User Manual for

DM700 ECDIS hardware

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1.0	2016-12-02	Initial version of document

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User manual for DM700 ECDIS hardware

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DBS11425 User Manual for Danelec Marine ECDIS software P/N 9303396

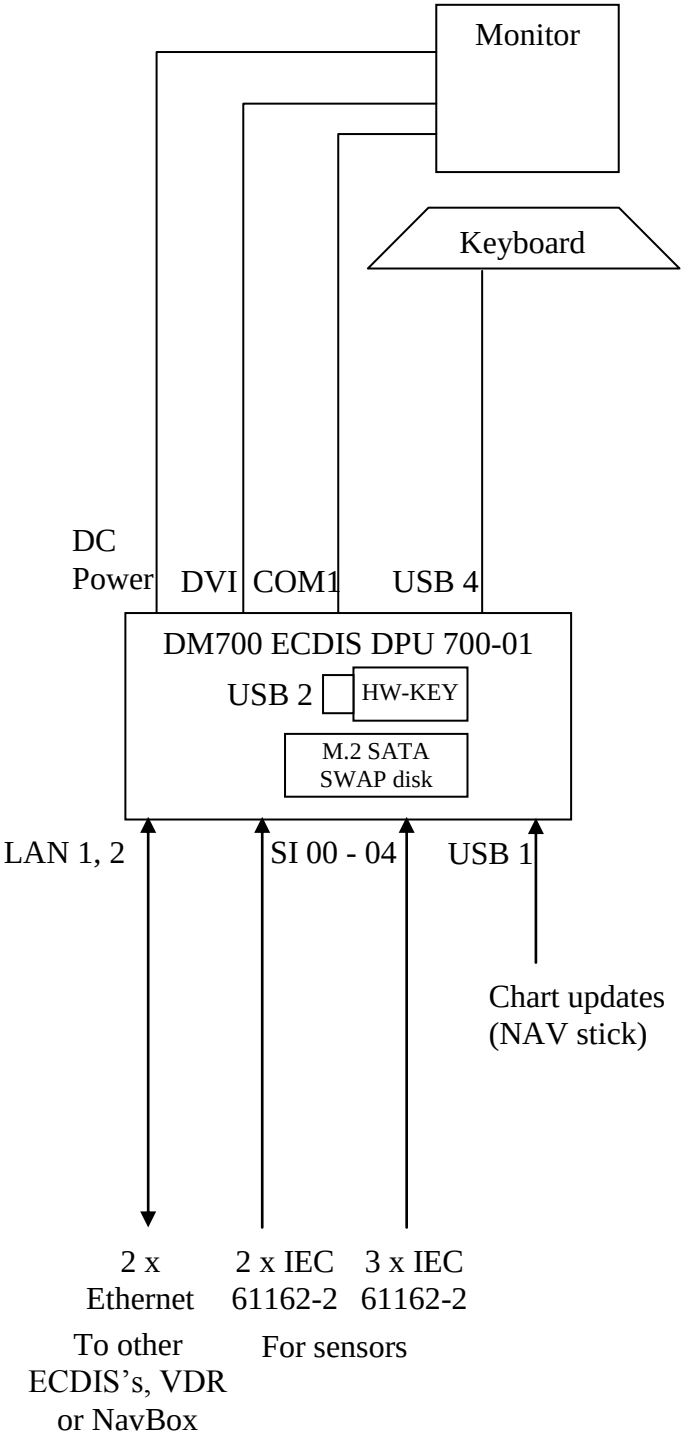
1.2 Terms and Abbreviations

ECDIS Electronic Chart Display and Information

2 System overview for DM700 ECDIS

2.1 System overview

A DM700 ECDIS consists of the following parts:



2.1.1 DPU (Data Processing unit)

The data processing unit contains the computer for the ECDIS software and communication I/O interface. The DPU can be installed on a table-top, bulkhead or in a console. For more information consult *section 6 "DM700 ECDIS data processing unit (DPU 700-01)".*

2.1.2 USB port

The USB port on the front (USB 1) is used for updating charts and software.

2.1.3 USB hardware key

The USB hardware key is a security device which contains encryption keys needed for accessing charts. The USB hardware key is located under the service cover on the DM700 ECDIS DPU

2.1.4 Monitor

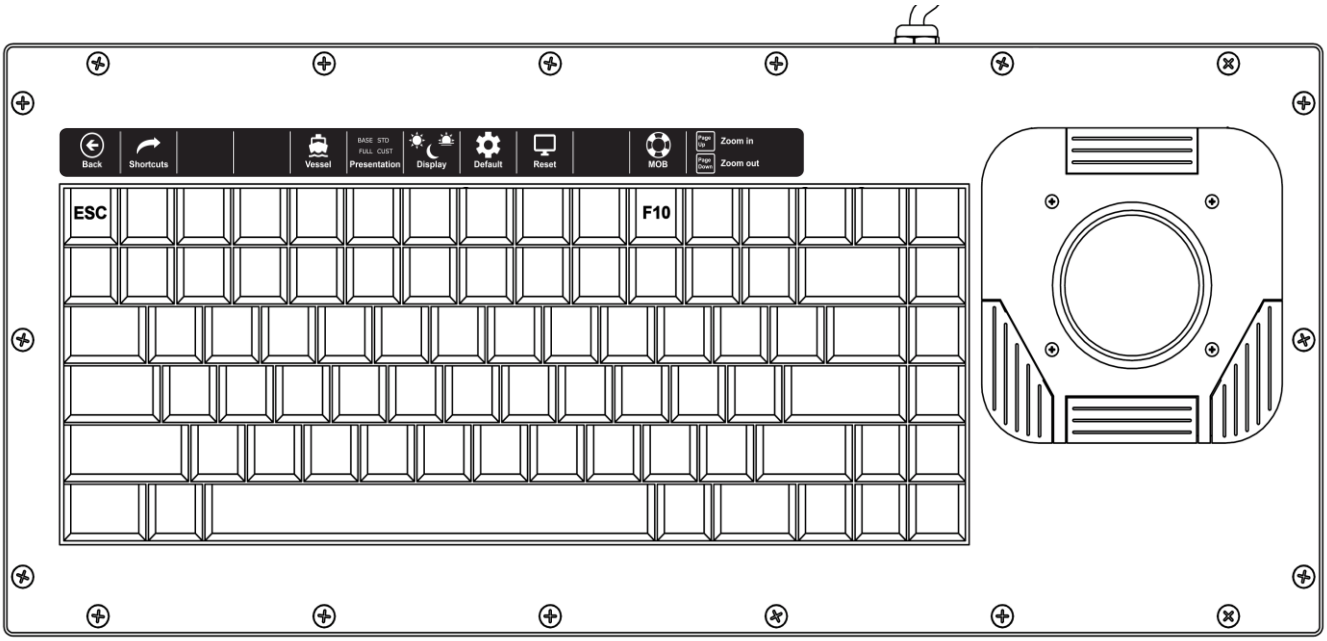
The monitor supplies power to the DM700 main unit and displays the image from the ECDIS computer. The monitor is installed on a table top, or flush-mounted in the console.

2.1.5 Monitor HMI

The monitor HMI is used to power the DM700 ECDIS ON and OFF. It also includes a buzzer which will sound if an alarm or warning condition occurs in the ECDIS. The monitor HMI is mounted on the monitor hinge or if the monitor is panel-mounted, installed adjacent to the monitor. Consult *section 3"Monitor HMI"*.

2.1.6 Keyboard – Hot keys

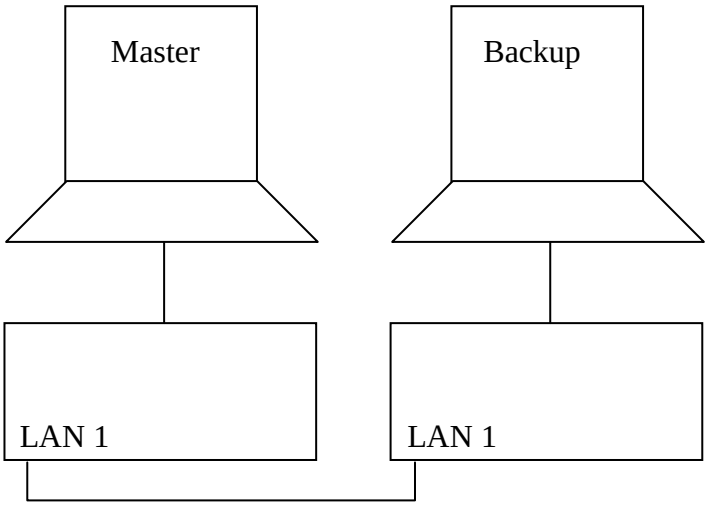
Some of the most important functions on the ECDIS are also located on the **[F1] - [F10]** function-keys (see *DBS11425 "User Manual for Danelec Marine ECDIS software*").
A sticker showing symbols for the hot key functionality is mounted on the keyboard.



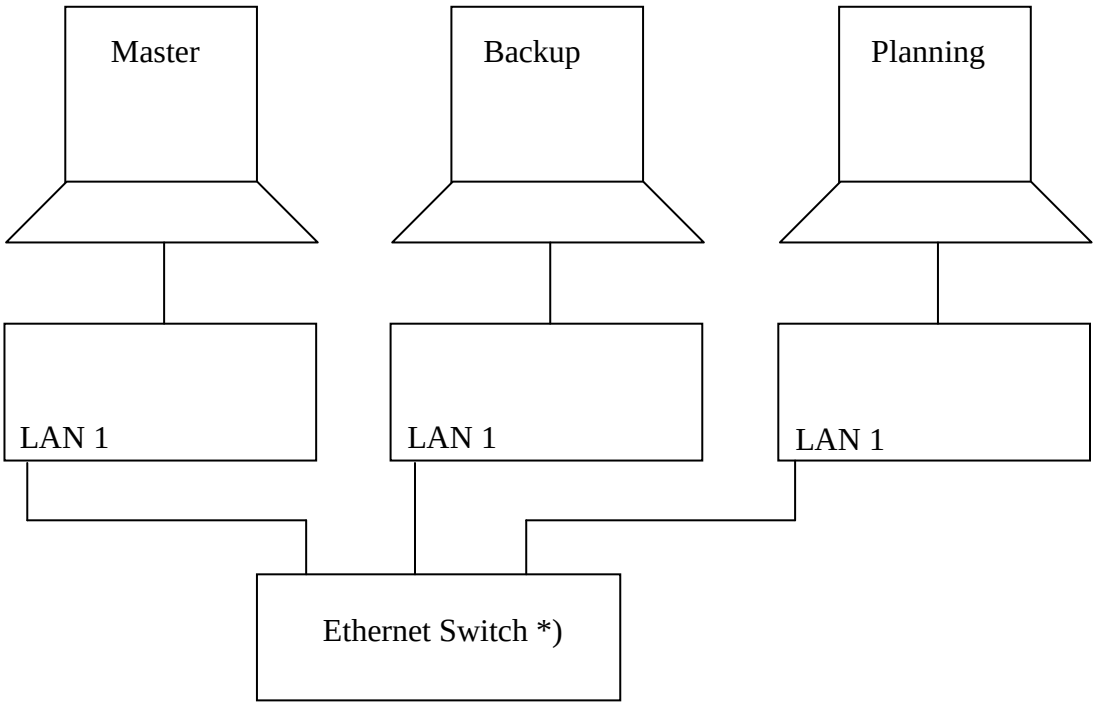
E.g. sticker mounted on Cortron keyboard.

2.2 ECDIS cluster

A complete ECDIS installation will in most cases consist of a number of systems (a cluster). The DM700 ECDIS can be connected directly together if the cluster contains only two systems. The DM700 ECDIS's must be connected using an Ethernet switch if the cluster contains more than two systems.



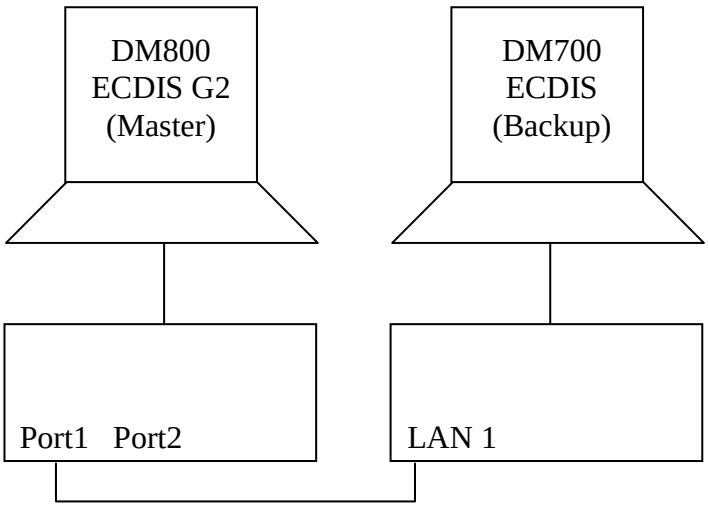
Cluster containing 2 x DM700 ECDIS



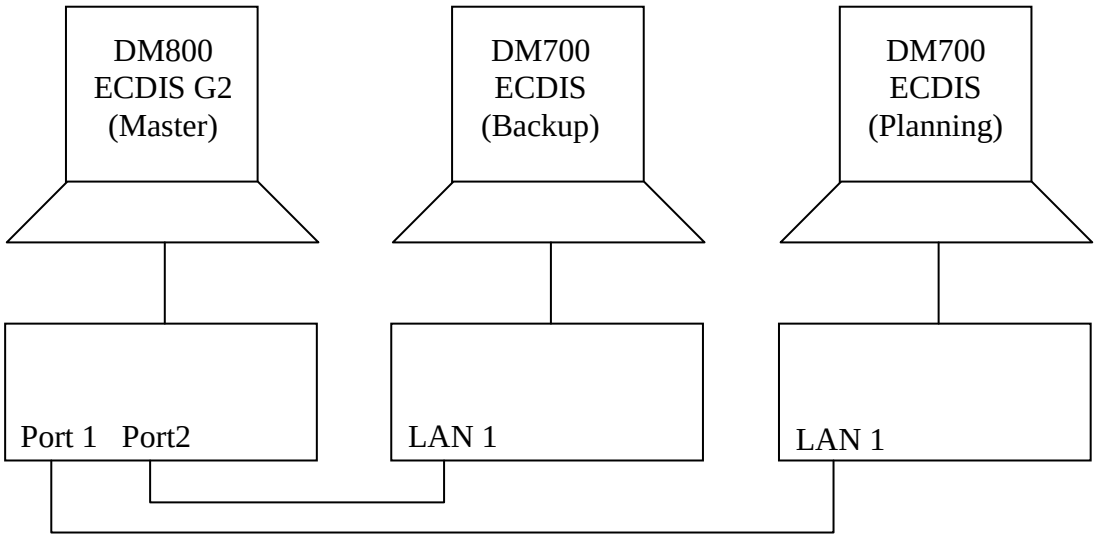
Cluster with 3 x DM700 ECDIS

**) Must be an Ethernet switch which is included on the type approval certificate (e.g. "5 Port Managed Gb Ethernet switch", type 1303974).*

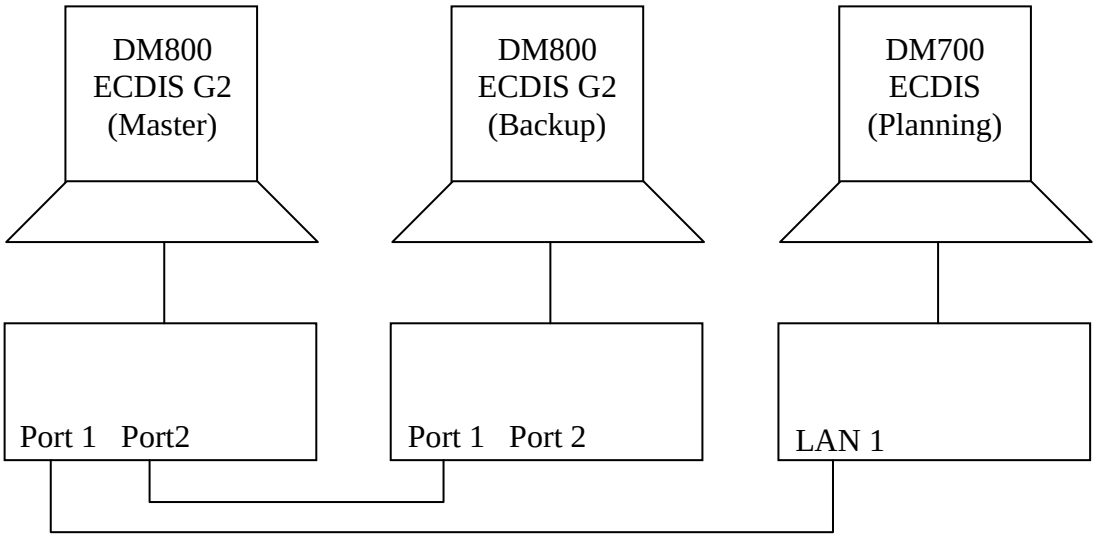
The DM700 ECDIS and DM800 ECDIS G2 can be combined in a cluster. It will not be possible to have redundant network connections if DM800 ECDIS G2 and DM700 ECDIS are used together



Cluster containing 1 x DM700 ECDIS and 1 x DM800 ECDIS G2

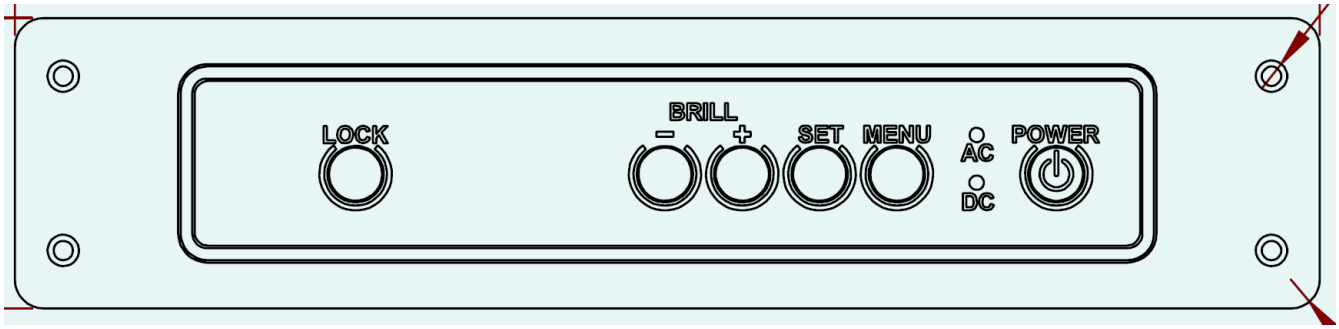


Cluster containing 2 x DM700 ECDIS and 1 x DM800 ECDIS G2



Cluster containing 1 x DM700 ECDIS and 2 x DM800 ECDIS G2

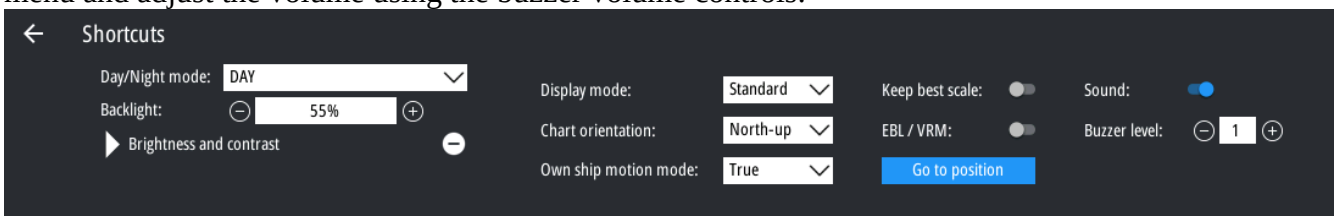
3 Monitor HMI



The monitor HMI must be mounted either directly on the monitor's hinge, or panel-mounted adjacent to the flush-mounted monitor.

3.1 Alert buzzer

The ECDIS will generate an audible alarm following an error - e.g., if the signal from the GPS is lost. The volume of the alarm signal may be adjusted in the ECDIS application. Go to the shortcut menu and adjust the volume using the buzzer volume controls.



(see *DBS11425 "User Manual for Danelec Marine ECDIS software*" for further details).

3.2 ECDIS computer shutdown

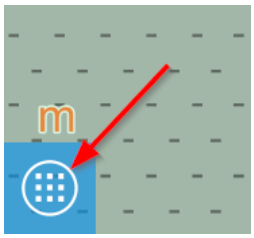
There are 2 ways to set the ECDIS to standby:

- Software standby
- Hardware standby

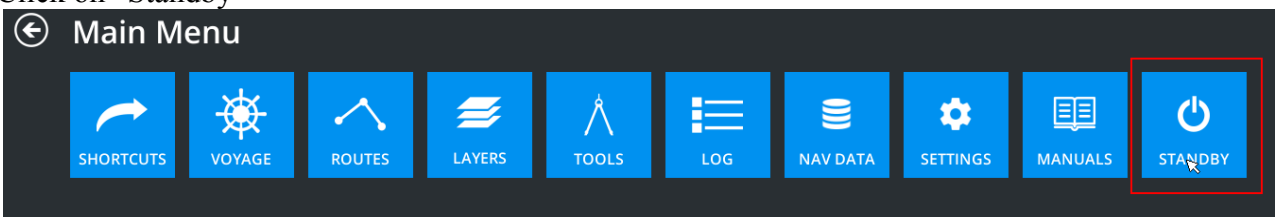
To start the system again, follow the procedure in *section 3.3 "ECDIS computer restart"*

3.2.1 Software standby

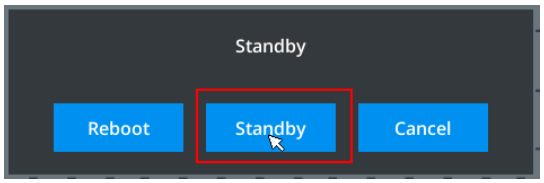
The normal procedure for closing the ECDIS (i.e. setting the ECDIS to standby) is to open the "Main Menu" in the bottom left corner



Click on “Standby”



and click on **[Standby]**.



3.2.2 Hardware standby

Note: The procedure described in this section should only be used if the ECDIS software freezes or stops responding to user input.

Press and hold the POWER button on the monitor HMI for 7 seconds in order to shut down the ECDIS computer.

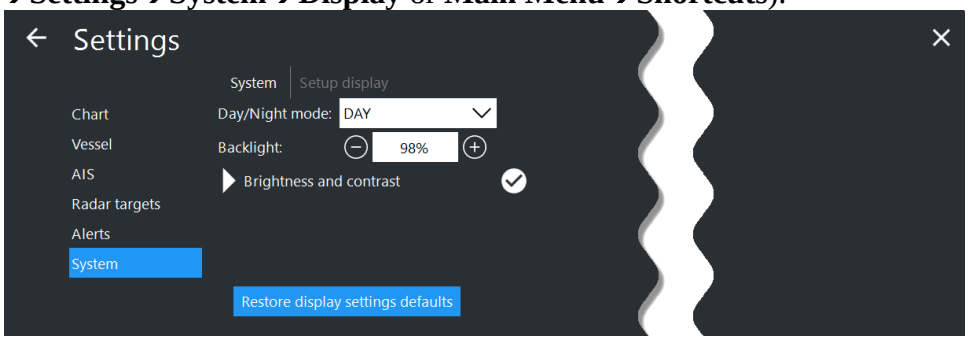
3.3 ECDIS computer restart

Press POWER button in the monitor HMI in order to restart the computer. This is applicable both after a “hard” shutdown (see *section 3.2 “ECDIS computer shutdown”*) or if the ECDIS is in standby after the software has been closed normally.

4 Monitor

4.1 Control panel on monitor

The brightness can be controlled from the ECDIS software
(**Main Menu→Settings→System→Display** or **Main Menu→Shortcuts**).



Note that the monitor is not calibrated unless is shown next to the brightness and contrast field.

The default (calibrated) level can be restored by pressing the Restore display settings defaults
or by pressing the keyboard function key – **F8**.

4.1.1 North Invent WAVE monitor:

All monitor settings are controlled from the ECDIS Software.

4.1.2 Returning backlight to normal

If the backlight is turned off and/or the monitor mode is set to night, it can be difficult to see if the monitor is on. Press **F6** to switch between monitor modes, and use **F8** to restore each monitor mode to its calibrated settings.

4.2 Control of Monitor

The color generating capability of the monitor may deteriorate over time. How the quality of the monitor is checked is described in *"Appendix A – Color Differentiation Test"*

4.3 Nominal viewing distance

The viewing distances for the supported monitors are:

North Invent Wave WA190-01	(19"):	70cm
North Invent Wave WA240-01	(24"):	100cm
North Invent Wave WA270-01	(27"):	100cm

5 Self-test

The presence of the keyboard, trackball, and USB hardware key is monitored by the DPU. A caution will be generated if an error in one of these devices is detected.

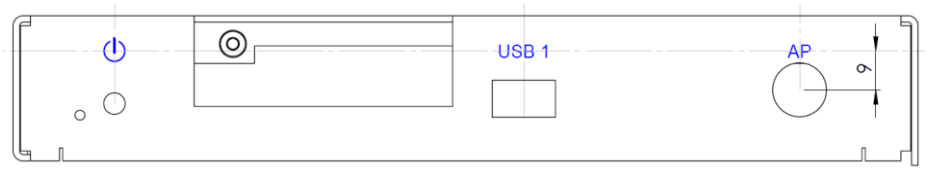
5.1 Buzzer in monitor HMI

The buzzer in the monitor HMI may be checked by adjusting the buzzer volume up or down. The buzzer will briefly sound at the current audio level if the buzzer volume if adjusted up or down.

5.2 Test of monitor

Check the colors and the contrast for the monitor (visually), and if in doubt consult *section 4.2 "Control of Monitor".*

6 DM700 ECDIS data processing unit (DPU 700-01)



DPU front panel

DPU Back panel

6.1 Power

The DM700 main unit must be powered from the DC output on the monitor. The monitor must be connected to the ship's main power source (110-230AC). The AC power must be backed up by the vessel's emergency power (automatic switch over). The cables must be as short as possible and have a conductor area of 0.75mm^2 minimum.

The power consumption for the Monitor and DM700 main unit is 80W.

6.2 Status LED's

6.2.1 Status LED

Off: The DM700 ECDIS is in standby or without power.

Red: Reverse power protection is active.

Green (normal operation)**:** The DM700 ECDIS is powered on and is probably operating normally.

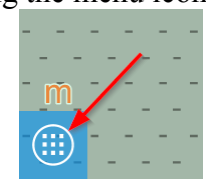
Blue flash (normal operation)**:** Disk activity.

7 System Management menu

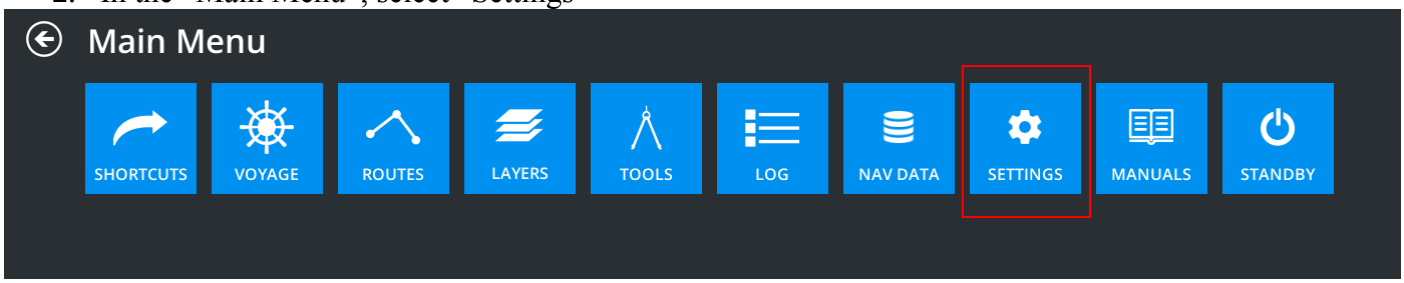
The ECDIS includes a System Management menu for performing special non-standard tasks.
Note: The System Management Menu should only be used by personnel with proper authorization, as incorrect use may result in loss of chart licenses.

The "Management Menu" is located in the **Settings→System→Management menu**.
To open the menu, do the following:

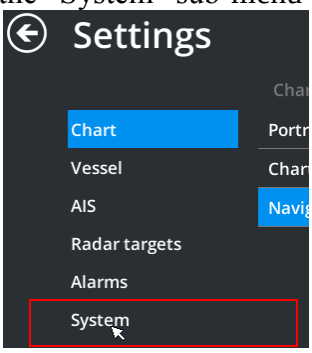
1. Open the "Main Menu" by clicking the menu icon in the bottom left corner:



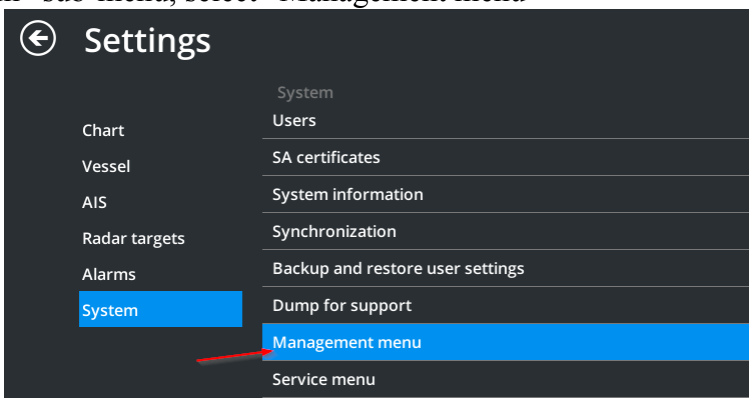
2. In the "Main Menu", select "Settings"



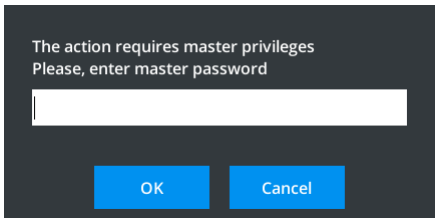
3. In the "Settings" menu, select the "System" sub-menu



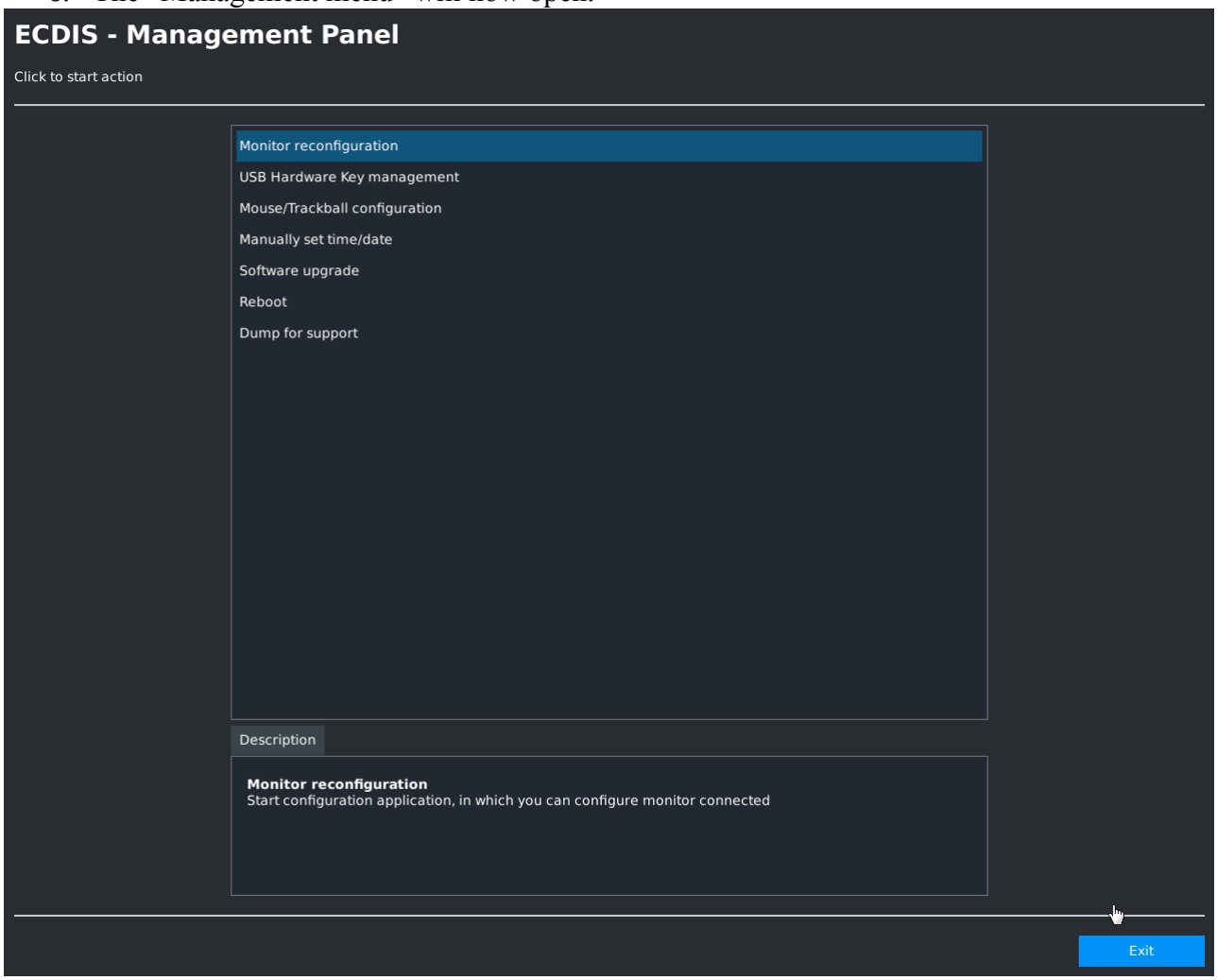
4. In the "System" sub-menu, select "Management menu"



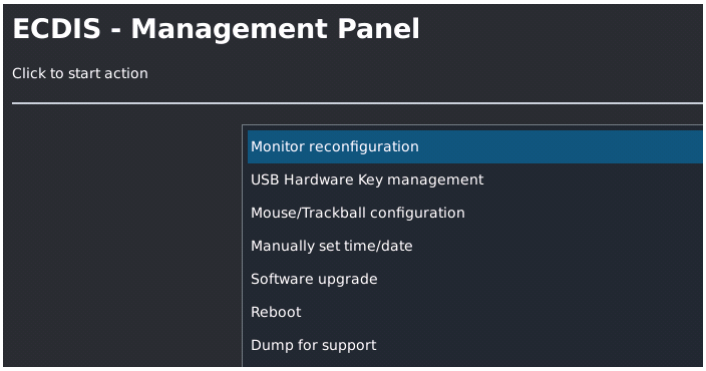
5. Enter the MASTER password



6. The “Management menu” will now open.



7.1 Menu



You will be able to do the following:

Info: Double click on the menu to select the function.

- Monitor reconfiguration.
  If the monitor needs to be replaced with a different type, this menu can be used to change the monitor type of the system.

- USB hardware key management.
  Use this menu if you need to replace the USB hardware key in the system. You can also use this function to change the role of the hardware key (primary/secondary/independent). See *section 7.3"USB hardware keys"* for further details.

- Mouse/Trackball configuration.
  You can adjust the speed of the mouse/track in the menu. This is relevant if you have replaced the keyboard (with integrated trackball) with a keyboard of a different type.

- Manually set time/date.
  Use this menu to set the BIOS time of the system manually.

- Software update.
  This menu is used for updating the software of the system. Only software updated made and signed by Danelec Marine A/S can be installed. Software update requires the ECDIS to be restarted. See *section 7.4 "Install software update"* for further details.

- Reboot.
  DM700 ECDIS will restart.

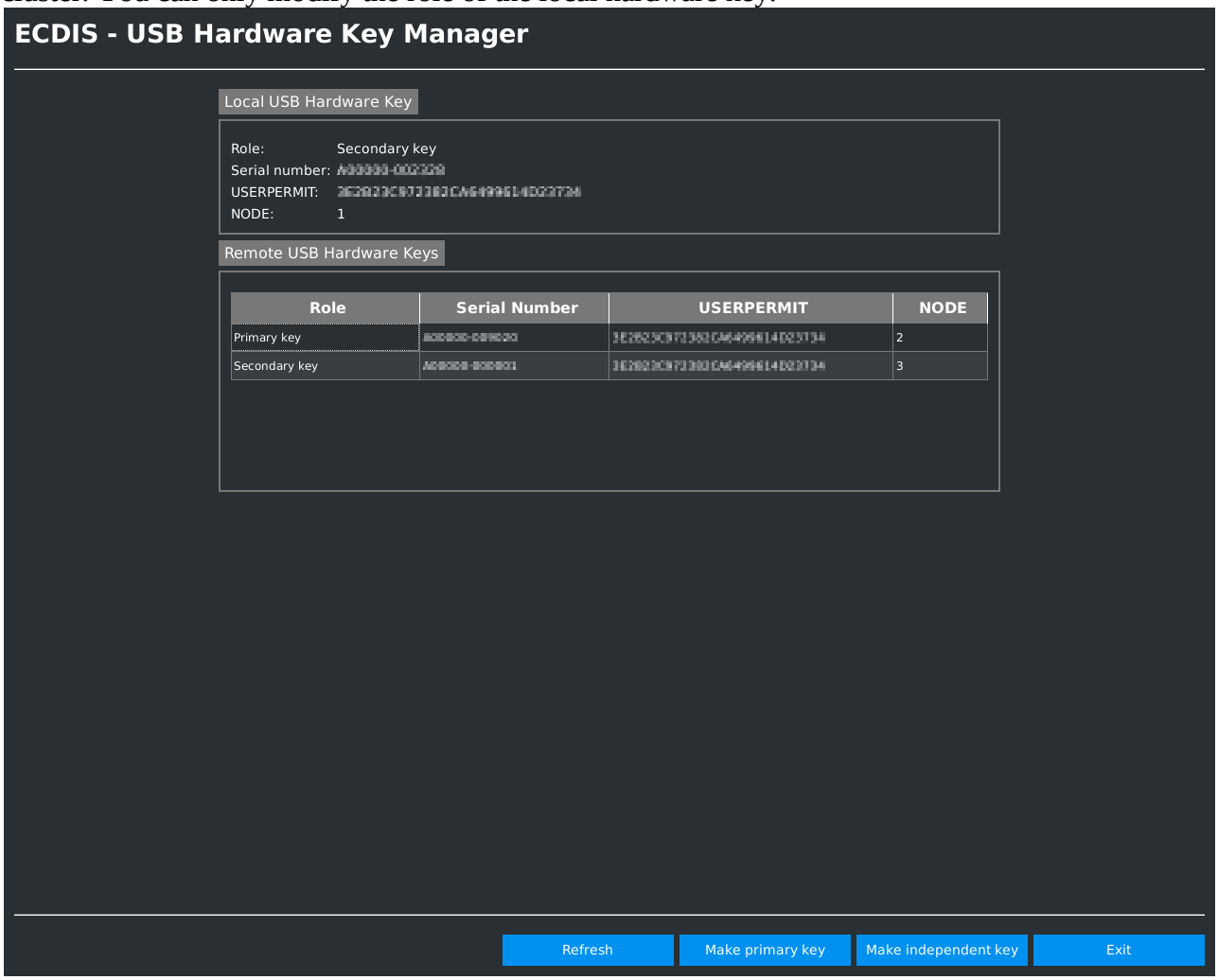
- Dump-for-support.
  A dump-for-support file is generated, and saved to a removable device.

7.2 Management of USB hardware Keys

It may be necessary to reset or change roles of a USB hardware key if one of the existing hardware keys is replaced.

In most cases this will be handled automatically by the system, but in cases where a USB hardware key has been used as primary key in another ECDIS cluster, the hardware key needs to be changed. To change a primary key into a secondary key in the current cluster, it must first be made independent. After this it will automatically be made a secondary key in the cluster.

By opening the USB hardware key management panel, you can inspect all the hardware keys in the cluster. You can only modify the role of the local hardware key.



- Make primary key
  Use this button to make the local USB hardware key the primary hardware key in the cluster. There may only be one primary hardware key in a cluster, so it is not possible to make a hardware key primary if another primary key already exists.
- Make independent key
  Use this button to change a USB hardware key back to an independent key. This can be used if a hardware key has been used as a primary key in another ECDIS cluster.

7.3 USB hardware keys

The USB hardware key contains the USERPERMIT for the charts. If no hardware key is inserted, it is not possible to view imported charts. The hardware key can be used in two configuration types. Stand-alone configuration and Cluster configuration

7.3.1 Stand-alone configuration

Stand-alone configuration is used if only one ECDIS is installed. In this configuration the USB hardware key exclusively controls the USERPERMIT in the ECDIS. If the hardware key is replaced with another hardware key, the ECDIS adopts the USERPERMIT from the new hardware key. This will render the installed charts and permits useless, and new chart permits must be installed.

7.3.2 Cluster configuration

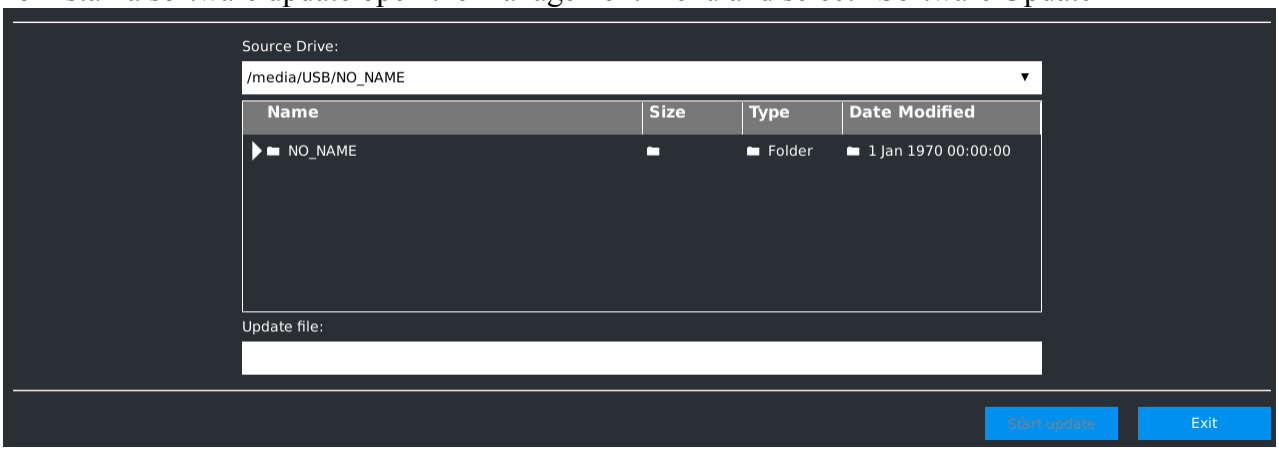
Cluster configuration is used when more than one ECDIS is installed. In this configuration one of the USB hardware keys is selected as the primary key. The remaining ECDIS will adopt USERPERMIT from the primary hardware key. It is possible later on to change which hardware key is the primary key. This is probably undesirable as it will render the installed charts and permits useless, and new chart permits must be installed.
If the primary USB hardware key is removed or becomes faulty, the remaining ECDIS in the cluster continues to work and uses the primary key‘s USERPERMIT for a period of 3 months. A faulty primary USB hardware key must be replaced as soon as possible to ensure continued operation of the ECDIS.

7.4 Install software update

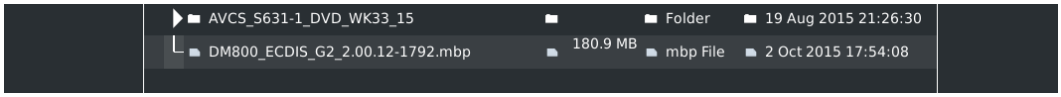
The software for the ECDIS may need to be updated. *Section 7.5 “Software Version”* describes how to verify if a newer software version is available.

IMPORTANT: Only install updates when in Port. Installation of software updates while at sea may compromise the operational safety of the vessel.

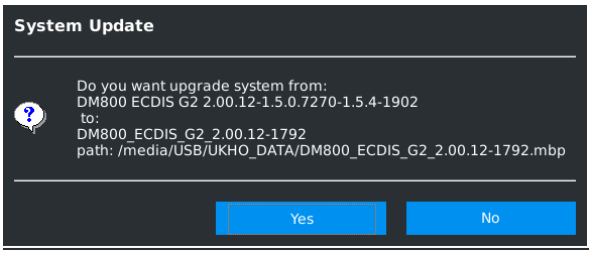
To install a software update open the management menu and select “Software Update”



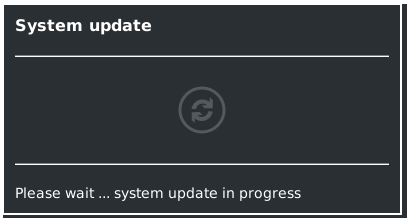
Select the installation packet (.mbp). The packet can be loaded from an USB stick.



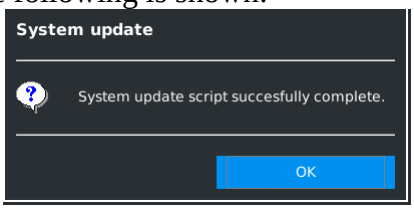
Click on **[Start Update]**.



Click **[Yes]**. The update process starts.



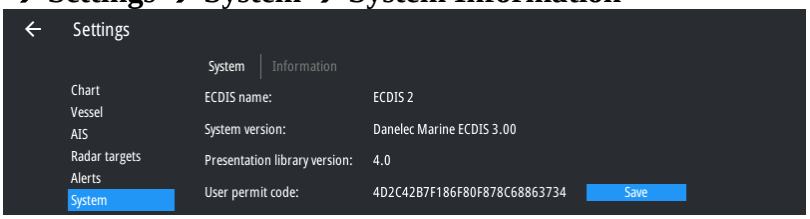
After completion of the update the following is shown:



When clicking **[OK]** the ECDIS will restart, and the the update is completed.

7.5 Software Version

The ECDIS system version is displayed in the “System Information panel”.
Open **Main Menu → Settings → System → System Information**



To verify that the latest available version is installed, see the sections below:

7.6 Verification of System Software Version

The system software on the ECDIS must be kept updated. Information about available versions, release status and compliance status may be found on the website: http://www.danelec-marine.com

In the ECDIS section of the site, look for the "ECDIS software information and compliance status" page. The site shows the released software versions, and a list of standards the software/ECDIS version complies with.

ECDIS software information and compliance status

As stated in IMO SN.1/Circ.266 on maintenance of ECDIS software, *"ECDIS that is not updated for the latest version of IHO standards may not meet the chart carriage requirements as set out in SOLAS regulation V/19.2.1.4"*.
Click here for more information on IHO standards currently in effect.

In order to ensure the safety of navigation, please check the compliance of your ECDIS against standards currently in effect to verify whether your ECDIS software needs to be upgraded.

For the best user experience we recommend upgrading your ECDIS to the latest available software version, even if your current software version is compliant with the applicable standards.

Please select your DM800 ECDIS software version from the list below.

- DM800 ECDIS (G2) software version 2.15
- DM800 ECDIS (G2) software version 2.14

DM800 ECDIS (G2) software version 2.15

Compliance status:

IMO	MSC.232(82)	Performance Standards for ECDIS
IHO S-57	Edition 3.1 (2000)	Transfer Standard for Digital Hydrographic Data
IHO S-52	Edition 6.0 (2010)	Specifications for Chart Content and Display Aspects of ECDIS
IHO S-52 PresLib	Edition 3.4 (2008)	Presentation Library for ECDIS (Annex A to S-52)
IHO S-63	Edition 1.1 (2008)	Data Protection Scheme
IHO S-64	Edition 2.0.0 (2012)	Test Data Sets for ECDIS
IEC 61174	Edition 3.0 (2008)	ECDIS - Operational and performance requirements, methods of testing and required test results

Verify that the software version for the ECDIS (see previous section) matches the latest "System software version" on the web page.

8 Hardware Errors

The hardware is continually monitored, and the user is warned if any errors occur. Some errors can be removed by the user. Others will require a service technician.

8.1 List of hardware alerts

#	Type	Text	Description/Resolution
10200	Caution, B	'Disk' device problem - detected *x* device(s), expected 1	No or more than one internal disk has been detected. This indicates a defective system. Contact support.
10201	Caution, B	'Mouse / Trackball' device problem - detected *x* device(s), expected 1	No or more than one pointing device has been detected. If x=0, connect a mouse/trackball (or keyboard with integrated trackball). If already connected, the mouse/trackball may be defective. If x > 1, and only one mouse/trackball is connected, it may be an indication of faulty operation.
10202	Caution, B	'Keyboard' device problem - detected *x* device(s), expected 1	No or more than one keyboard has been detected. If x=0, connect a keyboard. If already connected, the keyboard may be defective. If x > 1, and only one keyboard is connected, it may be an indication of faulty operation.
10204	Caution, B	'USB hardware key' device problem - detected *x* device(s), expected 1	No or more than one USB hardware key has been detected. If x=0, insert USB hardware key in any USB port. If already connected, the hardware key may be defective. Other alerts may also indicate this. If x > 1, remove any extra hardware keys inserted.
10230	Caution, B	The USB hardware key is not connected to the ECDIS	Insert a hardware key in the ECDIS
10231	Caution, B	There is a communication problem with the primary USB hardware key	Will only occur in a cluster configuration. The primary USB hardware key is not present in the cluster, or the ECDIS with the primary hardware key has been turned off for more than 1 day. Turn on the ECDIS with the primary hardware key. If the primary hardware key is defective, contact support and order a replacement.

10232	Caution, B	There is a communication problem with the primary USB hardware key. The licensed charts will stop working if the error persists	Will only occur in a cluster configuration. The primary USB hardware key is not present in the cluster and has not been for 14 days. If the primary hardware key is defective, contact support and order a replacement.
10233	Caution, B	The licensed charts have stopped working due to a communication problem with the primary USB hardware key	Will only occur in a cluster configuration. The primary USB hardware key is not present in the cluster and has not been for 90 days. The charts are no longer valid any more. If the primary hardware key is defective, contact support and order a replacement.
10234	Caution, B	The cluster contains multiple primary USB hardware keys	Will only occur in a cluster configuration Use the USB hardware key management tool to inspect the cluster and remove the unwanted primary hardware key.
10250	Caution, B	Incorrect monitor type connected. The color in the chart representation will be incorrect	The monitor connected is not the configured model/type. Connect the correct monitor.
10301	Caution, B	No connection to ECDIS system 1	The network connection has been lost to ECDIS node 1 (ECDIS 1). Possibly a disconnected or defective network cable. Verify all networks cables are connected correctly, and check that link is present for both Ethernet ports 1 and 2.
10302	Caution, B	No connection to ECDIS system 2	The network connection has been lost to ECDIS node 2 (ECDIS 2). Possibly a disconnected or defective network cable. Verify all networks cables are connected correctly, and check that link is present for both Ethernet ports 1 and 2.
10303	Caution, B	No connection to ECDIS system 3	The network connection has been lost to ECDIS node 3 (ECDIS 3). Possibly a disconnected or defective network cable. Verify all networks cables are connected correctly, and check that link is present for both Ethernet ports 1 and 2.
10304	Caution, B	No connection to ECDIS system 4	The network connection has been lost to ECDIS node 4 (ECDIS 4).

			Possibly a disconnected or defective network cable. Verify all network cables are connected correctly, and check that link is present for both Ethernet ports 1 and 2.
10401	Caution, B	Low disk space. Less than x MB left on disk	The disk is almost full. The operational state of the ECDIS will soon be compromised. Remove unused chart databases.
10402	Warning, B	No space left on disk	The disk is full. The operational state of the ECDIS is now compromised. Remove all unused chart databases, routes, logbooks, etc.

8.2 Diagnose errors/malfunctions

This section describes common solutions for some errors and malfunctions in the DM700 ECDIS.

No image on the display

1. Verify that the DM700 ECDIS DPU is turned on. (CPU status LED must be GREEN)
2. Change monitor mode to DAY by pressing **F6** on the keyboard up to three times.
3. Reset monitor settings at each monitor mode by pressing **F8** in each monitor mode.
4. Check the DVI cable is connected to the DVI port of the DM700 ECDIS DPU, and the DVI port of the monitor.
5. Check the RS232 cable is connected to COM1 port of the DM700 ECDIS DPU, and the RS232 port of the monitor.
6. Verify power is connected to the monitor, and turned ON.
7. Repeat step 2 and 3
8. Turn off the DM700 ECDIS computer by pressing the **"POWER"** button on the monitor HMI for 10 seconds. Release the button, and then briefly press the button again.
9. Contact a Danelec service partner for further assistance.

USB Disk is not recognized

1. Verify the USB Stick is correctly plugged into the USB port 1 on the front of the DM700 DPU.
2. Check the USB disk file system. Supported formats are: FAT, FAT32 or NTFS.
3. Contact a Danelec service partner for further assistance.

No data is received from any of the remote ECDIS nodes

1. Verify an Ethernet cable is connected to Ethernet port 'LAN1'.
2. Verify the remote ECDIS node is turned on.
3. Contact a Danelec service partner for further assistance.

No sound from the buzzer

1. Verify the monitor is connected correctly to the DM700 ECDIS DPU by adjusting the backlight of the monitor. The backlight should change.
2. Verify the monitor HMI is correctly connected to the monitor by pressing the POWER button briefly. You should see a standby dialog popping up.
3. If you do not see a standby dialog, verify the cable from the monitor HMI is connected to the monitor.
4. Adjust the buzzer in "Shortcuts"-menu (**Main Menu→Shortcuts** or Press **F1**) by pressing the + and – buttons, and also verify sound is not turned off.
5. Contact a Danelec service partner for further assistance.

The backlight of the monitor cannot be controlled

1. Check the RS232 cable is connected to COM1 port of the DM/00 ECDIS DPU, and the RS232 port of the monitor.
2. Contact a Danelec service partner for further assistance.

The ECDIS will not start

1. Verify AC power is connected to the monitor. The AC LED will be lit.
2. Verify DC is connected from the monitor to the DM700 ECDIS DPU.

3. Verify the DM700 ECDIS is turned on (Status LED must be GREEN). If not, briefly press the **“POWER”** button on the monitor HMI, or briefly press the **“POWER”** button on the DPU 700-01, next to the Status LED
4. If the message “No boot media found” appears, verify the M.2 SATA SDD is inserted in the M.2 SATA connector under the service cover. If M.2 SATA SDD is inserted, the M.2 SATA connector or M.2 SATA SDD is defective. Contact a Danelec service partner for further assistance.
5. If the message “Operating system not found” appears, the ECDIS system software is not installed properly and must be reinstalled. Contact a Danelec service partner for further assistance.

9 Appendix A – Color Differentiation Test

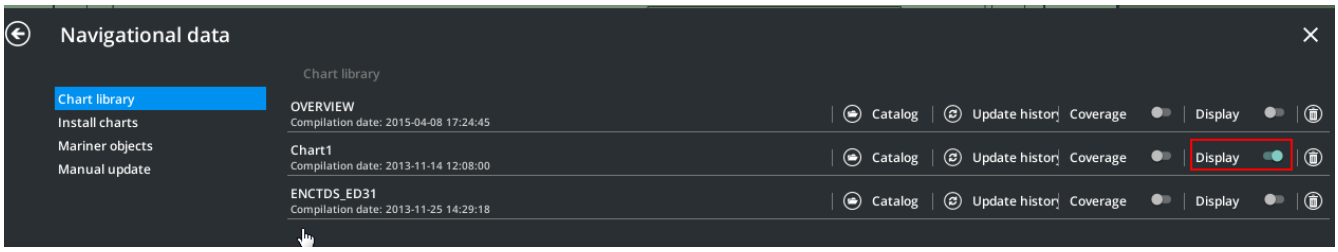
The color generating capability of any type of display screen will deteriorate with age. The Color Differentiation Test diagram is provided to enable the mariner to verify that his display screen still retains the color differentiation capability needed to distinguish between the various color-coded areas, lines and point symbols of the ECDIS display.

The Color Test should be applied to the day and dusk color palettes.

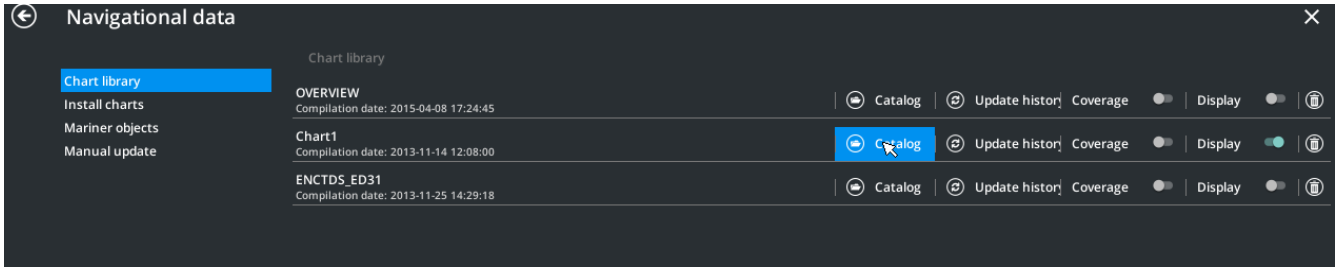
Before the Color Test diagram is used, the black-adjust symbol SY(BLKADJ) should be brought up on the screen, and the contrast and brightness controls (or equivalent controls for an LCD) should be adjusted in a specific way.

To adjust the contrast and brightness do the following:

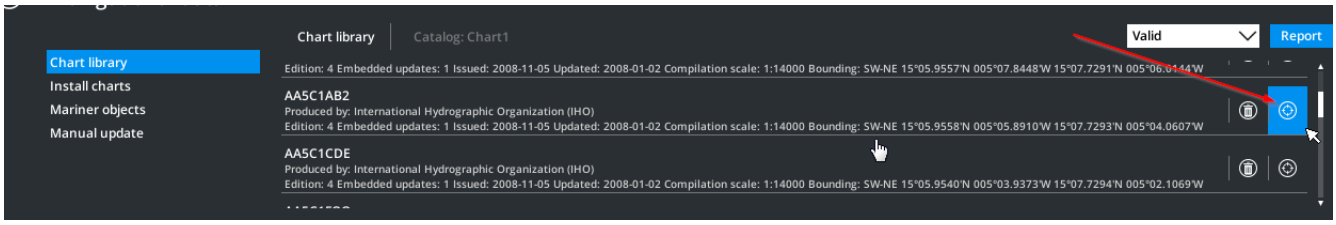
1. Make sure that the "Chart1" database is displayed (See *DBS1425"User Manual for Danelec Marine ECDIS Software"*).
   Open **Main Menu →NAV DATA →Chart Library** and enable "Display" of "Chart1"



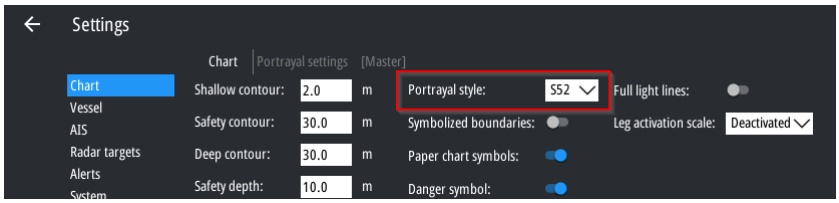
2. Locate the Chart1 chart-database and click on the "Catalog".



3. Locate cell "AA5C1AB2" and click on the "locate" button for the cell:

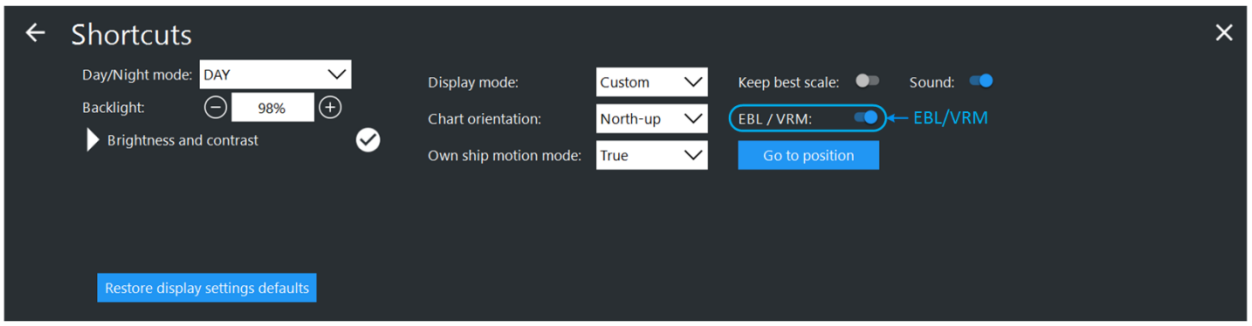


4. The cell containing the black-adjust symbol will be shown.
5. If you cannot see the black-adjust symbol, check the following:
   a. the display type is set to "Standard" – the display type indicator should not be "Base"
   b. the chart presentation type is set to S52 – the **S52** option is selected in the **Main Menu→ Settings → Chart → Portrayal settings.**



c. the chart scale is larger than 1:16 500.

6. Open the shortcut menu **Main Menu → Shortcuts**



7. First, set contrast to a maximum, and brightness to a minimum. Look at the black-adjust symbol.
8. Then if the center square is not visible, turn up the brightness until it just appears.
9. Or, if the center square is clearly visible (with contrast at maximum, brightness at minimum), turn the contrast down until the inner square disappears, then turn contrast back up until the inner square is just visible again.
10. If the above adjustment is not successful, select a more appropriate chart display palette and repeat this procedure.
11. The "black level" is then correctly set. If a brighter display is required, use the contrast control, but preferably do not adjust the controls unless lighting conditions on the bridge change.

After the “black level” has been set, you can proceed with the color test. For the test you need to display the color differentiation diagram in the chart view.

12. Repeat steps 1-3, but instead open cell”AA5C1WOO”. The cell contains the color differentiation test diagram is shown.
13. The diagram consists of twenty squares extending over the whole of a 350x270 mm (approximately) screen. Each square is colored with one of the four main background area shades (such as shallow water blue, DEPVS), and each carries a two-pixel wide diagonal line in one of the important line or symbol foreground colors (such as planned route red, PLRTE).
14. The color differentiation test consists of being able to distinguish the background colors and to pick out the like foreground colors, i.e. to say that squares 3, 5, 11, 15, 18 and 20 all have a shallow water blue background, and that squares 3, 10 and 17 have a grey line.