

2.6.2 Kelvin Hughes software copyright

All Kelvin Hughes software supplied be it pre-installed, supplied on CD/ DVD or other removable media, is the copyright of Kelvin Hughes Ltd, which will not accept any responsibility for any damage or loss caused in whatever way by the use or misuse of the software. This copyright applies to software that can be supply in various formats including but not restricted to CD, DVD, USB memory device, email or obtained via the agents download area.

2.6.3 Microsoft Windows© copyright

All Kelvin Hughes equipment uses genuine Microsoft Windows software which is subject to Microsoft copyrights.

2.6.4 Virus precautions

The MANTADigital processor is a PC based system fitted with user interfaces such as CD/ DVD drives, floppy disks and user accessible USB ports.

It should be noted that the MANTADigital processor does not have anti-virus protection installed.

It is the full responsibility of system users to ensure that potential virus threats are not transferred to the system via removable media.



Prior to use, all removable media used with Kelvin Hughes products MUST be fully scanned for viruses on a PC that has up to date anti-virus software installed.

Removable media referred to includes but is not restricted to:

- USB flash memory.
- Portable USB hard drives.
- Floppy discs.
- Any form of removable media connected to the MANTADigital system.

Kelvin Hughes cannot be held responsible for damage caused to systems by virus infections.



WARNING: Repairs to systems found to be infected with a virus are chargeable.

2.7 General health & safety

2.7.1 Health and safety policies

When working on Kelvin Hughes equipment, users, engineers and agents are expected to work within the health and safety guidelines as issued by their respective employers, shipyards or vessel owners.

Copies of the Kelvin Hughes Health and Safety requirements are available upon request.

2.7.2 Risk assessment

In line with the guidelines laid down by respective employers, shipyards or vessel owners, risk assessments of a working area must be undertaken prior to commencement of any work and must be regularly reviewed.

2.7.3 Electrical safety

When working on any equipment, ensure all power including standby and backup power to the equipment and any associated equipment is fully isolated.

2.7.4 Working at heights

When working at heights, the guidelines laid down by respective employers, shipyards or vessel owners must be observed at all times.

Power to any rotating or radiating equipment must be fully isolated.

Again in line with individual company policies, safety harnesses and personal protective equipment must be inspected prior to every use.

3 Handbook overview

3.1 Release notes

HBK-4001 PART 2

Issue 3 April 2012

ZM-2144 Software version 2.6 and higher.

This handbook replaces all previous versions.



All previous versions of HBK-4001 must be archived and should no longer be used.

Instructions added or amended:

HBK-4001 Part 1

- General updating of images to incorporate the new ESS tab in Dual Radar Display mode.
- Export of operator handbooks to memory stick; section 3.1.3
- Amendments to instructions on night vision camera; section 6.3
- Enhanced Spyscope tab added to Dual Radar Display mode; section 6.19
(*Note: The ESS function is still under development and is not available for use*).
- Navtex display and management added in ECDIS mode; section 6.34
- Addition and restrictions in the use of the Bypass password optional feature; section 6.42
- Safety check status of routes is now shown when a route is loaded; section 6.49.1

HBK-4001 Part 2

- Amendments to optional features (new features added); section 7.
- Export handbooks function added; section 5.6
- Route folder creation and management added to route planning; section 8.
- Changes to running and display of safety and full checking routes; section 8.

3.2 Handbook Part 1 & Part 2

The MANTADigital operator's handbook is split into two volumes that cover the following:

HBK-4001 Part 1	HBK-4001 Part 2
A-Z operator's instructions Handbook contents: <ol style="list-style-type: none">1. Contents2. Safety notices and warnings3. MANTADigital introduction4. Getting started5. Go to Run ...6. A to Z: Operators instructions7. Abbreviations8. Contacting Kelvin Hughes9. Index	Chart maintenance Route planning & ancillary information Handbook contents: <ol style="list-style-type: none">1. Contents2. Safety notices and warnings3. Handbook overview4. Alarm configuration5. Backup & restore6. Chart maintenance7. Optional features8. Route planning9. Simulation mode10. Set-up mode11. Fault finding12. Crew based maintenance13. Interpreting the radar display14. Symbols15. Type approval certificates16. IEC61162 messages17. Abbreviations18. Contacting Kelvin Hughes19. Index

3.3 Downloading the Handbook

The operator handbooks can be downloaded from the processor to a virus free USB flash memory stick using the **Export Operators Manual** button located within **Backup and Restore**.



Prior to use, all removable media used with Kelvin Hughes products MUST be fully scanned for viruses on a PC that has *up to date* anti-virus software installed.

Full instructions on downloading the handbook can be found as follows:

- Quick Start Guide HBK-4002
- HBK-4001 PART 2 **MANTADIGITAL™** Operator's guide/ Backup and restore section

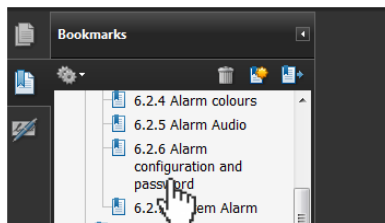
3.4 How to use the handbook

An electronic copy of the handbook can be found on a CD supplied with the system. This CD will be labelled *HBK-5001: MANTADIGITAL commercial handbooks*.



The handbook has been designed for use on a PC using a PDF reader or a tablet (e.g. iPad) loaded with an appropriate PDF reader application.

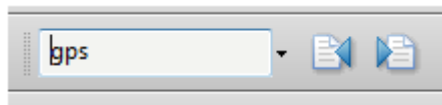
There are a number of methods for searching for a specific operation or functions within the handbook:



Bookmarks

Click on any of the entries in the bookmarks

Bookmarks can be enabled in Adobe from: *View / Navigation panels* then select bookmarks.



Find

Search for a topic or word using the FIND function in Adobe.

If this is not open, press **Ctrl + F** and enter the desired keyword in the text box and hit enter.

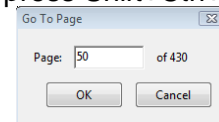
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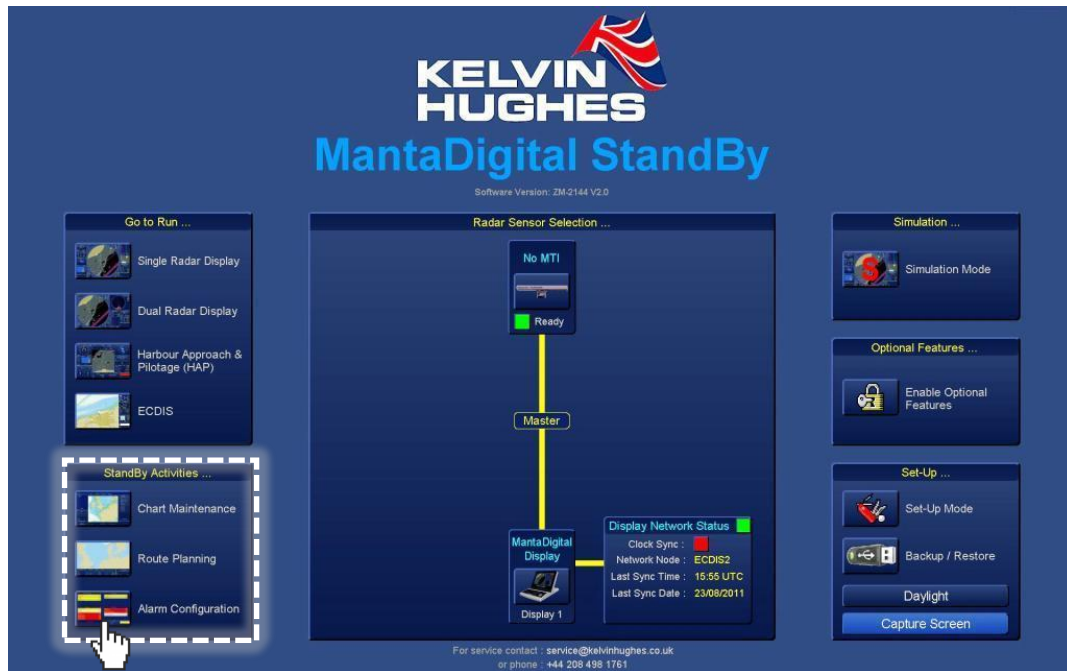
To go to a specific page number, press **Shift+Ctrl+N**



4 Alarm configuration

Alarms can be enabled, configured or disabled in the alarm configuration page.

The various functions are accessed by selecting the **Alarm Configuration** icon in the **Standby Activities** area of the standby screen:



The Alarm Configuration chapter comprises of the following sections:

Chapter 7.1: Alarm configuration

An overview of enabling, disabling, configuration and audio for alarms.

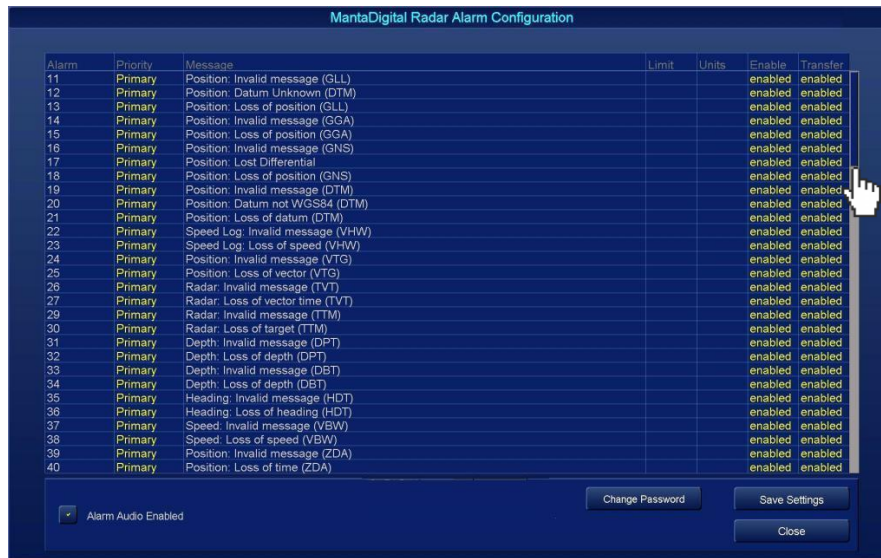
Chapter 7.2: Alarm configuration password.

Password management within alarm configuration.

Chapter 7.3: Alarm listings

A list of all alarms shown in alarm configuration.

4.1 Alarm Configuration



Alarm	Priority	Message	Limit	Units	Enable	Transfer
11	Primary	Position: Invalid message (GLL)			enabled	enabled
12	Primary	Position: Datum Unknown (DTM)			enabled	enabled
13	Primary	Position: Loss of position (GLL)			enabled	enabled
14	Primary	Position: Invalid message (GGA)			enabled	enabled
15	Primary	Position: Loss of position (GGA)			enabled	enabled
16	Primary	Position: Invalid message (GNS)			enabled	enabled
17	Primary	Position: Lost Differential			enabled	enabled
18	Primary	Position: Loss of position (GNS)			enabled	enabled
19	Primary	Position: Invalid message (DTM)			enabled	enabled
20	Primary	Position: Datum not WGS84 (DTM)			enabled	enabled
21	Primary	Position: Loss of datum (DTM)			enabled	enabled
22	Primary	Speed Log: Invalid message (VHW)			enabled	enabled
23	Primary	Speed Log: Loss of speed (VHW)			enabled	enabled
24	Primary	Position: Invalid message (VTG)			enabled	enabled
25	Primary	Position: Loss of vector (VTG)			enabled	enabled
26	Primary	Radar: Invalid message (TVT)			enabled	enabled
27	Primary	Radar: Loss of vector time (TVT)			enabled	enabled
29	Primary	Radar: Invalid message (TTM)			enabled	enabled
30	Primary	Radar: Loss of target (TTM)			enabled	enabled
31	Primary	Depth: Invalid message (DPT)			enabled	enabled
32	Primary	Depth: Loss of depth (DPT)			enabled	enabled
33	Primary	Depth: Invalid message (DBT)			enabled	enabled
34	Primary	Depth: Loss of depth (DBT)			enabled	enabled
35	Primary	Heading: Invalid message (HDT)			enabled	enabled
36	Primary	Heading: Loss of heading (HDT)			enabled	enabled
37	Primary	Speed: Invalid message (VBW)			enabled	enabled
38	Primary	Speed: Loss of speed (VBW)			enabled	enabled
39	Primary	Position: Invalid message (ZDA)			enabled	enabled
40	Primary	Position: Loss of time (ZDA)			enabled	enabled

The alarm configuration page has the following columns:

- Alarm:** An alarm number associated with a specific alarm.
The alarm number/ ID cannot be changed.
- Priority:** A priority status for each alarm.
The priority status of each alarm is fixed and cannot be changed.
- Message:** A description of each alarm.
- Limit:** Some alarms have a configurable distance or time limits that are displayed in this column.
- Unit:** The unit of measure for the limit.
- Enable:** Switch the selected alarm ON/ OFF.
- Transfer:** Enable/ Disable the transfer of the selected alarm to external systems such as Bridge Navigation Watch Alarm System (BNWAS).

4.1.1 Alarm Priorities

Alarm priorities *cannot be changed*.

Higher priority alarms will override lower priority alarms, for example a collision alarm (*Emergency priority*) will appear as a higher priority than an ARPA: Weak Target (*Warning priority*).

Alarms are listed in the alarm panel in order of priority as follows:

- Emergency (highest priority).
- Primary.
- Secondary.
- Warning (lowest priority).

Chapter 4: Alarm configuration

4.1.2 Setting alarm limits

Some alarms have limits; for example Anchor watch.

To adjust the limit, place the cursor in the limits box and use the keyboard to enter the desired value.

Alarm	Priority	Message	Limit	Units	Enable	Transfer
319	Primary	ARPA: Anchor watch limit exceeded	150,000	m	enabled	enabled
320	Secondary	Guard Zone Target Detected			enabled	enabled

4.1.3 Enable/ Disable alarms.

Individual alarms can be switched ON (Enabled) or OFF (Disabled) by placing the cursor on the Enable or Transfer column for the required alarm and selecting **Enable** or **Disable**.

The **Transfer** column enables/ disables the transfer of alarms to external systems such as Bridge Navigation Watch Alarm System (BNWAS).

The **Enable** Column switches alarms ON/ OFF within the system.

Alarm	Priority	Message	Limit	Units	Enable	Transfer
11	Primary	Position: Invalid message (GLL)			enabled	enabled
12	Primary	Position: Datum Unknown (DTM)			enabled	disabled

Changes in alarm status must be saved using the **Save Settings** button before exiting the alarm configuration page.

4.1.4 Alarm audio ON/ OFF

The audio alarm can be switched OFF.



Alarm Audio Enabled box **Ticked:**

Audio **ON**

Alarm Audio Enabled box **NOT Ticked:**

Audio **OFF**



WARNING
With audio switched OFF, regardless of the alarm priority or condition
NO AUDIBLE ALARMS ARE GENERATED

4.1.5 Save and Close alarm configuration

Save and Exit.

Press **Save Settings** to save changes made in the alarms configuration page.



The system will prompt for a password.

The factory default password for alarm configuration is: PASSWORD

Enter the password and press accept (the password is *case sensitive*). The changes are saved and the system exits the alarm configuration page.

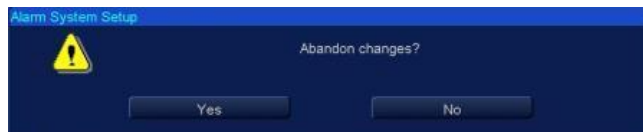
Close

Press **Close** to exit the alarms configuration page.

If changes have been made but not saved, the following warning is displayed:

YES: Closes the alarm configuration *without* saving changes.

NO: Returns to the alarm configuration page.




4.2 Alarm configuration password

A password is required to save any changes made in alarm configuration.

This password can be changed by the user.

The factory default password for alarm configuration is: PASSWORD



WARNING

Passwords cannot be remotely reset. If a password is changed and forgotten, an engineer will need to attend to reset the password.

Attendance to reset a lost or forgotten password is not covered under warranty.


Noting the above warnings, to change the password, press **Change Password**.



Type in the **default** or **current** password and press **Accept**.

Enter and repeat the new password and press **Accept**.


Note: Passwords are CASE SENSITIVE.

A screenshot of a 'Change Password' dialog box with a blue header and a red close button (X). It contains two input fields: 'New Password:' and 'Repeat New Password:'. Below the fields is an 'Accept' button.

If the password is incorrectly entered, a warning is shown. Carefully re-enter the password.



A note should be made of the new password which may be required by authorised Kelvin Hughes engineers carrying out maintenance tasks.



Caution: *This password is used for configuration of alarms but is also used for the following functions:*

- Clearing of past tracks
- Clearing of Mariners notes and events
- Enabling Lookahead

4.3 Alarms listing

The following is a list of alarms found in the alarm configuration page.

Alarm	Alarm Text	Description
11	Position: Invalid message (GLL)	Indicates an error with a GLL message from a position sensor. The GLL message provides position information.
12	Position: GLL Datum Not Known	Indicates that the horizontal datum of the position provided in a GLL message from a position sensor is not known. The horizontal datum is provided in a DTM message from a position sensor.
13	Position: Loss of position (GLL)	Indicates that a GLL message from a position sensor has not been received for the specified time. The GLL message provides position information.
14	Position: Invalid message (GGA)	Indicates an error with a GGA message from a position sensor. The GGA message provides position information.
15	Position: Loss of position (GGA)	Indicates that a GGA message from a position sensor has not been received for the specified time. The GGA message provides position information.
16	Position: Invalid message (GNS)	Indicates an error with a GNS message from a position sensor. The GNS message provides position information.
17	Position: GNS Lost Differential	Indicates that the position provided in a GNS message from a position sensor no longer incorporates differential corrections.
18	Position: Loss of position (GNS)	Indicates that a GNS message from a position sensor has not been received for the specified time. The GNS message provides position information.
19	Position: Invalid message (DTM)	Indicates an error with a DTM message from a position sensor. The DTM message provides horizontal datum information.
20	Position: Datum not WGS84 (DTM)	Indicates that the horizontal datum in the DTM message from a position sensor is not WGS84.
21	Position: Loss of datum (DTM)	Indicates that a DTM message from a position sensor has not been received for the specified time. The DTM message provides horizontal datum information.
22	Speed Log: Invalid message (VHW)	Indicates an error with a VHW message from a speed log sensor. The VHW message provides water speed information.
23	Speed Log: Loss of speed (VHW)	Indicates that a VHW message from a speed log sensor has not been received for the specified time. The VHW message provides water speed information.
24	Position: Invalid message (VTG)	Indicates an error with a VTG message from a position sensor. The VTG message provides SOG and COG information.
25	Position: Loss of vector (VTG)	Indicates that a VTG message from a position sensor has not been received for the specified time. The VTG message provides SOG and COG information.
26	Radar: Invalid message (TVT)	Indicates that a TVT message has an error. The TVT message provides Vector time information.
27	Radar: Loss of vector time (TVT)	Indicates that a TVT message has not been received for the specified time. The TVT message provides Vector time information.
29	Radar: Invalid message (TTM)	Indicates an error with a TTM message. The TTM message provides tracked target information.
30	Radar: Loss of target (TTM)	Indicates that a TTM message has not been received for the specified time. The TTM message provides tracked target information.

Chapter 4: Alarm configuration

Alarm	Alarm Text	Description
31	Depth: Invalid message (DPT)	Indicates an error with a DPT message from a depth sensor. The DPT message provides depth information.
32	Depth: Loss of depth (DPT)	Indicates that a DPT message from a depth sensor has not been received for the specified time. The DPT message provides depth information.
33	Depth: Invalid message (DBT)	Indicates an error with a DBT message from a depth sensor. The DBT message provides depth information.
34	Depth: Loss of depth (DBT)	Indicates that a DBT message from a depth sensor has not been received for the specified time. The DBT message provides depth information.
35	Heading: Invalid Heading (HDT)	Indicates an error with a HDT message from a heading sensor. The HDT message provides heading information.
36	Heading: Loss of heading (HDT)	Indicates that a HDT message from a heading sensor has not been received for the specified time. The HDT message provides heading information.
37	Speed: Invalid message (VBW)	Indicates an error with a VBW message from a speed sensor. The VBW message provides water and ground speed information.
38	Speed: Loss of speed (VBW)	Indicates that a VBW message from a speed sensor has not been received for the specified time. The VBW message provides water and ground speed information.
39	Position: Invalid message (ZDA)	Indicates an error with a ZDA message from a position sensor. The ZDA message provides time information.
40	Position: Loss of time (ZDA)	Indicates that a ZDA message from the position sensor has not been received for the specified time. The ZDA message provides time information.
41	Autopilot: Invalid message (NSD)	Indicates an error with a NSD message from an autopilot. The NSD message provides navigation status information from a C-Plath autopilot.
42	Autopilot: Loss of status (NSD)	Indicates that a NSD message from an autopilot has not been received for the specified time. The NSD message provides navigation status information from a C-Plath autopilot.
43	Autopilot: Invalid message (ASD)	Indicates an error with an ASD message from an autopilot. The ASD message provides autopilot status information from a C-Plath autopilot.
44	Autopilot: Loss of system data (ASD)	Indicates that an ASD message from an autopilot has not been received for the specified time. The ASD message provides autopilot status information from a C-Plath autopilot.
45	Speed: Invalid message (VLW)	Indicates an error with a VLW message from a speed sensor. The VLW message provides log distance information.
46	Speed: Loss of distance (VLW)	Indicates that a VLW message from a speed sensor has not been received for the specified time. The VLW message provides log distance information.
47	Wind: Invalid message (MWV)	Indicates an error with a MWV message from a wind sensor. The MWV message provides wind information.
48	Wind: Loss of wind (MWV)	Indicates that a MWV message from a wind sensor has not been received for the specified time. The MWV message provides wind information.
49	Autopilot: Invalid message (STA)	Indicates an error with a STA message from an autopilot. The STA message provides autopilot status information from an Anschütz autopilot.
50	Autopilot: Loss of status (STA)	Indicates that a STA message from an autopilot has not been received for the specified time. The STA message provides autopilot status information from an Anschütz autopilot.
51	AIS: Invalid message (VDM)	Indicates an error with a VDM message from AIS. The VDM message provides AIS information.

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Alarm	Alarm Text	Description
52	AIS: Loss of AIS (VDM)	Indicates that a VDM message from AIS has not been received for the specified time. The VDM message provides AIS information.
53	Heading: Invalid message (ROT)	Indicates an error with a ROT message from a heading sensor. The ROT message provides Rate Of Turn information.
54	Heading: Loss of ROT (ROT)	Indicates that a ROT message from a heading sensor has not been received for the specified time. The ROT message provides Rate Of Turn information.
55	Propulsion: Invalid message (RPM)	Indicates an error with a RPM message from a propulsion sensor. The RPM message provides shaft or engine revolution rate and propeller pitch information.
56	Propulsion: Loss of RPM (RPM)	Indicates that a RPM message from a propulsion sensor has not been received for the specified time. The RPM message provides shaft or engine revolution rate and propeller pitch information.
57	Rudder: Invalid message (RSA)	Indicates an error with a RSA message from a rudder sensor. The RSA message provides rudder angle information.
59	Rudder: Loss of rudder (RSA)	Indicates that a RSA message from a rudder sensor has not been received for the specified time. The RSA message provides rudder angle information.
60	SAM: Invalid SAM Message	Indicates an error with a message from a Status and alarm module.
61	SAM: Loss of SAM	Indicates that no message has been received for the specified time.
62	Central Alarm: Invalid message (ACK)	Indicates an error with an ACK message from a central alarm unit. The ACK message provides alarm acknowledgement information.
63	Central Alarm: Loss of acknowledgement (ACK)	Indicates that an ACK message from a central alarm unit has not been received for the specified time. The ACK message provides alarm acknowledgement information.
64	Central Alarm: Invalid message (ALR)	Indicates an error with an ALR message from a central alarm unit. The ALR message provides alarm information.
65	Central Alarm: Loss of alarm (ALR)	Indicates that an ALR message from a central alarm unit has not been received for the specified time. The ALR message provides alarm information.
66	Speed: VBW Water speed invalid	Indicates an error with a VBW message from a speed log sensor. The VBW message provides water speed information.
67	Speed: VBW Ground speed invalid	Indicates that a VBW message from a speed log sensor has not been received for the specified time. The VBW message provides water speed information.
68	Heading: Invalid heading (THS)	Indicates an error with a THS message from a heading sensor. The THS message provides heading information.
69	Heading: Loss of heading (THS)	Indicates that a THS message from a heading sensor has not been received for the specified time. The THS message provides heading information.
213	USB: FSD-A178 Interface failed	Indicates that the USB interface between the Processor Unit Motherboard and the System Interface PCB (FSD-A178) has failed.
214	Heading: Analogue Gyro Invalid	Indicates an invalid analogue gyro input from the System Interface PCB (FSD-A178).
221	USB: FSD-A232 Interface to Input Relays failed	Indicates that the USB interface between the Processor Unit and the input relays on the Relay Interface PCB (FSD-A232) has failed.
222	USB: FSD-A232 Interface to Output Relays failed	Indicates that the USB interface between the Processor Unit and the Output relays on the Radar Interface PCB (FSD-A232) has failed.
231	USB: FSD-A179 Interface to Output Relays failed	Indicates that the interface between the Processor Unit and the output relays on the Display Interface PCB (FSD-179) has failed.

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Alarm	Alarm Text	Description
261	Position: Sensor failed. Using DR	Indicates that the currently selected position sensor has failed and that dead reckoning is being used.
262	Position: DR drift limit exceeded	Indicates that there has been a jump in position or a position drift larger than the allowed limits. This indicates that the data from the position sensor could be unreliable.
263	Position: Fix needed to update DR	Indicates that the system has been using dead reckoning for longer than the time specified and requires a position fix by the user.
264	Position: Sensor failed. Reverted to alternative	Indicates that the selected position sensor has failed and an alternative sensor has been automatically selected.
265	Heading: Sensor failed. Reverted to alternative	Indicates that the selected heading sensor has failed and an alternative sensor has been automatically selected.
266	Speed Log: Sensor failed. Reverted to alternative	Indicates that the selected water speed log sensor has failed and an alternative sensor has been automatically selected.
268	Speed: Sensor failed. Reverted to alternative	Indicates that the selected speed sensor has failed and an alternative sensor has been automatically selected.
311	AIS: Targets nearing capacity	Indicates that the number of AIS targets displayed is 95% of the user selected display capacity.
312	AIS: Target capacity exceeded	Indicates that the number of AIS targets has exceeded the user selected display capacity and some targets are therefore not displayed.
313	ARPA: Tracked targets nearing capacity	Indicates that the number of tracked targets displayed is 95% of the maximum capacity.
314	ARPA: Tracked target capacity exceeded	Indicates that the maximum number of tracked targets has been reached. Existing tracked targets must be deleted before further targets may be tracked.
315	ARPA: Lost tracked target	Indicates that a tracked target has been lost.
316	ARPA: Lost reference target	Indicates that a tracked reference target has been lost.
317	AIS: Lost AIS target	Indicates that an AIS target has been lost.
318	Collision warning	Indicates that one or more tracked or AIS targets violate the CPA and TCPA limits set, and may therefore be a collision risk.
319	ARPA: Anchor watch limit exceeded	Indicates that ownship's position has moved by more than the limit set since the anchor watch was started, based on the relative positions of all anchor watch tracked targets.
361	Tx: No Sync	Indicates that the display has not detected the sync signal from the selected radar sensor.
362	Tx: No Azimuth	Indicates that the display has not detected the azimuth signal from the selected radar sensor.
363	Tx: No Heading Line	Indicates that the display has not detected the heading line signal from the selected radar sensor.
364	RIU: Unit Failed. Reverted to default Tx	Indicates that the RIU has failed, and the display can only use the default radar sensor.
365	RIU: Unit now available	Indicates that the RIU is available after having failed and that a radar sensor other than the default one can now be selected.
366	Tx: SharpEye Rx sensitivity test failed	Indicates a receiver sensitivity fault in the SharpEye™ radar sensor.
367	Tx: SharpEye Tx VSWR test failed	Indicates a VSWR test failure in the SharpEye™ radar sensor.
368	Tx: SharpEye low Tx power	Indicates that the Tx power output from a SharpEye™ radar sensor has been set to low.

Chapter 4: Alarm configuration

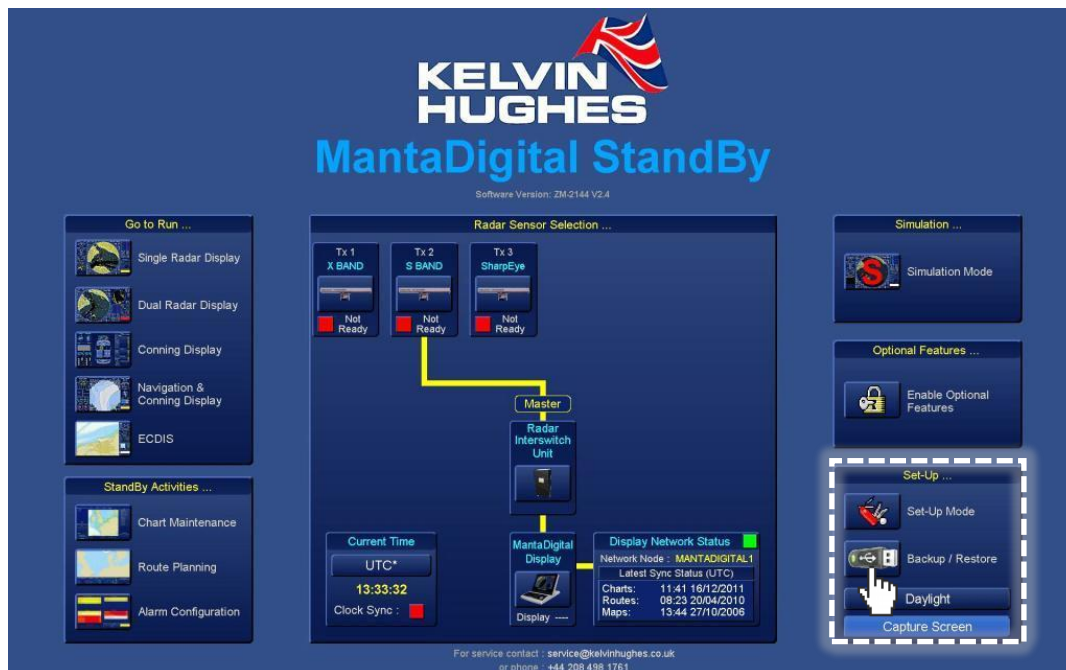
Alarm	Alarm Text	Description
369	Tx: SharpEye hardware error (PLO lock)	Indicates a phase locked oscillator fault in the SharpEye™ radar sensor.
370	Tx: SharpEye hardware error (synthesizer lock)	Indicates a hardware fault in the SharpEye™ radar sensor.
371	Tx: SharpEye over-temperature	Indicates that the SharpEye™ radar sensor has exceeded normal operating temperature and is operating on low power.
372	Tx: SharpEye over-temperature shutdown	Indicates that the SharpEye™ temperature has exceeded a second threshold and the radar sensor has therefore shut down.
373	Tx: SharpEye loss of Azimuth / Heading Line	Indicates that the SharpEye™ radar sensor is not receiving an azimuth or heading line signal.

5 Backup & restore

Using backup and restore, data can be backed up and selected data transferred between compatible MANTADigital processors.

The operator handbooks can also be downloaded.

Backup/ Restore is selected from the **Set-Up** area of the Standby screen.



Note: The restoration functions are used to restore user generated data. Backup & restore cannot be used for restoration or upgrading of the main system software.

Antivirus warnings and precautions



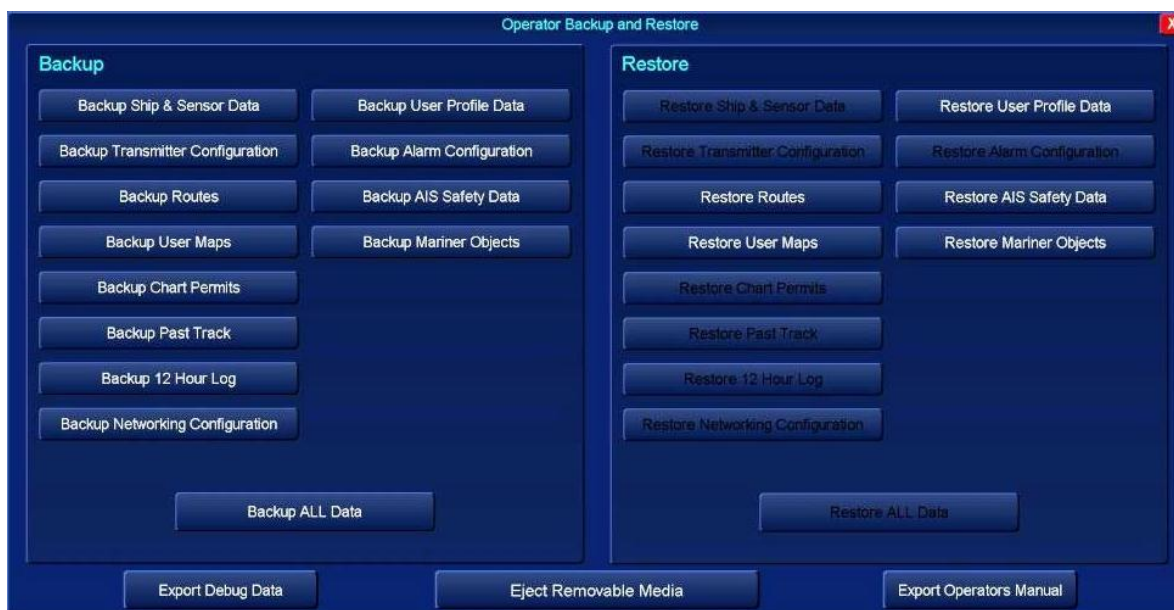
WARNING:

Prior to use, all removable media used on or in Kelvin Hughes products **MUST** be fully scanned for viruses on a PC that has *up to date* anti-virus software installed.

See section 2.6.4 for additional information on virus precautions and warnings.

5.1 Backup data

The following data can be backed-up to external media.



Backup function	Description	Availability
Ship & sensor data	The systems commissioning configuration including external sensors (<i>i.e. position sensors</i>) and ownship's settings	All systems
Transmitter configuration	The configuration of all transceivers connected to the system	All systems
Routes	User created routes (including pilotage tools and critical points added to a route)	All systems
User maps	User created maps	All systems
Chart permits	Chart permits	Chart Radar or ECDIS enabled systems only
Past track	The last 3 months of vessel tracks	ECDIS enabled systems only
12 hour log	A 12-hour log of own-ship primary sensor data, target data and current chart usage	ECDIS enabled systems only
Networking configuration	All network configurations	Network enabled system only
User profile data	User profiles created and stored on the system	All systems
Alarm configuration	The configuration of the alarms setup page	All systems
AIS safety data	All SRM's (Safety related messages) received and not deleted by the user.	All systems
Mariners objects	All mariners NOTEs or events entered into the system.	ECDIS enabled systems only
All data (RECOMMENDED)	All the above data is backed up (<i>RECOMMENDED</i>)	All systems

How do I back up data?

1

Noting all antivirus warnings shown in the safety notices and warnings section of this handbook, plug a USB memory stick to the socket on the door of the MANTADigital processor unit.

From the Standby screen, select **Backup and Restore** and select the desired backup.

2

From the pop-up box, select the removable media.

In a normal system the drives are allocated as follows:

A: Floppy drive (where fitted).

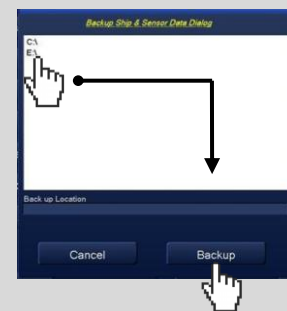
C: Main hard drive.

D: CD/ DVD-ROM.

E: Normally the USB flash drive.

If you are not in the correct drive, click on the **..** symbol to go up a level.

Select the **E:** Drive and click on **Backup**.



3

When the backup is complete, '**Backup restore action completed successfully**' will appear on screen; click **OK** to continue.

4

Eject the memory stick BEFORE unplugging from the processor (see **Eject removable media** later in this section).

5.2 System backup

The **Backup All Data** function within backup and restore saves all the system settings, user generated data, permits and system configurations.

It is strongly recommended that a backup of 'All Data' from all MANTADigital systems is taken regularly and retained with the systems for any possible service interventions.

5.3 Restoring data

The following data can be restored to any MANTADigital processor allowing the transfer of data between compatible systems.

Note: The restoration tab only restores user generated data. It cannot be used for restoration or upgrading of the main system software.



Backup function	Description	Availability
<i>Routes</i>	User created routes	All systems
<i>User maps</i>	User created maps	All systems
<i>User profile data</i>	User profiles created and stored on the system	All systems
<i>AIS safety data</i>	All SRM's (Safety related messages) received and not deleted by the user.	All systems
<i>Mariners objects</i>	All mariners NOTES or events entered into the system.	ECDIS enabled systems only



Caution: Some restoration functions will force a system restart.

The restoration function should only be used when the system is not required for safe navigation.

How do I restore data?

1

Noting all antivirus warnings shown in the safety notices and warnings section of this handbook, plug a USB memory stick to the socket on the door of the MANTADigital processor unit.

From the Standby screen, select **Backup and Restore** and select the desired restoration.

2

From the pop-up box, select the removable media.

In a normal system the drives are allocated as follows:

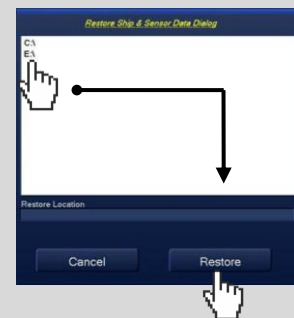
A: Floppy drive (where fitted).

C: Main hard drive.

D: CD/ DVD-ROM.

E: Normally the USB flash drive.

If you are not in the correct drive, click on the **..** symbol to go up a level.



Select the **E:** Drive and click **Restore**.

3

Depending on the restore function selected, the system may now prompt with '**Registry settings have been changed. An application restart will occur for the changes to take effect**'.

Click **OK** to proceed.

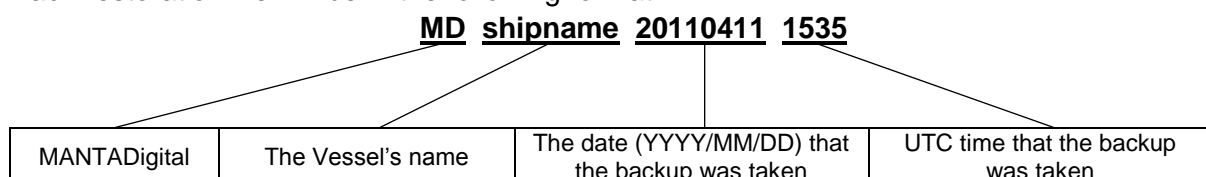
The system may **shut down** and **restart**.

4

Eject the memory stick **BEFORE** unplugging from the processor (see **Eject removable media** later in this section).

5.4 Backup file format

Each restoration file will be in the following format:



The contents and size of each file will change depending on the backup function selected.

5.5 Export Debug Data

Debug data consists of system error logs and screen grabs which are used by Kelvin Hughes to analyse any issues with the equipment.



Caution: The export debug function should only be used when specifically advised by Kelvin Hughes or one of our authorised agents.

How do I export debug data?

1

Noting all antivirus warnings shown in the safety notices and warnings section of this handbook, plug a USB memory stick to the socket on the door of the MANTADigital processor unit.

From the Standby screen, select **Backup and Restore**.

2

Select the **Export Debug Data** button.

WARNING: Only press the export debug button **ONCE** as repeated presses can incorrectly transfer data to the memory stick.

3

Depending on the size of the file, this can take several minutes to complete.

When the export is complete the system will prompt with '**Backup restore action completed successfully**'; click **OK** to continue.

4

Eject the memory stick BEFORE unplugging from the processor (see **Eject removable media** later in this section). The data found on the memory stick can be emailed to Kelvin Hughes for investigation (see Fault finding for addition details)

Each debug file will be in the following format where the file name is the date and time that the backup was made:

MD debug backup shipname 20110411 1535



WARNING

The Export Debug backup folder contains registry files that can only be used by Kelvin Hughes Ltd.

Users should not attempt to open files contained in the debug backup or release folders as they may corrupt the user's computer

5.6 Export Operators manual

The **MANTADIGITAL™** Operator's handbooks can be downloaded from the processor.

1

Noting all antivirus warnings shown in the *safety notices and warnings* section of this handbook, insert a virus free USB memory stick to the socket on the door of the MANTADigital processor unit.

From the Standby screen, select **Backup and Restore**.

Click **Export Operators Manual**.

2

In a normal system the drives are allocated as follows:

A: Floppy drive (where fitted)

C: Main hard drive

D: CD/ DVD-ROM

E: Normally the USB flash drive

If you are not in the correct drive, click on the **..** symbol to go up a level.

Select the **E:** Drive and click **Export**.

3

The system will now download the handbooks to the USB flash memory.

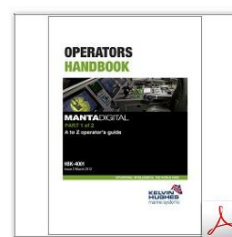
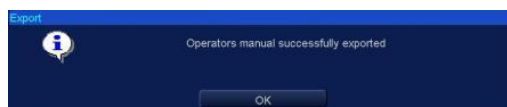
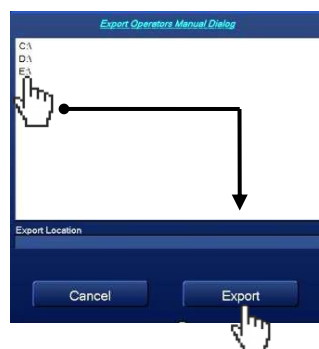
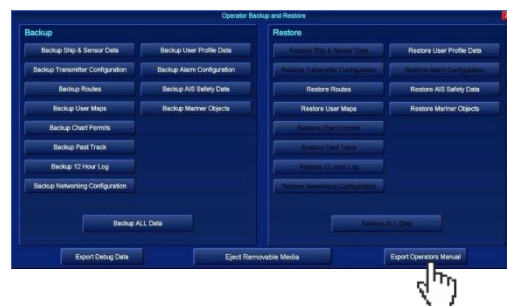
A notification is presented when the download is complete.

4

Eject the memory stick **BEFORE** unplugging the memory stick from the processor (see **Eject removable media** later in this section).

5

The handbooks will be found in the root directory of the memory stick in a PDF format.



PDF file

Chapter 5: Backup & restore

5.7 Eject Removable Media

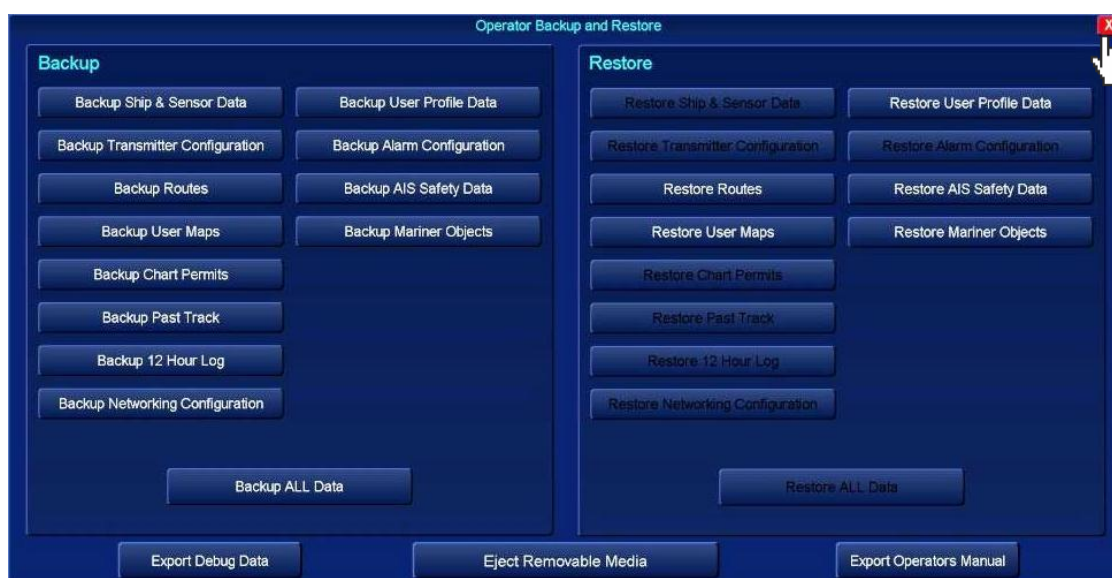


Before unplugging *any* removable media device, select '**Eject removable media**'.

This safely ejects the USB flash memory inserted into the system.

5.8 Close backup and restore menu

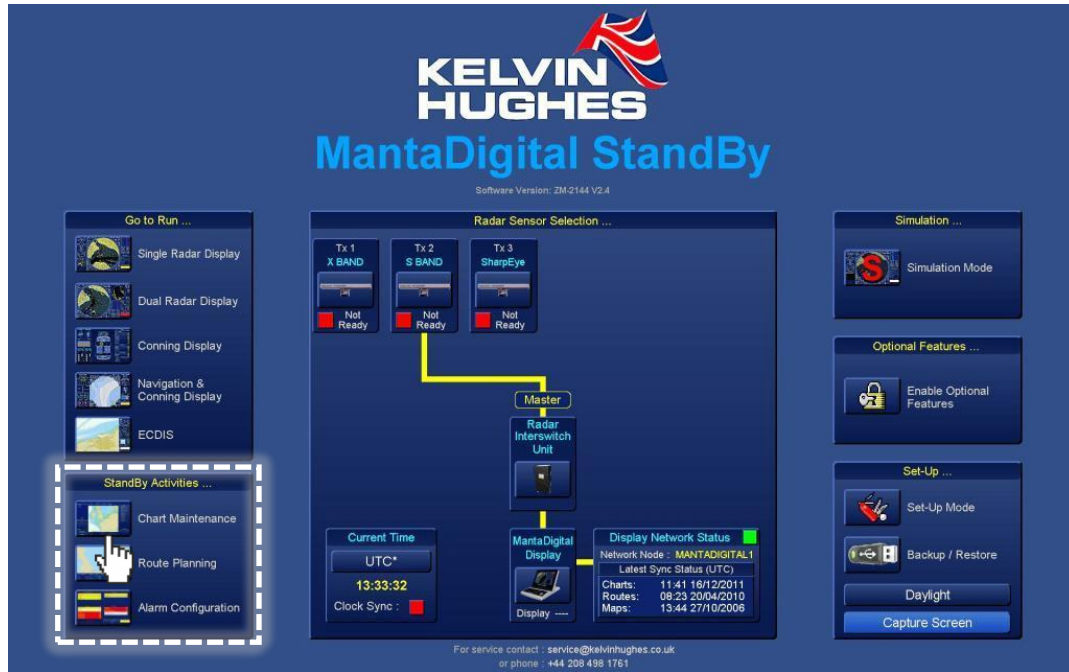
To close the backup and restore menu, press the **X** in the top right hand corner of the screen.



6 Chart maintenance

Chart maintenance allows the management of chart data, licenses and updates.

The various functions are accessed by selecting the **Chart Maintenance** icon in the **Standby Activities** area of the standby screen:



If the Chart maintenance section is '**greyed-out**' or cannot be accessed there may be a problem with the eToken or chart maintenance has not been enabled in optional features.

See the index entry for eToken software or optional features for additional details.

The chart maintenance section comprises of the following chapters:

Chapter 6.1: *Chart Maintenance: Overview.*

An overview of the 'tabs' found along the top of the chart maintenance screen.

Chapter 6.2: *Functions common to all tabs.*

Details the functions and controls that are common to each tab within chart maintenance.

Chapter 6.3: *How do I...?*

Step by step instructions for common activities within chart maintenance such as loading permits and charts.

6.1 Chart maintenance – an overview

Chart maintenance allows the management (installation and updating) of chart data and permits for **Chart Radar** and/ or **ECDIS** enabled systems.

The MANTADigital Chart Radar and ECDIS system is capable of displaying the following charts:

- **IHO/ IC-ENC S-57** Electronic Navigational Chart (ENC) vector based charts.
- **IHO/ IC-ENC S-63** Encrypted ENCs as supplied by Primar Stavanger, UK Admiralty ENC service and other hydrographic offices.
- **C-Map** vector based charts including Professional, Professional+ and C-Map ENC.



Note: *There are no facilities for installing or displaying ARCS/ Raster Navigation charts.*

When opened, the Chart maintenance section comprises of **6 tabs** as follows:



Chart View: This tab is used to:

- View and update installed charts
- Install new chart data

Routes can be loaded and charts to be used on the route may be selected.

Data View: This tab is used to view details of installed charts and charts on external media (e.g. CD or DVD).

The data on external media can be selected for installation and installed data selected for deletion.

Install Log: Shows the progress of chart installations or updates.

Chart License: Installation and management of chart licenses.

View updates: Installed updates can be viewed and manual updates applied.

Colour calibration: This tab is used to view the various colour palettes used in chart radar and ECDIS modes.

6.1.1 Chart view tab



The **chart view tab** is used to view chart data that is already installed or is available on removable media such as CD, DVD or USB flash memory.

The installed chart databases are shown in the top left hand side of the screen (Installed). A database **must be selected** for the chart data to be viewed.



Note: If *no chart database* is selected, no chart information or cell boundaries will be seen on the display.

The Data shown in the chart view tab is also dependent on the filter settings selected on the right hand side of the screen (filters).

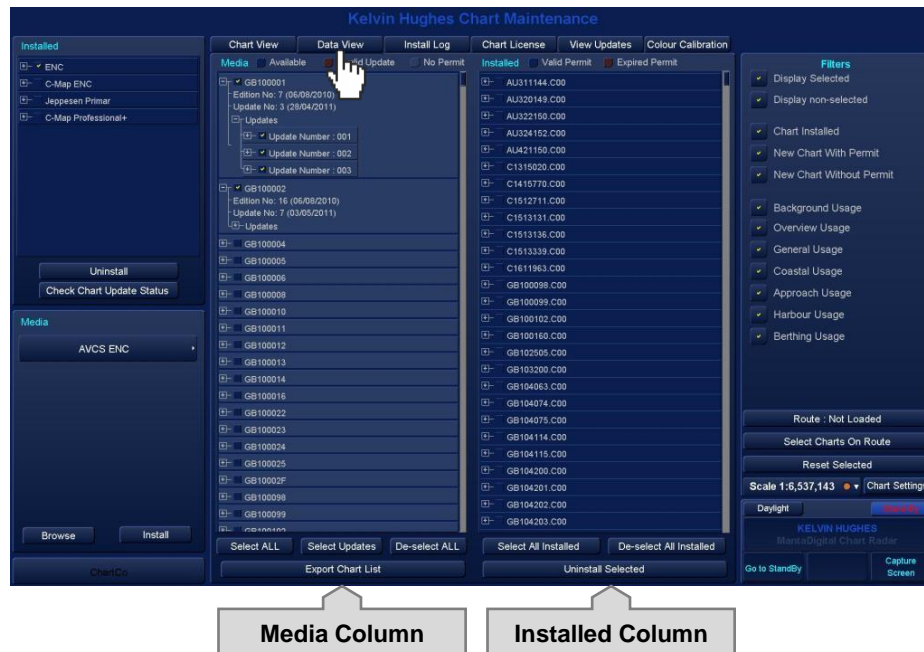
Cell boundary colours

In chart view, cell boundaries are displayed in different colours that represent the following:

- | | |
|---------------------------------|---|
| Cell outlined in GREEN : | Cell(s) are installed on the system and have a valid permit. |
| Cell outlined in BLUE : | Cell(s) are available on the external media and have a valid permit. These cells are NOT installed but are available for installation. |
| Cell outlined in RED : | Cell(s) are available on external media but no permit is installed. These cells cannot be installed until a valid permit is obtained and installed. |

Chapter 6: Chart maintenance

6.1.2 Data view tab



Data view shows data that is available to be installed from external media (**Media column**) and data that is already installed (**Installed column**).

The permit status of individual cells can be viewed and cells can be selected, installed and uninstalled.



Note: If *no chart database* is selected, no chart information will be seen on the display (see section 6.1.1).

The Data shown in the data view tab is also dependent on the filter settings selected on the right hand side of the screen (filters).

Each cell edition/ update number and date can be viewed by using the **+/-** buttons next to each cell.

Switch from Data View to Chart View

Clicking on any cell number automatically switches the view to the **chart view** tab where the selected cell is shown.



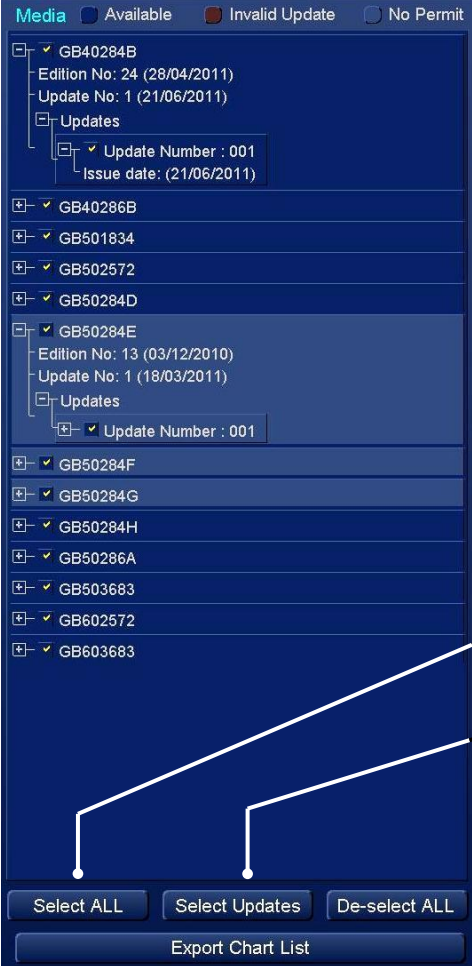
Data view



Chart view

Data view tab: Media Column – an overview

The following example shows a group of cells that are available on **external media** (CD/ DVD etc.).



Media ☐ Available ☐ Invalid Update ☐ No Permit

GB40284B
Edition No: 24 (28/04/2011)
Update No: 1 (21/06/2011)
Updates
Update Number : 001
Issue date: (21/06/2011)

GB40286B

GB501834

GB502572

GB50284D

GB50284E
Edition No: 13 (03/12/2010)
Update No: 1 (18/03/2011)
Updates
Update Number : 001

GB50284F

GB50284G

GB50284H

GB50286A

GB503683

GB602572

GB603683

Select ALL Select Updates De-select ALL

Export Chart List

This cell is available for installation.
The cell is on a dark blue background indicating the permit is valid.
The cell is expanded showing:

- Edition number/ issue date
- Update number with its issue date (the edition and update details are only shown where base data is installed).

This cell cannot be installed.
An expanded cell highlighted in light blue indicating that there is no permit.

Select ALL:
Selects all cells on the external media.

Select Updates
Selects cells on the media that have updates.
New base cells are NOT installed using this function

Deselect ALL
Deselects all cells

Export Chart List
This function is currently not enabled.

Invalid update(s)

If a cell is highlight in dark red then the update is invalid.

Invalid Updates are those charts that are installed, but the update cannot be installed either because the software version is not supported, or a previous update was not correctly installed.

Note: If a cell is selected/ de-selected in the Data View tab it is also automatically selected/ de-selected in the Chart View tab.

Data view tab: Installed Column – an overview

The following example shows a group of installed cells selected.



Installed cell

The cell is on a dark blue background indicating the permit is currently valid.

The cell is expanded showing:

- Edition number/ issue date
- Update number with its issue date (the edition and update details are only shown where base data is installed).

Select All Installed

Selects all installed cells.

Deselect ALL

Deselects all cells

Uninstall selected

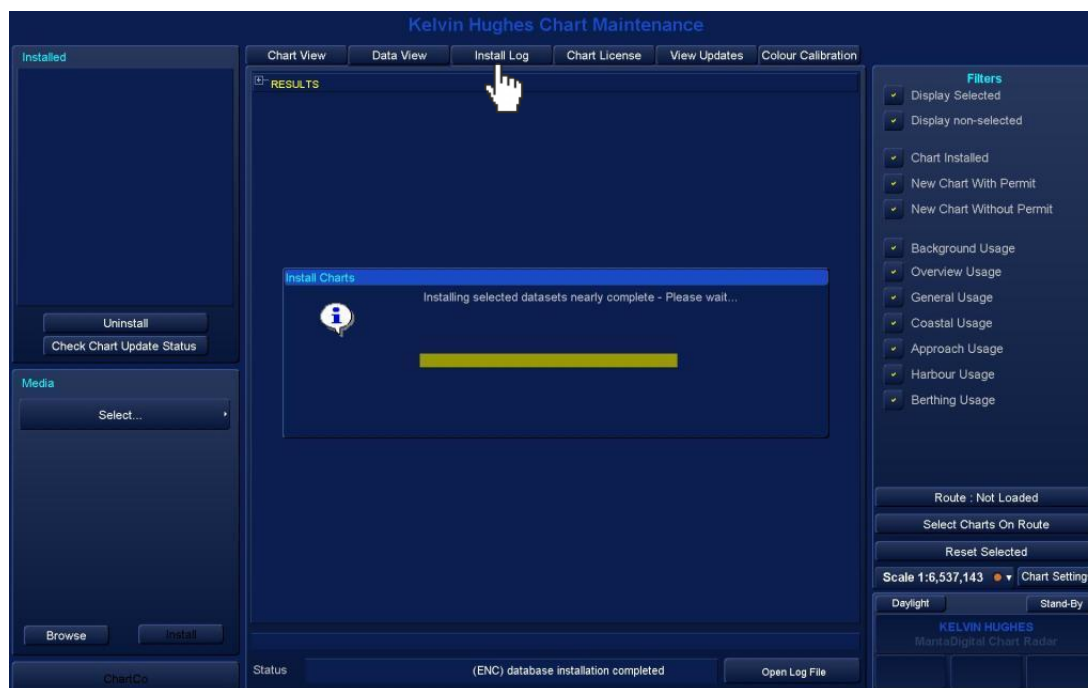
Removes all selected cells from the system.

Expired permit(s)

Where a permit for a cell has expired, the cell will be highlighted in **Dark Red**.

Chapter 6: Chart maintenance

6.1.3 Install Log



The **Install Log** tab shows the progress and results of a chart installation or update. During installation a progress bar is shown and the current installation is shown in the status field.

On completion of an installation the status box shows **Database Installation Complete**. A list of the data installed and a results field is shown which can be expanded/contracted using the **+/-** - button.



Chapter 6: Chart maintenance

Installation errors

When an installation is complete, any errors that occurred during the installation are shown

If no errors occur, the S63 Decryption results box is not shown.



Open Log File

The *Open Log File* button opens a **Chart Installation Log File** which is a log of all chart maintenance activities such as installations, updates and deletions.



Chapter 6: Chart maintenance

6.1.4 Chart License tab

The **chart license** tab allows the installation and management of chart permits.

The installation of permits is fully detailed in section 6.3; 'how do I...'

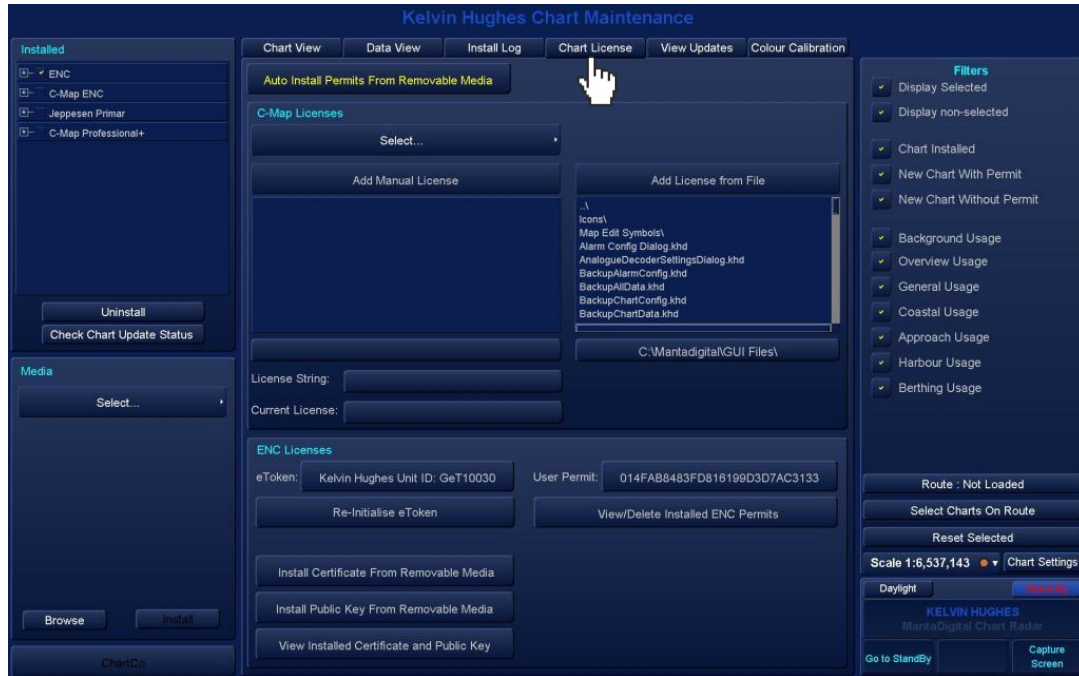
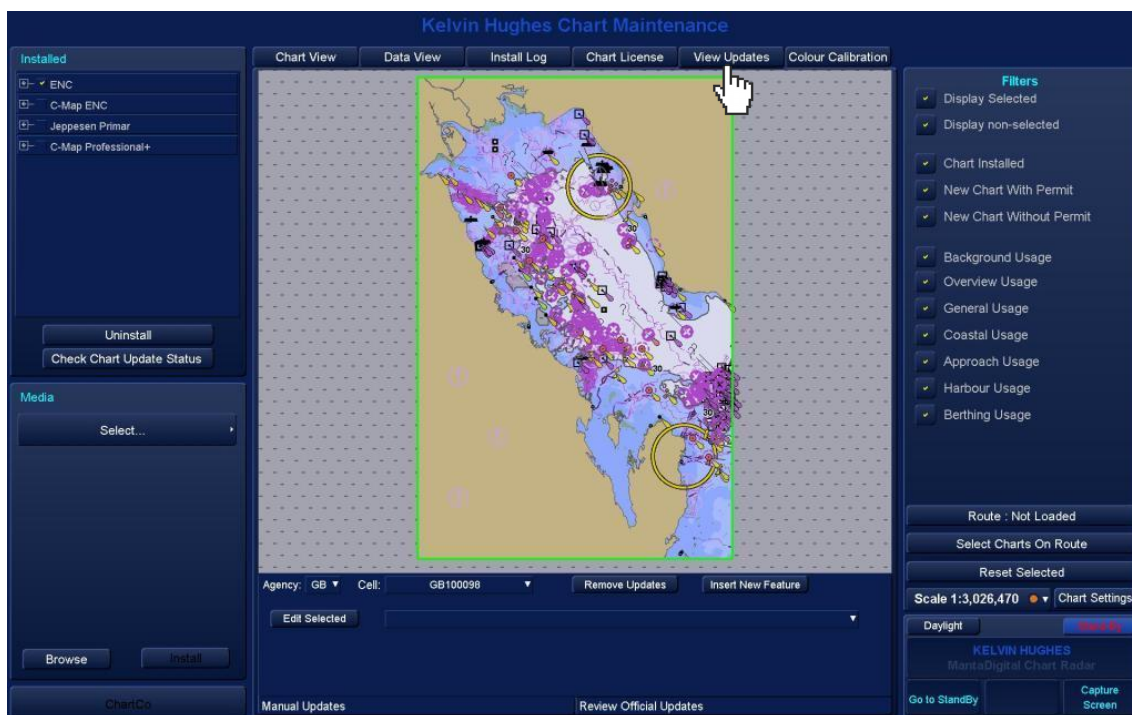


Chart Licensing can be broken down into five sub sections as follows:



Chapter 6: Chart maintenance

6.1.5 View updates tab



The view updates tab is used for:

Manually updating chart data

- Information can be manually inserted onto chart data.
- Existing chart features can be edited.

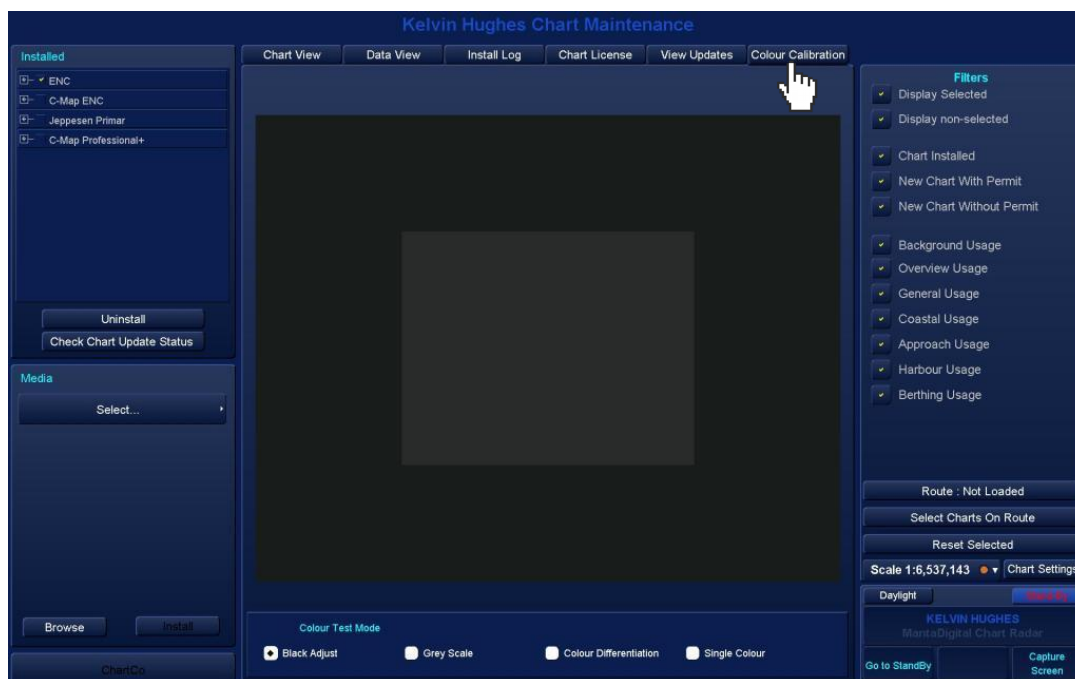
Reviewing official updates

- Information on official updates applied to chart data can be viewed.

Updating and reviewing charts is detailed in Section 6.3; 'how do I...'

Chapter 6: Chart maintenance

6.1.6 Colour Calibration tab



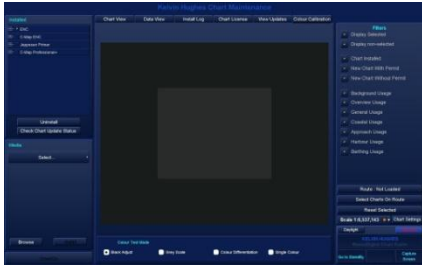
The colour calibration tab is used as part of the factory approval process for the MANTADigital system. During approval, calibrated luminance and colour sensing test equipment is used to check the colour of the display.

The Colour calibration is not used during normal operation of the MANTADigital processor but can be used as a visual 'quick check' that all greyscale shades and colours are being displayed.

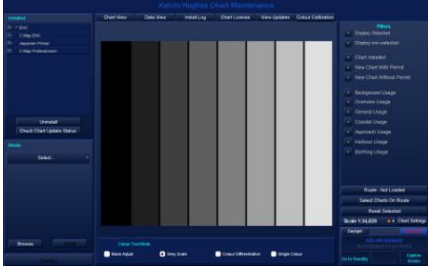
It should be noted that the identification of greyscale shades and display colours will vary according to the operator, so should not be considered as a quantitative test.

When the Single Colour palette has been selected, each colour can be selected and viewed by left clicking any of the lines of text. Selecting *List all S52 colours* expands the list to show all colours used in S52 charts.

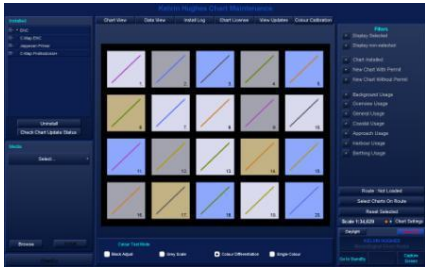
Chapter 6: Chart maintenance



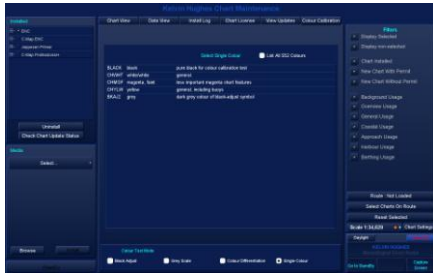
Black adjust selected



Grey scale selected

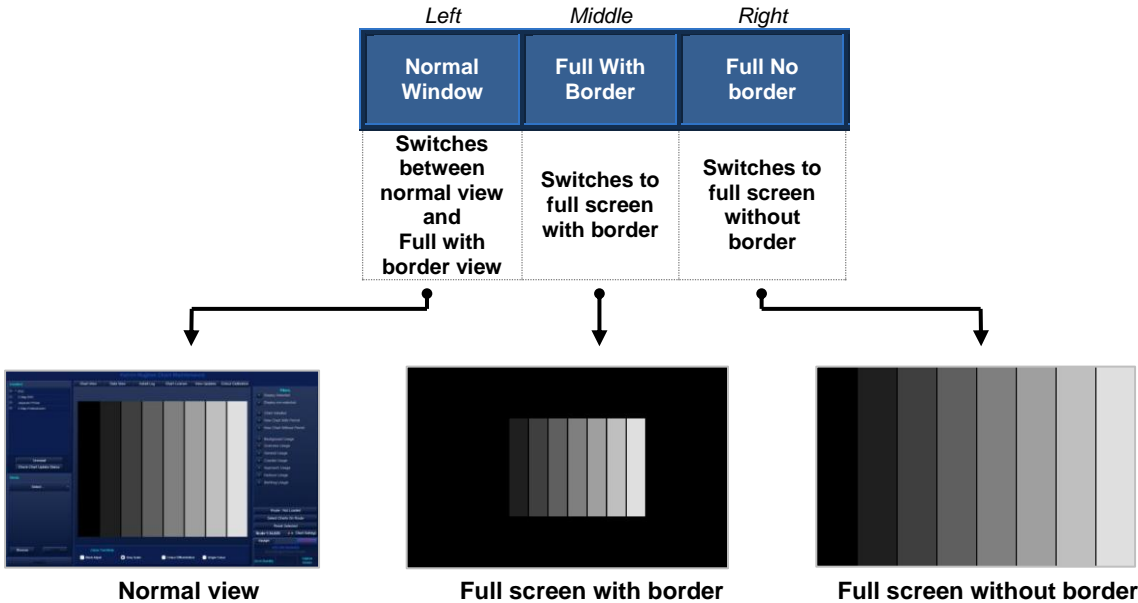


Colour Differentiation selected



Single colour selected

With one of the four the *colour test modes* selected and with the cursor placed over the centre of the screen, the following cursor options are available:



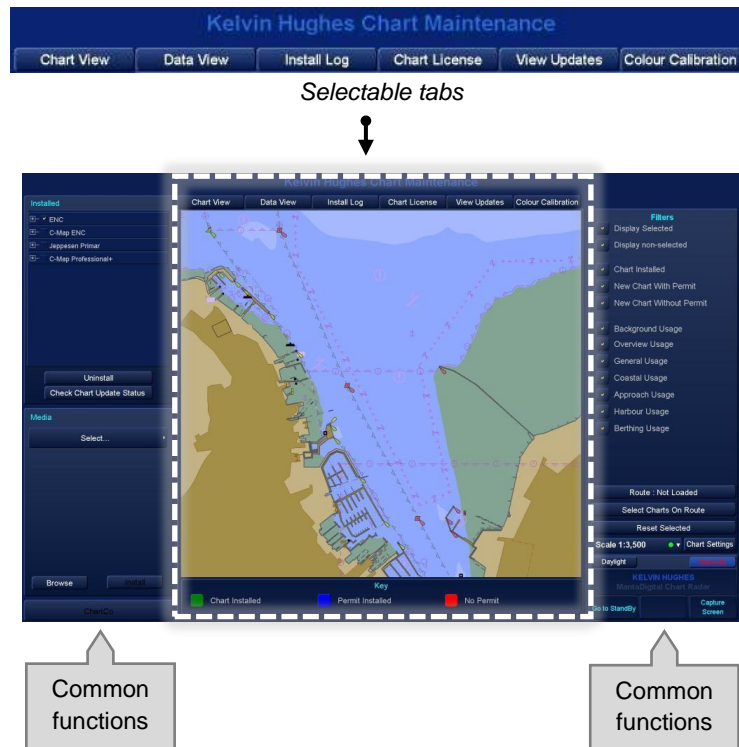
The above shows examples with the Gray scale colour test mode selected



Note: When 'Full with no border' or 'Full without border' has been selected, pressing the left button (Normal Window) returns the display to the chart maintenance/ colour calibration tab.

6.2 Common functions within chart maintenance

The following details functions that are common to all tabs within chart maintenance.



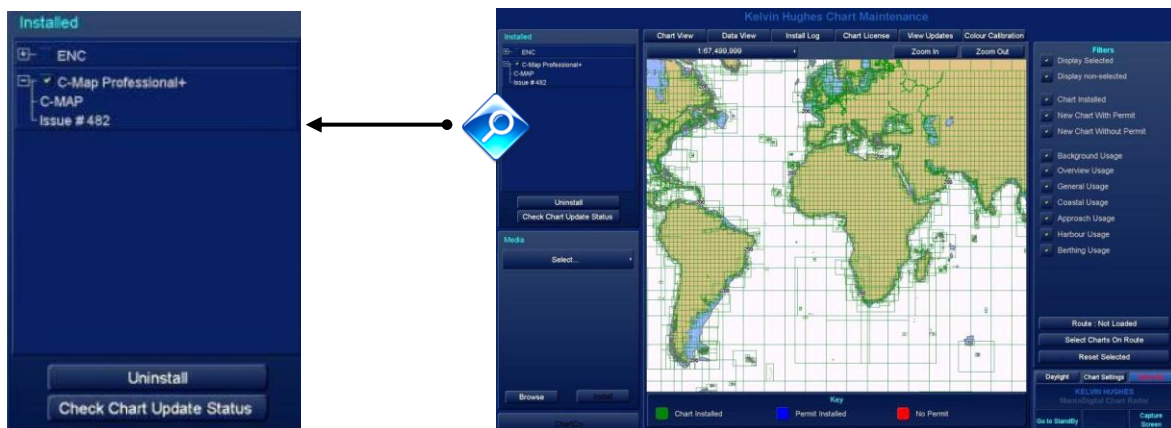
6.2.1 Installed

Installed: Shows a list of chart databases installed on the system.

A chart database is a collection of cells from a data provider; for example UKHO, AVCS or other chart provider.



Note: When Chart Maintenance is opened by default no databases are selected so no cell boundaries will appear in the Chart view tab.

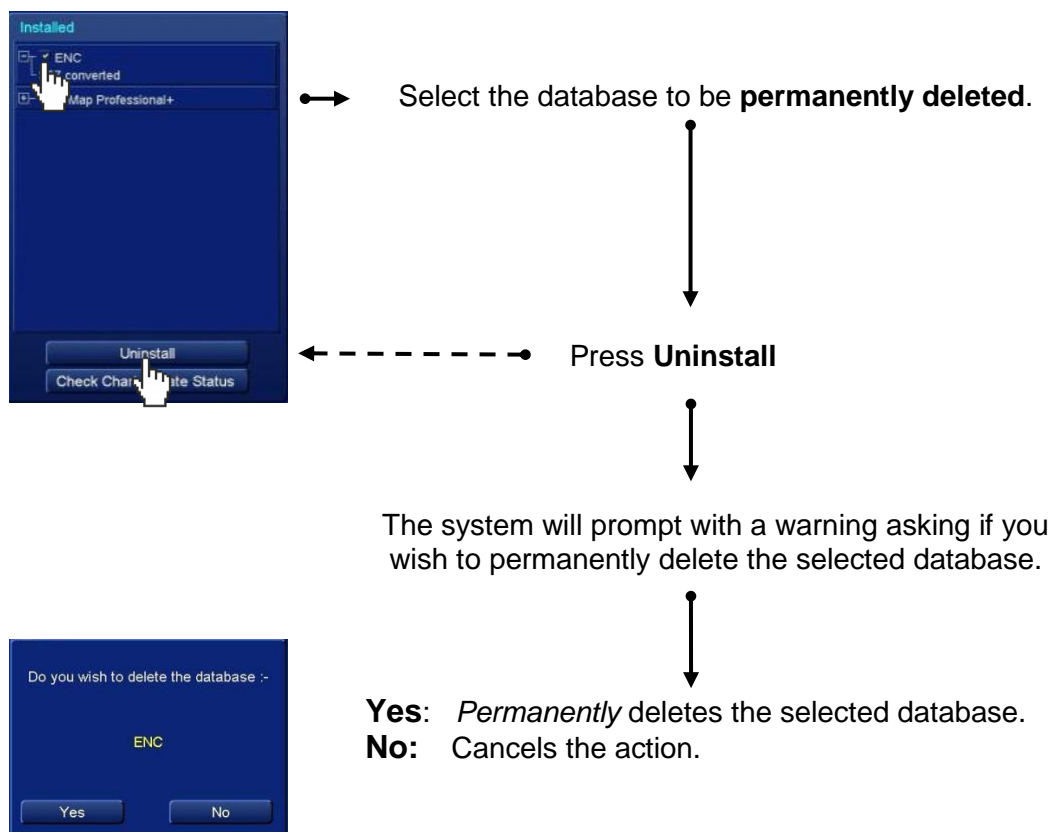
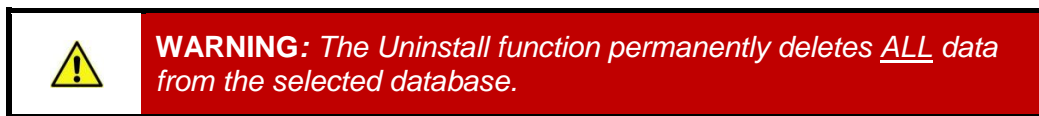


Example 1: The *C-Map professional+* database is ticked and expanded to show the issue number. Installed C-Map cell boundaries are shown in the **Chart View** tab.

Uninstall button

Uninstall is used to remove/ uninstall *the complete contents* of a selected database.

This can be used when a new source of charts is to be used.



Check Chart Update status button:

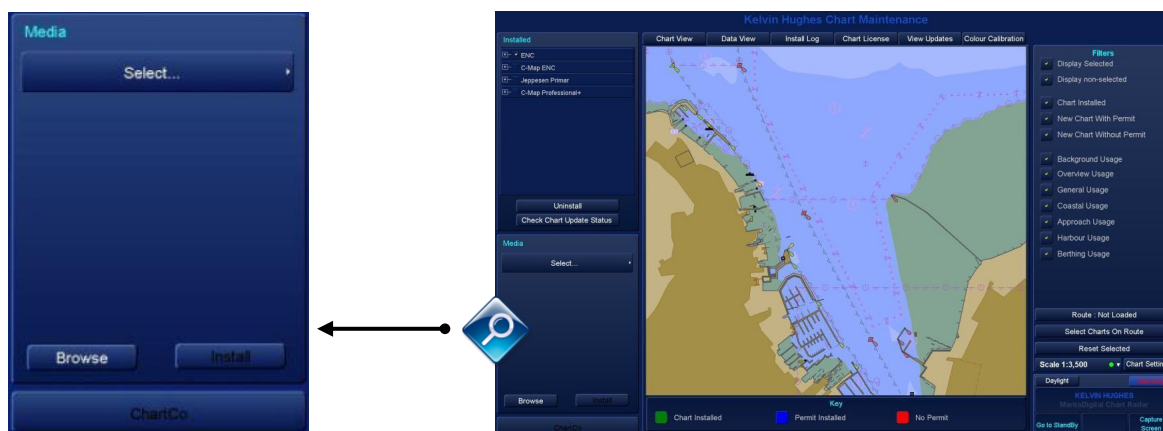
The Check Chart Update status button is used to view the current update status of all installed charts.

The system checks installed data against a file called '**xxxProducts**' where xxx is the chart supplier (see examples on following page).

When you browse chart media, the 'xxx products' file is *automatically loaded onto the system*.

6.2.2 Media

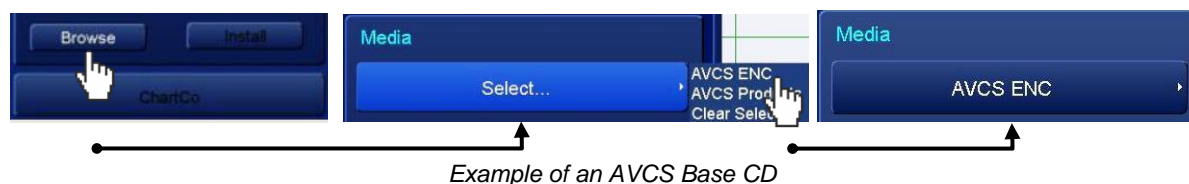
Media: This section is used to browse, install and update chart data from removable media such as CD, DVD or USB flash memory.



Insert the CD, DVD or USB flash drive into the system and press **Browse**; the system will search for chart data.

Once the system has detected the source of data, pressing the **Select** button produces a list of the data that is available.

The **Select** button will show the name of the selected data.



When a disk is loaded, the following options are available when the select button is pressed:

In the following 'xxx' is the chart supplier e.g. Primar, C-Map AVCS etc.

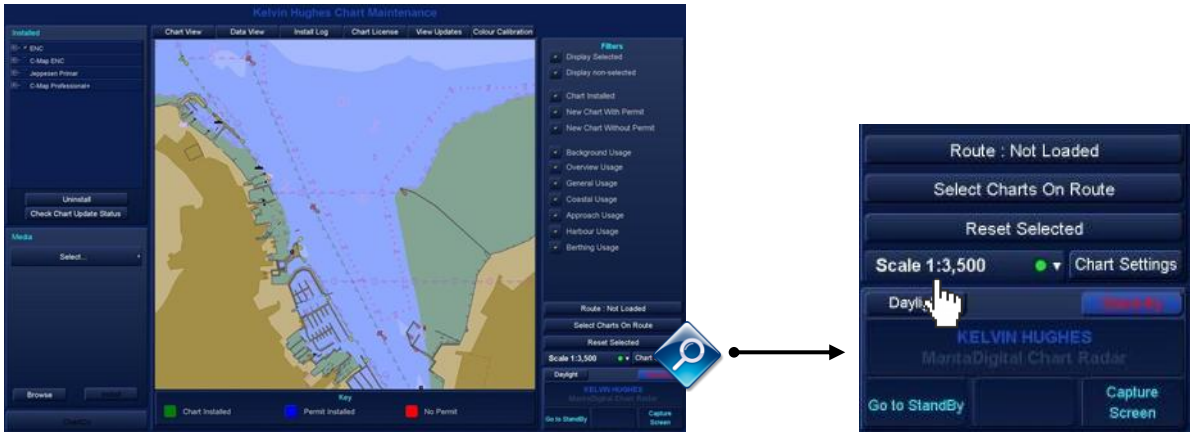
xxx ENC: Shows the contents/ cell boundaries available on the inserted media.

xxx Products: Shows the global coverage/ cell boundaries and any updates that are available.

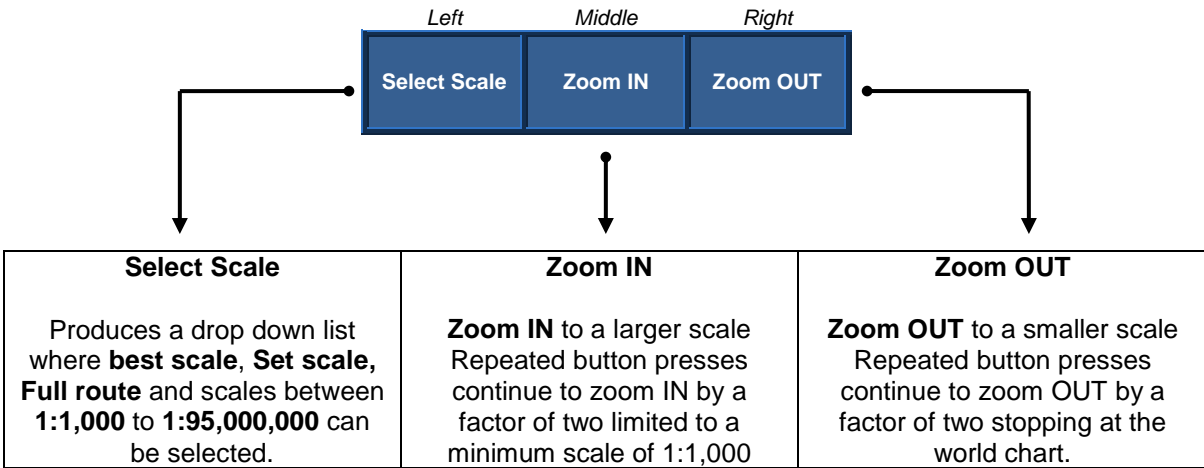
The region covered by the media can be installed however, if you attempt to install data for a region not covered, the system will request the appropriate CD/ media.

Clear Selection: Clears the cell boundaries/ media contents from the chart view and data view tabs.

6.2.3 Chart control (zoom, reposition & select cells)



With the cursor placed over **Scale**, the chart scale can be adjusted as follows:



For a full description of the scale button, its features and the 'traffic light' indicator, see section 'Chart Scales and position' in Handbook HBK-4001 Part 1 section 6.

6.2.4 Manual Zoom, selecting cells and reposition

Manual Zoom:

With the cursor placed over the chart presentation area, the following options are available:

Left	Middle	Right
Select	Deselect	Reposition
Selects the chart cell(s) at the cursor position	De-selects the chart cell(s) at the cursor position	Centres the chart on the current cursor position



To **manually zoom** into the chart, place the cursor in the desired position then **press and hold** the **RIGHT button** (reposition).

With the right button pressed, roll the trackerball and a magenta coloured box can be dragged over the required chart area. The cursor shows the GPS extent of the zoom area.

Release the button and the chart will zoom to the selected area.

Left	Middle	Right
Cancel Zoom		End Drag Zoom
Cancels the zoom	No Function	centres the chart on the current cursor position



Single cell boundary selection:

Place the cursor within the required cell and left click, the cell boundary becomes bold indicating that it has been selected.

When a cell boundary is selected, all boundaries that enclose that point will also be selected. For example; if you select a cell boundary for berthing, the other levels (overview, costal etc.) will also be selected.

To select an individual boundary, use the filters to select the layers that are not required.

Single cell boundary de-selection:

Individual cells can be deselected by placing the cursor over the cell and pressing the middle (Deselect) button.

Group selection and de-selection of cell boundaries:

Cells can be individually selected using the left hand (select) and middle (Deselect) buttons:



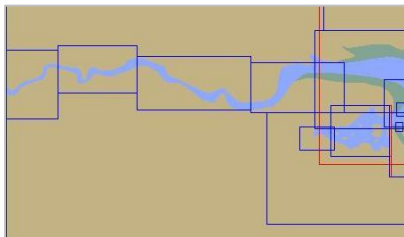
Note: When a cell or group of cells are selected in *chart view* they are also selected in the *data view* tab

Note: this function only works when selecting cells from external media such as CD, DVD or USB flash drives.

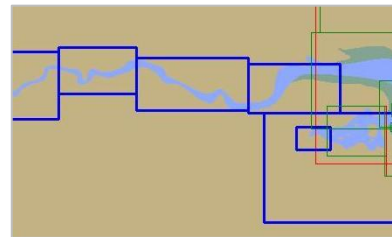
Group Select

With the cursor placed in the chart area, press *and hold* the **LEFT** button and drag the cursor across the required cells. The cursor shows the latitude & longitude coordinates of the zoom area and an orange coloured box can be dragged over the required chart area.

All cells within the orange zoom will be selected; the selected Cells are shown in **BOLD**.



Not selected



Cell boundaries selected

Group deselect

With the cursor placed in the chart area, press *and hold* the **MIDDLE** button and drag the cursor across the required cells. The cursor shows the latitude & longitude coordinates of the zoom area and an orange coloured box can be dragged over the required chart area.

All cells within the orange zoom will be deselected.

Deselect ALL/ Reset Selected

All selected cell boundaries can be *deselected* using the reset selected button.



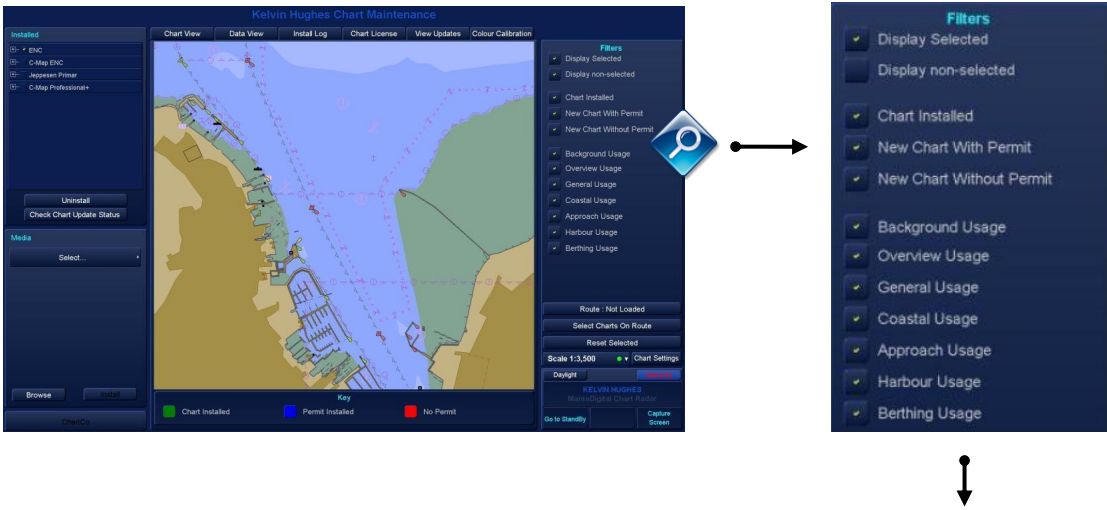
Reposition

Pressing the reposition button centres the chart on the current cursor position.

Chapter 6: Chart maintenance

6.2.5 Filters

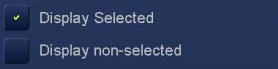
The level of cell boundaries that are viewed in the Chart view and Data View tabs can be set using the filters. When a filter is selected/ de-selected, the view is changed in both Chart and Data view tabs.



Display (Show/ Hide) Selected or Non-Selected cell boundaries.

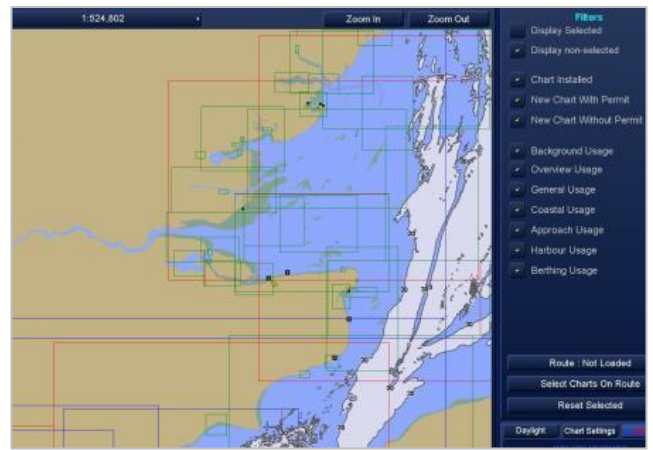


Show selected cell boundaries only

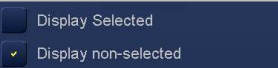


Selected cell boundaries are shown with bold outlines.

Non-Selected cell boundaries are not shown.



Show non-selected cell boundaries only



Non-Selected cell boundaries are shown.

Selected cell boundaries are NOT shown.

Chapter 6: Chart maintenance

Display (Show/ Hide) cell boundaries depending on permit status



Chart installed

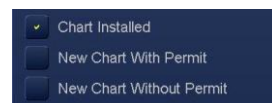


Chart data that is installed on the system is shown.

Cell boundaries are outlined in GREEN.



New chart with permit



Charts from external media that have valid permits are shown.

This includes charts that do not require permits (S57 data).

Cell boundaries are outlined in BLUE.



New chart without permit



Charts from external media that DO NOT HAVE permits are shown.

Cell boundaries are outlined in RED.

Display (Show/ Hide) cell boundaries by usage level



Background, overview, general, coastal and approach filters de-selected.

Usage level



The above filters can be selected or deselected as required.


The cell boundary colour depends on the permit.

If all display levels are deselected, no cell boundaries will be displayed on screen.

6.2.6 Routes in Chart view tab

A route can be loaded in chart maintenance and the cells that the route passes through can be selected.


With the cursor over the Route button, the following options are available:



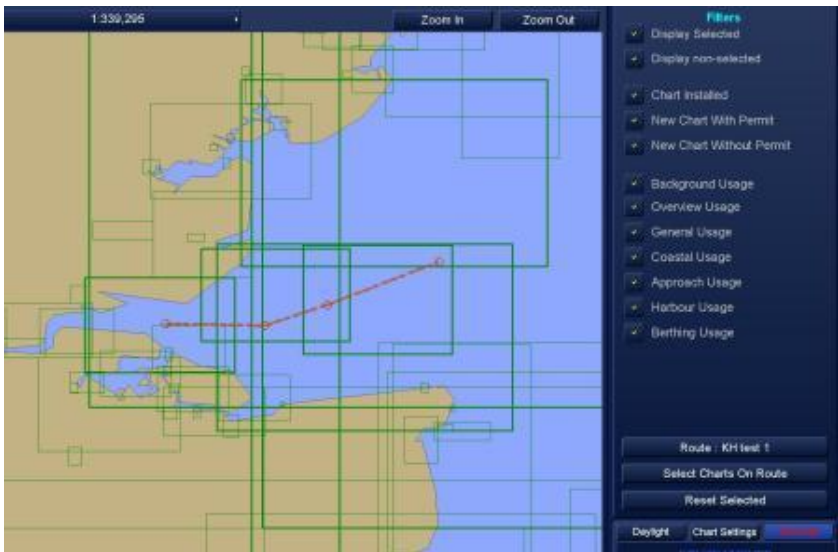
Left	Middle	Right
Select Main Route	Show/ Hide Route	Deselect Route
Select a route (see route management in Handbook HBK-4001 Part 1 section 6.	Show or hide the route (does not deselect the route)	Deselect the loaded route (see route management in Handbook HBK-4001 Part 1 section 6.

Select Charts on Route

With a route loaded, pressing **Select Charts On Route** will select all chart data along the path of the route.



Left	Middle	Right
Select Route Charts		
Loads cells along the route are selected	No Function	No Function

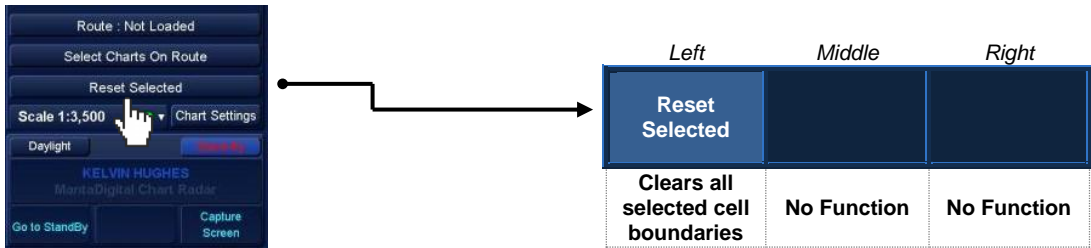


Example of a charts being selected along a loaded route.

The selected charts are shown in **BOLD**

Reset selected

Pressing **Reset Selected** clears all cell boundaries that have been selected.



6.2.7 Brilliance control/ chart settings / StandBy

This section of the display controls the screen colour palette, chart settings alarm messages, screen capture and access to the standby screen.

These functions are common to all navigation modes:



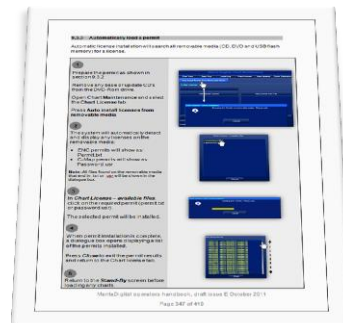
Daylight	Chart settings	Standby
Allows the selection of <i>Daylight, Dusk</i> or <i>Night</i> . The button name changes to reflect the palette selected. Additional details: <i>See chapter 6 of Handbook HBK-4001 Part 2 For addition instructions and warnings.</i>	Configuration of the chart display. Additional details: <i>See chapter 6 of Handbook HBK-4001 Part 2 for details on the General/ Advanced and query tabs available in chart settings.</i>	Exits Chart maintenance and returns the system to the standby screen. Capture Screen Also allows a screen capture to be taken (see fault finding section for additional information)

6.3 How do I...

The following section lists the procedures for loading permits, chart installation and update procedures.

These are described in a 'how do I...?' format.

The sections have been designed so that individual pages can be **printed** and kept with the system as **quick reference guides**.



The following topics are listed in this section:

Section	Procedure.
6.3.1	Locating the chart permit and eToken number
6.3.2	Preparing a license / permit for installation
6.3.3	Automatically loading a permit
6.3.4	Manually loading C-Map permits
6.3.5	Manually loading permits from a file or folder
6.3.6	Viewing and deleting ENC permits
6.3.7	View and install IHO certificate and public key
6.3.8	Re-initialise eToken (see warnings in section)
6.3.9	Installing base data or world chart
6.3.10	Network loading and updating of chart data
6.3.11	Checking the update status of data
6.3.12	Applying updates
6.3.13	Viewing updates
6.3.14	Manual updates – Adding a new feature
6.3.15	Manual updates – Amending an existing feature
6.3.16	Manual updates – Review edit or remove updates
6.3.17	Installation error messages (chart data)

6.3.1 Locate my chart permit and eToken number

1

To locate the systems Chart Permit number or the eToken number, open **Chart Maintenance** and select the **Chart License** tab



2

The **eToken** and **User Permit** numbers are displayed in the ENC licenses section.



6.3.2 Prepare to load a permits or charts

Preparation of permits:

ENC and C-Map licenses will be issued by a chart provider and may have instruction on preparing the licenses for installation.

Observing *all antivirus precautions*, ensure the chart providers instructions are fully followed prior to use.

Where do I insert a CD/ DVDs or USB device containing permits or charts?

USB flash memory

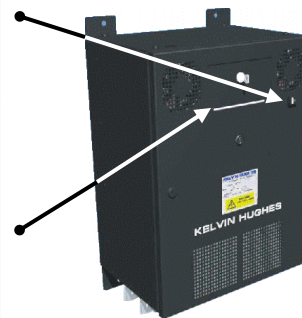
Virus-free memory sticks can be plugged into the socket located on the right hand side of the MANTADigital processor door.



CD's and DVD

Are placed into a DVD-ROM drive located behind the small door on the front of the processor.

The access flap must be *unlocked* and opened to gain access to the CD/ DVD drive



Antivirus warnings and precautions



Prior to use, all removable media used with Kelvin Hughes products MUST be fully scanned for viruses on a PC that has *up to date* anti-virus software installed.

See section 2.6.4 for additional information on virus precautions and warnings.

Other considerations

- For permit installation, it is recommended that no other files are present on the removable media as this can slow down the permit installation.
- Permits must be in the root directory of the drive, i.e. not in a folder on the drive.
- It is strongly recommended that users familiarise themselves with the chart maintenance pages as detailed in sections 6.1 and 6.2

6.3.3 Automatically load a permit

Automatic license installation will search all removable media (CD, DVD and USB flash memory) for ENC/ C-Map permits.

1

Prepare the permit as shown in section 6.3.2

Remove base or update CD's from the DVD-Rom drive.

Open **Chart Maintenance** and select the **Chart License** tab

Press **Auto install licenses from removable media**

2

The system will automatically detect and display any licenses on the removable media:

- ENC permits will show as:
Permit.txt
- C-Map permits will show as:
Password.usr

Note: All files found on the removable media that end in .txt or .usr will be shown in the dialogue box.

3

In **Chart License – available files**, click on the required permit (permit.txt or password.usr).

The selected permit will be installed.

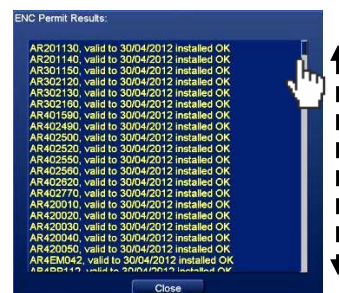
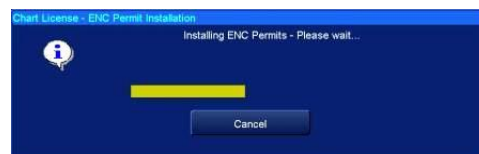
4

When permit installation is complete, a dialogue box opens displaying a list of the permits installed.

Press **Close** to exit the permit results and return to the Chart license tab.

5

Return to the **Stand-By** screen before loading any charts.



6.3.4 Manually loading permits for C-Map zones or areas

For Automatic loading of C-Map permits, see section 6.3.3.

1

To manually load a C-Map licence, open **Chart Maintenance** and select the **Chart License** tab

Place the cursor on the button marked **Select** which is located *below* the **C-Map licenses** text.

A list of installed C-Map databases is displayed.

2

Select the required C-Map database.

3

A list of C-Map zones is now presented.

The expiry date of the current license is also shown.

Select the required Zone and area.

The selected zone will be displayed below the list.

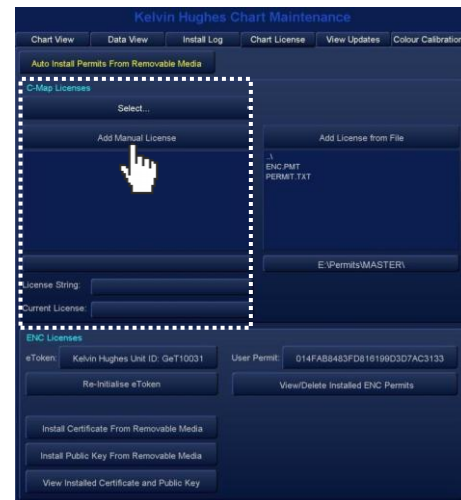
4

Using the keyboard, enter the C-Map licence for the Zone/ Area in the **License String** box and press **Enter**.

Press **Add Manual Licence** to add the licence to the system.

5

The licence is added; return to the **Stand-By** screen before loading any charts.



Errors that may occur during manual entry of C-Map license(s)

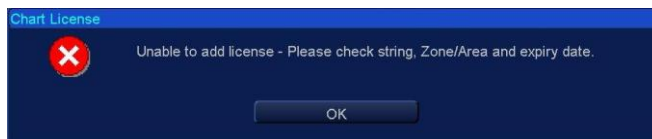
Unable to add license.

The installation has failed due to an error which could be:

- Incorrect Zone/ area selected.
- Incorrect permit entered

Reselect the zone/ area and re-enter the permit.

If this fails please contact you chart supplier and confirm the license is correct.



Please enter a license string

A zone/ area has been selected but a license number has not entered in
License String



Please enter a zone/ area

A zone has not been selected for the permit.

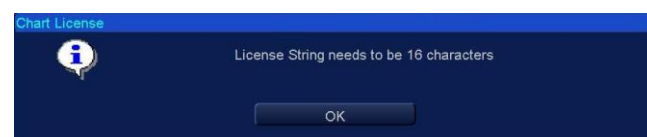
Select the appropriate zone/ area and re-enter the permit.



License string needs to be ...

The permit number has been entered incorrectly. Recheck the zone/ area and re-enter the number.

If this fails please contact you chart supplier and confirm the license is correct.



6.3.5 Manually load a permit from file

For Automatic loading of permits see section 6.3.3.

1

C-Map and **ENC** permits can be manually installed as follows:

Prepare the permit as shown in section 6.3.2

Open **Chart Maintenance** and select the **Chart License** tab

2

CD/DVD's or USB flash memory can be explored using the display window below the **Add license from file** button.

In a normal system the drives are allocated as follows:

A: Floppy drive (where fitted)

C: Main hard drive

D: CD/ DVD-Rom

E: Normally the USB flash drive

If you are not in the correct drive, click on the **..** symbol to go up a level.

3

Using the display window, locate and select the required permit(s).

- **ENC** permits will show as: **Permit.txt**
- **C-Map** permits will show as: **Password.usr**

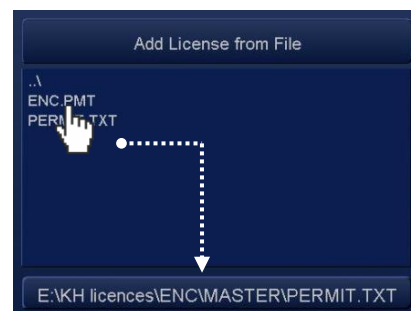
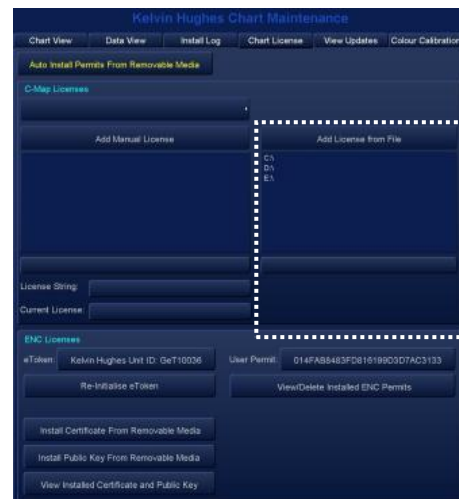
When a permit is selected it is shown below the display window.

4

Press **Add license from file** and the selected permit will be installed.

5

Return to the **Stand-By** screen before loading any charts.



6.3.6 View and delete ENC permits

1

In **Chart Maintenance**, select the **Chart License** tab

2

Select the **View/Delete Installed ENC Permits** button.

3

Select the **Data Server ID** required.
GB = UKHO
PR = Primar
AU = Australian/ Seafarer
Etc.

4

All installed cells and their individual expiry date can be viewed

Select All: Selects all installed permits. Selected cells are highlighted in light blue.

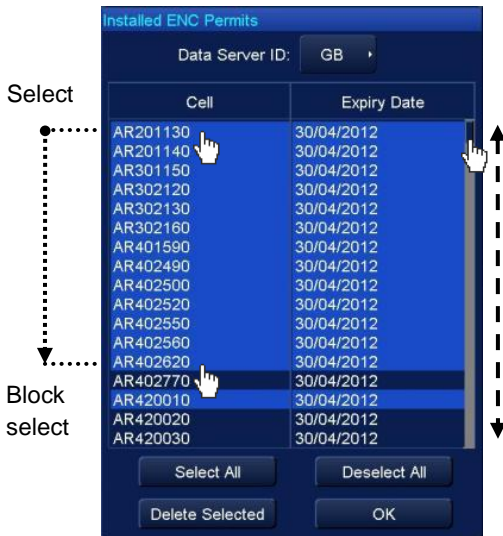
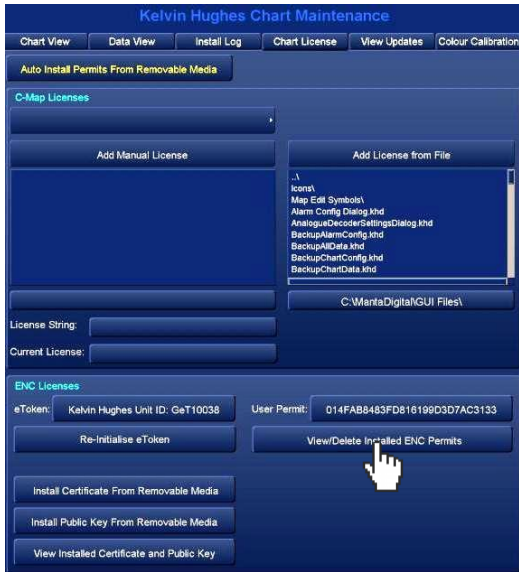
Deselect All: Deselects the user selection.

Delete selected: Permanently deletes the selected permits.

Select/ De-select: Use the left button to select or de-select an individual permit.

Block Select/ De-select: When a single permit has been selected, right clicking on a permit will select all permits between the first selection and the current selection.

If permits have been deleted, return to the standby screen prior to carry out any further chart maintenance activities.



Selecting cells or groups of cells

Left	Middle	Right
Select/ Deselect		Block select/ deselect
Selects an individual item	No Function	Selects a block of items

6.3.7 View or install IHO Certificates and/ or public keys

The IHO S63 data encryption scheme provides licensing for vector charts. The scheme requires the installation of a public key from the scheme administrator (IHO) and a certificate file.

MANTADigital systems are supplied with the IHO certificate and Public key pre-installed so it should *not be necessary* to re-install the certificate or key.

The certificate and public key can be viewed and, in the event of accidental deletion or overwriting, re-installed.

Copies of the current IHO certificate and public key can be obtained from your chart provider or downloaded from the IHO website at www.iho.shom.fr

Note: Kelvin Hughes is not responsible for the content of external web sites.

View the IHO certificate

1

Open **Chart Maintenance** and select the **Chart License** tab

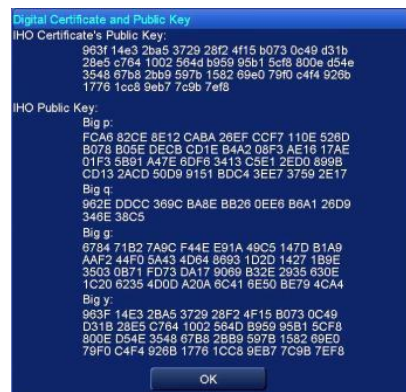
2

Select the **View Installed Certificate and Public Key** button

3

The Digital Certificate and Public key data is displayed.

The Public Key data must correspond exactly with the 'Big y' data that can be viewed on the original certificate.



To re-install the IHO Certificate and Public Key

1

Open **Chart Maintenance** and select the **Chart License** tab

2

Obtain a copy of the IHO certificates; the files required are:

IHO.CRT (IHO certificate)

IHO.PUB (Public key)

Copy the certificates to a virus free USB flash memory stick and insert this into the system.

IMPORTANT: Remove all CD's or DVD's from the DVD-Rom drive.

3

Select the ***Install certificate from removable media*** button

The system will browse for the IHO.CRT file

Click on the ***IHO.CRT*** file and the system will install the certificate.

A notification will appear when the installation is complete.

4

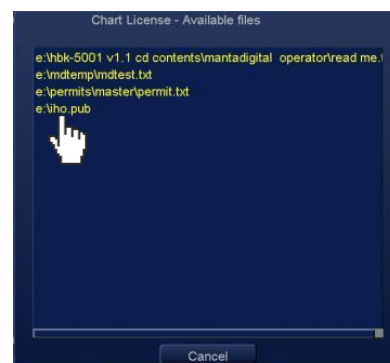
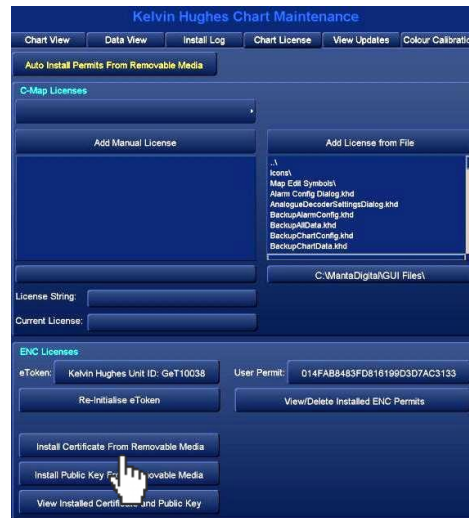
Select the ***Install Public Key from removable media*** button

The system will browse for the IHO.PUB file

Click on the ***IHO.PUB*** file and the system will install the certificate.

A notification will appear when the installation is complete.

After the certificates have been installed, return to the ***Stand-By*** screen *before loading any charts*.



6.3.8 Re initialise eToken

The **re-initialise eToken** function must only be used in the following circumstances:

- An official replacement eToken has been provided by Kelvin Hughes or a Kelvin Hughes authorised agent.
- The eToken has accidentally been swapped with a grouped eToken from another processor on the bridge.

Unless specifically advised by Kelvin Hughes Ltd, there are no other circumstances where the re-initialise eToken button should be used.



Caution: Re-initialising the eToken deletes all permits. If the eToken is re-initialised, all chart permits will have to be reinstalled.

1

Open **Chart Maintenance** and select the **Chart License** tab

2

Ensure the correct eToken is inserted into the processor.

3

Press the **Re-initialise eToken** button

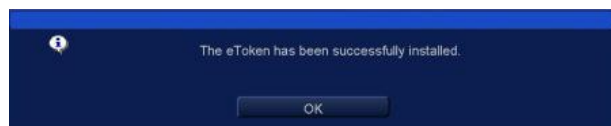
4

The system will prompt with the warning that permits *will be lost* if the eToken is re-initialised.

5

A notification will appear when the initialisation is complete.

ALL chart permits must now be reinstalled.



6.3.9 Install the contents of a Base CD

1

Open **Chart Maintenance**.

Ensure the relevant permits are installed.

Insert the media to be loaded and press **Browse**.

Select the C-Map database or ENC exchange set to be loaded.

2

Select the **Data View** tab.

Press the **Select ALL** button in the **Media** column

In filters, de-select **New Chart Without Permit**. This stops the system trying to install cells that do not have permits.

All cells on the media that have a valid permit are selected and are ready to be installed. The chart data can be viewed in the **Chart View** tab.

3

Press **Install**.

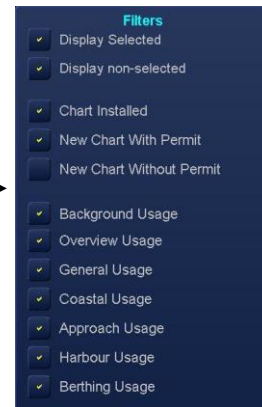
Installation time:

When Install is selected, the system will prompt with the approximate installation time.

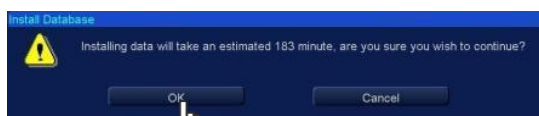
WARNING: The chart installation time varies depending on the amount of data being installed and the permit coverage.

Installation of base data or update CDs that have full permits can take a number of hours. During installation the system cannot be used for navigational purposes.

Press **OK** to commence the installation of all cells.



Media Column

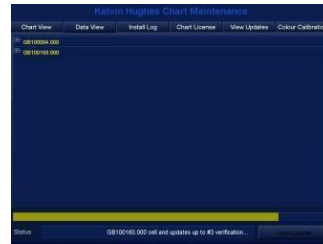


ENC base and C-Map world data CD's (continued)

4

The **Install Log** tab is automatically selected and a progress bar shown. A list of cells is displayed as they are installed.

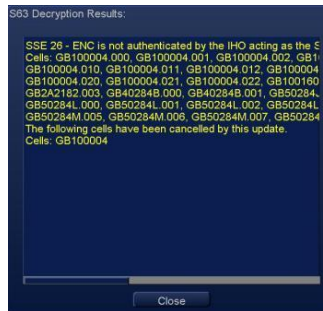
The **Status** box at the bottom of tab shows the current activity.



5

When the installation is complete, a pop-up box shows any issues that may have occurred during the installation.

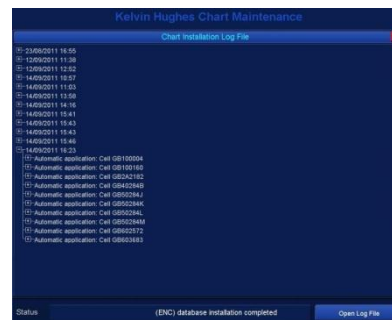
In the **Status** box, the system will show **Database Installation Complete**.



6

The results of all current and previous installations can be viewed by pressing the **Open Log File** button.

A list of installation dates is displayed which can be expanded and collapsed using the **+/-** symbol to see what data was installed and any problems encountered.



7

On completion of the installation, remove the media and return to the **Standby** screen.

Updates

Updates contained on base CD's/ media are automatically installed.

STOP the installation

Chart installation should not be stopped or interrupted. In an emergency, returning to the **Standby** screen will stop the installation. This is only applicable to CD/ USB installation, see Networking regarding the stopping of a networked update.



Warning: Returning to the Standby stops the installation and NO cells are installed. CMap databases may be permanently deleted and will need complete reinstallation.

6.3.10 Network loading and updating of chart data

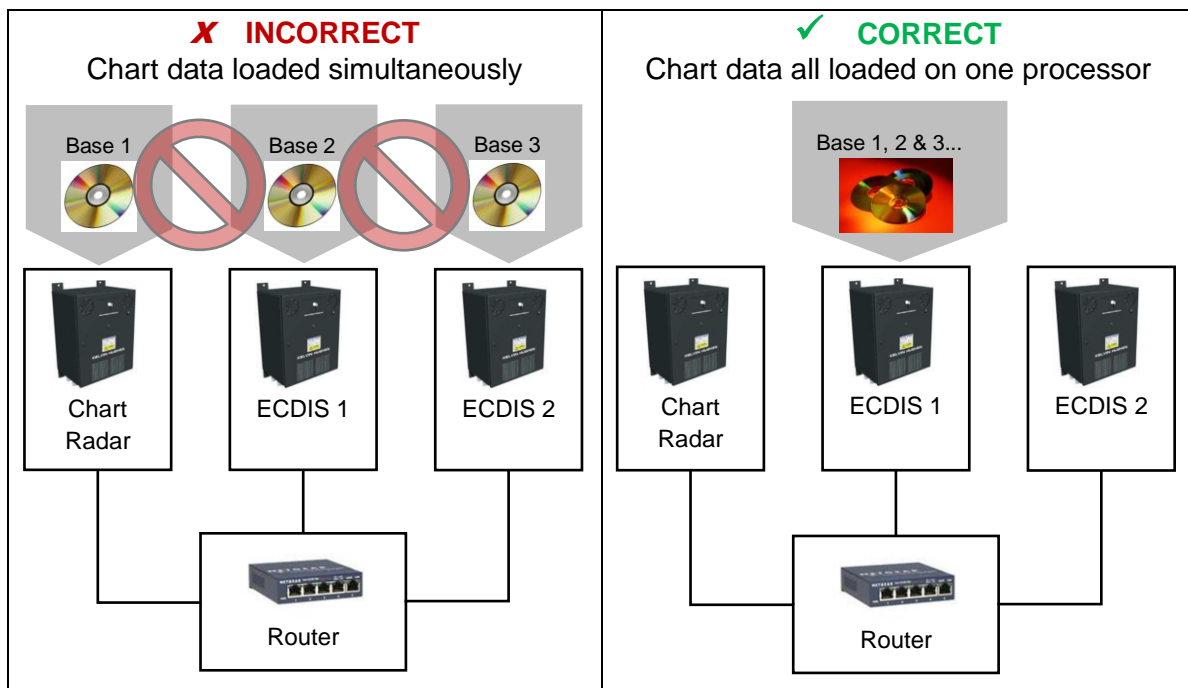
For general information on networking, see the networking section of chapter 6 of handbook HBK-4001 part 1

Chart base data and update data can be loaded onto any *individual* MANTADigital processor connected to a networked system that has Chart Maintenance enabled as an optional feature.

Chart data must never be simultaneously loaded from a number of processors at the same time, i.e. chart base disks must NOT be placed in every processor and data loaded at the same time (see below).



Note: This applies to data provided on CD/ DVD or being transferred to the system via a virus free USB memory device.



Whilst loading chart data or updates into a single processor, the other processors connected to the network can be used as normal.

Once all the required data/ updates have been loaded onto a single processor, the system can be prepared to share the information across the network.

The following shows the procedure for sharing new chart data or chart updates on a networked system:

1

Using chart maintenance, load chart data or chart updates onto a *single processor* as described in previous sections of this chapter

2

When the required data is loaded, place ALL systems connected to the network into the Standby screen.
This is essential for successful networking of data.

3

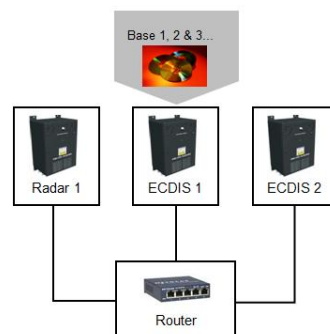
ALL processors must be left in the Standby screen until a *Network Synchronisation* notification is displayed showing 'Chart Data Updated – Do you wish to update charts?'

When the 'Chart Data Updated' warning is displayed, press **YES** to commence the update of chart data.

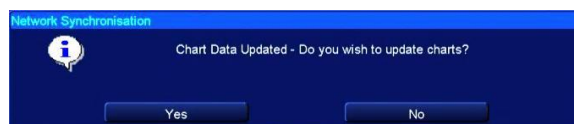
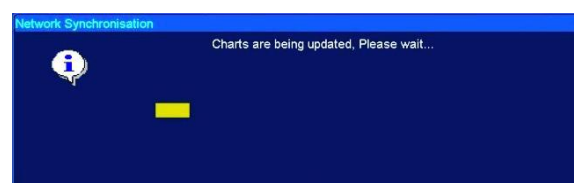
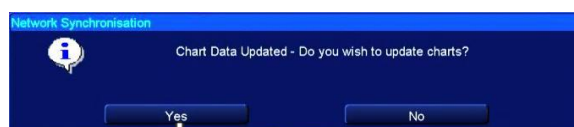
A progress bar will be displayed indication the status of the update.

If **NO** is selected, the update is not commenced. The system can be used normally but chart data *is not updated*.

The 'Chart Data Updated' warning will continue to appear at regular intervals to remind the user that updates are available.



Note: Depending on the amount of data loaded, it can take up to 30 minutes for the *Network Synchronisation* notification to appear in the standby screen.



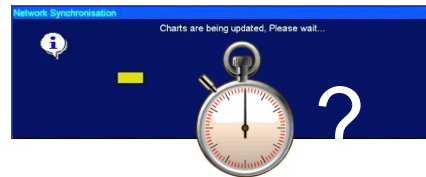
4

How long will an update take?

It is not possible to specify the time an update will take as this is determined by the amount of data that has been loaded onto a system.

As a guideline, *after* a base CD has been loaded, it should take approximately one hour to network the data to the other processors.

This time is measured from the point when the '*Chart Data Updated*' notification has been displayed and accepted on a processor.



Caution: During network updates, the system cannot be used for navigation purposes.

5

Network synchronisation complete.

The network synchronisation of data is complete when the progress bar reaches 100%.

When updated, all processors attached to the network should display the same time and date in the *Latest Sync Status (UTC)* section of the *Display Network Status* box in the standby screen.



6

Can I cancel an update?

NO. Networked updates cannot and should not be cancelled. If a system is urgently required for navigation, it must be shut down and restarted.

It must be noted that on restart the charts will not be updated and there is a *very high possibility* that cells will have become corrupted due to the forced shutdown.

Corrupted data would need to be re-loaded from the source data.



Warning: A Forced shutdown of a system during a networked update is not recommended and may corrupt chart data.

6.3.11 Check the update status of charts

The status of installed charts can be checked using the **Check Chart Update Status** button.

1

Open **Chart Maintenance**.

Press the **Check Chart Update Status** button.

Note: It is **NOT** necessary to select a chart database prior to pressing the Check Chart Update Status button.

2

If the system has not been checked before or a new database has been installed, the following warning will be displayed:

“Products list is not available. Please browse the latest media”.

Where this warning appears, place the latest chart media (base or update) into the system and press **Browse**. Browsing the media will automatically install the required file.

3

In systems where a **products list** has been loaded, the system will display the following:

The chart data will be checked to xxx
If newer media is available please insert and browse before checking.

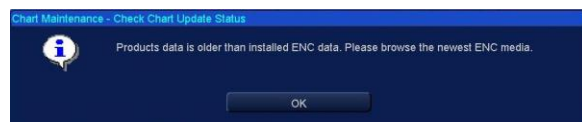
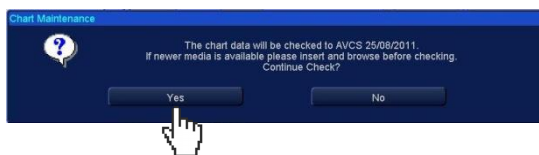
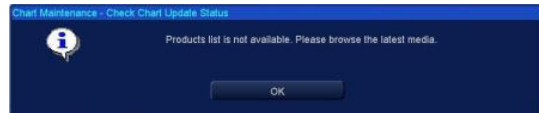
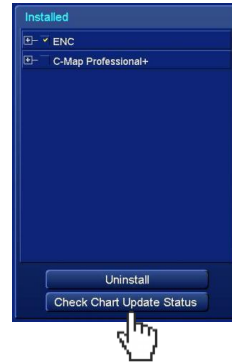
(xxx is the last update applied e.g. AVCS 25/08/2011).

To check the chart status press **Yes**
 To cancel the operation press **No**

Note: If chart media inserted into the system and is older than the last update, the system will warn that:

Products Data is older than the installed ENC data. Please browse the newest ENC media.

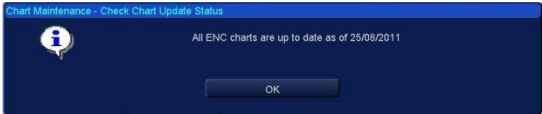
To correct this, insert and **Browse** the latest media.



4

If all installed cells are up to date, the system will display the following:

All charts are up to date at DD/MM/YYYY
(Where the date shown is the date of the last update).



All installed cells up to date

5

If any cells are **not up to date**, the system shows a list of cells that need updating.

The list shows:

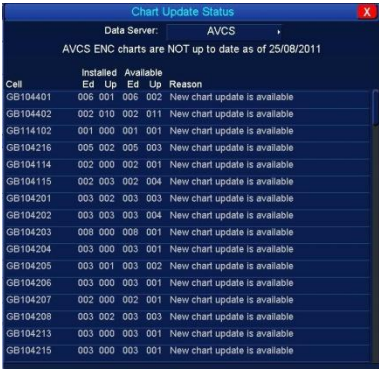
Data Server: Allows the selection of other databases that may be loaded.

Cell: The cell number

Installed: The edition and update number of the installed cell.

Available: The edition and update number of the available update.

Reason: A brief description of the required action (chart needs updating etc.)



Cell	Installed Ed	Up	Available Ed	Up	Reason
GB104401	005	001	005	002	New chart update is available
GB104402	002	010	002	011	New chart update is available
GB114102	001	000	001	001	New chart update is available
GB104216	005	002	005	003	New chart update is available
GB104114	002	000	002	001	New chart update is available
GB104115	002	003	002	004	New chart update is available
GB104201	003	002	003	003	New chart update is available
GB104202	003	003	003	004	New chart update is available
GB104203	008	000	008	001	New chart update is available
GB104204	003	000	003	001	New chart update is available
GB104205	003	001	003	002	New chart update is available
GB104206	003	000	003	001	New chart update is available
GB104207	002	000	002	001	New chart update is available
GB104208	003	002	003	003	New chart update is available
GB104213	003	000	003	001	New chart update is available
GB104215	003	000	003	001	New chart update is available

See the following section on how to update chart data.

6.3.12 Apply updates

Chart updates are installed as follows:



Warning: For successful updating of chart data, the update media must be **INSTALLED** and then **UPDATED** as shown below.

Failure to install the update media prior to updating will cause problems with subsequent updates.

1

Open **Chart Maintenance** and insert the relevant **update media**.

2

Install the update media using the instructions found in section 6.3.9 (How to install the contents of a base CD).

It is essential the media is installed BEFORE using the selecting the updates button.

3

When the data from the update media has been installed, press **Browse** again and **reselect** the C-Map database or ENC exchange set to be loaded.

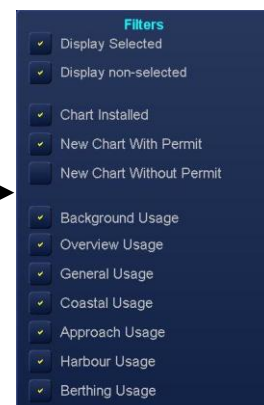
4

Select the **Data View** tab.

Press the **Select Updates** button in the **Media** column

De-select **New Chart Without Permit** which prevents the system trying to install cells without permits.

All data on the update media that has a valid permit is selected.

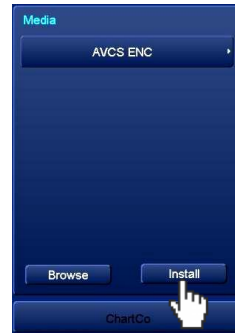


Apply updates (continued)

5

Press **Install**.

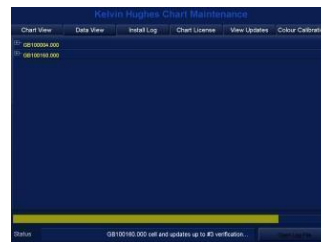
The system will prompt with the approximate installation time.



6

During installation of updates, the **Install Log** tab is automatically selected showing a progress bar. A list of cells is shown as they are updated.

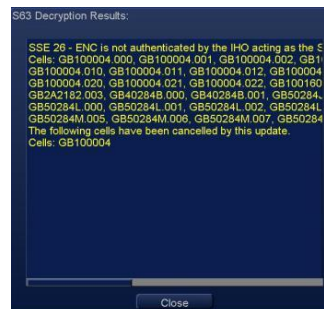
The **Status** box at the bottom of the tab shows the current activity.



7

When the update is complete, a pop-up box shows any issues that may have occurred during the update.

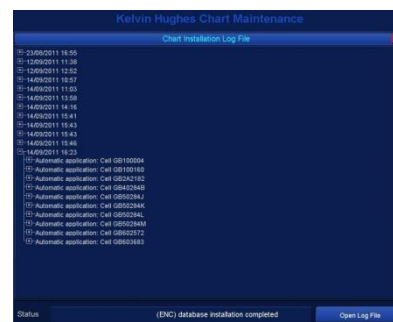
In the **Status** box, the system will show **Database Installation Complete**.



8

The results of all current and previous installations can be viewed by pressing the **Open Log File** button.

A list of installation dates is displayed and can be expanded/ collapsed using the +/- symbol to see what data was installed and any problems encountered.



9



Repeat the above process for ALL UPDATE data supplied by the chart provider.

6.3.13 View updates

1

Open **Chart Maintenance** and select the **View Update** tab.

At the bottom of the screen, select the **Review Official Updates** tab.

Caution: In the filters, ensure that **Charts installed** is selected.

If this is not selected, the Cells drop down list will be empty.

2

Use the **Agency** button to select the region for the required chart update.

3

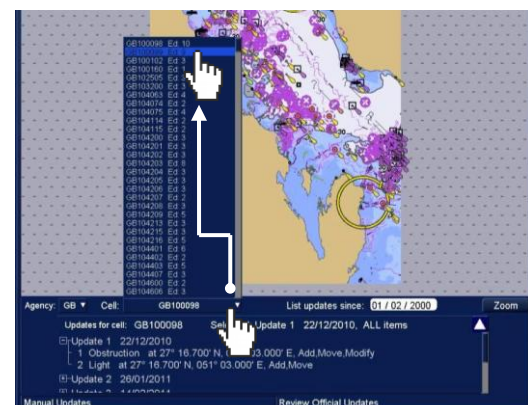
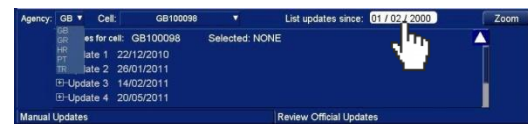
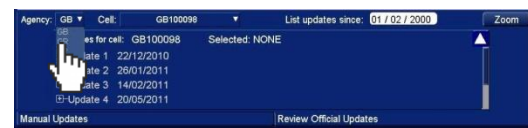
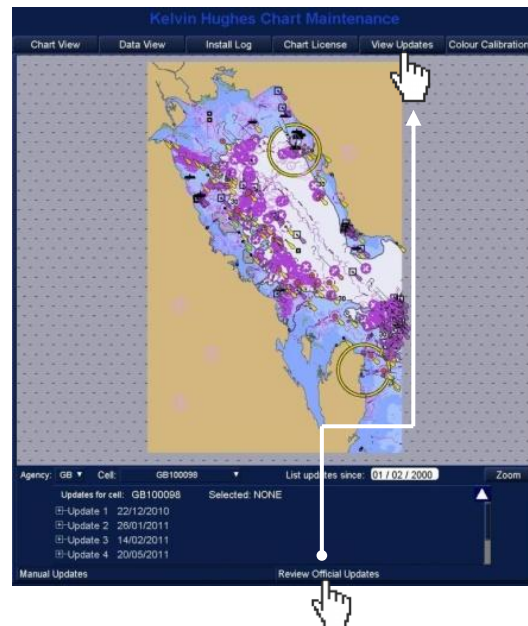
List Updates Since is used to filter the updates by date. To adjust the date, place the cursor over the day, month or year and use the trackerball to scroll up/ down to adjust to the desired date.

Note: Whilst the system is switched ON, the above date is retained in memory. The date should be checked each time view updates is used.

4

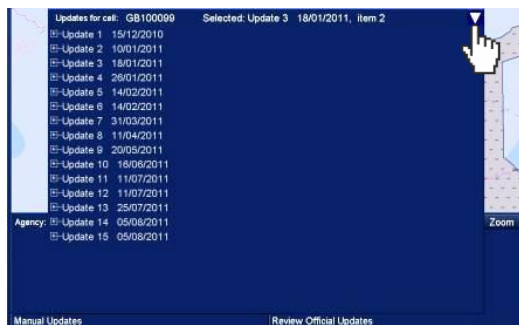
Using the **Cell** button select the cell to be viewed.

The selected cell is displayed with a list of updates filtered by the date set in **List Updates Since**.

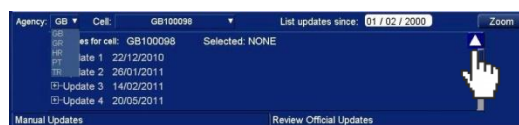


5

When a cell has been selected, the box containing updates can be expanded or contracted



Minimise screen



Maximise screen

6

The selected cell scale can be changed by placing the cursor over the **Zoom** button, the zoom options shown to the right are available.

The chart scale can also be expanded using the drag-zoom facility.

Left	Middle	Right
Zoom IN	Overview	Zoom OUT
Zooms into the selected cell	Shows the selected cell	Zoom out from the selected cell

7

Select an update and the update is shown on the corresponding cell. The area of the update is outlined with a flashing orange pentagon.

The information on each update can be expanded/ contracted using the **+/-** symbol.



8

The level of detail shown on a cell can be configured using the **Chart Settings** button

See handbook HBK-4001 chapter 6 for details on the General/ Advanced and query tabs available in chart settings.



6.3.14 Manual updates – Adding a new feature

1

Open **Chart Maintenance** and select the **View Update** tab.

At the bottom of the screen, select the **Manual Updates** tab.

Ensure the following filters are **SELECTED** (ticked)

- **Chart Installed**
 - **New Chart Without Permit**
- (If these are not selected, updates may not be displayed).

2

Use the **Agency** button to select the region for the required chart update.

3

Using the **Cell** button select the required cell.

The selected cell is displayed outlined in green.

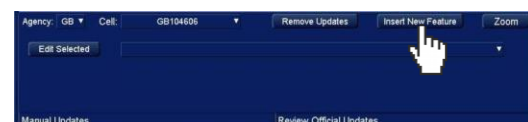
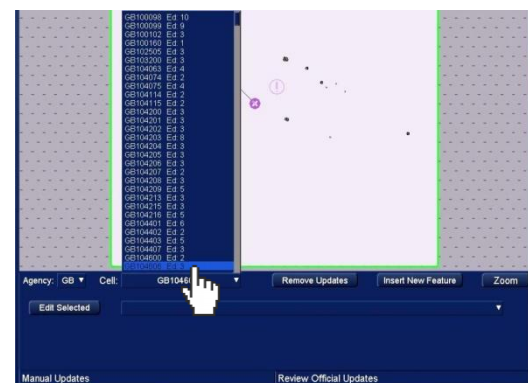
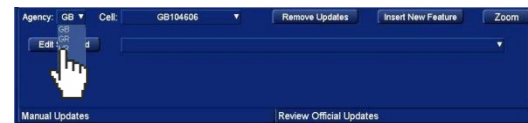
When the cursor is on the chart area it shows the Lat and Lon position and a text label **MU** indicating that *Manual Update* has been selected.

4

To add a new update:

Select **Insert New Feature** and the Select Feature to Insert box will open.

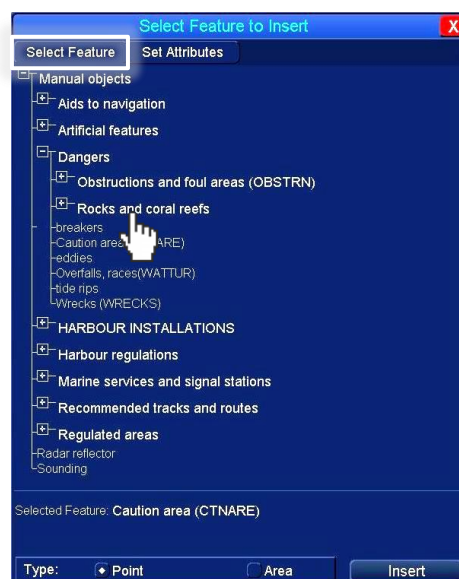
See later in this section for editing/deleting an existing chart feature or update.



5

Use the **Select Feature to Insert** box to select the manual update type required.

In the following example **Dangers / Breakers** has been selected



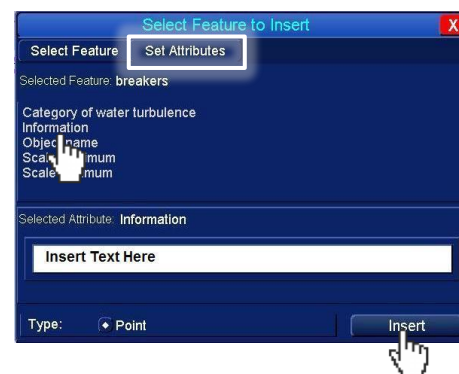
6

When a feature has been selected, the **Set Attributes** tab automatically opens.

Depending on the feature selected, each attribute can be modified to reflect the data required for the manual update.

As an example, when **Category of water turbulence** is selected, a drop down list is available where **breakers** can be selected.

Additionally in this example, when **Information** is selected a text can be entered to reflect the data required for the manual update.



7

When all data for the update has been entered, press **Insert** and use the cursor to place the update at the required position on the chart.

8

For single object such as aids to navigation, a single click will drop the update at the required cursor position (the position can be 'fine-tuned' later in the process).

For objects that have to be drawn, a left click is used to place/ draw the object and a middle or right click is used to end the edit.

9

When an object is placed on screen, it is also shown in a drop down list in the manual updates tab.

The dropdown list can be used to select, open and edit each item.

10

When an object is selected from the drop down list, the **Select Object to Edit/ Delete** box opens.

EDIT:

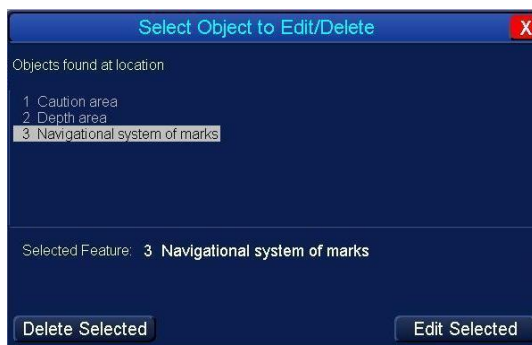
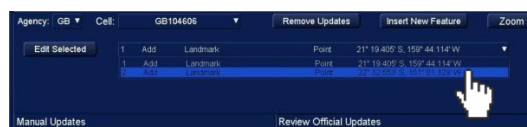
Select the feature to be edited and press **Edit Selected**. A new box appears called **Set Attribute to Edit**.

Delete:

Select the feature to be deleted and press **Delete Selected**. The selected feature is deleted from the chart database.

Using the **Set Attribute to Edit** box, the position of the selected feature can be adjusted.

To adjust the position place the cursor over the Latitude or Longitude position and use the trackerball to scroll up/ down to adjust to the desired value.



6.3.15 Manual updates – Amending an existing feature

1

Open **Chart Maintenance** and select the **View Update** tab.

At the bottom of the screen, select the **Manual Updates** tab.

Ensure the following filters are **SELECTED** (ticked)

- **Chart Installed**
- **New Chart Without Permit**

(If these are not selected, updates may not be displayed).

2

Use the **Agency** button to select the region for the required chart update.

3

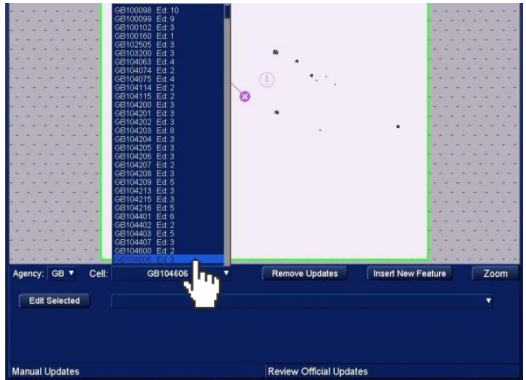
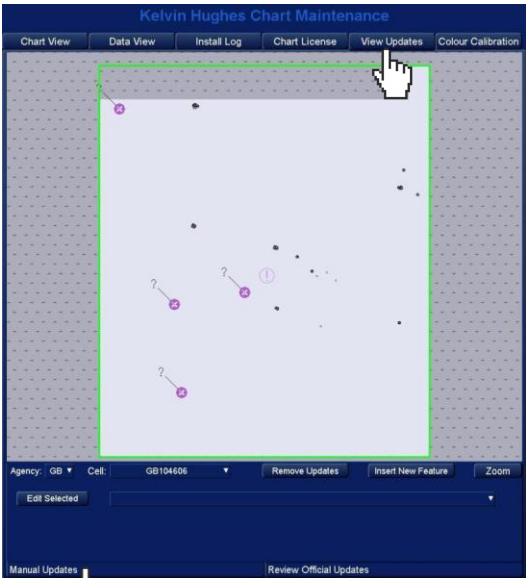
Using the **Cell** button select the required cell.

The selected cell is displayed outlined in green.

When the cursor is on the chart area it shows the Latitude and Longitude position and a text label **MU** indicating that *Manual Update* has been selected.

4

To amend an existing feature:
Place the cursor over the feature of interest and left click (Select Feature)



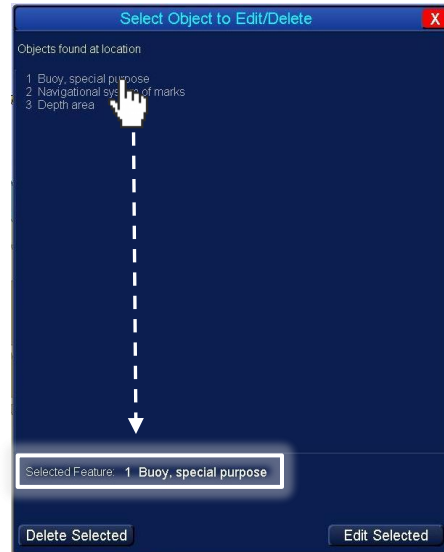
Left	Middle	Right
Select Feature		Reposition
Selects the chart feature at the current cursor position for editing	No Function	Centres the chart on the current cursor position

5

The details on the selected feature are now displayed and can be selected for editing.

Select the required object and press:

- **'X':** Closes the edit function without making any changes.
- **Delete Selected:** Deletes the selected item from the chart.
- **Edit Selected:** Opens the 'Select Attribute to Edit' function for the selected object.



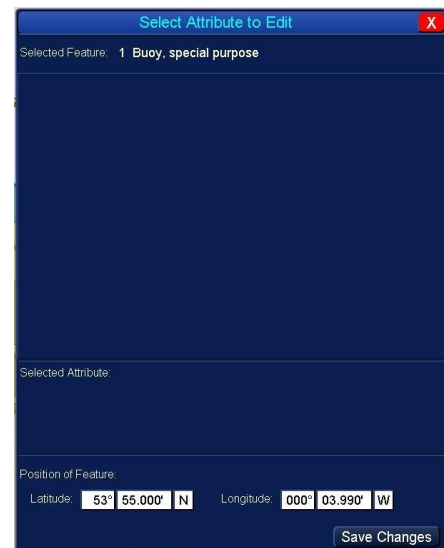
6

When **Edit Selected** is pressed, **Select Attribute to Edit** is opened.

Here the selected object name, position and object details can be edited.

Any numeric values are adjusted by placing the cursor over the numeric value, press and hold the left button and use the trackerball to adjust to the required value.

- **'X':** Closes the **Set Attribute to Edit** function without making any changes.
- **Save Changes:** Saves all amendments and closes **Set attribute to Edit**.



7

Chart features that have been deleted, amended or added are marked as shown:



Deleted
(Orange line through feature)



Added or amended
(orange line below feature)

6.3.16 Manual updates – Review, edit or remove updates

1

Open **Chart Maintenance** and select the **View Update** tab.

At the bottom of the screen, select the **Manual Updates** tab.

Ensure the following filters are **SELECTED** (ticked)

- **Chart Installed**
- **New Chart Without Permit**
(If these are not selected, updates may not be displayed).

2

Use the **Agency** button to select the region for the required chart update.

3

Using the **Cell** button select the required cell.

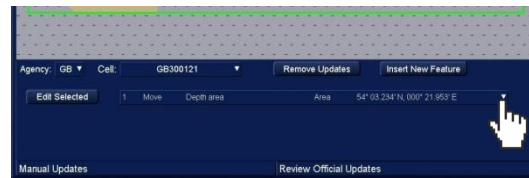
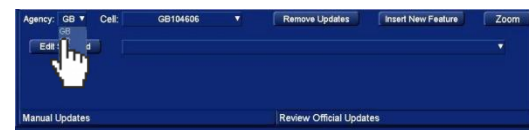
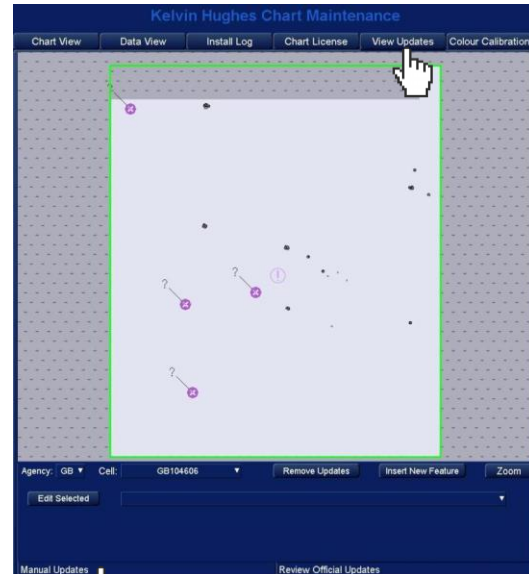
A drop down list of all updates for the cell is displayed.

Each update can be selected and edited by pressing the **Edit Selected** button. This opens the Select Object to Edit/ Delete box described in the previous manual update sections.

4

To remove a specific update or ALL updates:

Place the cursor over the Remove updates button



5

With the cursor over the Remove Updates button the options shown are available:

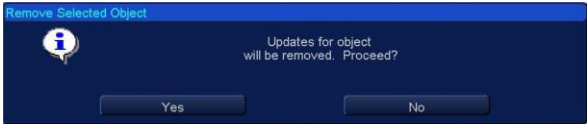
Left	Middle	Right
Remove Update		Clear ALL Updates
Removes the selected update	No Function	Clears all manually entered updates

6

When an update has been selected and **Remove Update** is pressed the following warning is presented:

Yes: The selected object update is removed.

No: The action is cancelled.



7

When Clear ALL updates is pressed, the following warning is presented:

Yes: All manual updates are removed.

No: The action is cancelled.



6.3.17 Installation error messages

The following table explains the various 'SSE' error messages that may occur during chart installation. The table is sorted by the 'SSE' number that appears as part of any error message.

Definitions:

SA	Scheme administrator
SA Digital Certificate (Digital Certificates)	SA Certificates are digital files issued by a certification authority. They bind a specific public key together with other information to an individual or organisation. Certificates help prevent someone from using a fake public key to impersonate someone else. The scheme uses a chain of certificates, each one certifying the previous one until all parties are confident as to the identities in question. The SA certificate used by the IHO will be a self-signed certificate and is the root certificate for the scheme. A copy of the SA certificate is available from your chart provider or from the IHO website
SA Public key	The IHO S63 data encryption scheme provides licensing for vector charts. The scheme requires the installation of a public key from the scheme administrator (IHO) and a certificate file. A copy of the public key is available from your chart provider or from the IHO website

Alarm messages

Number	Error Message	Explanation
SSE 05	SSE 05 - SA Digital Certificate (X509) file is not available. A valid certificate can be obtained from the IHO website or your data supplier	The Scheme administrator certificate is not installed. See section xxx in Chart maintenance for instructions on obtaining and installing the certificate.
SSE-05A	SSE 05SA - Public Key installation failed. Please check whether the public key file is there. A valid file can be obtained from the IHO website or your data supplier	The installation of the Scheme administrator certificate has failed, this could be because the certificate has expired or is corrupted. See section xxx in Chart maintenance for instructions on obtaining and installing the certificate.
SSE 06	SSE 06 - The SA Signed Data Server Certificate is invalid. The SA may have issued a new public key or the ENC may originate from another service. A new SA public key (certificate) can be obtained from the IHO website or your data supplier.	The Public Key is invalid. See section xxx in Chart maintenance for instructions on obtaining and installing a new public Key.
SSE 08	SSE 08 - SA Digital Certificate (X509) file incorrect format. A valid certificate can be obtained from the IHO website or your data supplier	The Scheme administrator certificate is in the wrong format. See section xxx in Chart maintenance for instructions on obtaining and installing the certificate.
SSE 08	SSE 08 SA public Key file incorrect format. A valid file can be obtained from the IHO website or your data supplier	The Scheme administrator certificate is incorrect. This can be caused by accidentally installing a SA certificate from a Chart Installation CD. See section xxx of Chart maintenance for instructions on obtaining and installing the correct certificate.

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Number	Error Message	Explanation
SSE 08	SSE 08 SA Digital Certificate (X509) and Public key are different. A valid certificate and public key can be obtained from the IHO website or your data supplier.	The Scheme administrator certificate and the Public Key are do not match. This can be caused by installing accidentally a SA certificate or Public Key from a Chart Installation CD. See section 6.3.7 of Chart maintenance for instructions on obtaining and installing the certificate.
SSE 09	SSE 09 - ENC Signature is invalid.	The SA digital certificate, public key or permit does not match the data being installed. This could be an error wit the SA digital certificate and. Or public key or the permit is for a differet supplier of data. Please contact your chart provider and obtain the correct permit(s).
SSE 10	SSE 10 - Permits not available for this data provider.	The installed permits are not valid for the dataset being installed. Please contact your chart provider and obtain the correct permit(s).
SSE 11	SSE 11 - Cell Permit not found. Load the permit file provided by the data supplier.	A permit for the cell(s) being installed cannot be found. Please re-install the permit(s) or contact your chart provider to obtain the necessary cell permit.
SSE 12	SSE 12 - Cell permit format is incorrect	The permit for the cell(s) being installed is incorrect. Please re-install the permit(s) or contact your chart provider to obtain the correct cell permit.
SSE13	SSE 13 - Cell Permit is invalid (checksum is incorrect)	There is an error in the permit. Please re-install the permit(s) or contact your chart provider to obtain a new copy of the permit(s).
SSE13a	SSE 13a - Cell Permit is not from this data provider (checksum is incorrect)	The installed permit is for another chart providers data. Please contact your chart provider and obtain the correct permit(s).
SSE 15	SSE 15 - Subscription service has expired. Please contact your data supplier to renew the subscription licence.	The licence period for permit has expired. The licence will need to be renewed with your chart provider.
SSE 16	SSE 16 - CRC is incorrect. Contact your data supplier as ENC(s) may be corrupt or missing data.	There is a problem with the data being installed. This could be because of a corrupt, faulty or dirty disk. contact your chart provider to obtain a new copy of the data.
SSE 20	SSE 20 - Subscription service will expire in less than 30 days. Please contact your data supplier to renew the subscription licence.	The listed permits will expire in less than 30 days. The permits noted will need to be renewed with your chart provider.
SSE 21	SSE 21 - Decryption failed, no valid cell permit found. Permits may be for another system or new permits may be required, Please contact your data supplier to obtain a new licence.	Data is being installed but no valid permit can be found. This may be because the wrong permits have been loaded or existing permits may have expired. Load the correct permits or renew the existing ones with your chart provider.

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Number	Error Message	Explanation
SSE 22	SSE 22 - SA Digital Certificate file has expired. A new SA Public Key (certificate) can be obtained from the IHO website or your data supplier.	The Scheme administrator certificate has expired. See section 6.3.7 in Chart maintenance for instructions on obtaining and installing a new certificate.
SSE 23	SSE 23 - Non sequential update, previous update(s) missing. Try reloading from the base media. If the problem persists contact your data supplier.	A previous update has not been installed or has been installed incorrectly. If update data has not been installed AND updated, this warning will appear. Data will have to be reloaded from the base disk.
SSE 25	SSE 25 - The ENC permit for this cell has expired. This cell may be out of date and MUST NOT be used for NAVIGATION.	The permit for the cell has expired and updates may not have been applied. The cell may be out of date and must not be used for navigation. Please contact your chart provider and re-new the permit. When installed the chart database must be updated.
SSE 26	SSE 26 - This ENC is not authenticated by the IHO acting as the Scheme Administrator	ECDIS systems type approved to the latest IMO ECDIS Performance Standards (Jan 2009), will report this warning when installing non IHO certified data.

7 Optional Features

Optional features:

Optional features allows additional modes and functionality to be enabled or disabled.

Additional modes can be applied for, purchased and enabled by email or phone. Expired optional features can also be renewed.

eToken:

Optional features are *directly linked* to the system eToken. If the eToken is removed, all optional features are disabled and the Optional Features menu cannot be accessed until the eToken is replaced in the system.

The system will present the warning '*eToken Dongle not detected; Optional features not available*', the Optional features box in the standby screen will show '*eToken not detected*'.

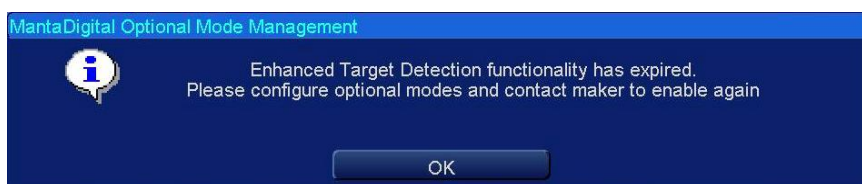


Example of a standby screen with NO eToken is fitted

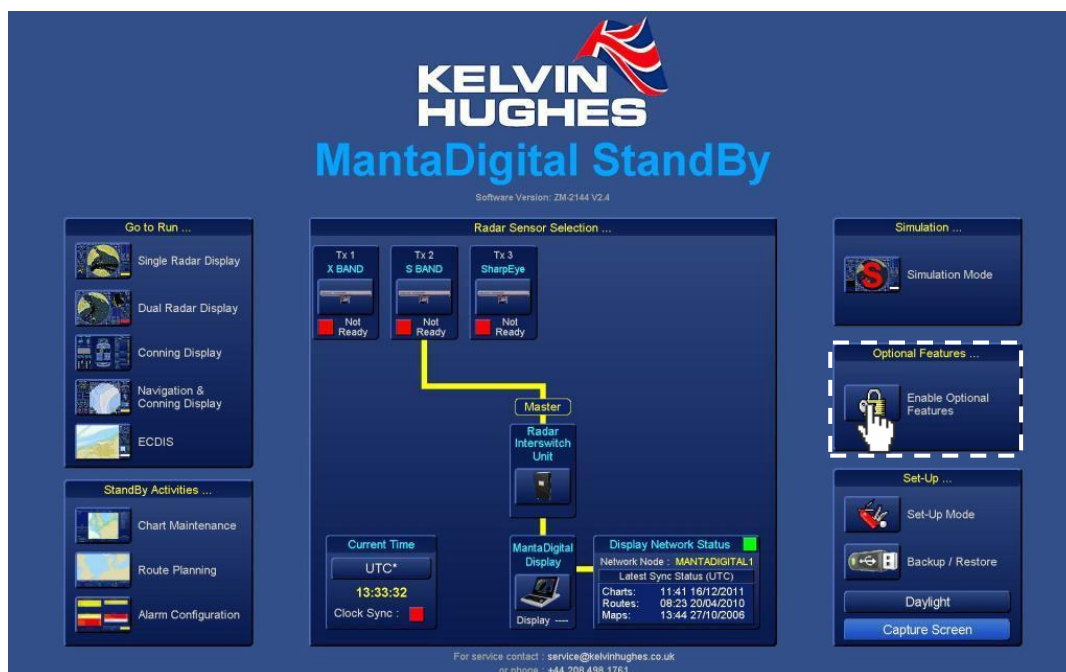
Trial period

On new equipment some optional features have a **trial period** installed (enhanced Target Detection for example).

When the trial period expires, the feature is **Disabled** and a license has to be purchased for continued use (see section 7.2.4).



7.1 Optional Features overview



The optional features menu is opened by selecting *Optional Features* from the standby screen.

The eToken number is shown at the top of the **MANTADIGITAL™** Optional Mode Management box.

The eToken number is different for each processor.

The following optional features are shown:

Note: Other optional features are being added and may not be shown



Optional Feature	Default status
Single Radar Display	Enabled for radar systems
Dual Radar Display	Enabled for radar systems
Chart radar	Enabled for chart radar systems
ECDIS	Enabled for ECDIS systems
Navigation & Conning display	Enabled for Nav & Conning systems
Enhanced Target Detection	Enabled for a 6 month trial on radar enabled systems
Route Planning	Enabled for chart radar and ECDIS systems
Simulation	Enabled for radar systems
ECDIS Radar Interlay	Not enabled as standard
Demonstration mode	Not available as a user option
Familiarisation mode	Training use only
Non Navigation mode	Training use only
FLIR camera	Optional FLIR night vision camera; not enabled as standard
Enhanced Spyscope	Optional ESS mode in dual radar display; not enabled as standard
Conning display	Enabled for Conning systems
Password bypass	Strictly for service use only
ChartCo interface	Enables ChartCo in chart maintenance; not enabled as standard

7.2 How do I...

7.2.1 Obtain prices for optional features?

Some processors have optional features enabled as standard.

The enabling of *non-standard* features is chargeable.

Optional Features can be permanently enabled or set to expire at a specified date.

To find the cost of an optional feature, please contact Kelvin Hughes Ltd/ commercial technical advice using the telephone number or email address shown at the bottom of the system Standby screen or using the contact details shown in section 18.

You will need to advise the following information:

- The optional feature(s) required.
- The eToken number of the system.

Non-essential but useful information:

- Serial number of the processor (not the display).
- Software version of the processor which can be found at the top of the standby screen.

CAUTION

Licenses can be requested and installed using a USB memory stick.



All memory devices must be scanned to ensure they are virus free prior to connection and use with any Kelvin Hughes equipment.

Any virus entering the system through a user device(s) will void all warranties made by Kelvin Hughes, resulting in applicable service charges.

7.2.2 Enable optional features using email

1

Optional features are chargeable. A purchase order will be required to process the application of non-standard optional features.

Insert a virus free USB memory device into the USB socket on the front door of the MANTADigital processor.

From the standby screen, select Optional Features.

2

In the **MANTADigital Optional Mode Management** table, select the function(s) required and place the cursor over the Status column.

Select **Enable**

Set an expiry date by clicking in the date field. The format *must* be DD/MM/YYYY (Day / Month / Year).

If **no expiry date** is required, a right click on the date field automatically selects **Permanent**.

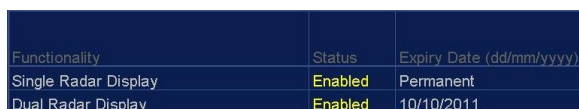
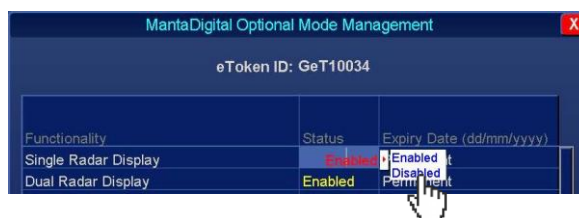
3

Select **Create Request**.

The system will write a file to the USB flash memory called **eTxxxxx.req**, where xxxxx is the eToken number

Email the file (approximate file size is 500b) to Kelvin Hughes, who will process the request and return a file called **eTxxxxx.fun**.

This is loaded into the system using the Import File function (see following page).



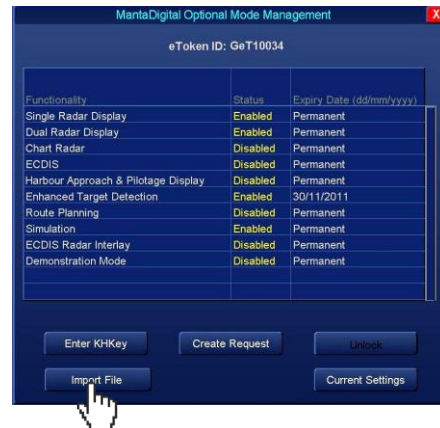
Chapter 7: Optional Features

4

Copy the **eTxxxxx.fun** file returned by kelvin Hughes onto a virus free USB memory device. Plug this into the MANTADigital Processor.

Select **Import File**. The system will automatically find and install the file

There are no confirmation messages but, the required optional feature should now be enabled and be available for use.



7.2.3 Enable an optional feature by phone

It is recommended that requests for optional features are made using email. However, if no email or USB memory stick is available, optional features can be manually requested and enabled using the **Enter KHKey** function as follows:

1

Enable the required optional features as shown in the previous section.

Contact Kelvin Hughes Ltd/ Commercial technical advice using the telephone number shown at the bottom of the systems Standby screen or using the contact details shown in section 18.

The following information *will be required*:

- The systems eToken number (*requests CAN NOT be processed without this number*).
- Optional feature(s) that are currently enabled
- New optional feature(s) that have been enabled as part of this process.
- Is the optional feature to be permanent or set to expire at a certain date?

2

Kelvin Hughes will process your enquiry and then advise a KHKey code. This will be in the form of a four digit pin number.

3

Open optional features and press the **Enter KHKey** button.

Enter the number provided and click Accept.

After inserting the correct license key, the desired functionality will be released.

Caution: There are a limited number of attempts at entering a KHKey. If an incorrect KHKey is entered too many times, a warning will appear noting that there are limited attempts left. Continued attempts at entering an incorrect KHKEY **will lock the system and stop all optional features from working.**

A locked system still operates and radar modes can still be used but all optional features will be disabled.

7.2.4 Renew a license for an existing optional feature

Where an optional feature has an expiry date or a trial period is about to run out, the system will show warnings noting that the optional feature is about to expire. Warnings are shown at:

- Approximately 12:00 UTC; 30, 7, 6, 5, 4, 3, 2 and 1 days prior to the feature expiring.
- On the hour, every hour on the day of expiry.
- If the system is not ON at the expiry date, a warning will be show when the system is next switched on but only for a 24 hour period after the expiry date.

Once a license has expired *no further warnings are presented* and the optional feature is disabled.

A new license can be purchased using either of the two methods noted in the previous sections.

7.2.5 Unlock optional features

You have a limited number of attempts at entering a KHKey. If an incorrect KHKey is entered too many times, a warning will appear noting that there are limited attempts left.

Continued attempts at entering an incorrect KHKEY **will lock the Optional features menu** preventing any changes being made.

To unlock a system, use the following procedure.

1

In normal operation, the **Unlock** button is not available for use.

Where a system has been locked, the unlock button becomes available.

2

To unlock the system press the **unlock** button and make a careful note of the unique number that is presented.

Contact Kelvin Hughes/
Commercial technical advice
quoting this number and they will
respond with an unlock code that
is entered using the Enter KHKey
button.



7.2.6 Current settings

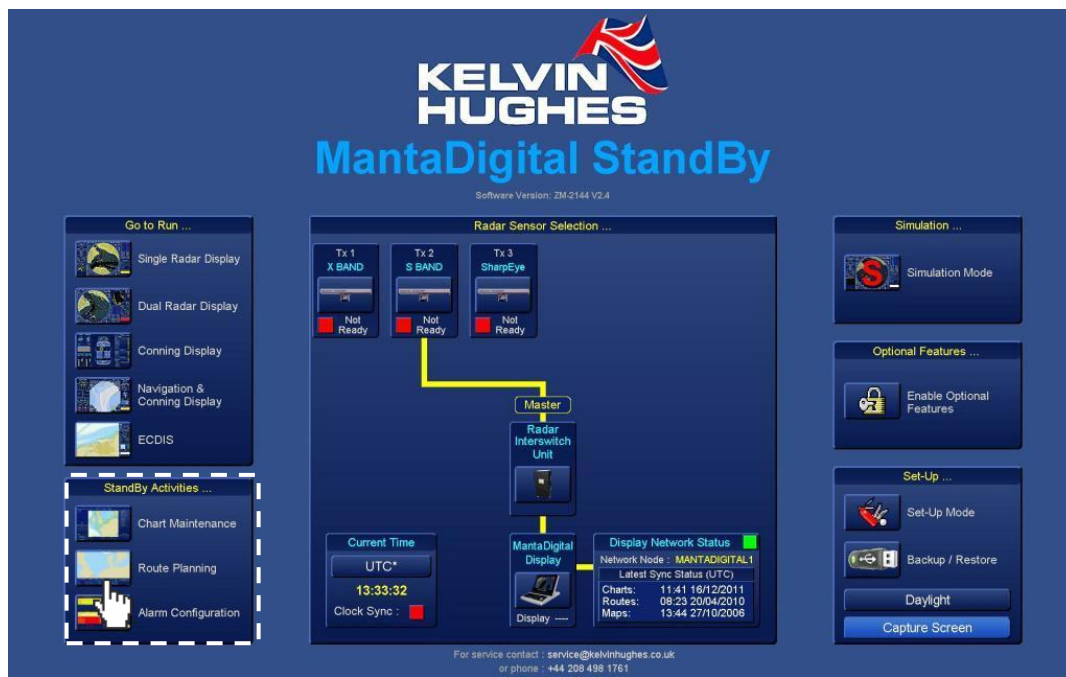
The **Current Settings** button resets the optional features page to the last saved configuration. This can be used to clear the screen if an error is made whilst enabling or disabling a feature or setting an expiry date.

Using this button does not delete the KHKey or licenses that have been previously installed.

8 Route planning

Route planning allows the creation, safety checking and management of routes

The various functions are accessed by selecting the **Route Planning** icon in the **Standby Activities** area of the standby screen:



If Route Planning is 'greyed-out' or cannot be accessed there may be a problem with the eToken or Route Planning has not been enabled in optional features.

See index entry for eToken software or optional features for additional details.

The Route planning section comprises of the following chapters:

Chapter 8.1: *Route Planning: Overview.*

An overview of route planning layout

Chapter 8.2: *Common functions.*

Details the functions and controls that are common in route planning such as placing and dropping WP's, chart settings etc.

Chapter 8.3: *How do I...?*

Step by step instructions for common activities within route planning such as: Creating new routes, safety checking, editing routes etc.

8.1 Route planning overview

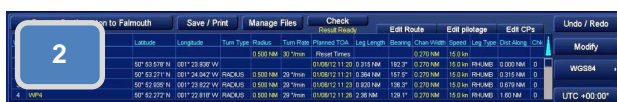
The Route planning screen can be broken down into three sections:



Chart display area

The level of information shown on the chart can be configured using the **Chart Settings** button.

Route can be created directly onto the display area.



Route creation tools

Functions include creation, editing safety checking and management of routes.



Screen controls

The screen palette, zoom levels, chart feature levels can be configured.

The **Standby** button exits route planning and returns the display to the standby screen.

8.2 Common functions

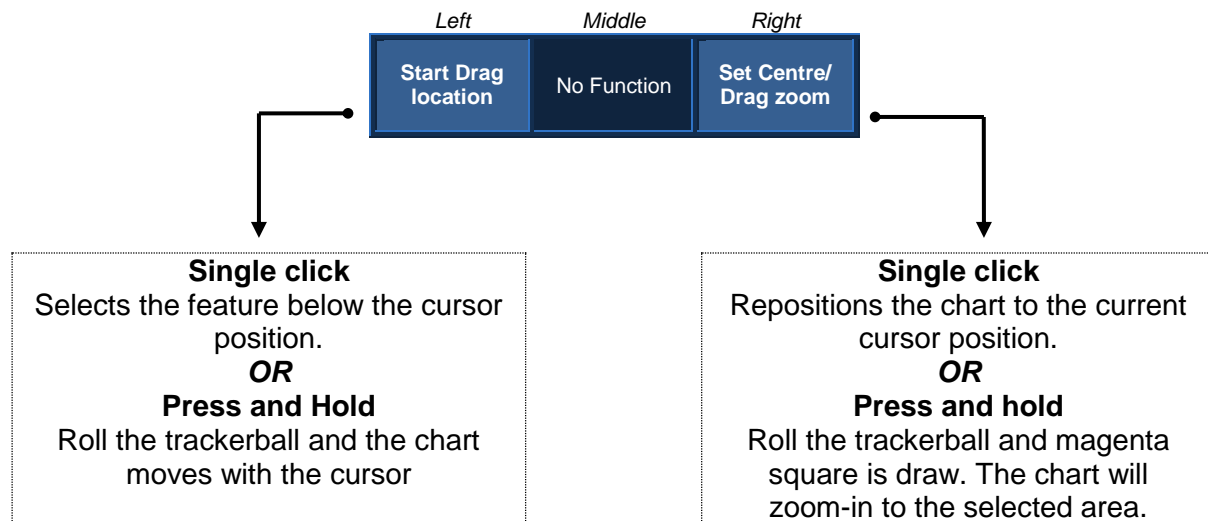
There are a number of common cursor functions in route planning for drawing, dragging, placing and editing routes.

These common functions are detailed in the following pages.

Chapter 8: Route planning

8.2.1 Chart Control (zoom and position)

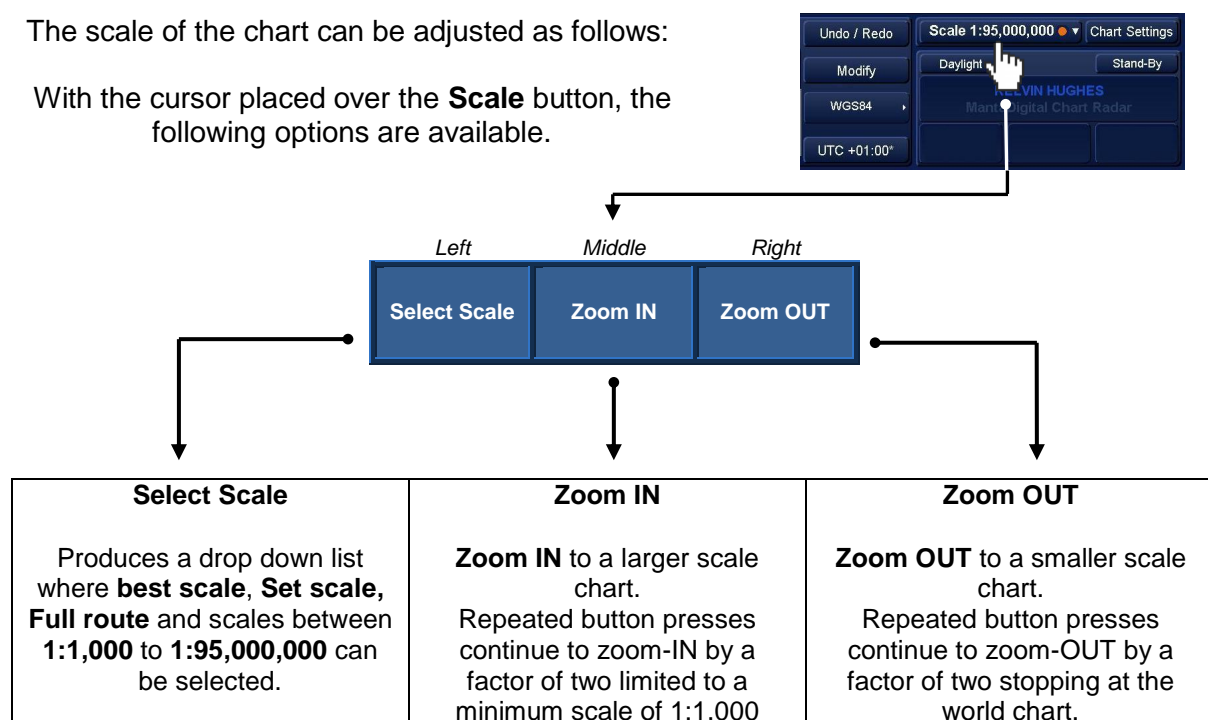
With the cursor placed in the chart area, the following options are available:



8.2.2 Chart control (zoom, reposition & select cells)

The scale of the chart can be adjusted as follows:

With the cursor placed over the **Scale** button, the following options are available.

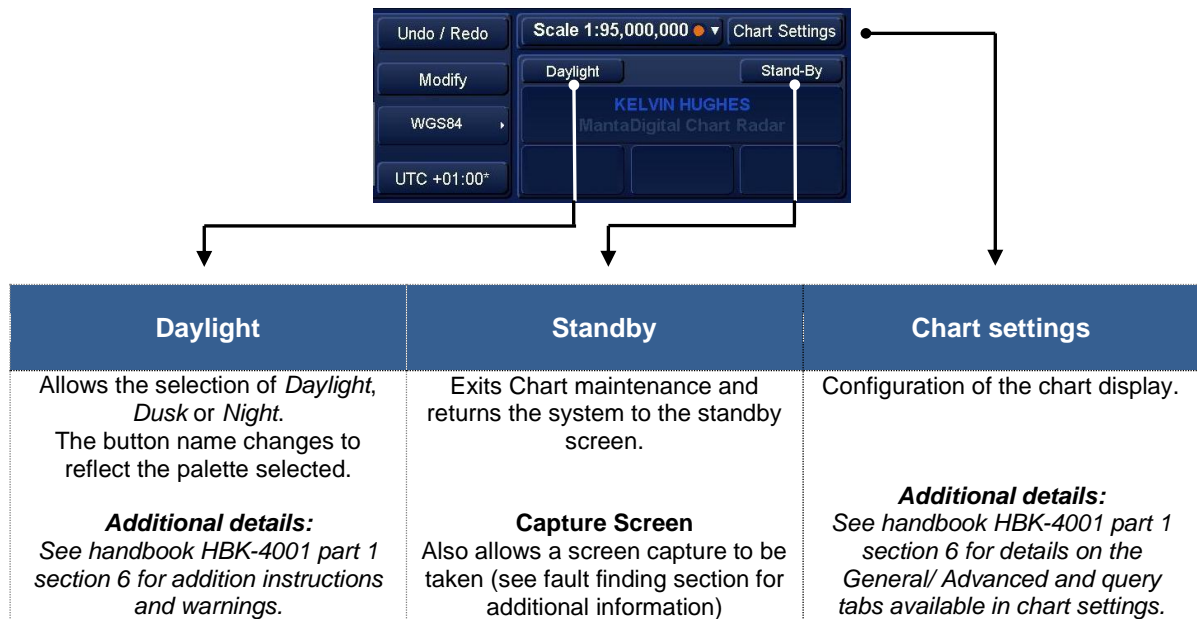


For a full description of the scale button, its features and the 'traffic light' indicator, see section 6 of Handbook HBK-4001 part 1: Chart Scales and position.

Chapter 8: Route planning

8.2.3 Brilliance control/ chart settings / Standby

The following functions are common to all navigation modes:



8.2.4 Positioning, editing and managing waypoints

There are a number of common cursor functions in route planning for positioning, editing of waypoints and adding Pilotage tools.

Each cursor function is detailed below.

NOTE: These functions are not detailed in the '**How do I...**' section. It is therefore recommended that users familiarise themselves with these functions prior to planning or editing a route.

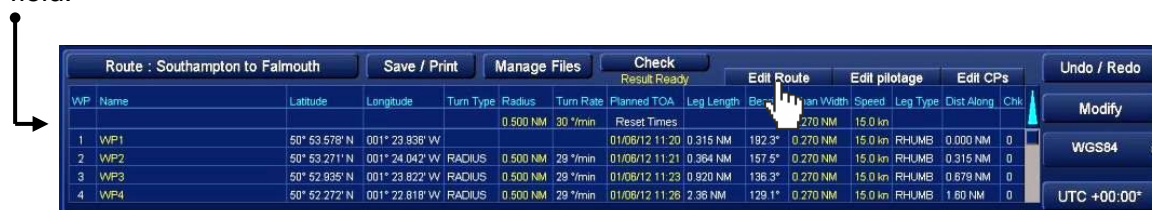
Chapter 8: Route planning

Editing and manual entry

As waypoints, pilotage features and critical points (CP) are added to a route, they are listed in the **Edit Route** box and tabs shown below.

Latitude and Longitude values can be manually entered or corrected. Additionally, any values in the Edit Route list that are shown in Yellow can also be edited.

Values entered in the **First Line** of a route set a **default value** for the remainder of the route. For example, if a channel width is set as 0.100 NM, all subsequent channel widths will be 0.100 NM. Individual values can then be manually adjusted by clicking in the required field.

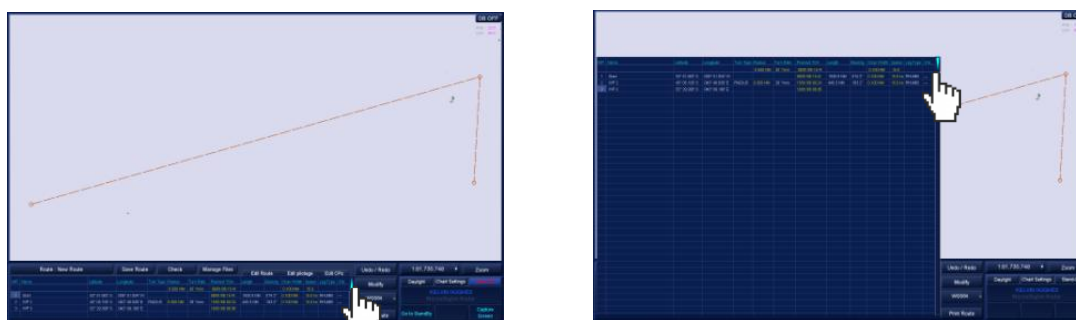


WP	Name	Latitude	Longitude	Turn Type	Radius	Turn Rate	Planned TOA	Leg Length	Bearing	Channel Width	Speed	Leg Type	Dist Along	Chk
1	WP1	50° 53.578' N	001° 23.938' W		0.500 NM	30 °/min	01/06/12 11:20	0.315 NM	192.3°	0.270 NM	15.0 kn	RHUMB	0.000 NM	0
2	WP2	50° 53.271' N	001° 24.042' W	RADIUS	0.500 NM	29 °/min	01/06/12 11:21	0.364 NM	157.5°	0.270 NM	15.0 kn	RHUMB	0.315 NM	0
3	WP3	50° 52.935' N	001° 23.822' W	RADIUS	0.500 NM	29 °/min	01/06/12 11:23	0.920 NM	136.3°	0.270 NM	15.0 kn	RHUMB	0.679 NM	0
4	WP4	50° 52.272' N	001° 22.818' W	RADIUS	0.500 NM	29 °/min	01/06/12 11:26	2.36 NM	129.1°	0.270 NM	15.0 kn	RHUMB	1.60 NM	0

Edit routes tab in route planning

The route editing tabs can be maximized/ minimized by clicking on the blue up/ down arrow.

When maximized, clicking on the chart area automatically minimizes the tab.



Selecting any waypoint, pilotage feature or critical point will place the selected item at the centre of the chart area. This can be useful when editing a long route at a low scale.



WP	Name	Latitude	Longitude	Turn Type	Radius	Turn Rate	Planned TOA	Leg Length	Bearing	Channel Width	Speed	Leg Type	Dist Along	Chk
1	WP1	50° 53.578' N	001° 23.938' W		0.500 NM	30 °/min	01/06/12 11:20	0.315 NM	192.3°	0.270 NM	15.0 kn	RHUMB	0.000 NM	0
2	WP2	50° 53.271' N	001° 24.042' W	RADIUS	0.500 NM	29 °/min	01/06/12 11:21	0.364 NM	157.5°	0.270 NM	15.0 kn	RHUMB	0.315 NM	0
3	WP3	50° 52.935' N	001° 23.822' W	RADIUS	0.500 NM	29 °/min	01/06/12 11:23	0.920 NM	136.3°	0.270 NM	15.0 kn	RHUMB	0.679 NM	0
4	WP4	50° 52.272' N	001° 22.818' W	RADIUS	0.500 NM	29 °/min	01/06/12 11:26	2.36 NM	129.1°	0.270 NM	15.0 kn	RHUMB	1.60 NM	0

Chapter 8: Route planning

Any Pilotage features that have been added to a route can be edited in the **Edit Pilotage** tab. This includes naming of pilotage notes, changing the colours of PI lines etc.

Route : Southampton to Falmouth									
Save / Print				Manage Files		Check		Undo / Redo	
Type	Name/Text	Latitude	Longitude	Range	Range2	Bearing	Category	On Leg	Colour
NOTE	Start turn	50° 52.989' N	001° 24.411' W				INFO	2	Orange
CLEARING BEARING	Keep clear	50° 52.520' N	001° 23.902' W	1.13 NM	0.250 NM	70.1°	NMT	3	Orange

Any Critical Points that have been added to a route can be edited in the **Edit CPs** tab. This includes setting critical point distances, notes and alarms.

Route : Southampton to Falmouth

Save / Print

Manage Files

Check
Not checked

Edit Route

Edit pilotage

Edit CPs

Undo / Redo

Critical Points on Route: Southampton to Falmouth

Add Critical Point

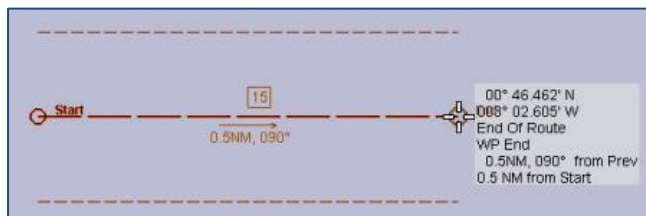
Modify

CP 1	0.115 NM	before waypoint WP2:WP2	Alarm 15 minutes before point.	WGS84
CP 2	2.44 NM	before waypoint WP9:WP9	Alarm 15.0 NM before point.	

UTC +00:00*

'Drawing' a route

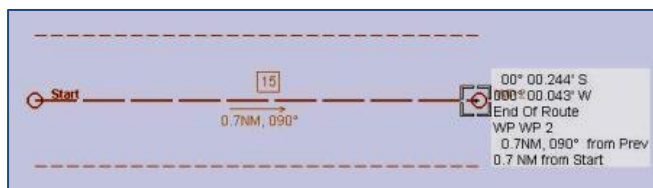
When a route is being created, the following cursor options are available.



Left	Middle	Right
Add WP/ Start Drag	Finish Appending	Undo
Drops a waypoint at the current cursor position. OR Press & Hold to drag the chart	Finishes the route at the last placed waypoint	Undo the last action

Select and edit a waypoint

With the cursor placed over an existing waypoint, route details are shown by the cursor and the following cursor options are available.

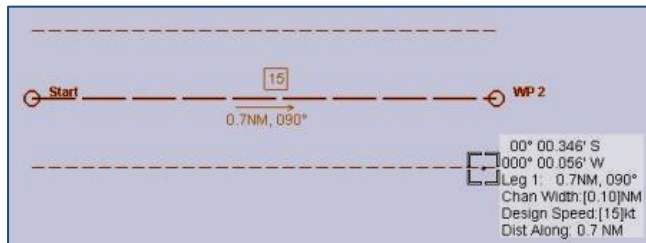


Left	Middle	Right
Select Drag WP		Select Action
Select a waypoint for editing	No Function	Opens the Pilotage menu
Accept position	Undo	Undo
Accepts the position of a selected waypoint	Undo the last action	Undo the last action

Chapter 8: Route planning

Channel width; Select and edit

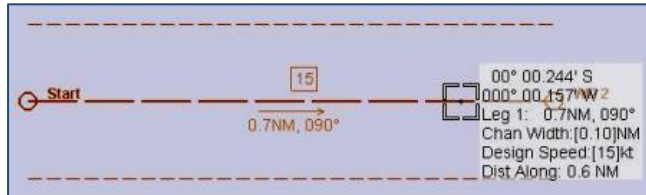
With the cursor placed over the channel width, route details are shown by the cursor and the following cursor options are available.



Left	Middle	Right
Select Drag Edge		Select Action
Select a channel width for editing	No Function	Opens the Pilotage menu
↓		
Accept Change	Undo	Undo
Accepts the new position of a selected channel width	Undo the last action	Undo the last action

Waypoint; addition

With the cursor placed on the centre line of a route, route details are shown by the cursor and the following cursor options are available where a waypoint can be added.



Left	Middle	Right
Insert WP		Select Action
Inserts a waypoint at the current cursor position	No Function	Opens the Pilotage menu
↓		
Accept Position	Undo	Undo
Accepts the position the new waypoint	Undo the last action	Undo the last action

Chapter 8: Route planning

Waypoint; Deletion

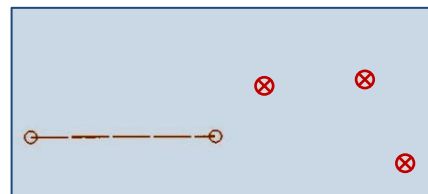
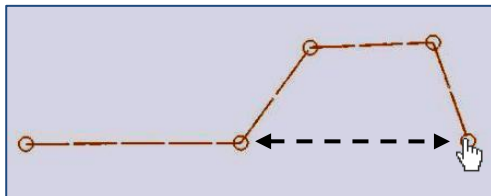
With the cursor placed over a waypoint, the following cursor options are available and a waypoint can be deleted.



<i>Left</i>	<i>Middle</i>	<i>Right</i>
Variable function		Select Action
Function is dependent on cursor position	No Function	Opens the Pilotage menu

The textual descriptions, latitude and longitude for waypoints can be edited in the **Edit Pilotage** tab.

If a waypoint is placed directly on-top of another waypoint, all waypoints inbetween the two are deleted; i.e.



Chapter 8: Route planning

Head/ Stern Mark at a waypoint; add, edit and delete.

With the cursor placed over a waypoint, the following cursor options are available and additional Pilotage features can be added and managed.

Left	Middle	Right
Variable function		Select Action
Function is dependent on cursor position	No Function	Opens the Pilotage menu

The Head and Stern Mark range and bearings can be adjusted and by left clicking on the Orange square and dragging to the required position.

Note: Stern marks cannot be enabled on the first or last waypoint

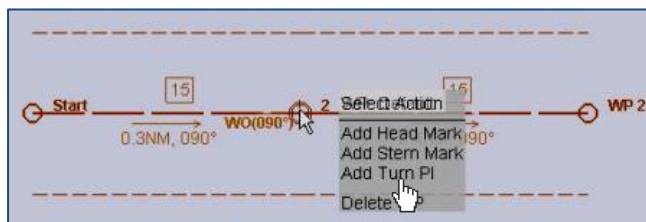
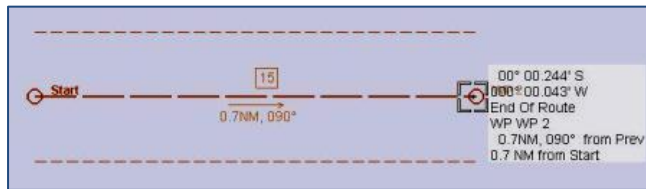
Head and Stern Marks can be deleted by right clicking on the Head Mark orange square and selecting **Delete this pilotage tool**.

The textual description, latitude and longitude etc. can be edited in the **Edit Pilotage** tab.

Chapter 8: Route planning

Turn Parallel Index; add, edit and delete

With the cursor placed on a waypoint, the following cursor options are available and additional Pilotage features can be added and managed.



Left	Middle	Right
Variable function		Select Action
Function is dependent on cursor position	No Function	Opens the Pilotage menu

Turn PI



Left click on the junction of the arrow and PI line to select and adjust the range.



Left click on the end of the PI line to select and adjust the distance of the PI line.

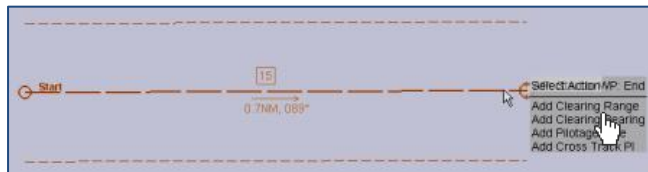
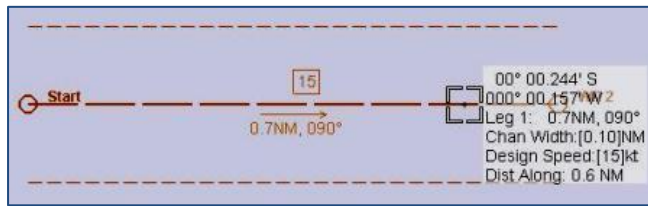
Delete Turn PI: Right click on the arrow for the Turn PI and select **Delete this Pilotage tool**.

The textual description, text colour, latitude and longitude etc can be edited in the **Edit Pilotage** tab.

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Clearing Range; add, edit and delete

With the cursor placed on the route, the following cursor options are available and additional Pilotage features can be added and managed.

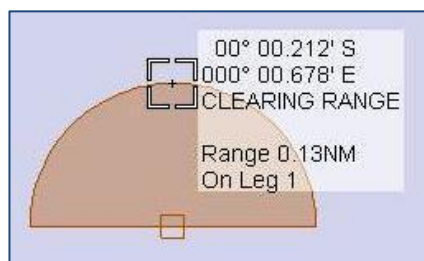


Left	Middle	Right
Variable function		Select Action
Function is dependent on cursor position	No Function	Opens the Pilotage menu

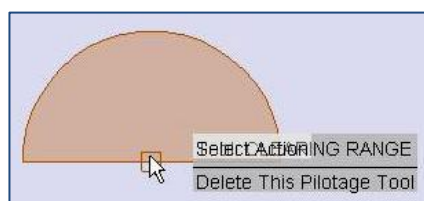
Clearing Range



Left click on the orange square to select and reposition the clearing range.



Left click on the edge to select and resize the clearing range.



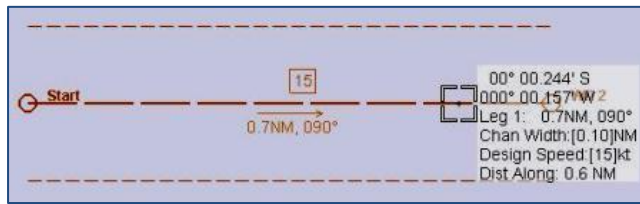
Right click on the orange square to delete the clearing range

The textual description, latitude and longitude etc. can be edited in the **Edit Pilotage** tab.

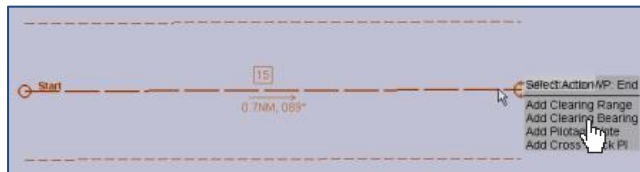
Chapter 8: Route planning

Clearing Bearing; add, edit and delete

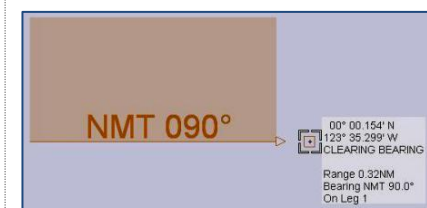
With the cursor placed on the route, the following cursor options are available and additional Pilotage features can be added and managed.



Left	Middle	Right
Variable function		Select Action
Function is dependent on cursor position	No Function	Opens the Pilotage menu



Clearing bearing



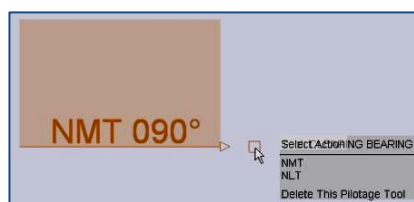
Left click on the orange square to select and reposition the clearing bearing.



Left click on the edge to select and adjust the bearing of the clearing range.



Click on the orange arrow to resize the clearing bearing.



Right click on the orange square to:

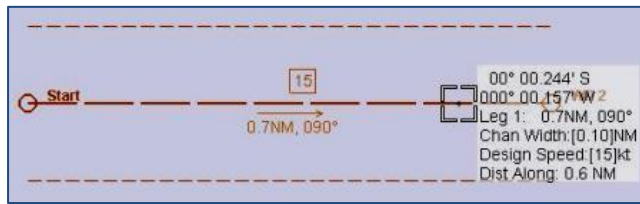
- Select **NMT** (Not more than)
- Select **NLT** (Not less than)
- **Delete** the selected clearing range

The textual description, latitude and longitude etc. can be edited in the **Edit Pilotage** tab.

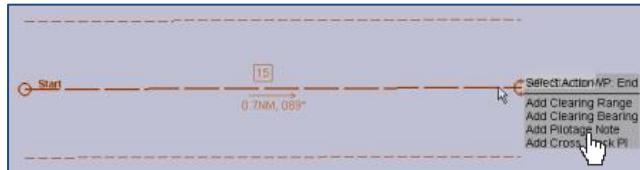
Chapter 8: Route planning

Pilotage Note; add, edit and delete

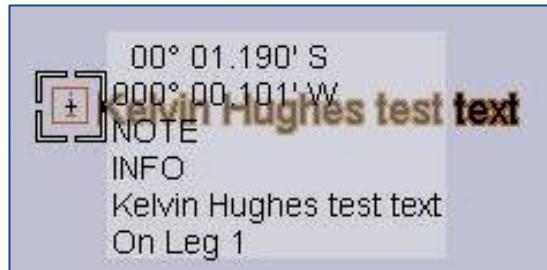
With the cursor placed on the route, the following cursor options are available and additional Pilotage features can be added and managed.



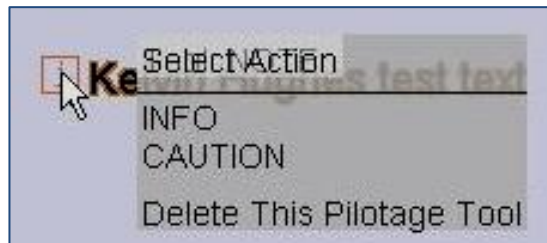
Left	Middle	Right
Variable function		Select Action
Function is dependent on cursor position	No Function	Opens the Pilotage menu



Pilotage Note



Left click on the orange square to select and reposition the Pilotage note.



Right click on the orange square to:

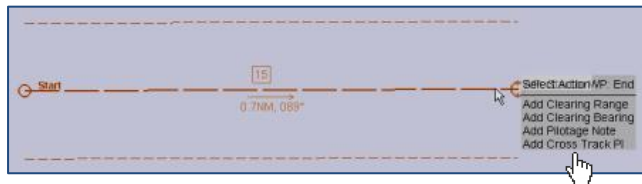
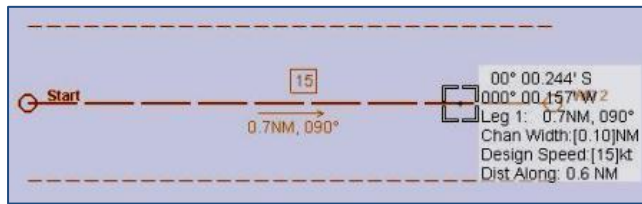
- Select an **INFO** symbol
- Select a **CAUTION** symbol
- **Delete** the selected clearing range

The textual description, latitude and longitude etc. can be edited in the **Edit Pilotage** tab.

Chapter 8: Route planning

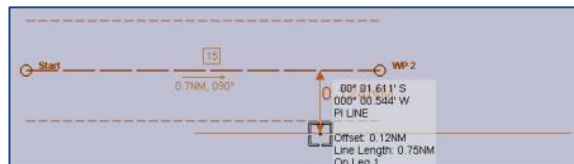
Cross Track PI; add, edit and delete

With the cursor placed on the route, the following cursor options are available and additional Pilotage features can be added and managed.

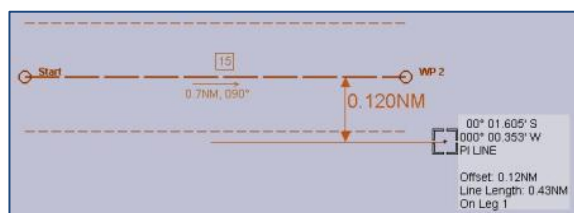


Left	Middle	Right
Variable function		Select Action
Function is dependent on cursor position	No Function	Opens the Pilotage menu

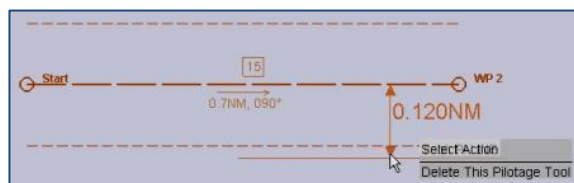
Cross track PI



Left click on the orange arrow to select and reposition the cross track PI.



Left click on the end of the Cross track PI line to select and adjust the distance of the line.



Right click on the orange square to **Delete** the selected cross track PI.

The textual description, text colour, latitude and longitude etc. can be edited in the **Edit Pilotage** tab.

Chapter 8: Route planning

Manually select, insert or delete a waypoint or pilotage feature

With the cursor placed over the required waypoint or pilotage feature in the **Edit Routes** tab, the following cursor options are available:



WP	Name	Latitude	Longitude	Turn Type	Radius	Turn Rate	Planned TOA	Leg Length	Bearing	Chan Width	Speed	Leg Type	Dist Along	Chk
1	WP1	50° 53 578' N	001° 23 836' W		0.500 NM	30 °/min	Reset Times			0.270 NM	15.0 km	RHUMB	0.000 NM	0
2	WP2	50° 53 271' N	001° 24 042' W	RADIUS	0.500 NM	29 °/min	01/08/12 11:21	0.364 NM	157.5°	0.270 NM	15.0 km	RHUMB	0.315 NM	0
3	WP3	50° 52 935' N	001° 23 822' W	RADIUS	0.500 NM	29 °/min	01/08/12 11:23	0.920 NM	136.3°	0.270 NM	15.0 km	RHUMB	0.679 NM	0
4	WP4	50° 52 272' N	001° 22 818' W	RADIUS	0.500 NM	29 °/min	01/08/12 11:26	2.36 NM	129.1°	0.270 NM	15.0 km	RHUMB	1.60 NM	0

	Left	Middle	Right
	Select Row	Insert New	Delete
	Selects the waypoint or pilotage feature below the current cursor position	Inserts a waypoint between the current and next waypoint	Deletes the selected waypoint

8.2.5 Undo/ redo button

The Undo/ Redo button can be used to delete a previous action or 'redo' an action. With the cursor placed over the Undo/ Redo button the following options are available:



Left	Middle	Right
Undo		Redo
Undo (delete) the last action		Redo (un-delete) the last action

Chapter 8: Route planning

8.2.6 Modify button / Reverse route

With the cursor placed over the **Modify** button, the following options are available:

Route : Southampton to Falmouth										Save / Print		Manage Files		Check		Edit Route		Edit pilotage		Edit CPs		Undo / Redo	
Result Ready																							
WP	Name	Latitude	Longitude	Turn Type	Radius	Turn Rate	Planned TOA	Leg Length	Bearing	Chan Width	Speed	Leg Type	Dist Along	Chk									
					0.500 NM	30 °/min	Reset Times			0.270 NM	15.0 kn											Modify	
1	WP1	50° 53 578' N	001° 23 936' W				01/06/12 11 20	0.315 NM	192.3°	0.270 NM	15.0 kn	RHUMB	0.000 NM	0							WG		
2	WP2	50° 53 271' N	001° 24 042' W	RADIUS	0.500 NM	28 °/min	01/06/12 11 21	0.364 NM	157.5°	0.270 NM	15.0 kn	RHUMB	0.315 NM	0									
3	WP3	50° 52 935' N	001° 23 822' W	RADIUS	0.500 NM	28 °/min	01/06/12 11 23	0.920 NM	136.3°	0.270 NM	15.0 kn	RHUMB	0.679 NM	0									
4	WP4	50° 52 272' N	001° 22 818' W	RADIUS	0.500 NM	28 °/min	01/06/12 11 26	2.36 NM	129.1°	0.270 NM	15.0 kn	RHUMB	1.60 NM	0							UTC +00:00°		

Left	Middle	Right
Append Waypoint	Reverse Route	
Selects the last waypoint in a route for editing.	Reverses the loaded route.	

Append Waypoint

The modify button automatically picks up the last waypoint in a route making it available for editing

Reverse Route

Selecting Reverse route reverses the selected route. Once a route has been reversed it should be saved under a different name

NOTE: If no route is loaded the Modify button has no action.

8.2.7 Datum

The chart Datum can be selected by clicking on the Datum button:

Route : Southampton to Falmouth															Save / Print		Manage Files		Check		Edit Route		Edit pilotage		Edit CPs		Undo / Redo	
															Result Ready													
WP	Name	Latitude	Longitude	Turn Type	Radius	Turn Rate	Planned TOA	Leg Length	Bearing	Chan Width	Speed	Leg Type	Dist Along	Chk														
							Reset Times										Modify											
1	WP1	50° 53 578' N	001° 23 936' W		0.500 NM	30 °/min	01/06/12 11:20	0.315 NM	192.3°	0.270 NM	15.0 kn	RHUMB	0.000 NM	0			WGS84											
2	WP2	50° 53 271' N	001° 24 042' W	RADIUS	0.500 NM	28 °/min	01/06/12 11:21	0.364 NM	157.5°	0.270 NM	15.0 kn	RHUMB	0.315 NM	0														
3	WP3	50° 52 935' N	001° 23 822' W	RADIUS	0.500 NM	28 °/min	01/06/12 11:23	0.920 NM	136.3°	0.270 NM	15.0 kn	RHUMB	0.679 NM	0														
4	WP4	50° 52 272' N	001° 22 818' W	RADIUS	0.500 NM	28 °/min	01/06/12 11:26	2.36 NM	129.1°	0.270 NM	15.0 kn	RHUMB	1.60 NM	0			+00:00											

8.2.8 UTC time

The adjustment of UTC time is common to all navigation modes and is explained in section 6 of handbook HBK-4001 Part 1.

Route : Southampton to Falmouth										Save / Print		Manage Files		Check		Edit Route		Edit pilotage		Edit CPs		Undo / Redo	
														Result Ready									
WP	Name	Latitude	Longitude	Turn Type	Radius	Turn Rate	Planned TOA	Leg Length	Bearing	Chan Width	Speed	Leg Type	Dist Along	Chk									
1	WP1	50° 53 578' N	001° 23 936' W		0.500 NM	30 °/min	Reset Times	01/06/12 11:20	0.315 NM	192.3°	0.270 NM	15.0 kn	RHUMB	0.000 NM	0								
2	WP2	50° 53 271' N	001° 24 042' W	RADIUS	0.500 NM	28 °/min	01/06/12 11:21	0.364 NM	157.5°	0.270 NM	15.0 kn	RHUMB	0.315 NM	0									
3	WP3	50° 52 935' N	001° 23 822' W	RADIUS	0.500 NM	28 °/min	01/06/12 11:23	0.920 NM	136.3°	0.270 NM	15.0 kn	RHUMB	0.679 NM	0									
4	WP4	50° 52 272' N	001° 22 818' W	RADIUS	0.500 NM	28 °/min	01/06/12 11:26	2.36 NM	129.1°	0.270 NM	15.0 kn	RHUMB	1.60 NM	0									

Modify

WGS84

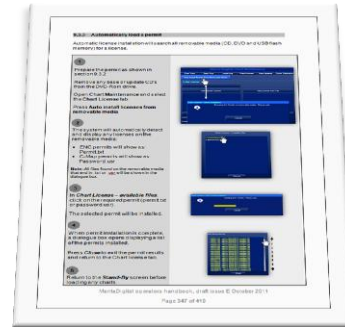
UTC +00:00

8.3 How do I...?

The following section lists some of the common procedures required for route planning.

These are described in a 'how do I...?' format.

The sections have been designed so that individual pages can be **printed** and kept with the system as **quick reference guides**.



The following topics are listed in this section:


Section	Procedure.
8.3.1	Getting started
8.3.2	Create and Save a new route
8.3.3	Open, edit and save an existing route
8.3.4	Opening edited versions of a route (route edited in ECDIS mode)
8.3.5	Auto Save route
8.3.6	Networking of routes
8.3.7	Critical Points on a route (CP)
8.3.8	Manage Files – an overview
8.3.9	Create / Rename a route folder
8.3.10	Move or copy routes between folders
8.3.11	Deleting routes
8.3.12	Viewing and importing routes from removable media
8.3.13	Backup and restore routes
8.3.14	Print a route
8.3.15	Change the datum in route planning
8.3.16	Safety Check overview
8.3.17	Safety check parameters
8.3.18	Safety Checking a route
8.3.19	Full safety check of a route
8.3.20	Clear the check results from the screen

Chapter 8: Route planning

8.3.1 Getting started

Note: The creation and editing of routes is *NOT* detailed in this section.

Users should familiarise themselves with the cursor functions detailed in the previous sections of this chapter (Route planning / Common functions section 8.1 and 8.2).



IMPORTANT NOTICE

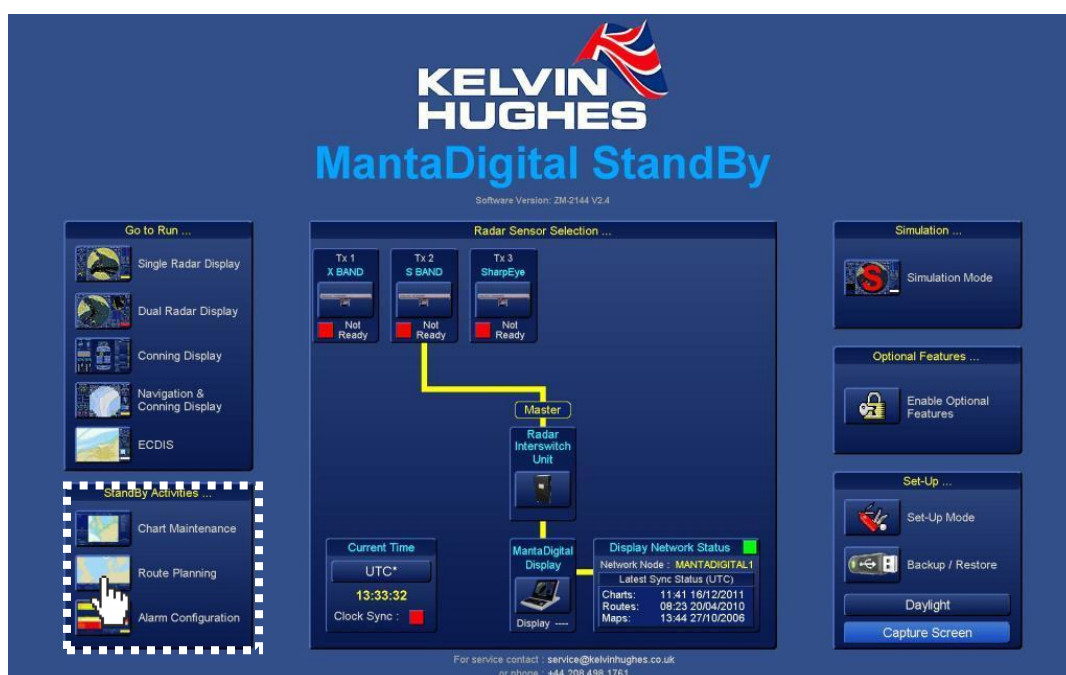
The route planning 'How do I...' section assumes the following:

Cursor Functions
Users have familiarised themselves with the cursor functions.

Chart data
The system has charts loaded and up to date permits are installed.

Safety Checking
For safety checking, all charts must be updated to the latest update data available.

The following instructions assume that **Route Planning** has been selected from the Standby screen:



Chapter 8: Route planning

8.3.2 Create and save a new route

1

New Route.

Place the cursor over the route selection button and the following options are available:

Click **Create New Route**.

Note: If a route is already open in route planning, a warning is presented noting that the previous route will be closed and any changes lost.

2

Create the desired route.

3

To save the route, place the cursor on **Save/ Print** and click **Save Route to File**.

4

Save the route.

Where no route folders exist or folders are not required, enter a name for the route **Route/ File name**.

Press **Save** and continue to point 7.

5

Save the route in a folder

If folders have been created select the folder where the route is to be saved.

Enter a name for the route in **Route/ File name** and press **Save** to save the route.



See previous sections for instructions on route creation



Continued on next page

6

Create a new folder.

If a new folder is required, click **New Folder** in the Save route menu and **Create/ Rename Folder** opens.

Enter a name for the folder and click **Accept**.

Select the newly created folder from the list in the **Save Route** menu.

Enter a name for the route in **Route/ File name**.

Press **Save**.

7

Warnings during save

When routes are being saved, a number of warnings may appear relating to safety checking.

Save with safety check

If a route has been safety checked, the system will prompt with the warning shown to the right that has the following options:

YES: Saves the route with the time and date that the safety check was carried out.

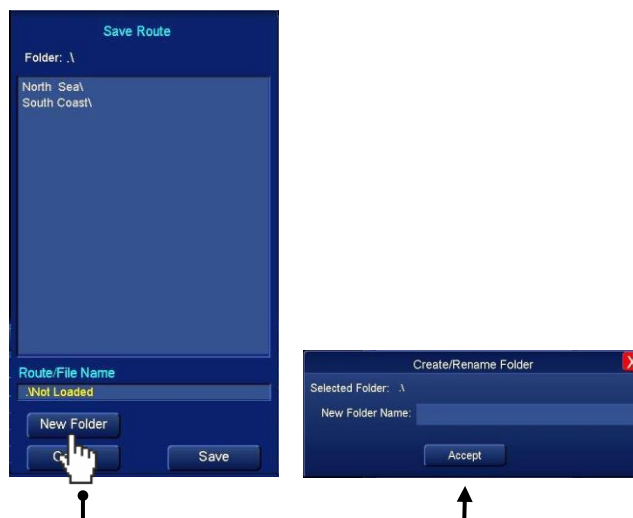
NO: The route is saved with no safety checking.

Save without safety check

When a route is saved that has not been safety checked, a warning stating **Route has not been approved** appears.

Click **OK** to continue.

The route is saved but is NOT safety checked.



Route has been safety checked



Route has not been safety checked

Continued on next page

8

Cancel the Save.

Pressing **Cancel** in the **Save Route** menu abandons the save function and returns the user to the route planning menu.



9

Abandon all changes.

To abandon any changes made to a route click on **Stand-By**.

The system will warn that **Changes to route xxx will be lost. Press OK to proceed** (where xxx is the name of the route currently being edited).

OK: All changes to the loaded route are lost, the system will return to the standby screen.

Cancel: Cancels the action and returns the user to route editing.



8.3.3 Open, edit and save an existing route

1

Load the route.

Place the cursor over the **Route** selection button.

Click **Select Route to Edit**.

Select the required route and click **Load**.

Note: If a route is already open for editing, a warning is presented noting that the previous route will be closed and any changes lost.

2

Edit the route as required.

3

Save the route.

To save the route, place the cursor on **Save/ Print** and press **Save Route to File**.



WP	Name	Latitude	Longitude	Turn Type	Radius	Turn Rate	Planned TOA	Leg Length	Bearing	Churn Width	Speed	Leg Type	Dist Along	Chk
1	WP1	51° 07' 26.9" N	001° 20' 58.0" E	RADIUS	0.500 NM	30°/min	31/01/12 14:01	4.92 NM	132.7°	0.300 NM	15.0 kn	RHUMB	0.000 NM	---
2	WP2	51° 04' 00.0" N	001° 26' 30.0" E	RADIUS	0.500 NM	20°/min	31/01/12 14:20	3.32 NM	127.1°	0.300 NM	15.0 kn	RHUMB	4.92 NM	---
3	WP3	51° 02' 00.0" N	001° 30' 50.0" E	RADIUS	0.500 NM	20°/min	31/01/12 14:35	6.02 NM	115.6°	0.300 NM	15.0 kn	RHUMB	8.14 NM	---
4	WP4	50° 59' 40.0" N	001° 36' 10.0" E	RADIUS	0.500 NM	20°/min	31/01/12 14:57	4.37 NM	110.1°	0.300 NM	15.0 kn	RHUMB	14.2 NM	---

Left

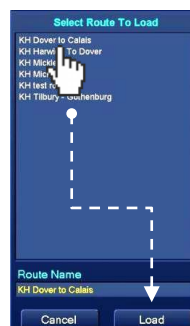
Middle

Right

Select
Route to
Edit

No Function

Create New
Route



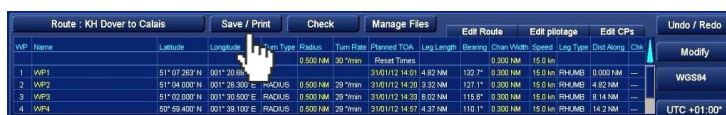
Select Route To Load

- KH Dover to Calais
- KH Harve to To Dover
- KH Mick...
- KH Mick...
- KH Tibury...

Route Name
KH Dover to Calais

Cancel Load

See previous section for instructions on route creation



WP	Name	Latitude	Longitude	Turn Type	Radius	Turn Rate	Planned TOA	Leg Length	Bearing	Churn Width	Speed	Leg Type	Dist Along	Chk
1	WP1	51° 07' 26.9" N	001° 20' 58.0" E	RADIUS	0.500 NM	30°/min	31/01/12 14:01	4.92 NM	132.7°	0.300 NM	15.0 kn	RHUMB	0.000 NM	---
2	WP2	51° 04' 00.0" N	001° 26' 30.0" E	RADIUS	0.500 NM	20°/min	31/01/12 14:20	3.32 NM	127.1°	0.300 NM	15.0 kn	RHUMB	4.92 NM	---
3	WP3	51° 02' 00.0" N	001° 30' 50.0" E	RADIUS	0.500 NM	20°/min	31/01/12 14:35	6.02 NM	115.6°	0.300 NM	15.0 kn	RHUMB	8.14 NM	---
4	WP4	50° 59' 40.0" N	001° 36' 10.0" E	RADIUS	0.500 NM	20°/min	31/01/12 14:57	4.37 NM	110.1°	0.300 NM	15.0 kn	RHUMB	14.2 NM	---

Left

Middle

Right

Save Route
to File

No Function

Print Route

Continued on next page

4

Route name.

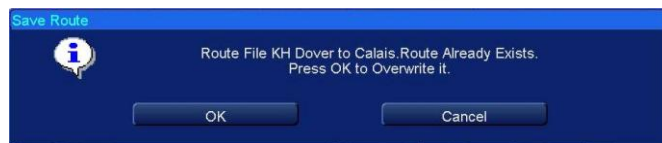
The existing route name is automatically shown in **Route/File name**.

Press **Save** to save the route.

A warning is presented noting that the route already exists.

Press **OK** to replace the old version of the route with the edited version.

Press **Cancel** to exit save and return to route planning (changes to the route are NOT lost).



5

Warnings during save.

When routes are being saved, a number of warnings may appear relating to safety checking.

Save with safety check.

If a route has been safety checked, the system will prompt with the warning shown that has the following options:

YES: Saves the route with the time and date that the safety check was carried out.

NO: The route is saved with no safety checking.

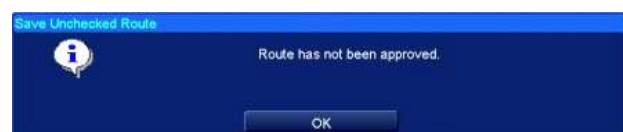
Save without safety check.

When a route is saved that has not been safety checked, a warning stating **Route has not been approved** appears.

Click **OK** to continue.



Route has been safety checked



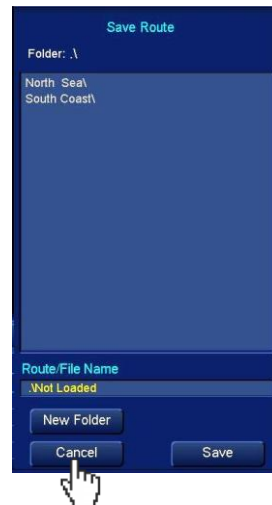
Route has not been safety checked

6

Cancel the Save.

Pressing **Cancel** in **Save Route** abandons the save function.

The system returns to route planning; changes made to the route currently loaded are not lost.



7

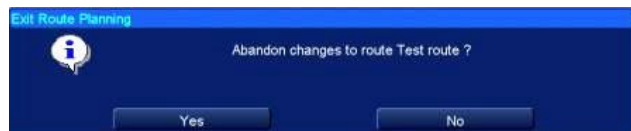
Abandon all changes.

To abandon any changes made to a route click on the Stand-By button.

The system will warn that **Changes to route xxx will be lost. Press OK to proceed.**

OK: All changes to the loaded route are lost, the system will return to the standby screen.

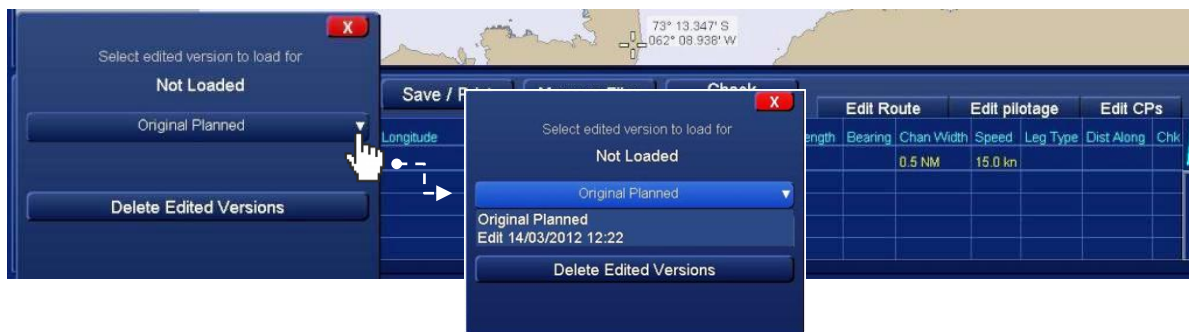
Cancel: Cancels the action and returns the user to route editing.



8.3.4 Opening edited versions of a route

In ECDIS mode only, routes can be edited whilst they are in loaded/ in use using **Edit Selected Route** (see Route Editing in the index of HBK-4001 part 1).

When an edited route is selected and loaded in route planning, the system gives the option of opening the **Original Planned** route or an **Edit** version of the route:



1

Original Planned route.

If an **Original Planned** version of a route is opened, edited (if required) and saved, all temporary edits are overwritten and are lost.

2

Edited version of a route.

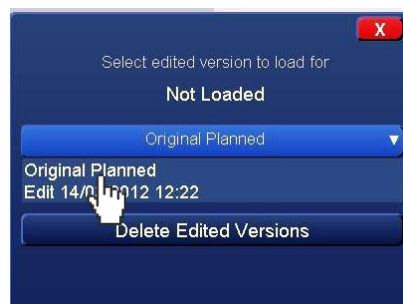
Edited versions of a route will show the time and date the revision(s) were made.

When an Edited version of a route is opened, edited (if required) and saved, all previous edits and the Original Planned route are overwritten with the edited version being saved.

3

When opened, an edited version of a route can be saved using a new name.

The original route can then be opened and the edited version(s) deleted as shown in the next step.



4

Deleting edited versions.

When opening an edited route, clicking **Delete Edited Versions** deletes all temporary edits of a route leaving the *Original Planned route unchanged*.

In **networked systems**, all changes made are automatically shared across the network.



8.3.5 Auto-Save route

If the system is accidentally shutdown during route planning or there is a power failure, the system automatically saves the route that is currently being created or edited.

When entering **Route Planning** after an unexpected shutdown, the following dialogue will be displayed:



YES: Opens the auto saved version of the route and allows creation/ editing to be continued.

NO: Opens route planning with no route loaded. Changes to the route being created/ edited before the unexpected shutdown are lost.

Safety check in auto-save

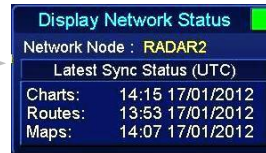
Safety or Full checking results are NOT saved as part of an auto recovery. If a route was being safety checked at the time of the unexpected shutdown, the safety/ full check must be run again.

8.3.6 Networking of routes

On network enabled systems, routes (including pilotage tools and critical points) are automatically shared and saved across the network.

- No user action is required to share saved routes.
- New or edited routes are shared across the network when they are saved.

The operational status of the network is shown in the standby screen.



Display Network Status:
■ **Green:** Network running.
■ **RED:** Network offline.

Network Node: Displays the network name assigned the processor being viewed.

Latest Sync status (UTC): This shows when the charts, routes and maps were last synchronised.

See **Route management section** of handbook HBK-4001 part 1 for additional details on networked routes.

See the **Networking section** of handbook HBK-4001 part 1 for additional information on system networking.

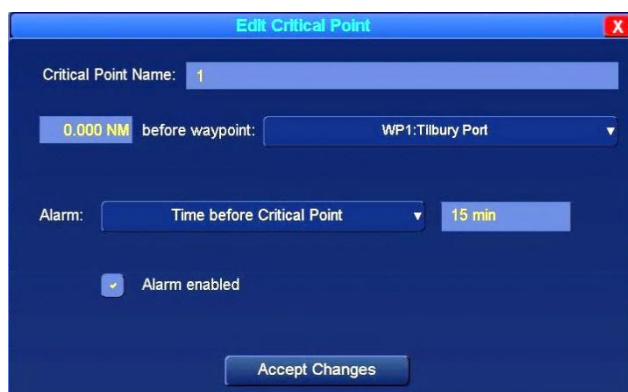
Chapter 8: Route planning

8.3.7 Critical points on a route

Once a route has been created or an existing route loaded, critical points can be added in route planning by selecting the **Edit CPs** tab:



Clicking on **Add Critical Point** opens the **Edit Critical Points** menu where Critical points can be added and ammended:



Critical Point Name:

Using the keyboard, enter a name for the critical point.

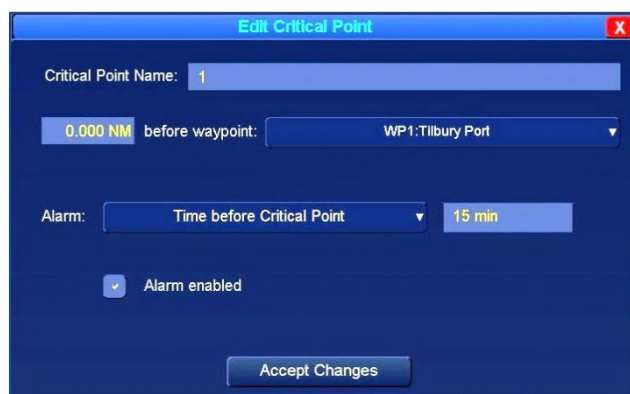
This is the name that is displayed on the route and is also shown as the Critical Point alarm message.

0.000NM before waypoint:

Assign the distance before the assigned waypoint where the Critical Point will appear on the route.

If left at zero, the Critical point name does not appear on the route.

To adjust the distance, place the cursor over the numbers, press and hold the left button and roll the tracker ball to adjust to the required distance.



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Waypoint selection:

Use the drop down list to select the required waypoint on the loaded route.

Alarm:

Use the drop down list to select *Time before critical point* (minutes) or *Distance before critical point* (NM):

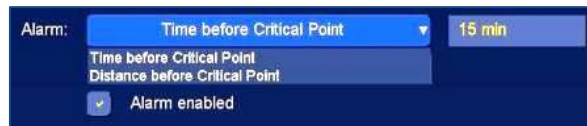
To adjust the time or distance, place the cursor over the numbers, press and hold the left button and roll the tracker ball to adjust to the required value.

At the configured time or distance to the Critical Point (NOT THE WAYPOINT) an alarm will be triggered showing the text entered in Critical Point Name (see example below).

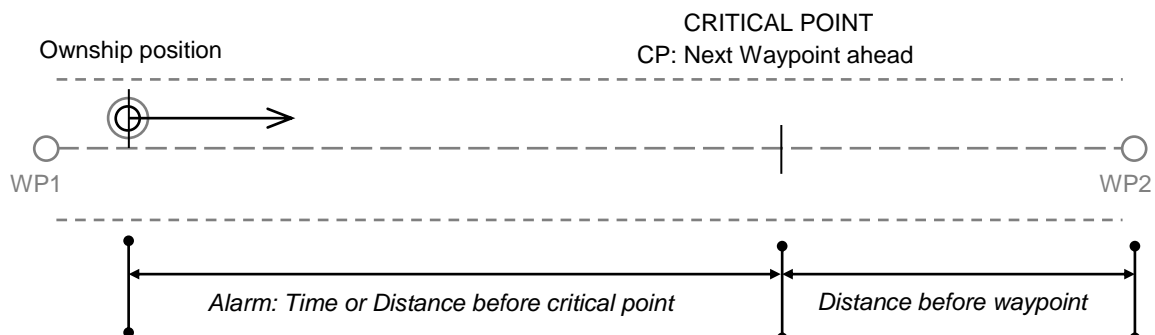
If **Alarm Enabled** is de-selected (not ticked) *no alarm will sound* for the time or distance before a critical point.

Accept changes.

Pressing Accept Changes adds the critical Point to the loaded route.



Example of a Critical point on a route



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Critical Point display

Information on the next Critical Point on a loaded route is shown in the Alarm tab:



Editing or Delete Critical Points.

With the cursor placed over an existing Critical point, the following options are available:



↓

Left	Middle	Right
Edit CP details		Delete CP
Opens the selected Critical Point for editing	No Function	Deletes the selected Critical Point

Saving Critical points

Critical points are automatically saved when the selected route is saved.

Networking critical points

Critical Points are saved as part of the loaded route. When connected to a network, these are automatically shared across the network.

Closing Critical Points dialog boxes

Critical Points continue to be displayed on a route when the Add/ Edit Critical point dialog boxes are closed.

Critical Points visible scale range

Critical Points on a loaded route can only be viewed at the following ranges and scales:

- **Radar/ Chart radar:** 3.0NM or less.
- **ECDIS:** 1:50,000 or less.

Critical Points in Conning display

Critical points cannot be viewed or edited in Conning display mode however; any alarms associated with a Critical Point on a loaded route will be shown.



8.3.8 Manage Files - an overview

Routes can be sorted into a folder or set of folders; this can be useful in managing systems with multiple routes.

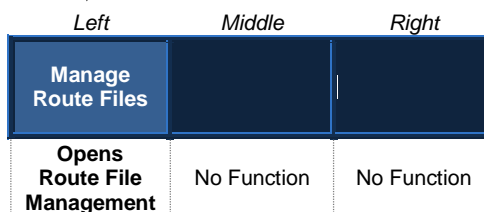
Folders are identified as they have a back slash (\) at the end of the folder name e.g. **South Coast**

Folders can also be created within folders so for example a folder called **South Coast** could contain another folder called **Approaches to Southampton**.

Folders and their contents are managed in route planning using **Manage Files**.



With the cursor placed over **Manage File**, the option shown is available:



Route file management is divided into two columns:

- Current Route Folder 1
- Current Route Folder 2

New folders can be created and existing folders renamed.

The contents of the route library can be explored using both columns and routes copied or moved between folders.

Routes and folders can be individually or block deleted.

Routes from removable media can be viewed, imported and deleted.



Chapter 8: Route planning

Basic operations within Route File Management

Open or select a folder.

In **Current Route Folders 1 or 2**, with the cursor placed over a folder name, the following options are available:

Left	Middle	Right
Open folder		Select folder
Opens the select folder	No Function	Highlights the folder for renaming, moving, copying or deleting.



Route selection.

In **Current Route Folders 1 and 2**, with the cursor placed over a route, the following options are available:

Left	Middle	Right
Select/ Deselect		Block Select/ Deselect
Selects the individual route or folder at the cursor position.	No Function	Use to select a group of routes or folders.



Go back/ up a level in a folder.

To go back a level or return to the root directly of a folder, click on **..**



Select All Routes.

In **Current Route Folders 1 or 2** using the **Select All Routes** button below the respective column highlights and selects all routes in the folder being viewed.

Deselect All Routes.

The routes currently selected in a folder can be deselected by using **Deselect All Routes**.

8.3.9 Create / rename a route folder

There are two methods for creating route folders.

- A) Using the **Manage Files** menu.
- B) Using **New Folder** whilst saving a route.

1

Manage Files.

Open the **Manage Files** menu.

Left click on **New Folder**.

Enter a name for the folder and click accept.

The new folder is created.



2

Create a folder whilst saving a route.

Whilst saving a route, click **New Folder** in the **Save Route** menu. **Create/ Rename Folder** opens.

Enter a name for the folder and click **Accept**.

(See section 8.3.2 for additional information).

In networked systems, any changes made are automatically shared across the network.



3

Rename a route folder.

Folders can only be renamed using **Manage Files**.

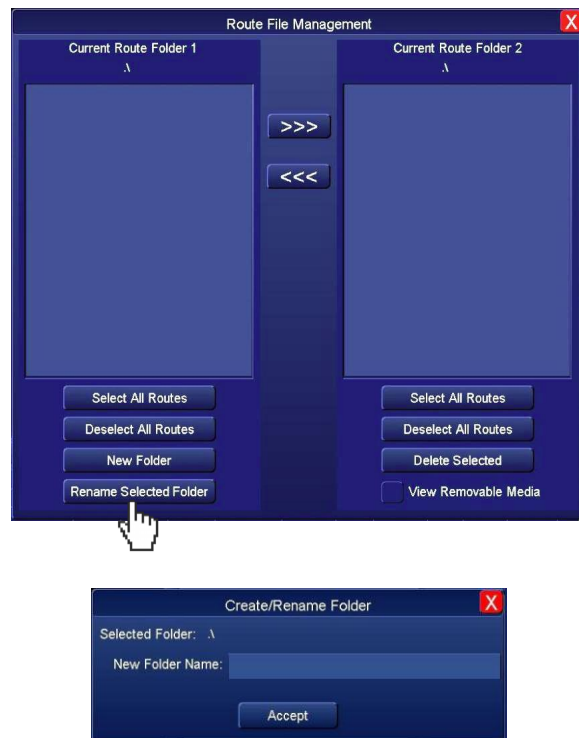
Open the **Manage Files** menu.

Select the folder to be renamed.
(Folders are selected by right clicking on the required folder).

Left click on **Rename Selected Folder**.

Enter a new name for the folder and click **Accept**.

In networked systems, any changes made are automatically shared across the network.



8.3.10 Move or copy routes between folders

When routes and folders have been created, routes can be moved and copied as follows:

1

Select the route(s) and destination.

In **Current Route Folder 1**, select the destination folder.

In **Current Route Folder 2**, select the route or routes to be copied.

When a route or group of routes has been selected, they can be transferred as follows:

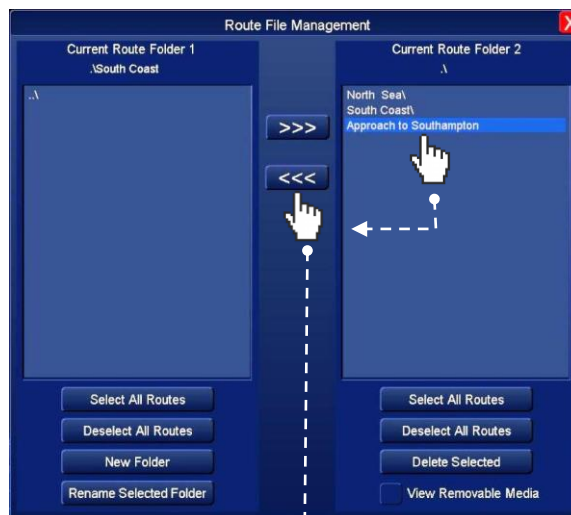
Move: Left click on <<< or >>>
Copy: Right click on <<< or >>>

In the example shown, a route has been moved *from current route folder 2 to current route folder 1*. However files can be moved and copied in any direction.

In networked systems, any changes made are automatically shared across the network.

Caution: Routes that are moved (not copied) from a folder to removable media are effectively deleted from the system (see section 8.3.12).

Moving routes to removable media is not recommended. Routes should be backed up using the backup routes function that can be found in Backup & Restore (see section 5).



Left	Middle	Right
Move Selected		Copy Selected
Moves the selected route/folders	No Function	Copies the selected route/folders



8.3.11 Deleting routes

1

Routes can only be deleted from Current Route Folder 2.

Open the **Manage Files** menu.

In Current Route Folder 2, select the route or routes that are to be deleted.

2

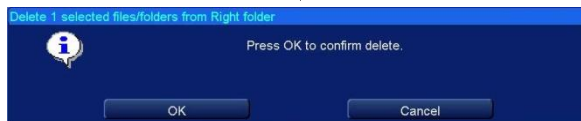
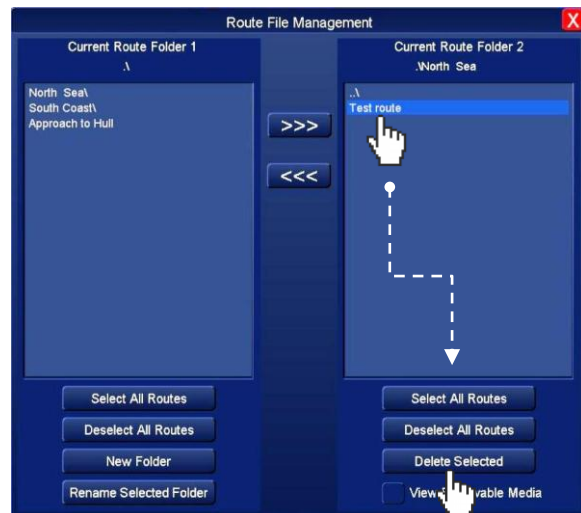
Left click **Delete Selected**.

A warning is displayed stating **Press OK to confirm delete**.

OK: The selected route(s) are permanently deleted from the system.

On networked systems, the route will also be deleted across the network.

Cancel: Cancels the delete; no routes are deleted.



8.3.12 Listing and importing routes from removable media

Compatible routes can listed, copied (imported) and deleted from removable media such as USB flash memory.



Prior to use, all removable media used with Kelvin Hughes products MUST be fully scanned for viruses on a PC that has up to date anti-virus software installed.

See section 2.6.4 for additional information on virus precautions and warnings.

1

Use **Manage Files** to open the **Route File Management** menu.

2

Tick/select **View Removable Media**.

The contents of the removable media are displayed in **Current Route Folder 2**, the drive letter (**E:**) is also displayed.

Note: The system will only show routes that are compatible with the MantaDigital system.

3

Routes from removable media can be selected and imported into the system or system folders using the processes described in the previous sections.

Routes can also be deleted from removable media using **Delete Selected**.

4

If no removable media is found the system displays a warning noting **No removable medium found**.

Route : Southampton to Falmouth											
Save / Print				Manage Files		Check		Edit Route		Edit Pilotage	
				Result Ready						Undo / Redo	
WP#	Name	Latitude	Longitude	Turn Type	Radius	Rate	Planned TOA	Log Length	Bearing	Chain Width	Speed
1	WP1	50° 53.519' N	001° 23.828' W	0.500	10m	0.500	01/08/12 11:26	0.315 NM	182.5°	0.270 NM	15.0 kn
2	WP2	50° 52.211' N	001° 24.942' W	RADIUS	0.500 NM	29 *min	01/08/12 11:21	0.384 NM	187.5°	0.270 NM	15.0 kn
3	WP3	50° 52.959' N	001° 23.822' W	RADIUS	0.500 NM	29 *min	01/08/12 11:23	0.520 NM	136.3°	0.270 NM	15.0 kn
4	WP4	50° 52.272' N	001° 22.818' W	RADIUS	0.500 NM	29 *min	01/08/12 11:26	2.36 NM	129.1°	0.270 NM	15.0 kn



Chapter 8: Route planning

8.3.13 Backup and restore routes

The backup and restoration of routes is carried out using the **Backup & Restore** function which is accessed from the standby screen.

See chapter 5 for full details.

8.3.14 Print a route

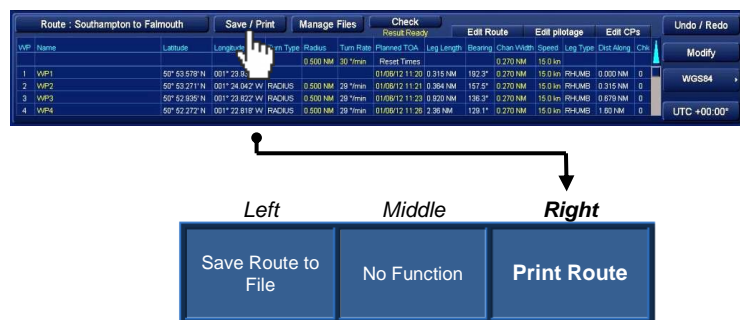
Where a printer is connected and commissioned into a system, selected routes can be printed as follows:

In **Route Planning**, load the route to be printed.

Ensure the printer is switched on.

With the cursor over the **Save/ Print** button, right click on **Print Route**.

The route is sent to the printer.



Printers are configured during commissioning. Addition of a printer after commissioning will require a service attendance.



Caution: Not all printers are compatible with the MANTADIGITAL™ system. Please consult with Kelvin Hughes Ltd prior to obtaining a printer.

8.3.15 Change the datum in route planning

The datum for the chart displayed in route planning can be selected. The CCRP, cursor, chart features and route planning table are converted to the selected datum.

The default datum is **WGS84**

With the cursor placed over the datum button a list of available datum's is shown.

Select the datum required.

The button name changes to reflect the selected datum.



Chapter 8: Route planning

8.3.16 Safety check overview

Using the chart database installed on the system, the **Check** function scans the path of a route for potential hazards which are then identified on screen.



WARNING: Successful safety checking of a route is dependent on the following factors:

- Installed charts and permits are fully up to date.
- Ships safety settings (depth, contour, safety contour etc.) are correctly set.

Check button notices

In route planning, the text below the Check button shows the current status of check for the loaded route:

Route : Southampton to Falmouth										Save / Print		Manage Files		Check Result Ready	Edit Route		Edit pilotage		Edit CPs		Undo / Redo	
WP	Name	Latitude	Longitude	Turn Type	Radius	Turn Rate	Planned TOA	Leg Length	Bearing	Chan Width	Speed	Leg Type	Dist Along	Chk								
1	WP1	50° 53.578' N	001° 23.936' W		0.500 NM	30 °/min	01/06/12 11:20	0.315 NM	192.3°	0.270 NM	15.0 kn											
2	WP2	50° 53.271' N	001° 24.042' W	RADIUS	0.500 NM	29 °/min	01/06/12 11:21	0.364 NM	157.5°	0.270 NM	15.0 kn	RHUMB	0.315 NM	0								
3	WP3	50° 52.935' N	001° 23.822' W	RADIUS	0.500 NM	29 °/min	01/06/12 11:23	0.920 NM	136.3°	0.270 NM	15.0 kn	RHUMB	0.679 NM	0								
4	WP4	50° 52.272' N	001° 22.818' W	RADIUS	0.500 NM	29 °/min	01/06/12 11:26	2.36 NM	129.1°	0.270 NM	15.0 kn	RHUMB	1.60 NM	0								

WGS84

UTC +00:00°

Check text empty

Check

If there is no text below the check box, no route has been loaded.

Not Checked

Check

Not Checked

The route has not been safety checked.

Results Ready

Check

Result Ready

The route has been checked but the results have not been accepted/ saved.

Results saved

Check

0 days since check

The route check has been run, accepted and saved.

Check overdue

Check

85 days since check

The route check was run, accepted and saved xx days ago where xx is the number of days since the last check was run.

Chapter 8: Route planning

Check button overview

With the cursor placed over the **Check** button, the following cursor options are available.

Route : Southampton to Falmouth

Save / Print

Manage Files

Check

Result: Ready

Edit Route

Edit pilotage

Edit CPs

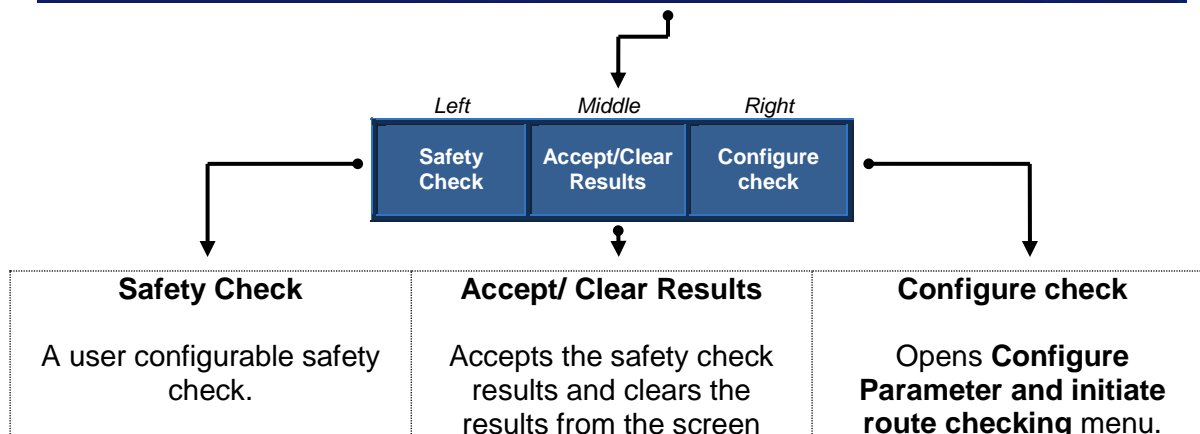
Undo / Redo

WP	Name	Latitude	Longitude	Turn Type	Radius	Turn Rate	Planned	Leg Length	Bearing	Chan Width	Speed	Leg Type	Dist Along	Chk	
1	WP1	50° 53 578' N	001° 23 936' W		0.500 NM	30 °/min	Reset Times	01/06/12 11:20	0.315 NM	192.3°	0.270 NM	15.0 km	RHUMB	0.000 NM	0
2	WP2	50° 53 271' N	001° 24 042' W	RADIUS	0.500 NM	29 °/min		01/06/12 11:21	0.364 NM	157.5°	0.270 NM	15.0 km	RHUMB	0.315 NM	0
3	WP3	50° 52 935' N	001° 23 822' W	RADIUS	0.500 NM	29 °/min		01/06/12 11:23	0.920 NM	136.3°	0.270 NM	15.0 km	RHUMB	0.679 NM	0
4	WP4	50° 52 272' N	001° 22 818' W	RADIUS	0.500 NM	29 °/min		01/06/12 11:26	2.36 NM	129.1°	0.270 NM	15.0 km	RHUMB	1.60 NM	0

Modify

WGS84

UTC +00:00+



Route checking preliminaries

Before running a safety check, the objects to be checked along the path of the route must be configured using **Configure Check** (see next page).

8.3.17 Safety check parameters

With the cursor over the **Check** button in Route planning, Click **Configure check** to open the **Configure Parameter and initiate route checking** menu.

Objects in Full Check


This is an IMO defined list of objects that are checked during a **Full Check**.

This list cannot be modified.

Objects in Safety Check

This is a list of objects that are checked during a **Safety Check**.

This list can be modified.



Add to Safety Checks

Objects can be added to the safety check list by selecting individual items or groups of items from the list of **Objects in Full Check** and pressing the **Add to Safety Checks** button.



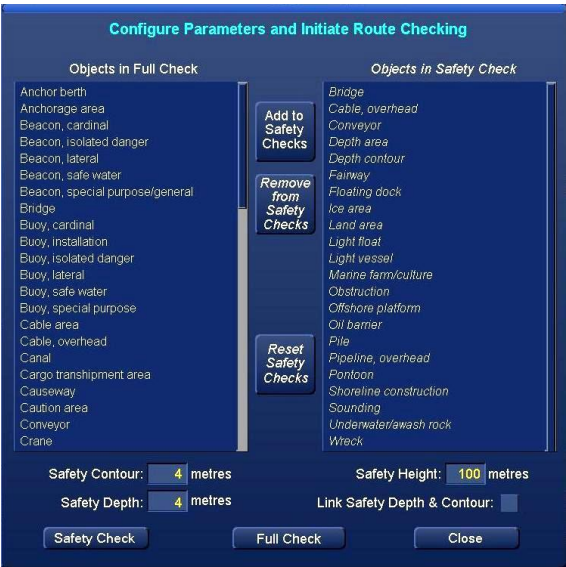
Remove From Safety Check


Objects can be removed from the *objects in safety check* list by selecting individual items or groups of items and pressing **Remove From Safety Check**.



Reset Safety Checks

This resets **Objects in Safety Check** to the IMO recommended level (the same as a full check).





Caution: All safety values are directly linked to the values set in chart settings. Changing the safety settings in *Configure Check* changes the values in *Chart Settings*.

Safety Check button


Scans the selected route using objects listed in **Objects in Safety Check**.

Full Check button

Scans the selected route using objects in **Objects in Full Check**.

Close

Closes the **Configure Parameter and initiate route checking** menu.



Note: Checking a long route may take some time.

8.3.18 Safety checking a route

1

For accurate safety checking all charts and permits **MUST** be fully up to date and the vessel safety settings correctly configured.

Load the route to be checked.

Configure the safety check objects using **Configure check** (see previous section).

To commence the safety check, place the cursor on the **Check** button and press **Safety Check**

2

The system will scan the route for hazards using the objects listed in the **Objects in Safety Check**.

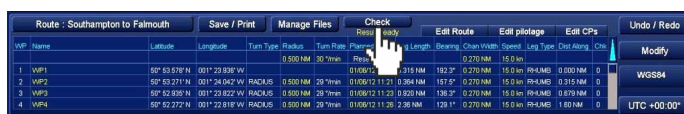
Caution: This is NOT a full safety check

NOTE: Safety checking long routes may take some time.

3

When the safety check is complete, hazards are shown on screen:

In the **Edit Routes** tab, the number of hazards identified in each leg of the route is shown in the **Chk** column.



Left

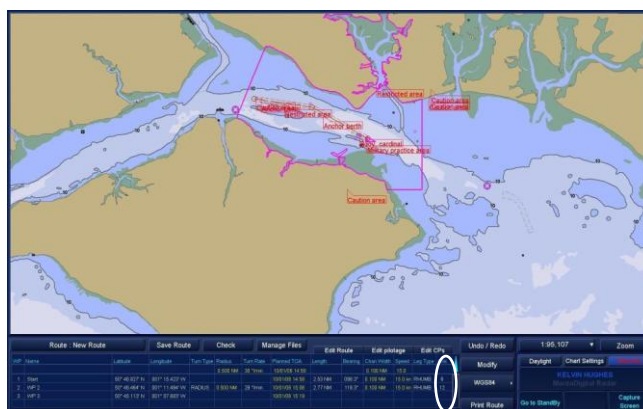
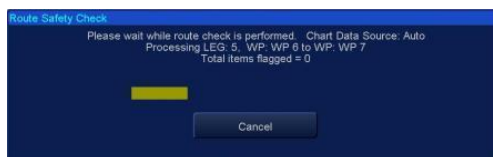
Middle

Right

Safety Check

Accept/Clear Results

Configure check



Continued on next page

Chapter 8: Route planning

4

Specific hazards are outlined in red with a brief description of the hazard.

Place the cursor over the point of the hazard warning arrow and the hazard details are displayed.

Click on the point of the arrow and the **Chart Query** dialogue will also open showing more detailed data.

5

Some chart areas may be outlined in magenta.

This indicates that there is a specific hazard associated with the outlined area, for example a restricted area.

6

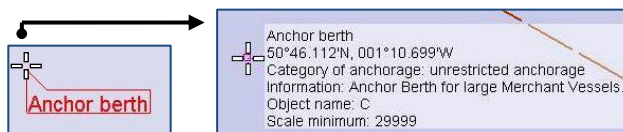
When the hazards have been identified and the route amended as necessary, the safety check must be saved.

With the cursor placed over **Check**, middle click on **Accept/Clear Results**. The system prompts with '**Approve route for use**'.

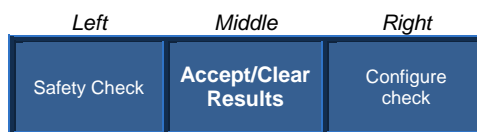
Yes: Saves the safety check time and date and clears the results from the screen.

No: Cancels the safety check and clears the results from the screen.

The route should now be **Saved** as described in section 8.3.3.



Route : Southampton to Falmouth									
Save / Print Manage Files Check Edit Route Edit pilotage Edit CPs Undo / Redo									
WP Name	Latitude	Longitude	Turn Type / Radius	Turn Rate / Phase	Radius	Length	Bearing	Chain Width	Speed
1. WP1	50° 53.516' N	001° 23.808' W	0.500 NM / 30° turn	0.00012	0.00012	2.315 NM	192.3°	0.270 NM	15.0 kn
2. WP2	50° 53.211' N	001° 24.942' W	0.500 NM / 20° turn	0.00013	0.00013	0.368 NM	157.2°	0.270 NM	15.0 kn
3. WP3	50° 52.836' N	001° 23.822' W	0.500 NM / 20° turn	0.00013	0.00013	0.520 NM	136.3°	0.270 NM	15.0 kn
4. WP4	50° 52.272' N	001° 22.818' W	0.500 NM / 20° turn	0.00013	0.00013	0.520 NM	128.1°	0.270 NM	15.0 kn



8.3.19 Full safety check a route

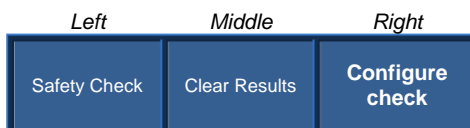
1

For accurate safety checking all charts and permits **MUST** be fully up to date and the vessel safety settings correctly configured.

Load the route to be checked.

Place the cursor on **Check** and press **Configure Check**

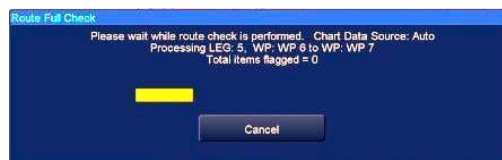
In **Configure Parameters** and initialise route checking, Select **Full Check**



2

The system will scan the route for hazards using the IMO recommended objects listed in the **Objects in Full Check**.

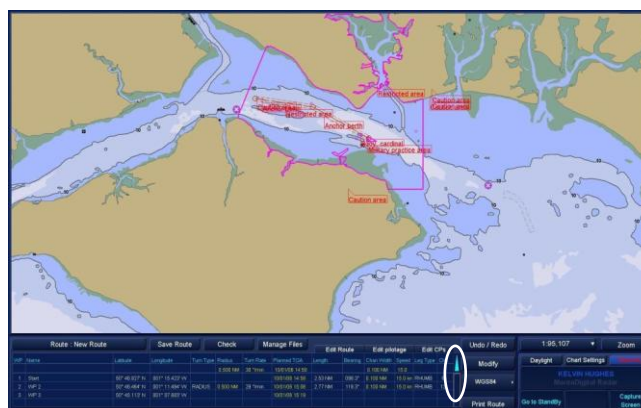
NOTE: Safety checking long routes may take some time.



3

When the safety check is complete, hazards are shown on screen:

In the **Edit Routes** tab, the number of hazards identified in each leg of the route is shown in the **Chk** column.

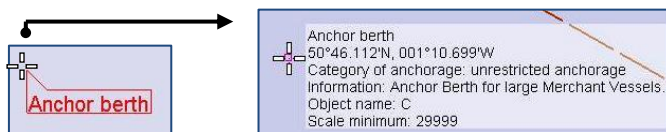


4

Specific hazards are outlined in red with a brief description of the hazard.

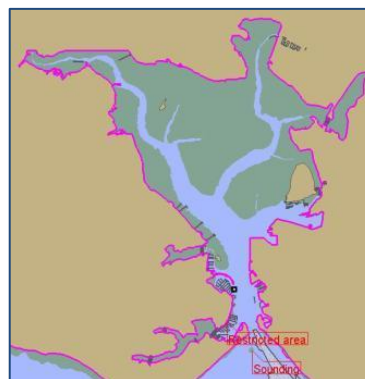
Place the cursor over the point of the hazard warning arrow and the hazard details are displayed.

Click on the point of the arrow and the **Chart Query** dialogue will also open showing more detailed data.



5

Some areas may be outlined in magenta. This indicates that there is a specific hazard associated with the outlined area, for example a restricted area.



6

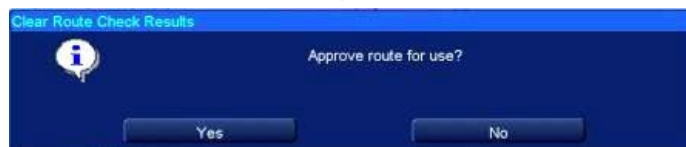
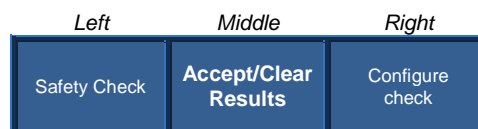
When the hazards have been identified and the route amended as necessary, the safety check must be saved.

With the cursor placed over **Check**, middle click on **Accept/Clear Results**. The system prompts with '**Approve route for use**'.

Yes: Saves the safety check time and date and clears the results from the screen.

No: Cancels the safety check and clears the results from the screen.

The route should now be **Saved** as described in section 8.3.3.



8.3.20 Clear the safety/ full check results from screen

1

The results of a **Safety** or **Full Check** can be removed from the display without affecting the route.

Once removed, the results can only be recovered by running a safety or full check again.

2

Place the cursor on **Check**

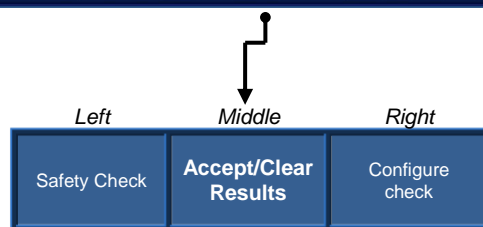
Middle click on **Accept/Clear Results**.

The system prompts with '**Approve route for use**'.

Select **NO**.

The results of the check are removed from the screen.

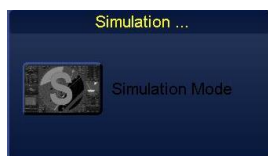
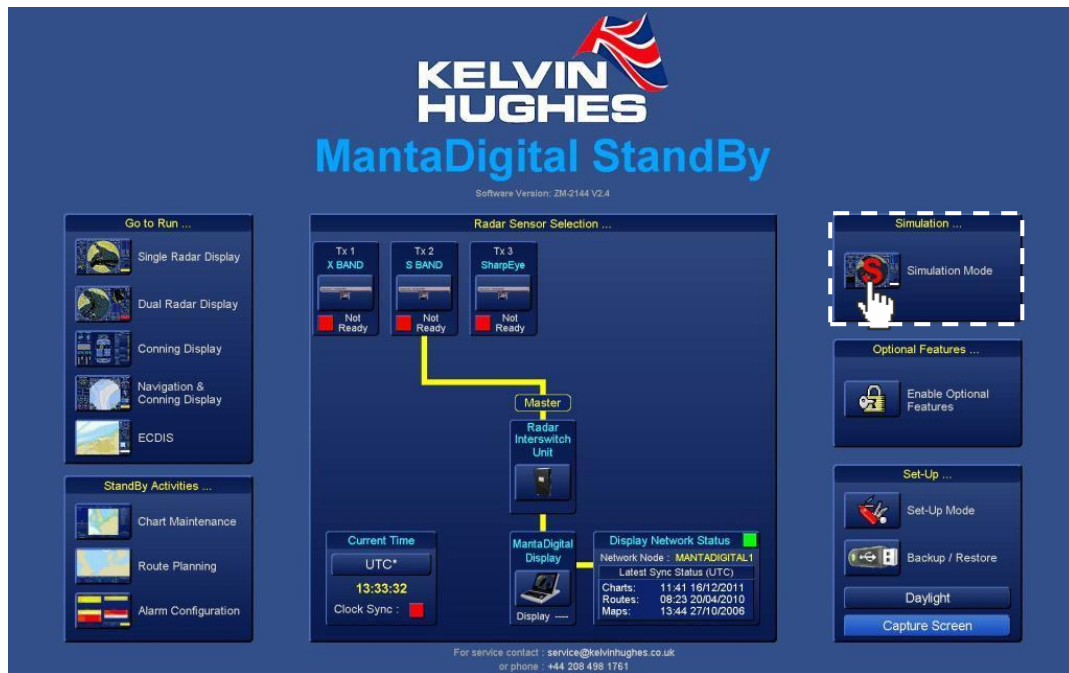
Safety/ Full check results are NOT saved.



9 Simulation mode

Simulation Mode runs a pre-recorded playback of data that can be used for familiarisation and training purposes.

Where enabled in Optional Features (*simulator is not enabled on all systems*), the simulator is accessed by selecting the **Simulation Mode** icon in the **Simulation...** area of the standby screen:



If the Simulator is 'greyed-out' or cannot be accessed Simulation mode has not been enabled in optional features or there may be a problem with the eToken.

See index entry for eToken software or optional features for additional details.

9.1 Run Simulator Mode


When simulator is selected a replay of a vessel leaving the Thames estuary is shown.

The replay lasts approximately 5 minutes.

A red '**S**' is shown at the bottom of the screen indicating the system is running in Simulator mode.



9.2 Simulation: Changing display modes

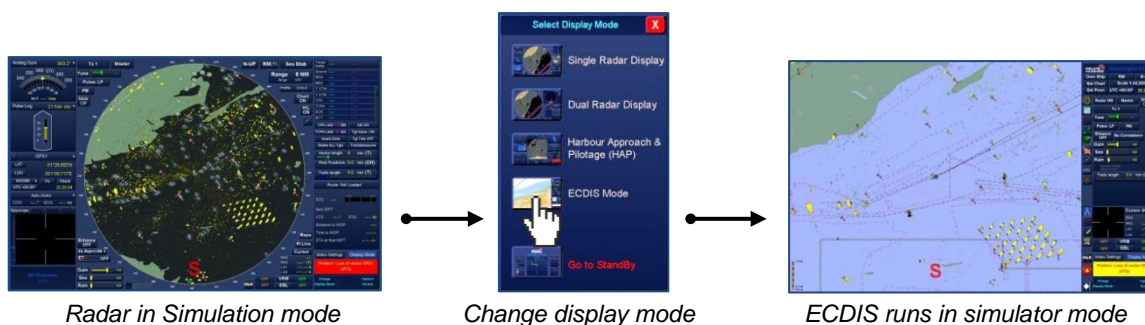


Warning

If the display mode is changed whilst Simulator mode is running, the selected mode will continue to run simulated data.

LIVE NAVIGATION DATA IS NOT SHOWN

A red 'S' continues to be shown at the bottom of the screen indicating the Simulator is running.



Operating in Simulator mode

The following functions **do not operate** during simulation replay.

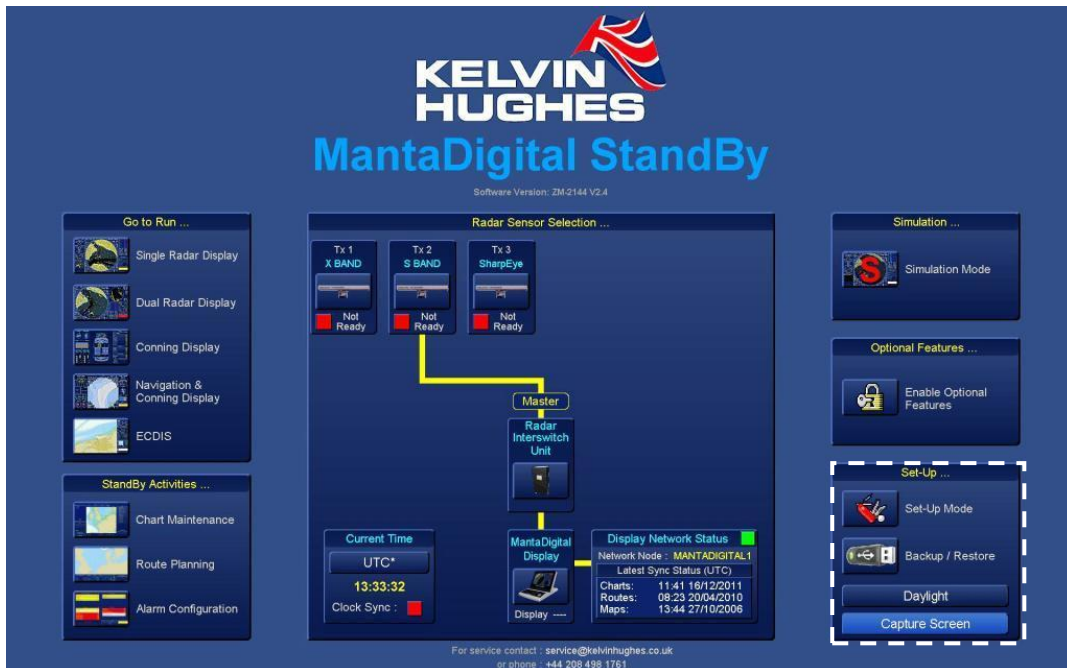
- Tune bar
- Pulse length control
- Performance monitor
- Mute
- Sea & Rain filters

9.3 Stop the simulator

To stop simulation mode from any navigation mode selected, return to the **StandBy** screen.

10 Set-up mode

Set-up mode can only be accessed by commissioning or service engineers.



Access to Set-up mode is **password protected** and can only be accessed by authorised Kelvin Hughes engineers or agents.

Access to the Set-up page is monitored and logged by the system.



WARNING

Unauthorised access to the Set-up menus invalidates the warranty status of the unit and can inhibit the functionality of the system.



WARNING

There are no operational or software requirements that necessitate access to the operating system desktop.

Unauthorised access to the operating system desktop by any means invalidates the warranty status of the unit (see section 2.6)

Attempted access to the desktop is logged by the system

11 Fault Finding

11.1 Fault finding



Caution: Users must not attempt to change printed circuit boards, disassemble any part of the system, access the system setup pages or use diagnostic software without the prior agreement of Kelvin Hughes Ltd.



WARNING: Lethal voltages are present within the equipment.

Screen lock-up

Problem	Possible cause	Action
Picture not updated or appears to be <i>lock-up</i> . This may be indicated by the UTC time not changing	Possible system error	Shut down and restart the processor.

External sensor failures

Problem	Possible cause	Action
Heading, speed, position or depth sensor failure alarm.	The indicated sensor has not been detected	Ensure that the sensor is switched ON and a reading can be made on any repeaters or other navigation equipment. See Sensor Selection in handbook HBK-4001 part 1 for additional details on possible sensor errors.

Transceiver performance issues

Problem	Possible cause	Action
Poor discrimination in range	Sea anti-clutter control not set correctly	Adjust SEA anti-clutter control
Tuning adjusted correctly, but poor sensitivity	Low magnetron power. Receiver failure. Dirt on antenna radiator face.	Carry out a performance monitor check. If the results show degradation there is possibly a fault in the transceiver or the magnetron needs replacing. If the performance monitor is OK there may be dirt of the antenna face. Observing all relevant health and safety requirements and ensuring all necessary equipment is fully isolated from the power supply, clean the antenna radiator face
Target Tracking target not tracked correctly	Poor definition of targets in sea clutter	Adjust the SEA anti-clutter and RAIN anti-clutter controls to improve target definition.

Chapter 11: Fault Finding

Transceiver warning messages		
Problem	Possible cause	Action
No Sync	Transceiver sync pulses are not being detected at the processor	This could be an indication that the transceiver is not transmitting. Ensure that the selected transceiver is: <ul style="list-style-type: none"> Selected as <i>Master</i> not <i>Slave</i>. Is showing as Tx ready.
No Azimuth	Transceiver azimuth pulses are not being detected at the processor	This could be an indication that the gearbox is not running. Ensure that the selected transceiver is: <ul style="list-style-type: none"> Selected as <i>Master</i> not <i>Slave</i>. Is showing as Tx ready. The antenna is rotating when in Run mode
No Heading Line	Transceiver heading line pulses are not being detected at the processor	This could also be an indication that the gearbox is not running. Ensure that the selected transceiver is: <ul style="list-style-type: none"> Selected as <i>Master</i> not <i>Slave</i>. Is showing as Tx ready. The antenna is rotating when in Run mode
Receiver Sensitivity Low	SharpEye™ only The minimum detectable signal is below a pre-set threshold	<p>In any of these alarm conditions, the SharpEye™ transceiver will either enter one of the following modes:</p> <p>Degraded mode: The transceiver will continue to operate at reduced power with a loss of performance or functionality</p> <p>Fault mode: The transceiver will shut down.</p> <p>Call the Kelvin Hughes Service Control Centre or the agent.</p>
Antenna VSWR High	SharpEye™ only Indicates a mismatch in the VSWR into the antenna	
RF Power Low	SharpEye™ only The RF power output from the transceiver has fallen below 100 watts	
PLO Lock	SharpEye™ only Indicates hardware fault in phase locked oscillator	
Synth Lock	SharpEye™ only Indicates hardware fault in frequency synthesiser	
Transmitter Over-temperature	SharpEye™ only The temperature of the RF power transistors is high	

If a fault condition persists, please contact Kelvin Hughes using the contact details shown in Section 18: *Contacting Kelvin Hughes*.

11.2 Fuse replacement



WARNING: Lethal voltages are present within the equipment.

All maintenance procedures and/ or fuse replacement must be carried out by a suitably trained engineer with the power supplies switched OFF and fully isolated at the appropriate power breaker.



Caution: This equipment contains electrostatic sensitive devices. To prevent damage to equipment; when implementing corrective maintenance, ensure that an earthing strap is used to connect the maintainer to the earth stud located within the MANTADigital navigation processor.

11.2.1 MANTADigital navigation processor

AC mains supply:

- There are two fuses on the power supply assembly
- Fuse rating and type: 10A 250V, anti-surge, 5x20mm
- Kelvin Hughes spare part No. 45-615-162-50

+12V supply on FSD-A178 PCB:

- Fuse rating: 3.15A, anti-surge, 5x20mm
- Kelvin Hughes spare part No. 45-615-161-30

Fuse location in MANTADigital navigation processor:

Where possible, shutdown the processor and fully isolate the power supply to the unit.

Unlock and open the front door of the Processor unit.

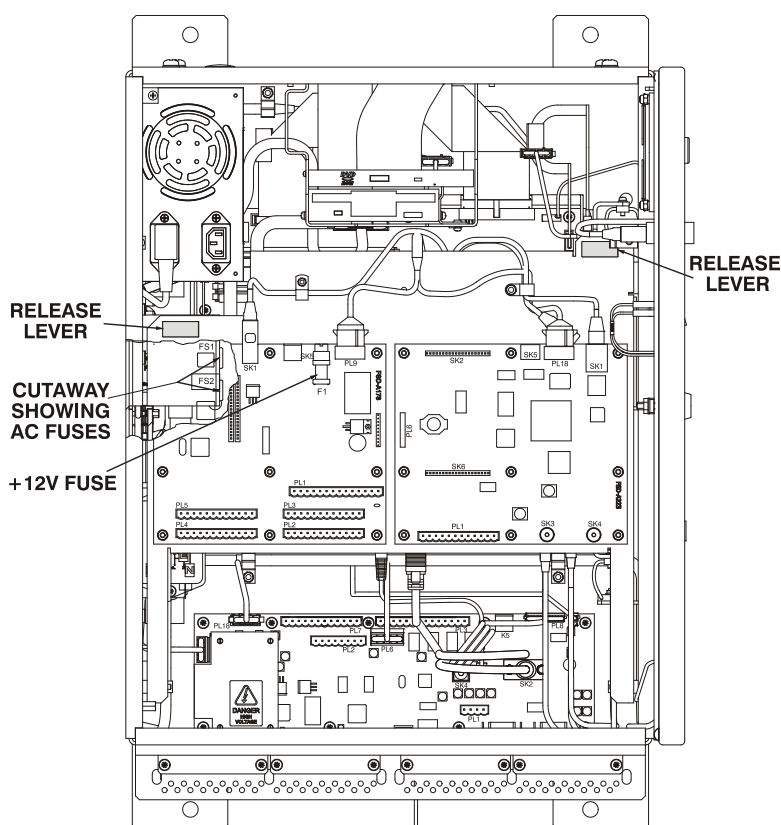
AC mains input fuses:

These are located on the power supply assembly behind the drop down mounting plate.

Release the plate by lifting the two release levers and lowering the plate forwards.

Fit the new fuse(s), close and secure the drop down mounting plate.

+12VDC supply fuse: This is located on a PCB within the unit as shown.



11.2.2 Radar Interswitch Unit

The fuse for the MDP-A12 RIU is located under a clear protective cover on the main PCB within the unit.

F1 on NNR-A5179 PCB:

- Fuse rating and type: 3.15A 250V, anti-surge, 5x20mm
- Kelvin Hughes spare part No. 45-615-162-30

11.2.3 Transmitter Interface Unit

The fuse for the NNR-A66-ABAB is located on the main power supply within the unit (see section 11.2.5).

11.2.4 Transceivers

Description	Part number	Fuse location and value
MK4 Transceiver & gearbox	CAE-A12-20	The fuse for CAE-A12-20 is located on the main power supply within the unit (see section 11.2.5).
MK5 Standard speed transceiver & gearbox	CAE-A30-20 CAE-A30-22	There are no user accessible fuses within the MK5 standard speed gearbox or transceiver.
MK5 High speed transceiver & gearbox	CAE-A30-21	The fuse is located on the CAE-A236 PCB inside the gearbox. Please refer to Kelvin Hughes or one of our official agents as accessing the fuse requires the removal of some safety critical parts of the system.
MK5 High speed gearbox	CAE-A30-23	The fuse is located on the CAE-A236 PCB inside the gearbox. F1 on CAE-A236 PCB: <ul style="list-style-type: none"> ▪ Fuse rating and type: 15A 250V, time delay, 5x20mm ▪ Kelvin Hughes spare part No. 45-650-0004-002
MK7 X band downmast Tx	CTX-A8	The fuse is located on the main power supply within the unit (see section 11.2.5).
MK7 S band downmast Tx	CTX-A9	The fuse is located on the main power supply within the unit (see section 11.2.5).
MK7 S band gearbox	GTX-A11	There are no user accessible fuses within this unit.
MK7 S band upmast transceiver & gearbox	GTX-A16	The fuse is located on the main power supply within the unit (see section 11.2.5).
SharpEye Upmast transceiver & gearbox	DTX-A1	There are no user accessible fuses within this unit.

11.2.5 Power supply Fuse

The fuse for the power supply is located on the front of the power supply as shown:

A neon is illuminated within the unit when AC mains.



Fuse on power supply:

- Fuse rating and type: 8A 250V, HRC ceramic, 5x20mm
- Kelvin Hughes spare part No. 45-650-0004-009

11.2.6 Drive control unit

The fuses for the GTX-A24 drive control unit are located externally on the base of the unit.

Fuses on base of unit:

- Fuse rating and type: 10A 250V, ceramic time lag, 6.3x32mm
- Kelvin Hughes spare part No. 45-650-0054-001

Chapter 11: Fault Finding

11.3 Fault reporting

The following form should be completed and returned to Kelvin Hughes. This form assists in our understanding of any reported errors, possible spares required or software versions for a MANTADigital system.

Vessel Name			
What is the serial number of the processor? <i>This is located on a plate mounted <u>on the processor</u> and is NOT the part number printed on the display. For example: MDP-A1 Ser. No. M100000</i>	Ser. No.		
Display screen size	20 inch <input type="checkbox"/>	22 inch <input type="checkbox"/>	26 inch <input type="checkbox"/>

11.3.1 Software versions

From the **standby screen** you will see the current version of ZM-2144 software. Place the cursor on this text and press the left hand button. The software version screen will open (example shown below):



Please make a note of the Software versions below.

Description	Number	Version.
MANTADigital Chart Radar Software.	ZM-2144	V
Manta Systems Interface (FSD-A178) firmware.	ZM-2008	V
Manta Systems Interface (FSD-A179) firmware.	ZM-2007	V
Manta Transmitter Interface (FSD-A223) FPGA.	ZM-2160	V
Manta Transmitter Interface (FSD-A223) firmware.	ZM-2114	V
Wide-Screen Display Interface (FSD-A242) firmware (<i>see note</i>).		
Kelvin Hughes USB driver	ZM-2006	V

(Note: In some versions of software the FSD-A242 will show 'invalid', this is not an error).

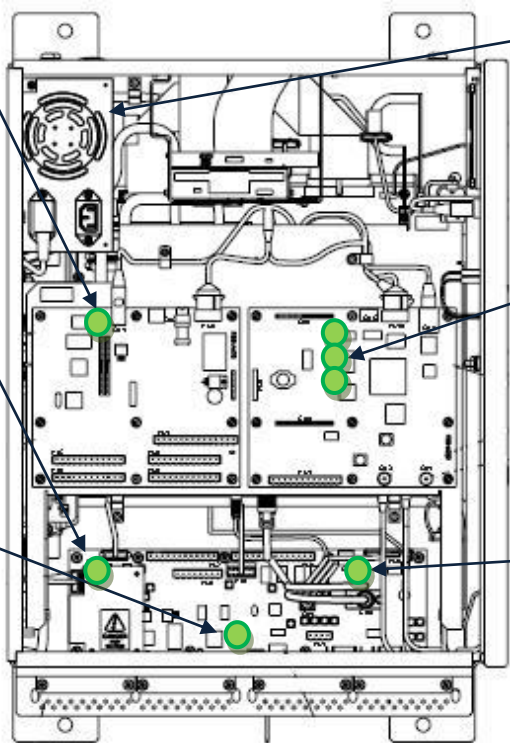
Press **X** to close the software version box.

Chapter 11: Fault Finding

11.3.2 Hardware checks

Please confirm (tick) the status of the items indicated below

(Note that LED locations are approximate)



FSD-A178 PCB
Processor OK
Green LED

OFF	<input type="checkbox"/>
ON	<input type="checkbox"/>
Flashing	<input type="checkbox"/>

FSD-A179 PCB
Mains ON
Green LED

OFF	<input type="checkbox"/>
ON	<input type="checkbox"/>

FSD-A179 PCB
Processor OK
Green LED

OFF	<input type="checkbox"/>
ON	<input type="checkbox"/>
Flashing	<input type="checkbox"/>

Fans
Fans running (rotating)?

PSU (indicated)	<input type="checkbox"/>
Door (two fans)	<input type="checkbox"/>
Motherboard	<input type="checkbox"/>

FSD-A223 PCB
Green LEDs

	D7	D9	D10
OFF	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ON	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Flashing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

FSD-A179 PCB
PSU OK
Green LED

OFF	<input type="checkbox"/>
ON	<input type="checkbox"/>

11.3.3 Transceiver type and status

Transceiver Type	Tx 1	Tx2	Tx 3	Tx 4	Tx 5	Tx 6
Part number						
Not fitted		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
X band	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
S band	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Standby Screen Status							
■	OFF	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
■	Not Ready	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
■	Ready	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Antenna rotates in RUN?		<input type="checkbox"/> YES <input type="checkbox"/> No	<input type="checkbox"/> YES <input type="checkbox"/> No	<input type="checkbox"/> YES <input type="checkbox"/> No	<input type="checkbox"/> YES <input type="checkbox"/> No	<input type="checkbox"/> YES <input type="checkbox"/> No	<input type="checkbox"/> YES <input type="checkbox"/> No

11.3.4 Alarms/ conditions seen

Please give a brief description of **ALL** alarms or conditions that have been experienced. If the alarm is specific to a transmitter please note the transmitter number (e.g.Tx1: Alarm No Sync). Please also make notes of any tests carried out.

11.3.5 Additional data

Capture a screen: Pictures of most screens can be taken *without the need of a camera*.

With the display in RUN mode placing the cursor over "**Display Mode**" gives the right hand button option of "**Capture Screen**". Pressing this button takes a time and date stamped capture of the entire radar screen.

Exporting pictures: Once captured, the screen shots can be exported to a USB memory stick. The files are approximately 100Mb to 400Mb (*see section 5 for details on how to extract screen captures*).

System backup: The configuration and setup of the system can be extracted from the system using the **Backup All** function in the Backup and restore menu (*see section 5 for details*).

11.3.6 Contact details

Contact details (Phone / email etc.)	
Form completed by	
Date (DD / MM / YYYY)	
Company	

11.4 Grab-IT fault diagnostic software

The Kelvin Hughes 'Grab-IT' Software is a diagnostic tool for MANTADigital navigation processor series. The software is supplied by the technical advice department of Kelvin Hughes and is not part of a standard system.

When the software is run it analyses the system and produces a report which can be emailed to our technical advice department for investigation.

Antivirus warnings and precautions



Warning: Prior to use, all removable media used with Kelvin Hughes products **MUST** be fully scanned for viruses on a PC that has *up to date* anti-virus software installed.

See section 2.6.4 for additional information on virus precautions and warnings.

1

Kelvin Hughes technical advice will email a compressed file (WinZip) called grabit.zip

Noting all antivirus precautions, unzip the file and copy the contents (MDx_x_x.grabIT) to a virus free USB memory device.

Rename the file MDx_x_x.exe

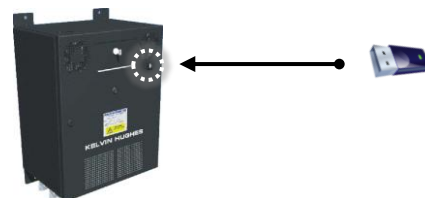
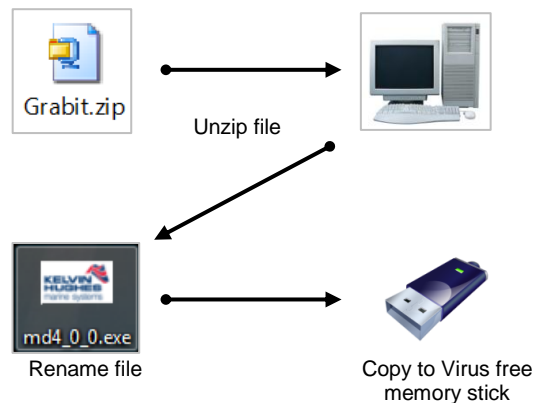
Note 1: x_x_x is the version number of the software issued.

Note 2: The file must be 'unzipped' and renamed prior to use. The file cannot be unzipped on the MANTADigital navigation processor.

2

Insert the memory stick containing MDD4_0_3.exe into the MANTADigital processor.

Caution: DO NOT remove the USB memory device until the Grab-IT program has finished running and the system has been restarted.



3

In the standby screen, click on the software version.

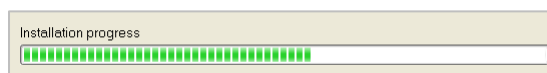
4

Click on the **Upgrade software** button.

In the software upgrade dialogue click **YES**. Note: *this will NOT upgrade the system software but will run the Grab-IT program from the USB memory device.*

5

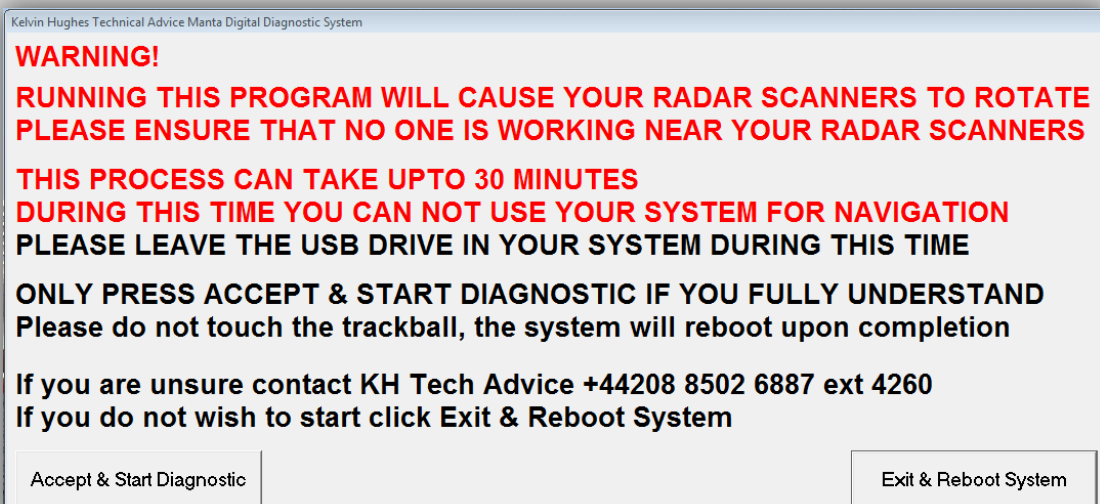
The MANTADigital program will close and the Grab-IT program will start.



6

The system will now prompt with the following critical safety warning.

THE FOLLOWING WARNINGS MUST BE READ AND UNDERSTOOD.



7

When the warnings have been read and understood, press:

Accept & Start Diagnostic to run the Grab-IT program.

Exit & Reboot System to stop the Grab-IT program and return to normal navigation modes.

When the program is run, various diagnostic screens will open. As per the acknowledged warnings users should be aware that antennas may rotate. Users must also not touch or use the system and the USB memory device must not be removed until the program is complete.

When the diagnostics has been completed the system automatically copies the results to the USB memory device and the reboots the system.

After the restart, the system can be used for its normal navigation purpose.

8

When Grab-IT has completed running it automatically copies the following files onto the USB memory device.

FULLkhexportV2XXX.kham

Full diagnostic report and all screen captures.

File size: Varies depending on the number of screenshots but can be many Megabytes.

Note: Screen captures are removed from the system when Grab-IT has been run.

STANDARDkhexportV2XXX.kham

Full diagnostic report and NO screen captures.

File size: Less than 2.5mb

LITEkhexportV2XXX.kham

Basic diagnostic report and NO screen captures.

File size: Less than 200kb



Depending on the bandwidth of the available email system, one of the above files will need to be returned to Kelvin Hughes for investigation. Note that it is *not necessary* to return all three files.

Please return the largest file possible to Technical.advice@kelvinhughes.com

9

Notes & precautions:

- Do not delete the *.KHAM* files until the issue under investigation has been resolved.
- The *.kham* file is encrypted and *cannot be opened* or analysed by the user or Kelvin Hughes agents.
- DO NOT attempt to compress the file before sending it by email. Compressing a *.kham* file actually increases the size of the file.

12 Crew based maintenance

12.1 Routine maintenance

This section provides information on routine maintenance for the MANTADigital widescreen navigation system.

Preventive Maintenance comprises keeping the equipment clean, particularly the screen, console cabinets and fan exhaust filters, and carrying out transceiver performance checks.

All shipbourne/ manufactures health and safety procedures and safety warnings must be read, understood and observed at all times when maintaining any part of a Kelvin Hughes navigation system. If you are in any doubt as to the nature of these warnings please consult with Kelvin Hughes or one of our official agents prior to carrying out any maintenance tasks.

	<p style="text-align: center;">WARNING</p> <p style="text-align: center;"><i>Lethal voltages are present within the equipment.</i></p> <p style="text-align: center;"><i>All maintenance procedures must be carried out with the relevant power supplies switched OFF and fully isolated.</i></p>
---	--

General maintenance

Cleaning: Ensuring systems are fully isolated from their respective power supplies, clean the equipment as follows:

- **External surface:** External surfaces (but not screens) should be cleaned with a soft, non-abrasive cloth moistened in a mild soap solution.
- **Trackerballs:** Clean trackerballs with a soft clean cloth. The trackerball is optical so has no internal parts that need routine cleaning.
- **Screens:** Screens are to be checked and cleaned regularly using a proprietary screen cleaner and a soft cloth. Do not use abrasive detergents or cleaning material as this may damage the screen.
The screen must not be dismantled for cleaning.

Electrical connection: Observing all safety considerations and ensuring that all power supplies are isolated, check that all connections especially earth bonding's are secure and in their correct positions.

Chapter 12: Crew based maintenance

Fans: Ensure system fans are operational.

The fan filter must be checked and cleaned every 3 months as follows:

Switch the system OFF and ensure that all power supplies to the processor are isolated.

Unlock and open the processor door. The fan filter is located in the lower section of the door.

Remove the filter, inspect and if necessary clean using a vacuum cleaner to remove any dust.

If it is not possible to satisfactorily clean the filter, a new one must be fitted.

Replacement filter part number MDP-1039

Replace the filter, close and lock the door then restore the power.



Location of fan filter



Caution: Do not wash the air filter.

12.2 Radar Sensor Maintenance

Radar transceiver and gearbox maintenance is limited to visual inspection, cleaning the antenna transmission facia and checking the performance monitor (where fitted).

Safety considerations



WARNING: Before carrying out any maintenance on transceivers or gearboxes, ALL power supplies must be switched OFF and be fully isolated. All health and safety precautions must be observed when working on gearboxes and antennas.

When working aloft, ensure that someone in authority at deck or at ground level is aware of your intentions and that suitably placed warning notices are posted warning that work aloft is in progress. Ensure that the means of access aloft is secure and beware of wet or slippery ladder rungs and working areas.

S band transceivers: Ensure the system is fully isolated and that the keyswitch on the Drive Control Unit is set to OFF.

Remove and retain the Drive control unit key whilst aloft.

X band transceivers: Isolate the transceiver from the mains supply. On transceivers fitted with a Transmitter Interface Unit (TIU), ensure the TIU power switch is set to OFF and if possible, remove the fuses. The TIU unit does not have a keyswitch.

Gearbox inspection:

- Ensure that all bolts and waveguide connections are secure and show no signs of corrosion or damage.
- Check that cable glands and cable entries are securely fastened and are waterproof.
- Ensure all earth bonding points are secure.
- Check the mechanism for any signs of damage or corrosion.

Antenna:

- Check the antenna for any signs of damage.
- Clean the antenna facia with a soft, non-abrasive cloth moistened in a mild soap solution.
- Check the antenna for signs of excessive end play, if more than +/-10mm please consult with Kelvin Hughes or one of our authorised service agents.



Caution: The antenna surface must never be painted.

Performance Checks: The procedure for testing the transceiver performance can be found in handbook HBK-4001 part 1 section 6.

Performance monitor checks must be carried out regularly in line with IMO regulations and ship specific requirements.

The results of the performance monitor tests should be recorded.

Notes:

- *Transceiver magnetrons are a lifed item and should be replaced when the running hours approach the life of the magnetron.*
- *Test result measurements should be recorded in Nautical miles.*
- *The SharpEye™ transmitter does not have a user accessible performance monitor. The SharpEye™ will automatically alert the user to any performance related issues.*

12.3 System backup

The system set-up, commissioning data and all user generated data (routes, maps etc.) is internally stored on the systems hard disk.

A back-up of all data should be taken at regularly intervals and safely stored for possible use during service attendances.

See section 5.1/ page 21 for instructions on how to backup all data.

13 Interpreting the Radar display

This section describes some of the factors that influence radar performance and the presentation of a radar image.

13.1 Source material

This section makes reference to the regulations specified in IEC62388 Maritime navigation and radio communication equipment and systems. Copies of IEC specifications and additional information can be obtained via the IEC at www.iec.ch

Reference publications on the use of Radar at Sea are also available from the Royal Institute of Navigation at www.rin.org.uk or similar marine publication suppliers.

13.2 Factors Affecting Performance

The following factors influence target detection:

- Target characteristics such as Radar Cross Section (RCS), stability and aspect, height.
- Wind strength and direction relative to the line of sight between the antenna and the target.
- Sea state, wave height, clutter spike characteristics.
- Rainfall and rain extent.
- Radar antenna height.

A target may demonstrate low probability of detection in the near range with an acceptable or high probability of detection in the further ranges.

Installation Factors

A long transmission line will have losses and performance will typically be reduced by 3.0dB for a 30m transceiver to antenna separation. A damaged transmission line, poorly fitted transmission couplings, water or corrosion within the transmission line will all result in performance losses. Problems associated with transmission lines often cause a strong signal extending from zero range, similar to a sun at the centre.

Antenna Design, Height, Range and Bearing Discrimination

The antenna design influences detection performance. The vertical radiation pattern of the antenna is designed to perform when own ship pitches and rolls without undue loss of performance, while also providing a main beam pattern to curtail degradation in performance due to nearby structures and to minimise the illumination of precipitation. Both X-band and S-band radar systems operate in a horizontally polarised mode and the design minimises the antenna sidelobes that might otherwise be exhibited on larger targets.

Chapter 13: Interpreting the Radar display

Radar performance is very dependent on the location of a radar antenna. Sectors that need to be muted (no transmission) and potential blind sectors should be recorded for each sensor and bearings saved in the radar display.

Antenna height is an important factor in target detection. A higher antenna will provide a better range of first detection however, it will also extend the clutter field and effectively mean small targets are more difficult to detect. A lower antenna may result in waves masking small targets that have a height which is significant relative to wave peaks.

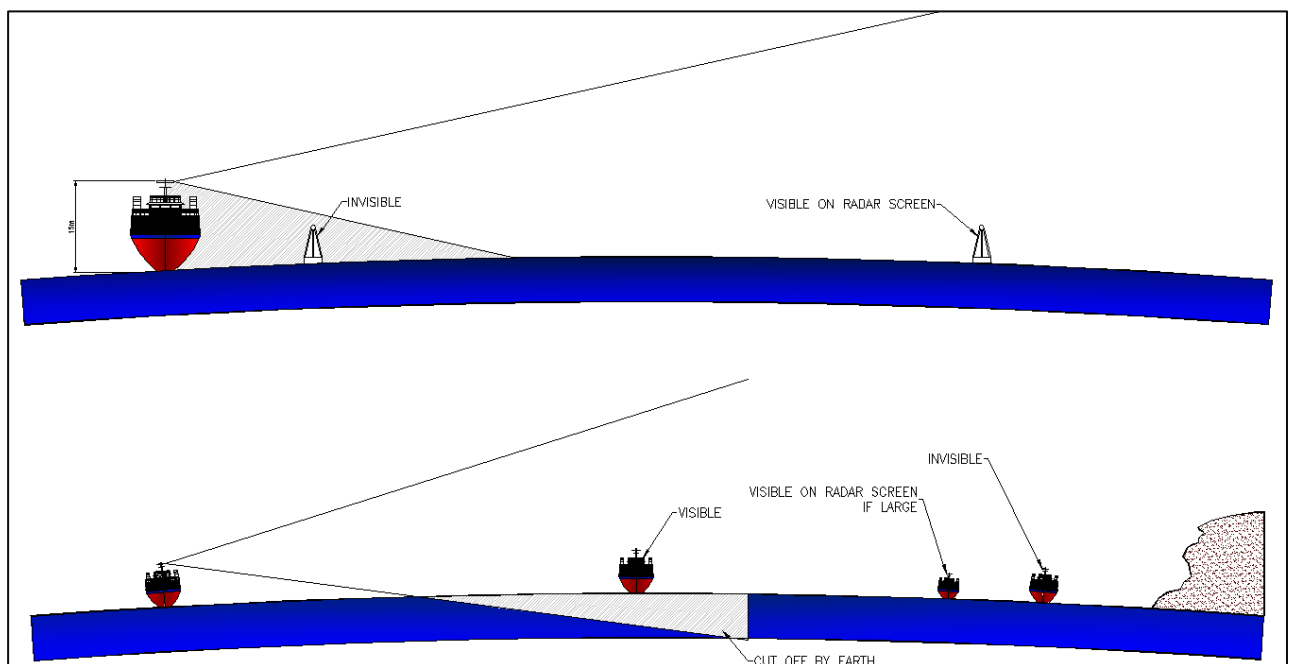
The height of the Antenna above the waterline also affects the maximum and minimum range performance of the equipment. The ability to discriminate between objects that are very close together depends on the range and bearing discrimination performance. Range discrimination is mainly dependent on the Pulse Length in use. Bearing discrimination is a factor of the size of target and Antenna parameters.

Minimum Range

Radar performance on larger ships may suffer from shadowing where the minimum radar detection range will be degraded by a combination of antenna height, ship structures and cargo. The minimum range is defined by the shortest distance at which, using a scale of 1.5 or 0.75 NM, a target having an echoing area of 10 m^2 is still shown separate from the point representing the antenna position. It is mainly dependent on the pulse length, antenna height and location, own ship structure and an efficient transmission line.

Maximum Range

The maximum detecting range of the radar varies considerably depending on several factors such as the height of the antenna above the waterline, the height of the target above the sea, the size, shape and material of the target, and the atmospheric conditions. Under normal atmospheric conditions, the maximum range is equal to the radar horizon or a little longer. The radar horizon is longer than the optical one by about 6% because of the diffraction property of the radar signal.



Operational Factors

For a conventional (non-coherent) radar system, the user should check that:

- The transceiver is “on tune” to achieve optimum performance.
- The pulse length is optimum for the range scale and marine environment.
- The signal processing functions are used correctly, particularly settings for Gain, anti-clutter Sea, anti-clutter Rain and Correlation.

Components with a limited life should be scheduled for replacement, ideally before failure or poor performance occurs. For example, magnetrons are thermionic devices and their performance will degrade slowly, typically over 9000 to 12000 hours, and weaker targets may not be detected nearer to the end of life. Infrequently, other faulty microwave components or a noisy receiver may likewise degrade performance. The performance monitor is provided as a means to test overall performance. Any degradation in the microwave transmission line (coaxial or waveguide) could significantly reduce performance.

X-band and S-band

In calm conditions, there is little difference between X and S band regarding radar detection performance. However, in heavy precipitation and higher sea states, an S-band radar system would normally give a better detection performance. X-band will provide better bearing discrimination and higher gain for a similar antenna size.

Radar resolution

There are two important factors in radar resolution (discrimination): *bearing resolution* and *range resolution*.

Bearing resolution

Bearing resolution is the ability of the radar to separate and present the echoes from two separate targets with an echoing area of 10 m^2 that are at the same range and positioned close to each other. It is proportional to the antenna length and reciprocally proportional to the wavelength. This condition is normally satisfied with a radiator of 1.2 m (4 foot) or longer in the X-band. The S-band radar requires a radiator of about 3.6 m (12 foot) or longer. An enhance function that increases target size in bearing will reduce the presented bearing discrimination.

Range resolution

Range resolution is the ability of the radar to separate and present the echoes from two separate targets with an echoing area of 10 m^2 that are on the same bearing and positioned close to each other. The resolution is primarily a factor of pulse length. However, an Enhance function that increases target size in range will reduce range discrimination.

Chapter 13: Interpreting the Radar display

Bearing accuracy

One of the most important features of the radar is how accurately the bearing of a target can be measured. However, the bearing is usually taken relative to the ship's heading, and thus, proper adjustment of the heading line at installation is an important factor in ensuring bearing accuracy. The bearing of a target can be measured more accurately if it is positioned towards the outer extreme of the radar operational area.

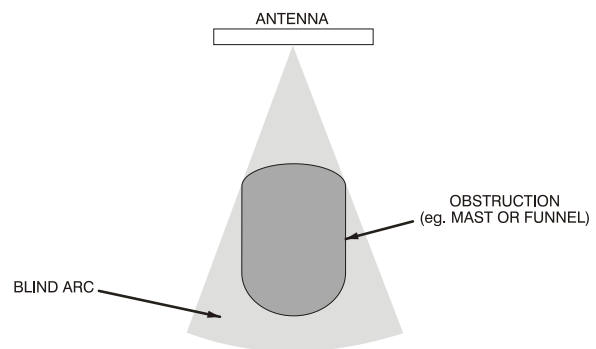
To minimize error when measuring the bearing of a target, show the target echo at the extreme position on the screen by selecting a suitable range.

Blind Arcs

Where the path of the transmitted energy is interrupted by the superstructure, funnels, masts, etc., beam or energy scatter takes place and the radar beam is blocked.

When the obstruction is narrow in relation to the transmission path, a sector of reduced sensitivity and increased beamwidth is formed behind the obstruction.

For a large obstruction, such as a superstructure, a blind arc is formed in which there is no radar coverage, but in which false echoes or elongated targets may occur due to reflections from the obstruction. Targets cannot be detected within the blind arc.



False echoes

Any large obstruction may reflect energy, causing false echoes. The surface of the obstruction reflects a significant proportion of the transmitted energy at an angle creating a false echo. Reflected signals from these objects reach the antenna and are presented on the bearing at which the Antenna is pointing. The range of the false echo is the true distance (via the reflecting surface) of the object causing the false echo; however, it is possible to have false echoes at multiples of that range. False targets (echoes) usually occur as a result of reflections originating from large structures such as other substantial ships, a harbour building, storage tanks or wind farms. Note that own ship structures can generate similar reflections. These reflections are normally seen as a large arc on the radar presentation.

Adjusting the signal processing control functions may reduce or suppress a reflection, but at the expense of a lower target detection performance. Radar transmitters provide techniques to prevent false targets resulting from previous transmissions (second-time-around echoes).

SharpEye™ has superior processing techniques to reduce reflections.

The user must be acquainted with the bearings of obstructions from which false echoes may be obtained.

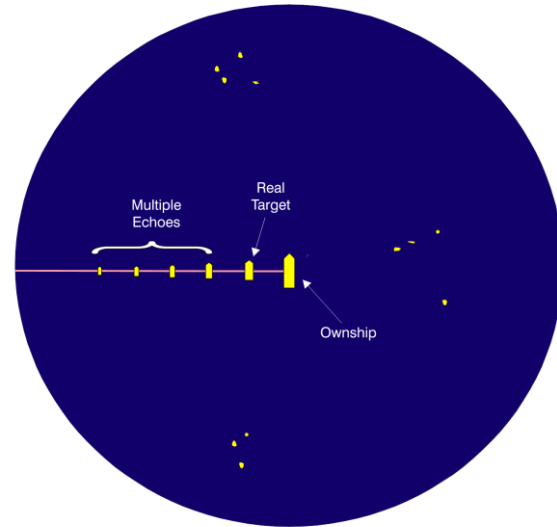
Multiple Echoes

Multiple echoes may be obtained when another ship or vessel is passing on a parallel course at close range.

This effect occurs when return signals are sufficiently strong to be reflected backwards and forwards between the two vessels. Multiple echoes always occur on the same bearing as the true target and at exact multiples of the true target range.

The echoes become weaker as the amount of energy reflected diminishes with each return.

Multiple reflection echoes can be reduced and often removed by decreasing the gain (sensitivity) or properly adjusting the SEA anti-clutter control.

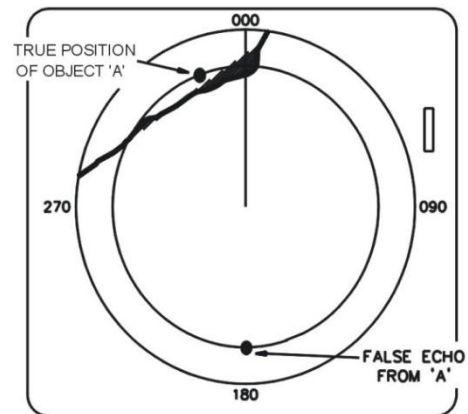
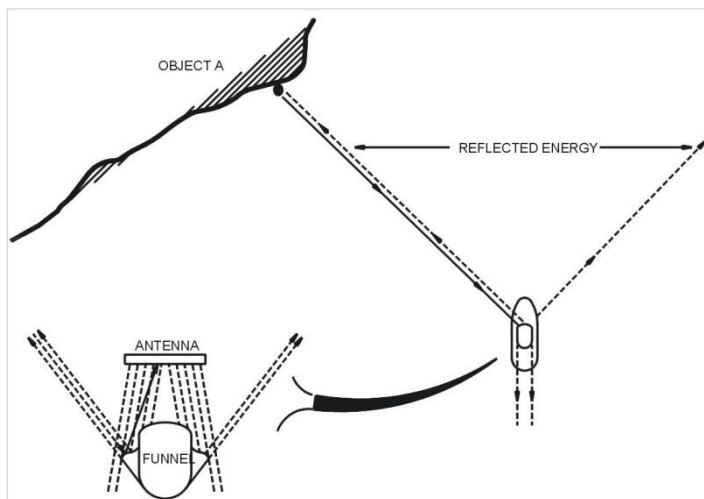


CD-2528

Spurious Echoes

In built up areas and in narrow congested waters, transmitted energy may be reflected along a number of paths producing confusing spurious echo patterns on the screen. Spurious echoes may not always appear in the same location and may not correlate.

Note: Adjustment of the GAIN control helps to minimise these spurious echoes.

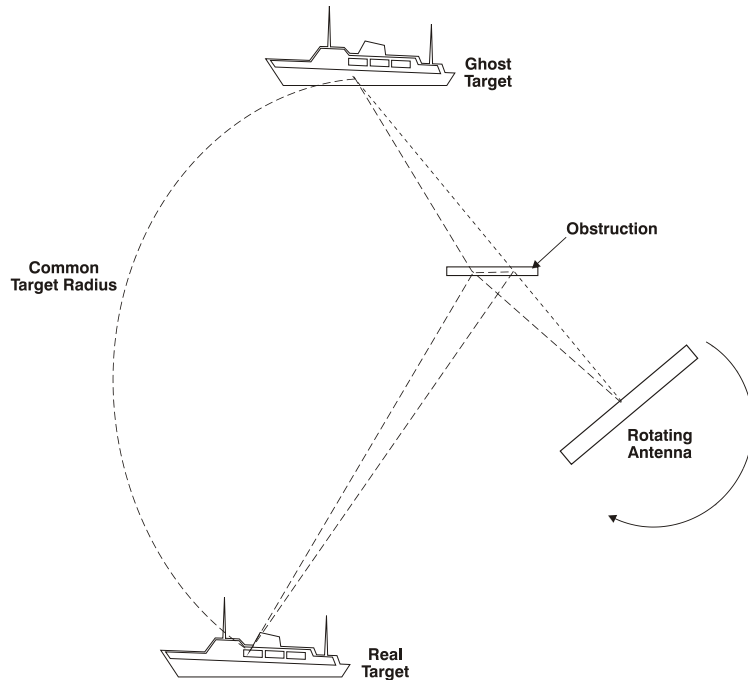


Ghost echoes

In a similar manner to false echoes, the proportion of transmitted energy reflected off obstructions may be directed towards a real target causing a **ghost echo** of the real target to appear on the bearing at which the antenna is pointing. The ghost echo will appear to be a real target and behave in the same way. However, because the antenna is not directed at the real target the returns from the ghost target will be weaker than those of the real target. The range of the ghost echo is the true distance of the real target.

The suspected Ghost target echo will appear on the screen at the same radius as the real target.

The VRM facility can be used to confirm this. However, there is no real way of determining whether the indicated target is a ghost or a real target.



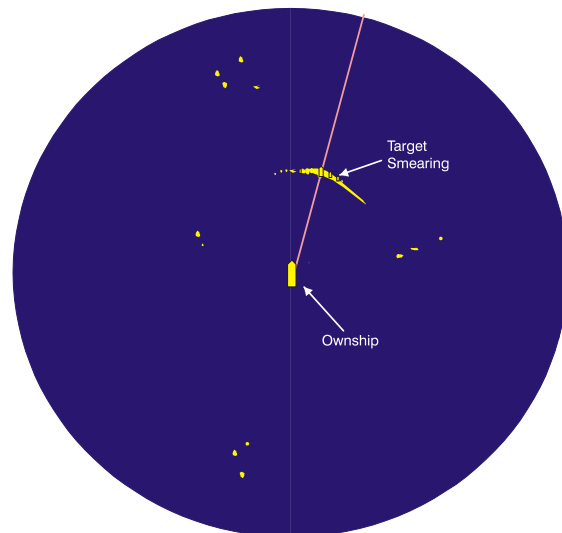
Other types of ghosting include echoes of groups of targets (which appear to be real). When in the vicinity of land masses, these may be from large inland objects and may be caused by a combination of atmospheric conditions, unusual propagation conditions and reflection.

Target Smear

Where obstructions occur in close proximity to the antenna, the radar beam may be dispersed causing target smearing to occur.

This is indicated by a number of weaker echoes appearing around a stronger target echo on the screen.

When the antenna points directly at the target the returns are at their strongest and these form the thickest part of the arc shaped pattern on the screen.



CD-2529

Sidelobe Echoes

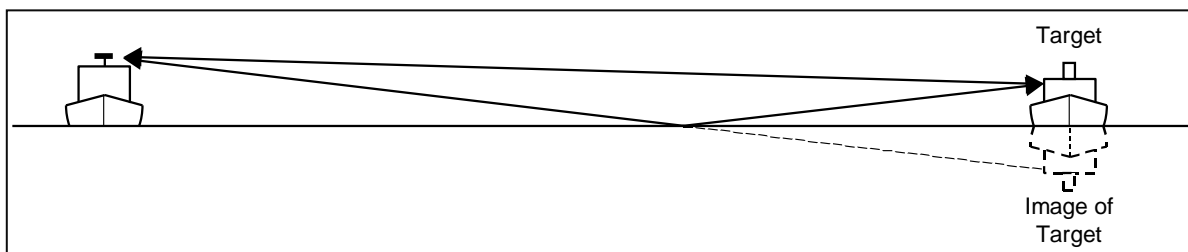
Every time the radar pulse is transmitted, some radiation occurs on each side of the beam, called "Sidelobes." If a strong target exists where it can be detected by the side lobes as well as the main lobe, the side echoes may be represented on both sides of the true echo at the same range. They can be reduced through careful reduction of the gain or proper adjustment of the SEA anti-clutter control.

Virtual Image

A relatively large target close to own ship may be represented at two positions on the screen. One of them is the true echo directly reflected by the target and the other is a false echo which is caused by the mirror effect of a large object on or close to own ship. If own ship comes close to a large metal bridge, for example, such a false echo may temporarily be seen on the screen.

13.3 Multipath interference

Radar energy reflects from the target directly or following reflection at the surface of the sea. The result is that sometimes the two signals will reinforce each other while at other times they will cancel and create a null.



Multipath is most pronounced when the sea is calm, acting like a mirror, and when the target is simple (essentially comprising a single reflector) such as a buoy. Here multipath reflection may produce a large number of signal nulls at short range. These become less frequent as range increases.

In the higher sea states when the sea is rough and is less like a mirror or when the target is complex (comprising a number of reflectors), as are many vessels, the effect of multipath is less pronounced so that the nulls are less deep.

As the height of the radar antenna (or target) increases, then the frequency of the nulls also increases. The frequency of the nulls also increments with increasing radar frequency, i.e. an X-band system will have more nulls than an S-band system, although they may not be so deep.

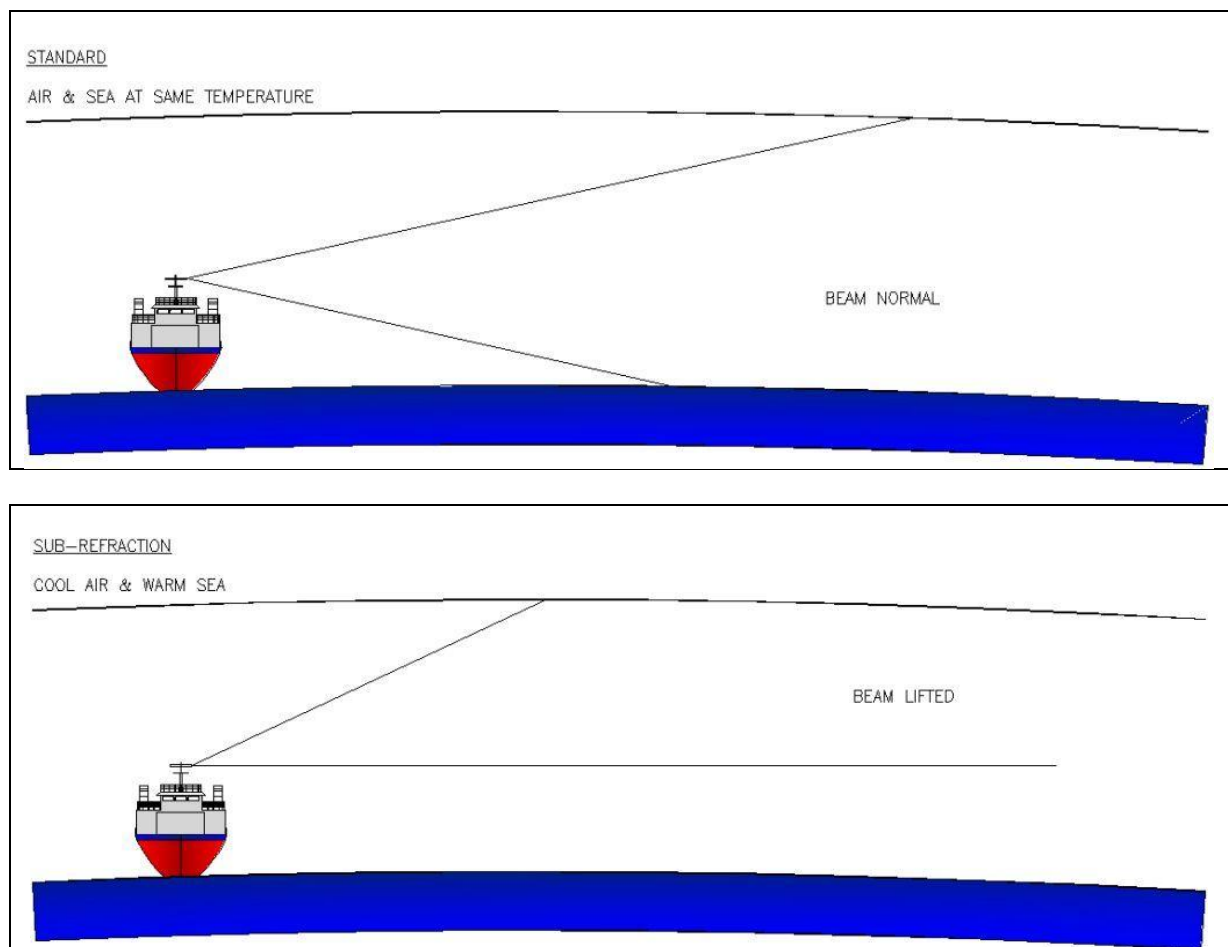
13.4 Atmospheric Conditions

The propagation of radar signals in acute atmospheric conditions may have an adverse effect on the radar presentation. A transmitted beam of energy normally travels in a straight 'line of sight' path but certain atmospheric conditions may contribute to the beam bending upwards or downwards.

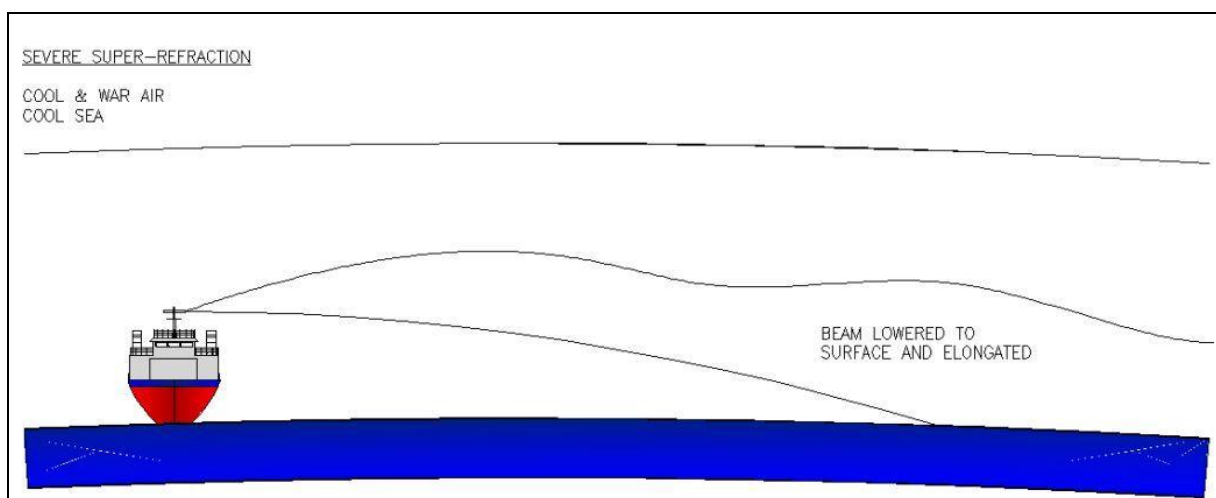
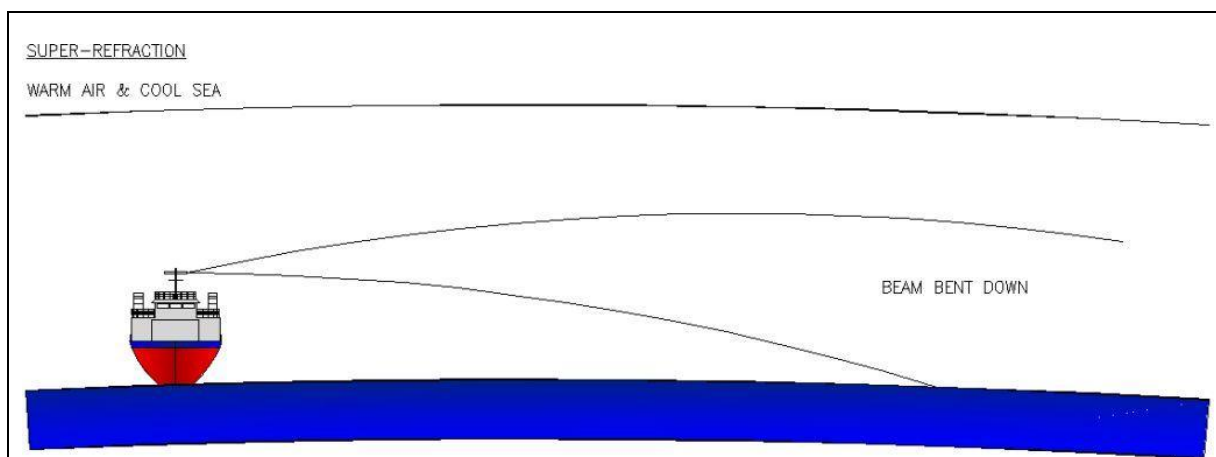
The effect of this condition (known as anomalous propagation) is where the beam is 'bent' upwards, distant targets appear below the beam and consequently the maximum detection range of the equipment is impaired.

When the transmitted beam is 'bent' downwards, the beam tends to follow the earth's surface and improves maximum range performance, with the detection of targets over the horizon.

Under specific atmospheric conditions the beam may be 'bent' to reflect from the earth's surface to the upper atmosphere where, due to the presence of a layer of dense air, the beam is reflected back to earth. This condition, known as 'ducting', may happen several times and echoes may be obtained over great distances. However, these echoes may return several transmissions later and are shown as false ranges on the screen. Transmission 'jitter' techniques are applied to minimise these false echoes.



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Fog: Fog and mist may cause some signal attenuation resulting in a small reduction in detection range.

Dust: Dust storms in some locations can produce difficult propagation conditions, appearing similar to clutter.

Hail, Snow and Ice: Hail and wet snow produce effects similar to that of rain clutter. Dense snow has a greater effect than that of light flurries which, owing to the small reflecting surface, have minimal effect. The echoes obtained from ice depend on the form and shape that the ice presents. The generalisation of the effects produced by various ice flows are as follows:

Smooth Flat Ice: Most of the radar energy is reflected at the angle of incidence, providing little or no return signal. Sometimes an advantage is gained by setting up the controls to obtain sea clutter right up to the edge of the ice. Patches of water in a smooth ice field are often revealed by clutter return if sufficient wind disturbs the surface of the water.

Pack Ice: Strong multiple echoes are obtained from pack ice, producing a pattern on the screen not unlike excessive sea clutter. The ice left in the wake of a vessel passing through an ice field may be distinguished clearly on the screen.

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<i>Ice Walls:</i>	These objects give strong return echoes depending on the angle that the walls are to the sea surface to scatter the reflected energy.
<i>Icebergs:</i>	As the angle of iceberg faces is rarely normal to the surface of the sea, much of the reflected energy from the transmitted pulse does not reach the receiver aerial, giving a poor signal return. Also the surrounding dense air produces a higher than usual atmospheric attenuation.
<i>Growlers:</i>	The detection of growlers by radar is uncertain due to the small surface area above water and the mass that is submerged.

13.5 Radar Reflectors and Beacons

Reflectors are designed to give maximum return from radar transmissions and may be fitted to buoys to aid navigation, to sundry features such as dangerous outcrops of rocks, and to any hazard that would impair the navigation of a vessel. Small boats may also have reflectors fitted to increase the boat's detection range.

Note: Some small buoys have a reduced cross-sectional area when heeling over in high sea states.

Radar beacons produce a specific, coded signal response when the radar transmission interrogates the beacon. The reflected signal then gives a precise echo paint on the radar presentation. This effect can be reduced when using a high Correlation level (RACONS are not normally affected by Correlator Interference Rejection or Scan/Scan).

13.6 The radar image

Open Sea

At sea, out of sight of land, interpreting the radar operational area presents little difficulty. Echoes on the screen depend on the size, range, shape and aspect of the targets. Wake echoes may sometimes be seen, particularly where a vessel is moving or turning at high speed.

Coastal Waters

The behaviour of sea clutter in coastal waters is different from that experienced in open sea conditions. There is insufficient time for waves in coastal waters achieve maturity and therefore the waves are shorter and choppy in nature. There is also increased breaking of waves in shallower waters, and in addition the water depth, seabed contours and coastline features contribute to influence water currents and the radar reflective characteristics of the sea surface. In these choppy coastal conditions, the sea clutter returns are greater than might be expected in a comparatively low sea state, sometimes resulting in buoys and other navigational aids becoming more difficult to detect. Careful use of anti-clutter controls and signal processing (particularly correlation) will assist the mariner/user, however the detection of ships moving at high speed may prove more difficult on lower range scales with correlation processing applied.

Land Echoes

Echo paints of a coastline require careful examination and translation since the presence or absence of return signals depend on parameters such as height, slope, composition, aspect and distance of the feature. When a radar beam strikes a high reflecting surface, including cliffs and large buildings at close range, a sharp echo with a blank area behind is presented on the screen. Coastlines with flat areas return echoes depicting every small reflecting surface that the radar beam strikes for several miles inland. The variation of tide may also affect the presentation owing to the height at which the Antenna is relative to that of the coastlines.

At low tide the radar operational area presentation shows less of an area of coastline due to the reflected echo from cliffs or sand dunes etc. High tide gives the radar the ability to slightly 'look over' low lying objects.

13.7 Factors affecting target detection

The detection of targets, particularly small or marginal radar targets, is very susceptible to antenna height and horizontal beam width, target size and height, sea state, clutter characteristics, and atmospheric conditions. Even small changes in these parameters will impact target detection. Target Radar Cross Sections provide the means to define different targets and the radar signal they generate.

The requirements for target detection are laid out in IEC62388 which can be obtained from

Radar Cross Section (RCS) Values

The relationship between X-band and S-band Radar Cross Section (RCS) values for small point targets is often assumed to be in the ratio of 10:1. Some targets may produce a smaller ratio or an even larger RCS value for S-band, depending on the target characteristics. Simple, stable targets provide a more consistent radar signal than a distributed target. An example of a distributed target is a large yacht, comprising multiple reflective surfaces, each of differing radar cross section and at various heights, and having multiple polarisation reflections.

The RCS of a shoreline is variable according to the reflectivity of the surface. As the range of a shoreline increases, the RCS may increase as a greater surface is illuminated by the antenna beam. The surface illuminated is partly offset by the curvature of the earth and increased scattering of reflected signals.

The RCS of a large SOLAS ship will vary primarily according to the structure, profile and aspect of the ship. Newer shipping, particularly High Speed Craft (HSC), will tend to have a much smoother profile and therefore have a correspondingly lower RCS. The aspect of the ship observed will also influence the RCS value. For example, a change from 50,000 m² to 5,000 m² could reduce the detection range by about 10%.

Distributed targets generate a more complex multi-path and may produce different RCS values according to the antenna polarisation in use. A simple cylinder reflector such as a channel marker pole will provide a known RCS if the reflector is correctly installed to be stable and vertical. A small angular offset (for example, a buoy heeling over in strong wind)

will greatly decrease the RCS values. For distributed targets including all ships, the target centroid height shall be assumed rather than maximum height.

A full list of RCS values and target detection criteria can be found in IEC 62388 (see *section 13.1: Source material*).

Target Detection in Calm Sea

The extent of ducting or other performance dependent phenomena will not be apparent at sea. However, multipath effects may cause deep detection nulls.

Atmospheric conditions and the sea surface may enhance or degrade the range of first detection listed in the following tables.

Coherent **SharpEye™** radar systems provide a superior detection performance; therefore the detection ranges noted in IEC62388 will be exceeded.

13.8 Target detection in clutter conditions

The following paragraphs provide general information on clutter conditions.

Gain: The raw Radar signal consists of targets, precipitation and sea clutter, and in addition, a level of noise generated by the receiver system. The gain and signal processing functions serve to reduce unwanted radar returns and optimise the display. The Manual Gain function sets a detection threshold for the strength of targets. The gain should be set to a level that just preserves a minimal amount of receiver noise, as viewed beyond any sea clutter field. The gain may require resetting on different ranges.

Calm sea: Multi-path signals may enhance or reduce signal strength depending on the target range and characteristics. The range of detection of a target at optimum Gain, assuming that it is not obscured by the horizon, will depend on target's characteristics and the propagation (ducting) conditions. In some circumstances, ducting will permit visibility of targets at much longer ranges than could normally be expected. A higher radar antenna will normally increase the range of detection, but may deteriorate performance in an adverse clutter environment. SharpEye™ transmits multiple pulse lengths, thereby enhancing detection.

Rough sea: As the roughness of sea increases, targets are less affected by multi-path effects but must compete with radar signals generated by sea clutter. The nature of the signal reflected from a wave differs from the signal reflected from a target. Processing techniques assist in making the target more visible. Note that clutter signals increase when viewed upwind. Although sea clutter signals can exhibit target-like behaviour, as most clutter is in the form of sea spikes, correlation techniques reduce the impact. Applying signal correlation has limitations when detecting high speed ships, especially on shorter range scales, where the rapid movement of these ships may fail to correlate, impacting on target visibility.

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Very large waves may obscure targets, and in these conditions targets may not be visible to the radar system. High winds will cause small targets (e.g. buoys and yachts) to heel over, thereby reducing the radar reflected signal and the resulting detection.

Rain clutter: Precipitation (rain and wet snow) generates noise-like reflections and reduces target detection capability. The reduction in detection performance is dependent on the radar antenna characteristics, the transmission frequency (S-band or X-band) and pulse length selected. In light rain the range to first detection due to precipitation is similar for S-band and X-band radars. However in heavy rain, S-band has a superior performance. For both S-band and X-Band radars, a short transmission pulse provides better detection, but this is more evident at X-band. The Rain Anti-clutter control signal processing function improves target detection. However, while reducing the impact of rain, it will thin solid targets, for example land masses. Auto-Rain optimises the detection and selects a short pulse for conventional magnetron transmitters to provide best performance. SharpEye™ features a high discrimination on all range scales so maintaining a higher detection performance in rain clutter conditions.

Sea Clutter: Sea spray, backscatter and breaking waves will produce a radar clutter field, predominantly at close range around own ship. The clutter field will extend to a range largely depending on the radar antenna height and the sea state, though other factors may influence the extent and properties of the clutter. The wind direction will make the clutter field non-uniform. The Sea Anti-clutter control provides both manual and automatic means to reduce the visibility of clutter. The anti-clutter processing applies maximum attenuation at zero range (own ship) and reduces the attenuation as the range increases.

Further information on the detection of small targets can be found in IEC 62388 (see section 13.1: Source material).

A combination of wind speed and average wave height may be used as a means of assessing the sea state. The following influences target detection:

- Target description (characteristics), RCS, stability, aspect, height.
- Wind strength and direction relative to the line of sight between antenna and target.
- Estimated sea state, wave height, clutter spike characteristics.
- Measured or estimated rainfall and rain extent.
- Any variation in antenna height.

Many variables impact on actual radar performance and therefore all predictions are indicative. A target may demonstrate low probability of detection in the near range with an acceptable or high probability of detection in the further ranges. This may be a result of multi-path signals creating signal cancellation at near range. Atmospheric conditions, for example ducting, can enhance or degrade detection performance depending on antenna height, target height and range, and radar frequency.

If the Gain or Sea anti-clutter threshold is set too high, point targets appear small or may even be fully suppressed. The user should set the signal processing control functions to retain some clutter speckles to promote a better sensitivity within the clutter field. Although such a setting increases the false alarm rate and gives a noisier presentation, detection sensitivity is improved.

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In adverse weather conditions considerable echo return may be obtained from the sea. Under these circumstances the sea clutter return may be greater than the reflections from buoys and other small targets and thus prejudice the detection of these echoes. Use the Gain and Sea functions to combat these varying conditions.

High sea swell tends to produce random echoes and clutter on the screen. Clutter returns from sea breaking on shoals and sand banks may help to show the position of these hazards.

Sea State

The following table provides information for assessing the sea state, using a combination of wave height and wind conditions.

Douglas sea state (number)	Mean wind speed kn	Significant wave height m	Sea state description
0	<4	<0,2	Flat, very calm
1	5-7	0,6	Smooth
2	7-11	0,9	Slight
3	12-16	1,2	Moderate
4	17-19	2,0	Rough
5	20-25	3,0	Very rough
6	26-33	4,0	High

Note: Significant wave height is defined as the crest to trough height of the highest 1/3 waves. Individual waves and/or swell can combine to significantly increase the wave height and may result in obscuration of the target. This table only applies to waves formed by local wind.

Note: The table values are approximate due to the subjective nature of the sea state assessment.

Note: Sea swell will make assessment of wave height very difficult.

Rain clutter (precipitation)

The presence of rain (precipitation) will degrade performance by causing additional clutter and target return loss. This condition differs from sea clutter, as falling rain produces a continuous return, blanketing whole areas of the screen. The plotting of rain storms and torrential rain conditions may be easily determined due to the continual movement of the weather over an area.

Rain clutter creates a high return of noise-like reflections that effectively decreases the signal to noise levels within the radar receiver. In addition, it creates an attenuation of the radar signal, which also decreases the signal to noise levels. Both these effects reduce the target detection capability of a radar system.

Additional details on the reduction of performance due to rain can be found in IEC 62388 (see section 13.1: Source material).

SharpEye™ is a coherent radar system and maintains a high resolution at all ranges and together with front-end processing, will provide superior performance in rain.

13.9 Factors affecting target tracking, acquisition and tracking accuracy

The Target Tracking processing monitors the same signal as the radar image presented. It follows therefore that, if the screen is showing clearly visible strong echoes, the tracking system can also 'see' those targets and be capable of acquiring and tracking them.

Automatic target acquisition within the guard zone requires 3 out of 4 visible 'hits' on the target during successive antenna resolutions, whilst successful tracking of a target requires 5 out of 10 hits. If a target is not detected for 7 successive antenna revolutions it is indicated as weak, and after 20 successive antenna revolutions, it is dropped and indicated as lost.

Adverse Conditions

It will be appreciated that any of the adverse factors listed earlier in this section affecting the radar operational area, such as clutter, or spurious reflections, can also affect the reliability or accuracy of Target Tracking. In particular, unexpected swinging of vectors can arise if an echo appears unstable due to target glint or local abnormal reflections of the microwave beam. Such effects do not indicate a malfunction but should be recognised by the user to avoid misleading decisions.

Key Sources of Error

A comprehensive guide to Target Tracking use and potential error sources is to be found in the "Automatic Radar Plotting Aids Manual" by A G Bole and K D Jones (Heinemann, London). The following summary of key sources of error and their consequences is included here as a short form user guide.

<i>Own Ship HL</i>	Must be correctly aligned
<i>Own Ship Gyro Error</i>	This will introduce error into the predicted course of other ships but is unlikely to conceal a Target Tracking collision situation since all course data will be affected, including own ship. It can, however, result in miss-assessment in dealing with collision avoidance.
<i>Own Ship Log Error</i>	This will result in incorrect 'true' speed and course readout for every other ship. Any stationary targets being tracked will also acquire an apparent speed. Log error can result in dangerous miss-assessment of a situation.
<i>Pitch and Roll of Own Ship</i>	This inevitably reduces bearing and range accuracy. The errors are usually small; typically less than 1 degree in azimuth and 50 metres in range, but serious rolling can cause intermittent echo paint and target loss.
<i>Target Swap</i>	This is a recognised tracking phenomenon if echoes pass very close or merge. Processing includes features designed to minimise the effect, but the user should still be alert to the possibility that swap can occur.
<i>Tracker Smoothing</i>	In some circumstances this can cause the Tracking vectors to lag behind the real world situation. In order to present a usefully stable vector presentation despite the changes in the radar echo returns, the Target Tracking processing includes sophisticated mathematical filters. These present an averaged picture which is the best indication of the current track, whilst also detecting manoeuvre as quickly as possible.

Summary

This inevitable compromise between stability and responsiveness can affect vector presentation and course and speed readings during and immediately after a target manoeuvre or own ship manoeuvre.

When a tracked target or own ship has completed a manoeuvre, the system presents in a period of not more than 1 minute, an indication of the target's motion trend and shown within 3 minutes the target's predicted motion in accordance with specified tolerances.

The user must therefore allow the necessary time to elapse before using Target Tracking data as the basis for a critical decision.

13.10 Search and rescue transmitter (SART)

The Search and Rescue Transmitter (SART) is a 9 GHz receiver/transmitter which provides a position indication by producing range and bearing (BRG) information on any 9 GHz radar screen (with no modification). The SART code shown on the radar screen is a series of dots extending radially outwards from the location of the transmitter. The series of dots represents a range of approximately 10 nautical miles. This indication is an internationally accepted signal for search and rescue operations. In addition, the SART gives confidence to survivors by giving a loud audible signal and/or visual indication of the approach of assistance.

Operation of Marine Radar for SART Detection

Radar Range Scale

To observe for a SART signal, select a range scale of 6 or 12 nautical miles. The spacing between the SART responses is about 0.6 nautical miles (1125 metres) and a number of returns are required to distinguish the SART from other responses.

SART Range Errors

Inherent delays occur in the SART responses due to the in-built trigger delay. Also SART may have to sweep through the whole radar band before reaching the frequency of the search radar. At medium ranges of about 6 nautical miles the range delay may be between about 150 metres and 0.6 nautical miles beyond the SART position.

As the SART is approached, the radar detects the initial fast sweep of the SART and double dots are shown. The range delay of the first dot is no more than 150 metres beyond the SART position.

Radar Bandwidth

Any radar bandwidth of less than 5 MHz attenuates the SART signal slightly, so a medium bandwidth is normally selected to ensure optimum detection of the SART. Operating Instructions are to be consulted about the particular radar parameters and bandwidth selections.

Radar Side Lobes

As the SART is approached side lobes from the radar antenna may show the SART responses as a series of arcs or concentric rings. These can be removed by the use of the sea anti-clutter control. Operationally, observation of the side lobes can be used to confirm that the SART is near to the ship.

Detuning the radar

To increase the visibility of the SART in clutter conditions, the radar can be detuned to reduce the clutter without reducing the SART response. The radar AFC system permits sufficient manual control to detune the receiver. Care is to be taken when operating the radar while detuned, as other wanted navigational and collision avoidance information may not be detected. The radar tuning must be returned to normal operation as soon as possible.

Gain

For maximum range SART detection the normal operational gain level is to be used.

Sea Anti-clutter Control

For optimum range SART detection, this control is to be set to the minimum. Care must be exercised as targets in sea clutter may be obscured when the radar system is retuned for normal operation.

Automatic/manual anti-clutter sea control facilities are to be switched to manual.

Rain Anti-clutter Control

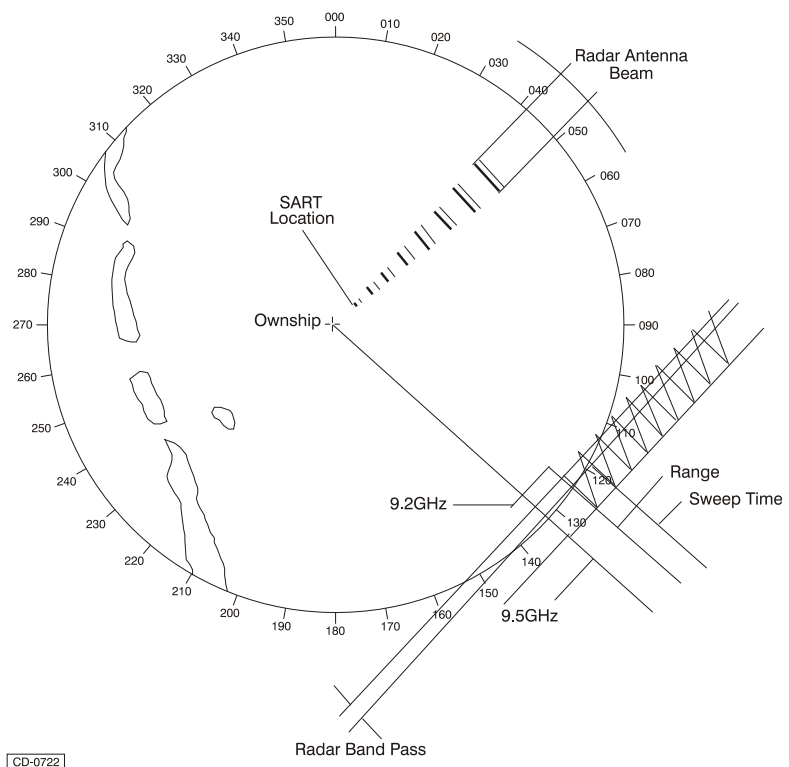
Rain control should not be used when trying to detect SARTs, as the SART responses may be reduced or suppressed.

RACON

A RACON is a radar beacon which emits radar receivable signals in the radar frequency spectrum (X or S band).

There are several signal formats; in general, the RACON signal appears on the radar screen as a rectangular echo originating at a point just beyond the position of the radar beacon.


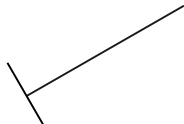
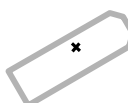
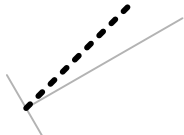
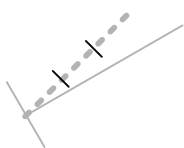
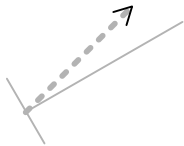
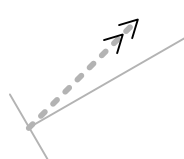
It has a Morse coded pattern. Note that the position on the screen may not be accurate, but is sufficiently close to the beacon radar image.



14 Symbols

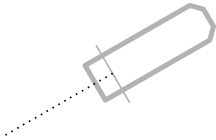
The following tables provide information on the symbols used in the radar operational area and are based on those shown in IEC-62388 Ed 1. Further information on the IEC specification is available from www.iec.ch

14.1 Ownship Symbols




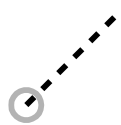
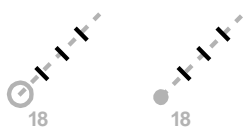

Symbol Name	Symbol	Description
Own Ship True Scale Outline		Own Ship True Scale Outline is presented as a scaled outline of own ship drawn relative to the CCRP and oriented along its heading. Own Ship minimised symbol is used when the beam of Own Ship True Scale Outline is less than 6mm.
Own Ship Heading line and Beam Line		Own Ship Heading Line is presented as a single line originating at the CCRP extending to the bearing scale in the direction of own ship heading. Own Ship Beam Line is presented as a single line perpendicular to the heading line with its midpoint at the CCRP. The beam line is referred to as the minimised symbol for own ship.
Own Ship Radar Antenna Position		Own Ship Radar Antenna Position is presented as crossed lines centred at the physical location of the radar antenna that is the source of the displayed radar image.
Own Ship Speed Vector		Own Ship Speed Vector is presented as a single line originating at the CCRP and drawn at a length to represent the distance own ship will travel in a user-selected time interval.
Own Ship Speed Vector Time Increments		Own Ship Speed Vector Time Increments are presented as single lines perpendicular to Own Ship Speed Vector. They are located along the vector to represent the distance own ship will travel in a user-selected time increment of the time interval.
Own Ship Speed Vector Water-Stabilized Indicator		Own Ship Speed Vector Water-Stabilized Indicator is presented as a single arrowhead added to the end of Own Ship Speed Vector.
Own Ship Speed Vector Ground-Stabilized Indicator		Own Ship Speed Vector Ground-Stabilized Indicator is presented as a double arrowhead added to the end of Own Ship Speed Vector.

Chapter 14: Symbols

Ownship symbols (continued)

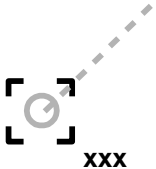
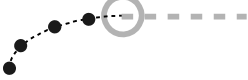

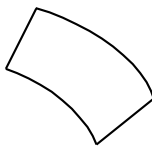
Symbol Name	Symbol	Description
Own Ship Stern Line		A Stern Line may be shown that originates at CCRP and extends, in the direction 180 degrees from the heading, to the bearing scale.

14.2 Tracked Target Symbols


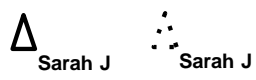
Name	Symbol	Description
Tracked Target		A Tracked Target is presented as a circle centred at the target's tracked position. A Dangerous Tracked Target is drawn using the colour red and flashes until acknowledged.
Target in Acquisition State		A Target in Acquisition State is presented as a broken circle centred at the acquisition position.
Target Automatically Detected in Acquisition Zone		A Target Automatically Detected in an Acquisition Zone is presented as a broken circle centred at the acquisition position. It is coloured red and flashes until acknowledged.
Tracked Target Speed Vector		A Tracked Target Speed Vector is presented as a single line originating at the target's tracked position and extends to a length representing the distance the tracked target will travel in the user-selected time interval. The vector for a Dangerous Tracked Target is drawn using the colour red and flashes until acknowledged.
Target Time Increments		Target Time Increments are presented as single lines perpendicular to a target speed vector. They are located along the vector to represent the distance the tracked target will travel in the user-selected time increment. The time increments for a Dangerous Tracked Target are drawn using the colour red and flash until acknowledged. The presentation of target time increments is user-selectable.
Lost Target		A Lost Target is presented as crossed lines centred on the symbol of the lost target The symbol flashes until acknowledged. The Lost Target symbol for a Dangerous Tracked Target is drawn using the colour red.

Chapter 14: Symbols

Tracked target symbols (continued)



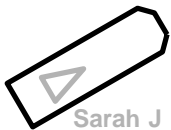


Topic	Symbol	Description
Selected Target		A Selected Target is presented as a broken square indicated by its corners centred on the symbol of the selected target and clearly extending beyond the symbol.
Target Past Positions		Target Past Positions are presented as a series of dots indicating the target's past positions. They are connected by a single thin dotted line drawn through the past positions.
Reference Target		The label for a tracked target designated as a Reference Target is presented as the letter "R" adjacent to the symbol of the tracked target. The reference label for a Dangerous Tracked Target is drawn using the colour red and flashes until acknowledged.
Target Acquisition Area		A Target Acquisition Area is presented as a series of lines encompassing the acquisition area.

14.3 AIS Symbols

Topic	Symbol	Description
Activated AIS Target		An Activated AIS Target is presented as an acute isosceles triangle centred at the target's reported position and oriented to the target's reported heading (or COG if heading is not reported). A Dangerous AIS Target is drawn using the colour red and flashes until acknowledged.
Activated AIS Target without Heading or COG		An Activated AIS Target without a Heading or COG is considered a Dangerous AIS Target. It is oriented toward the top of the operational display area and is coloured red. It flashes until acknowledged.


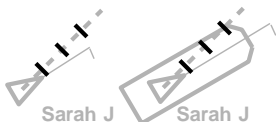

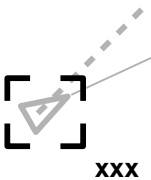
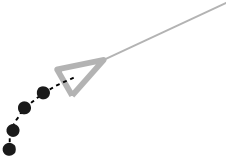



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AIS symbols (continued)

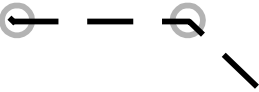
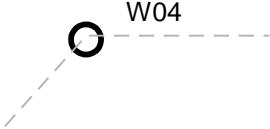



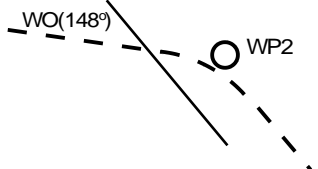
Topic	Symbol	Description
Associated targets - alternative	Associated Targets represented by AIS target symbols 	The user may select to present Associated Targets (i.e. Activated AIS Targets associated with Tracked Radar Targets) as either Activated AIS Target symbols or Tracked Radar Target symbols. Alternatively, Activated AIS Target symbols representing Associated Targets may be modified by circumscribing a circle around the symbols' isosceles triangle. Tracked Radar Target symbols representing Associated Targets may be presented with larger diameter circles, modified by inscribing an isosceles triangle inside the symbols' circle.
	Associated Targets represented by radar target symbols: 	The circumscribed circle and inscribed triangle shall be drawn using a solid line style with the same basic colour used for target symbols. Associated Targets may be labelled or numbered, as appropriate. Alphanumeric text used to label/number Associated Targets shall be drawn with the same basic colour as used for target symbols
Activated AIS Target True Scale Outline		An Activated AIS Target True Scale Outline is presented as a scaled outline of the reported target drawn around the triangle symbol relative to the target's reported position, oriented along the target's reported heading, according to the reported position offsets, beam and length. Activated AIS Target True Scale Outline is not used when the target's heading is not reported. A Dangerous AIS Target is drawn using the colour red and flashes until acknowledged.
Activated AIS Target Heading Line		An Activated AIS Target Heading Line is presented as a single line originating at the apex of the Activated AIS Target symbol triangle. The heading line for a Dangerous AIS Target is drawn using the colour red and flashes until acknowledged.
Activated AIS Target Turn Indicator		An Activated AIS Target Turn Indicator is presented as a single line perpendicular to the heading line in the direction of turn. The indicator for a Dangerous AIS Target is drawn using the colour red and flashes until acknowledged.

Chapter 14: Symbols

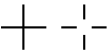
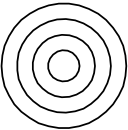
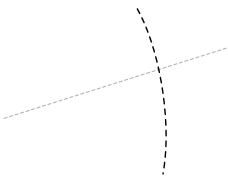



AIS symbols (continued)

Topic	Symbol	Description
Activated AIS Target Speed Vector		An Activated AIS Target Speed Vector is presented as a single line originating at the target's reported position and extends to a length representing the distance the AIS target will travel in the user-selected time interval. The vector for a Dangerous AIS Target is drawn using the colour red and flashes until acknowledged.
Target Time Increments		Target Time Increments are presented as single lines perpendicular to a target speed vector. They are located along the vector to represent the distance the tracked target will travel in the user-selected time increment. The time increments for a Dangerous AIS Target are drawn using the colour red and flash until acknowledged.
Lost Target		A Lost Target is presented as crossed lines centred on the symbol of the lost target. It flashes until acknowledged. The Lost Target symbol for a Dangerous AIS Target is drawn using the colour red.
Selected Target		A Selected Target is presented as a broken square indicated by its corners centred on the symbol of the selected target and clearly extending beyond the symbol.
Target Past Positions		Target Past Positions are presented as a series of dots indicating the target's past positions. They are connected by a single thin dotted line drawn through the past positions.
Sleeping AIS Target		A Sleeping AIS Target is presented as an acute isosceles triangle centred at the target's reported position and oriented to the target's reported heading (or COG if heading is not reported).
AIS Based ATON (Real or Virtual)		An AIS Based ATON is presented as a diamond with crossed lines centred at the ATON reported position.
AIS SAR		An AIS SAR is presented as an 'aircraft' style symbol.

14.4 Navigation Symbols

Symbol Name	Symbol	Description
Monitored Route		The monitored route symbol is presented as lines connecting origin and waypoints.
Waypoint		The waypoint symbol is used in conjunction with the monitored route.
Fix and time		The fix position and time symbol are presented as a circle and crosshairs centred at the fix position.
Dead reckoning position and time (DR)		The dead reckoning position and time (DR) symbol are presented as a circle and crosshairs centred at the DR position.
Estimated position and time (EP)		The estimated position and time (EP) symbol are presented as a circle and crosshairs centred at the EP position.
Position and time of "wheel-over"		The symbol is presented as a thin line. The line is labelled with the planned rudder bearing.

14.5 Tools and other symbols

Topic	Symbol	Description
Trial Manoeuvre	T	When a Trial Manoeuvre function is performed, a large “T” is presented in a conspicuous location on the display, nominally centred at the bottom of the operational display area. The symbol is drawn using the colour red.
Simulation Mode	S	When in simulation mode a large “S” is presented in a conspicuous location on the display, nominally centred at the bottom of the operational display area. The symbol is drawn using the colour red.
ARPA Test target	XT	When an internally generated test target is enabled, the large characters “XT” are displayed in a conspicuous location on the display, nominally centered at the bottom of the operational display area. The symbol is drawn using the colour red.
Cursor		The symbol is presented as a crosshair using single thin lines perpendicular to each other with the midpoint on the line, extending at least 3 mm from the centre on all sides. The centre may be open. Both alternatives may be used.
Range Rings		The symbol is composed of a series of concentric circles using single thin lines centred on the CCRP and equally spaced in range.
Variable Range Marker		The symbol is presented as a circle (part shown) with the first VRM using a thin long-dashed line. The symbol is drawn using the orange colour. Additional VRMs are distinguished from each other by different colours or different styles of dashed lines. A VRM and EBL may be combined.
Electronic Bearing Line		The symbol is presented as a dashed line. When offset from own ship, the origin is marked with 2mm dot. The first EBL symbol uses a thin long. Additional EBL lines are distinguished from each other by different colours or different styles of dashed lines. A VRM and EBL may be combined.
Event Mark		The event mark symbol is presented as a square of thin solid lines not more than 5 mm in length. A diagonal thin solid line marked at the midpoint with a 2 mm dot. A label (e.g. “MOB” for man overboard) may be added for clarification. Multiple Event Marks may be numbered.
Parallel index lines		The parallel index lines are presented as a thin dashed or dotted lines. The parallel index lines are distinguishable from electronic bearing lines by colour and/or line style.

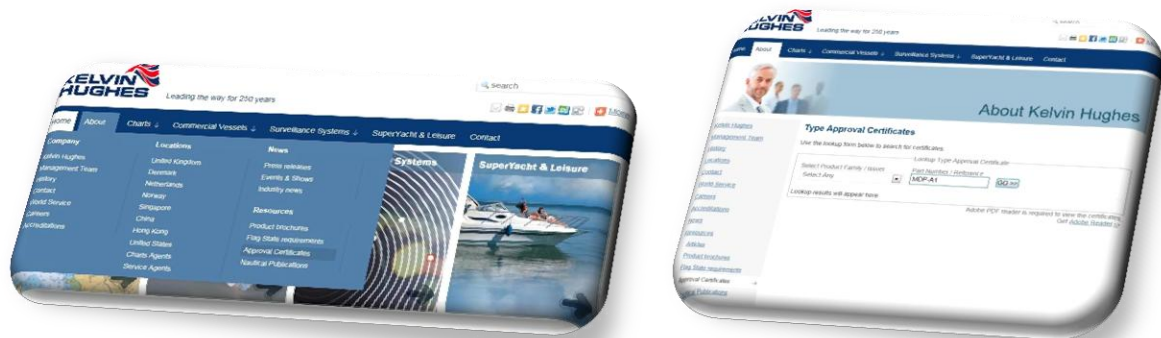
15 Type approval certificates

Type approval certificates can be obtained from the Kelvin Hughes web site as follows:

www.kelvinhughes.com



From the Kelvin Hughes web home page, select **'About'** then **'Approval Certificates'**



Type Approval Certificates

Use the lookup form below to search for certificates.

Lookup Type Approval Certificate

Select Product Family / Issuer Select Any	Part Number / Reference <input type="text"/>	GO >>
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Lookup results will appear here.

Adobe PDF reader is required to view the certificates.
[Get Adobe Reader](#)

Certificates can be selected and downloaded by using the **'Select Product family / issuer'** drop down list or by searching for a specific part number using the **'Part number / reference'** box.

16 IEC61162 messages

The following list details the IEC61162 messages that can be accepted by the MANTADigital Navigation processor. This list is current for **ZM2144 V2.3.2** software and is subject to change with later versions of software.

Standard messages decoded

Decoder	Description
ACK	Acknowledge (alarms)
ALR	Local alarm status
DBT	Water depth reference to the transducer
DPT	Water depth reference to the transducer
DTM	Datum reference
GGA	Global position system fix data
GLL	Geographic position – latitude and longitude
GNS	GNSS fix data
HDT	Heading true
HTC & HTD	Autopilot messages (Yokogawa PT500A)
PIP	Picture in picture
PPRS	Thrusters
RMC	Recommended minimum specific position transit data
ROT	Rate of turn
RPM	Revolutions per minute
RSA	Rudder sensor angle
RTE	Routes
SSA, SSD & SSX	Proprietary messages for EMRI SEM200 autopilot
THS	True heading and status
TTM	Target data
VBW	Dual ground/ water speed
VDM	AIS VHF data link message
VHW	Water speed and heading
VTG	Actual track and ground speed
MWV	Wind speed and angle
WPL	Waypoint location
XDR	Azipod data/ VDR-A4 DIU data
ZDA	Time and date

Standard messages output

Decoder	Description
OSD	Own ship data
RSD	Radar system data
RTE	Routes
TLB	Target label
TTD	Tracked target data
TTM	Tracked target message
WPL	Waypoint location

17 Abbreviations

ACK	Acknowledge	ANT	Antenna
ACQ	Acquire/ acquisition	AP	Autopilot
AFC	Automatic frequency control	ARCS	Admiralty raster chart service
AGC	Automatic gain control	AUD	Audio/ audible
AIS	Automatic Identification system	AVAIL	Available
ALT	Altitude/ alternate	AZ¹	Acquisition zone
ANCH¹	Anchor	AZ²	Azimuth
ANCH²	Anchor watch		

BCR	Bow crossing range	BRG	Bearing
BCT	Bow crossing time	BRILL	Brilliance
BKGRD	Background	BWW	Bearing waypoint to waypoint

CAL	Calibrate/ calibration	CONT	Contrast
CCRP	Consistent common reference point	CORR¹	Correction
CCRS	Consistent common reference system	CORR²	Correlator
CENT	Centre	CPA	Closest point of approach
CHG	Change	CRS	Course
CLR	Clear	CTW	Course through water
CNCL	Cancel	C-Up	Course up
COG	Course over ground	CSR	Cursor

DAY/NT	Day/ night	DIST	Distance
DECR	Decrease	DG	Dangerous goods
DEL	Delete	DGPS	Differential global positioning system
DEP	Departure	DPTH	Depth
DEST	Destination	DR	Dead reckoning
DEV	Deviation	DTG	Distance to go
DISP	Display		

EBL	Electronic bearing line	EPFS	External position fixing system
EBRL	Electronic bearing and range line	EPIRB	Emergency position indicating radio beacon
ECDIS	Electronic chart display & information system	ERBL	Electronic range and bearing line
ECS	Electronic chart system	ERR	Error
ENC	Electronic navigation chart	ETA	Estimated time of arrival
ENH	Enhance	ETD¹	Estimated time of departure
ENT	Enter	ETD²	Enhanced target detection
EP	Estimated position	EXT	External
EPA	Electronic plotting aid	EZ	Exclusion zone

FWD	Forward		
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GC	Great Circle	GNSS	Global navigation satellite system
GND	Ground	GZ	Guardzone

HAP	Harbour approach and pilotage	HL	Heading line
HDG	Heading	H-UP	Head up

IBS	Integrated bridge system	INT	Interval
IND	Indication	IR	Interference rejection
INS	Integrated navigation system		

KN	Knots		
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Chapter 17: Abbreviations

Lat	Latitude	LOP	Line of position
LIM	Limit	LP	Long pulse
LON	Longitude	LR	Long range

MAN	Manual	MMSI	Maritime Mobile service identity
MOB	Man over board	NAV	Navigation
MON	Monitor/ Performance monitor	NMT	Not more than
MP	Medium pulse	NORM	Normal
MVR	Manoeuvre	N-UP	North up

OOW	Officer on watch	OS	Ownship
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PI	Parallel index lines)	PPI	Planned position indicator
PL	Pulse length	PPR	Pulses per revolution
PM	Performance monitor	PRF	Pulse repetition frequency
POSN	Position	PWR	Power

RAD	Radius	RM(R)	Relative motion with relative trails
RADAR	Radio detection and ranging receiver	RM(T)	Relative motion with true trails
RCDS	Raster chart display system	RNC	Raster navigation chart
R CRS	Elative course	RNG	Range
REF	Reference	ROT	Rate of turn
REL	Relative	RR	Range rings
RIP	Radar interlay processor	R SPD	Relative speed
RL	Rhumb line	RTD	Real time display
RM	Relative motion	Rx	Receiver/ Receive

SART	Search and rescue transponder	SPD	Speed
SAT	Satellite	STAB	Stability
SC/SC	Scan to Scan correlation	STBY	Standby
SEL	Select	STG	Speed to go
SOG	Speed over ground	STW	Speed through water
SOLAS	Safety of life at sea	SYM	Symbol
SP	Short pulse	SYNC	Synchronised

T	True	TOD	Time of departure
TCPA	Time to closest point of approach	TPL	Transferred line of position
T CTW	True course through water	TRK	Track
T SPW	True speed through water	TT	Target tracking
TGT	Target	TTG	Time to go
TM	True motion	Tx	Transmit
TM(T)	True motion with true trails	TWOL	Time to wheel over line
TOA	Time of arrival		

UNSTAB	Unstabilised		
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VAR	Variation/ variable	VOY	Voyage
VECT	Vector	VRM	Variable rang marker
VID	Video		

WGS	World geodetic system	WOT	Wheel over time
WOL	Wheel over line	WP	Waypoint
WOP	Wheel over point	WPT	Waypoint

XTD	Cross track distance	XTE	Cross track error
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18 Contacting Kelvin Hughes

18.1 Equipment service

Providing Value, Quality and Safety through a world-wide team

Installation and After Sales Service

We recognise that delivering a first-time-fix and value for money are fundamental expectations of our customers.

Key to meeting these expectations is a philosophy of working in partnership with our customers and suppliers centred around a global team of experienced service engineers and support staff who are all passionate about delivering service excellence to the marine industry.

In applying this approach a shared set of values has emerged that defines the way that we aim to work with our customers, our service suppliers and within our own organisation, these being to:

What we offer

- Spare Parts Sales
- Global Service
- Warranty Support
- Installation and Commissioning Services
- Management / Maintenance Contracts
- VDR Annual Performance Testing
- VDR Replay Services
- Compass Adjusting and Repair
- Operator Equipment familiarisation and Training
- Equipment Surveys and Inspection
- Technical Advice
- Major retrofit project management
- V-Sat Airtime Contracts

- Ensure that the customer is central to everything that we do.
- Apply mutual trust, fairness and honesty in all of our business dealings.
- Strive to exceed customer expectations, on time and right first time.
- Provide value for money, good quality and maintain vessel safety.
- Continue to improve the service offerings through process improvements and innovation.
- Adapt quickly to changing customer needs.

These values and capabilities drive the entire customer experience and are at the heart of what we do 24 hours every day, 365 days a year

Chapter 18: Contacting Kelvin Hughes

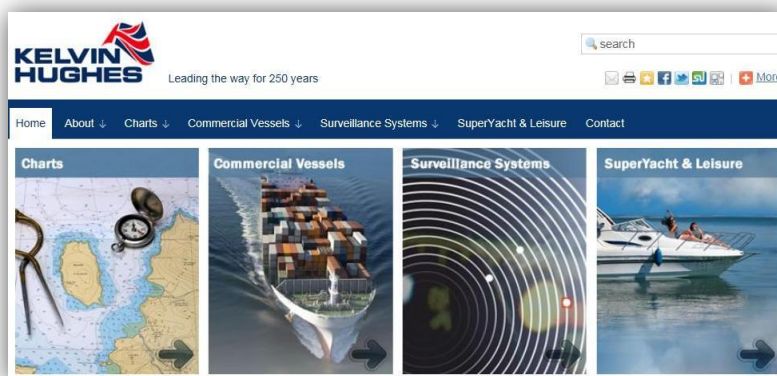
18.2 Request a service 'on-line'

A service request can be made on-line via the Kelvin Hughes web site as follows:

From the Kelvin Hughes web page **www.kelvinhughes.com**, select **Commercial vessels / Equipment Service/ Request service** and complete the on-line form.

If you do not have access to the internet please contact any of the Kelvin Hughes offices shown in the following pages who will assist in your service request.

http://www.kelvinhughes.com/

The image shows the "Request service" form on the Kelvin Hughes website. The form is titled "Request service" and includes a sidebar with links to various services. The main form area contains several sections for user and ship details, port information, and service requirements. At the bottom are "Submit", "Reset", and "Cancel" buttons.

Commercial Vessels

Request service

Please complete this form to request a service.

Please complete all fields. If details unknown please provide best information available.

Your details

Full name Company

Phone Email

Ship details

Ship name IMO Number (Only number)

Port details

Port name Country

ETA time (yyyy-mm-dd)

ETD time (yyyy-mm-dd)

Port Agent's details

Name Phone

Email

Service requirement

Part number Serial number

Nature of fault

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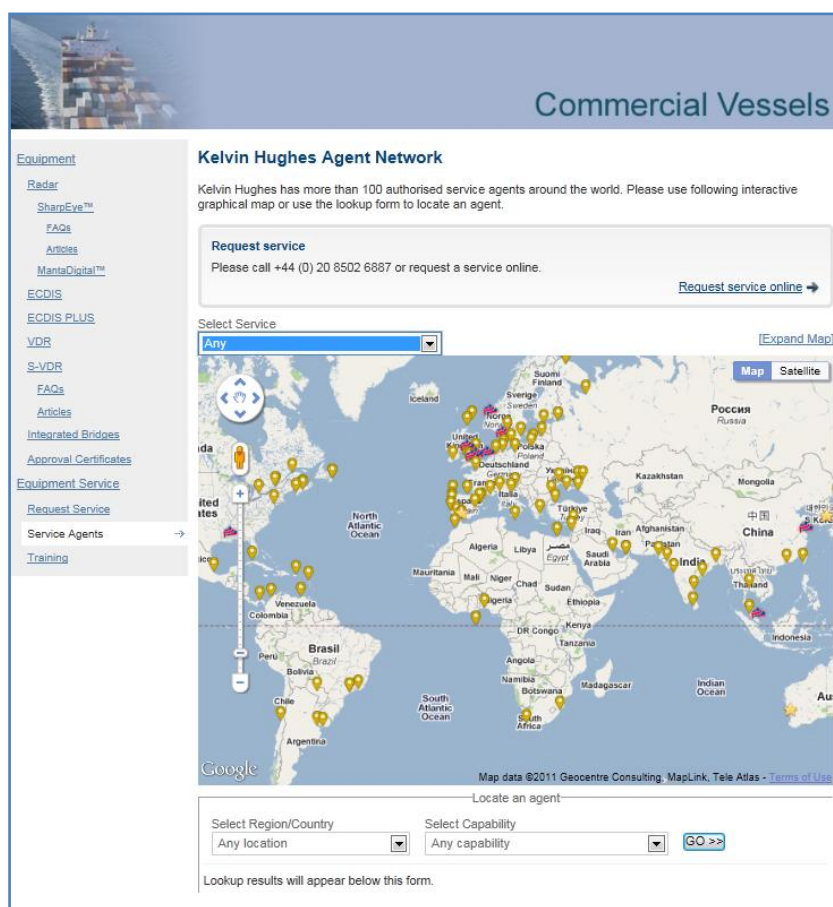
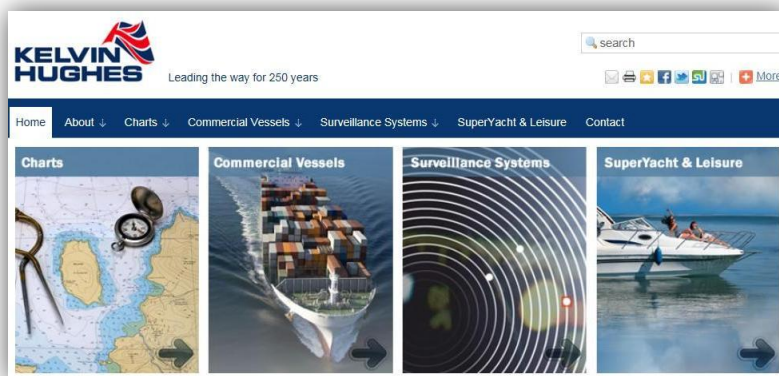
18.3 Service agents list

A full list of authorised Kelvin Hughes service agents can be found on the Kelvin Hughes web site as follows

From the Kelvin Hughes web page www.kelvinhughes.com, select **Commercial vessels / Equipment Service / Service agents** and select the region where service assistance is required.


If you do not have access to the internet please contact any of the Kelvin Hughes offices shown in the following pages who will assist in locating a suitable agent.

<http://www.kelvinhughes.com/>





18.4 Contact Kelvin Hughes



Service 	email:	service@kelvinhughes.co.uk
	Phone:	+44 208 498 1761 (Monday to Friday 8:00 to 17:00 GMT)
	Out of hours phone:	+44 208 498 1761
	Fax:	+44 208 559 8526

Technical advice 	email:	technical.advice@kelvinhughes.co.uk
	Phone:	+44 208 502 6887
	Fax:	+44 208 559 8526

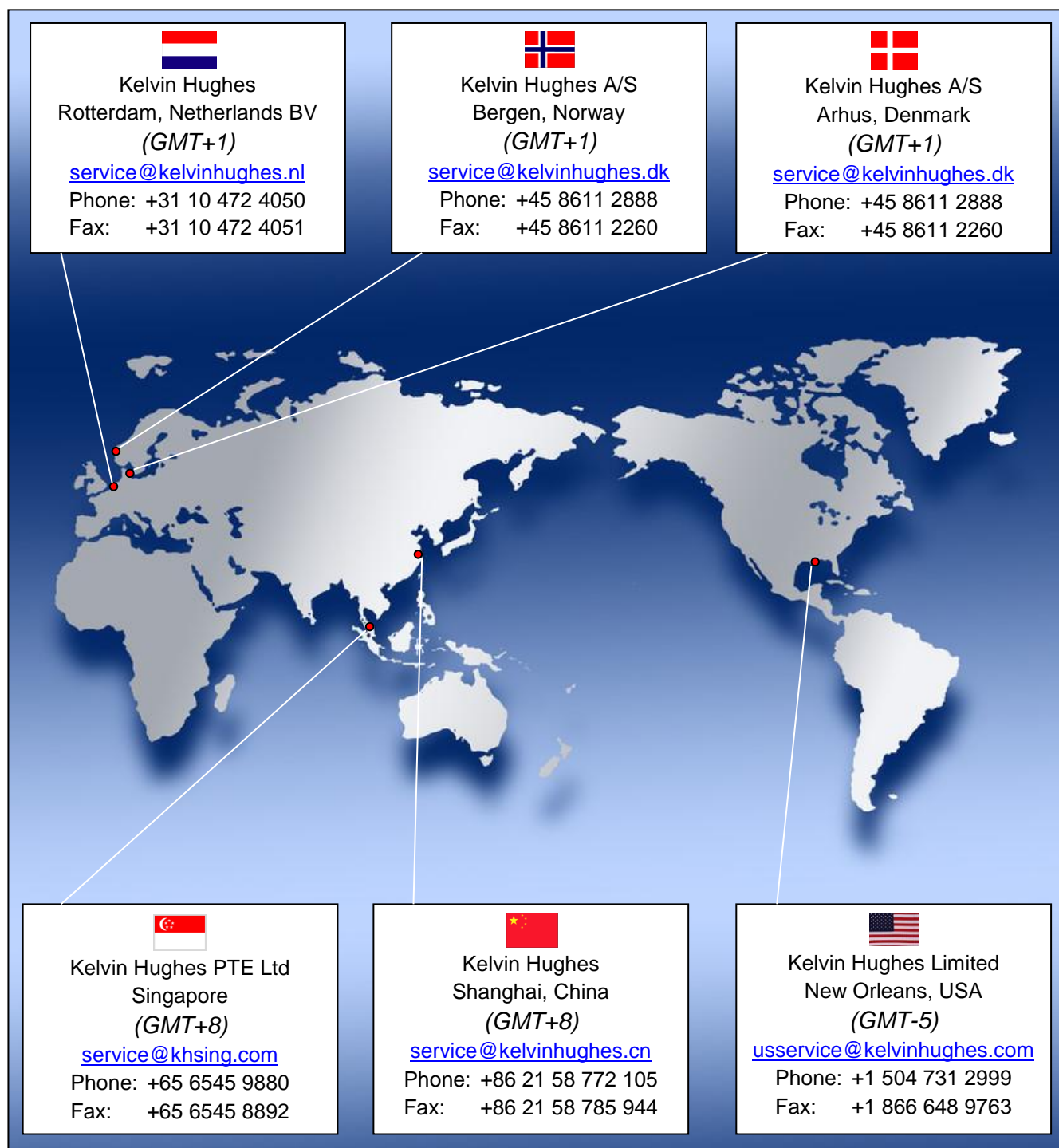
Spares 	email:	spares@kelvinhughes.co.uk
	Phone:	+44 208 502 6887
	Fax:	+44 208 559 8526

General 	General enquiries	+44 208 502 6887
	Fax:	+44 208 559 8526
	Address	Kelvin Hughes Customer Services Group, New North Road, Hainault, ESSEX, IG6 2UR, UK

Internet 	Website:	www.kelvinhughes.com
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18.5 Kelvin Hughes regional offices

The following details the regional offices of Kelvin Hughes.



18.6 Centres of excellence

Centres of excellence are authorised Kelvin Hughes agents that have met and continue to meet the following criteria:

- The agent should demonstrate a quality system and show associated industry accreditation
- They hold spare parts to a level agreed with Kelvin Hughes Ltd
- The agent's engineers are trained by Kelvin Hughes in the installation, service and repair of Kelvin Hughes equipment and attend regular training updates
- The agent meets a measured first time fix as determined by Kelvin Hughes

Details for each centre of excellence are located in the service agents list in the Kelvin Hughes web site



18.7 Useful Kelvin Hughes contacts

Various departments and regional offices can be contacted on-line using the **Contact** tab which can be found on the Kelvin Hughes website.

Other contacts that may be of use are:

APT To arrange the Annual performance testing of VDR/ S-VDR systems.	APT@kelvinhughes.co.uk
Optional features To arrange for an optional feature of a system to be enabled or renewed	Technical.advice@kelvinhughes.co.uk
Marketing For information on Kelvin Hughes or our product range	marketing@kelvinhughes.com

Charts, chart licences and permits

A full range of paper and electronic charts are available from Kelvin Hughes. For more information please visit the charts section of the Kelvin Hughes web site or alternatively contact any of the following:

United Kingdom London	Tel: +44 (0) 20 8502 6887	
	Fax: +44 (0) 20 8500 0837	
	Out of hours Mobile +44 (0) 7748 146504	
United Kingdom Southampton	Tel +44 (0) 23 8063 4911	
	Fax +44 (0) 23 8033 0014	
United Kingdom Glasgow	Tel +44 (0) 14 1429 6462	
	Fax +44 (0) 14 1429 5539	
Netherlands Rotterdam	Tel +31 (0) 10 416 7622	
	Fax +31 (0) 10416 7218	
Singapore	Monday to Friday: 0830 to 1700	Tel: +65 6545 9880
	1700 to 0830 call our UK office	Tel: +44 (0) 208 502 6887 and select option 5
	Friday 1730 onwards and over weekend	Tel: +65 9817 4202
ChartCo	Tel: +44 (0)20 8276 0003	
	Fax +44 (0)20 8276 0004	

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