



# NAVY 44 Mk II Sail Training Craft



## Electronics Lecture

## Winter Training 2019



# Learning Objectives



- 
1. Overview of electronic systems onboard a Navy 44 Mk II
  2. Key functions and features of each system
  3. Basic operations of each system
  4. Tips, Dos and Don'ts



# References and Acronyms



Source Documentation and Reference Material May Be Put Up here

Look up here for source documentation and references

Here is a short list of acronyms we'll use:

AIS	Automatic Identification System	OPC	Offshore Prediction Center (NOAA)
AKA	Also Known As		
B&G	Brookes and Gatehouse	RACON	Radio/RADAR Beacon
BIB	Boat Information Book	SART	Search And Rescue Transponder
COG	Course Over Ground	SOG	Speed Over Ground
CPU	Central Processing Unit	SSB	Single Side Band (Radio)
DSC	Digital Select Calling	SST	Sea Surface Temperature
GPS	Global Positioning System	STC	Sail Training Craft
HF	High Frequency	STW	Speed Through (the) Water
MFD	Multi-Function Display	TZT14	Furuno Multi-Function Display
MMSI	Mobile Maritime Service Identities	VHF	Very High Frequency (Radio)
MOB	Man Overboard	WAAS	Wide Area Augmentation System
NAVTEX	Navigation Text	WGS	World Geodetic System (Datum)
NMEA	National Marine Electronics Association	XTE	Cross-Track Error



# Equipment Manuals For Major Electronics Is On Blackboard



<https://usna.blackboard.com/>

The screenshot shows the USNA Blackboard interface. At the top, the USNA logo and 'BLACKBOARD' text are visible. Below the navigation bar, the breadcrumb trail reads 'OSTS Documents > Navy 44 MK II Electronics Manuals - Updated Equipment'. The main content area is titled 'Navy 44 MK II Electronics Manuals - Updated Equipment' and lists five manual entries, each with a document icon and a list of attached files:

- Navy 44 MK II Electronics - B&G Instruments Operators Manual**  
Attached Files: [B&G H5000 Operators Manual.pdf](#) (8.588 MB)
- Navy 44 MK II Electronics - Furuno TZT14 Radar/GPS Operators Manual**  
Attached Files: [Furuno NavNet TZT14.pdf](#) (40.732 MB)
- Navy 44 MK II Electronics - Furuno Weather Fax Operators Manual**  
Attached Files: [Furuno WeatherFax.pdf](#) (1.765 MB)
- Navy 44 MK II Electronics - VHF Radio Operators Manual**  
Attached Files: [IC-M506 VHF INSTRUCTION MANUAL.pdf](#) (4.683 MB)
- N44 MK II SSB (HF) Radio Operators Manual**  
Attached Files: [IC-M802 Quick Reference Guide.pdf](#) (673.058 KB), [ICOM M802 SSB Radio.pdf](#) (2.091 MB)

Operator manuals on Blackboard under OSTs Documents



# SYSTEM OVERVIEW

**RF Switch  
(Around Corner)**

**ICOM HM-195B  
Command Mic (In Cockpit)**



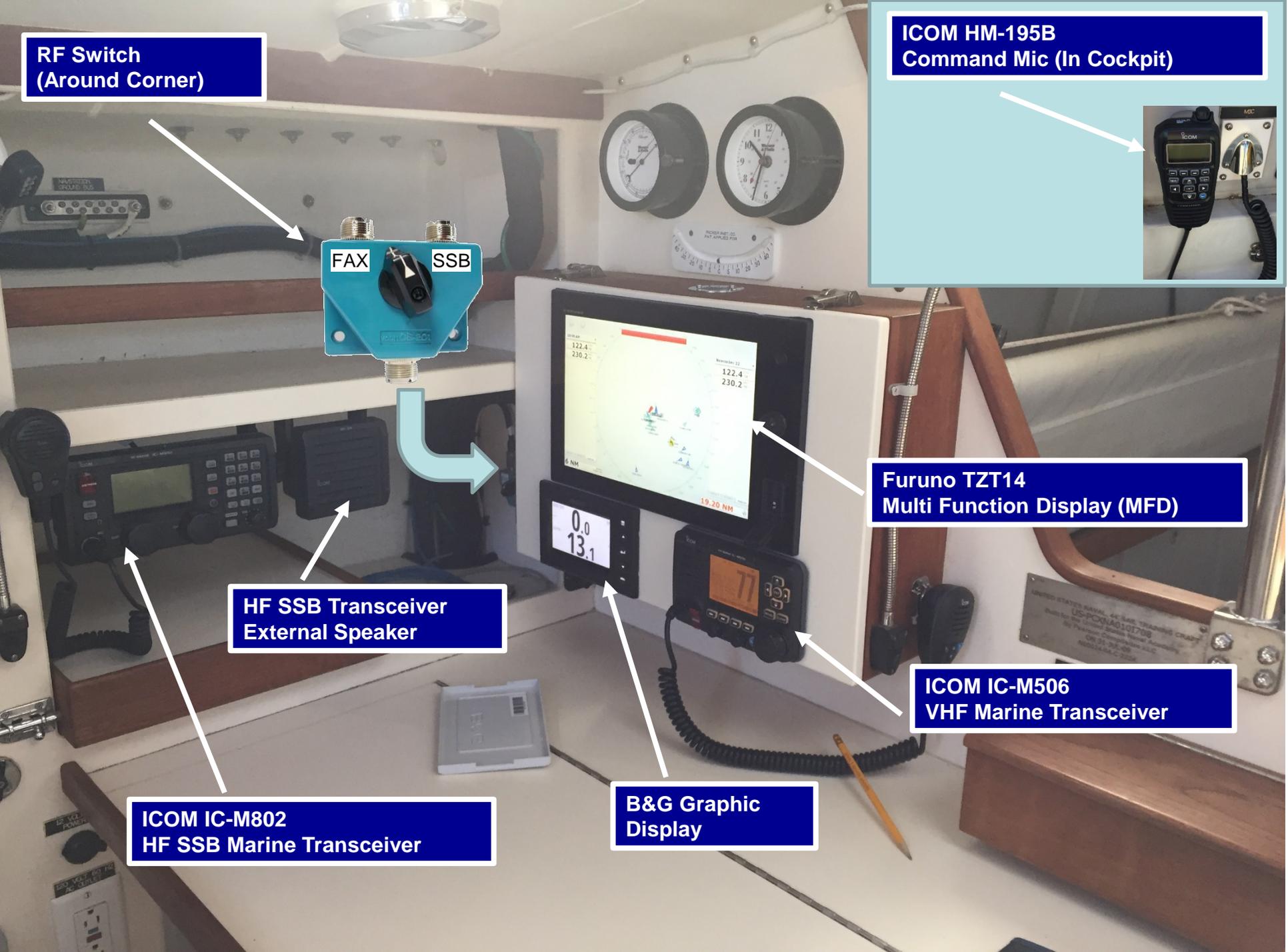
**Furuno TZT14  
Multi Function Display (MFD)**

**HF SSB Transceiver  
External Speaker**

**ICOM IC-M506  
VHF Marine Transceiver**

**ICOM IC-M802  
HF SSB Marine Transceiver**

**B&G Graphic  
Display**





# INSTRUMENTATION



# Instrumentation



- The STC Instrumentation is a Brookes and Gatehouse (B&G) Hercules H5000 system
  - The system has a central processor unit (CPU) which is installed behind the DC Main Breaker Panel
  - The H5000 uses both Analog and Digital sensors
  - The digital sensors communicate via NMEA 2000®



B&G 5000 CPU



# ANALOG INSTRUMENTS



# Analog Instruments



To NMEA 2000® Digital Instrumentation (Discussed Later In Presentation)

NMEA 2000®  
Termination Resistor

NMEA 2000®  
Termination Resistor

NMEA 2000® Backbone

B&G 5000  
CPU



B&G Gravity  
Switch



Mast Top  
Windbird



*AIRMAR ST850 Speed Sensors*  
Speed Range: 2 knots to 45 knots  
(2 MPH to 52 MPH)  
Pulse Rate: 17,000 pulses per nautical mile  
(4.8 Hz per knot)

AIRMAR  
ST850  
Speed  
Paddle  
Wheel  
(Port)



AIRMAR  
ST850  
Speed  
Paddle  
Wheel  
(Starboard)





# Knotmeters (“Speedos”)



Two removable paddlewheel speed sensors provide boat speed through the water (STW)

- Substantial marine growth will slow paddlewheel movement
  - Need to clean and install dummy plugs at dock if not in use (> 1 week)
  - Plastic dummy plugs are provided to insert when the paddlewheels are out for cleaning or maintenance

Dummy Plug



“Speedo”



**You can check for proper operation by spinning the paddlewheel by hand and observing the speed indications**

**Do Not Use The Wooden Damage Control Plug for Speedo Cleaning!**



# Gravity Switch



Knotmeters may pick up seaweed, other flotsam underway. If a knotmeter is damaged or inoperable, you can manually select the working knotmeter using the gravity switch.



**The gravity switch for the speed sensors is located in the forward port locker opposite the head compartment, on the forward face of the bottom compartment**



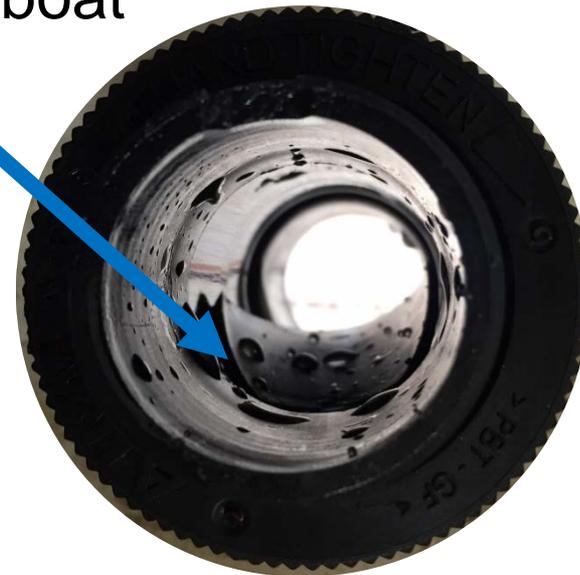
# Speedo Cleaning (1 of 3)



Speedos can be temporarily removed and cleaned while the STC is in the water

– There is a flapper to reduce the inrush of water into the boat

- Removing and reinstalling a speedo should be a supervised evolution with a short brief before the speedo is removed
- It is not that hard, but it can be intimidating the first time



**Recommend removing and reinstalling speedos at low boat speeds**



# Speedo Cleaning (2 of 3)



1. Unscrew the SMALL plastic ring on the top of the speedo and pull it out
2. Temporarily put your hand over the opening to slow the flow

**Note:** Water will slowly flow into the STC – do not worry & do not panic

3. Install the dummy plug
4. Clean the transducer
5. Remove the dummy plug
6. Replace the speedo



**Do Not Unscrew The Large Ring!**

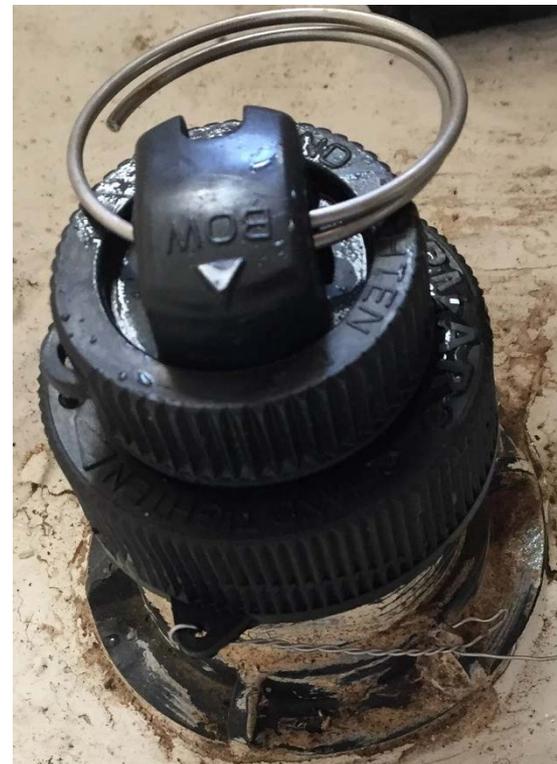
**Hand Tighten Only!  
Do not over-torque**



# Speedo Cleaning (3 of 3)



- The knotmeter (“speedo”) should be oriented towards the bow
  - There is a detent in the housing to help you align it

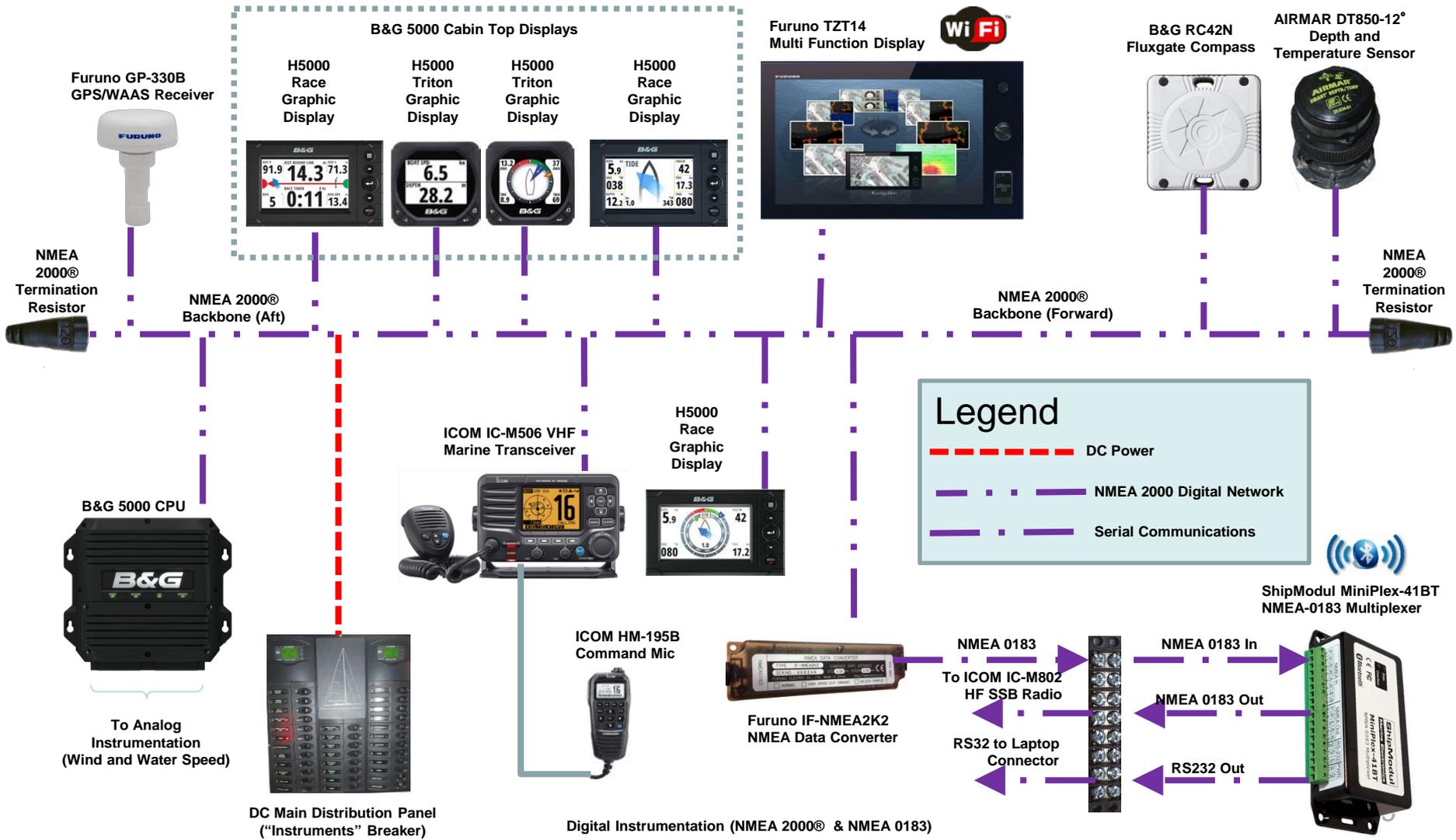




# **DIGITAL INSTRUMENTS AND NMEA 2000<sup>®</sup> NETWORK**



# Digital Instruments and NMEA 2000® Network





# Global Positioning System (GPS) Receiver and Antenna



There are two (2) independent GPS systems on each N44 STC

- Three if you include the handheld GPS Receiver
- Four if you include the EPIRB
- Even more if you include the PLBs

## 1. Furuno GP-330B GPS/WAAS Receiver

Reports GPS data to all of the other instruments via the NMEA2000® interface ( $\approx 3m$  accuracy)

## 2. Furuno GPA-017S GPS Antenna

Dedicated to the Automatic Identification System (AIS) Transceiver ( $\approx 10m$  accuracy)

GP-330B  
GPS/WAAS  
Receiver



GPA-017S GPS  
Antenna  
(For AIS System)



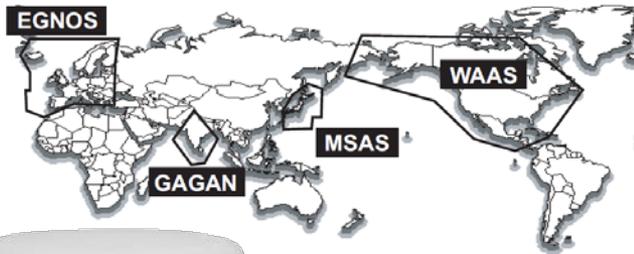


# GP-330B GPS/WAAS Receiver



The GP-330B is a GPS receiver with WAAS (Wide Area Augmentation System) capability

WAAS is a Satellite Based Augmentation System (SBAS) that provides GPS signal corrections for even better position accuracy, **typically better than three meters**



Provider	Satellite type	Longitude	Satellite No.
WAAS	Intelsat Galaxy XV	133°W	135
	TeleSat Anik F1R	107.3°	138
	Inmarsat-4-F3	98°W	133

The GP-330B GPS Receiver also receives GPS corrections from satellites to improve accuracy

The GP-330B GPS/WAAS Receiver reports all data "Over Ground" (COG & SOG)

If the paper chart does not have the same datum or if manual offsets are implemented, this will introduce navigational errors.



**GP-330B  
GPS/WAAS  
Receiver**

## GPS Data Outputs\*:

- PGN 129025 **Position**
- PGN 129026 **COG & SOG**
- PGN 129033 **Time & Date**
- PGN 129044 **Datum**
- PGN 127258 **Magnetic Variation**

\*This is a partial list  
See the manual for the full list

PGN = Parameter Group Definition  
(AKA a NMEA 2000 message)

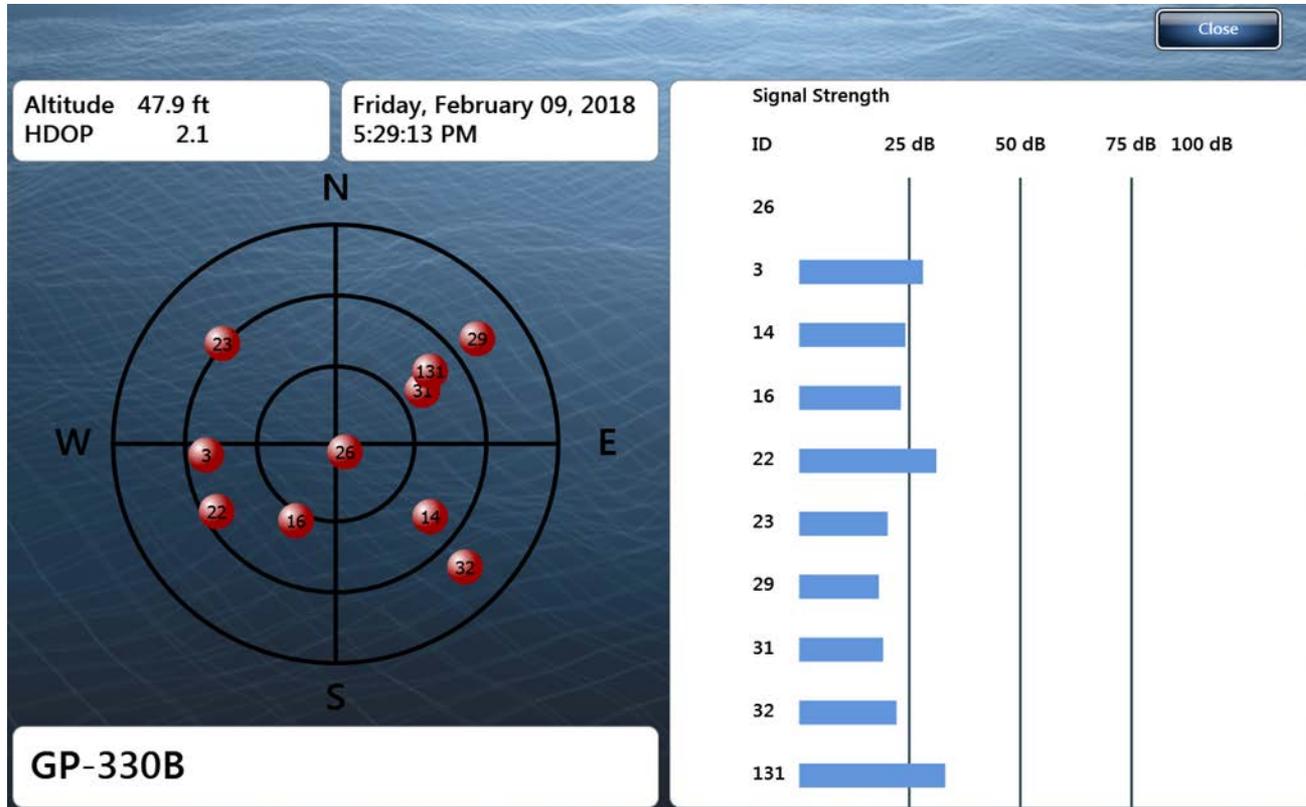


# GP-330B GPS/WAAS Receiver



The GP-330B can track up to 12 GPS satellites at a time

- A GPS receiver needs to get signals from a minimum of 3 satellites for a position fix





# Depth & Temperature Transducer

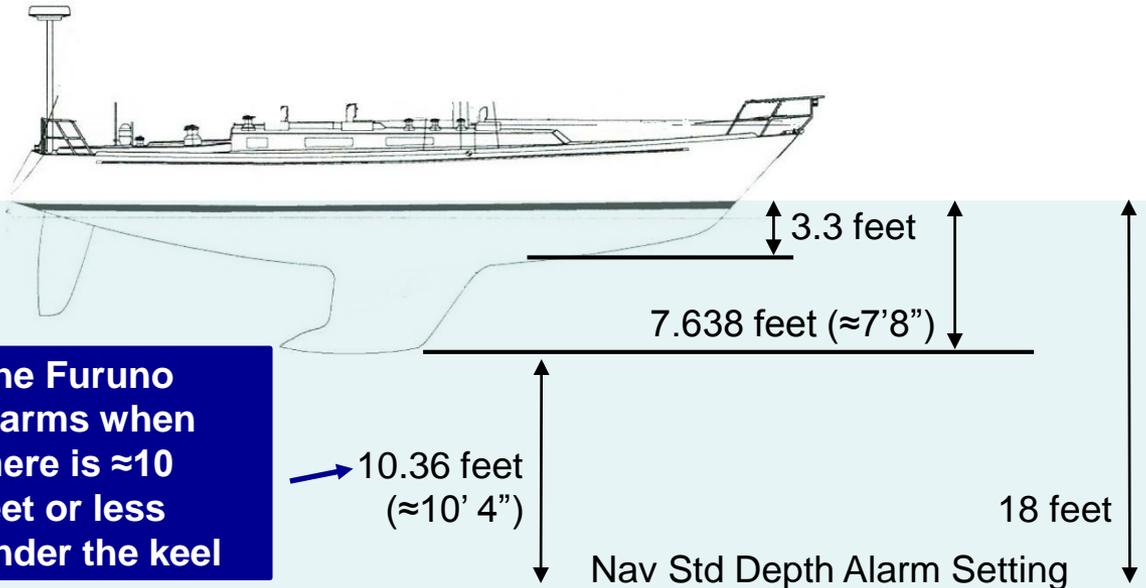


One depth transducer provides total depth (DEPTH) and Sea Surface Temperature (SST)

Depth reported by the instruments is corrected to the **waterline** or total depth (not depth beneath the keel or depth below the transducer)

- This setting is part of the Furuno setup procedure in the Navigation Standard (3.3 feet)

Depth transducer faces the keel (it is an angled sensor)

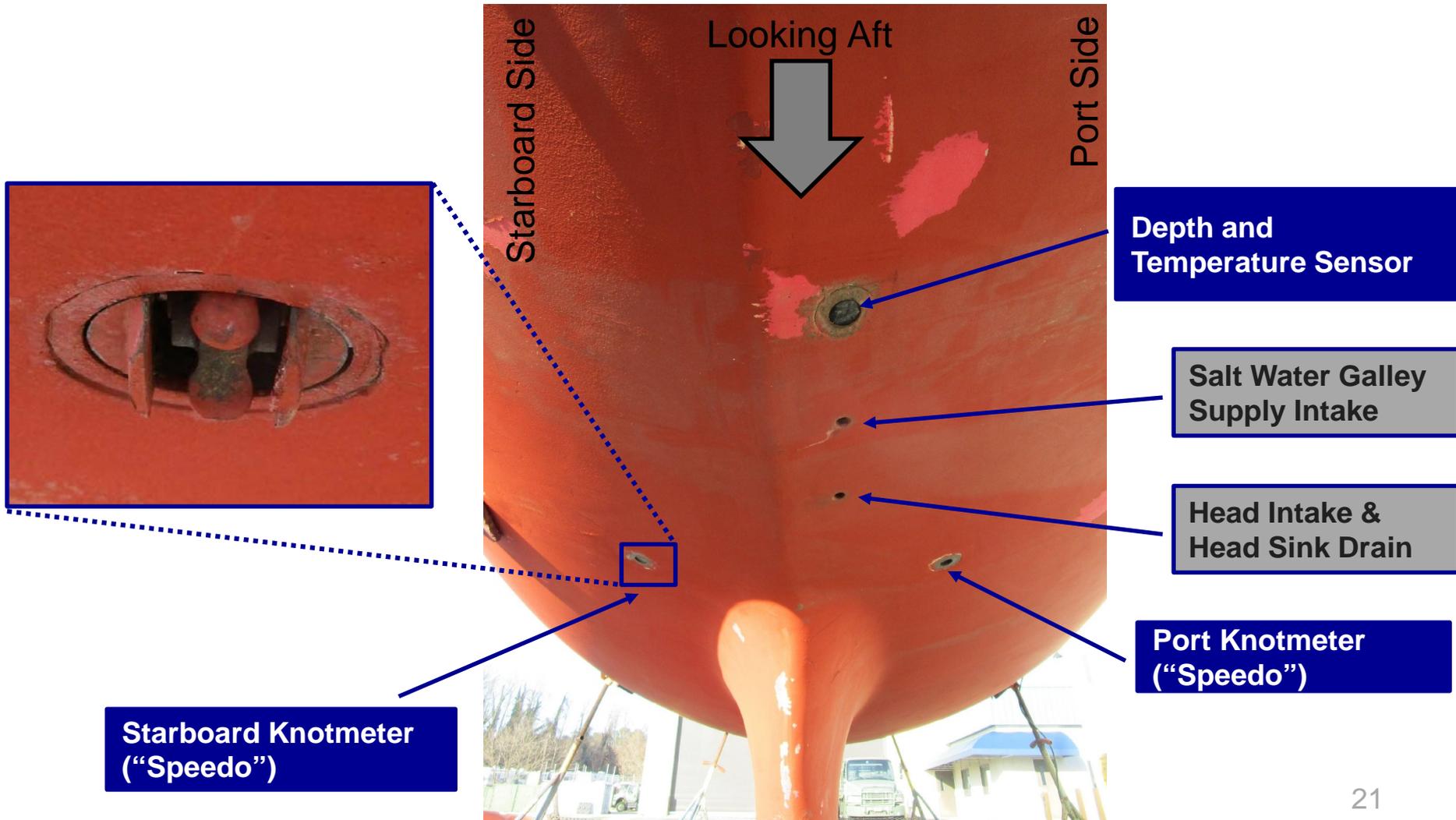


Do Not Remove The Depth Transducer

The Furuno alarms when there is ≈10 feet or less under the keel



# Hull Fitting Locations





# Fluxgate Compass



One Rate Compass provides Magnetic Heading (HDG)

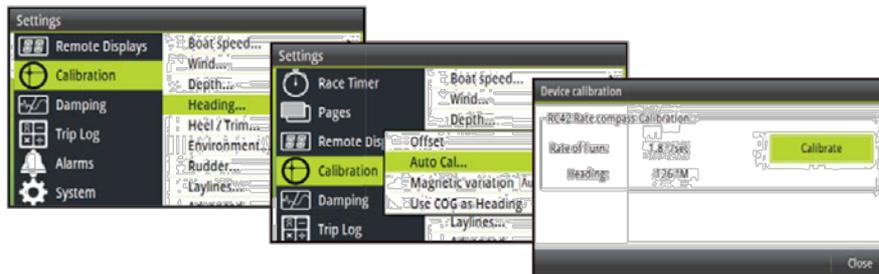
- The compass reports the heading on the NMEA2000® network
- This compass is mounted below the deckplates, starboard side just forward of the mast
- The heading accuracy is  $\pm 3$  degrees after calibration:



**Do Not Step On The Compass!**

**Do Not Store Magnetic Materials Near the Compass!**

- 1 Select Auto Cal
  - 2 Select Calibrate
  - 3 Steer the vessel through 360° maintaining a steady rate of turn
- During calibration, a 360° turn should take 2-12 minutes





# Keep Magnetic Compass Variation Set to “Auto”

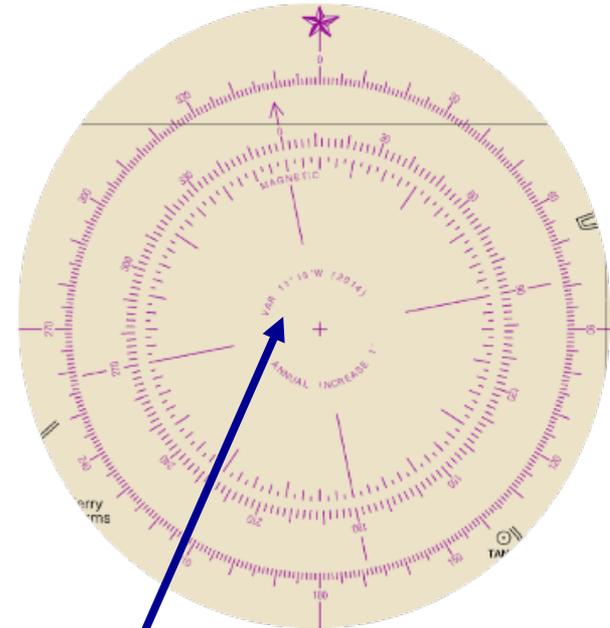
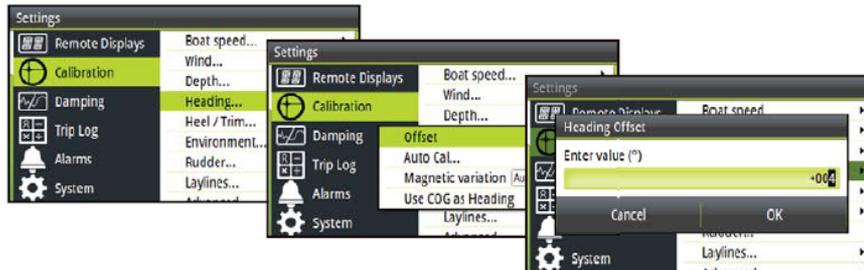


## B&G Operator’s Manual p.59

### Offset

The compass offset compensates for fixed errors (misalignment) between the compass sensor and the direction of the boat.

To accurately enter a compass offset, the boat’s heading must be referenced to, for example: a calibrated bowl compass. The offset value will be the difference between the known source and the currently displayed heading. Enter this value as the offset in the compass heading field as a plus or minus number up to 180°



**Note:** Variation above is from Chart 12283 (Annapolis Harbor)

**Keep the Magnetic variation on “Auto”**  
**The GPS sends the variation over the NMEA 2000 network**  
**If your courses and headings seem to be off by about 11°, check this!**

### Magnetic variation

Adjust how the system handles magnetic variation.

### Auto

Receives variation data from a network source.

### Manual

If variation is not available enter a value manually.



# Non-Electronic Magnetic Compass



## Six-inch RITCHIE Globemaster, Model D-615EP

- Mounted on the Edson steering pedestal
- Compass card is scribed in 5-degree increments, and is equipped with 45 degree and 90 degree offset lines
- Low level 12 VDC lighting
- Removable stainless steel hood with sliding door protects the face of the compass



The fluxgate compass requires power and as such does not eliminate the need for a non-electric magnetic compass

**Handheld VHF, Binoculars and metal objects nearby will affect the compass**





# **B&G GRAPHIC DISPLAYS AND TRITON DISPLAYS**



# B&G Displays



There are a total of five (5) B&G displays

– Four on the cabin top

H5000  
Graphic  
Display

H5000  
Triton  
Display

H5000  
Triton  
Display

H5000  
Graphic  
Display



H5000  
Graphic  
Display



– One below decks at the navigation station

- They are all powered and connected via the NMEA 2000<sup>®</sup> network



# B&G Graphic Display Buttons



## B&G H5000 Operators Manual



### PAGE

- Short press of the **PAGE** key - scrolls through the data pages.
- Long press (when viewing a data page) of the **PAGE** key - displays the pages menu.
- From any dialog screen, pressing the **PAGE** key - navigates back to the data pages.
- When using a menu, the **PAGE** key - navigates back a step.

**UP** - Scrolls up through selected menus/set values

**ENTER** - Used to enter the elected sub menus and confirm selection

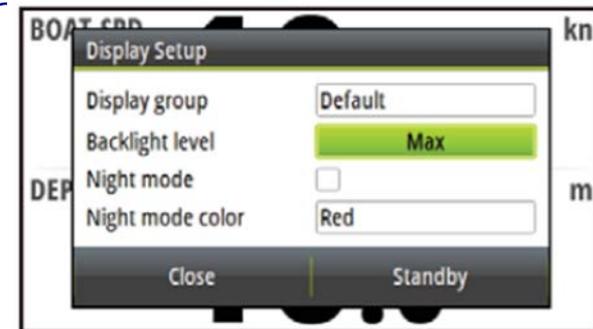
**DOWN** - Scrolls down through selected menus / set values

### MENU/LIGHTS

- Single press of the **MENU** key – displays the Page menu
- Double press of the **MENU** key – displays the Settings menu
- Long press of the **MENU** key – enters the display setup dialog and light settings menu

### IMPORTANT: Night Settings

- With a long press of the MENU key, you can set the display brightness and color
- Adjusting the backlight settings on one display will change the settings on all other displays in the same display group
- At dusk and dawn, adjust the displays for readability





# B&G Graphic Display Pages



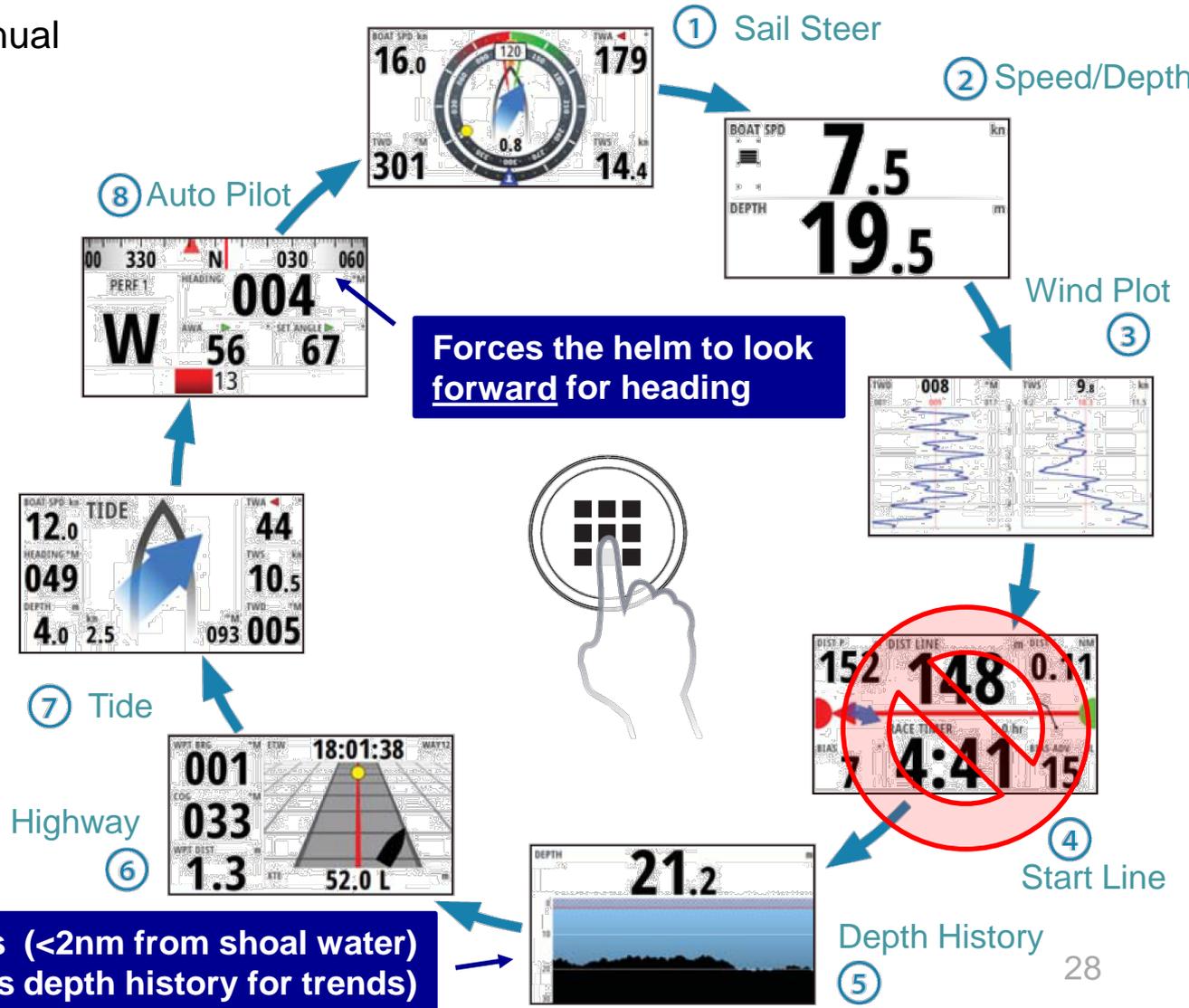
B&G H5000 Operators Manual

8 pages available\*:

1. Sail Steer
2. Speed/Depth
3. Wind Plot
4. ~~Start Line~~ VOST
5. Depth History
6. Highway
7. Tide
8. Autopilot\*\*

\*Some pages can be suppressed via the B&G setup menus

\*\* Even though the STC does not have an autopilot, this display is available



**Forces the helm to look forward for heading**

**My favorite for restricted waters (<2nm from shoal water)  
(Shows depth history for trends)**



# B&G Triton Display Buttons



Display Keys	
	Menu / Enter / Lighting: Used to enter the main menu, select sub menus and confirm selection. Note: Press and hold the Enter key for 3 seconds takes you directly to the display setup lighting level screen. If the lighting level is set below 5 it will automatically increase to 5. Use the up and down keys to set the desired level and press Enter to confirm.
	Page: Scrolls through the eight default display pages and navigates back a step in menus. Note: the eight default display pages including the autopilot page can be customized to display the required data.
	Directional keys: Scrolls up and down through selected menus / set values.

You can replace or enable displays:

The image shows four overlapping menu screens from the B&G Triton display:

- Main Menu:** Lists options like Timer..., Log..., Alarms, Pages (highlighted), and Setup.
- Pages:** Lists display pages: Basic Speed/Depth, Wind Composite, Basic Wind Angle/Speed, Steering, and Depth History.
- Action Menu:** Lists actions: Replace Page (highlighted), Change Data, Enable Page (checked), Include in AutoScroll (checked), and Auto Scroll Settings.
- Select page format:** Lists data formats: Wind Composite, Basic Speed/Depth, Basic Wind Angle/Speed, Steering (highlighted), and Depth History.



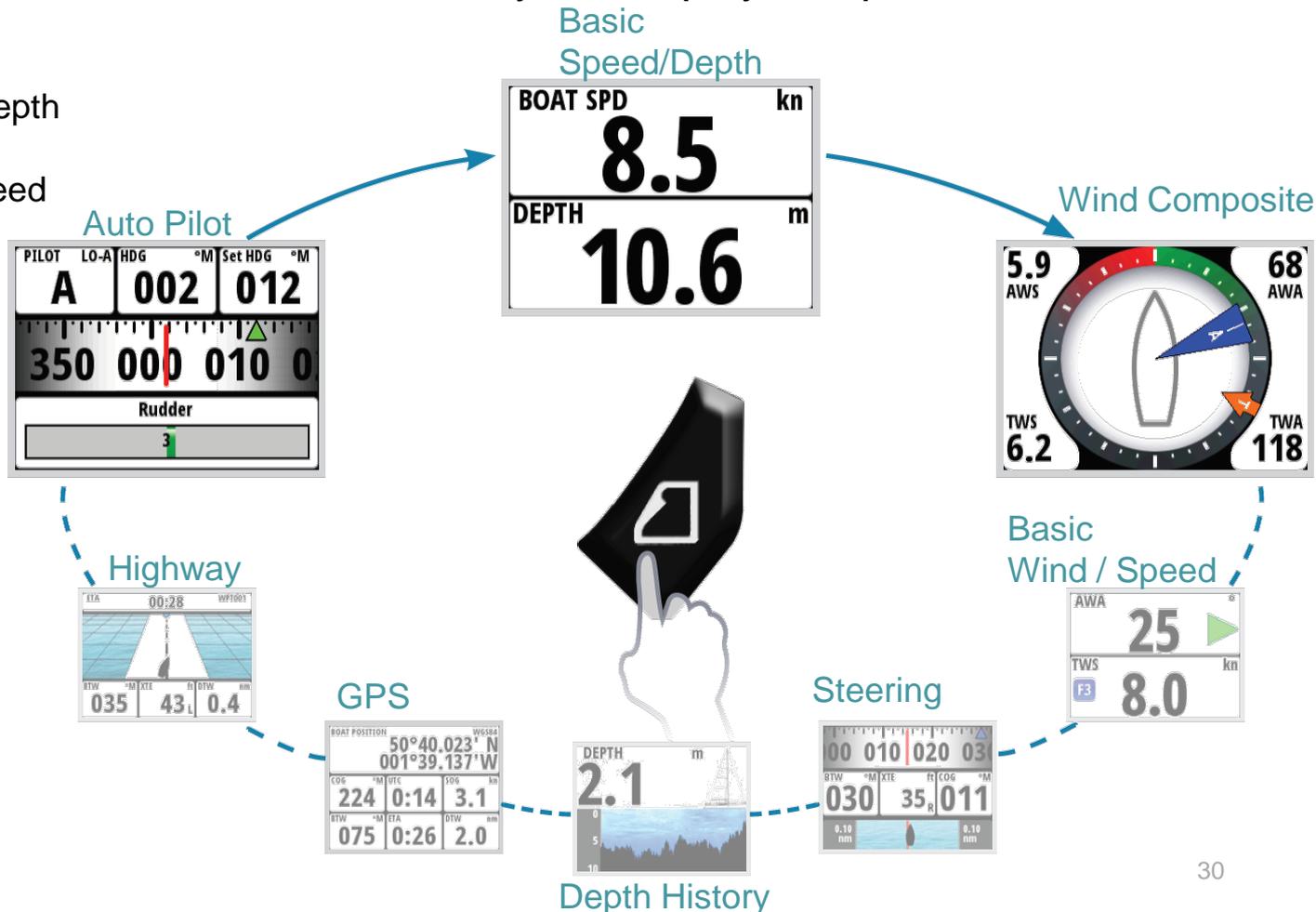
# B&G Triton Display Pages



There are eight pages available via the Triton Displays  
Some of them may be customized or hidden by the display setup menu

## 8 pages available:

1. Basic Speed / Depth
2. Wind Composite
3. Basic Wind / Speed
4. Steering
5. Depth History
6. GPS
7. Highway
8. Autopilot





# Wind Direction and Speed Indications



B&G H5000 Operators Manual



Mast Top Windbird



## Apparent Wind Speed (AWS)

The speed of the wind as it appears on the sailboat considering the course and speed of the boat

## Apparent Wind Angle (AWA)

The angle of the wind as it appears on the sailboat considering the course and speed of the boat

## True Wind Speed (TWS)

The speed of the wind as it appears to the stationary objects around the STC (Not considering the course and speed of the boat)

## True Wind Angle (TWA)

The angle of the wind as it appears to the stationary objects around the STC (Not considering the course and speed of the boat)



If the electronic compass fails, the true wind angle and the true wind speed will be affected

The wind composite display is excellent for:

- 1) Wind awareness/points of sail training and
- 2) Making the final turn for crew overboard recoveries



# **FURUNO MULTI-FUNCTION DISPLAY (MFD)**

## **DISPLAY BASICS**



# Furuno Multi-Function Display



B&G Instruments

NMEA 2000® Network

14" Glass LCD Display & Color Plotter



GPS

NMEA 2000® Network



DC Main Distribution Panel ("NAV-NET VX2" Breaker)

Ethernet Switch Network Port Assignments:

1. FA-50 AIS Transponder
2. Laptop Computer
3. FAX-30 Weather FAX
4. DRS4D RADAR
5. TZT14 Multi-Function Display

Ethernet

Ethernet



DRS4D RADAR



Optional Laptop



Fax-30 Weather Receiver



FA-50 AIS

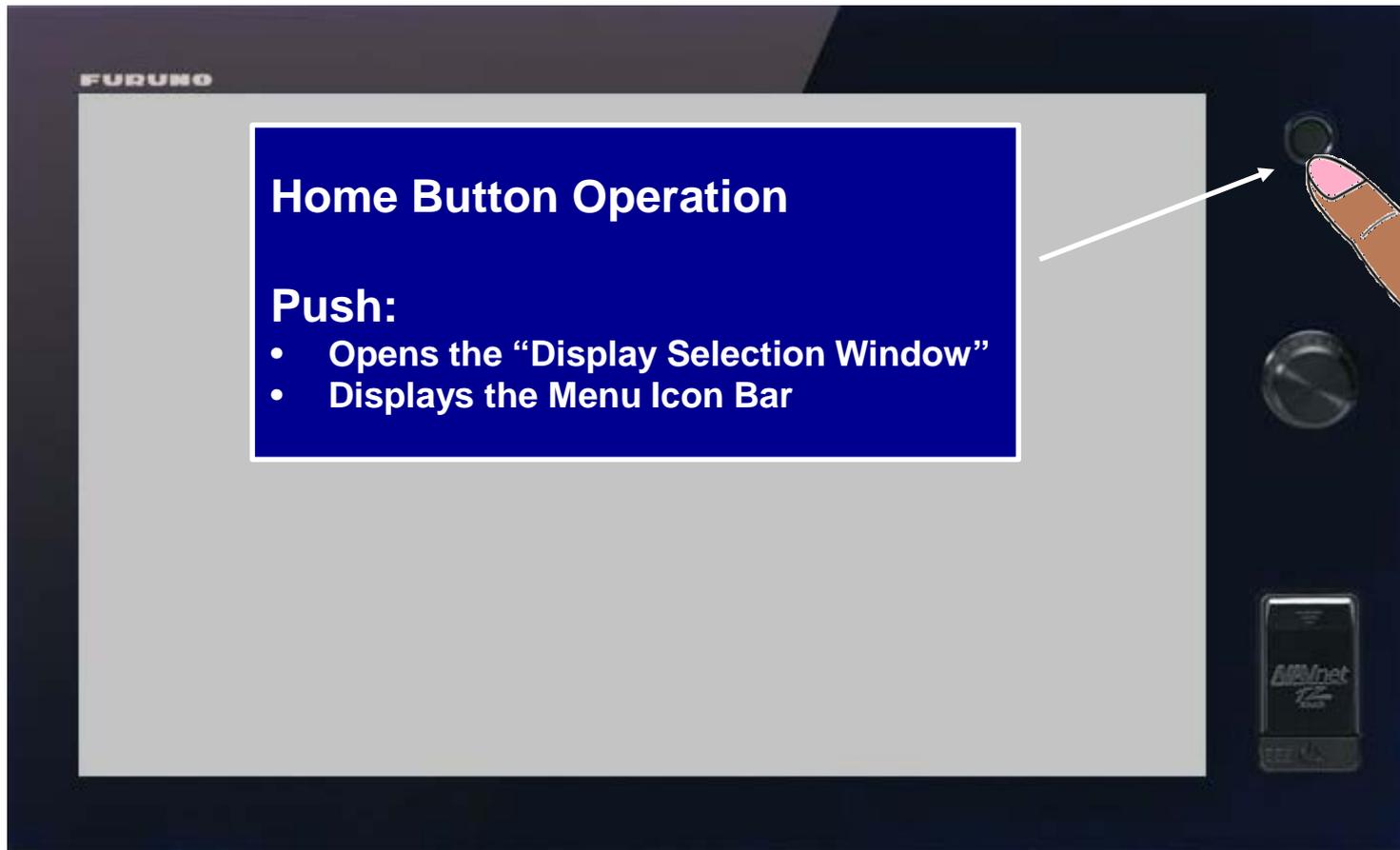


# Furuno TZT14 Operation

## Home Button



Furuno TZT14 Operator's Manual





# Furuno Multi-Function Display Home Page



Furuno TZT14 Operator's Manual

If you use the RADAR display (with AIS), you can use a "heading up" orientation and the bearings to RADAR returns will be in relative bearings



Display Selection Window

99.999% of the time, we use the plotter page

Menu Icon Bar

This is one of the ways to initiate a MOB



# Furuno TZT14 Operation

## RotoKey™ (1 of 2)



Furuno TZT14 Operator's Manual

The diagram shows a close-up of the Furuno TZT14 control panel. On the left, a blue box with white text explains the RotoKey operation. On the right, a hand is shown with the index finger pointing to the RotoKey, which is a circular knob. A white arrow points from the text box to the RotoKey. Below the RotoKey is a small rectangular display showing the 'iNet' logo.

**FURUNO**

### RotoKey Operation

**Push:**

- Opens the RotoKey Menu or Validates the selected item

**Rotate:**

- Selects the range scale on the chart plotter or the radar screen
- Selects an item on the RotoKey Menu

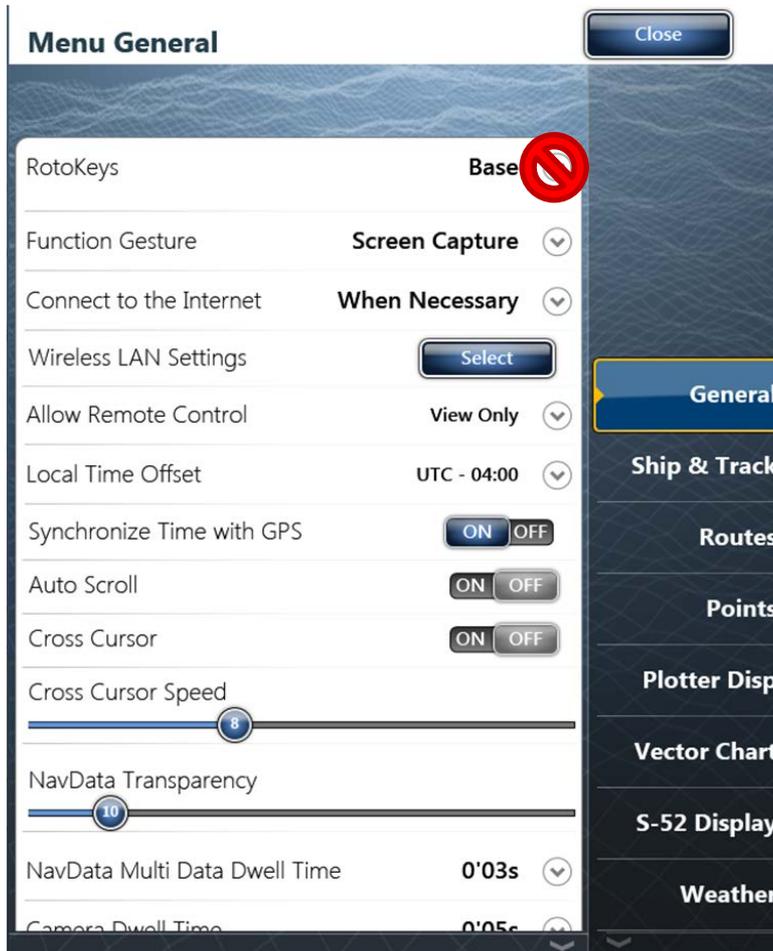
**iNet**



# Furuno Multi-Function Display RotoKey™ (2 of 2)



Furuno TZT14 Operator's Manual



**Set RotoKeys to “Full”**

**If you do not, then important menu selections will not be available**

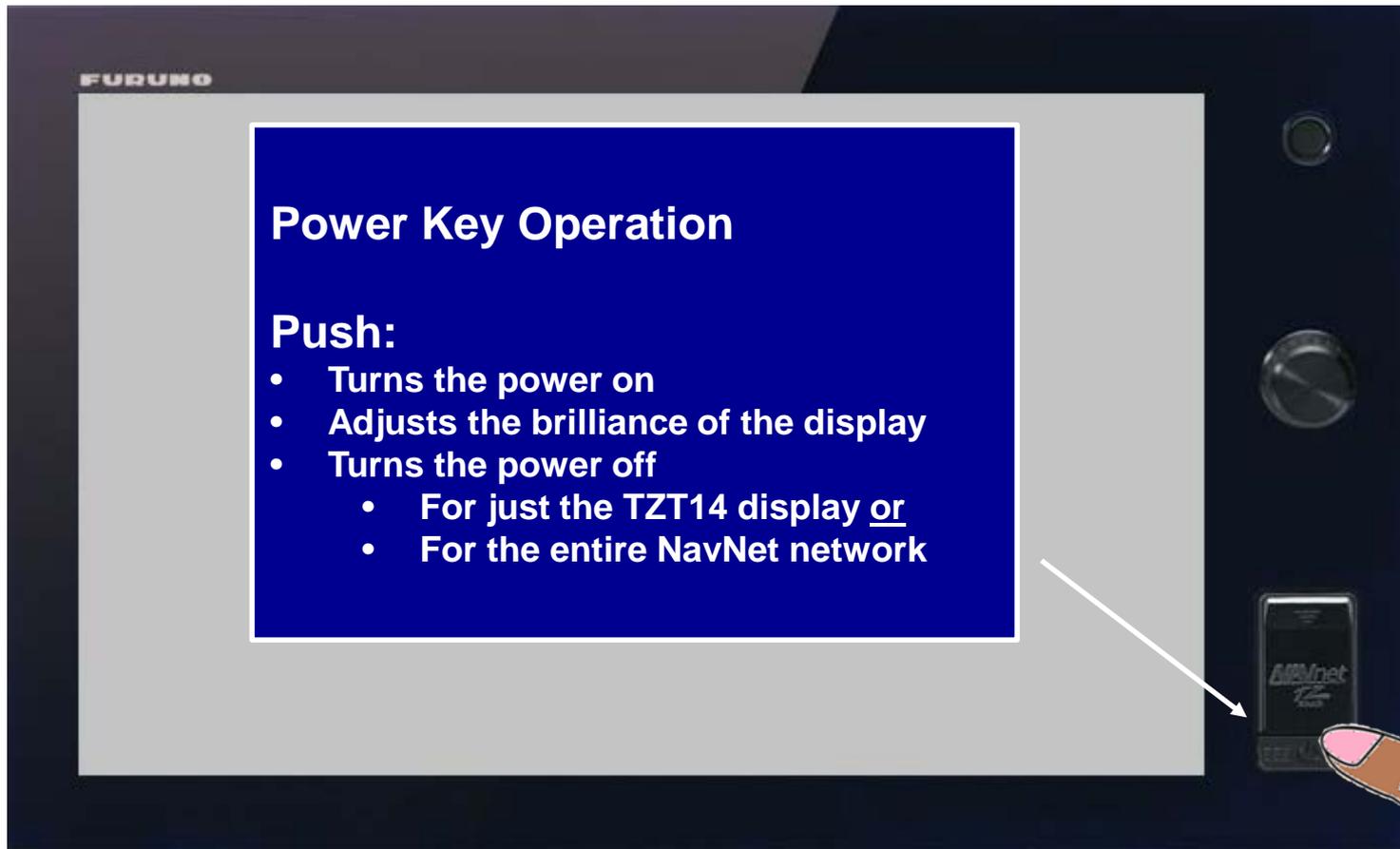


# Furuno TZT14 Operation

## Power Key (1 of 2)



Furuno TZT14 Operator's Manual





# Furuno TZT14 Operation Power Key (2 of 2)



Furuno TZT14 Operator's Manual

Lock Touch Screen  ON  OFF

Night Mode  
 Day  Dusk  Night  Automatic

Brilliance  
[Slider bar set to 15]

Close

**1** Power Off This Device    Power Off Network

**Night mode and Brilliance:**  
Adjust as necessary to retain night vision yet still operate the Furuno

DC MAIN PANEL



**IMPORTANT!**  
1. Power off the network BEFORE you  
2. Turn off the NAVNET breaker



# Furuno TZT14 Operation Touch Screen Operation



Furuno TZT14 Operator's Manual

## Touch control

### Tap with finger



- Select a menu item.
- Select an object to display the corresponding pop-up menu.

### Drag with finger



- Pan the charts.
- Scroll the menu.

### Pinch with two fingers



Zoom in



Zoom out

- Zoom in or out the chart scale in the 2D/3D modes or weather display.
- Select radar range on the radar display.

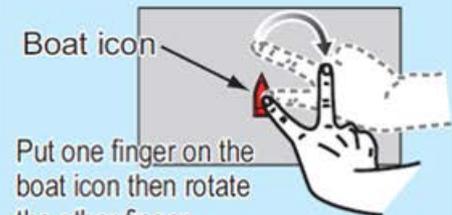
**RotoKey does the same action**

### Tap with two fingers



Execute the function which is selected in [General] - [Function Gesture] of the main menu.

### Rotate with two fingers



Put one finger on the boat icon then rotate the other finger.

Switch between head up and north up in the 2D/3D modes.

**The Two Finger Tap is setup for Man Over Board (MOB) on N44 STCs (It does not matter where on the screen you tap)**

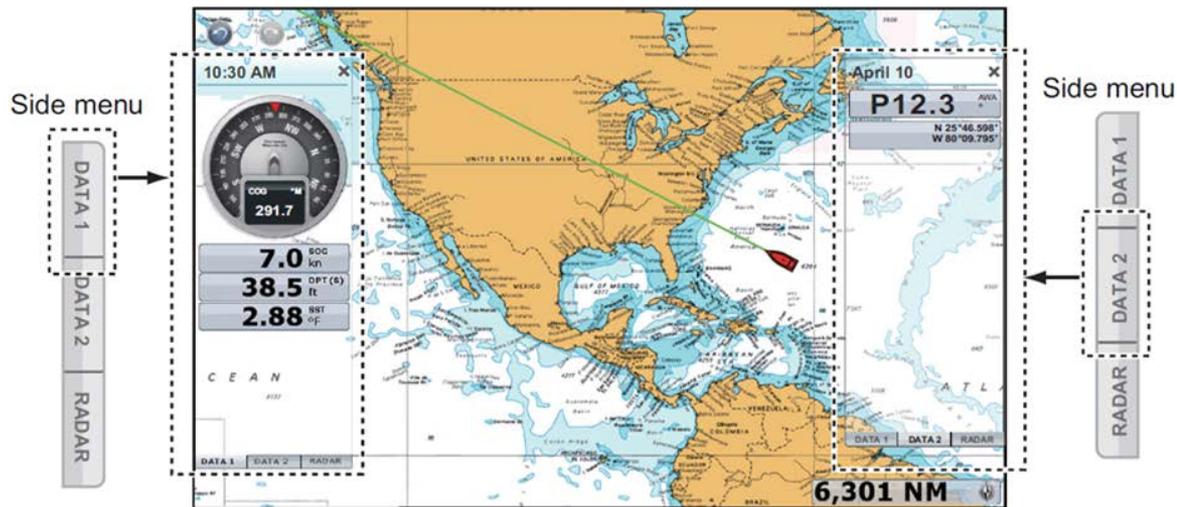


# Furuno TZT14 Operation Data Areas & Data Boxes (1 of 5)



## Furuno TZT14 Operator's Manual Paragraph 1.12.1

The data area at both sides of the screen shows the navigation data, with data boxes. You can select the data to display in the area, and show or hide the data boxes as necessary. The data that you can show depends on your system configuration.



Select [DATA 1], [DATA 2] or [RADAR] of the side menu at the left or right of the screen to show a data box set. To hide a data box set, select [X] at the top right-hand corner of the data area.

You can select the data to display in each data box on the screen.

When you can scroll the data box, [▼] appears at the bottom of the box. Touch [▼] to scroll the display area of the data box.



# Furuno TZT14 Operation Data Areas & Data Boxes (2 of 5)

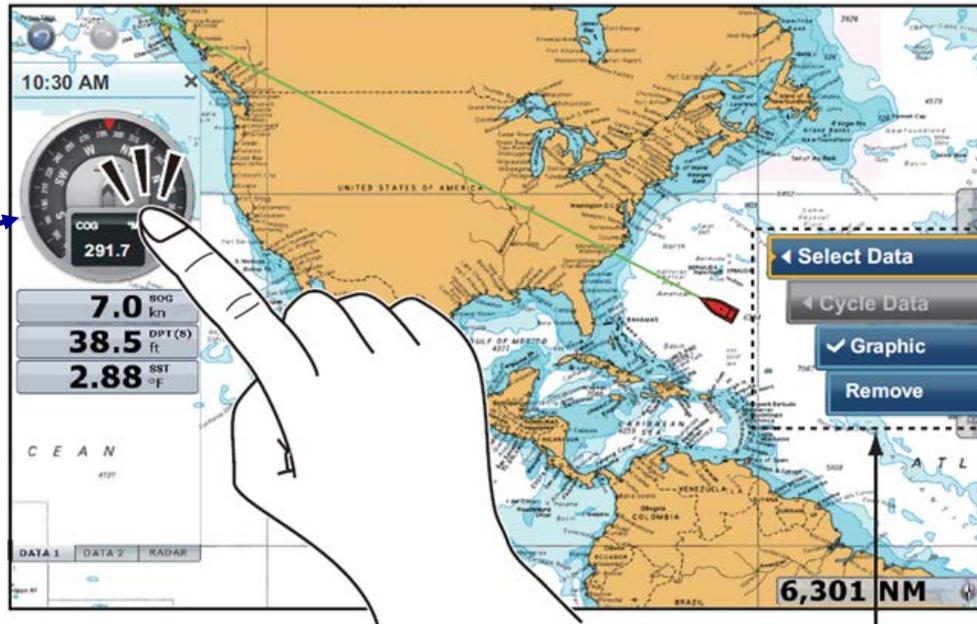


Furuno TZT14 Operator's Manual Paragraph 1.12.1

## How to change the contents of a data box

1. Select the data box to change. The pop-up menu appears.

**Data Boxes can be analog or digital displays**



Select the data box to change (in this case, COG).

The pop-up menu appears.

2. Select [Select Data].
3. Select the new data.



# Furuno TZT14 Operation Data Areas & Data Boxes (3 of 5)

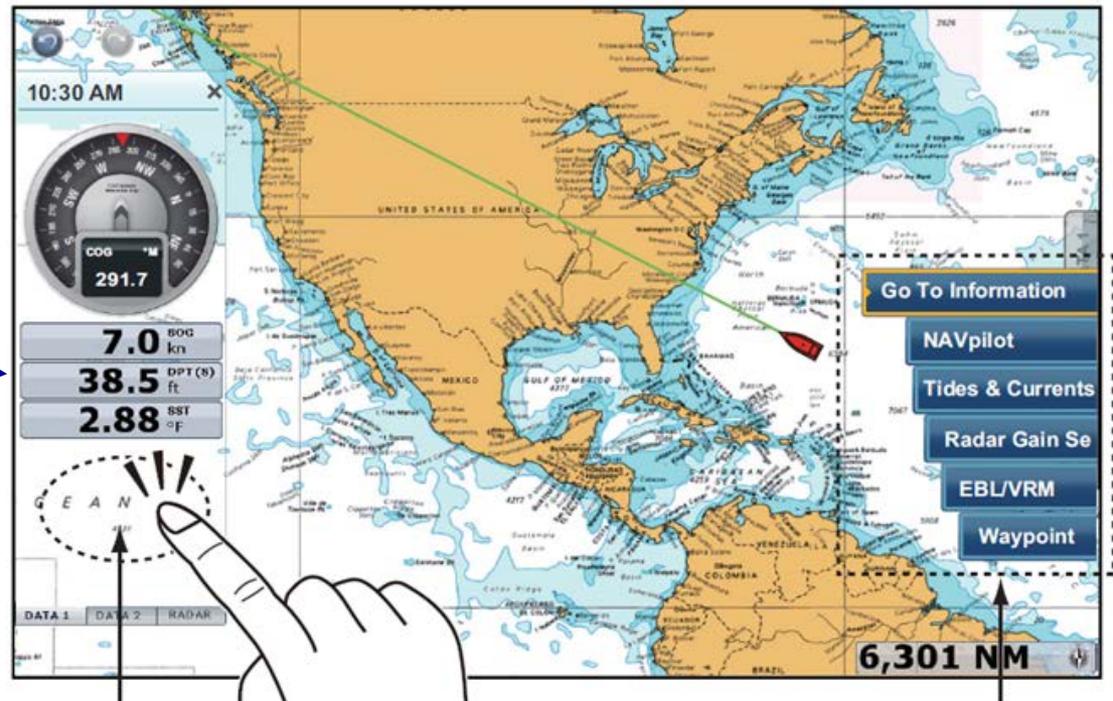


Furuno TZT14 Operator's Manual Paragraph 1.12.1

## How to add a data box to a data area

1. Tap any unoccupied area in the data area to display the pop-up menu.

**Recommendation:**  
Setup one of the Data  
Boxes for the periodic  
paper log data



Tap unoccupied  
position.

The pop-up menu appears.

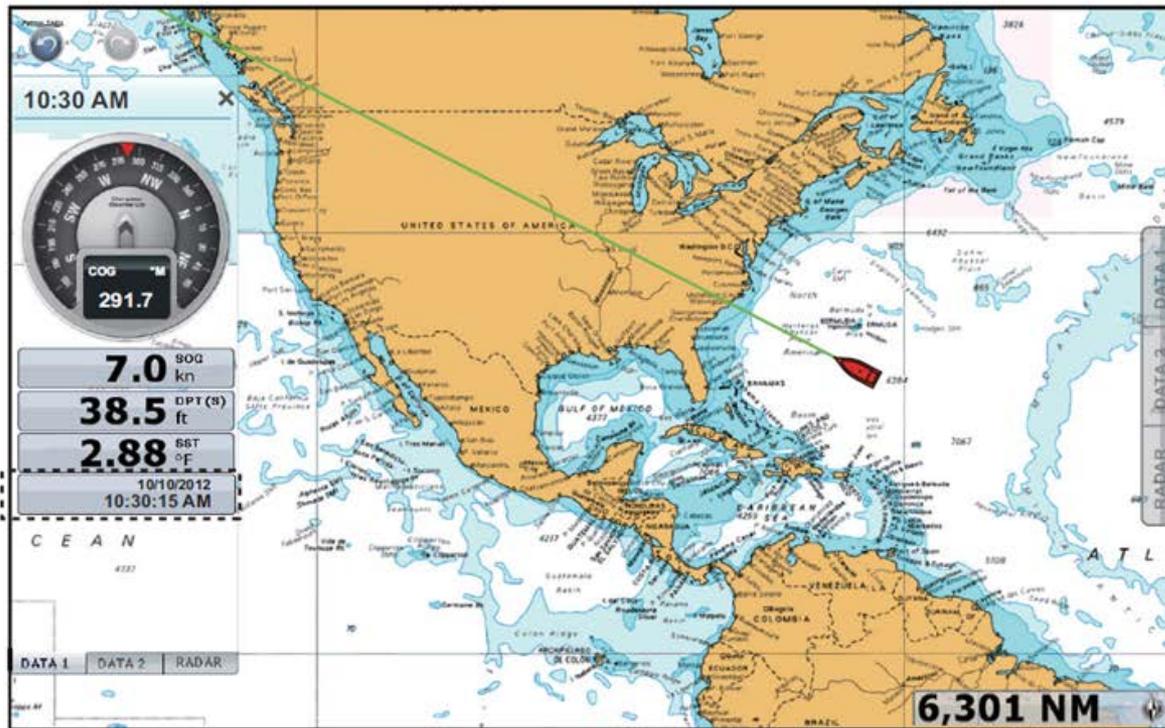


# Furuno TZT14 Operation Data Areas & Data Boxes (4 of 5)



Furuno TZT14 Operator's Manual Paragraph 1.12.1

2. Select the data to add. The added data appears under the bottommost data box. [Date] is added in the following example.



You can sort the data boxes by drag and drop.



# Furuno TZT14 Operation Data Areas & Data Boxes (5 of 5)



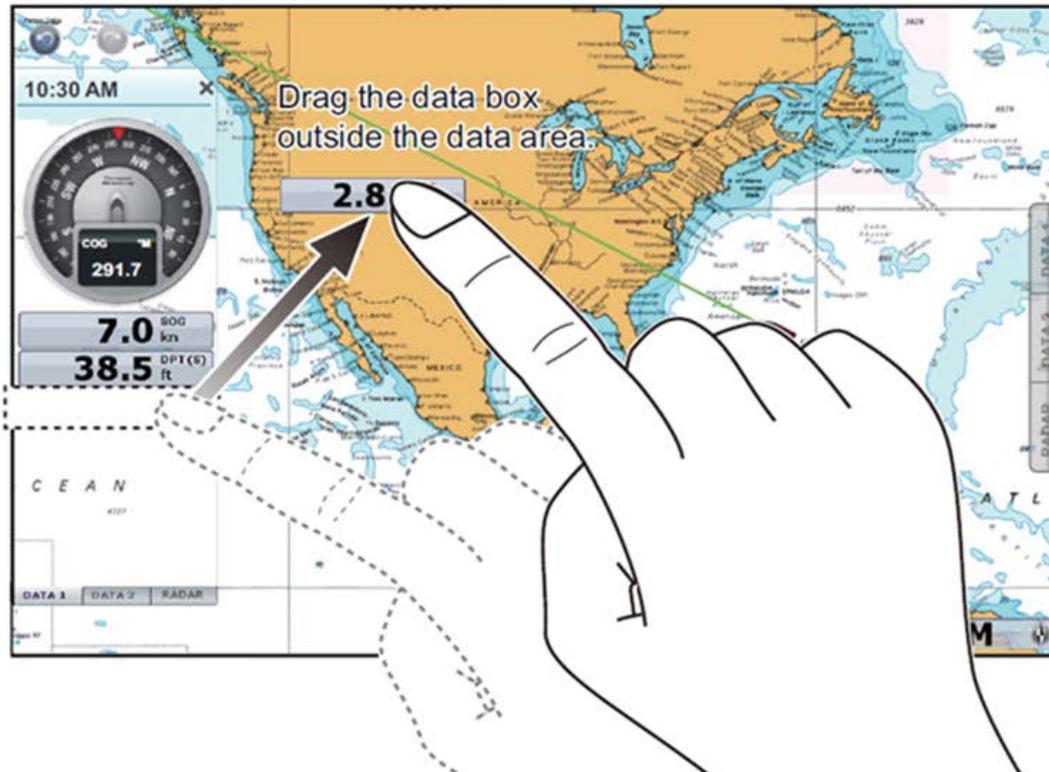
Furuno TZT14 Operator's Manual Paragraph 1.12.1

## How to delete a data box from a data area

Pop-up menu: Select the data box to delete. The pop-up menu appears. Select [Remove].

**Touch control:** Drag the data box outside the data area.

Two ways to remove (delete) a databox from one of the data areas



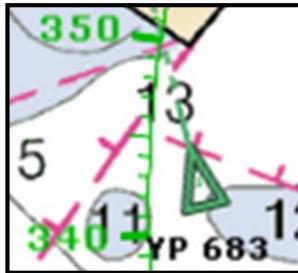


# Furuno Multi-Function Display Relative Bearing Ring



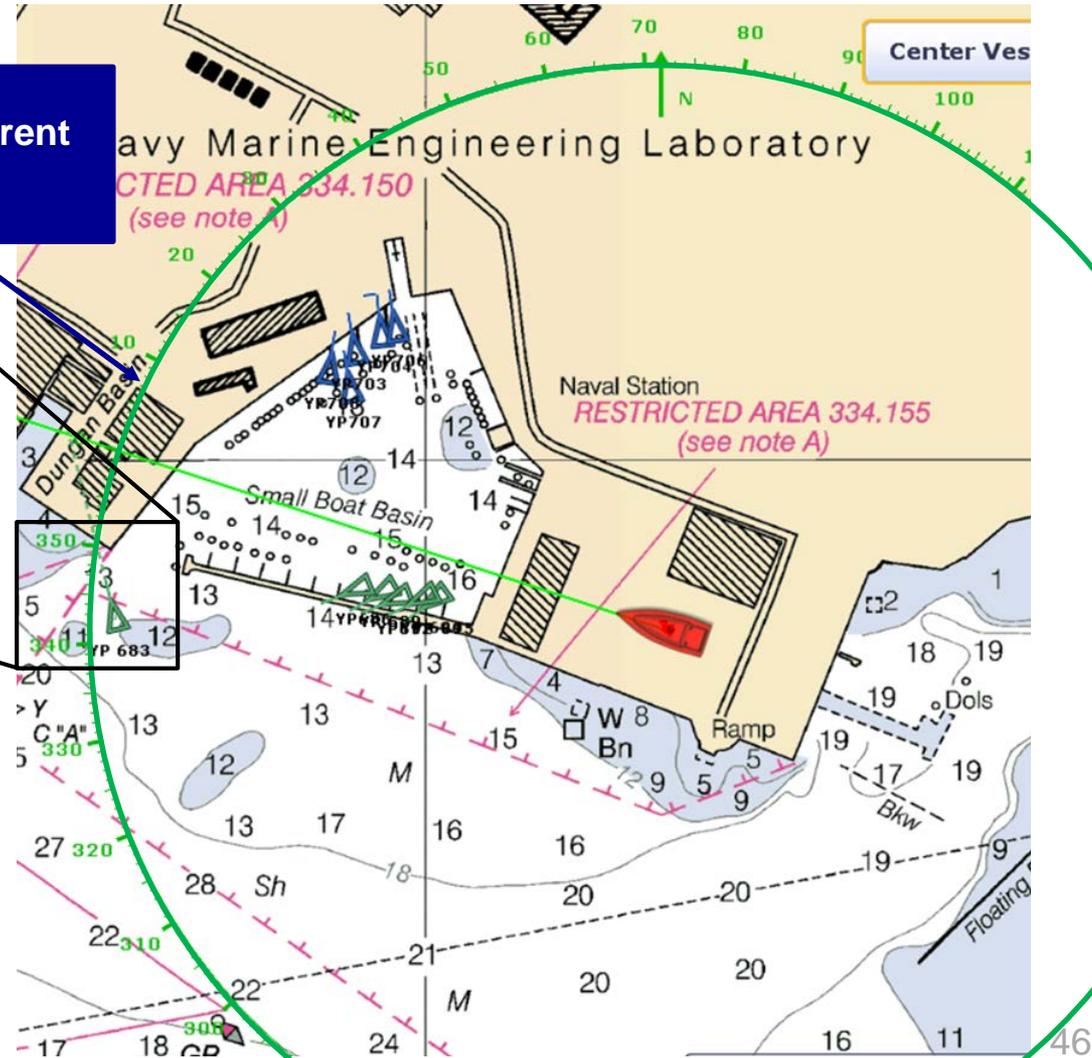
Furuno TZT14 Operator's Manual

The **GREEN** ring shows the STC current heading and relative bearings



YP 683 bears  $343^\circ$  relative from our STC

Using relative bearings helps the Nav Plotter effectively communicate contact positions to the helm and lookout and vice versa:  
“There is a YP at relative bearing  $343^\circ$  [at xx nautical miles]”





# **VHF COMMUNICATION AND AUTOMATIC IDENTIFICATION SYSTEM (AIS)**



# Maritime Mobile Service Identity



<https://www.navcen.uscg.gov/?pageName=mtmmsi> & <https://www.itu.int/en/ITU-R/terrestrial/fmd/Pages/mid.aspx>

- Maritime Mobile Service Identity (MMSI) is a 9 digit number which is sent in digital form over a radio frequency channel (HF, VHF, AIS...)
- MMSI numbers uniquely identify ship stations, coast stations, ship earth stations, coast earth stations, and group calls
- MMSI is also used by digital select calling (DSC)

MMSI Numbers start with a three to five digit identification code:

<b>972</b> xxyyyy	= Man/Crew Overboard AIS Transponder	} Where xx is the Transponder manufacturer's ID
<b>974</b> xxyyyy	= EPIRB-AIS Transponder	
<b>970</b> xxyyyy	= AIS Search and Rescue Transponder	
<b>00MID</b> yyyy	= Coast Radio Station (Base Station), where MID are the <a href="#">Maritime Identification Digits</a>	



# Navy Sailing STC MMSI Numbers



<https://www.navcen.uscg.gov/?pageName=mtmmsi> & <https://www.itu.int/en/ITU-R/terrestrial/fmd/Pages/mid.aspx>

Hull	Name	MMSI
NA11	Swift	369970702
NA21	Renaissance	369970061
NA22	Integrity	369970062
NA23	Defiance	369970063
NA24	Gallant	369970064
NA25	Tenacious	369970065
NA26	Invincible	369970066
NA27	Warrior	369970067

Hull	Name	MMSI
NA28	Daring	369970068
NA29	Brave	369970069
NA30	Honor	369970071
NA31	Courage	369970072
NA32	Commitment	369970073
NA33	Intrepid	369970074
NA34	Audacious	369970075
NA35	Valiant	369970076
NA36	Fearless	369970077

MMSI numbers are already programmed into all applicable STC electronics (AIS, HF SSB Radio and VHF Radio)

(USA has several identification codes and 369 is one of them)



# VHF Communication and Automatic Identification System (AIS)



Automatic VHF Antenna Splitter enables the VHF Radio and the AIS to share the same antenna

Furuno GPA-017S GPS Antenna



Dedicated GPS Antenna

Furuno FA-50 Class B AIS Transponder



ADAM-65201 5-Port Ethernet Switch

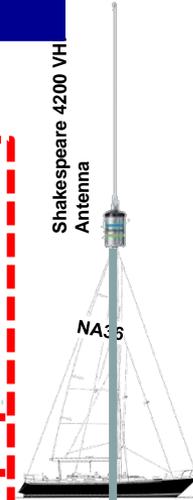


Ethernet Network (10/100 Base-T TCP/IP)



DC Main Distribution Panel ("VHF Radio" Breaker)

Shakespeare 4200 VHF Antenna



NA:33



vespermareine SP160 Antenna Splitter

ICOM HM-195B Command Mic



ICOM IC-M506 VHF Marine Transceiver



If you are using AIS Personal Locator Beacons (PLBs), you don't want to use the main VHF while locating a crew overboard

Since the VHF antenna is shared between the AIS and the VHF radio, you may inhibit reception of the PLB transmissions – use the handheld if you can



# AIS Description



<https://www.navcen.uscg.gov/?pageName=AISworks>

An **autonomous system** for the **exchange of navigational information** between suitably equipped vessels and shore stations using distinct messages and operating on two designated marine VHF channels

## Two Classes of AIS

- **Class A: Regulated Vessels**

- 2- to 10-second Interval while Underway
- 3 Minutes while at Anchor
- Supplemental Data at 6-minute Intervals
- 12.5 watt transmitter

- **Class B: Non-Regulated Vessels**

- Uses protocol which politely interweaves with Class A transmissions
- 30-second Interval while Underway >2 knots
- 3 Minutes while at Anchor
- Supplemental Data at 6-minute Intervals
- 2 watt transmitter

Facilitates Bridge to Bridge Communications  
– You get a higher response rate when you call another vessel by name on the VHF radio

Instead of “Tug boat 1nm southeast of Greenbury Point...”, you can say “Tugboat Funky Monkey...”

Navy 44s have Class B AIS Systems



# AIS Target Symbols



## Furuno Operators Manual

Target type	Symbol	Description
Activated AIS target	<p>Color            Blue: Class A AIS            Green: Class B AIS            Blue (filled): BFT AIS target (see next page for details)</p>	COG is marked on the symbol with a dashed line.
Dangerous AIS target	<p>Color: Red</p>	A dangerous target is one whose CPA and TCPA are smaller than the set [CPA Alarm Value] and [TCPA Alarm Value], which are set on the [Targets] menu.

Target type	Symbol	Description
Lost AIS target	<p>Symbol color            Blue: Class A AIS            Green: Class B AIS            Blue (filled): BFT (Blue Force Tracking) AIS target</p> <p>Cross color            Red</p>	An AIS target becomes a lost target if a signal is not received from the AIS target for x* minutes. The lost target symbol is erased if a signal is not received for an additional x* minutes. *: The time depends on the AIS transponder. Check the operator's manual for your AIS transponder for information about lost targets.

Class A AIS  
(Regulated)



Class B AIS  
(Non-Regulated)



Dangerous AIS  
(CPA & TCPA)



By default, all AIS targets closer than 12nm are displayed

- This setting can be changed in discrete steps between 1nm and 96 nm

The default setting for AIS/ARPA Alarms are:

- CPA < 0.5 nm and TCPA < 10 min
- Proximity Alarm: Off (100 yards)

The STC Navigation Standard Allows you to keep the AIS Alarm OFF when in Santee Basin Don't Forget To Turn It ON After Departure



# Automatic Identification System (AIS)



Lookouts **must** remain vigilant – Not all vessels are visible via AIS

When you touch the AIS Contact, basic AIS Contact Information Displayed

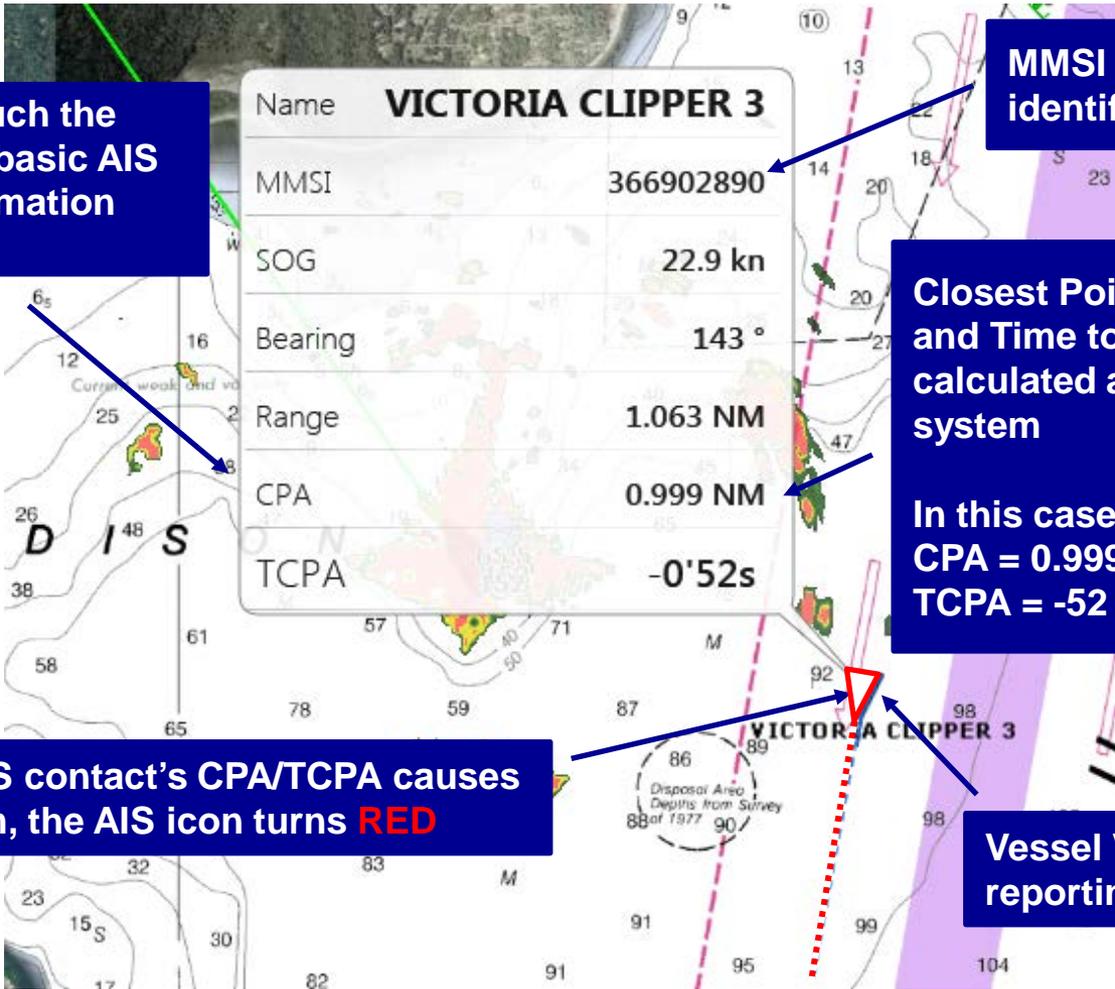
Name	<b>VICTORIA CLIPPER 3</b>
MMSI	366902890
SOG	22.9 kn
Bearing	143 °
Range	1.063 NM
CPA	0.999 NM
TCPA	-0'52s

MMSI number uniquely identifies the AIS contact

Closest Point of Approach (CPA) and Time to CPA (TCPA) is calculated and displayed by the system  
In this case:  
CPA = 0.999 nautical miles  
TCPA = -52 seconds (“past CPA”)

If the AIS contact's CPA/TCPA causes an alarm, the AIS icon turns **RED**

Vessel VICTORIA CLIPPER 3 reporting itself via AIS



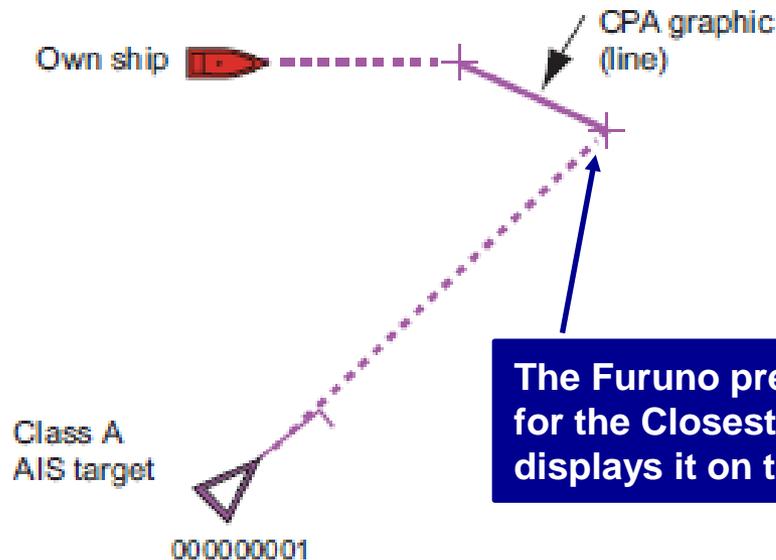


# AIS Closest Point of Approach (CPA) Graphic Display



Furuno TZT14 Operators Manual p12-9

If the CPA/TCPA alarm is generated while the CPA line is in use, the CPA line and the selected target symbol turn red.



The Furuno predicts the location in the future for the Closest Point of Approach (CPA) and displays it on the screen



# Very High Frequency (VHF) Radio (ICOM IC-M506)



The VHF Radio is an ICOM IC-506 VHF Radio

- It does not have the AIS option
- It does not have the external speaker/hailer option



**You should expect continual VHF communications  
If you don't hear anything for awhile, check to see if the VHF radio is setup properly**



# Very High Frequency (VHF) Radio Overview



- The VHF Radio is used for summoning rescue services, communicating with other vessels, harbors, locks, bridges and marinas
  - The VHF has a distress button for emergency calls
  - The VHF has Digital Select Calling (DSC)
    - DSC uses VHF Ch70
  - Do not use the intercom function
  - Do not hold casual conversations on Ch16
- Ensure the VHF is scanning the correct channels when you are not transmitting
  - It is very easy to forget to put it back into scan after transmitting



# Very High Frequency (VHF) Radio COMMANDMICIV™

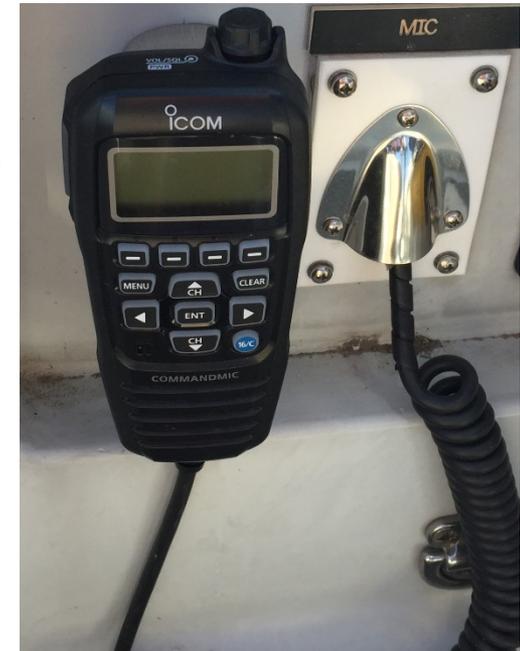


## Full function remote microphone in cockpit

- Cautions for Remote Microphone:
  - You do not hear “ownship” VHF communications in the cockpit (what your navigator is saying to someone else)
  - It is easy to kick where it is mounted
  - Do NOT use the intercom

Consider using a handheld VHF radio in the cockpit

- BONUS:
  - You can verify from the cockpit if the VHF is scanning different channels





# Very High Frequency (VHF) Radio Settings & VHF Call Channel

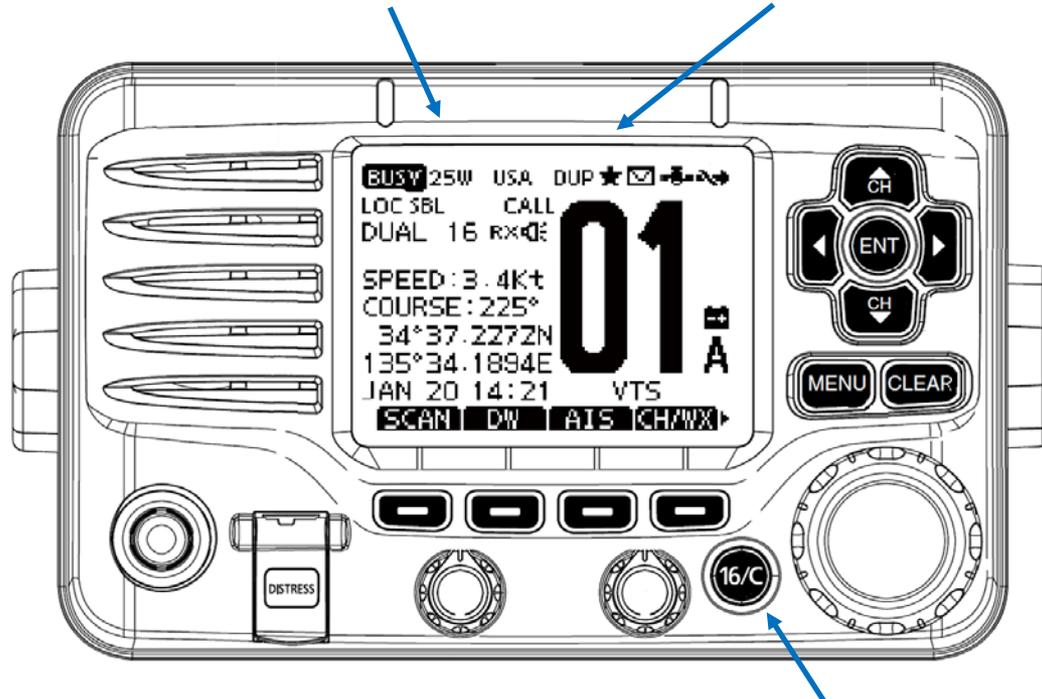


## High vs. Low Power Transmit

1. 25Watt = High Power Transmit
2. 1 Watt = Low Power Transmit

## Favorite (Scanned) Channels

1. A star ★ above the channel = Favorite (scanned)
2. No star above the channel = Not scanned



If you use Normal Scan (the default), ensure that Ch16 is programmed as a Favorite

## Channel 16 & Call Channel Button

1. Press for Channel 16
2. Hold for 1 Second for Pre-programmed Call Channel



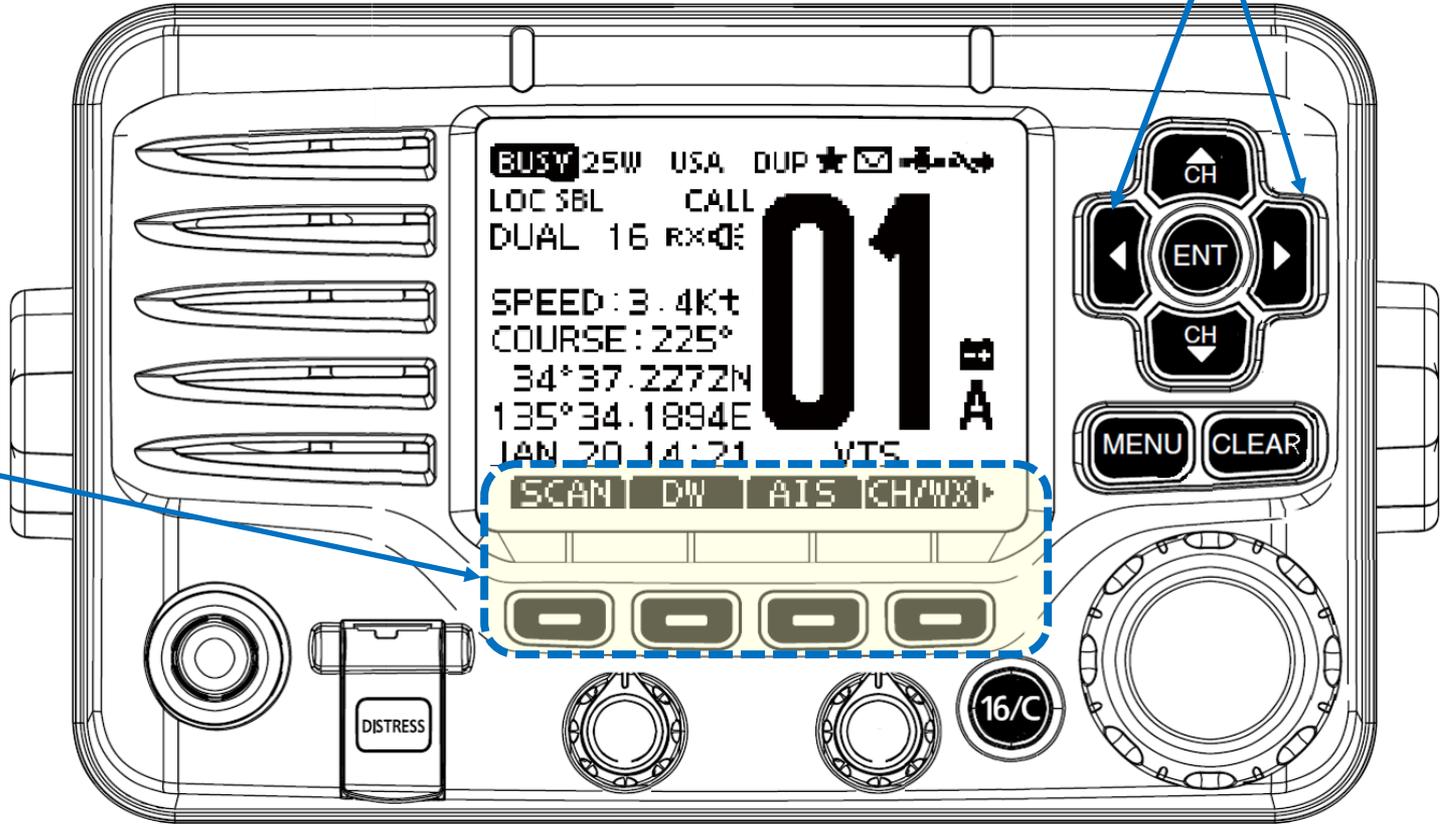
# Very High Frequency (VHF) Radio Softkeys



ICOM VHF Manual

Left/Right Buttons  
(Changes Sofkeys)

Sofkeys





# Very High Frequency (VHF) Radio Softkey Functions

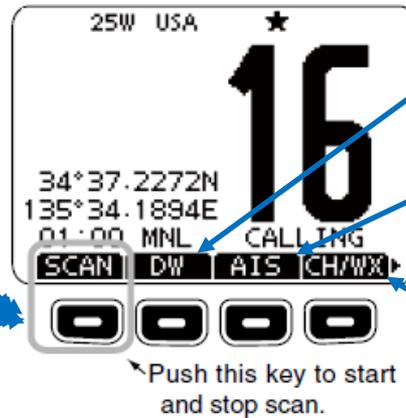


- Scan
- Scan!
- Scan!!
- Scan!!!
- Scan!!!!
- Scan!!!!!
- Scan!!!!!!
- Scan!!!!!!!
- Scan!!!!!!!!
- Scan!!!!!!!
- Scan!!!!!!!!

Various functions can be assigned to the softkeys. When a key function is assigned, the key icon is displayed above the softkey, as shown below.

### ◇ Softkey function selection

When “◀” or “▶” is displayed beside the key icon, pushing [◀]/[▶] to scroll key functions that is assigned to the softkey. The key movement is set to “Group” in default. 4 icons move by pushing [◀]/[▶] once. You can set the key movement of your choice in menu screen. (p. 94)



DW = Dualwatch/Tri-Watch  
(Not used)

AIS (Not used)

Weather!  
Toggles between  
regular channel and  
weather channel





# VHF Weather



<https://www.nws.noaa.gov/nwr/Maps/>

The NOAA Weather Radio network provides voice broadcasts of local and coastal marine forecasts on a continuous cycle. The forecasts are produced by local National Weather Service Forecast Offices. Coastal stations also broadcast predicted tides and real time observations from buoys and coastal meteorological stations operated by NOAA's National Data Buoy Center. Based on user demand, and where feasible, Offshore and Open Lake forecasts are broadcast as well.

The NOAA Weather Radio network provides near continuous coverage of the coastal U.S, Great Lakes, Hawaii, and populated Alaska coastline. Typical coverage is 25 nautical miles offshore, but may extend much further in certain areas.

ICOM VHF has 10 weather channels (1-10) and a weather alert that can be set up.

NOAA Weather Radio Frequencies
162.400 MHz (WX2)
162.425 MHz (WX4)
162.450 MHz (WX5)
162.475 MHz (WX3)
162.500 MHz (WX6)
162.525 MHz (WX7)
162.550 MHz (WX1)
Channel numbers, e.g. (WX1, WX2) etc. have no special significance but are often designated this way in consumer equipment. Other channel numbering schemes are also prevalent.

Site Name	Transmitter Name	Call Sign	Frequency	Power	WFO
Baltimore	Pikesville	<a href="#">KEC83</a>	162.400	1000	Sterling, VA
Frostburg	Dan's Rock	<a href="#">WXM43</a>	162.425	300	Sterling, VA
Hagerstown	Clear Spring	<a href="#">WXM42</a>	162.475	1000	Sterling, VA
Sudlersville	Sudlersville	<a href="#">WXK97</a>	162.500	1000	Mount Holly, NJ

Number of Stations in Maryland = 4

**The different channels correspond to different geographic locations**

**The STC crew should be checking the weather at least once a day**



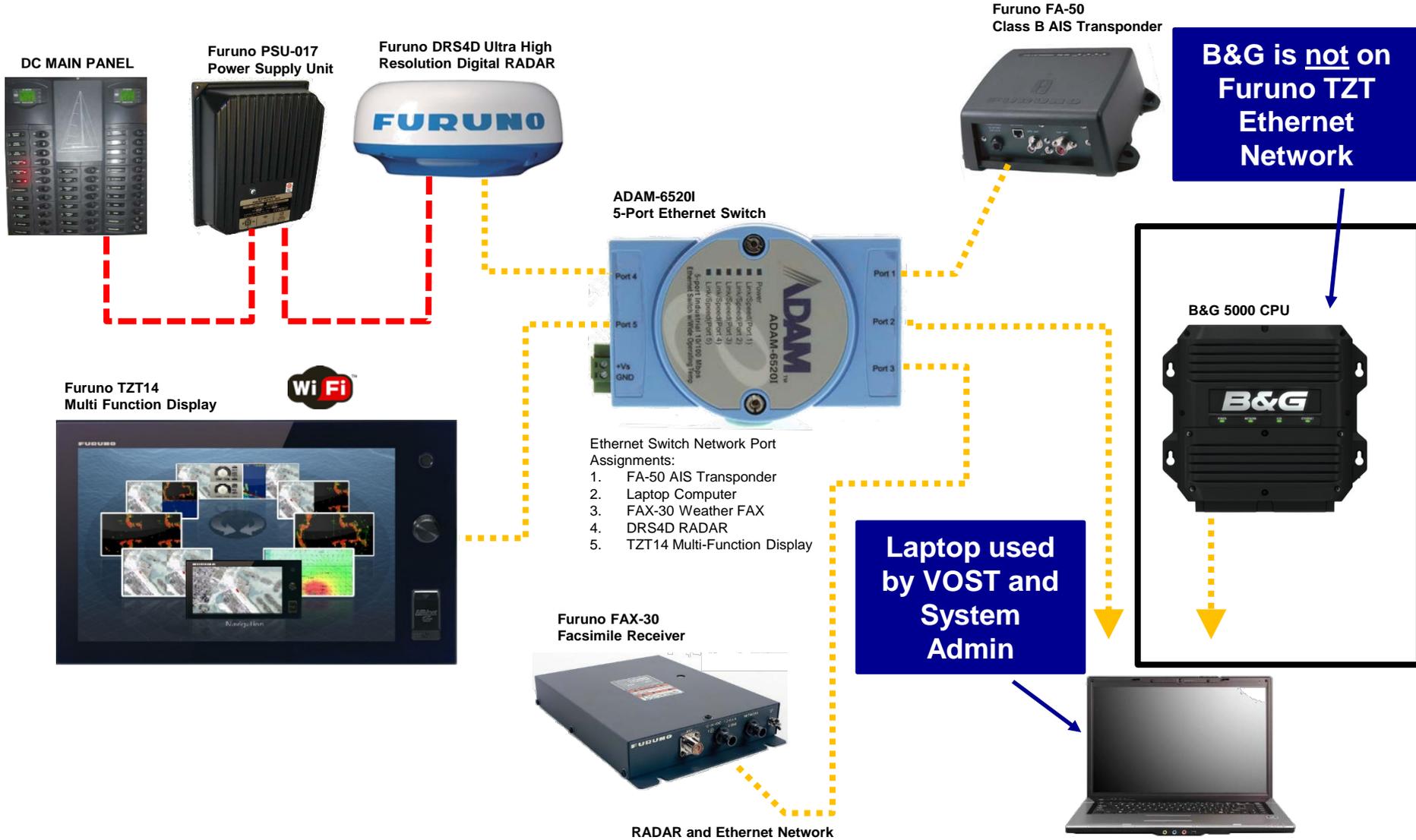
**BREAK?**



# **RADAR AND ETHERNET (NAVNET) NETWORK**



# RADAR and Ethernet Network

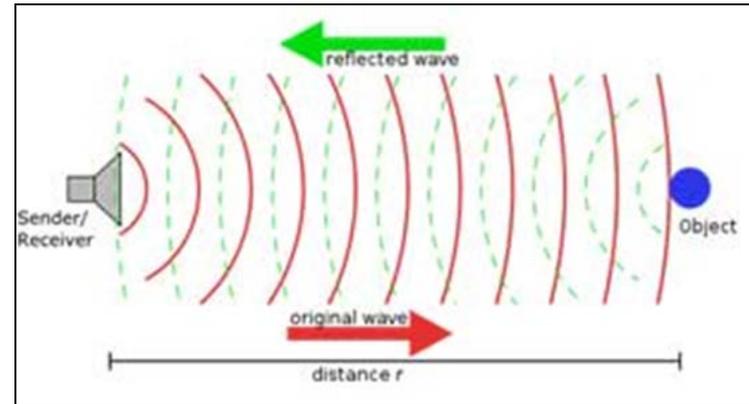




# RADAR (Radio Detection And Ranging)

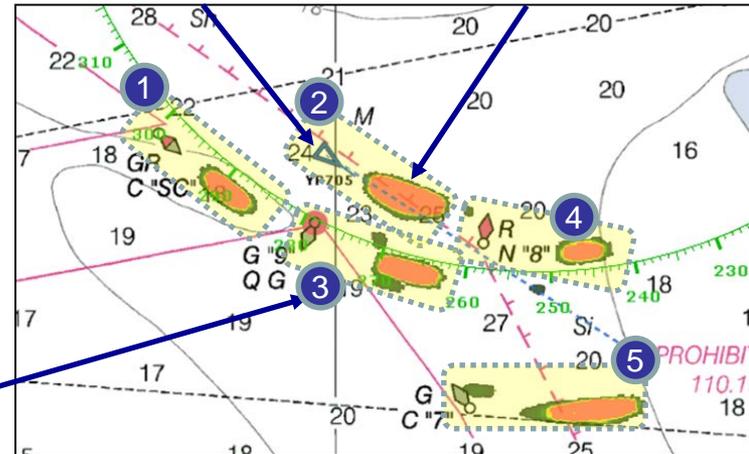


- Radio frequency energy is transmitted outward
  - A RADAR pulse encounters an object and the pulse is reflected back towards the antenna
  - The return pulse (echo) is processed and resulting images (targets) are painted on the display



**YP705 (AIS)**

**YP705 (RADAR)**



**Five RADAR return pulses displayed:**

- 4 buoys and
- 1 YP (YP705)

**(Yellow boxes added for clarification)**

**Note:** From this screenshot, you can tell there is an angular misalignment between the chart plotter and the RADAR returns that should be addressed. This should be done by the Cutter Shed, but if needed, the instructions are on page 3-10 of the Furuno manual "How to Align the Antenna Heading"



# RADAR Features



- Ultra High Definition Digital RADAR. UHD™ with automatic, real-time digital signal processing
- The effective range of the RADAR is primarily determined by the RADAR's antenna height above the water

Radome angle can be adjusted to compensate for heel angle

Don't Use The Upper Radome Adjustment Rod for a Hand Hold or Harness Clip Point







# Automatic RADAR Plotting Aid (ARPA) with RADAR



Furuno Operator's Manual Paragraph 6.26

- The ARPA shows the movement of a maximum of 30 RADAR targets
  - The targets can be acquired manually or automatically
- To show the ARPA display:
  1. Select [Targets] from the RotoKey menu
  2. Select [ARPA] to show the display

ARPA Symbol	Meaning
	At acquisition of the target.
	30 s after the acquisition, the plotting symbol changes to a small circle, which indicates steady-state tracking. A vector appears to show the direction of the target.
	A lost target is indicated by a diamond symbol, created from two equal triangles.

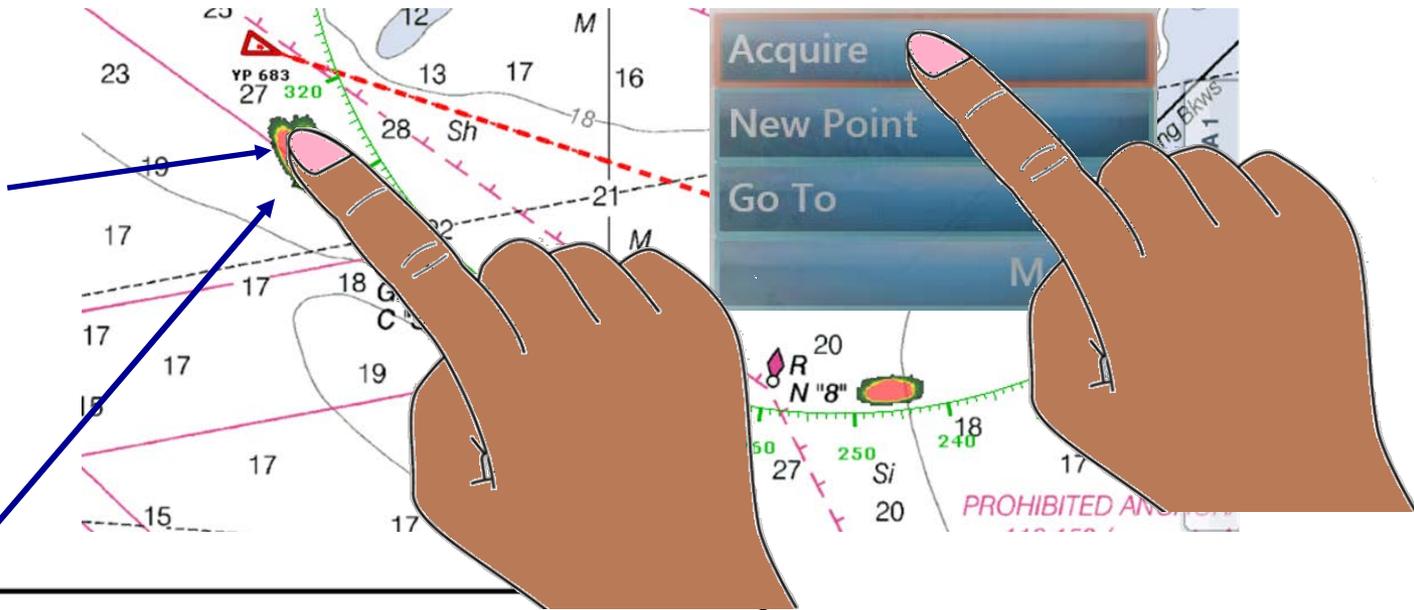


# RADAR



## ARPA Contact Tracking (1 of 4)

YP693 manually acquired as an ARPA target



ARPA Symbol	Meaning
	At acquisition of the target.
	30 s after the acquisition, the plotting symbol changes to a small circle, which indicates steady-state tracking. A vector appears to show the direction of the target.
	A lost target is indicated by a diamond symbol, created from two equal triangles.

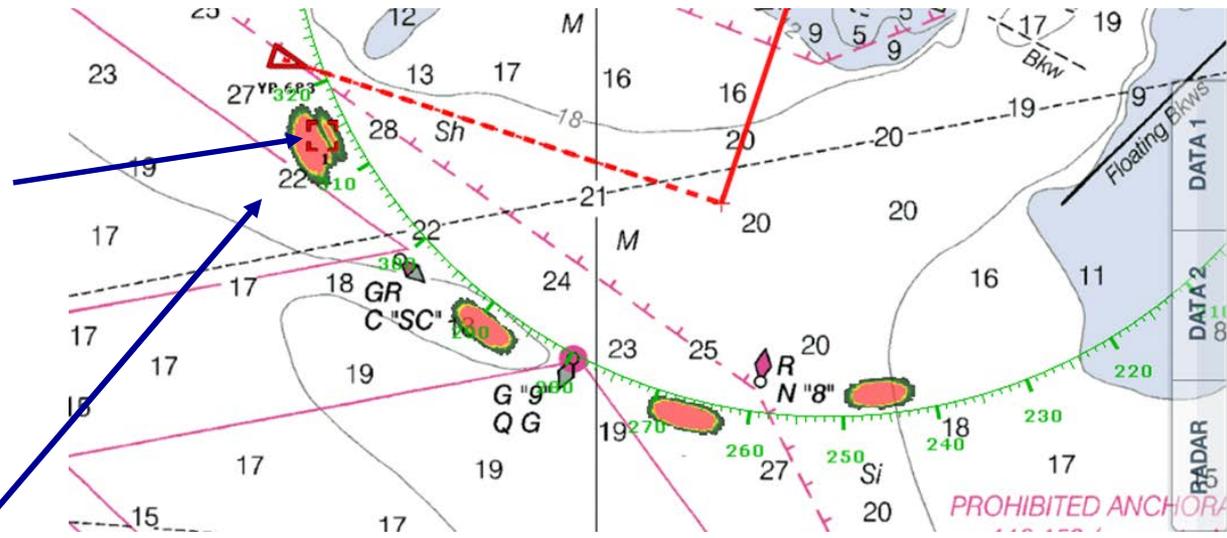


# RADAR

## ARPA Contact Tracking (2 of 4)



YP693 is acquired (...and evaluated as **dangerous** by ARPA)



ARPA Symbol	Meaning
	At acquisition of the target.
	30 s after the acquisition, the plotting symbol changes to a small circle, which indicates steady-state tracking. A vector appears to show the direction of the target.
	A lost target is indicated by a diamond symbol, created from two equal triangles.



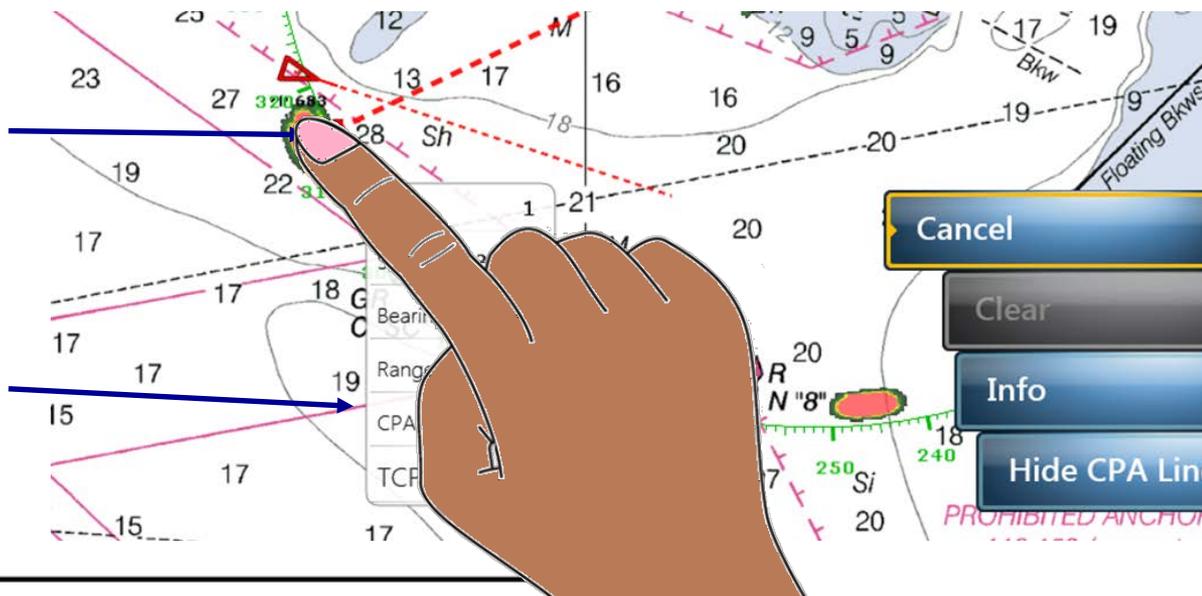
# RADAR



## ARPA Contact Tracking (3 of 4)

Contact course vector showing and contact is still **Dangerous**

ARPA is reporting contact data (CPA = 1 yard!)



ARPA Symbol	Meaning
	At acquisition of the target.
	30 s after the acquisition, the plotting symbol changes to a small circle, which indicates steady-state tracking. A vector appears to show the direction of the target.
	A lost target is indicated by a diamond symbol, created from two equal triangles.



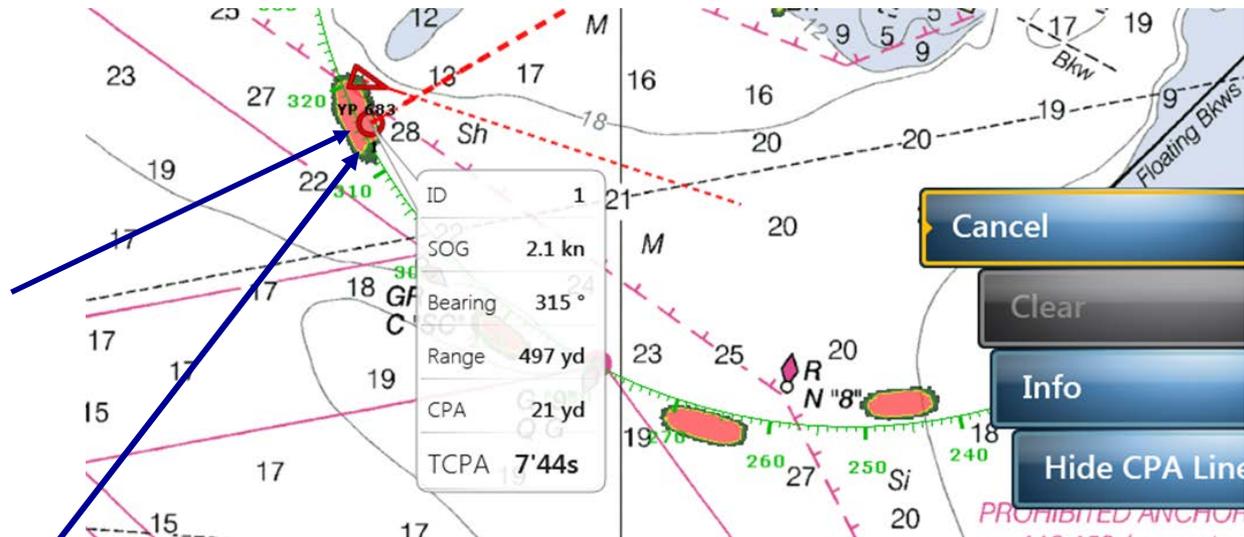
# RADAR

## ARPA Contact Tracking (4 of 4)



>30 seconds later  
we have steady  
state tracking

ARPA RADAR  
contact is still **RED**



ARPA Symbol	Meaning
	At acquisition of the target.
	30 s after the acquisition, the plotting symbol changes to a small circle, which indicates steady-state tracking. A vector appears to show the direction of the target.
	A lost target is indicated by a diamond symbol, created from two equal triangles.



# RADAR Beacon (RACON) on RADAR



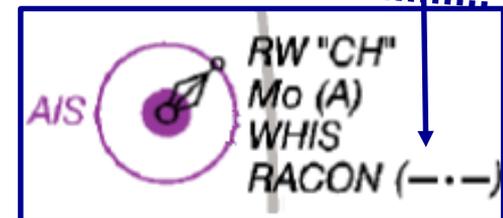
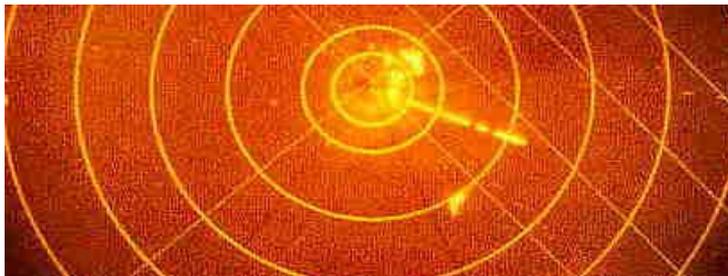
<https://www.navcen.uscg.gov/?pageName=enavRADARBeacons>

- RACONs are receiver/transmitter transponder devices used as a navigation aid, identifying landmarks or buoys on a shipboard marine RADAR display.
  - A RACON responds to a received RADAR pulse by transmitting an identifiable mark back to the RADAR set
  - The displayed response has a length on the RADAR display corresponding to a few nautical miles, encoded as a Morse character beginning with a dash for identification
  - The anti-clutter rain setting could mask a RACON return and may need to set to zero
  - The anti-clutter sea setting could also degrade a RACON response in some situations



**Buoy “CH” at the entrance of the Delaware Bay is both an AIS buoy and a RACON buoy**

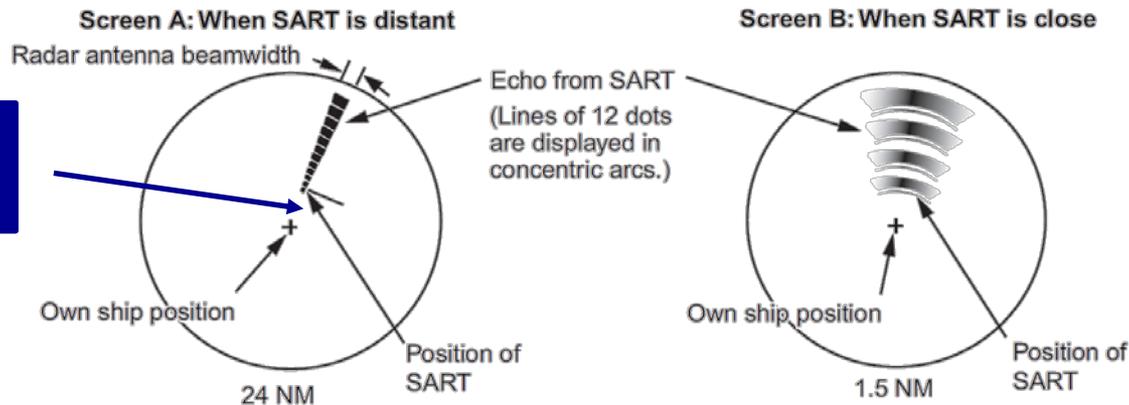
**Its RACON response is DASH DOT DASH**



# Search and Rescue Transponder (SART) on RADAR



- A ship in distress can use a RADAR-SART to show a series of dots on the RADAR display of nearby ships to indicate distress
  - Shows up as lines of 12 dots in concentric arcs
  - Also available as a standalone transmitter
- A SART transmits when it receives a RADAR pulse from any X-band (3cm) RADAR (within a range of approximately 8 nm)



Location of ship in distress



# RADAR Tuning



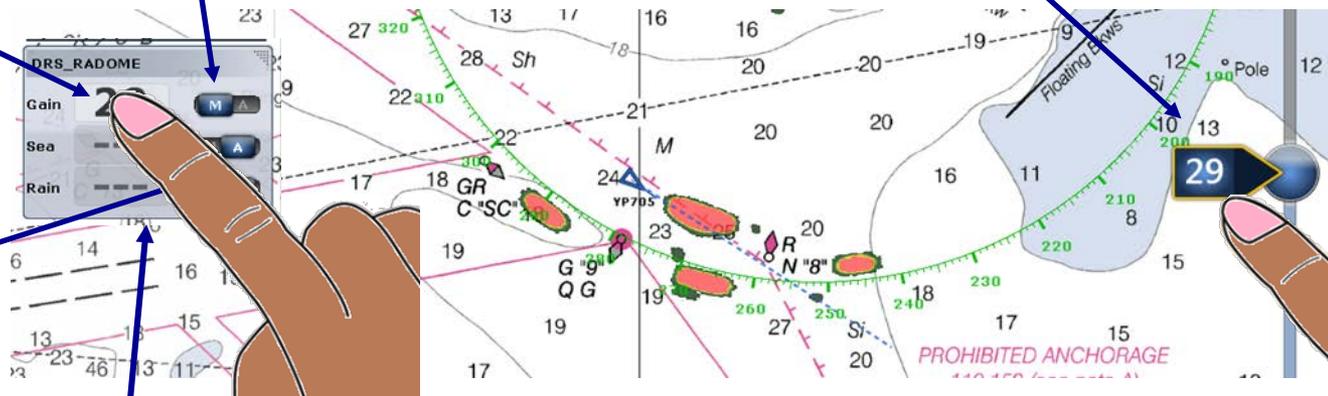
Tuning of the RADAR (Gain, Sea & Rain) can be automatic or manual  
The settings can be adjusted to detect incoming weather also (rain)

1. Press here to adjust the manual setting

Gain is set to Manual

2. This is where you adjust the gain setting manually

Sea and Rain are set to Automatic



This is a standard menu that can be added to the data boxes  
See the Furuno TZT14 manual for how to add this menu if it is not present

Manual Adjustment of the RADAR is advised when:  
1. Looking for a RACON Buoy or SART  
2. Looking for nearby weather (storm clouds)



# **FURUNO MULTI-FUNCTION DISPLAY (MFD) OPERATION**

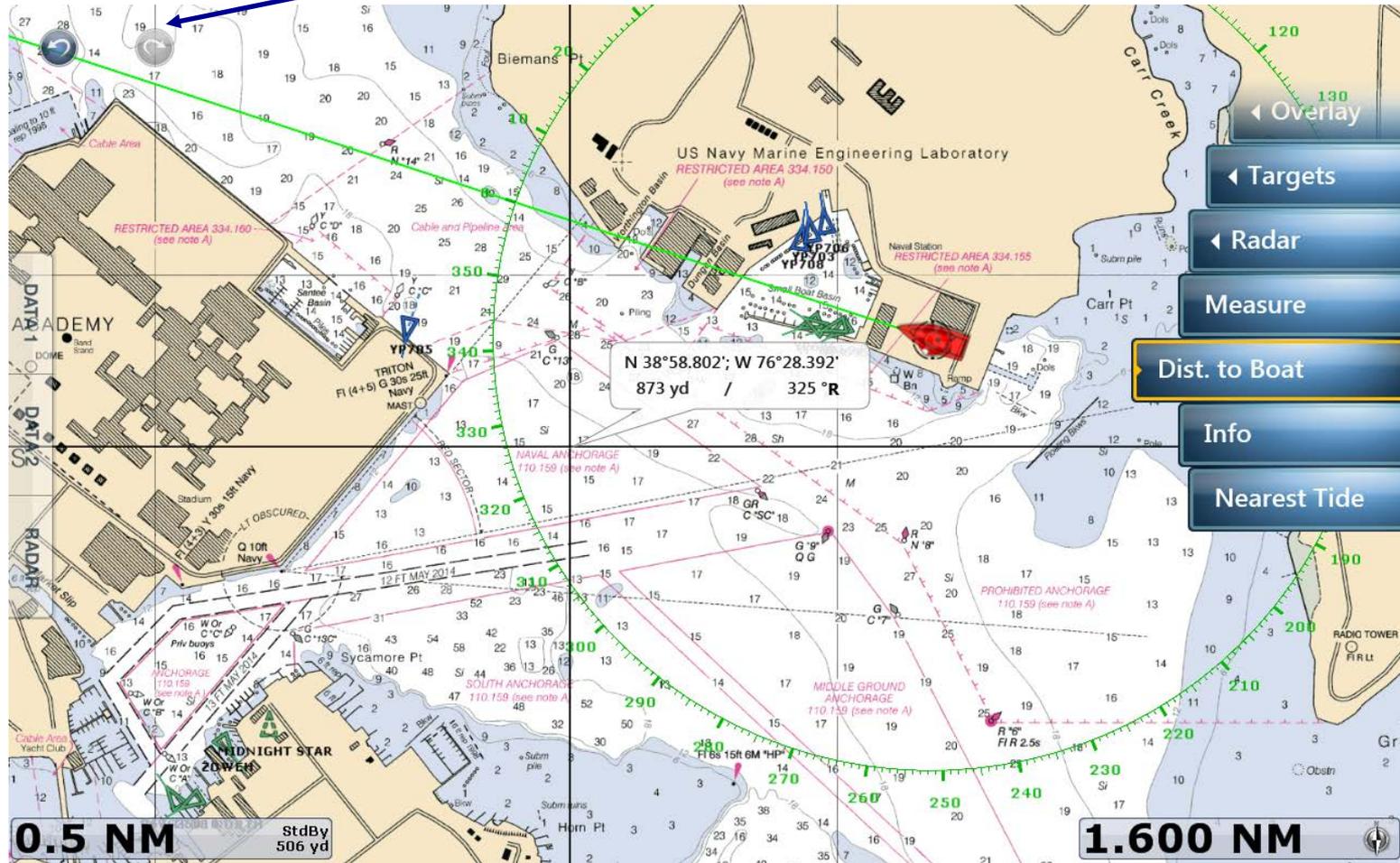


# Furuno Multi-Function Display Undo and Redo



Furuno TZT14 Operator's Manual

There are "undo" and "redo" icons in the top left for certain operations (like point and route adjustments)





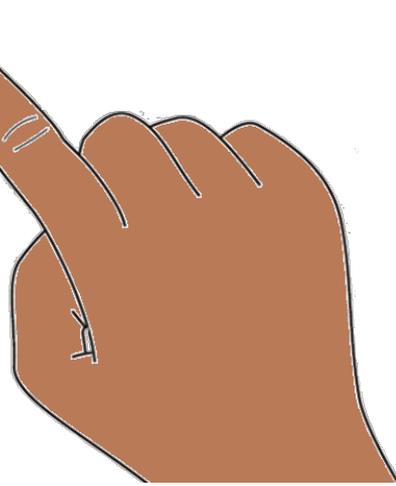
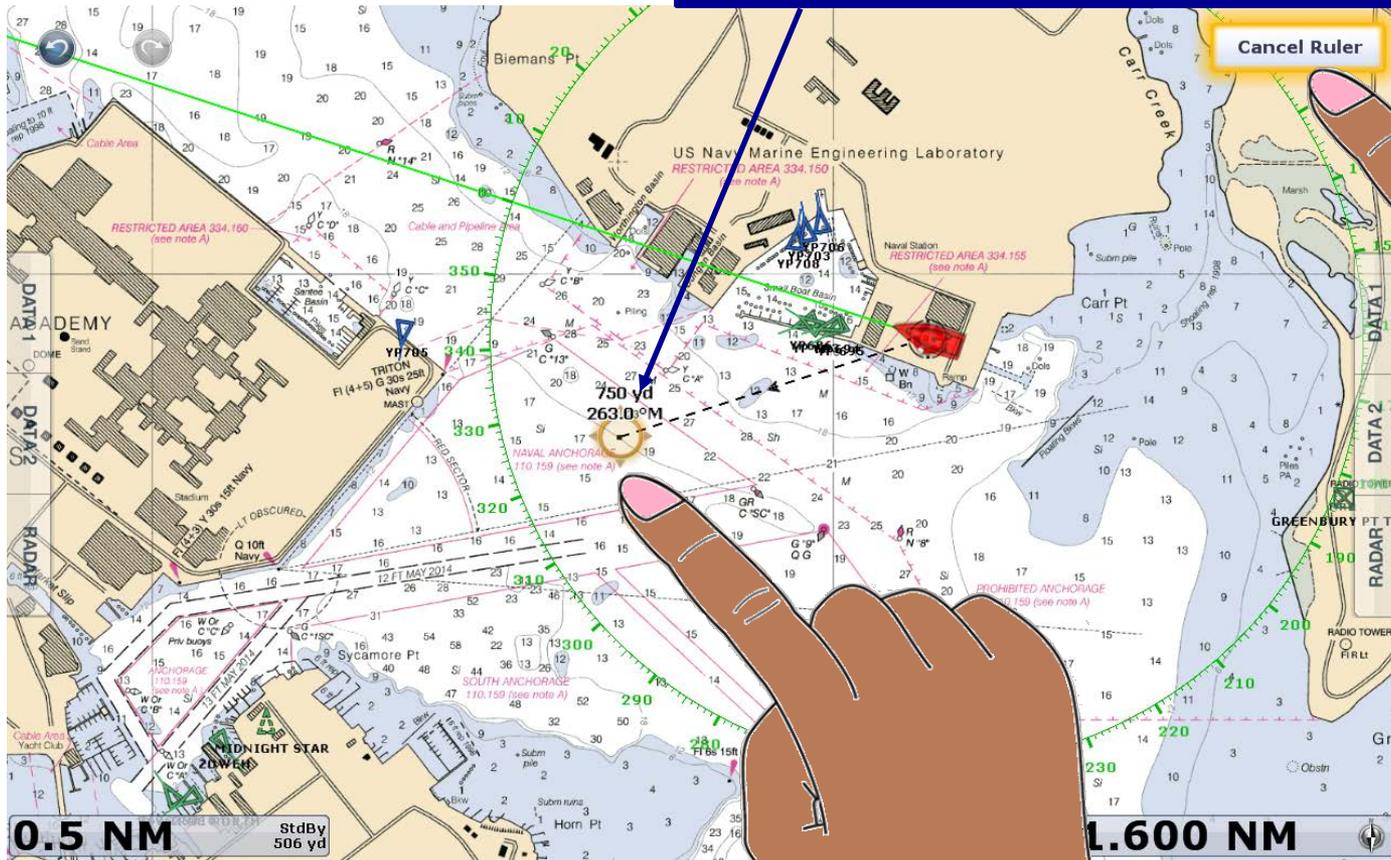


# Furuno Multi-Function Display Distance From Boat Ruler



Furuno TZT14 Operator's Manual

You can now drag the "distance from boat" icon around to different locations



Press "Cancel Ruler" when you no longer need to take measurements



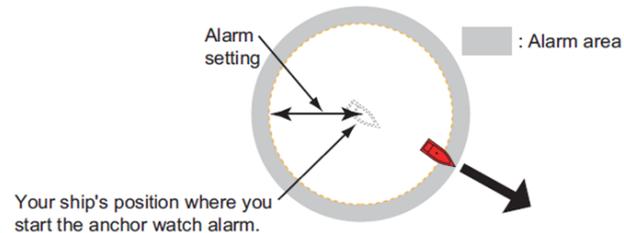
# Furuno Multi-Function Display Common Alarms



1. AIS CPA/TCPA <math><0.5\text{ nm}& \text{ \& } <10\text{ minutes}</math>
2. ARPA CPA/TCPA <math><0.5\text{ nm}& \text{ \& } <10\text{ minutes}</math>
3. Depth <math><18\text{ feet total water depth}</math>
4. Anchor Watch As desired

## Anchor watch alarm

The anchor watch alarm tells you that your ship has moved a distance greater than the set value when the ship must not be moving.



Alarms will generate a flashing status bar at the top of the screen

- The name of the alarm that is sounding will be displayed
- To stop the alarm, tap the status bar



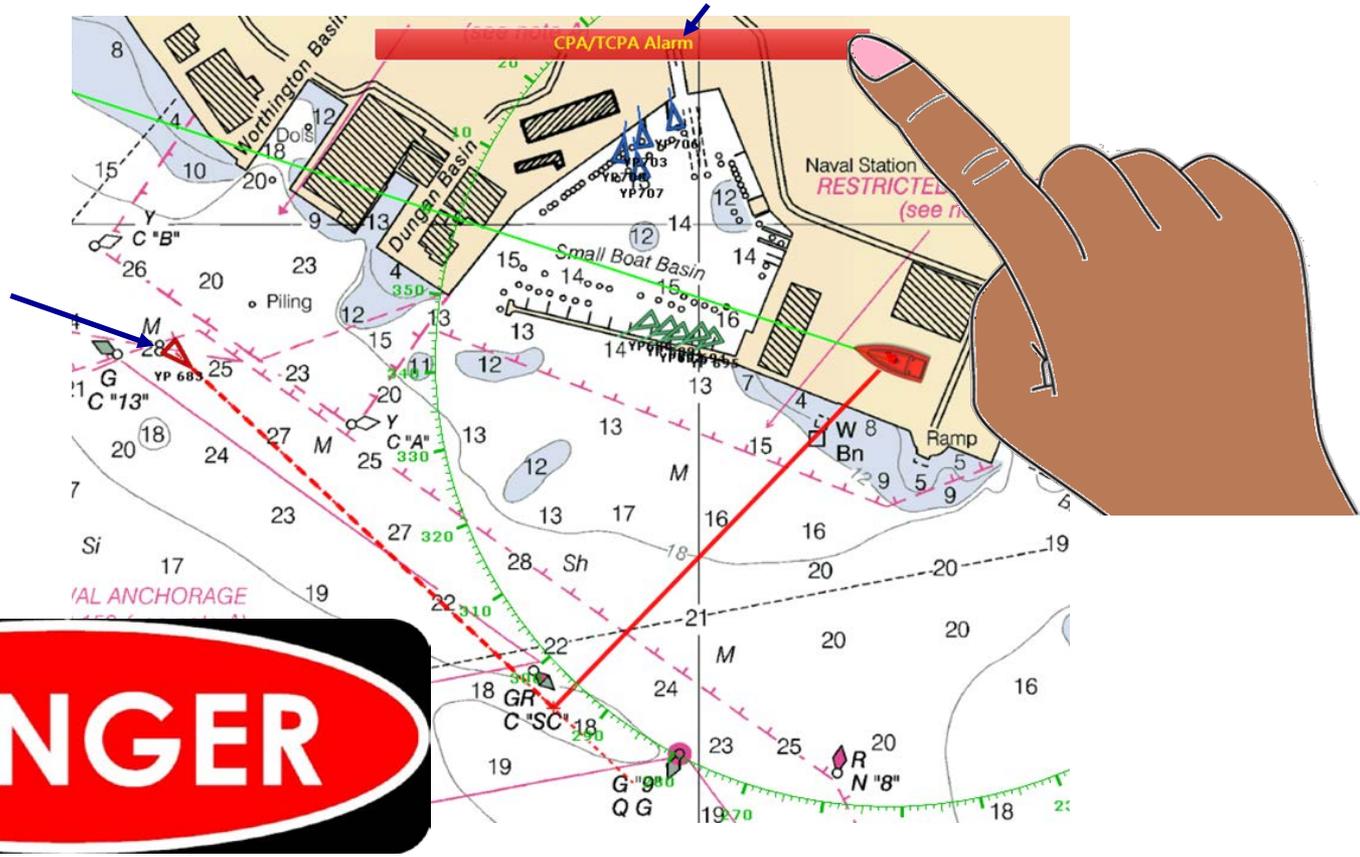
# Furuno Multi-Function Display CPA/TCPA Alarm



Furuno TZT14 Operator's Manual

1. Tap here to silence the alarm
2. Determine the cause of the alarm
3. Report to Helm the cause and recommended action(s)

AIS & ARPA  
Contacts  
causing alarms  
will turn **RED**





# Furuno Multi-Function Display Routes and Route Detail



Furuno TZT14 Operator's Manual

- Official OSTS Points and Routes will be pre-programmed into the Furuno
- The OTC will be given a SD Card with a back up of the needed data

**Routes List** Close

Search:  Sort by: **Name** **Color** **Length**

**F**

- Freeport via Norfolk and NY Length 414.8 NM  
From To
- Freeport via Norfolk and NY Length 415.4 NM  
From To
- Freeport via Norfolk Inshore Length 374.4 NM  
From To
- Freeport via Norfolk Inshore Length 374.9 NM  
From To
- Freeport via Norfolk Outside Length 405.2 NM  
From To
- Freeport via Norfolk Outside Length 405.7 NM  
From To

**G**

- Goat Island Length 0.973 NM  
From

**L**

- Liberty landing  
From To

**N**

Points List  
**Routes List**  
Route Detail  
AIS List  
DSC List  
ARPA List

**Route Detail** Close

Route Speed  Departure Date : Wednesday, May 17, 2017 12:09

ID	BTW/Speed	Dist/Total	TTG/Total
AH01	11.2 *M 5.0 kn	0 yd 0 yd	0'00s 0'00s
AH03	137.5 *M 5.0 kn	0.645 NM 0.645 NM	8'22s 8'22s
AH05	159.2 *M 5.0 kn	1.394 NM 2.039 NM	18'04s 26'26s
AH06	83.5 *M 5.0 kn	2.948 NM 4.987 NM	33'58s 1h00'
CN01	27.2 *M 5.0 kn	1.229 NM 6.216 NM	15'20s 1h16'
CN02	27.8 *M 5.0 kn	9.495 NM 15.71 NM	2h08' 3h23'
CN03	51.7 *M 5.0 kn	5.044 NM 20.76 NM	1h14' 4h37'
CN05	59.2 *M 5.0 kn	2.826 NM 30.15 NM	34'34s 6h43'
CN06	68.6 *M 5.0 kn	3.186 NM 30.15 NM	38'14s 6h43'

Points List  
Routes List  
**Route Detail**  
AIS List  
DSC List  
ARPA List

**Contingency routes will also be pre-programmed by OSTS and can be activated when the situation requires using them**



# Furuno Multi-Function Display Route Reverse



Furuno TZT14 Operator's Manual

Routes List

Close

Sort by: Name Color Length

From	To	Length
Cape May		2.746 NM
Delmarva Northbound		376.2 NM
Freeport via Norfolk and NY		414.8 NM
Freeport via Norfolk and NY		415.4 NM
Freeport via Norfolk Inshore		374.4 NM

Points List

Routes List

Route Detail

AIS List

DSC List

ARPA List

Goto

Reverse

Find On Chart

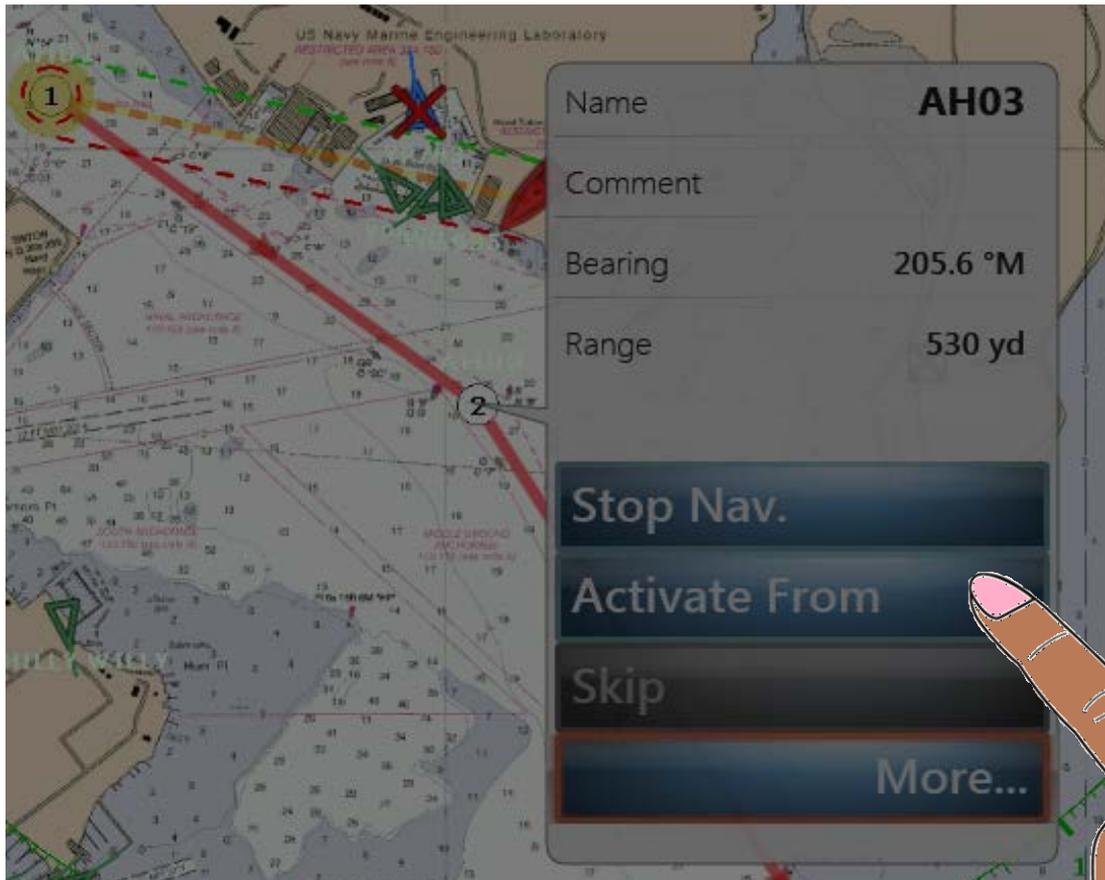
If a Route is going the wrong way, you can easily "reverse" it from the menu



# Furuno Multi-Function Display Route Activate From



Furuno TZT14 Operator's Manual



If you start a route at a location other than the starting point (like after a MOB drill), you can use “activate from” to start from the next waypoint

\*\*\*\*\*

**Make sure you check the plotted track to the first activated point for safe water**

\*\*\*\*\*



# Furuno Multi-Function Display AIS List (Different Sorts)



Furuno TZT14 Operator's Manual

Color Coded

Sorted by CPA

Sorted by Range

**AIS List** Close

Sort by: **Name** Range Cpa

Name/MMSI	Range/Bearing	CPA/TCPA
VICTORIA CLIPPER 3 366902890	1.619 NM 113 °	1.159 NM 2'26s
WALLA WALLA 366710810	4.015 NM 56 °	2.478 NM 33'17s
WESTWOOD RAINIER 311349000	2.306 NM 125 °	2.067 NM -5'16s
ISLAND CHIEF 366838990	4.635 NM 110 °	1.403 NM 47'12s
PACIFIC 366980170	6.610 NM 195 °	3.761 NM -31'46s
367337230	4.186 NM 195 °	4.098 NM -8'58s
CADEAU 338115675	4.163 NM 193 °	4.086 NM -8'25s
ZEEHAEN 366955010	4.248 NM 195 °	4.161 NM -8'58s
MT.MITCHELL 369190000	5.225 NM 198 °	5.030 NM -14'51s
RIIIFACE	5.243 NM	5.091 NM

Points List  
Routes List  
Route Detail  
**AIS List**  
DSC List  
ARPA List

**AIS List** Close

Sort by: Name **Range** Cpa

Name/MMSI	Range/Bearing	CPA/TCPA
VICTORIA CLIPPER 3 366902890	1.731 NM 110 °	1.297 NM 2'24s
WESTWOOD RAINIER 311349000	2.275 NM 127 °	1.667 NM -8'19s
WALLA WALLA 366710810	4.043 NM 56 °	417 yd 41'18s
CADEAU 338115675	4.152 NM 193 °	3.004 NM -29'17s
367337230	4.173 NM 195 °	2.934 NM -30'20s
ZEEHAEN 366955010	4.235 NM 194 °	2.987 NM -30'41s
ISLAND CHIEF 366838990	4.665 NM 110 °	3.626 NM 30'25s
MT.MITCHELL 369190000	5.211 NM 198 °	3.463 NM -39'47s
366425240	5.328 NM 196 °	3.659 NM -39'35s
Name/MMSI	Range/Bearing	CPA/TCPA
	5.375 NM	3.549 NM

Points List  
Routes List  
Route Detail  
**AIS List**  
DSC List  
ARPA List

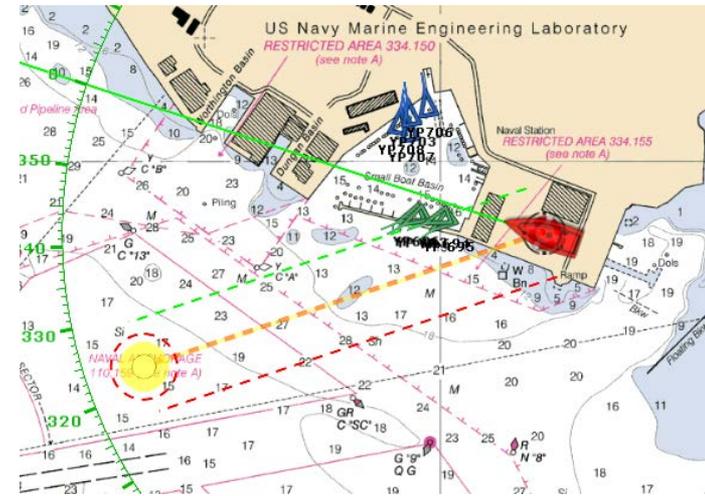
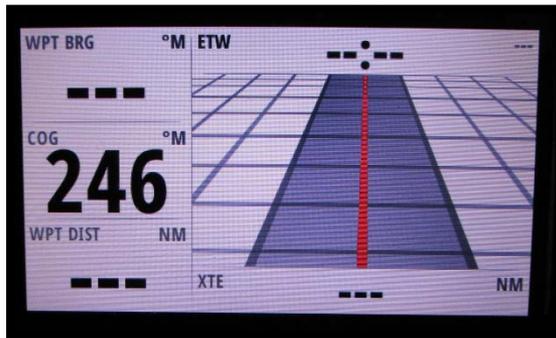


# Route and Waypoint Navigation



Furuno TZT14 Operator's Manual

## No Active Waypoint



If you want to go straight to your waypoint, the helm should steer to make COG (2.) = WPT BRG (1.)

You can also reduce the cross-track error, XTE, (6.)

1. Bearing to Waypoint

2. Course Over Ground

3. Distance To Waypoint

## Active Waypoint



5. Estimated Time to Waypoint

6. Cross Track Error



# **NAVIGATION STANDARDS**

## **USNA DIVPRODEVINST 3530.2**



# The OSTTS Main References Are On The OSTTS Training Webpage



<https://www.usna.edu/Sailing/osts/training.php>

OSTTS Training :: USNA Sailing Center :: USNA - Mozilla Firefox

File Edit View History Bookmarks Tools Help

OSTTS Training :: USNA Sailing C X

https://www.usna.edu/Sailing/osts/training.php

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**NEW VOLUNTEER INFORMATION**

- [2018 Volunteer Recruiting Brief](#)
- [USNA Map to Robert Crown Sailing Center](#)
- [SECNAV 5512 Base Access Pass Registration Form](#)
- [How to complete the SECNAV 5512 Form](#)
- [Volunteer Service Agreement \(for non-military only\)](#)
- [Volunteer Questionnaire](#)

**REFERENCES**

- [Navy MKII Boat Information Book \(BIB\)](#)
- [DIVPRODEVINST 3120.7A Standard Operating Procedures \(SOP\)](#)
- [DIVPRODEVINST 3530.2 Navigation Standards](#)
- [2014 Experiential Leadership Guide](#)

**Available Online Resources:**

1. Boat Information Book (BIB)
2. Standard Operating Procedures (SOP)
3. Navigation Standards
4. Experiential Leadership Guide (ELG)

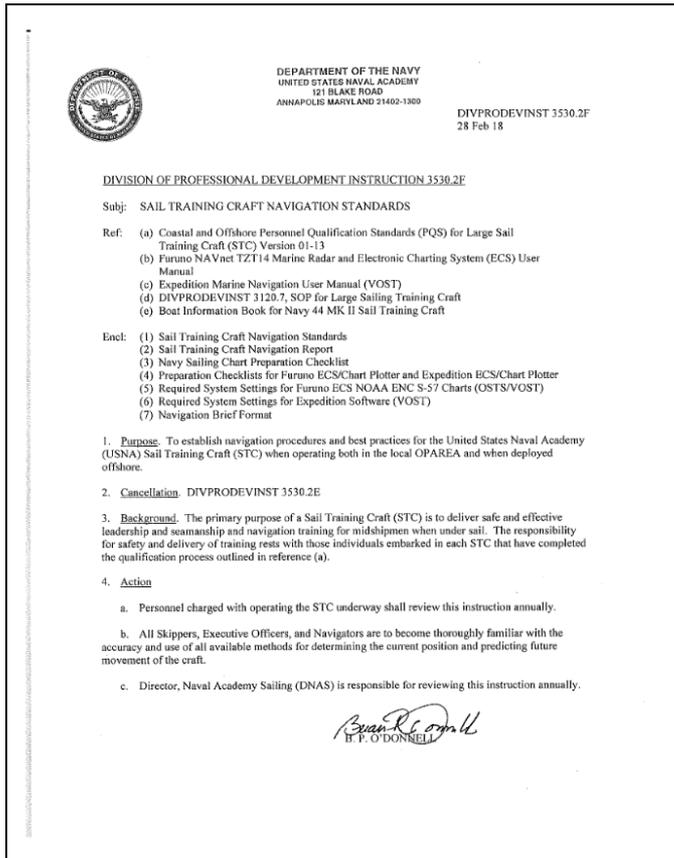
**(also available onboard in hard copy)**



# Navigation Standards Electronic Charting System (ECS)



USNA DIVPRODEVINST 3530.2F (<https://www.usna.edu/Sailing/osts/training.php>)



3. **Electronic Navigation.** Shall be the **primary method of navigation** when underway and operating with electronic charts. All personnel shall reference the installed ECS for position keeping and supplement it with other sources as appropriate. An **ECS must be considered a single aid to navigation** and should be **used with a corrected chart.**

4. **Position Log.** A record of positions and soundings from all fix sources used shall be maintained as an official record of each fix taken. Position, course and speed, charted depth, fix type and fathometer soundings will be recorded at a minimum. **The track option shall be enabled to record data via the Furuno system, the system recording limitations may require overwrite of some data.** The Voyage Data Recorder of the ECS (where available) will also be enabled and may be used as an official record while racing (VOST only).

5. **Fix Interval.** **Fixes shall be entered in the log from the ECS and used to generate a STC navigation report, enclosure (2).** Fixes should not exceed 9 minutes while within 2NM of shoal water, 15 minutes between 2-10NM, and 60 minutes while 20NM or greater from shoal water.

AREA	DISTANCE FROM LAND/SOAL WATER	FIX INTERVAL
Restricted Waters	Less than 2 NM	6-9 minutes or as conditions warrant*
Piloting Waters	Between 2-10 NM	6-15 minutes or as conditions warrant*
Coastal Waters	Between 10-20 NM	15-30 minutes or as conditions warrant*
Open Ocean	Greater Than 20 NM	30-60 minutes

\*The Skipper/XO shall determine or approve the fix interval with respect to other actions on deck, speed, distance to navigation hazards, and visibility.



# Navigation Standards

## Navigation Report



USNA DIVPRODEVINST 3530.2F (<https://www.usna.edu/Sailing/osts/training.php>)

A good Nav Plotter is continually talking to the helm and vice versa. You should regularly provide a formatted navigation report, but you can just talk about what is going on without stressing over the formality or structure of the report.

DIVPRODEVINST 3530.2F

### SAIL TRAINING CRAFT NAVIGATION REPORT

Notes for Navigation Reports:

1. Relative bearing is the following: 270 would be port beam on current heading
2. .1 nm = 200 yards
3. Reference nautical miles unless inside 200 yards.
4. Hazards: shoal water, unlit buoy, navaid, non-AIS traffic, AIS traffic, bridge, etc.

*Last GPS fix verified good by fathometer, expected depth is \_\_\_\_\_ feet.*

**Or**

*Good/Poor, Visual/Radar fix, expected depth is \_\_\_\_\_ feet.*

Safe on this course for \_\_\_\_\_ nautical miles and \_\_\_\_\_ minutes at current speed of \_\_\_\_\_ knots.

**OR**

Recommend course change to heading \_\_\_\_\_ degrees. Safe water is to port/starboard.  
(Recommend a tack or gybe as needed).

Closest hazard is \_\_\_\_\_, relative at bearing \_\_\_\_\_, range \_\_\_\_\_ nautical miles or \_\_\_\_\_ minutes at current speed.

Closest AIS contact is relative bearing \_\_\_\_\_, range \_\_\_\_\_ nautical miles. Closest Point of Approach (CPA) on current course will be \_\_\_\_\_ nautical miles.

AIS contacts within a 10 mile range that have a CPA of 2nm or less are at relative bearing \_\_\_\_\_, range \_\_\_\_\_ nautical miles, Time to CPA (TCPA) is \_\_\_\_\_.

Next recommended course change is in \_\_\_\_\_ minutes.



# Navigation Standards

## Securing Paper Plotting



USNA DIVPRODEVINST 3530.2F (<https://www.usna.edu/Sailing/osts/training.php>)

- ✓ Furuno is primary method of navigation
- ✓ GPS is primary fix source for all waters
- ✓ Skippers *may* adjust or relax paper plotting

6. **Paper Charts.** While the ECS will be the primary navigation plot, manual plotting on paper charts shall be the secondary navigation plot. As a result, paper charts shall be prepared and maintained to be ready for their immediate use in the event of loss of the ECS. Additionally, even while maintaining ECS as the primary plot, manual paper plotting will increase situational awareness. While using paper charts, GPS shall still be used as the primary fix source in all waters. Visual and/or radar fixes may be used at the discretion of the skipper. Fix intervals for paper plotting shall be in accordance with the table in paragraph 6. Skippers may adjust or relax the paper plotting requirement in restricted and piloting waters if the plotting activity is hindering situational awareness.

- ✓ Once in the pre-briefed training area, navigation log keeping *may* be stood down

### 7. Navigation Instruction Exceptions

a. **OSTS and VOST Local area training/racing.** During local area training/racing, navigation log keeping may be stood down once the craft has arrived in the pre-briefed training or racing area.

- ✓ Make an entry in the Deck Log when navigation is stood down and again when it is resumed

(2) An entry shall be made in the Deck Log when navigation is stood down and again when resumed.



# Navigation Standards Preparation Checklist



USNA DIVPRODEVINST 3530.2F Encl (4) (<https://www.usna.edu/Sailing/osts/training.php>)

The Navigation Standards contains a preparation checklist for the Furuno Electronic Charting System (ECS):

**The Navigator is responsible for the configuration of the ECS**  
**The XO or CO shall verify...**

## PREPARATION CHECKLIST FOR FURUNO ECS/CHART PLOTTER

Date: \_\_\_\_\_

The Navigator shall review the following has been completed prior to getting underway and the XO or CO shall verify them.

- ✓ Voyage plans are loaded
- ✓ Routes and points are accurate
- ✓ Setup Furuno according to Nav Std
- ✓ Check operation of RADAR
- ✓ "Nearest NAVAID is visible"

Action	Reviewed	Verified
1. Ensure the required voyage plans are loaded and that tracks and waypoints are accurate. (OSTS Only)	NAV	XO
2. Configure the Display Systems Settings in accordance with enclosure (5). Refer to reference (b).	NAV	XO
3. Check operation of radar.	NAV	XO
4. Set display range so nearest NAVAID is visible.	NAV	XO



# Navigation Standards ECS (Furuno) Configuration



USNA DIVPRODEVINST 3530.2 (<https://www.usna.edu/Sailing/osts/training.php>)

The mandatory setup of the Furuno is documented at the end of the Navigation Standards:

**The NAV and ANAV should be able to ensure the correct ECS setup**

DIVPRODEVINST 3530.2F

REQUIRED SYSTEM SETTINGS FOR FURUNO ECS NOAA ENC S-57 CHARTS (OSTS/VOST)

The default settings shall be verified, or changed as specified below, per reference (b).  
Press the Home key, and select "MENU":

**General**

- Reset Default Settings
- Change Function Gesture to "MOB"
- Change RotoKey to "Full"
- Change "Allow Remote Control" to "View Only"
- Set Local Time Offset to UTC -4
- Change "Auto Scroll" to "ON"
- Change "Key Beep" On/Off per preference

**Ship and Track**

- Reset Default Settings
- Change "Track Intervals" to "5'00" (5 minutes)
- Track may be hidden, but do not activate "Delete Track"

**Routes**

- Reset Default Settings
- No changes

**Points**

- Reset Default Settings
- No changes

**Plotter Display**

- Reset Default Settings
- Change "Day/Night Mode" as needed
- Ensure "Chart Priority in Auto Mode" is "Raster"

**Vector Chart**

- Reset Default Settings
- Change "Shallow" to 9'
- Change "Safety" to 12'
- Change "Deep" to 18'
- Change "Display Soundings in Red Shallower than" to 12'
- Change "Light Description" to "ON"

**S-52 Display**

- Reset Default Settings

1 Enclosure (6)

DIVPRODEVINST 3530.2F

- Change "Radar" to ON
- Change "Fishing Facilities" to OFF
- Change "Harbor Facilities" to OFF
- Change "Services and Small Craft Facilities" to OFF

**Weather**

- Reset Default Settings
- No changes

**Radar**

- Reset Default Settings
  - NOTE: DO NOT reset "Factory Settings"
- Change "Antenna Longitudinal Position" to 42'
- Change "Antenna Latitudinal Position" to 2'

**Targets**

- Reset Default Settings
- Change "CPA/TCPA Alarm" to ON
- NOTE: CPA Alarm will sound in Santee Basin, turn CPA/TCPA Alarm "ON" when you reach Greenbury Point.

**Alarm**

- Reset Default Settings
- Change "Depth Alarm" to ON
- Change "Depth Value" to 12' for VOST N44, 18' for OSTs N44 and VOST boats with draft over 8'
- Set "Anchor Watch Alarm" as needed

**Files**

- No changes

**Units**

- Reset Default Settings
- Change "Position Format" as needed to match chart, either deg.mm.sec or deg.mm.mm

**Camera**

- N/A

**Initial Setup. Verify the following**

- Boat Length = 44'
- Longitudinal GPS = 42'
- Latitudinal GPS = 2'
- Boat Icon = Sail
- Depth Transducer = 3.3'

2

DIVPRODEVINST 3530.2F

- Keel = 7.6'
- Average Boat Speed = Sailing
- Nav Data Max = Shallow
- Charts Master Device = ON
- WAAS = ON
- PGN = Open and ensure the following items are turned "ON"
  - Cross Track Error
  - Navigation Data
  - Navigation - Route/Waypoint Information

**AIS/ARPA Target Display**

- From the chart plotter or radar display:
  - Using RotoKey menu, choose Targets
  - Select AIS/DSC (check mark) to show AIS targets
  - NOTE: Dangerous AIS targets are shown as a red triangle icon, and have a CPA/TCPA less than the alarm value.
- When using radar, use the RotoKey menu, Targets, and ensure ARPA has a checkmark for ON.

**Brooks & Gatehouse (B&G) Instruments**

- Press "Menu" twice to access "Settings"
- Use down arrow to scroll to "Calibration"
- Select "Depth" from the right side menu
- Verify (or change) "Depth Offset" = 3.3'
- Press "Enter" key to confirm
- Press Pages to exit Settings

- Press "Menu" twice to access "Settings"
- Use down arrow to scroll to "Alarms"
- Verify (or change) "Alarms Enabled" is check-marked "NO"

**The STC Navigation Standard allows you to keep the AIS Alarm OFF when in Santee Basin**

**Don't Forget To Turn It ON when you reach Greenbury Point (or before)**



# Navigation Standards (Furuno MFD Settings)



Basic Process for Setting up Furuno:

1. Reset to Default Settings
2. Customize per Navigation Standard

For example, the AIS:

AIS Contacts that are greater than 12nm away are not displayed

The AIS will not alarm for contacts going slower than 1.0 knots

Don't forget to turn this on after leaving Santee Basin

CPA/TCPA Alarm:  
CPA < 0.5nm and TCPA < 10 min

Setting	Value
Display Target IDs	ON OFF
Hide AIS Targets Farther than...	12.00 NM
Ignore Alarms for AIS Slower than...	1.0 kn
CPA Graphic Display	ON OFF
CPA/TCPA Alarm	ON OFF
CPA Alarm Value	0.500 NM
TCPA Alarm Value	00:10:00
Proximity AIS Target Alarm	ON OFF
Proximity AIS Target Alarm Value	100 yd
Buddies List (AIS & DSC)	Select
Reset Default Settings	Reset



# **MAN OVERBOARD (MOB) / CREW OVERBOARD (COB)**



# Man Over Board (MOB)

## MOB Activation on Furuno



### 1. Initiate Man Overboard Function (Two methods):

#### a. Two Finger Tap

- This option is set in Settings, Function Gesture (see REQUIRED settings for Furuno in the Navigation Standards)
- Works from Chart Plotter or RADAR screens
- Area around boat icon is zoomed in, 1.25 nm for chart plotter, 0.5 nm for RADAR
- MOB mark is entered and flashes
- A yellow course line runs between the MOB position and your ship

**Do this immediately! Why?**

#### b. MOB Icon

- Push home button to display menu on left side of screen.
- Tap icon to save MOB position

### 2. Go to MOB

**Point navigation *should* happen automatically (without human action needed)**

## Deleting a MOB mark

### 1. Cancel the navigation first

1. Select the active MOB mark
2. Select "Stop Nav"

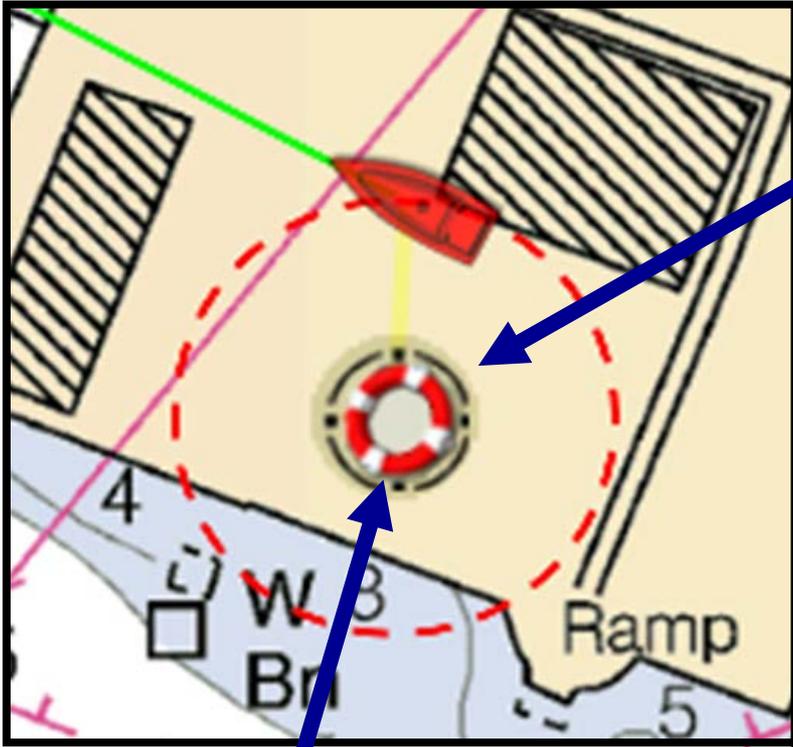
### 2. Then select the MOB mark again and select "Delete"



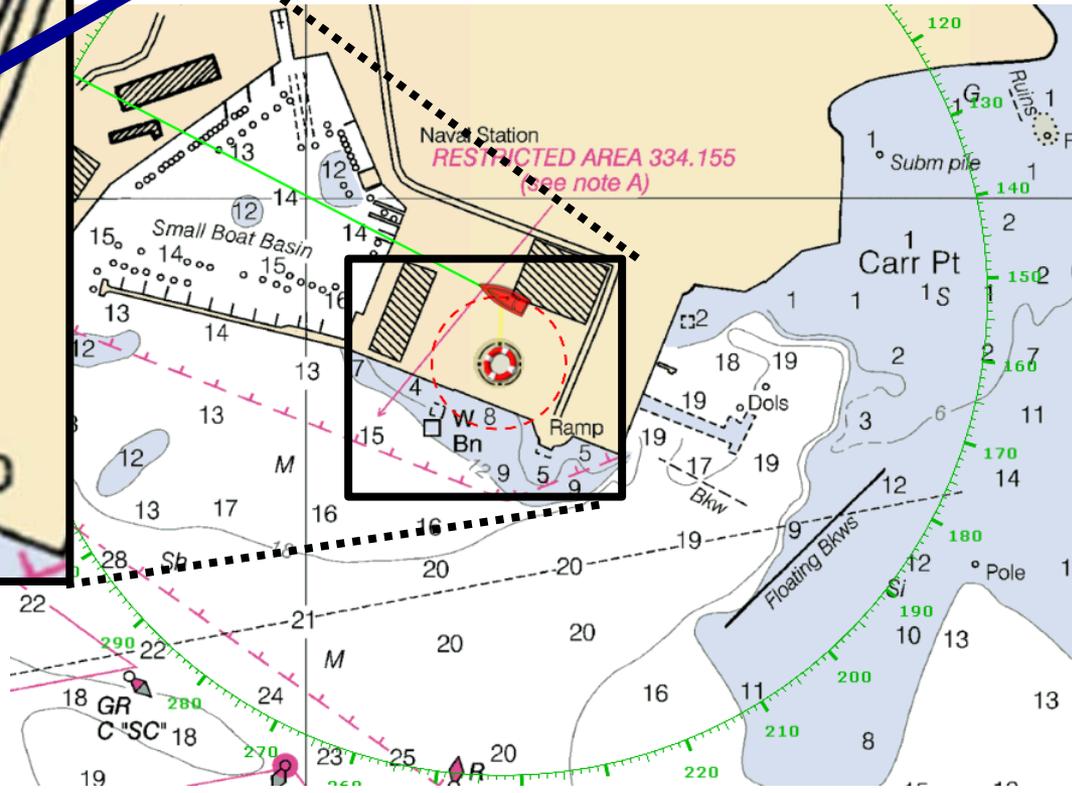
# Man Over Board (MOB) Furuno Display



Furuno automatically navigates to the MOB as a point



Man Overboard Icon





# AIS Operations With MOB1 Personal Locator Beacons (PLB)



<http://oceansignal.com/products/mob1/>



- Ocean Signal MOB1 AIS and DSC PLB
  - ≈ 5 nautical mile range
  - Sends AIS transmissions to all AIS receivers with the GPS-determined position of the crew overboard
    - First alert within 15 seconds
  - Activates DSC alarm on N44s VHF radio when PLB is [programmed](#) with the STC's MMSI number
    - The host STC's MMSI can be reprogrammed multiple times if the DSC PLB is used on a different N44
    - Compatible with VHF radio on N44s (ICOM M506)
    - DSC transmissions can be tested up to two times per year
  - Intended to be installed *within* the personal floatation device (PFD)
    - Activates automatically on inflation, sending the first alert within 15 seconds
    - Waterproof to 10 meters
  - With integrated strobe light
  - 7 year battery life and 24+ hours operational life
  - Three periodic tests:
    - Functional and battery test (once a month)
    - DSC test transmission (no more than two times per year)
    - AIS test transmission (no more than three times per year)





# AIS Operations With MOB1 Personal Locator Beacons (PLB)

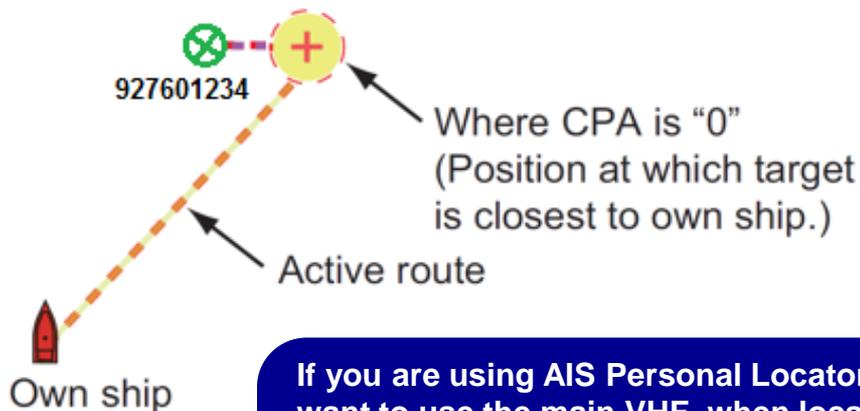


<http://oceansignal.com/products/mob1/>

- PLB MMSI number begins with “97260xxxx”
- Furuno AIS-MOB Symbol (Green): 
- Either manually navigate or use Furuno “Intercept” function to rendezvous with crew overboard



On-Going Intercept	
MMSI	927601234
Pos	N 25°01.634' W 79°48.081'
GTS	222.6 °M
TTG	3' 29s
SOG	5.6 kn
Reliability	Good
<b>Stop Intercept</b>	



If you are using AIS Personal Locator Beacons (PLBs), you don't want to use the main VHF when locating a crew overboard

Since the VHF antenna is shared between the AIS and the VHF radio, you may inhibit reception of the PLB transmissions – use the handheld VHF if you can



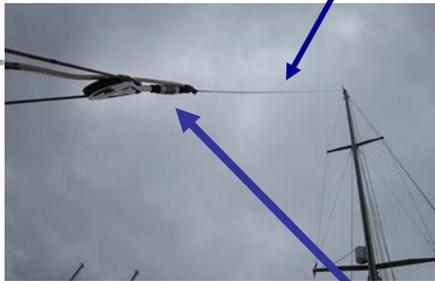
# **HF COMMUNICATIONS, NAVTEX MESSAGING AND WEATHER FACSIMILE**



# HF SSB, NAVTEX & Weather FAX



The backstay is the HF Antenna (with insulators)



In-Line Insulator

Furuno FAX-30 Facsimile Receiver



Ethernet Network (10 Base-T TCP/IP)

ADAM-6520I 5-Port Ethernet Switch



Diawa CS-201 Coaxial Switch



**Notes:**

The ICOM IC-M802 HF SSB Transceivers shown below are two views of the same physical unit (front and back). The front and back terminology is used by the manufacturer. For the Navy N44's, the transceiver is mounted vertically with the front on top (accessible via a hatch outboard of the lower port bunk) and the back on the bottom (and relatively inaccessible). The RS232 cable for the laptop is installed but not connected to the transceiver.

ICOM IC-M802 HF SSB Control Unit



ICOM SP-24 External Speaker



ICOM HM-135 Microphone



ICOM IC-M802 SSB Transceiver (Back)



ICOM IC-M802 SSB Transceiver (Front)



RS232 (Optional Laptop)

NMEA 0183 Serial (v3.01)

GPS Input (NMEA 0183 v3.01)

Ground

Ground



# **HIGH FREQUENCY (HF) SINGLE SIDE BAND (SSB) RADIO**



# High Frequency (HF) Single Side Band Radio (SSB)



# High Frequency (HF) Single Side Band Radio (SSB)



- HF-SSB radio used for long-distance comms, long-distance distress calls and weather
  - Also useful as short range squadron backup comms (using ground waves) in event of VHF failure.
- Equipped with:
  - Antenna is the backstay, insulated on top and bottom to prevent personnel shock
  - Switch in navigation station to go from SSB to Weather Fax/NAVTEX
    - You cannot use both systems simultaneously
  - HF automatic antenna tuner
  - DSC transmitter





# HF Voice Weather Broadcast



[https://vos.noaa.gov/docs/marine\\_info\\_guide.pdf](https://vos.noaa.gov/docs/marine_info_guide.pdf)

VOBRA (High Frequency Voice Broadcast) marine forecast transmitted by the United States Coast Guard provides mariners with a general overview of large scale environmental marine conditions for the next 5 days. The synopsis has a brief description of significant weather features and forecast over the offshore waters through the forecast period. Emphasis is placed on the forecast movement of low pressure, high pressure, fronts, and tropical systems.

It covers a smaller area and contains more detailed information than the High Seas Forecast.

The forecast includes expected winds, seas, reduced visibility, and any precipitation. Emphasis in the forecast is for systems with maximum sustained winds (over a ten minute period) in excess of 34 Kts and areas with reduced visibility of less than 1 NM. A warning is issued when wind conditions are expected to exceed 34 kts within a 24 hour period.

The VOBRA is issued every 6 hours for the Western North Atlantic and Eastern North Pacific Oceans. It may be issued sooner when current or expected conditions differ significantly from the forecast. HF voice broadcasts may be terminated if longer than the available broadcast period. This will most likely occur during the hurricane season when supplementary advisories are broadcast in addition to the routine forecasts.

Chesapeake (NMN) HF Voice Broadcast Schedule						
4426, 6501, 8764 kHz (USB)	0330Z <sup>1</sup>	0515Z <sup>2</sup>	0930Z <sup>1</sup>			
6501, 8764, 13089 kHz (USB)			1115Z <sup>2</sup>	1530Z <sup>1</sup>	2130Z <sup>1</sup>	2315Z <sup>2</sup>
8764, 13089, 17314 kHz (USB)				1715Z <sup>2</sup>		
<sup>1</sup> Offshore Forecasts, hurricane information <sup>2</sup> Highseas Forecast, hurricane information Broadcast of hurricane and other weather broadcasts from this station may on occasion be preempted, as the frequencies are shared with other USCG stations.						



# **NAVTEX MESSAGING AND WEATHER FACSIMILE**



# NAVTEX and Weather FAX



- Paperless system that receives one FAX image or NAVTEX message at a time
- Shares the HF Antenna (the backstay) with the HF SSB Radio
- Three receiving modes are available:
  1. Facsimile Only
  2. NAVTEX Only
  3. Facsimile (Timer) and NAVTEX
- Can preview image, manually start or stop receiving image, fine tune RX frequency
- An image can be locked to prevent deletion
- FA-30 FAX needs time (ZDA) and GPS position (GGA or GLL) from Ethernet navigation network (NAVNET) to work

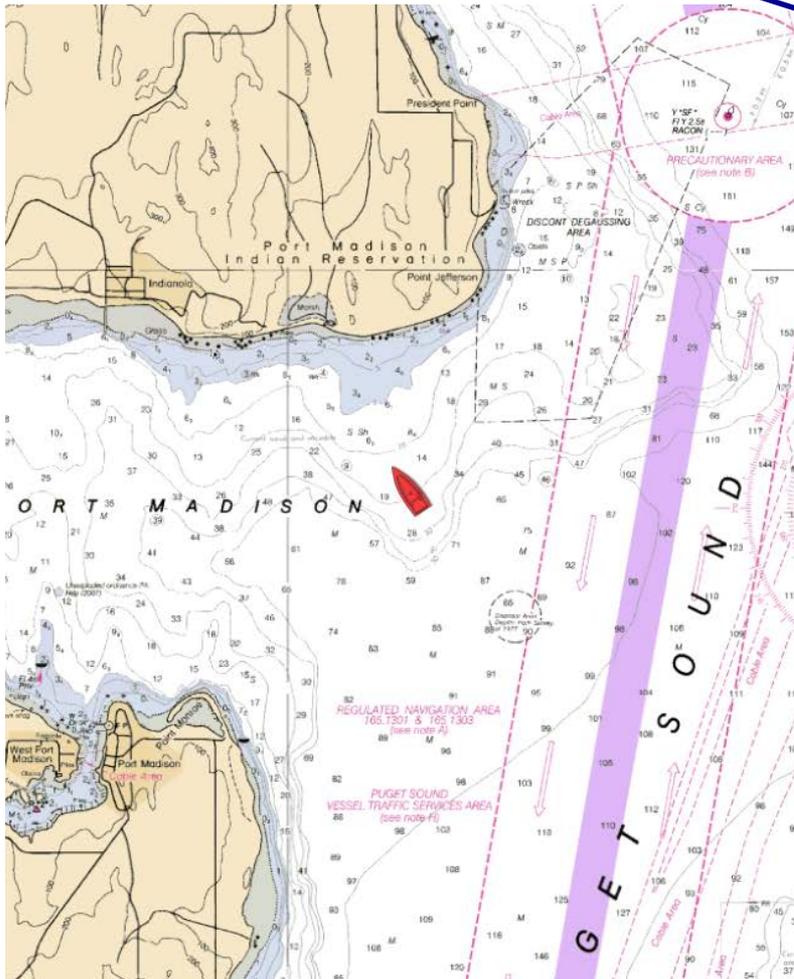
**The Weather Receiver is a stand-alone system and the HF Radio does not have to be powered-on to get weather information**



# Furuno FAX-30 Weather Fax Operations



Home, Menu, Initial Setup  
FAX-30 Browser



**Menu Initial Setup** Close

**Browser Installation**

- FAX-30 Browser FAX-30
- FA-30 Browser FA-30
- FA-50 Browser FA-50

Charts Master Device ON OFF

System ID *N4 DCC0 5A95 F92A F3D9 90*

IP Address **172.31.252.1**

Serviceman Launch

Event/Buzzer Port Configuration **Event Input** ▼

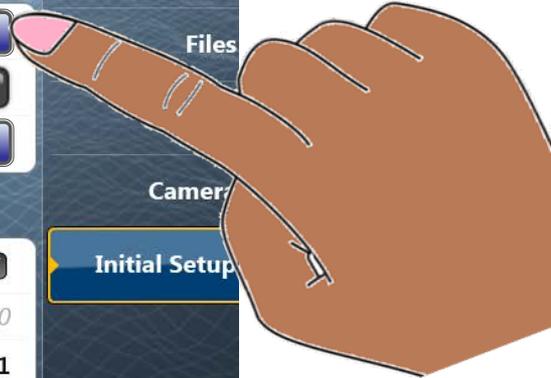
Event Input Configuration **Off** ▼

Update Network Equipment Launch

External Touch Screen Mode ON OFF

Show Home Button ON OFF

Reset Default Settings Reset





# Furuno FAX-30 Weather Fax Operations



**FACSIMILE RECEIVER  
FAX-30**

WX FAX  
NAVTEX

LOGOUT

*Marine Electronics*  
**FURUNO**



# NAVTEX MESSAGING



# NAVTEX Messaging



<https://www.navcen.uscg.gov/?pageName=NAVTEX>

<http://www.nws.noaa.gov/om/marine/navtex.htm>

## NAVTEX in the United States

- NAVTEX is an international automated medium frequency (518 kHz) service for delivery of navigational and meteorological warnings and forecasts, as well as urgent marine safety information to ships
  - NAVTEX stations in the U.S. are operated by the U.S. Coast Guard
  - The International Maritime Organization has designated NAVTEX as the primary means for transmitting coastal urgent marine safety information to ships worldwide

## NAVTEX Message Selection

Every NAVTEX message is preceded by a four character header **B(1) B(2) B(3) B(4)**:

**B(1)** is an alpha character identifying the **station**

**B(2)** is an alpha character used to identify the **subject of the message**.  
Receivers use these characters to reject messages from stations or concerning subjects of no interest to the user.

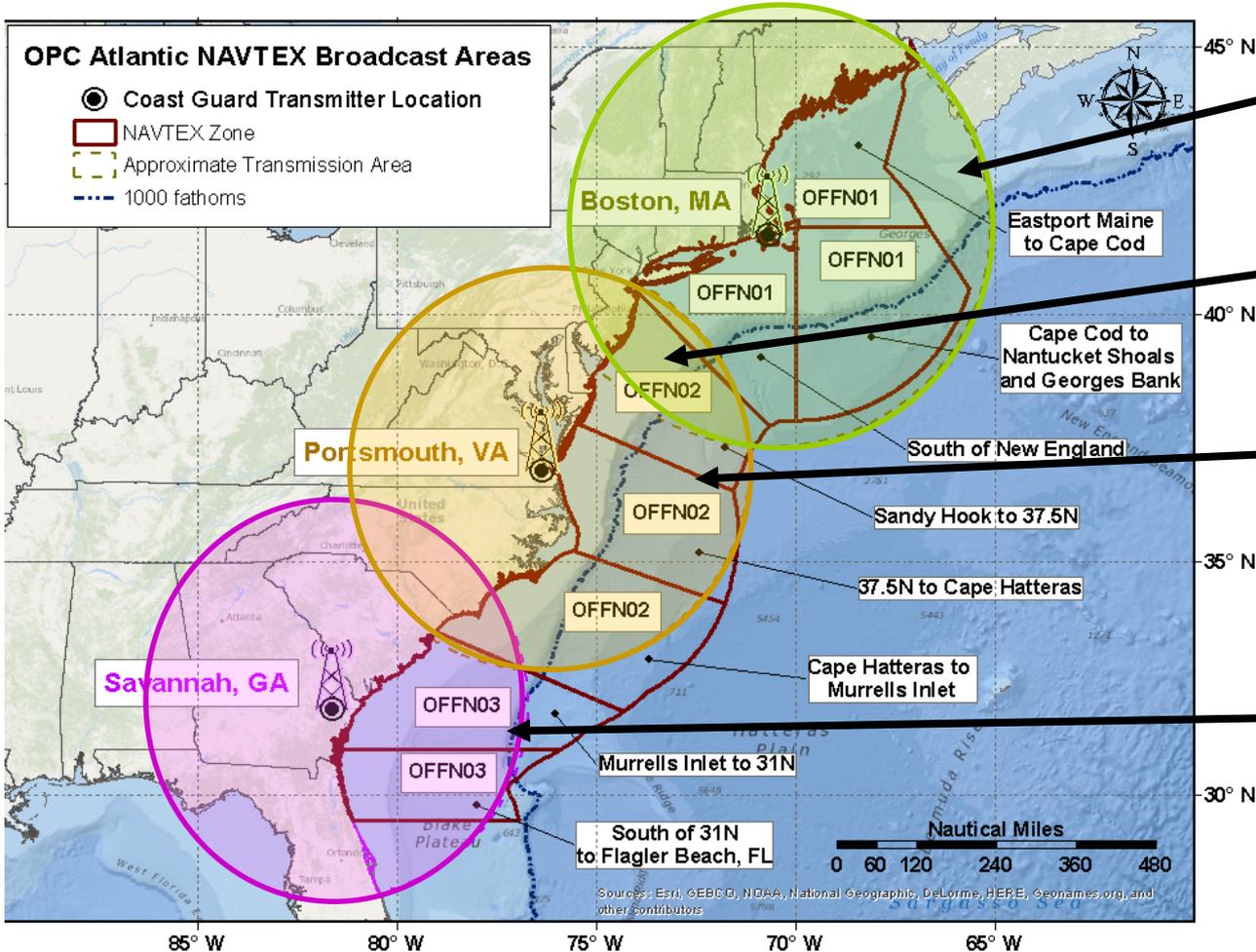
**B(3) & B(4)** are two-digit numerics **identifying individual messages**, used by receivers to keep already received messages from being repeated.



# NAVTEX Offshore Forecast and Station Identification



[https://para.ocean.weather.gov/offshore/atl\\_navtex.png](https://para.ocean.weather.gov/offshore/atl_navtex.png)



**BOSTON, MA**  
(Station ID = F)

**Rule of Thumb: The common “cross over” area is off the coast of New Jersey**

**PORTSMOUTH, VA**  
(Station ID = N)

**SAVANNAH, GA\***  
(Station ID = E)

\*SOMETIMES IDENTIFIED AS “CHARLESTON, SC”



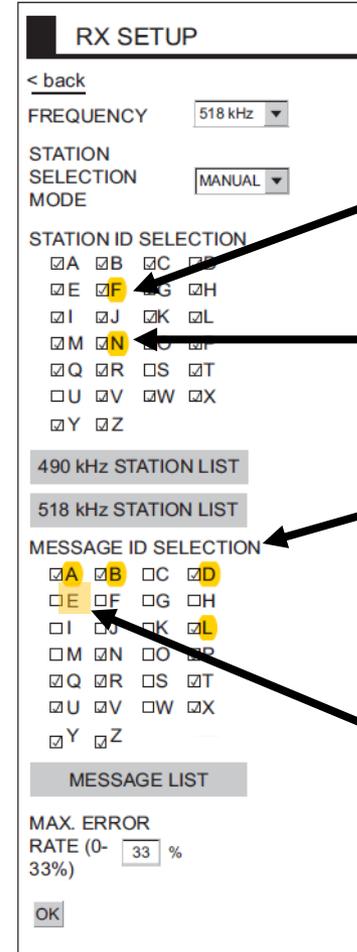
# NAVTEX Subject Identifiers



## NAVTEX B(2) Subject Identifiers:

- B = Meteorological Warning
- L = NAVAREA warnings
- A = Coastal Navigation Warning
- D = Search and Rescue Alert
- E = Meteorological Forecasts

Letter	Message Type	Notes
A	Coastal Navigational Warnings	Note 1
B	Meteorological Warnings	Note 1
C	Ice Reports	
D	Search And Rescue Information, Piracy And Armed Robbery Warnings, And Tsunamis And Other Natural Phenomena	Note 1
E	Meteorological Forecasts	
F	Pilot Service and VTS Messages	
G	AIS Service Messages (Formerly DECCA Messages)	
H	LORAN Messages	
I	Currently Not Used (Formerly OMEGA Messages)	
J	SATNAV Messages	
K	Other Electronic Navigational Aid System Messages	
L	Navigational Warnings — Additional To Letter A	Note 1
T	Test Transmission (UK Only)	
Z	No Messages On Hand	



BOSTON, MA (Station ID = F)

PORTSMOUTH, VA (Station ID = N)

Remember: "BLADE"

Don't forget "E"!

**Note 1:** A, B, D and L cannot be filtered out by SOLAS-compliant receivers





# NAVTEX Display on Furuno MFD



RX MODE

WX FAX

**NEXT PAGE** 1/2

1. FA86 SEP/30 13:07 518kHz
2. FB49 SEP/30 13:02 518kHz
3. FB32 SEP/30 12:58 518kHz
4. FA28 SEP/30 09:18 518kHz
5. FA17 SEP/30 09:17 518kHz
6. FA46 SEP/23 12:59 518kHz
7. FE39 SEP/23 12:49 518kHz

**MENU**

---

<< Top

RX SETUP

EDIT STATION LIST

SYSTEM SETUP

RX MODE

PREV
NEXT

**FA86 SEP/30 13:07 518kHz ERROR RATE=0.0%**

ZCZC FA86  
 BROADCAST UPON RECEIPT AND REGULAR SCHEDULED BROADCASTS. DGPS

BNM 381-17 ALL DGPS SITES  
 1. THE USCG NAVIGATION CENTER HAS LOST COMMUNICATIONS TO AND  
 THE ABILITY TO VERIFY SITE STATUS OF ALL 42 ERN US DGPS  
 SITES UFN.  
 2. DGPS SITES ARE DESIGNED TO OPERATE AUTONOMOUSLY FOR LONG  
 PERIODS OF TIME. ALL SITES MAY BE OPERATING NORMALLY.  
 3. USERS THAT EXPERIENCE DGPS ISSUES ARE REQUESTED TO CONTACT  
 NAVCEN AT 703-313-5902.

NNNN

MFD = Multi-Function Display (The Furuno TZT14)



# NAVTEX Broadcast Schedule



<http://www.nws.noaa.gov/om/marine/navtex.htm>

Station	Identifier	WX Broadcast Schedule (UTC)
Adak	X	(Broadcast no longer available)
Kodiak <sup>1</sup>	J	0130, 0530, 0930 <sup>2</sup> , 1330, 1730, 2130 <sup>2</sup>
	X	0350, 0750, 1150 <sup>2</sup> , 1550, 1950, 2350 <sup>2</sup>
Astoria	W	0340 <sup>2</sup> , 0740, 1140, 1540 <sup>2</sup> , 1940, 2340
San Francisco	C	0020, 0420 <sup>2</sup> , 0820, 1220, 1620 <sup>2</sup> , 2020
Cambria	Q	0240 <sup>2</sup> , 0640, 1040, 1440 <sup>2</sup> , 1840, 2240
Marianas	V	0330, 0730, 1130, 1530, 1930, 2330
Honolulu	O	0220, 0620, 1020 <sup>2</sup> , 1420, 1820, 2220 <sup>2</sup>
Boston	F	0050, 0450, 0850 <sup>2</sup> , 1250, 1650, 2050 <sup>2</sup>
Portsmouth	N	0210 <sup>2</sup> , 0610, 1010, 1410 <sup>2</sup> , 1810, 2210
Charleston	E	0040, 0440, 0840 <sup>2</sup> , 1240, 1640, 2040 <sup>2</sup>
Miami	A	0000, 0400, 0800 <sup>2</sup> , 1200, 1600, 2000 <sup>2</sup>
San Juan	R	0250 <sup>2</sup> , 0650, 1050, 1450 <sup>2</sup> , 1850, 2250
New Orleans	G	0100, 0500, 0900 <sup>2</sup> , 1300, 1700, 2100 <sup>2</sup>

1. Kodiak also broadcasts weather forecasts during time slots initially allocated to Adak.

2. Routine weather forecasts are broadcast four times per day with these being the normal times when repeats of Notices to Mariners are broadcast in lieu of weather. Weather warnings may be broadcast at any time.

The U.S. Coast Guard may on occasion have to defer or shorten the broadcast of a scheduled weather forecast via NAVTEX to ensure delivery of more urgent navigational and safety warnings.

NAVTEX receivers must be programmed with proper NAVTEX station and subject identifiers in order to receive weather broadcasts.

U.S. NAVTEX broadcasts of weather forecasts containing a warning or a Dense Fog Advisory will be broadcast with a Subject Indicator of "B" vs. "E", such that receipt cannot be suppressed on the user's equipment. Mariners are encouraged to include subject indicator "E" in programming their NAVTEX in order to receive routine weather forecasts as well as weather warnings via NAVTEX.

- Routine weather forecasts are broadcast four times per day
  - Boston (F) = 50 minutes past the hour
  - Portsmouth (N) = 10 minutes past the hour
  - Charleston (E) = 40 minutes past the hour
- Two additional time slots<sup>2</sup> are the when repeats of Notices to Mariners are broadcast in lieu of weather.
- Weather warnings may be broadcast at any time

**FIFO (First In – First Out):** The FAX-30 holds 130 NAVTEX messages. When the NAVTEX message storage capacity is exceeded, the oldest NAVTEX message is automatically deleted to make room for the latest.



# WEATHER FACSIMILE (FAX)



# Weather Fax Operation



Furuno FAX-30 Operators Manual

- Facsimile images take 30-40 minutes to receive depending on the size of the image and rotation speed of the drum at the facsimile transmitter
  - Received line by line
  - When the FAX-30 receives the start signal from the facsimile station it automatically adjusts itself to match speed, IOC (Index of Cooperation) and phase of the station's transmitter
- Timer receiving mode will allow "hands-off" automatic operation.
  - 30 timer programs may be set
  - The data sentence ZDA must be output through the Furuno Ethernet network for the timer to function



# Weather Fax on Furuno MFD



TIMER	07:30-23:59
51°N NMF	___ _ kHz

**MENU**

<< Top

- CHANNEL SETUP
- TIMER SETUP
- EDIT STATION LIST
- SYSTEM SETUP
- RX MODE

<< THUMBNAILS

ZOOM OUT

51°N NMF 4235.0kHz IOC576 120rpm OCT/22 12:04

24-HOUR SURFACE FORECAST  
ISSUED: 09:19 UTC 22 OCT 2017  
VALID: 00:00 UTC 23 OCT 2017

The weather fax map displays a 24-hour surface forecast for the North Atlantic region. It includes a grid of latitude and longitude lines, with various weather symbols such as clouds, rain, and wind vectors. Key data points include pressure readings (e.g., 1014, 1012, 1008, 1004, 1000, 996, 992, 988, 984, 980, 976, 972, 968, 964, 960, 956, 952, 948, 944, 940, 936, 932, 928, 924, 920, 916, 912, 908, 904, 900, 896, 892, 888, 884, 880, 876, 872, 868, 864, 860, 856, 852, 848, 844, 840, 836, 832, 828, 824, 820, 816, 812, 808, 804, 800, 796, 792, 788, 784, 780, 776, 772, 768, 764, 760, 756, 752, 748, 744, 740, 736, 732, 728, 724, 720, 716, 712, 708, 704, 700, 696, 692, 688, 684, 680, 676, 672, 668, 664, 660, 656, 652, 648, 644, 640, 636, 632, 628, 624, 620, 616, 612, 608, 604, 600, 596, 592, 588, 584, 580, 576, 572, 568, 564, 560, 556, 552, 548, 544, 540, 536, 532, 528, 524, 520, 516, 512, 508, 504, 500, 496, 492, 488, 484, 480, 476, 472, 468, 464, 460, 456, 452, 448, 444, 440, 436, 432, 428, 424, 420, 416, 412, 408, 404, 400, 396, 392, 388, 384, 380, 376, 372, 368, 364, 360, 356, 352, 348, 344, 340, 336, 332, 328, 324, 320, 316, 312, 308, 304, 300, 296, 292, 288, 284, 280, 276, 272, 268, 264, 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# Weather Fax Schedule



## BOSTON, MASSACHUSETTS, U.S.A.

<http://www.nws.noaa.gov/os/marine/rfax.pdf>

CALL SIGN	FREQUENCIES	TIMES	EMISSION	POWER
NMF	4235 KHz	0230Z-1039Z	J3C	4 kW
	6340.5 KHz	ALL BROADCAST TIMES	J3C	4 kW
	9110 KHz	ALL BROADCAST TIMES	J3C	4 kW
	12750 KHz	1400Z-2239Z	J3C	4 kW

TRANS TIME	CONTENTS OF TRANSMISSION	RPM/IOC	VALID MAP TIME AREA
0230/1400	TEST PATTERN	120/576	
0233/----	PRELIMINARY SURFACE ANALYSIS	120/576	0000 1
0243/1405	BROADCAST SCHEDULE (PART 1)	120/576	
0254/1420	BROADCAST SCHEDULE (PART 2)	120/576	
0305/1433	REQUEST FOR COMMENTS	120/576	
----/1443	PRODUCT NOTICE BULLETIN	120/576	
----/1453	PRELIMINARY SURFACE ANALYSIS	120/576	1200 1
----/1503	SATELLITE IMAGE	120/576	1200 5
0315/1515	WIND/WAVE ANALYSIS	120/576	00/12 8
0325/1525	SURFACE ANALYSIS (PART 1 NE ATLANTIC)	120/576	00/12 2
0338/1538	SURFACE ANALYSIS (PART 2 NW ATLANTIC)	120/576	00/12 3
0351/----	SATELLITE IMAGE	120/576	0000 5
----/1600	ICE CHART (REBROADCAST)	120/576	2100
----/1720	TEST PATTERN	120/576	
0402/1723	(REBROADCAST OF 0325/1525 NE ATLANTIC)	120/576	00/12 2
0415/1736	(REBROADCAST OF 0338/1538 NW ATLANTIC)	120/576	00/12 3
0428/1749	500MB ANALYSIS	120/576	00/12 4
----/1759	SEA STATE ANALYSIS	120/576	1200 4
0438/----	ICE CHART (REBROADCAST)	120/576	2100
----/1810	24HR SURFACE FORECAST	120/576	1200 8
0452/1824	CYCLONE DANGER AREA* or HIGH WIND/WAVES	120/576	03/15 7
----/1835	24HR WIND/WAVE FORECAST	120/576	1200 8
----/1855	24HR 500MB FORECAST	120/576	1200 4
0745/----	TEST PATTERN	120/576	
0755/----	PRELIMINARY SURFACE ANALYSIS	120/576	0600 1
0805/----	24HR SURFACE FORECAST	120/576	0000 8
0815/----	24HR WIND/WAVE FORECAST	120/576	0000 8
0825/----	24HR 500MB FORECAST	120/576	0000 4
0835/1905	36HR 500MB FORECAST	120/576	00/12 4
----/1915	96HR SURFACE FORECAST	120/576	1200 4
----/1925	96HR WIND/WAVE FORECAST	120/576	1200 4
----/1935	96HR 500MB FORECAST	120/576	1200 4
----/1945	96HR WAVE PERIOD FORECAST	120/576	1200 4
0845/1955	48HR SURFACE FORECAST	120/576	00/12 4
0855/2005	48HR WIND/WAVE FORECAST	120/576	00/12 4
0905/2015	48HR 500MB FORECAST	120/576	00/12 4
0915/2025	48HR WAVE PERIOD FORECAST	120/576	00/12 4
----/2035	PRELIMINARY SURFACE ANALYSIS	120/576	1800 1
----/2045	72HR SURFACE FORECAST	120/576	1200 4
----/2055	72HR WIND/WAVE FORECAST	120/576	1200 4
----/2105	72HR 500MB FORECAST	120/576	1200 4
----/2115	72HR WAVE PERIOD FORECAST	120/576	1200 4
0925/2125	SURFACE ANALYSIS (PART 1 NE ATLANTIC)	120/576	06/19 2
0938/2138	SURFACE ANALYSIS (PART 2 NW ATLANTIC)	120/576	06/19 3
0951/2151	SATELLITE IMAGE	120/576	06/19 6
1002/2202	(REBROADCAST OF 0925/2125 NE ATLANTIC)	120/576	06/19 2
1015/2215	(REBROADCAST OF 0938/2138 NW ATLANTIC)	120/576	06/19 3
1028/2228	CYCLONE DANGER AREA* or HIGH WIND/WAVES	120/576	09/21 7
1039/2239	REBROADCAST/N American Ice Service Chart	120/576	21/21

IV-9

MAP AREAS	
1. 28N-52N, 45W-85W	2. 18N-65N, 10E-45W
3. 18N-65N, 40W-95W	4. 18N-65N, 10E-95W
5. 20N-55N, 55W-95W	6. EQ-60N, 40W-130W
7. 05N-60N, 0W-100W	8. 22N-51N, 40W-98W

NOTES: 1. CARRIER FREQUENCY IS 1.9 kHz BELOW THE ASSIGNED FREQUENCY

2. Schedule effective September 19, 2018, includes new 72 hour products

**Lower frequencies in the night (2130-0539)**  
**Middle frequencies all the time**  
**High frequencies in the daytime (0900-1739)**

Daytime = Sun is "High" = Higher Frequency  
 Nighttime = Sun is "Low" = Lower Frequency

The Furuno FA-30 allows 30 timer programs to be set



# Weather Fax Operation



Furuno TZT14 Manual, p 1-27

N44 Boat Information Book, page A-4

## Facsimile Receiver FAX-30

The FURUNO Facsimile Receiver FAX-30 installs in the TZT network and can be controlled from a TZT display. Below are the steps to start fax operation.

1. At the installation of this equipment, connect the FAX-30 to the TZT.
2. Select [Menu] on the menu icon bar to open the main menu.
3. Select the [Initial Setup] - [FAX30 Browser] menu.



4. Select [WX FAX] or [NAVTEX].

The Weather Fax does not require the HF SSB Radio to be energized, but if it is not the antenna tuner is powered off and not adjusting the antenna (the implications of that are empirically unknown)

## 2-1 FURUNO FAX-30 NAVTEX AND WEATHER FAX (WXFAX)

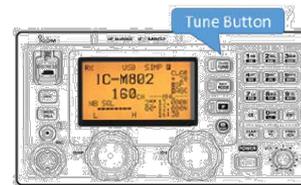
The FAX-30 has three modes: Facsimile only, NAVTEX only, and Facsimile (timer) & NAVTEX. Weather forecast maps can be downloaded via the WXFAX, and text forecasts from the National Weather Service can be downloaded via NAVTEX.

**CAUTION:** Do not transmit from the HF Radio while the FAX/SSB switch is in the FAX position.

- a. The Weather Facsimile transmission schedule for Boston can be found at: [http://www.nws.noaa.gov/om/marine/hfmarsh\\_links.htm](http://www.nws.noaa.gov/om/marine/hfmarsh_links.htm)
- b. The NAVTEX transmission schedule can be found at: <http://www.nws.noaa.gov/om/marine/navtex.htm>

### 2-1.1 ANTENNA TUNING

- a. The Furuno Weather receiver can operate without the ICOM HF SSB Radio energized, but the AT-140 antenna tuner will be de-energized and the backstay antenna probably not tuned to optimize the reception of the weather information. Better reception might be obtained by initially selecting the SSB position of the antenna switch and tuning the HF SSB Radio to the intended reception frequency (or a harmonic of it) and pressing the [THRU TUNE] button on the HF Radio control head. Ensure the antenna switch is set back to FAX prior to the intended broadcast.



- b. Setup the Furuno Weather receiver at least two minutes prior to the intended broadcast. This enables the receiver to synchronize with the transmitter prior to the actual transmission of the facsimile images.

### 2-1.2 WEATHER FAX OPERATIONS - AUTOMATIC

Automatic Weather Fax Receiving: Once you choose the facsimile station from which to receive, the system goes into standby mode to await the start signal from the facsimile station.

- a. Press the HOME button (upper right), then press [MENU], [Initial Setup] and [FAX-30].
- b. Press the [WX FAX] underlined text. Thumbnails of received images are shown.
- c. From Menu, press [CHANNEL SETUP].
- d. Choose [5 NORTHWEST ATLANTIC] from pulldown menu for Zone.
- e. Choose [1 NMF/BOSTON] from pulldown menu for Station.
- f. Choose [AUTO] from pulldown menu for Channel.
- g. Press keyboard icon (upper right) to enter [AUTO] kHz for Frequency (or other frequency).
- h. Press [OK] then [back].
- i. Press [RX MODE], chose WX FAX, press [OK], then press [back].
- j. Place the HF antenna selector switch to "WFAX" when ready to start receiving a WXFAX. When the HF antenna is selected to "WFAX", HF voice communications are not possible.
- k. The WX FAX will receive the next scheduled broadcast from the station selected. Facsimile images are received line by line, taking 30-40 minutes to receive depending on the size of the image and rotation speed of the drum at the facsimile transmitter.

If the RF Switch is kept in the SSB position, WX FAX and NAVTEXT reception is inhibited



Don't Transmit From the HF SSB Radio With the RF Switch in the FAX Position



# Communications Schedule For Mid-Atlantic Norfolk to Boston



<http://www.nws.noaa.gov/os/marine/rfax.pdf> and <http://www.nws.noaa.gov/om/marine/navtex.htm>

22 of the 30 (max) timer programs

Station	Station Identifier	Local Time Zone	Time (UTC)	Time (Local)	Broadcast Type	Content	FAX RPM/IOC	Forecast VALID TIME	Forecast Map Area
Portsmouth, VA	N	-5.0	0610	0110	NAVTEX	Routine Weather Forecast	N/A	N/A	
Boston, MA	NMF	EST (New York)	0805	0305	Weather FAX	24HR SURFACE FORECAST	120/576	0000	8
Boston, MA	NMF		0815	0315	Weather FAX	24HR WIND/WAVE FORECAST	120/576	0000	8
Boston, MA	NMF		0835	0335	Weather FAX	36HR 500 mb FORECAST	120/576	0000	4
Boston, MA	NMF		0845	0345	Weather FAX	48HR 500 mb FORECAST	120/576	0000	4
Boston, MA	NMF		0855	0355	Weather FAX	48HR SURFACE FORECAST	120/576	0000	4
Boston, MA	NMF		0905	0405	Weather FAX	48HR WIND/WAVE FORECAST	120/576	0000	4
Boston, MA	NMF		0915	0415	Weather FAX	48HR WAVE PERIOD FORECAST	120/576	0000	4
Boston, MA	NMF		0938	0438	Weather FAX	SURFACE ANALYSIS (PART 2 NW ATLANTIC)	120/576	0600	3
Portsmouth, VA	N		1010	0510	NAVTEX	Routine Weather Forecast	N/A	N/A	
Portsmouth, VA	N		1410	0910	NAVTEX	Notices to Mariners	N/A	N/A	
Boston, MA	NMF		1515	1015	Weather FAX	WIND/WAVE ANALYSIS	120/576	1200	8
Boston, MA	NMF		1538	1038	Weather FAX	SURFACE ANALYSIS (PART 2 NW ATLANTIC)	120/576	1200	3
Boston, MA	NMF		1749	1249	Weather FAX	500 mb ANALYSIS	120/576	1200	4
Portsmouth, VA	N		1810	1310	NAVTEX	Routine Weather Forecast	N/A	N/A	
Boston, MA	NMF		1905	1405	Weather FAX	24HR SURFACE FORECAST	120/576	1200	8
Boston, MA	NMF		1915	1415	Weather FAX	24HR WIND/WAVE FORECAST	120/576	1200	8
Boston, MA	NMF		1935	1435	Weather FAX	36HR 500 mb FORECAST	120/576	1200	4
Boston, MA	NMF		1945	1445	Weather FAX	48HR 500 mb FORECAST	120/576	1200	4
Boston, MA	NMF		1955	1455	Weather FAX	48HR SURFACE FORECAST	120/576	1200	4
Boston, MA	NMF		2005	1505	Weather FAX	48HR WIND/WAVE FORECAST	120/576	1200	4
Boston, MA	NMF		2015	1515	Weather FAX	48HR WAVE PERIOD FORECAST	120/576	1200	4
Boston, MA	NMF		2138	1638	Weather FAX	SURFACE ANALYSIS (PART 2 NW ATLANTIC)	120/576	1800	3
Portsmouth, VA	N		2210	1710	NAVTEX	Routine Weather Forecast	N/A	N/A	
Portsmouth, VA	N		0210	2110	NAVTEX	Notices to Mariners	N/A	N/A	
Boston, MA	NMF		0315	2215	Weather FAX	WIND/WAVE ANALYSIS	120/576	0000	8
Boston, MA	NMF		0338	2238	Weather FAX	SURFACE ANALYSIS (PART 2 NW ATLANTIC)	120/576	0000	3
Boston, MA	NMF		0428	2328	Weather FAX	500 mb ANALYSIS	120/576	0000	4



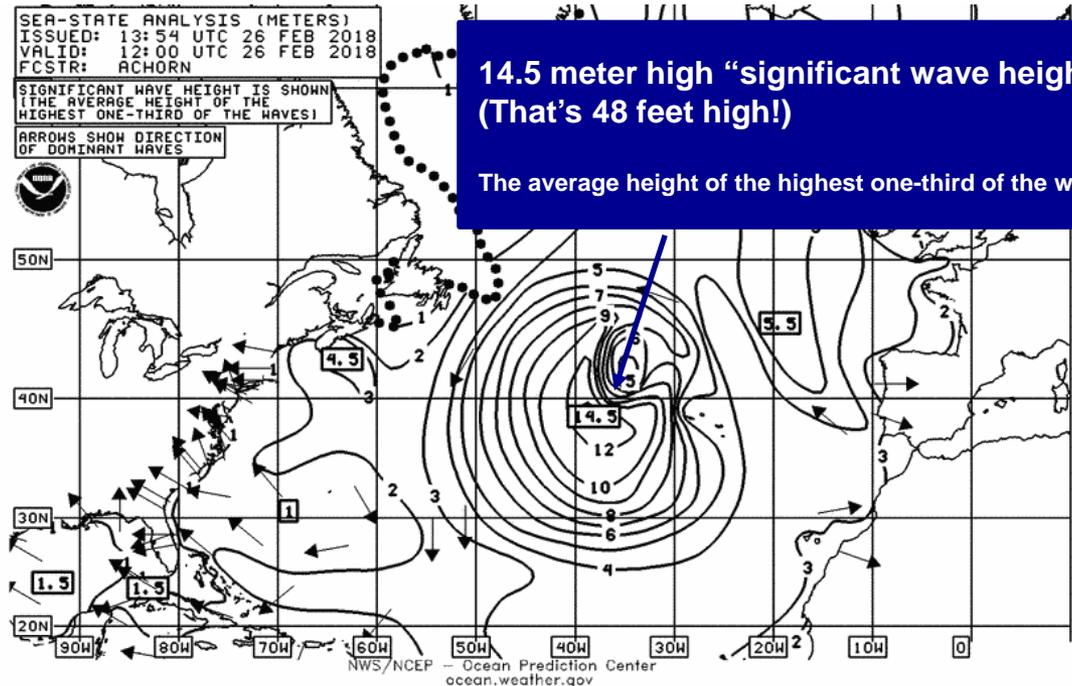
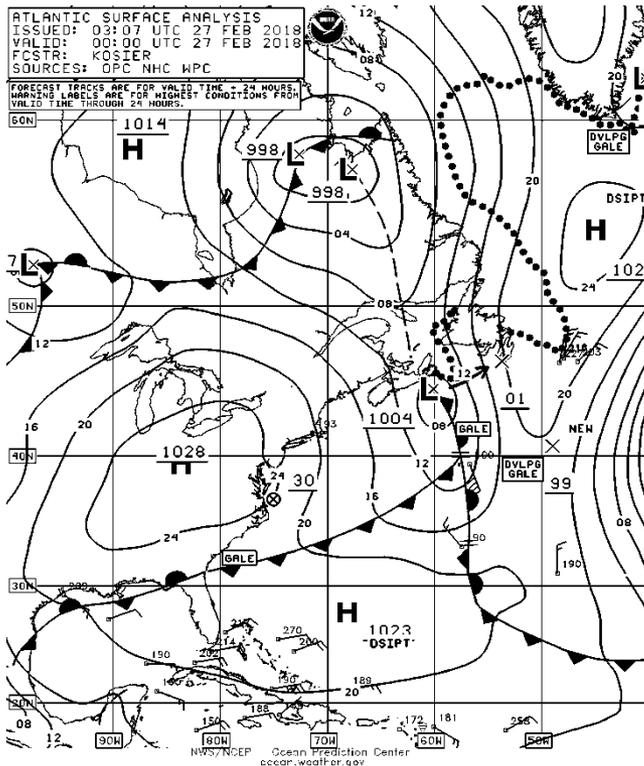
# Attend Safety At Sea Seminar For Weather Training



[https://vos.noaa.gov/docs/marine\\_info\\_guide.pdf](https://vos.noaa.gov/docs/marine_info_guide.pdf)

This is a great website for understanding the available weather products from the NOAA Offshore Prediction Center (OPC)

Training on weather is part of the Safety at Sea Seminar



14.5 meter high "significant wave height"  
(That's 48 feet high!)  
The average height of the highest one-third of the waves



# Lightning Strikes





# Lightning Strikes



Boat Information Book

The N 44 has an electrical ground bonding system installed for “cathodic protection” that connects all metallic parts of any mass.

- The boat’s mast, rigging, engine and electrical systems are grounded to the keel to facilitate passing the current from a strike to ground (Faraday Cage)
- The purpose of the bonding system is to provide a low resistance path for electrical connections between all underwater fittings, fuel fills, fuel tank tanks, and engine.
- This keeps all equipment at essentially the same electric potential (ground)
- This reduces the effects of galvanic corrosion and electrolysis. In addition, this vessel has an isolated lightning protection system where the chainplates, sea cocks and the mast are connected directly to the keel as required by ABYC boat building standards

**The way the STC is grounded does not completely ensure the electronics equipment is safe from possible damage. These precautions only reduce the probability.**



# Lightning Storm Preparations



## Standard Operating Procedures, DIVPRODEVINST 3120.7A

**d. LIGHTNING STRIKES.** When sailing in the vicinity of thunderstorm activity, take the following precautions to avoid or minimize damage from lightning strikes:

- 1) Track storm on radar or using personal hand-held devices, if within range, to try and avoid its direct path.
- 2) If avoidance is not possible, reduce sail early based on the forecast, reef and #3, storm sails or reef and take jib down and put down forward hatch if time allows.
- 3) Plot your position on the chart and commence dead reckoning. Check for sea-room to run with the storm on a beam reach or consider heaving to if there are no contacts nearby.
- 4) Radio your current position, speed and heading to OTC.
- 5) Turn "off" all electronic and unnecessary electric equipment at the equipment and turn "off" the breakers.
- 6) Place hand held VHF and hand held GPS in the stove, which acts as a Faraday cage in the event of a direct strike.
- 7) Put all non-essential crew below. Instruct them not to touch the mast or chainplate area. Any crew topside should avoid standing near or holding the rigging or anything metal, or dangling arms or legs overboard. Use gloves at the helm.
- 8) If struck, assess damage, check for electrical fires, check through-hull integrity and account for all crew.

- During violent storms, avoid touching the metal rigging, or two metal objects at the same time, and do not dangle arms or legs overboard.
- When practical, put crew members below with a caution not to touch the mast, and leave only the minimum number required to safely run the boat on deck.
- Turning instruments off at the breaker may not be sufficient to save the electronics if the boat is hit.
- Take a fix on the chart and have the handheld VHF charged and handheld GPS ready to use prior to approach of a storm.
- If struck -- check first safety of crew, verify thru-hulls intact, check for hull penetrations (flooding).

**... but don't "Shake and Bake" the GPS and VHF!**



# POWER CONSUMPTION



# N44 Electronics Published Power Consumption



The largest *electronics* “power hogs” are the VHF and SSB radios when transmitting

Device	Model No.	Maximum Current Draw*	Notes
HF SSB Radio	ICOM IC M-802	30.0 Amps (transmitting)** 3.0 Amps (listening)**	Largest power consumer (transmitting)
VHF Radio	ICOM IC M-506	5.5 Amps (transmitting)** 1.5 Amps (listening)**	
MFD Display	Furuno TZT14	3.6 Amps	
RADAR	Furuno DRS4D w/ PSU-17	2.1 Amps	
AIS	Furuno FA-50	2.0 Amps	Turns on with VHF breaker
Weather Fax	Furuno FA-30	1.0 Ampere	Receive only
B&G CPU	B&G H5000	0.20 Amps	
Graphic Display	B&G H5000	0.19 Amps, each	3 of them onboard
Triton Display	B&G Triton	0.16 Amps at 13.5 VDC, each	2 of them onboard

\* If not specified, current draw is at 12 Volts, DC

\*\* For radios, current draw at highest **audio** output (higher volume = higher power)

**The largest continual electrical load on the Navy 44 Mk II is the refrigerator which draws between 15 and 20 Amperes when the compressor is running**



# PORTABLE ELECTRONICS



# Portable Electronics



- Personal Locator Beacons (PLBs)
- EPIRB
- Hand Held VHF
- Hand Held GPS
- Satellite Phone (OTC Only)

Make sure someone is assigned to get the portable electronics for abandoning ship as part of your watch bill





# Additional Reading for D-qual



- *Chapman Piloting and Seamanship:*  
RADAR Overview pg 633-636 and 738-745
- [www.navcen.uscg.gov](http://www.navcen.uscg.gov)
- Navy 44 SOP and BIB
- Electronics Lecture on Blackboard



**ALMOST DONE!**





# Don't Get So Caught Up That You Lose Situational Awareness



Navigating is not just sitting at the table. Come topside and correlate what you can see visually with what you have electronically

Don't get caught up in the process vs. the principle. We don't want good documentation if we run aground, we want to prevent running aground.

Navigation is not a clerical function. Do not get sucked up into the paperwork.





# Questions?





**BACK UP SLIDES**



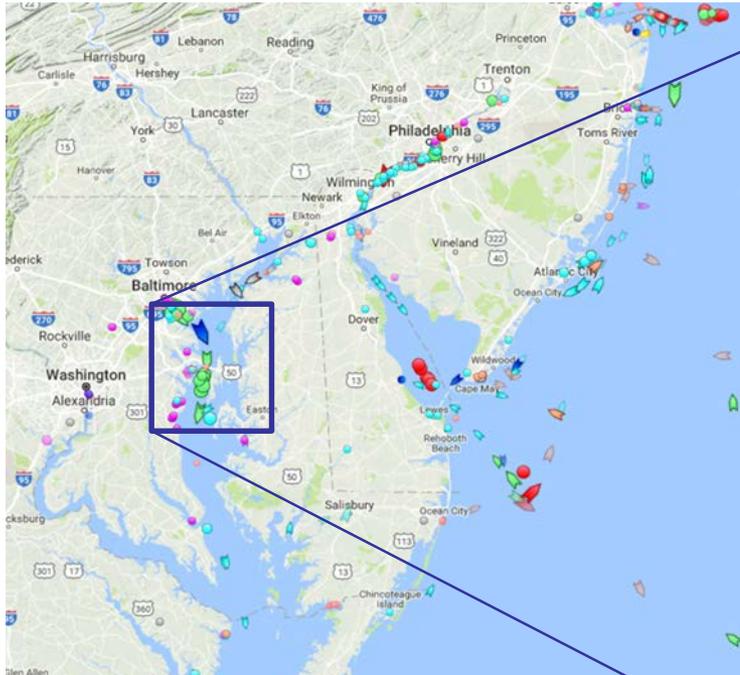
# MarineTraffic.com



<http://www.marinetraffic.com/>

A great backup for the Skipper/XO to check the long-range contact picture

**Carnival Pride is headed our way!**



**CARNIVAL PRIDE**  
Passenger Ship

**US BAL** PRINCESS CAYS [BS]

ATD: 2018-02-18 17:47 ETA: 2018-02-21 07:00

**Status: Underway Using Engine** Speed/Course: 14.9kn / 162° Draught: 8.2m

Received: 2 minutes ago (AIS Source: 2816 Capt Chris)

**This is just another tool which can be used; it should NOT be considered a 100% solution nor a replacement for the AIS**



# Navy 44 MK II Electronics Suite



DC MAIN PANEL



Furuno GP-330B  
GPS/WAAS Receiver



Furuno DRS4D Ultra High  
Resolution Digital RADAR



Furuno GPA-017S  
GPS Antenna



ICOM IC-M506  
VHF Marine Transceiver



ICOM HM-195B  
Command Mic



Furuno TZT14  
Multi Function Display



B&G 5000 CPU



vespermarine SP160  
Antenna Splitter



Diawa CS-201  
Coaxial Switch



ICOM IC-M802  
HF SSB Marine Transceiver



ICOM AT-140  
HF Automatic Antenna  
Tuner



Furuno FA-50  
Class B AIS Transponder



Furuno PSU-017  
Power Supply Unit



Furuno IF-NMEA2K2 NMEA  
Data Converter



ShipModul MiniPlex-41BT  
NMEA-0183 Multiplexer



Furuno FAX-30  
Facsimile Receiver

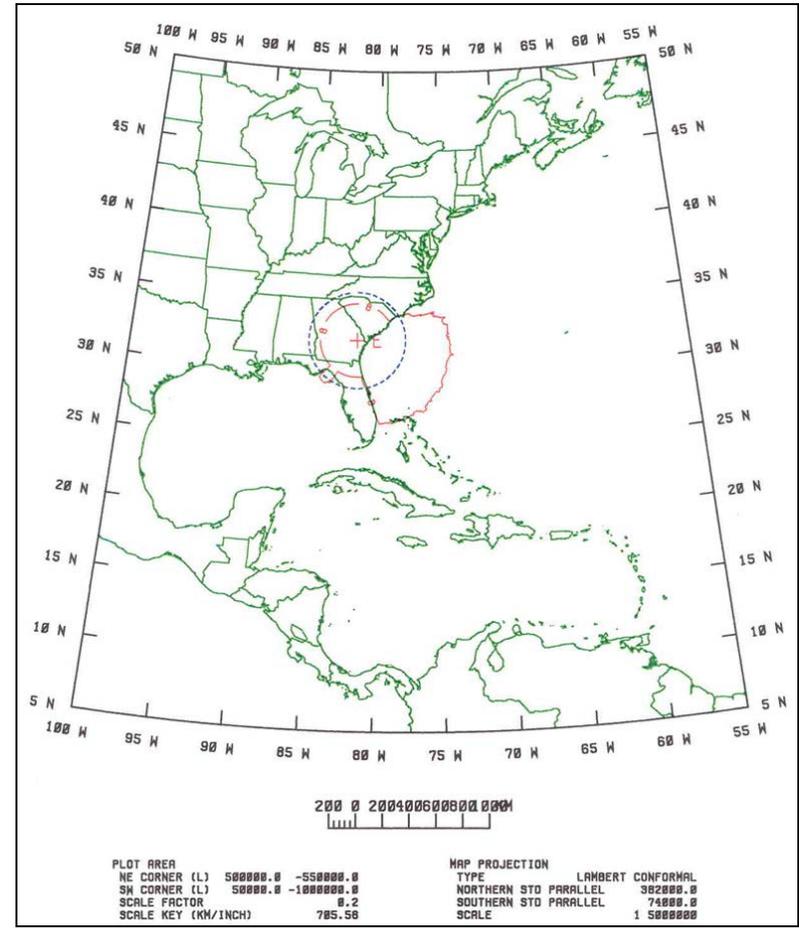
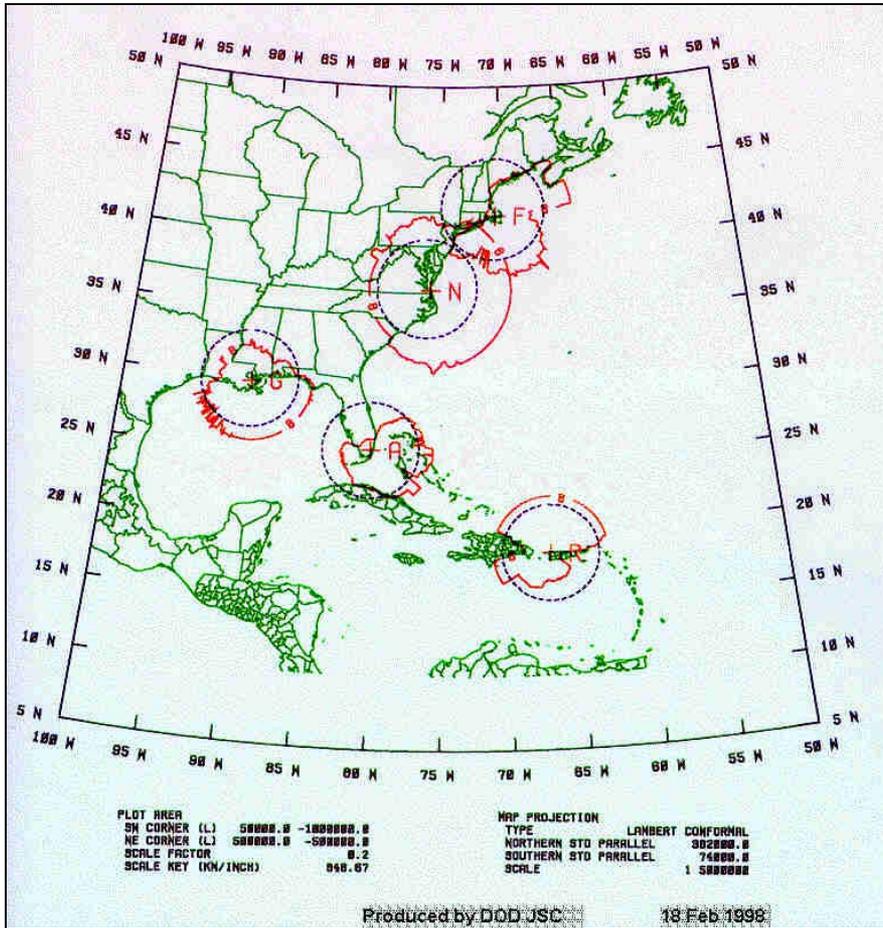


ADAM-6520I  
5-Port Ethernet  
Switch





# NAVTEX Coverage Areas





# Electronic Navigation Is The CNO-Directed Fleet Standard



## SAIL TRAINING CRAFT NAVIGATION STANDARDS, DIVPRODEVINST 3530.2F

3. Electronic Navigation. Shall be the primary method of navigation when underway and operating with electronic charts. All personnel shall reference the installed ECS for position keeping and supplement it with other sources as appropriate. An ECS must be considered a single aid to navigation, and should be used with a corrected chart.

4. Position Log. A record of positions and soundings from all fix sources used shall be maintained as an official record of each fix taken. Position, course and speed, charted depth, fix type and fathometer soundings will be recorded at a minimum. The track option shall be enabled to record data via the Furuno system, the system recording limitations may require overwrite of some data. The Voyage Data Recorder of the ECS (where available) will also be enabled and may be used as an official record while racing (VOST only).

## COMNAVSURFPAC/COMNAVAIRPAC/COMNAVAIRLANT/COMNAVSURFLANTINST 3530.4E

5. Transition to Electronic Charting. The CNO-directed transition from paper standard nautical charts (SNC) to the use of electronic charts is moving forward. The National Geospatial Intelligence Agency (NGA) has delivered a world-wide set of Digital Nautical Charts certified 'Safe for Navigation' and installation of approved electronic chart systems continues.

a. Once a ship is certified by the TYCOM to navigate with ECDIS-N as the primary plot, the certification is required to be maintained for the life of the ship. For ECDIS-N certified ships, the use of paper nautical charts as the primary means of navigation is no longer authorized. Per reference (d), ships will still be required to carry some paper nautical charts as a



# Position Log and Fix Interval



## SAIL TRAINING CRAFT NAVIGATION STANDARDS, DIVPRODEVINST 3530.2F

- 4. Position Log.** A record of positions and soundings from all fix sources used shall be maintained as an official record of each fix taken. Position, course and speed, charted depth, fix type and fathometer soundings will be recorded at a minimum. The track option shall be enabled to record data via the Furuno system, the system recording limitations may require overwrite of some data. The Voyage Data Recorder of the ECS (where available) will also be enabled and may be used as an official record while racing (VOST only).
- 5. Fix Interval.** Fixes shall be entered in the log from the ECS and used to generate a STC navigation report, enclosure (1). Fixes should not exceed 15 minutes while within 2NM of shoal water, 30 minutes while between 2-10NM, and 60 minutes while 20NM or greater from shoal water.

AREA	DISTANCE FROM LAND/SHOAL WATER	FIX INTERVAL
Restricted Waters	Less than 2 NM	3-15 minutes or as conditions warrant*
Piloting Waters	Less than 2-10 NM	6-15 minutes or as conditions warrant*
Coastal Waters	Between 10-20 NM	15-30 minutes or as conditions warrant*
Open Ocean	Greater Than 20 NM	30-60 minutes

\*The Skipper/XO shall determine or approve the fix interval with respect to other actions on deck, speed, distance to navigation hazards, and visibility.



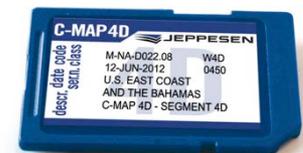
# **FURUNO BACKUP SLIDES**



# Importing and Exporting Info SD Card



- SD card stores tracks, routes, points, settings and updated charts.
- SD card should be installed and will remain in the Furuno for the duration of your block
- Do not insert or remove the card when the power is on or while a chart is being drawn.
- If there is water at the bottom of the card cover, do not open the door until the water has been wiped dry completely.





# Systems Interface



- Electronics are linked through both an Ethernet and NMEA 2000 interface
  - Enabling connection of multiple instruments to each other and to an (optional) computer
- Furuno functions can be accessed through WiFi by tablets or phones and used as a repeater or controller (ensure you are NOT in controller mode)
- When all systems are operational:
  - GPS location fed to both VHF and HF radios, so that they will transmit your location through DSC when you push the red distress signals
  - A laptop can be linked into the B&G and Furuno Systems for navigational programs (like Expedition for VOST), system setup and troubleshooting
    - Connecting to the B&G CPU requires a switch, router or null modem (you cannot plug most computers directly in)



# Internet Protocol Addresses



## Various Operator Manuals

The network-enabled equipment can be accessed directly via Ethernet for system configuration and extracting information.

The Internet Protocol addresses are different between Furuno and B&G  
The B&G is not connected to the Furuno NAVNET Ethernet network (it has a different cable)

Component	IP Address	Subnet Mask	Notes
B&G CPU	192.168.0.2	255.255.0.0	Note 1
Furuno AIS	172.31.24.3	255.255.0.0	Note 2
Furuno Weather	172.31.8.1	255.255.0.0	Note 2

### Notes:

1. The B&G CPU will attempt to select a DHCP server for 2 minutes after power-on. If a server is not detected, it will then revert to the default address
2. If using a laptop, the IP address of the laptop also needs to be 172.31.x.x



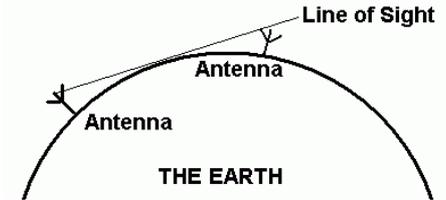
# VHF (& AIS) Propagation Distance



<http://www.offshoreblue.com/communications/vhf-capabilities.php>

**Visible Horizon**  $d = 1.17 * \sqrt{h_f}$

Where  $d$  = range in nautical miles and  $h_f$  = the height of your antenna in feet



**Radio Horizon**  $d = 1.2246 * \sqrt{h_f}$

Where  $d$  = range in nautical miles and  $h_f$  = the height of your antenna in feet

## Theoretical VHF Communications Range Between Two Navy 44 MK II STC:

$$d = 2 * 1.2246 * \sqrt{h_f}$$

Where  $d$  = range in nautical miles and  $h_f$  = 65 feet (to the VHF Antenna)

**$d = 19.8$  nautical miles**

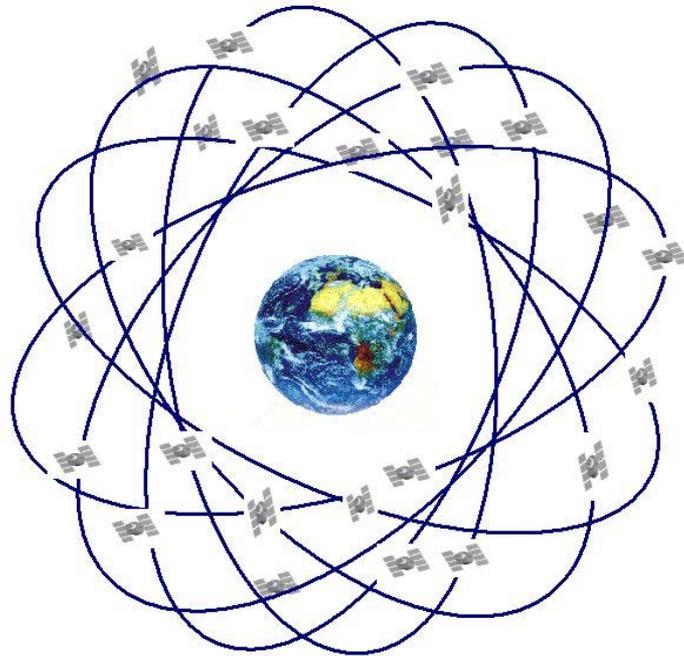
**When >20 nm apart, two STC will lose AIS and VHF connectivity with each other**



# **GLOBAL POSITIONING SYSTEM BACKUP SLIDES**



# Global Positioning System (GPS)



© Lockheed Martin

*Lockheed Martin GP IIR Satellite  
(launch dates circa 1997-2004)*



# Global Positioning System (GPS)



- A space-based satellite navigation system that provides location and time information in all weather.
- At least 24 NAVSTAR satellites (of 30) in operation.
- A GPS receiver calculates its position by precisely timing the signals sent by GPS satellites.
- The receiver uses the messages it receives to determine the transit time of each message and computes the distance to each satellite using the speed of light.
- Wide Area Augmentation System (WAAS) corrects for GPS signal errors caused by ionosphere disturbances, timing, and satellite orbit errors, and it provides vital integrity information regarding the health of each GPS satellite.



# Global Positioning System (GPS)



- Three or more satellites must be visible to obtain an accurate result.
- Accuracy (GPS/WAAS)
  - Selective Availability (SA)
    - SA is an intentional degradation of public GPS signals implemented for national security reasons and is turned off.
    - GPS III satellites (~2014) will not have any SA capability.
  - 7.8 meters at 95% confidence
- Using GPS positions with a paper chart can introduce errors if the GPS datum is different from chart datum (i.e., *why we highlight WGS 84 on our paper charts*).
- Boat speed calculated by GPS is speed over the ground, course calculated is course over ground



# **B&G INSTRUMENTATION BACKUP SLIDES**



# B&G Central Processing Unit (CPU)



- CPU is the core of the H5000 system, taking the majority of sensor inputs and using a dedicated processor to rapidly calculate and calibrate further functions and distribute them to display units and external devices
- Speed, depth, wind speed/angle, sea temp and fluxgate compass sensor inputs
- The B&G CPU is accessible via an Ethernet cable in the locker underneath the DC Main Panel (A crossover adapter is needed):





# B&G Instruments Damping and Calibration



## B&G H5000 Operators Manual

### Damping

The damping rate affects the frequency that the sensor data is updated, the greater the damping value the smoother the number change will be but the slower the response will be to data change.



### Damped parameters

Below is a list of parameters that a damping value can be applied to. Set the damping value (response rate) for each parameter from 0 to 9 seconds.

- Heading
- Apparent wind (angle & speed)
- True wind
- True wind direction
- Boat speed
- Dynamic boat speed (Bspd) Hercules & Performance only!
- Tide
- Speed Over Ground (SOG)
- Course Over Ground (COG)

### Dynamic boat speed

With Dynamic Damping the damping value applied to boat speed will reduce to almost zero during conditions when the data is changing rapidly.

The boat speed damping value is set (in seconds) to a steady state value, the Dynamic Damping is set to a value between 0 (off) and 9 (maximum), the higher the value, the more sensitive the boat speed is to rates of change and the quicker the damping value is lowered. This allows the effects of the change to be more readily seen on the Instruments. As the rate of change of the function reduces, so the damping value is allowed to rise to the preset damping value.

→ **Note:** Damping should not be confused with the update rate, which is the number of times per second that the function value is sent to the display. The update rate is fixed for all the functions.

### Boat speed

Speed calibration is necessary to compensate for hull shape and paddlewheel location on your boat. For accurate speed and log readings, it is essential that the paddlewheel is calibrated. Boat speed values can be shown in knots, kph or mph. Your preferred unit of measurement can be set in the units page of the setup menu.



### Auto - Calibration via reference to GPS SOG value

This is an AutoCal facility that uses speed over ground (SOG) from your GPS and compares the average of SOG against the average boat speed from the speed sensor for the duration of the calibration run.



→ **Note:** This calibration should be made in calm sea with no effect from wind or tidal current.

- 1 Bring the boat up to cruising speed (above 5 knots)
- 2 Select Auto correct on the Calibrate boat speed page
- 3 When the calibration is completed the Boat speed calibration scale will show the adjusted percentage value of the boat speed.
- 4 Select OK once complete to confirm correction and exit.





# PORTABLE ELECTRONICS BACKUP SLIDES



# Portable Electronics ACR RLB-32 EPIRB



<https://www.acrartex.com/products/catalog/legacy-products/satellite2-406/#sthash.KPQ0Fjld.dpbs>

EPIRB - Emergency Position Indicating Radio Beacon  
Registered at : [beaconregistration.noaa.gov](http://beaconregistration.noaa.gov)

Self-test feature (done by staff on regular intervals)

406 MHz

Store your beacon in the holder by the companionway

Emergency Bill should designate responsibility to take the EPIRB to a specific billet

Make sure everyone on board knows how to activate (flip switch full over and take out of holder)

Turn on and leave on if you have to abandon ship, tie to liferaft, outside for better tracking





# Portable Electronics

## Garmin GPS 76 Hand Held GPS



<https://buy.garmin.com/en-US/US/p/164#overview>

GPS 76 is WAAS-enabled for accuracy to within 3 meters and features a large 2 AA batteries (not included) on't worry about losing this GPS device in the drink. The GPS 76 floats in water, and it's waterproof (IPX7) to withstand the accidental dunk or splash in the lake. The GPS 76 is preloaded with worldwide cities as well as marine navigation aids, including lights, buoys, sound signals and day beacons.





# Portable Electronics

## ICOM Model M-36 Hand Held VHF



<http://www.icomamerica.com/en/products/marine/handhelds/m36/default.aspx>

6Watt Output

980mAh Li-ion battery, up to 8 hours

The M36 is designed for the serious boater with 6 watts of power for further communications range. The floating handheld comes with Clear Voice ensuring clear radio conversation and Voice Boost that turns the volume to full power with a touch of a button





# VHF RADIO BACKUP SLIDES

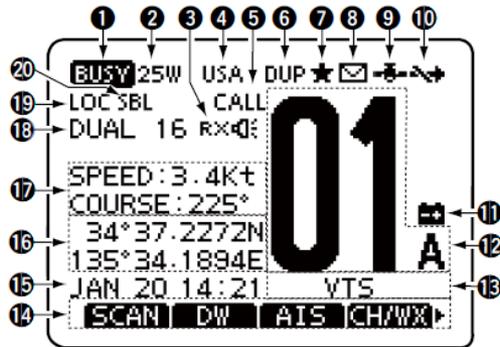


# VHF Function Display (1 of 2)



## ICOM IC-M506 Instruction Manual

### ■ Function display



- 1 BUSY/TRANSMIT ICON** (pp. 11, 12)
  - The "BUSY" icon appears when receiving a signal or when the squelch is open.
  - The "TX" icon appears while transmitting.
- 2 POWER ICON** (p. 11)
  - The "25W" icon appears when high power is selected.
  - The "1W" icon appears when low power is selected.
- 3 RX HAILER ICON** (p. 75)
 

Appears while in the RX Hailer mode.
- 4 CHANNEL GROUP ICON** (p. 10)
  - The selected channel group icon, USA "USA," International "INT" or Canadian "CAN" appears.
  - The "WX" icon appears when the weather channel is selected.

- 5 CALL CHANNEL ICON** (p. 9)
 

Appears when the Call channel is selected.
- 6 DUPLEX ICON** (p. 10)
 

Appears when a duplex channel is selected.
- 7 FAVORITE CHANNEL ICON** (p. 17)
 

Appears when a Favorite (Tag) channel is selected.
- 8 MESSAGE ICON**

Blinks when there is an unread DSC message.
- 9 GPS ICON**
  - Stays ON when the GPS receiver is activated and valid position data is received.
  - Blinks when invalid position data is being received.
- 10 SWITCH ICON** (p. 69)
 

Appears when the "CH 16 SWITCH" in DSC Settings is set to OFF.
- 11 LOW BATTERY ICON**

Blinks when the battery voltage drops to approximately 10.8 V DC or less.
- 12 CHANNEL NUMBER READOUT**

Shows the selected operating channel number.

  - When a simplex channel is selected, "A" or "B" appears.
- 13 CHANNEL NAME FIELD**

The channel name appears, if programmed. (p. 13)



# VHF Function Display (2 of 2)



## ICOM IC-M506 Instruction Manual

### 14 KEY ICON (p. 7)

Shows the programmed function of the softkeys on the front panel.

### 15 TIME ZONE INDICATOR

- Shows the current time when a GPS receiver is connected, or the time is manually programmed.
  - When the GPS current time is invalid, “??” will blink every 2 seconds instead of the current time. After 23.5 hours has passed, “NO TIME” will appear.
  - “??” will blink every 2 seconds instead of the current time, after 4 hours have passed from when the time was manually programmed. The manually programmed time is held for only 23.5 hours, and after that, “NO TIME” will appear.
- “LOCAL” appears when the offset time is set.
- “MNL” appears when the time is manually programmed.
- “UTC” appears when the GGA, GLL or GNS GPS sentence formats are included in the GPS signal.
- The date information appears when the RMC GPS sentence formats are included in the GPS signal.
- “NO TIME” appears when no GPS receiver is connected, and no time is manually input.

### 16 POSITION INDICATOR

- Shows the current position when a GPS receiver is connected, or the position is manually programmed.
  - When the GPS position is invalid, “??” may blink every 2 seconds instead of position. The last position is held for only 23.5 hours, and after that, “NO POSITION” will appear.

- “??” will blink every 2 seconds instead of position, after 4 hours have passed from when the position is manually programmed. The manually programmed position is held for only 23.5 hours, and after that, “NO POSITION” will appear.

- “NO POSITION” appears when no GPS receiver is connected, and no position is manually input.

### 17 COURSE/SPEED INDICATOR

Shows the course and speed of your vessel if the GPS receiver is connected to the transceiver.

- Course and speed are displayed when the RMC GPS sentence format is included in the GPS signal. Course and speed are also displayed when the VTG and either the GGA, GLL or GNS GPS sentence formats are included in the GPS signal.

### 18 SCAN INDICATOR

- “SCAN 16” appears during a Priority scan; “SCAN” appears during a Normal scan. (p. 17)
- “DUAL 16” appears during Dualwatch; “TRI 16” appears during Tri-watch. (p. 18)

### 19 LOCAL ICON (p. 11)

Appears when the Attenuator function is turned ON.

### 20 VOICE SCRAMBLER ICON\* (p. 78)

Appears when the Voice Scrambler function is turned ON.  
\*Appears only when the voice scrambler unit is installed.



# Very High Frequency (VHF) Radio Priority Scan vs. Normal Scan



## ICOM IC-M506 Instruction Manual

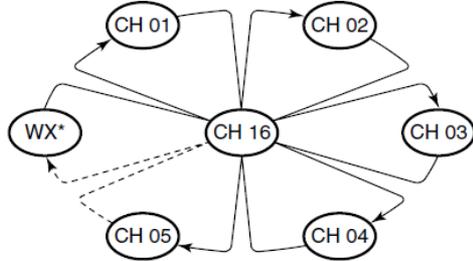
Scanning is an efficient way to locate signals quickly over a wide frequency range. The transceiver has a Priority scan and a Normal scan.

When the Weather Alert function is turned ON, the weather channel is also checked while scanning. (p. 98)

Set the Favorite channels (scanned channel) before scanning. Clear the Favorite channels which inconveniently stop scanning, such as those for digital communication use. (Refer to the next page for details.)

☞ Choose Priority or Normal scan in the Menu screen. (p. 97)

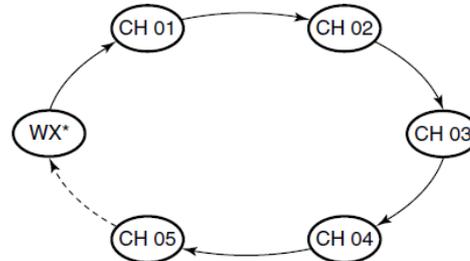
### PRIORITY SCAN



\*When the weather alert function is activated.

The Priority scan sequentially searches through all Favorite channels while monitoring Channel 16. When a signal is detected on Channel 16, the scan pauses until the signal disappears. When a signal is detected on a channel other than Channel 16, the scan becomes a Dualwatch until the signal disappears.

### NORMAL SCAN



\*When the weather alert function is activated.

The Normal scan, like the Priority scan, sequentially searches through all Favorite channels. **However, unlike the Priority scan, Channel 16 is not checked unless it is set as a Favorite channel.**

If you use Normal Scan, ensure that Ch16 is programmed as a Favorite

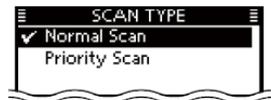


Consider channels: 12, 13, 16 & 82A as a minimum

Normal Scan is the Factory Default

### ◇ Scan Type

The transceiver has two scan types to locate signals; Normal scan and Priority scan. A Normal scan searches all Favorite channels in the selected channel group. A Priority scan sequentially searches all Favorite channels, while monitoring Channel 16. (Default: Normal Scan)





# Very High Frequency (VHF) Radio Setting Favorite Channels



## ICOM IC-M506 Instruction Manual

For more efficient scanning, add desired channels as Favorite channels, or clear the Favorite on unwanted channels.

**Channels that are not tagged will be skipped while scanning.**

Favorite channels can be independently assigned to each channel group (INT, USA, or CAN).

- ① Select the desired channel group. (p. 10)
- ② Select the desired channel to be set as a Favorite channel.
- ③ Push [★] to set the displayed channel as a Favorite channel.
  - The “★” icon appears on the display.
- ④ To cancel the Favorite channel setting, repeat step ③.
  - The “★” icon disappears.

### ✓ Clearing (or setting) all Favorite channels

Hold down [★] for 3 seconds (until a long beep changes to 2 short beeps) to clear all Favorite channel settings in the selected channel group.

- Repeat above procedure to set all channels as Favorite channels.

First, set the scan type (Priority or Normal scan) and scan resume timer in the Menu screen. (p. 97)

- ① Select the desired channel group. (p. 10)
- ② Set the Favorite channels, as described to the left.
- ③ Make sure the squelch is closed to start a scan.
- ④ Push [SCAN] to start a Priority or Normal scan.
  - “SCAN 16” appears during a Priority scan; “SCAN” appears during a Normal scan.
  - When a signal is detected, the scan pauses until the signal disappears, or resumes after pausing 5 seconds, depending on the setting. (Channel 16 is still monitored during a Priority scan.)
  - Push [▲]/[▼] on either transceiver or microphone, to check the scanning Favorite channels, change the scanning direction or manually resume the scan.
  - A beep tone sounds and “16” blinks when a signal is received on Channel 16 during a Priority scan.
- ⑤ To stop the scan, push [CLEAR] or repeat step ④.

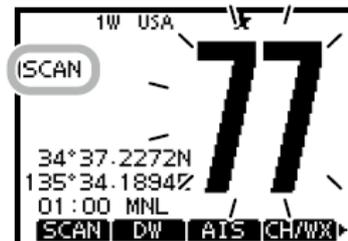
[Example]: Starting a Normal scan.



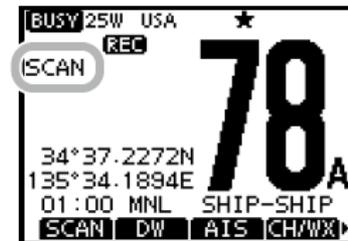
Push [SCAN]



Scan starts.



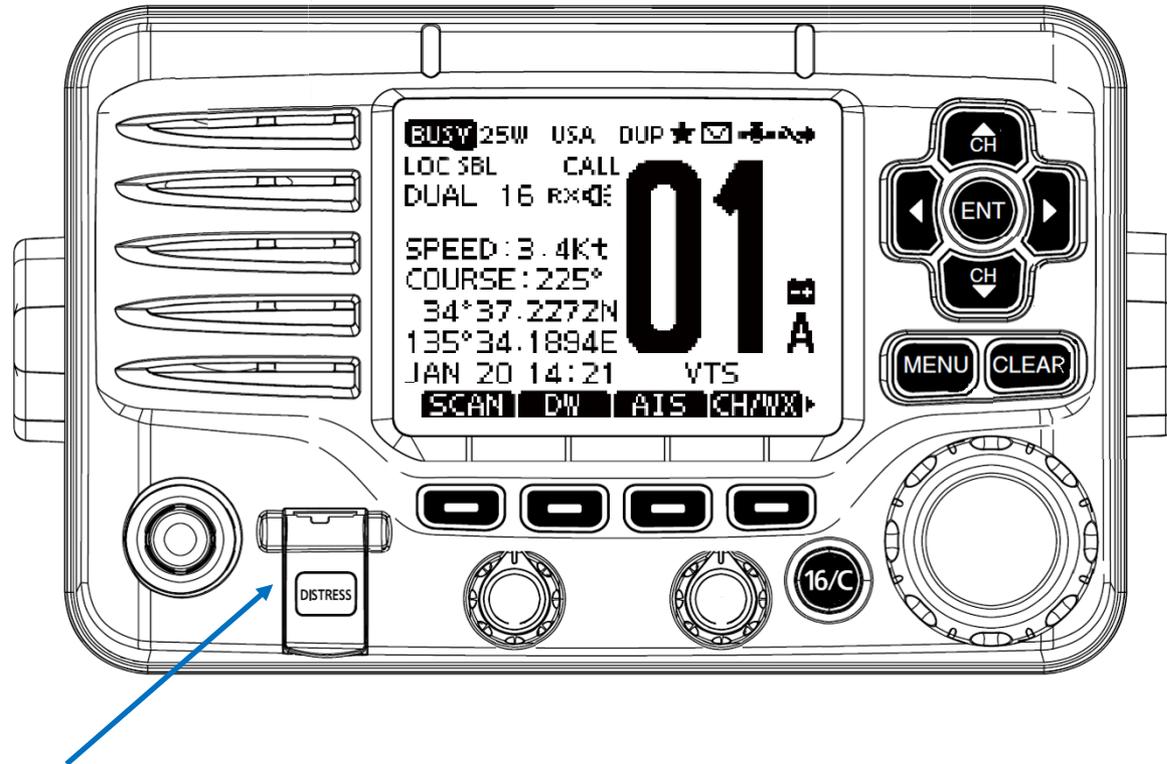
When a signal is received.





# Very High Frequency (VHF) Radio

## VHF Distress Calls



### Distress Button

Press and hold for 3 seconds  
for an actual distress



# Very High Frequency (VHF) Radio

## VHF Urgent Distress Call



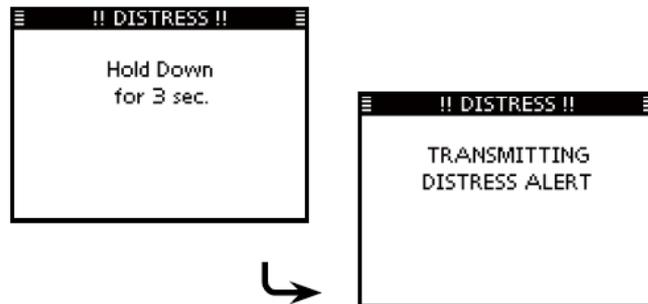
### ■ Distress call

A Distress call should be transmitted if, in the opinion of the Master, the ship or a person is in distress and requires immediate assistance.

*NEVER MAKE A DISTRESS CALL IF YOUR SHIP OR A PERSON IS NOT IN AN EMERGENCY. A DISTRESS CALL SHOULD BE MADE ONLY WHEN IMMEDIATE HELP IS NEEDED.*

#### ◇ Simple call

- ① Confirm no Distress call is being received.
- ② While lifting up the key cover, hold down [DISTRESS] for 3 seconds to transmit the Distress call.
  - While holding down [DISTRESS], count down beeps sound and both the key and display backlighting blink.
  - DSC channel (Channel 70) is automatically selected and the Distress call is transmitted.



- ③ After transmitting the call, the transceiver waits for an acknowledgment call.
  - The Distress call is automatically transmitted every 3.5 to 4.5 minutes, until an acknowledgement is received ('Call repeat' mode), or DSC Cancel call is made. (p. 27)
  - Push [RESEND] to manually transmit the Distress repeat call.
  - Push [◀]/[▶] then push [INFO] to display the transmitted Distress call information.
  - Push [◀]/[▶] then push [PAUSE] to pause the 'Call repeat' mode, push [RESUME COUNTDOWN] to resume it.



- ④ After receiving the acknowledgment, push [ALARM OFF] then reply using the microphone.
- A distress alert default contains:
- Nature of distress: Undesignated distress
  - Position information: The latest GPS or manual input position is held for 23.5 hours, or until the power is turned OFF.



# Very High Frequency (VHF) Radio

## VHF Regular Distress Call



### ◇ Regular call

The nature of the Distress call should be included in the Distress call.

- ① Enter "DISTRESS CALL" in the DSC menu.

◀MENU> ⇨ ▶DSC> ⇨ ▶Distress Call  
(Push [MENU]) (Select icon) (Rotate dial, then push [ENT].)

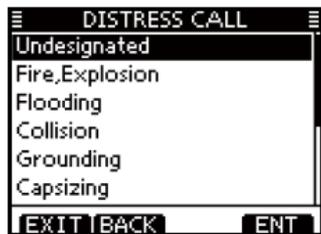
- ② Select the nature of the distress using dial or [▲]/[▼], then push dial or [ENT].

• 'Undesignated,' 'Fire,Explosion,' 'Flooding,' 'Collision,' 'Grounding,' 'Capsizing,' 'Sinking,' 'Adrift,' 'Abandoning ship,' 'Piracy' or 'Man Overboard' is selectable.

• The nature of the distress is stored for 30 seconds after a selection is made.

• Push [EXIT] to return to the normal operating mode.

• Push [BACK] to return to the previous screen.



- ③ The Distress call confirmation screen is displayed.
- Rotate dial or push [▲]/[▼] to see the hidden lines.



- ④ Hold down [DISTRESS] for 3 seconds to transmit the Distress call.

• While holding down [DISTRESS], count down beeps sound and both the key and display backlighting blink.

• The selected nature of the distress is stored for 30 seconds.





# Very High Frequency (VHF) Radio Call Channel Programming

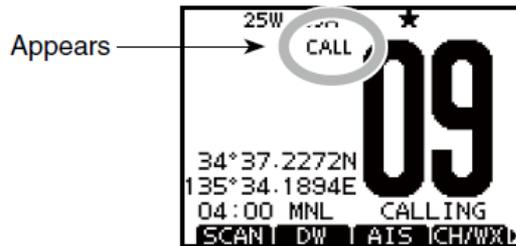


## Using The Call Channel

Each regular channel group has a separate leisure use Call channel. The Call channels can be programmed, and are used to store your most often used channel in each channel group, for quick recall.

The Call channel is monitored during Tri-watch. (p. 13)

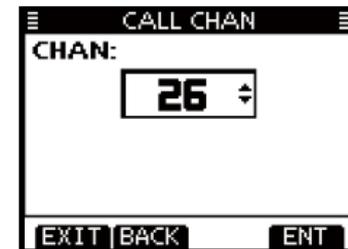
- ➔ Hold down [16/C] for 1 second to select the Call channel of the selected channel group.
  - The “CALL” icon and the Call channel number appear.
  - Each channel group has an independent call channel after programming. (p. 13)
- ➔ Push [CH/WX] to return to the screen displayed before you selected Call channel, or rotate dial or push [▲](CH)/[▼](CH) to select an operating channel.



## Programming The Call Channel

You can program the Call channel with your most often-used channel in each channel group for quick recall.

- ① Select the desired channel group (INT, USA or CAN) to be programmed. (p. 10)
- ② Push [MENU].
- ③ Rotate dial or push [◀]/[▶] to select the “RADIO SET” icon and then push the softkey below the icon.
  - RADIO SETTINGS menu is displayed.
- ④ Rotate dial or push [▲]/[▼] to select “CALL CHAN,” and then push [ENT].
- ⑤ Rotate dial or push [▲](CH)/[▼](CH) to select a channel.



- ⑥ Push [ENT] to save the channel as the Call channel.
  - Push [BACK] to cancel and return to the previous screen.
- ⑦ Push [EXIT] to exit the Menu screen.

**Recommendation:**  
Program your squadron working channel (e.g. 78A or 82A) as the “call channel”



# HF SSB RADIO BACKUP SLIDES



# HF SSB Radio Distress Call Button



## ◇ Simple distress call

- ➔ Lift up the distress switch cover, then push and hold [DISTRESS] for 5 sec.
  - After 5 sec., a distress call is sent.



Distress Button



Don't forget to switch the HF Antenna switch!

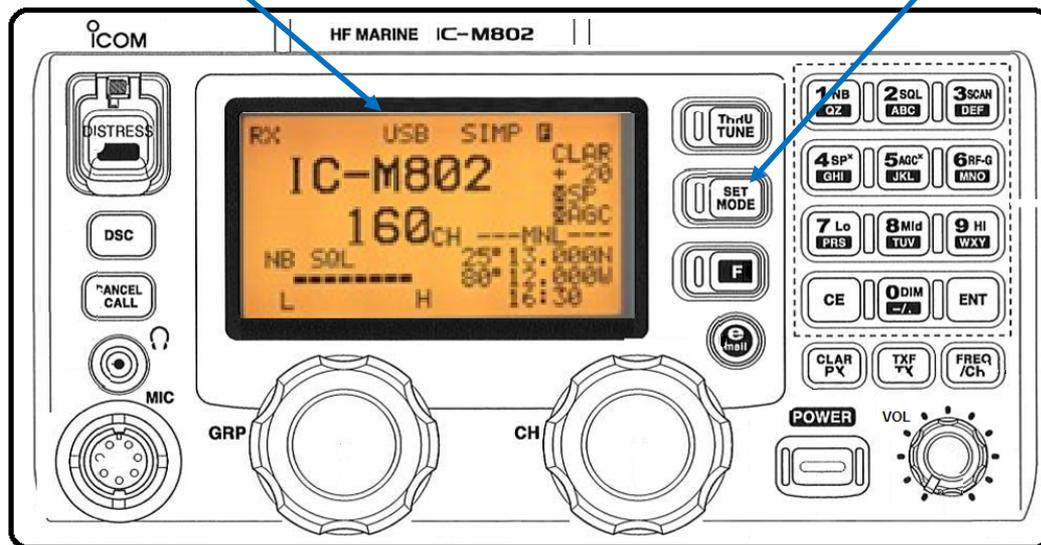


# HF SSB Radio Mode Selection



Mode Indicator (USB)

Mode/Set Switch



## MODE/SET SWITCH [MODE SET]

➔ Push to select an operating mode.

- J3E (USB), H3E (AM), LSB, J2B (AFSK), F1B (FSK), and A1A (CW) modes are available, depending on version or countries.



# HF SSB Radio Pre-Programmed Channels



	CH 11 – 13089.0 (“USCG 1205”)
CH 2 – 4125.0 kHz (“SOS 4s”)	CH 12 – 17314.0 kHz (“USCG 1625”)
CH 3 – 6215.0 kHz (“SOS 6s”)	CH 13 – 2070.0 kHz (“OSTS A”)
CH 4 – 8291.0 kHz (“SOS 8s”)	CH 14 – 4037.0 kHz (“OSTS B”)
CH 5 – 12290.0 (“SOS 12s”)	CH 15 – 6793.0 kHz (“OSTS C”)
CH 6 – 16420.0 kHz (“SOS 16s”)	CH 16 – 8187.0 kHz (“OSTS D”)
CH 7 – 2670.0 kHz (“USCG Local”)	CH 17 – 12417.0 kHz (“OSTS E”)
CH 8 – 4426.0 kHz (“USCG 424”)	CH 18 - Undefined
CH 9 – 6501.0 kHz (“USCG 601”)	CH 19 - Undefined
CH 10 – 8764.0 kHz (“USCG 816”)	CH 20 - Undefined

Setup or verify the above listed frequencies are programmed into the HF radio (USB). General rules for HF frequency selection:

- The higher the sun, the higher the frequency.
- The lower the sun, the lower the frequency.
- The longer the distance, the higher the frequency.
- The shorter the distance, the lower the frequency.



# HF SSB Radio

## OTC HF Communications Checks



**Voice Communication Times.** HF is useful as an emergency communications tool. Each squadron OTC will set up a schedule to test the HF radio, and cycle all midshipmen through the process so that they gain proficiency. In the event that an individual boat's VHF is inoperable, they can communicate with the squadron on HF. In the event that cellular/SATPHONE comms with the NSDO are unsuccessful for >12 hours, the OTC (or Skippers operating independently) will establish HF comms in order to give a SITREP to Robert Crown. Specific directions on the times and reporting information can be found in the OPORDER (Operations Order).

- | • Time (Local USNA) | Channel        | Frequency   |
|---------------------|----------------|-------------|
| • 0930-0940         | OSTS A (Ch 13) | 2070.0 kHz  |
| • 0940-0950         | OSTS B (Ch 14) | 4037.0 kHz  |
| • 0950-1000         | OSTS C (Ch 15) | 6793.0 kHz  |
| • 1000-1010         | OSTS D (Ch 16) | 8187.0 kHz  |
| • 1010-1020         | OSTS E (Ch 17) | 12417.0 kHz |
| • 2030-2040         | OSTS D (Ch 16) |             |
| • 2040-2050         | OSTS C (Ch 15) |             |
| • 2050-2100         | OSTS E (Ch 17) |             |
| • 2100-2110         | OSTS B (Ch 14) |             |
| • 2110-2120         | OSTS A (Ch 13) |             |