Electronic charts - potential pitfalls
A review of the ECDIS systems

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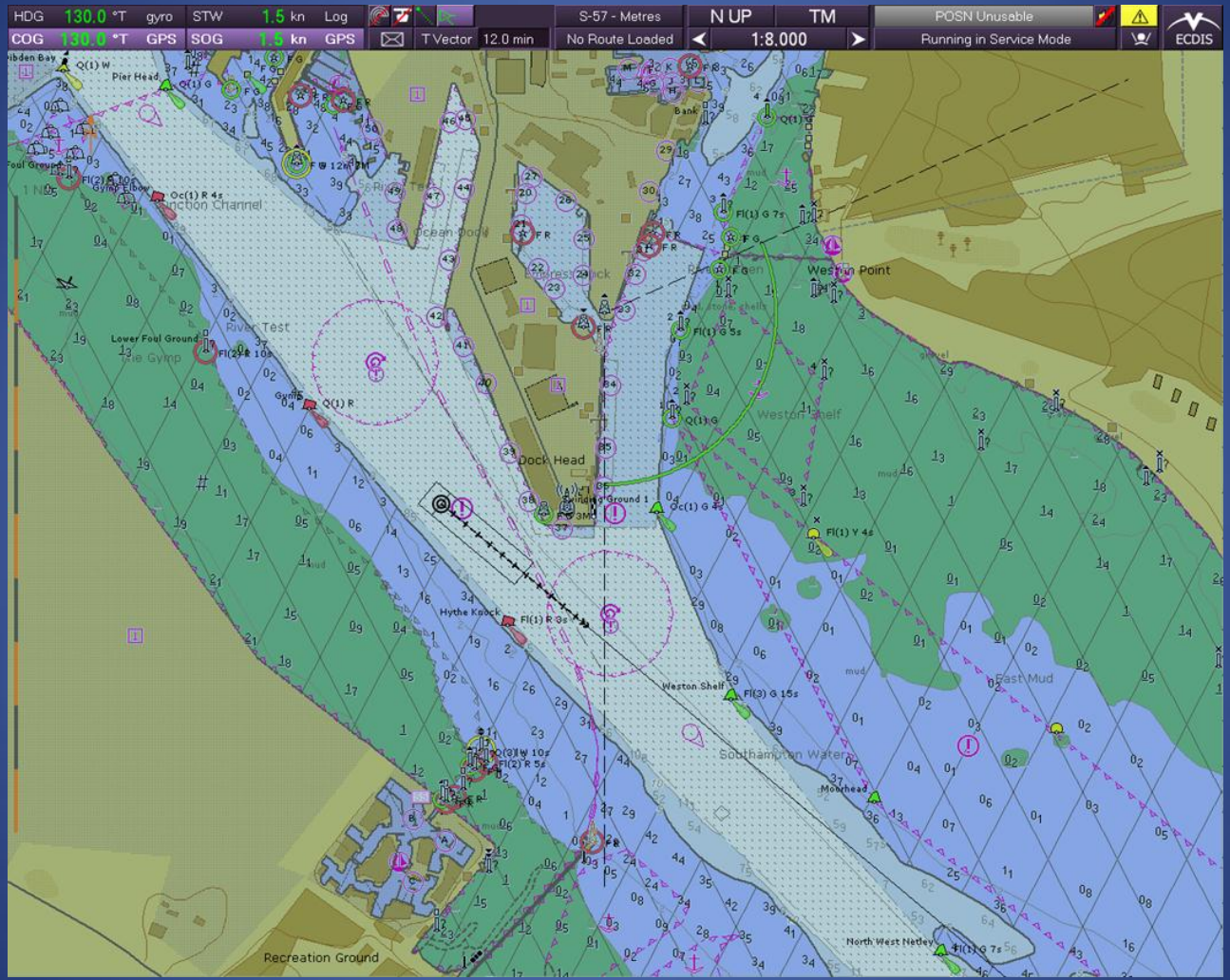
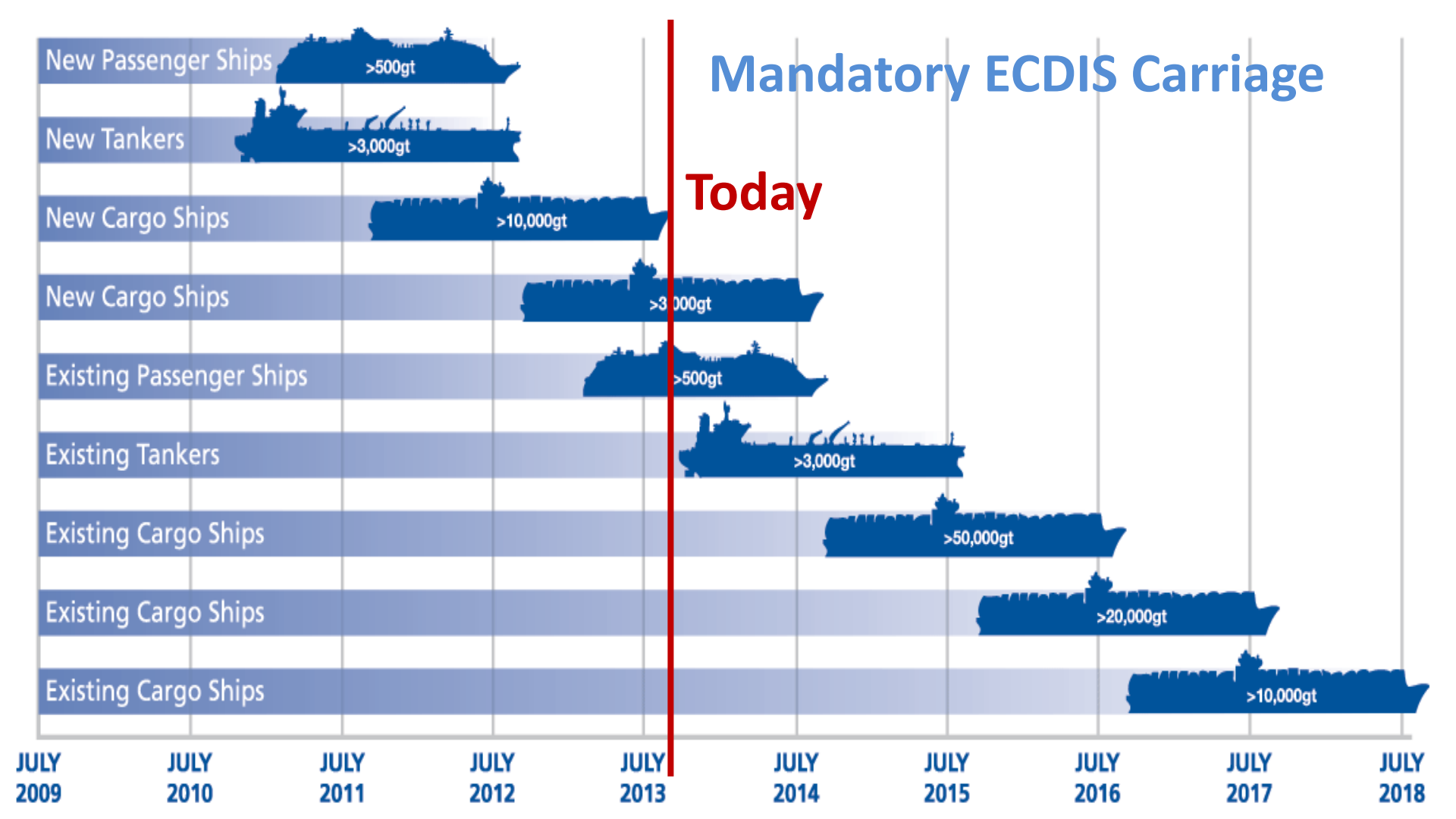
What is ECDIS?

Electronic Chart Display and Information System


HDG 130.0 °T gyro
STW 1.5 kn Log
COG 130.0 °T GPS
SOG 1.5 kn GPS
T Vector 12.0 min
S-57 - Metres
No Route Loaded
N UP
TM
1:8.000
POSN Unusable
Running in Service Mode
ECDIS
Pier Head
Q(1) W
Q(1) G
Oc(1) R 4s
Junction Channel
Ocean Dock
Western Point
Fl(1) G 7s
Fl(1) G 5s
River Test
Lower Foul Ground
Fl(2+1) 10s
Q(1) R
Weston Shelf
Dock Head
Oc(1) G 4s
Fl(1) Y 4s
Hythe Knock
Fl(1) R 5s
Fl(3) G 15s
East Mud
Southampton Water
Oc(3)W 10s
Fl(2) R 5s
Mooring
Recreation Ground
North West Netley
Fl(1) G 7s


Mandatory ECDIS Carriage
Today
New Passenger Ships
>500gt
New Tankers
>3,000gt
New Cargo Ships
>10,000gt
New Cargo Ships
>3 000gt
Existing Passenger Ships
>500gt
Existing Tankers
>3,000gt
Existing Cargo Ships
>50,000gt
Existing Cargo Ships
>20,000gt
Existing Cargo Ships
>10,000gt
JULY 2009
JULY 2010
JULY 2011
JULY 2012
JULY 2013
JULY 2014
JULY 2015
JULY 2016
JULY 2017
JULY 2018

New, immature technology?

- First IMO ECDIS resolution – 1995
- Accepted as equivalent to paper – 2002
- First Mandatory Carriage - 2008

Key components

- Approved Hardware and Software
- Official S57 Vector Charts
- Competent Users
- Updated Safety Management System

Advantages

- Real time position displayed relative to dangers
- Alarms BEFORE grounding
- Automated route checking
- Easy to update

Disadvantages

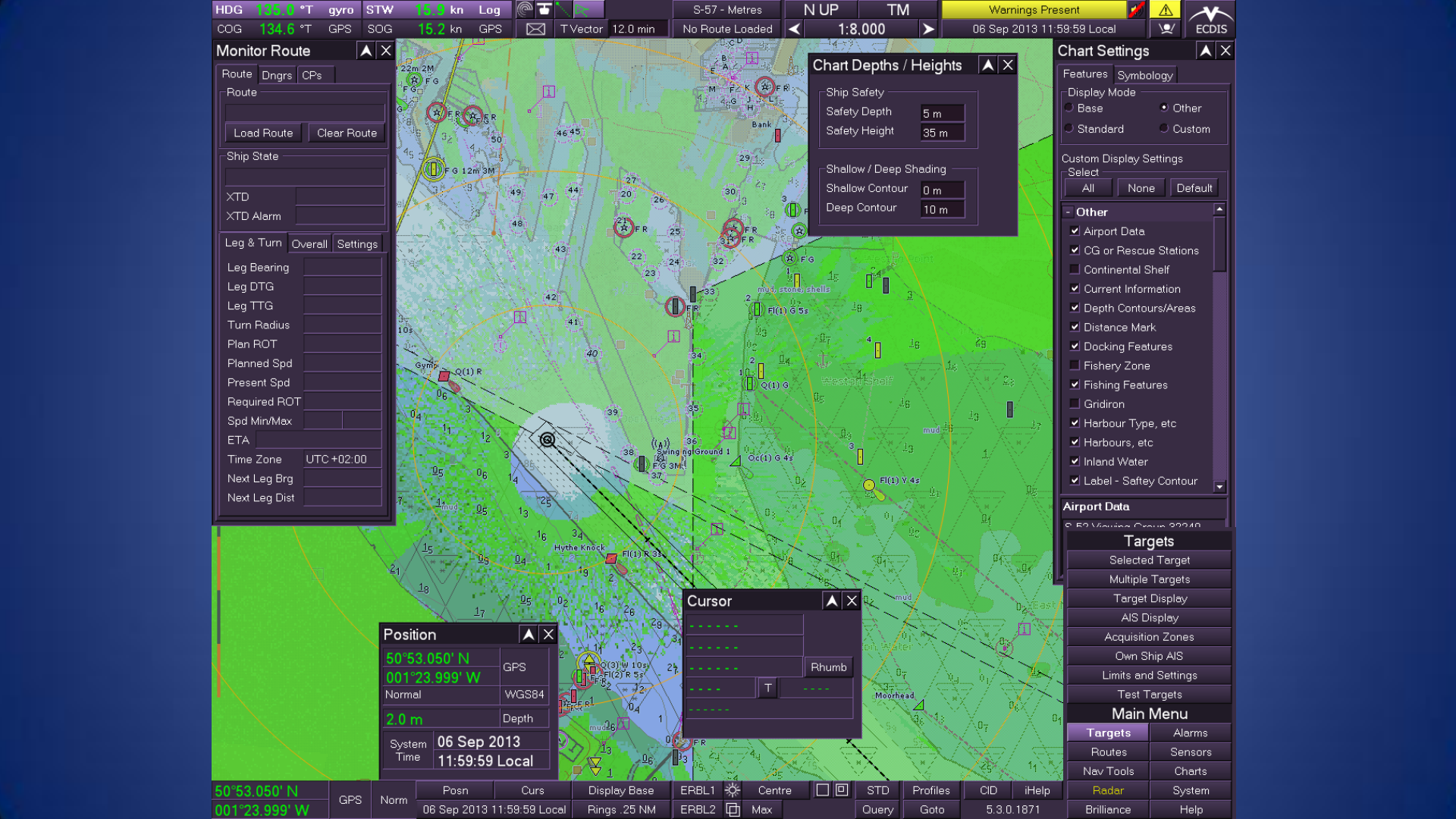
- Complexity
- Anomalies
- New Training Requirements
- Too Good?

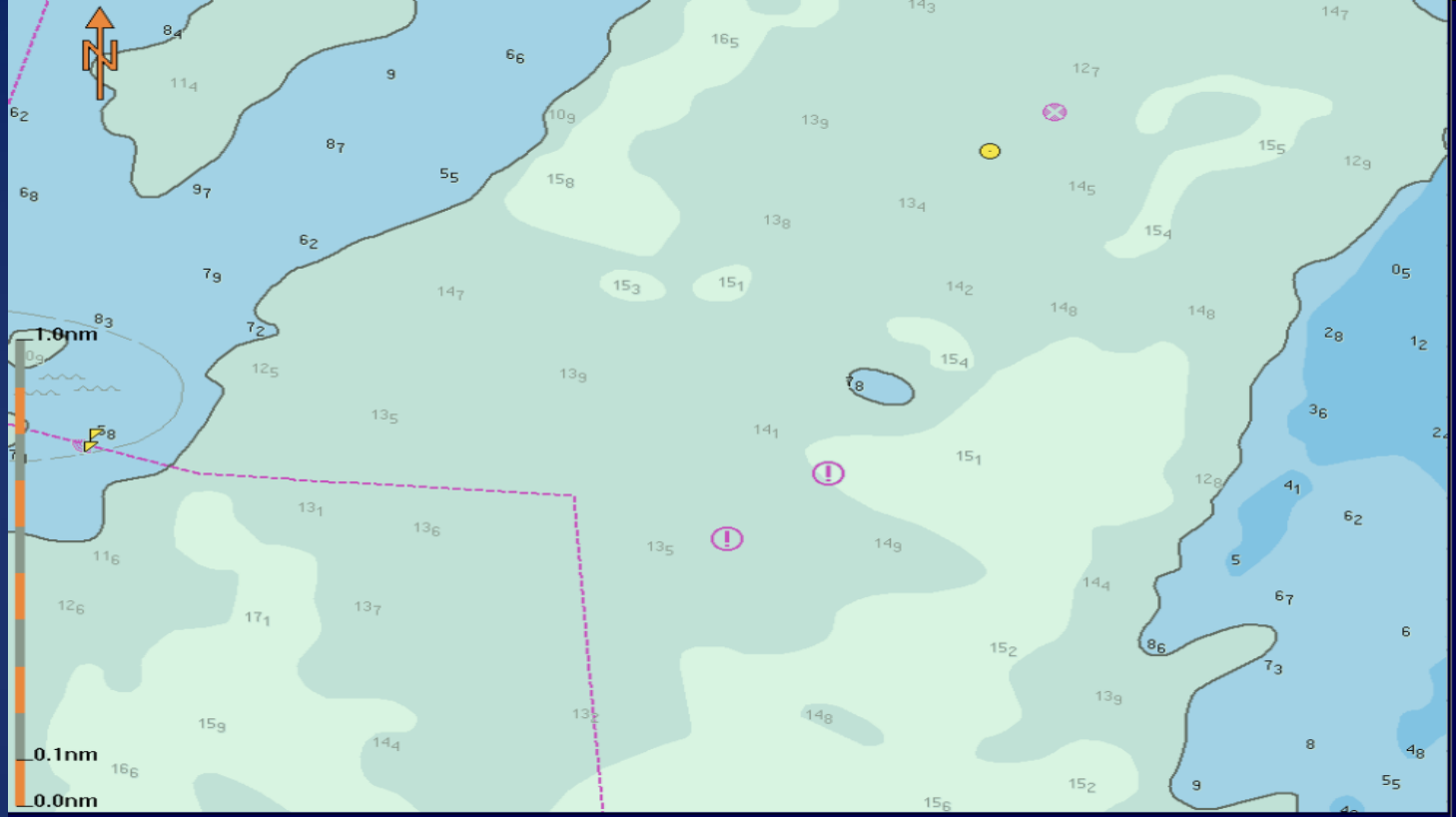
Complexity

- Computer based system
- Usually not designed by users
- Deck Officers not trained in computers
- Difficult to move between systems

Display of electronic charts

Mariners have a great deal of control of the display


HDG 135.0 °T gyro STW 15.9 kn Log
COG 134.6 °T GPS SOG 15.2 kn GPS
T Vector 12.0 min
S-57 - Metres
No Route Loaded
N UP TM
1:8.000
Warnings Present
06 Sep 2013 11:59:59 Local
ECDIS
Monitor Route
Route Dngrs CPs
Route
Load Route
Clear Route
Ship State
XTD
XTD Alarm
Leg & Turn Overall Settings
Leg Bearing
Leg DTG
Leg TTG
Turn Radius
Plan ROT
Planned Spd
Present Spd
Required ROT
Spd Min/Max
ETA
Time Zone UTC +02:00
Next Leg Brg
Next Leg Dist
Chart Depths / Heights
Ship Safety
Safety Depth 5 m
Safety Height 35 m
Shallow / Deep Shading
Shallow Contour 0 m
Deep Contour 10 m
Chart Settings
Features Symbology
Display Mode
Base Other
Standard Custom
Custom Display Settings
Select
All None Default
Other
Airport Data
CG or Rescue Stations
Continental Shelf
Current Information
Depth Contours/Areas
Distance Mark
Docking Features
Fishery Zone
Fishing Features
Gridiron
Harbour Type, etc
Harbours, etc
Inland Water
Label - Saftey Contour
Airport Data
Position
50°53.050' N
001°23.999' W
GPS
Normal
WGS84
2.0 m
Depth
System Time
06 Sep 2013
11:59:59 Local
Cursor
Rhumb
T
Targets
Selected Target
Multiple Targets
Target Display
AIS Display
Acquisition Zones
Own Ship AIS
Limits and Settings
Test Targets
Main Menu
Targets Alarms
Routes Sensors
Nav Tools Charts
Radar System
Brilliance Help
50°53.050' N
001°23.999' W
GPS
Norm
Posn Curs Display Base ERBL1 Centre STD Profiles CID iHelp
06 Sep 2013 11:59:59 Local
Rings .25 NM
ERBL2 Max
Query Goto
5.3.0.1871



ECDIS 11 ECDIS

Main Menu

Heading	Man	000.0°
Speed	Man	00.0 kts
COG	DR	000.0°
SOG		00.0 kts
Time	UTC	16:13:12
Depth	*	

Sensor DR

00°00.000'N 000°00.000'E

Datum WGS84

Charts

Routes

Manual steering

(No Route Selected)

Alt. (No Route Selected)

XTE CTS

Dist to WOP

Time to WOP

ETA at final WP

Tools

51°14.175'N
001°29.974'E

Rng 3075.1 nm

Brg 001.4°

Manual Log is Still Being Used.
Revert to another Log Sensor

Select/ Query Feature | Context Menu

Vector Chart Settings

Display Level: Standard

Depth Shading: Four Depth Shades

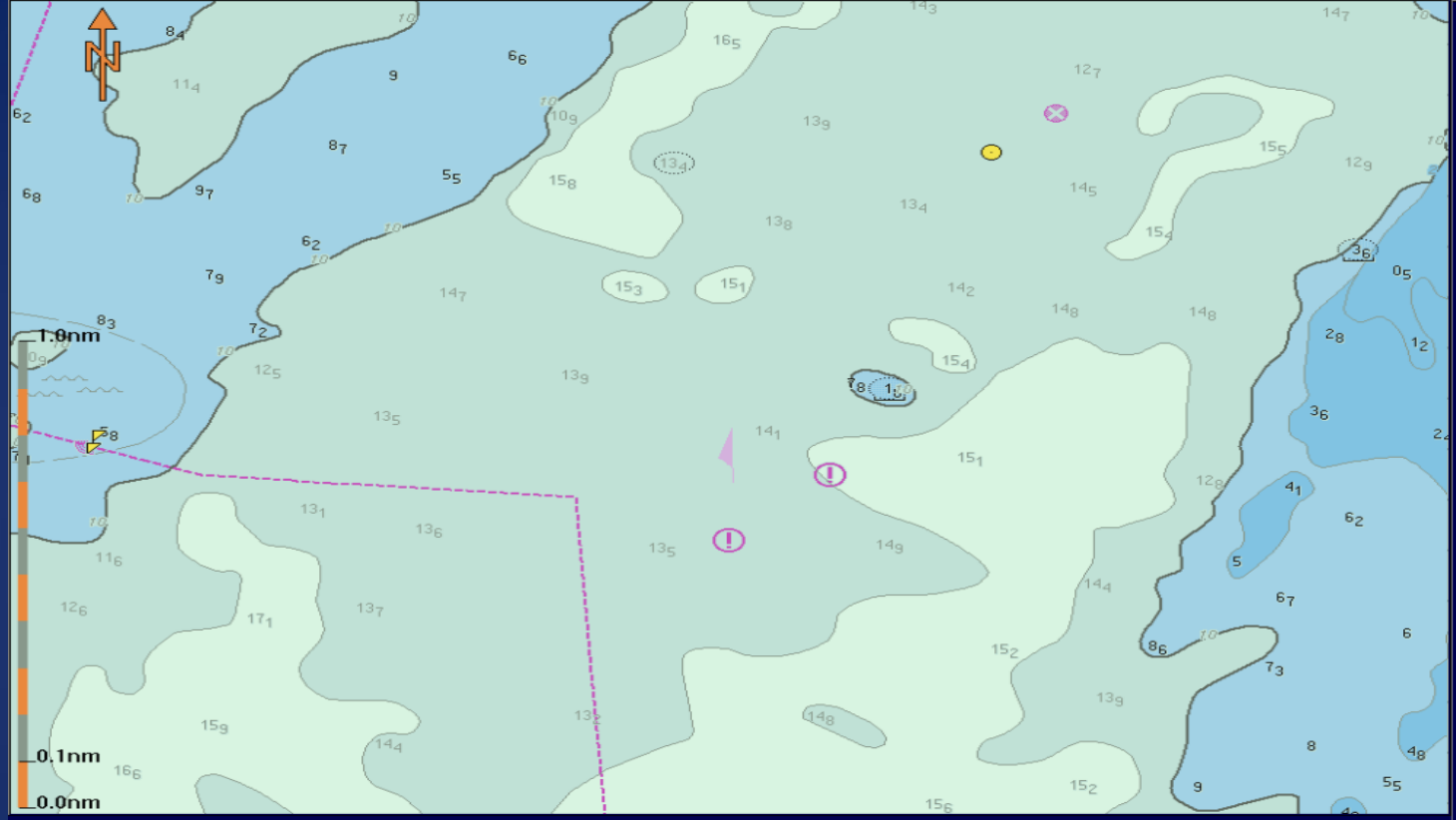
Symbol Style: Simplified

All | Close

Specific Settings

- [x] Deep Soundings
- [x] Shallow Soundings
- [ ] Lights
- [ ] Textual Annotations
- [x] Symbol Failures
- [ ] Information Points
- [ ] Shallow Pattern
- [ ] Better Usage Areas
- [ ] Data Quality

Time Varying Objects: Show All



ECDIS 11 ECDIS

Main Menu

Heading	Man	000.0°
Speed	Man	00.0 kts
COG	DR	000.0°
SOG		00.0 kts
Time	UTC	16:15:03
Depth	*	

Sensor	FAILURE
00°00.000'N	000°00.000'E
Datum	WGS84

Charts

Routes

Manual steering

(No Route Selected)

Alt. (No Route Selected)

XTE CTS

Dist to WOP

Time to WOP

ETA at final WP

Tools

51°14.458'N
001°27.973'E
Rng 3075.4 nm
Brg 001.4°

Manual Log is Still Being Used.
Revert to another Log Sensor

Select/ Query | Context Menu

Vector Chart Settings

Display Level: Additional

Depth Shading: Four Depth Shades

Symbol Style: Simplified

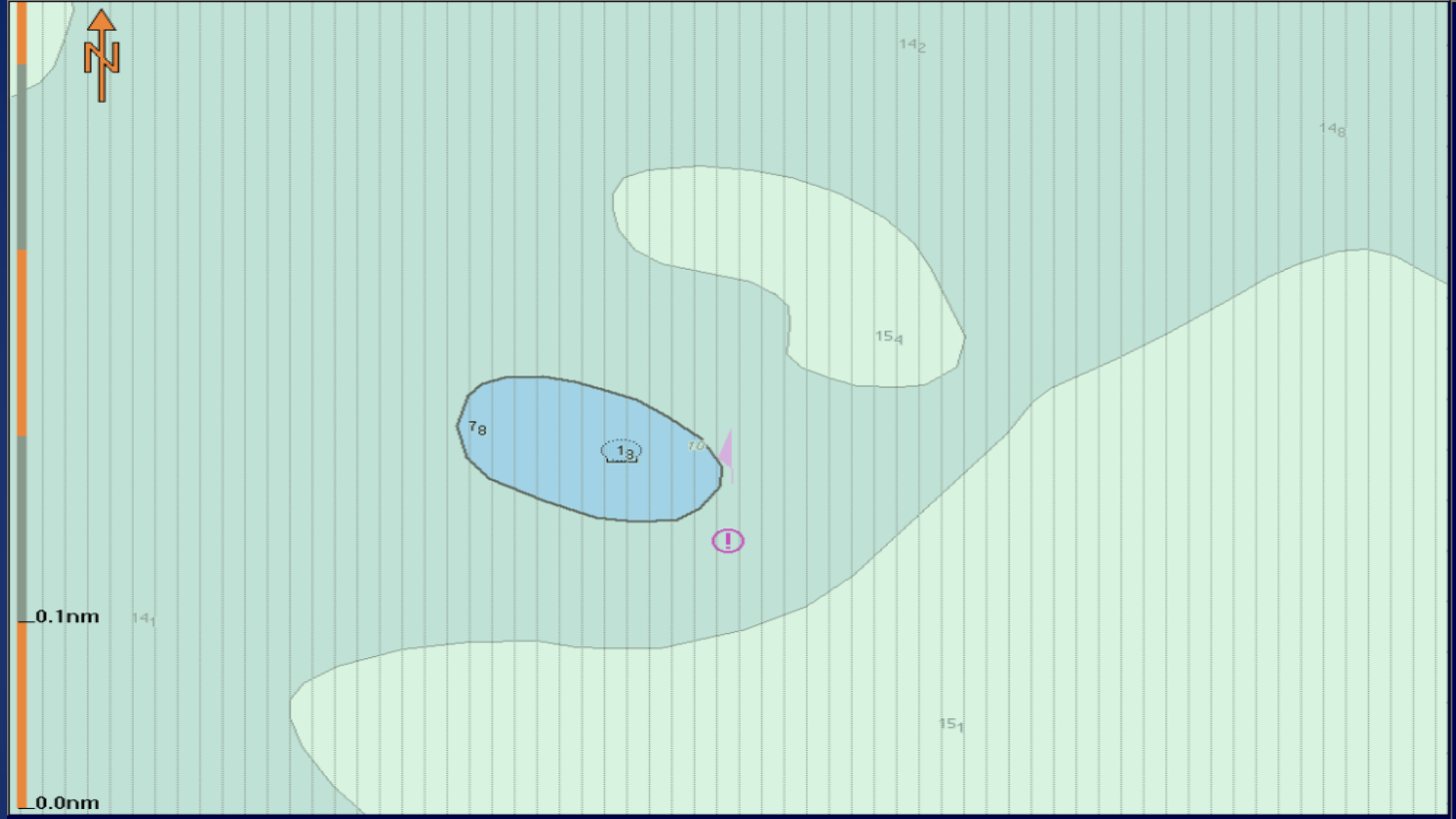
All | Close

Specific Settings

- [x] Deep Soundings
- [x] Shallow Soundings
- [ ] Lights
- [ ] Textual Annotations
- [x] Symbol Failures
- [ ] Information Points
- [ ] Shallow Pattern
- [ ] Better Usage Areas
- [ ] Data Quality

Time Varying Objects: Show All

Start | EcdisMMI - [Default... | Pride of Canterbury... | 16:15



ECDIS 11 ECDIS

Main Menu

Heading	Man	000.0°
Speed	Man	00.0 kts
COG	DR	000.0°
SOG		00.0 kts
Time	UTC	16:15:45
Depth	*	

Sensor FAILURE

00°00.000'N 000°00.000'E

Datum WGS84

Charts

Routes

Manual steering

(No Route Selected)

Alt. (No Route Selected)

XTE CTS

Dist to WOP

Time to WOP

ETA at final WP

Tools

51°14.345'N

001°28.929'E

Rng 3075.3 nm

Brg 001.4°

Manual Log is Still Being Used.
Revert to another Log Sensor

Select/ Query | Context Menu

Vector Chart Settings

Display Level: Additional

Depth Shading: Four Depth Shades

Symbol Style: Simplified

All | Close

Specific Settings

- [x] Deep Soundings
- [x] Shallow Soundings
- [ ] Lights
- [ ] Textual Annotations
- [x] Symbol Failures
- [ ] Information Points
- [ ] Shallow Pattern
- [ ] Better Usage Areas
- [ ] Data Quality

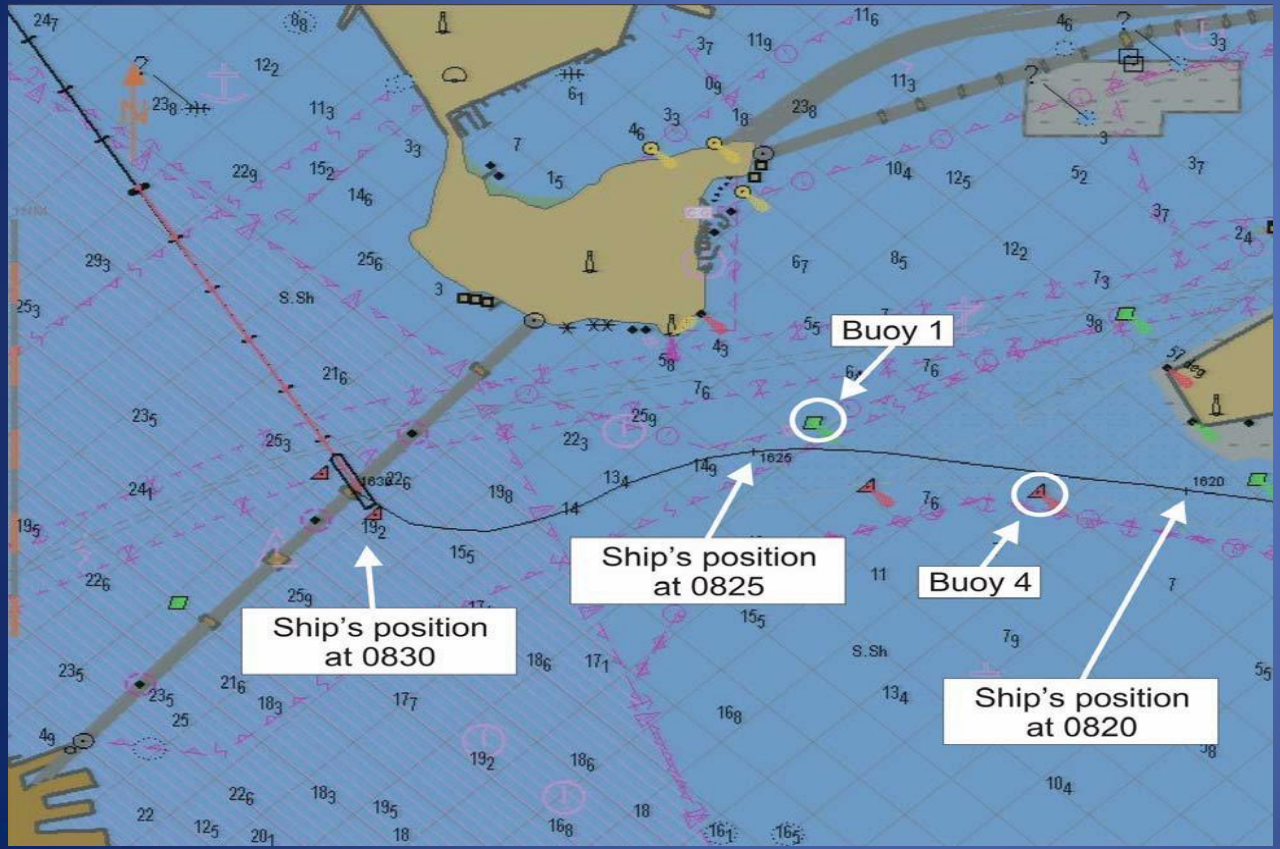
Time Varying Objects: Show All

Start | EcdisMMI - [Default... | Pride of Canterbury... | 16:15

Pride of Canterbury - bridge

VMS monitor

Cosco Busan



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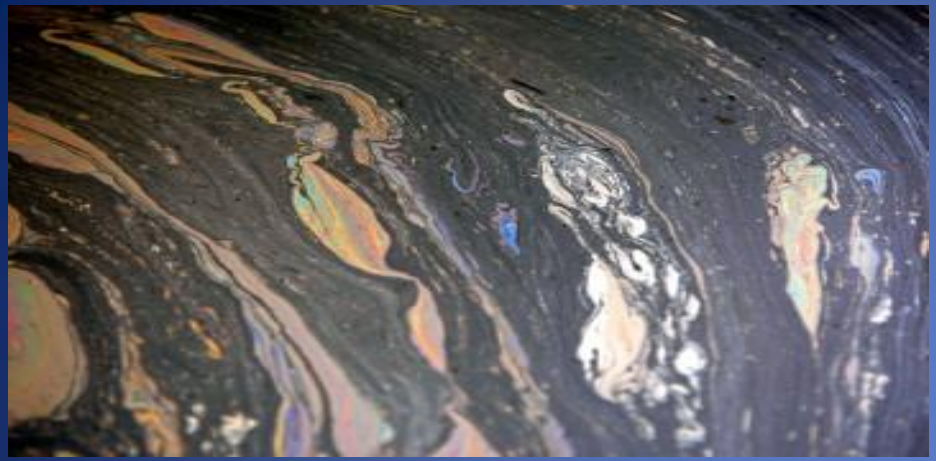
H A N
10 feet
212 feet

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London
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September 15 -18

Display of electronic charts

- Mariners have a great deal of control of the display
- ECDIS interprets and displays charts according to rules
- Unexpected Interaction between charts and ECDIS

Anomalies

- IHO Data Presentation and Performance Check (DPPC)
  - Issued October 2011

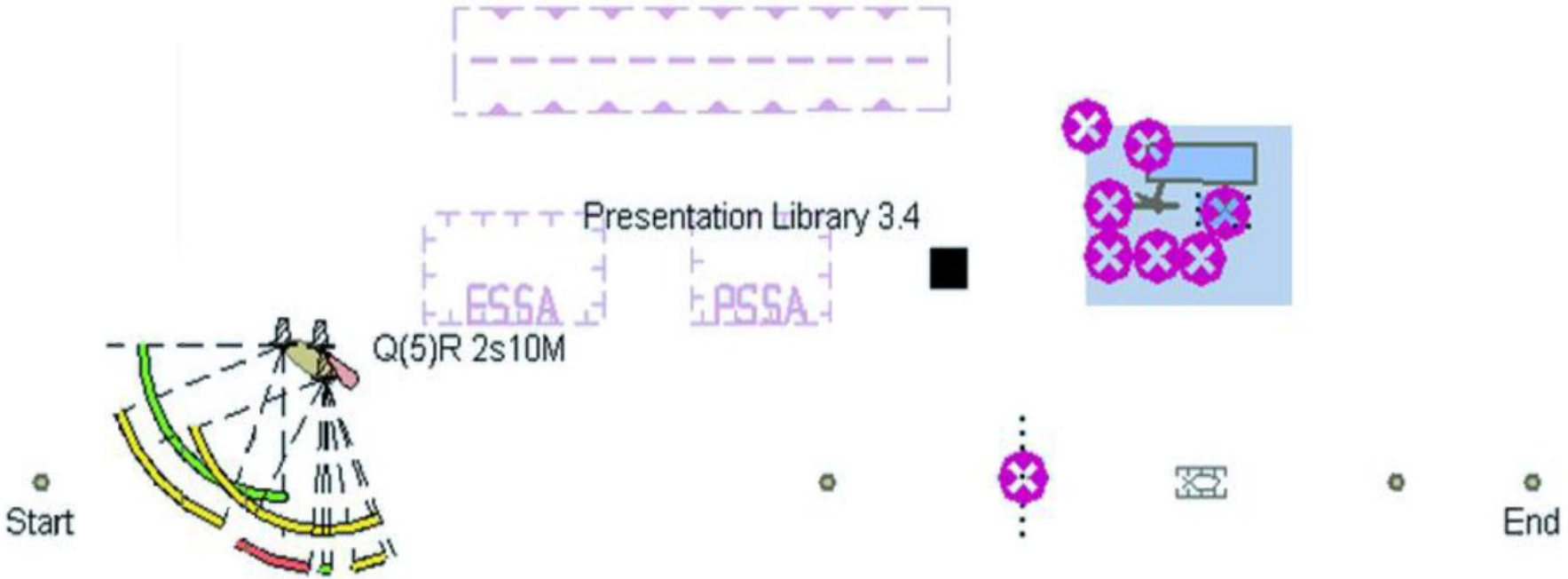
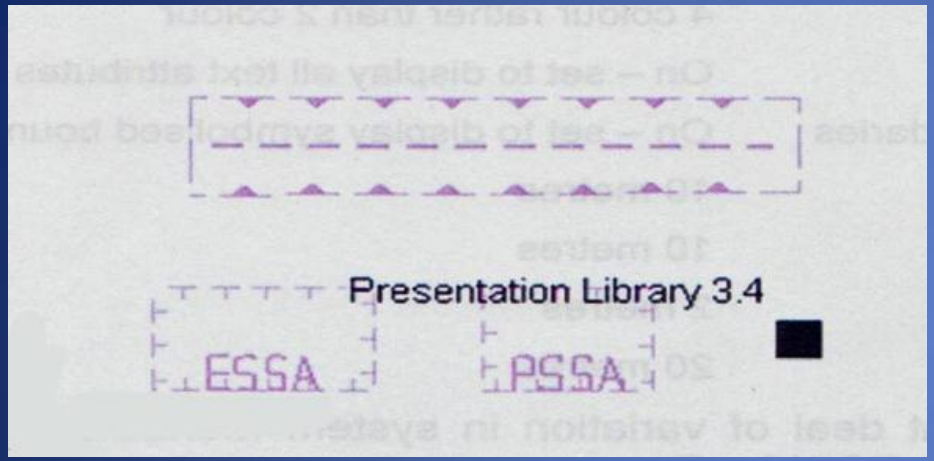
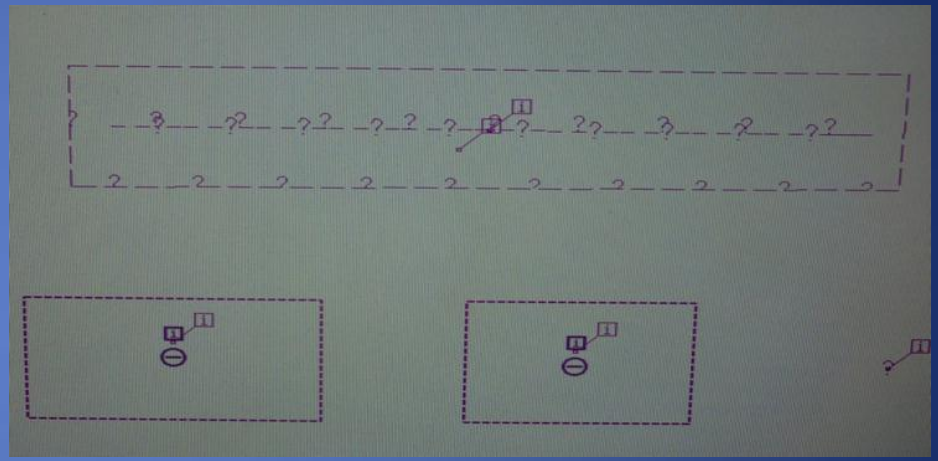
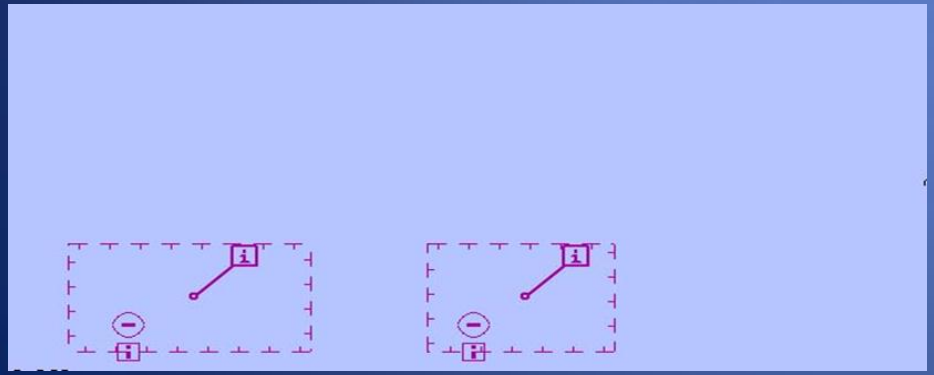


Figure 1 - Initial display of the check ENC cells

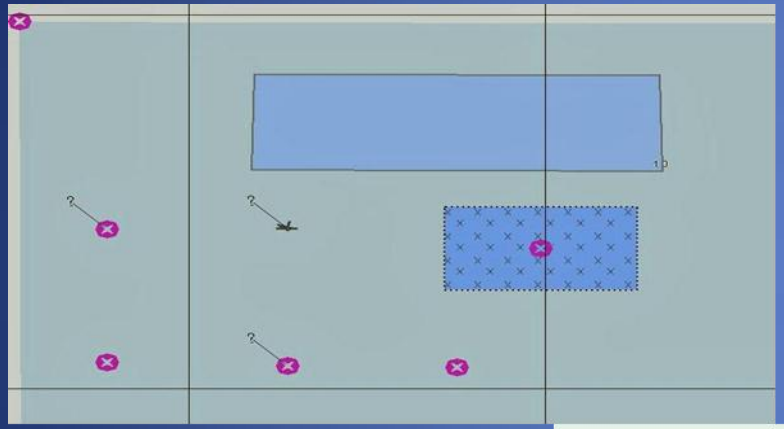
Presentation library updates

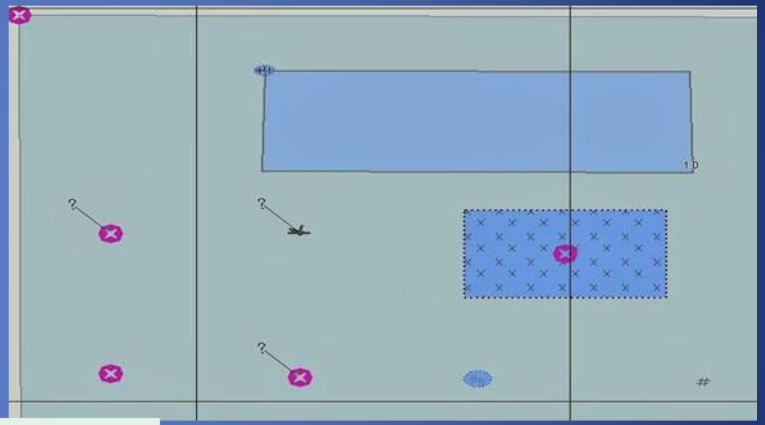


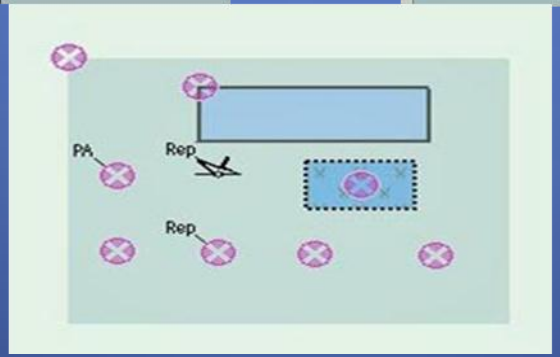




Variation in the display of wrecks and obstructions







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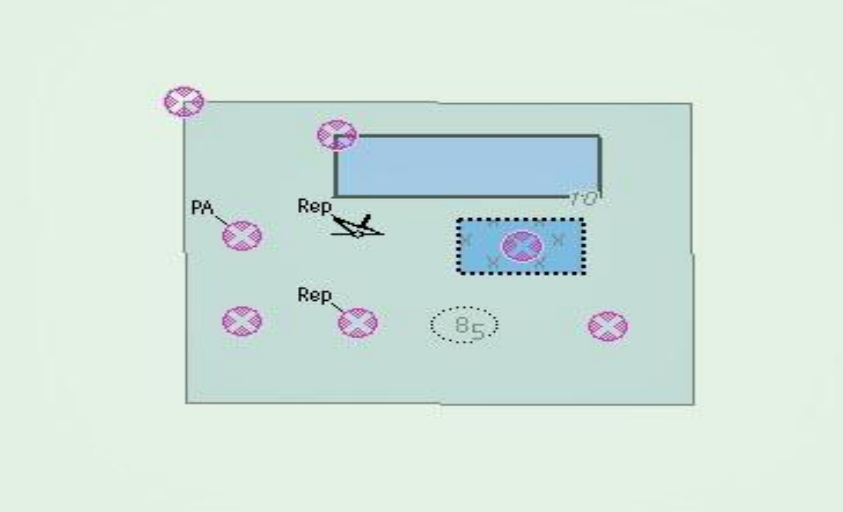
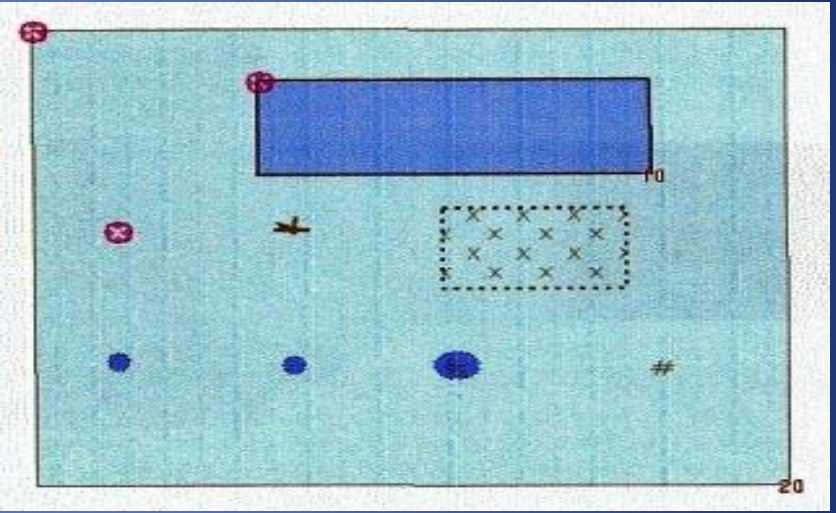
Variations in symbols displayed

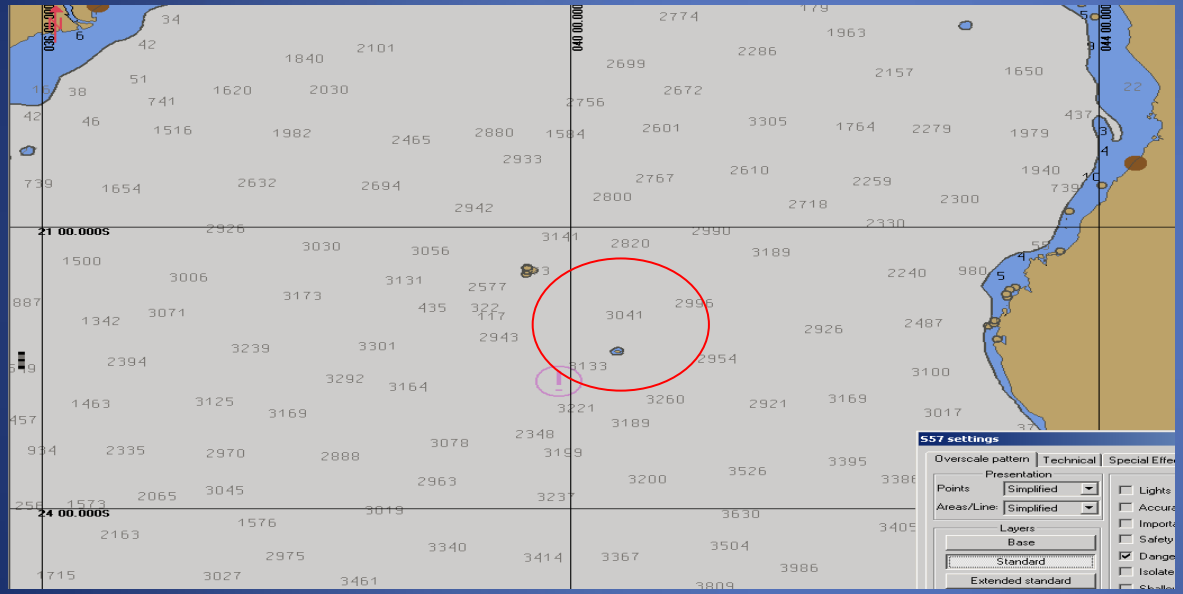




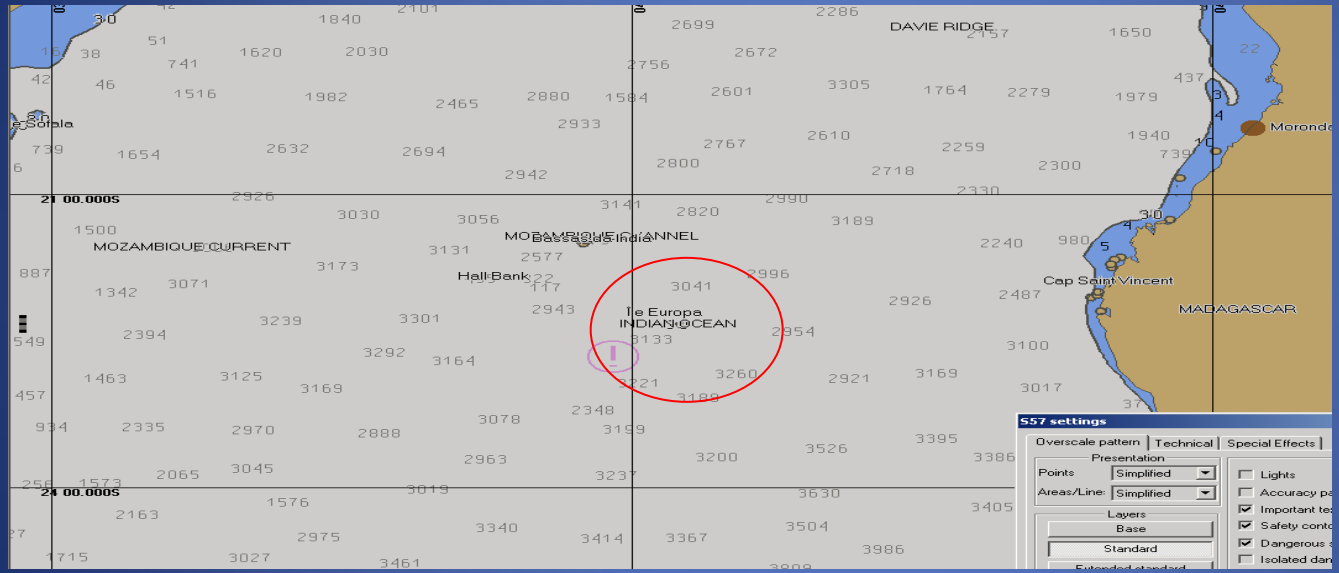
IMO safety of navigation circular 312:

- Based on the results of the Check Data Set
- 17 significant anomalies and workarounds

The importance of visual checks during route planning



Automated name placement may lessen clarity



Too good?

- Assumption that GPS/ECDIS is infallible
- How many officers know what to do when GPS fails?

What can a shipowner do?

- Purchase reliable systems; the cheapest is seldom the best
- Remain in contact with manufacturer
- Enter maintenance agreements
- Use the IHO check data set, know the limitations

Making the most of ECDIS

- Ensure sensible procedures are in place
- Voyage planning is vital
- Cross check what is on the screen with the real world
- Know what to do when things go wrong
- Develop an ECDIS mindset!

Training

- Initial generic training
- Ship / equipment specific training / familiarisation
- Refesher training
- Onboard drills and exercises

Would your officers' know what to do?

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