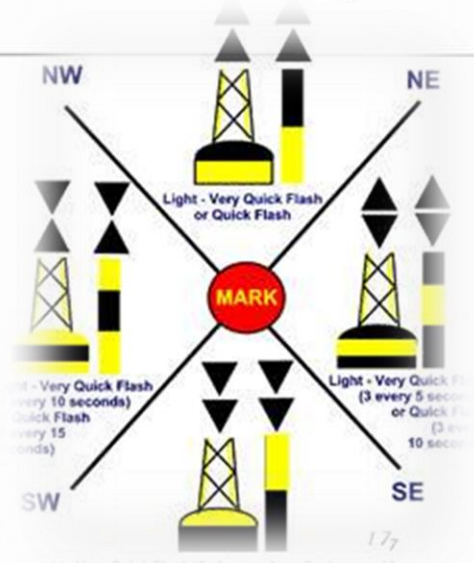# Navigation Rallies – Things to Discuss

- What is a Navigation Rally ?
- Understanding the Info you have
- How to Enter your Boat
- GPS – How to plot NavRally Course
- Navigation Route de-mystified
- The Running Sheet explained
- How to Start / Prepare your Boat
- Tack Tracker – How it works and scores
- Questions
- Navigation Tech Talk

Navigation Rallies – What are They ?

- NOT a race. Be in the right place at the right time. Timed checkpoints along a course at unknown locations.

- Like orienteering but on the water.

- Boats travel 10 to 12 Nautical Miles at constant speed in just over an hour.

- At checkpoints target time is compared to actual time of arrival.

- Winner is boat that gets closest to their predicted or target times.

NavRally – Tack Tracker Replay

NavRally: Sun14 Wackett Trophy

- **Tack Tracker used by BMYS to run events**
- **Data logger in boat**
- **System calculates score for each boat**

- **BMYS Home Page**
https://tacktracker.com/cloud/home/bmysnav

Enter NavRally – How?

- Assemble crew – Skipper and Navigator
- Email entry to Brendan – week before
- You will receive Running Sheet, event details, start time
- Prepare navigation / GPS – Keep it simple
- Plenty of Help Available with Course
- Setup Boat – Clock, GPS, Coffee
- More details from Event Manager - Brendan

MAIL, or Email TO:
Postal Address:
Beaumaris Motor Yacht Squadron
Po Box 45, Black Rock 3193
Email: bodco@bigpond.com
BMYS: bmys@bigpond.com

OR:
Enter Online:
Beaumaris Motor Yacht Squadron
https://www.bmys.com.au/nav-rally-entry-form/

Entries must be received by Sunday 16th February 2020

Boat Name: ....   Race No. ....   Reg No. ....
Club: ....   Radio: VHF ☐   27 MHZ ☐

Use of electronic navigational aids in this Nav. Rally   Yes ☐   No ☐

HULL TYPE: Planing ☐   or   Displacement ☐

BOAT LENGTH: (Meters) ....   BOAT COLOUR: ....

DESCRIPTION OF BOAT ....

MOTOR: ....

SPEED: 5 ☐   6 ☐   7.5 ☐   10 ☐   12 ☐   .... ☐ Other   (Please Tick one)

SKIPPER: ....   Phone No ....   Mobile No ....

E-mail address ....   Fax No ....

What Information do you have?

COURSE INSTRUCTIONS

THE BEAUMARIS MOTOR YACHT SQUADRON

THE COMMODORE, BOATING COMMITTEE & MEMBERS

Present

THE COMMODORES NAV RALLY

On Sunday 23rd February 2020

Members of all clubs are invited to attend this event to be held at the Beaumaris Motor Yacht Squadron

Followed by lunch starting at 12:30 pm
Free to all Skippers & Navigators ---$10 per head others

ENTER NOW FOR THIS GREAT EVENT
Entries close on Sunday 16th February 2020

All participating entrants will have the opportunity to win great prizes

LEG	DEGREES (TRUE)	DISTANCE (Nm)	TOTAL DISTANCE (Nm)	LATITUDE		LONGITUDE	
Start				37 59.550	S	145 02.750	E
1	55	0.31	0.31	37 59.372	S	145 03.072	E
2	142	0.32	0.63	37 59.624	S	145 03.322	E
3	180	0.41	1.04	38 00.034	S	145 03.322	E
4	168	0.77	1.81	38 00.787	S	145 03.525	E

Chart: AUS143 WGS84
Official Time: Telstra **1194,** GPS Time
Start Time: 0900 Hours

Datum Point: 1.0 Cable 145 degrees True from seaward end of BMYS Jetty
(37 59.550 S 145 02.750 E   WGS84)

Start / Finish Line: Line 145 degrees True through flagpole on end of BMYS jetty to three red lights on clubhouse roof

- **Course Document has all key info**
- **Chart – AUS 143**
- **Timing - 1194**
- **Datum / Start**
- **Legs / Degrees**
- **Coordinates**
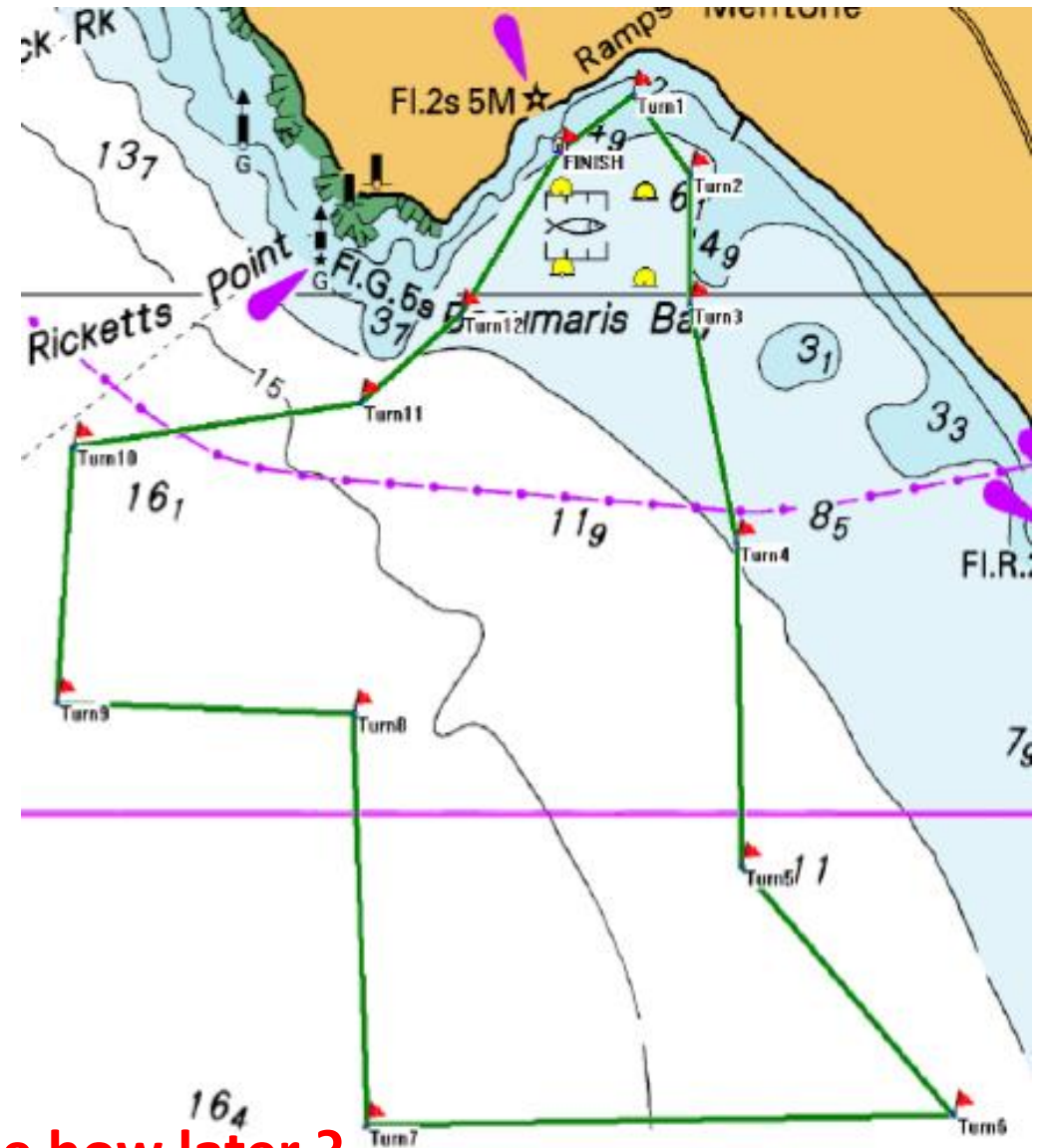- **Running Sheet Course Timing**

Latitude Fast Facts
- **1 NM = 1852 M**
- **1 degree Lat = 60NM**
- **1 minute Lat = 1 NM**
- **0.1 minute = 185.2M**
- **0.001 minute = 1.852M**
- **0.0001 minute = 0.1852M**

Plotting the Course – Legs and Turns

COURSE INSTRUCTIONS

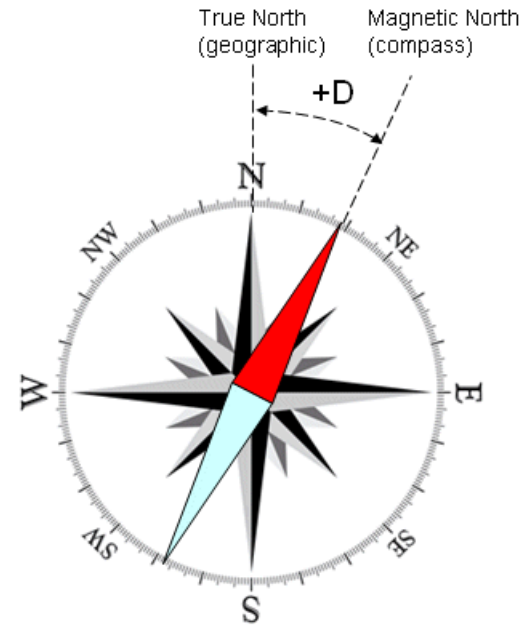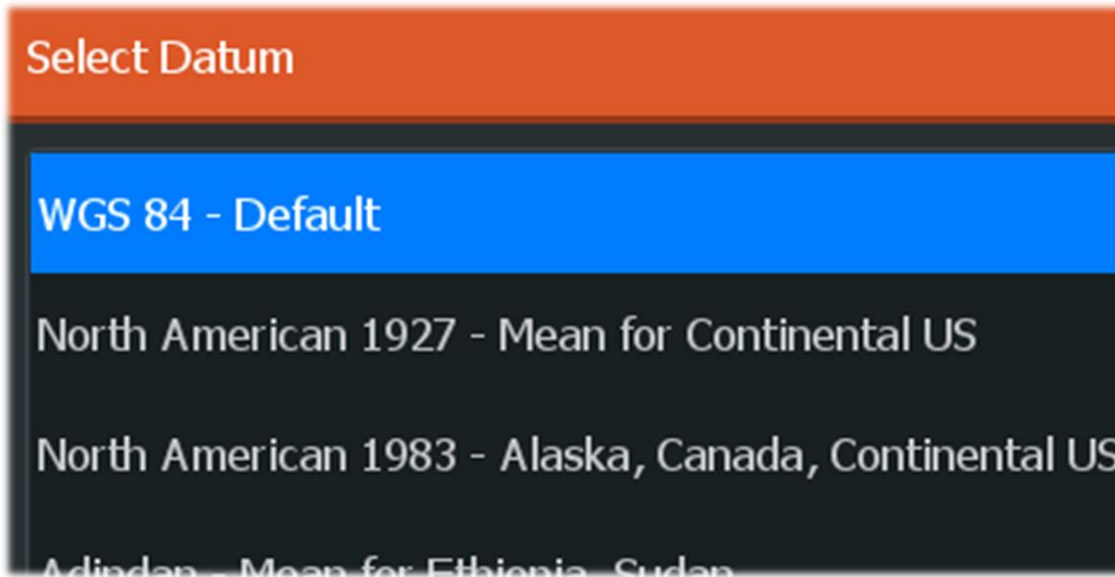| LEG	DEGREES (TRUE)	DISTANCE (Nm)	TOTAL DISTANCE (Nm)	LATITUDE		LONGITUDE	
Start				37 59.550	S	145 02.750	E
1	55	0.31	0.31	37 59.372	S	145 03.072	E
2	142	0.32	0.63	37 59.624	S	145 03.322	E
3	180	0.41	1.04	38 00.034	S	145 03.322	E
4	168	0.77	1.81	38 00.787	S	145 03.525	E
5	179	1.02	2.83	38 01.806	S	145 03.547	E
6	137	1.07	3.90	38 02.588	S	145 04.473	E
7	269	2.02	5.92	38 02.623	S	145 01.910	E
8	358	1.3	7.22	38 01.325	S	145 01.853	E
9	272	1.02	8.24	38 01.289	S	145 00.560	E
10	4	0.81	9.05	38 00.482	S	145 00.632	E
11	82	1.0	10.05	38 00.343	S	145 01.887	E
12	51	0.44	10.49	38 00.066	S	145 02.321	E
Finish	33	0.62	11.11	37 59.550	S	145 02.750	E

Course Instructions becomes Navigation Route – See how later ?
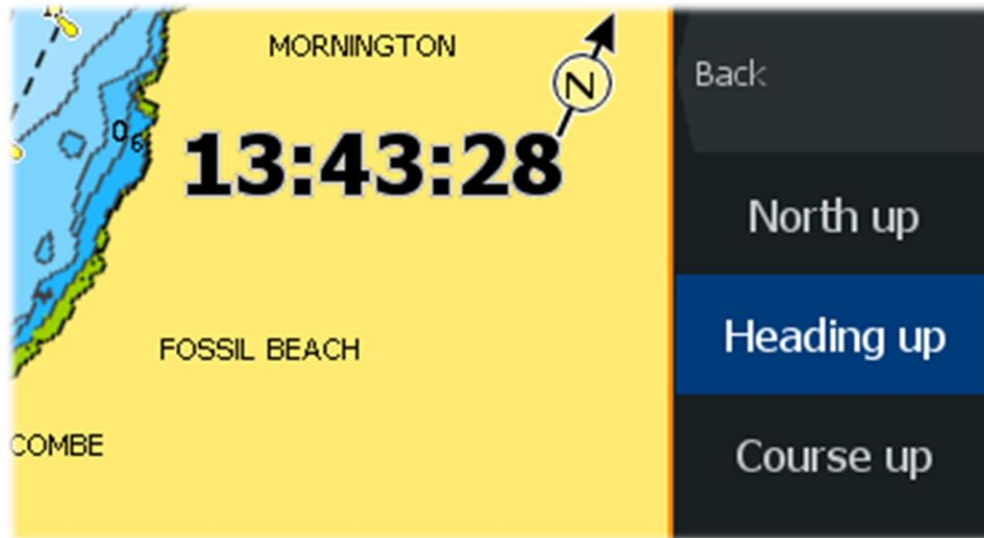
GPS – Plot the Course
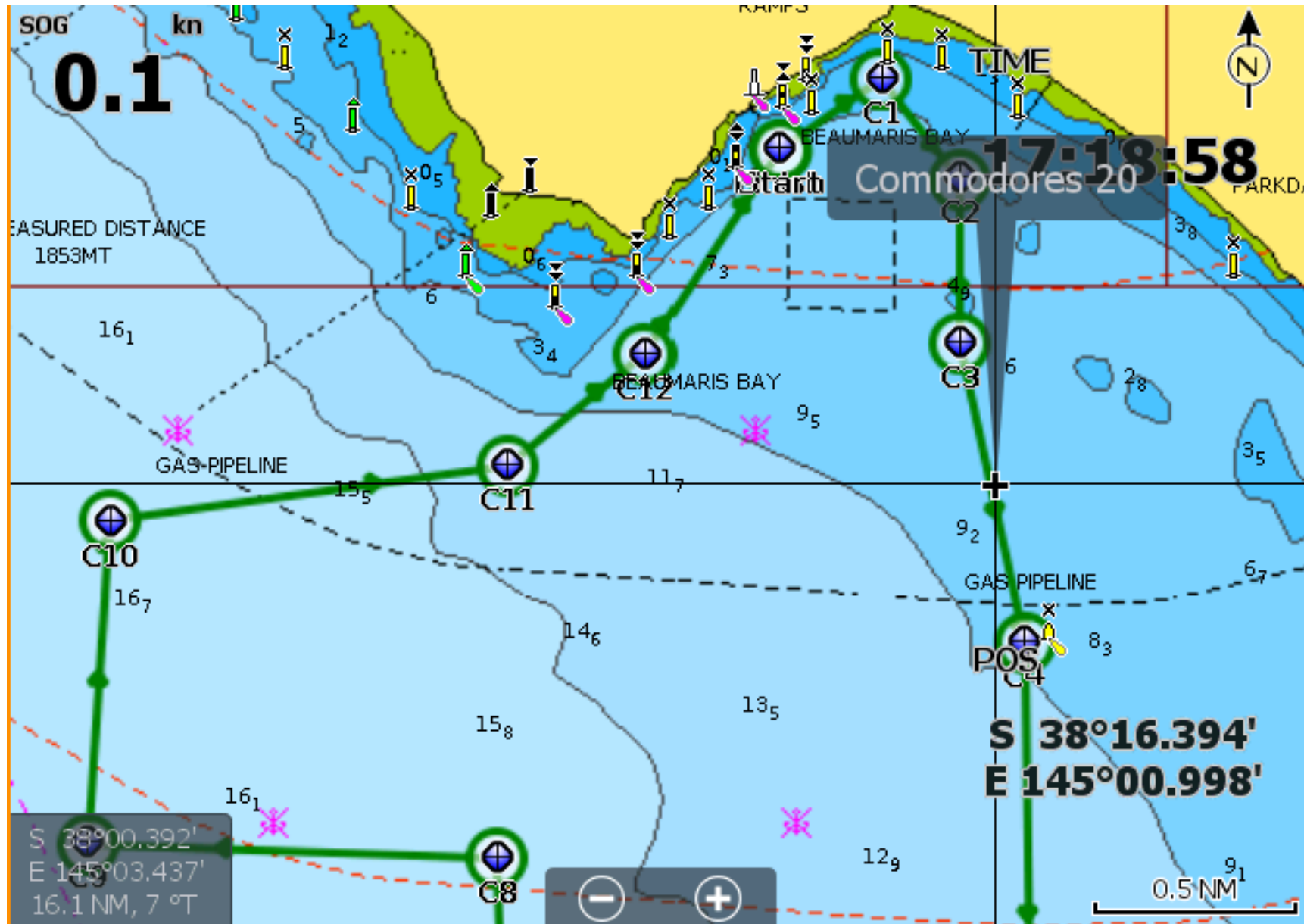
- **Create Route for the Nav Rally Course.**

- **Route is a series of connected waypoints.**

- **Create waypoints for Start, Turns and Finish**

- **Add series of waypoints to route**

- **View route on Chart**

- **Navigate the route for Nav Rally Course**

- **Works OK on handheld GPS**

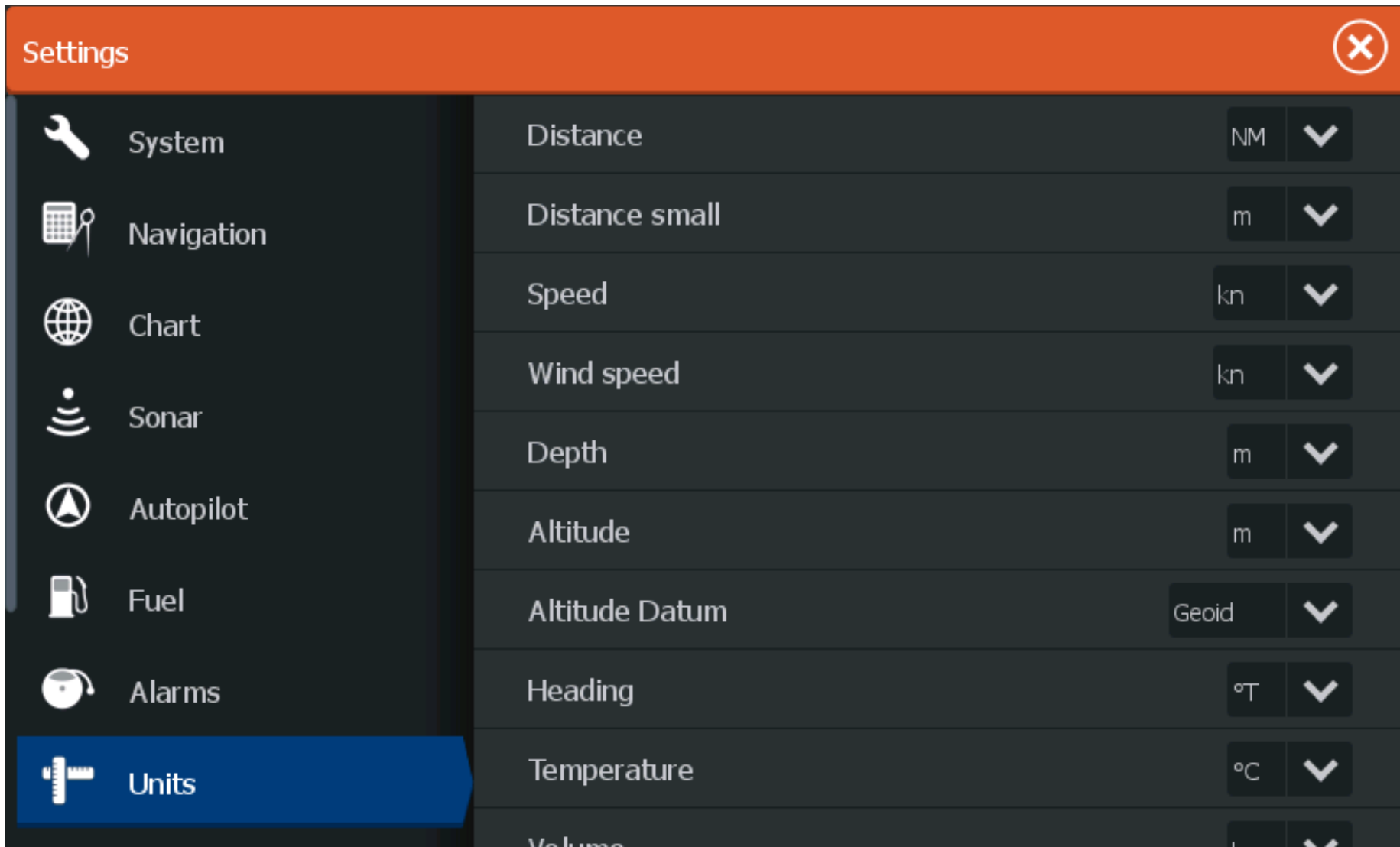- **Don't need a Map**

GPS – Settings and Units - 1

Select Datum

- WGS 84 - Default
- North American 1927 - Mean for Continental US
- North American 1983 - Alaska, Canada, Continental US
- Adindan – Mean for Ethiopia, Sudan

MORNINGTON

13:43:28

FOSSIL BEACH

COMBE

Back
North up
Heading up
Course up

True North (geographic) Magnetic North (compass)

+D

Magnetic declination in Melbourne, Australia is **+11.63°**

- **Set GPS or Chartplotter units**
- **Nautical miles for distance**
- **Knots for speed**
- **Bearing True (not Magnetic)**
- **Datum to be WGS84**
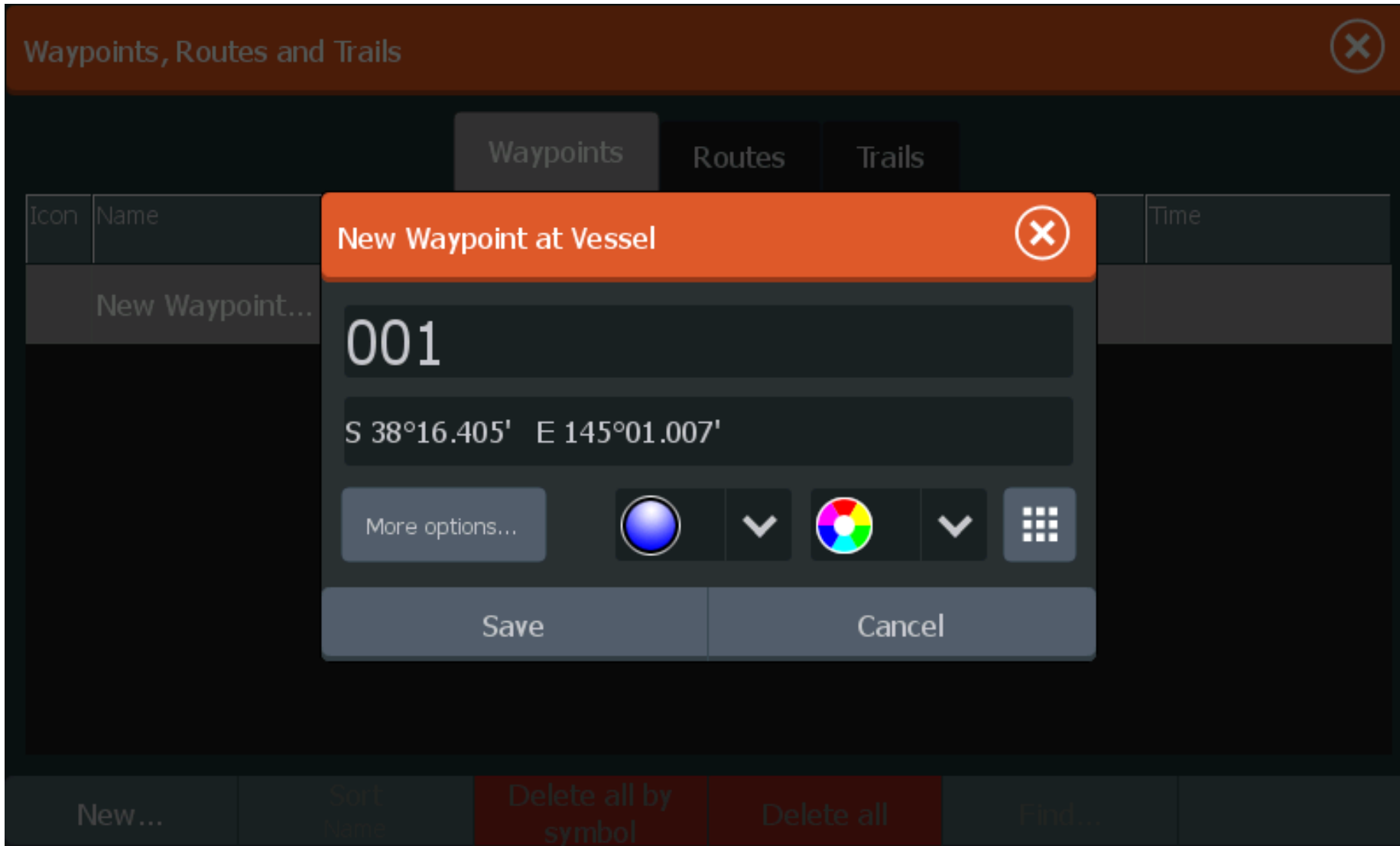- **Same for handheld GPS to high end chart plotter**

GPS – Settings and Units - 2

Settings	
System	
Navigation	
Chart	
Sonar	
Autopilot	
Fuel	
Alarms	
Units	

Distance	NM
Distance small	m
Speed	kn
Wind speed	kn
Depth	m
Altitude	m
Altitude Datum	Geoid
Heading	°T
Temperature	°C
Volume	

- **Set GPS or Chartplotter units**

- **Nautical miles for distance**

- **Knots for speed**

- **Bearing True (not Magnetic)**

- **Datum to be WGS84**

- **Same for handheld GPS to high end chart plotter**
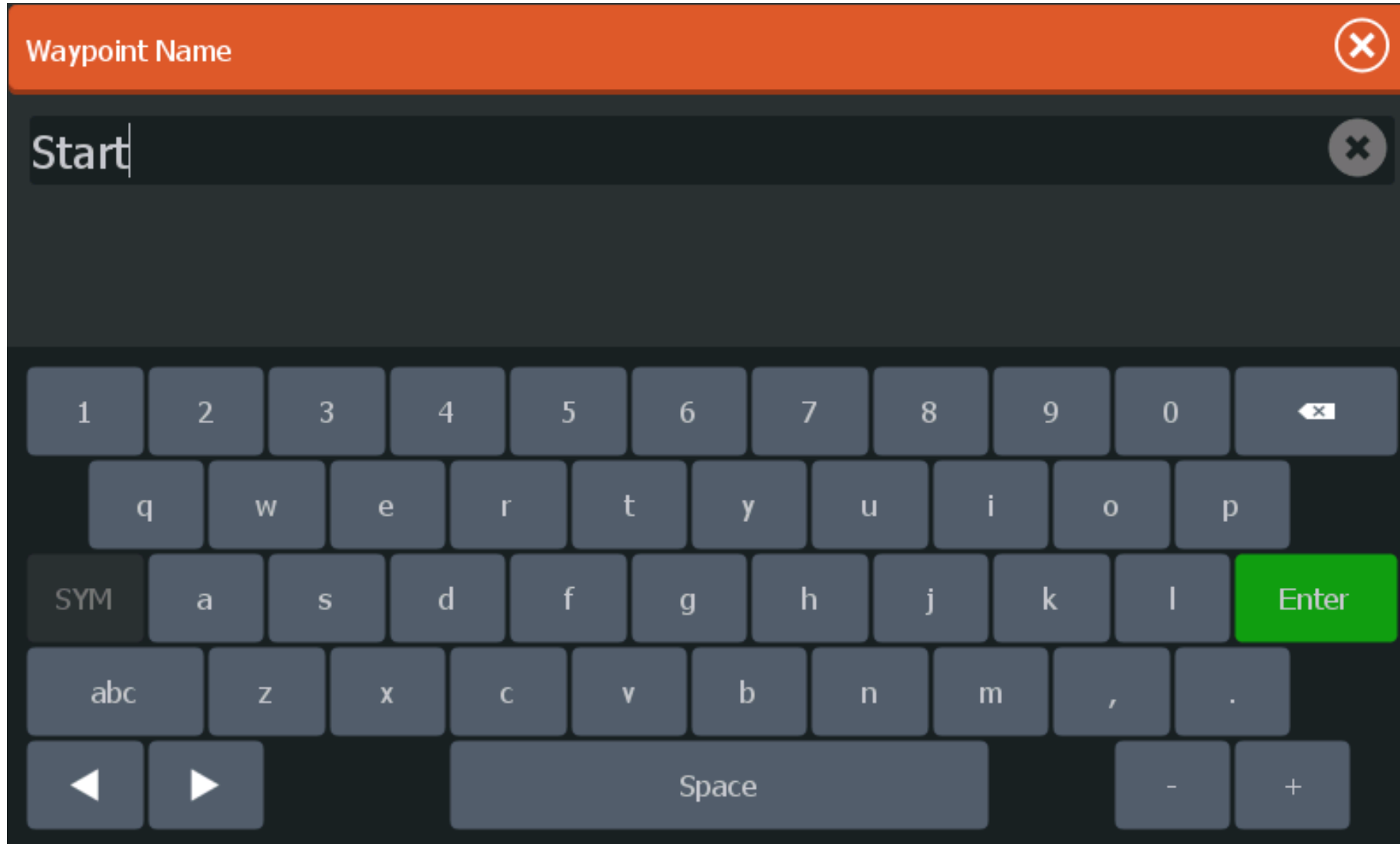
GPS – Create Waypoints 1

- **Calculate Nav Rally waypoint coordinates for turns (Refer Course Document)**

- **Enter Waypoints in GPS**

- **New waypoint menu shown**

GPS – Create Waypoints 2

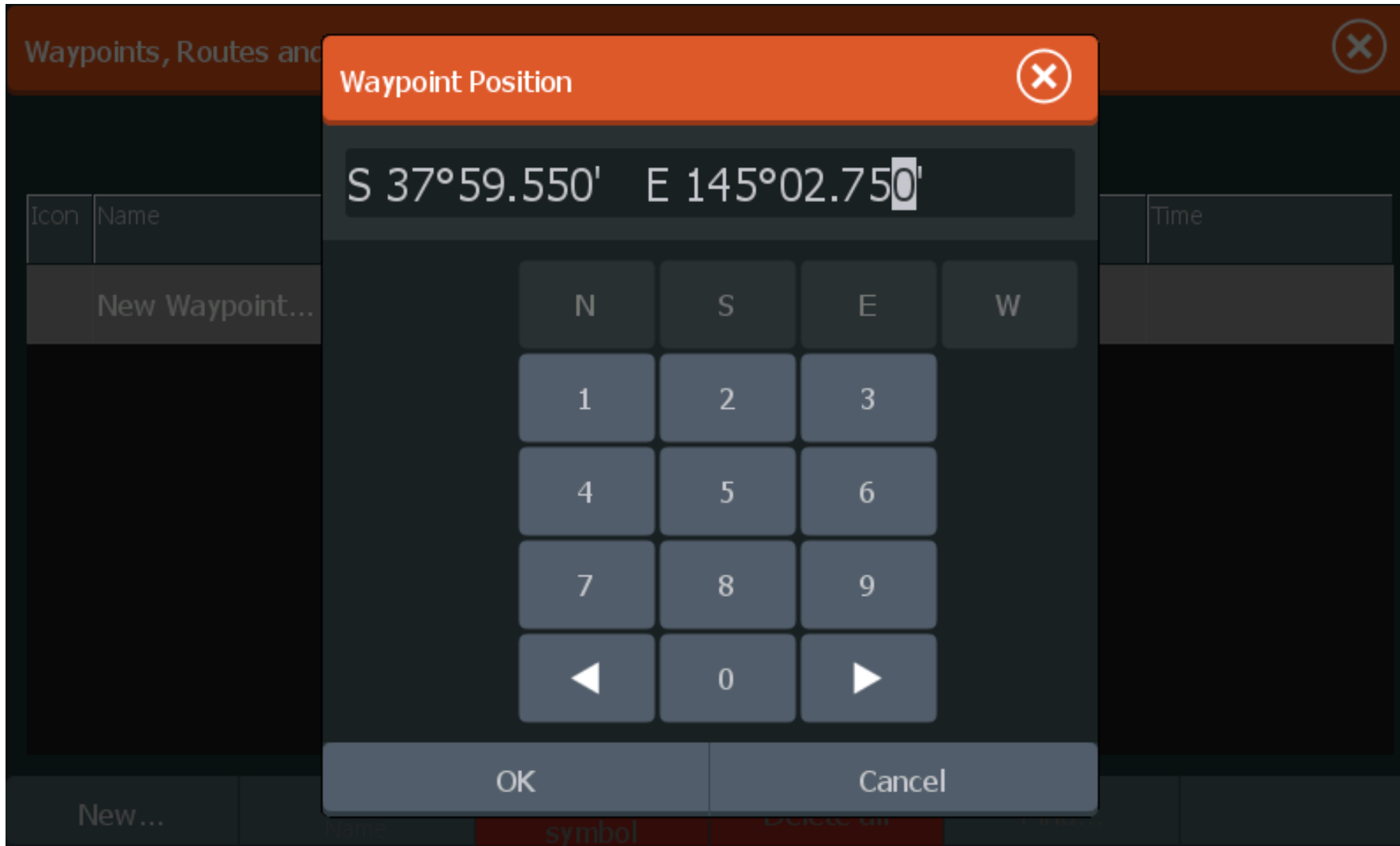

- **Calculate Nav Rally waypoint coordinates for turns (Refer Course Document)**

- **Enter Waypoints in GPS**

- **New waypoint shown**

Waypoints, Routes and Trails

| Waypoints | Routes | Trails |

| Icon | Name | Time |

New Waypoint...

New Waypoint at Vessel

001

S 38°16.405' E 145°01.007'

More options...

Save

Cancel

New...

Sort Name

Delete all by symbol

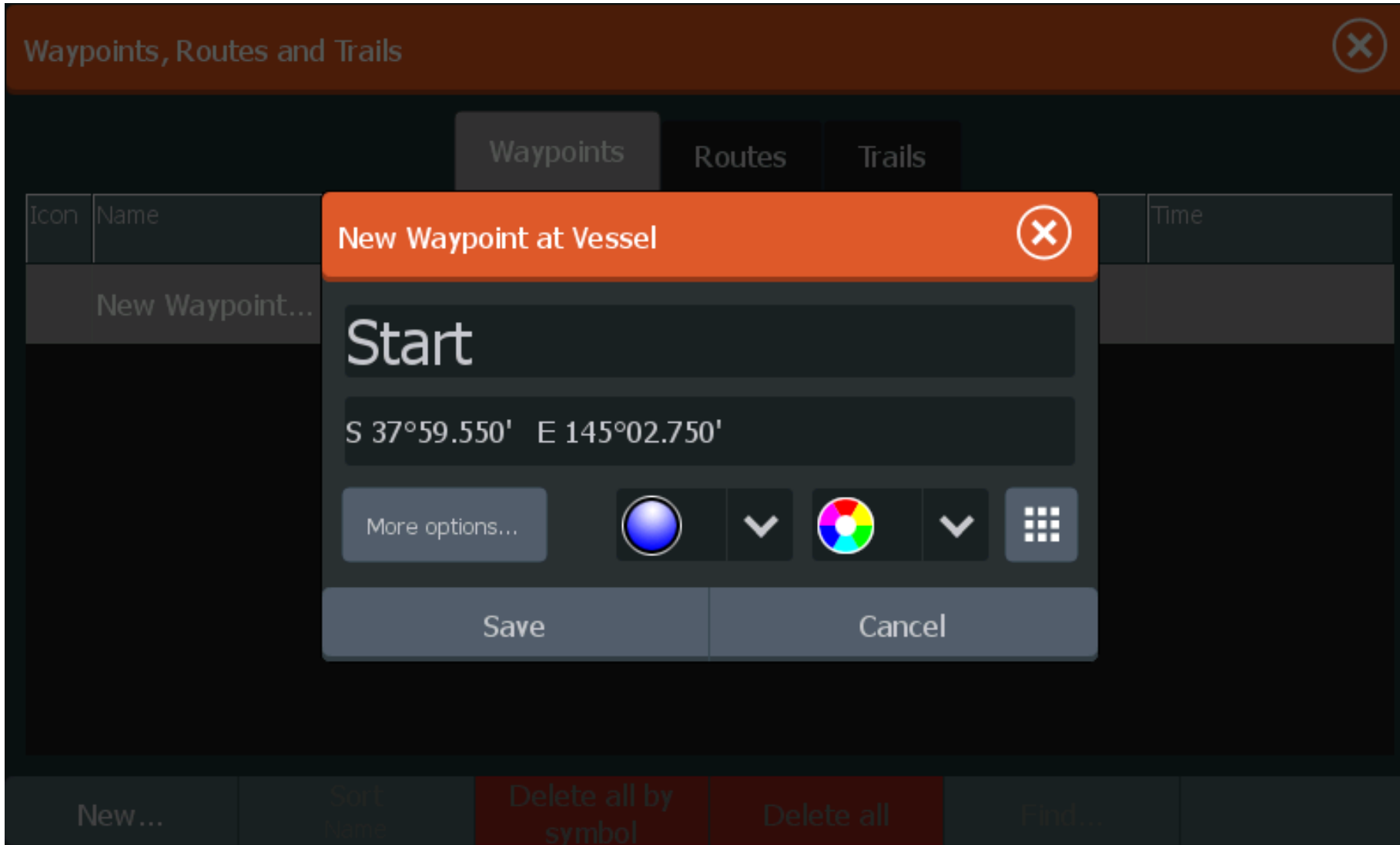Delete all

Find...

GPS – Create Waypoints 3

- **Calculate Nav Rally waypoint coordinates for turns (Refer Course Document)**

- **Enter Waypoints in GPS**

- **Waypoints name shown**

GPS – Create Waypoints 4

Waypoints, Routes and

Waypoint Position

S 37°59.550' E 145°02.750'

| | Icon | Name | | | | | | Time |

New Waypoint...

N	S	E	W
1	2	3
4	5	6
7	8	9
◀	0	▶

OK   Cancel

New...

name   symbol   Delete all

- **Calculate Nav Rally waypoint coordinates for turns (Refer Course Document)**

- **Enter Waypoints in GPS**

- **New waypoint menu shown**

GPS – Create Waypoints 5

- **Calculate Nav Rally waypoint coordinates for turns (Refer Course Document)**

- **Enter Waypoints in GPS**

- **New waypoint menu shown**

GPS – Create Waypoints 6

- **Calculate Nav Rally waypoint coordinates for turns (Refer Course Document)**

- **Enter Waypoints in GPS**

- **Create a waypoint for each Turn on the course**

GPS – Create Waypoints 7

- **Calculate Nav Rally waypoint coordinates for turns (Refer Course Document)**

- **Enter Waypoints in GPS**

- **Create a waypoint for each Turn on the course including Start and Finish**

GPS – Create Route for Course

Waypoints, Routes and Trails

	Waypoints	Routes	Trails		

Name	Start	End	Legs	Distance (NM)
New Route…				

New…   Delete all   Find…

- **Calculate Nav Rally waypoint coordinates for turns (Refer Course Document)**

- **Enter Waypoints in GPS**

- **Create a Route for the Nav Rally course**

GPS – Edit Route Name
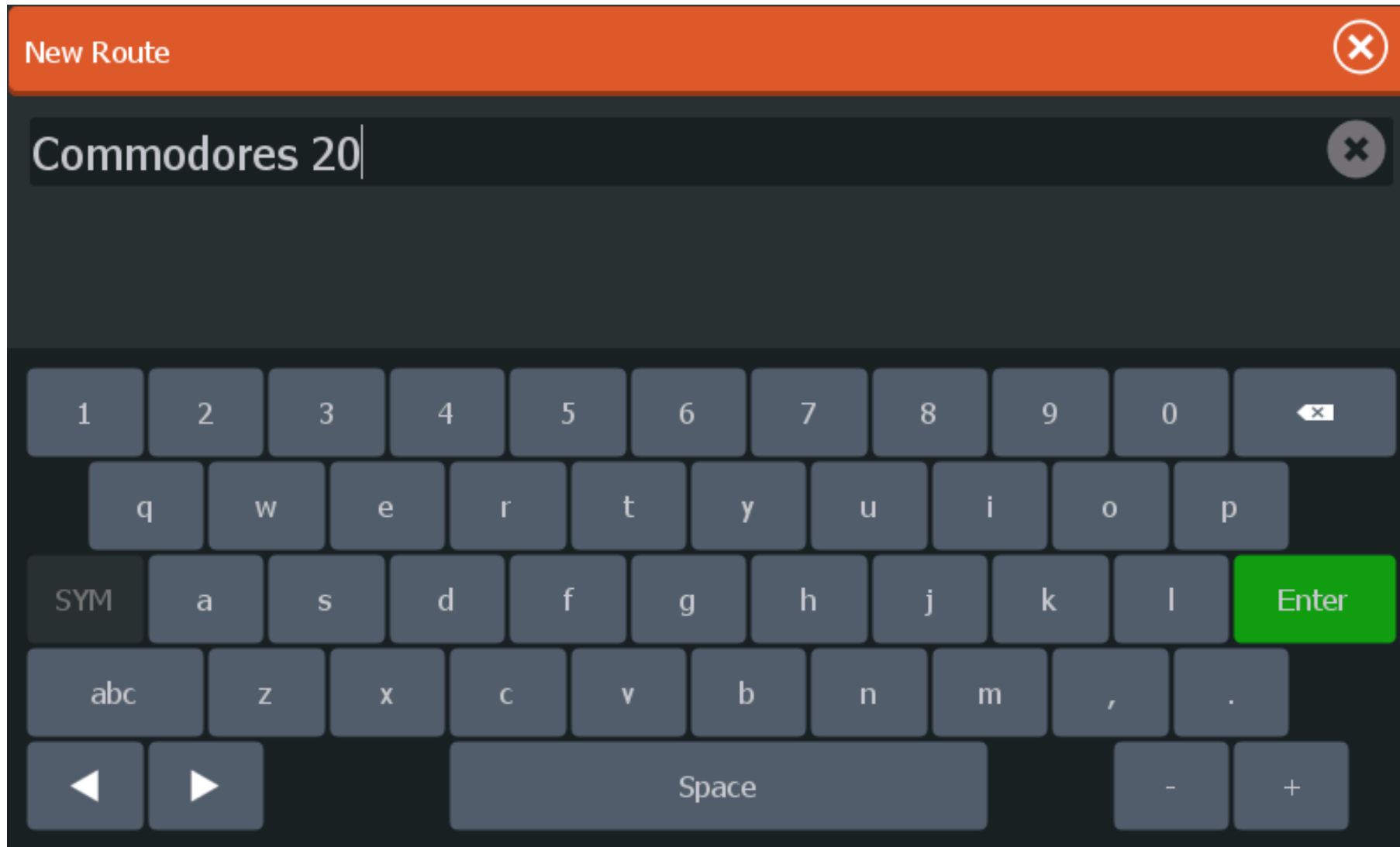
- **Calculate Nav Rally waypoint coordinates for turns (Refer Course Document)**

- **Enter Waypoints in GPS**

- **Create Route – Enter Name**

GPS – Route Add Waypoint
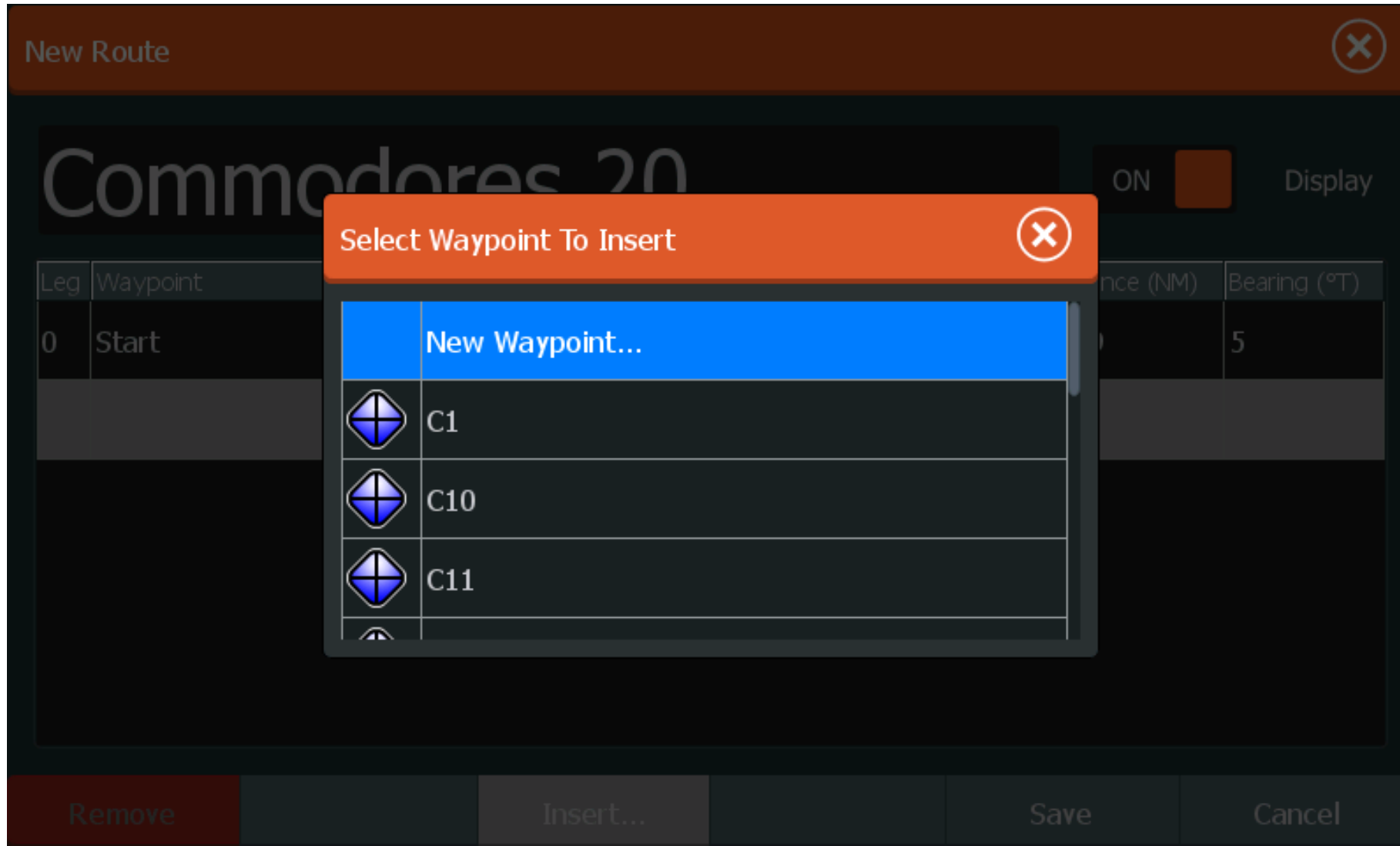
- **Calculate Nav Rally waypoint coordinates for turns (Refer Course Document)**

- **Enter Waypoints in GPS**

- **Create Route**

- **Add waypoint to Nav Rally Route from list in GPS**

GPS – Route Add Waypoints for Turns

New Route

Commodores 20

ON ▮ Display

Leg	Waypoint	Distance (NM)	Bearing (°T)
0	Start	16.9	5
1	C1	0.31	55
2	C2	0.32	142
3	C3	0.41	180

Remove | Insert... | | Save | Cancel

- **Calculate Nav Rally waypoint coordinates for turns (Refer Course Document)**

- **Enter Waypoints in GPS and create Route for course**

- **Add all Turn, Start and Finish waypoints**

GPS – Route - Waypoints for All Turns
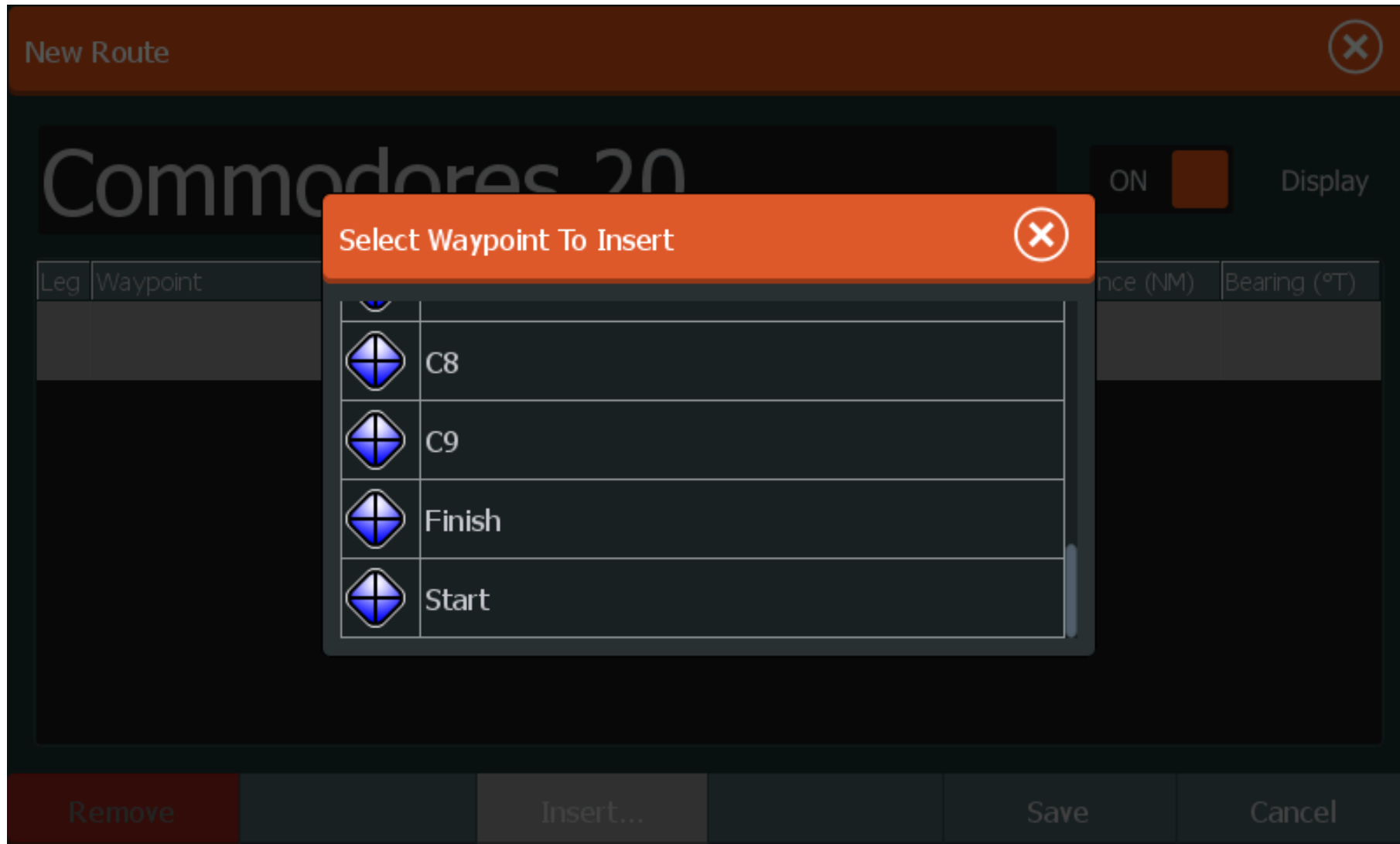
- **Calculate Nav Rally waypoint coordinates for turns (Refer Course Document)**

- **Enter Waypoints in GPS**

- **Add Start, Finish and Turn waypoints to route**

GPS – Route - Waypoints for All Turns

New Route

Commodores 20

ON ☐ Display

| Leg	Waypoint	Distance (NM)	Bearing (°T)
8	C8	1.30	358
9	C9	1.02	272
10	C10	0.81	4
11	C11	1.00	82
12	C12	0.44	51
13	Finish	0.62	33

Remove | Insert… | | Save | Cancel

- **Calculate Nav Rally waypoint coordinates for turns (Refer Course Document)**

- **Enter Waypoints in GPS**

- **Add Start, Finish and Turn waypoints to route**

- **You can insert intermediate waypoints in between the turns**

GPS – Route - Waypoints for All Turns

- **Calculate Nav Rally waypoint coordinates for turns (Refer Course Document)**

- **Enter Waypoints in GPS**

- **Add Start, Finish and Turn waypoints to route**

- **NavRally - Navigate Route using GPS**

Recap : Course -> Waypoints / Route -> NavRally -> Runsheet

COURSE INSTRUCTIONS

LEG	DEGREES (TRUE)	DISTANCE (Nm)	TOTAL DISTANCE (Nm)	LATITUDE		LONGITUDE	
Start				37 59.550	S	145 02.750	E
1	55	0.31	0.31	37 59.372	S	145 03.072	E
2	142	0.32	0.63	37 59.624	S	145 03.322	E
3	180	0.41	1.04	38 00.034	S	145 03.322	E
4	168	0.77	1.81	38 00.787	S	145 03.525	E
5	179	1.02	2.83	38 01.806	S	145 03.547	E
6	137	1.07	3.90	38 02.588	S	145 04.473	E
7	269	2.02	5.92	38 02.623	S	145 01.910	E
8	358	1.3	7.22	38 01.325	S	145 01.853	E
9	272	1.02	8.24	38 01.289	S	145 00.560	E
10	4	0.81	9.05	38 00.482	S	145 00.632	E
11	82	1.0	10.05	38 00.343	S	145 01.887	E
12	51	0.44	10.49	38 00.066	S	145 02.321	E
Finish	33	0.62	11.11	37 59.550	S	145 02.750	E

New Route

Commodores 20

ON   Display

Leg	Waypoint	Distance (NM)	Bearing (°T)
8	C8	1.30	358
9	C9	1.02	272
10	C10	0.81	4
11	C11	1.00	82
12	C12	0.44	51
13	Finish	0.62	33

Remove   Insert…   Save   Cancel

- **Navigation Route for the Nav Rally Course.**
- **Route is a series of connected waypoints.**
- **Create waypoints for Start, Turns and Finish**
- **Add series of waypoints to route**
- **View route on Chart**
- **Navigate the route for Nav Rally Course**
- **Use Run Sheet for Position and Time**

SKIPPER NAME: Roger Hartley

NAVIGATOR NAME : Brendan O'Donoghue

SPEED: **10 KN**

BOAT NAME

TACK-TRACK

POSITION	DIST	SPEED	TIME	TOTAL DIST	TOTAL TIME	ETA
START HEAD 220 TRUE	0.000	10	0:00:00	0.000	0:00:00	9:30:00
	0.000					
TURN TO 190 TRUE	0.900	10	0:05:24	0.900	0:05:24	9:35:24
Intermediate Position 1A	0.450	10	0:02:42	1.350	0:08:06	9:38:06
Intermediate Position 1B	0.480	10	0:02:53	1.830	0:10:59	9:40:59
Intermediate Position 1C	0.670	10	0:04:01	2.500	0:15:00	9:45:00
	0.000					
TURN TO 138 TRUE	2.220	10	0:13:19	3.120	0:18:43	9:48:43
	0.000					
TURN TO 48 TRUE	0.790	10	0:04:44	3.910	0:23:28	9:53:28

Running Sheet – Combines Position / Time

POSITION	DIST	SPEED	TIME	TOTAL DIST	TOTAL TIME	ETA	LAT.		LONG.		TURNNo.
SKIPPER NAME: Roger Hartley											
NAVIGATOR NAME : Brendan O'Donoghue		SPEED: **10 KN**				BOAT NAME: Black Pearl					
						TACK-TRACKER No: **BMYS 1**			RACE No: 9		
START HEAD 220 TRUE	0.000	10	0:00:00	0.000	0:00:00	9:30:00	37:59:550	S	145:02:750	E	START
	0.000										
TURN TO 190 TRUE	0.900	10	0:05:24	0.900	0:05:24	9:35:24	38:00:239	S	145:02:017	E	1
Intermediate Position 1A	0.450	10	0:02:42	1.350	0:08:06	9:38:06	38:00:685	S	145:01:912	E	
Intermediate Position 1B	0.480	10	0:02:53	1.830	0:10:59	9:40:59	38:01:160	S	145:01:805	E	
Intermediate Position 1C	0.670	10	0:04:01	2.500	0:15:00	9:45:00	38:01:825	S	145:01:659	E	
	0.000										
TURN TO 138 TRUE	2.220	10	0:13:19	3.120	0:18:43	9:48:43	38:02:423	S	145:01:528	E	2
	0.000										
TURN TO 48 TRUE	0.790	10	0:04:44	3.910	0:23:28	9:53:28	38:03:010	S	145:02:198	E	3
	0.000										
TURN TO 133 TRUE	1.000	10	0:06:00	4.910	0:29:28	9:59:28	38:02:342	S	145:03:141	E	4
	0.000										
TURN TO 68 TRUE	0.750	10	0:04:30	5.660	0:33:58	10:03:58	38:02:853	S	145:03:837	E	5
	0.000										
TURN TO 314 TRUE	0.910	10	0:05:28	6.570	0:39:25	10:09:25	38:02:512	S	145:04:908	E	6
	0.000										
TURN TO 358 TRUE	1.090	10	0:06:32	7.660	0:45:58	10:15:58	38:01:755	S	145:03:913	E	7
	0.000										
TURN TO 18 TRUE	0.770	10	0:04:37	8.430	0:50:35	10:20:35	38:00:987	S	145:03:879	E	8
	0.000										
TURN TO 28 TRUE	0.500	10	0:03:00	8.930	0:53:35	10:23:35	38:00:511	S	145:04:075	E	9
	0.000										
TURN TO 309 TRUE	0.400	10	0:02:24	9.330	0:55:59	10:25:59	38:00:158	S	145:04:313	E	10
Intermediate Position 10A	0.350	10	0:02:06	9.680	0:58:05	10:28:05	37:59:945	S	145:03:968	E	
Intermediate Position 10B	0.520	10	0:03:07	10.200	1:01:12	10:31:12	37:59:610	S	145:03:461	E	
	0.000										
TURN TO 236 TRUE	1.250	10	0:07:30	10.580	1:03:29	10:33:29	37:59:372	S	145:03:081	E	11
	0.000										
FINISH	0.316	10	0:01:54	10.896	1:05:23	10:35:23	37:59:550	S	145:02:750	E	END

- **Up to now emphasis on position.**

- **Be at known position at target time.**

- **Run sheet combines position and time**

- **Combination of position and time needed**

- **When running course need to be at each point at target time**

- **Keep it simple !**

Start and Finish

Start line 145 degrees from traffic lights through pole on end of jetty

°12A

A

Practice runup to start E.g 25 secs from known point before line

Get to start at your nominated time E.g 09:34
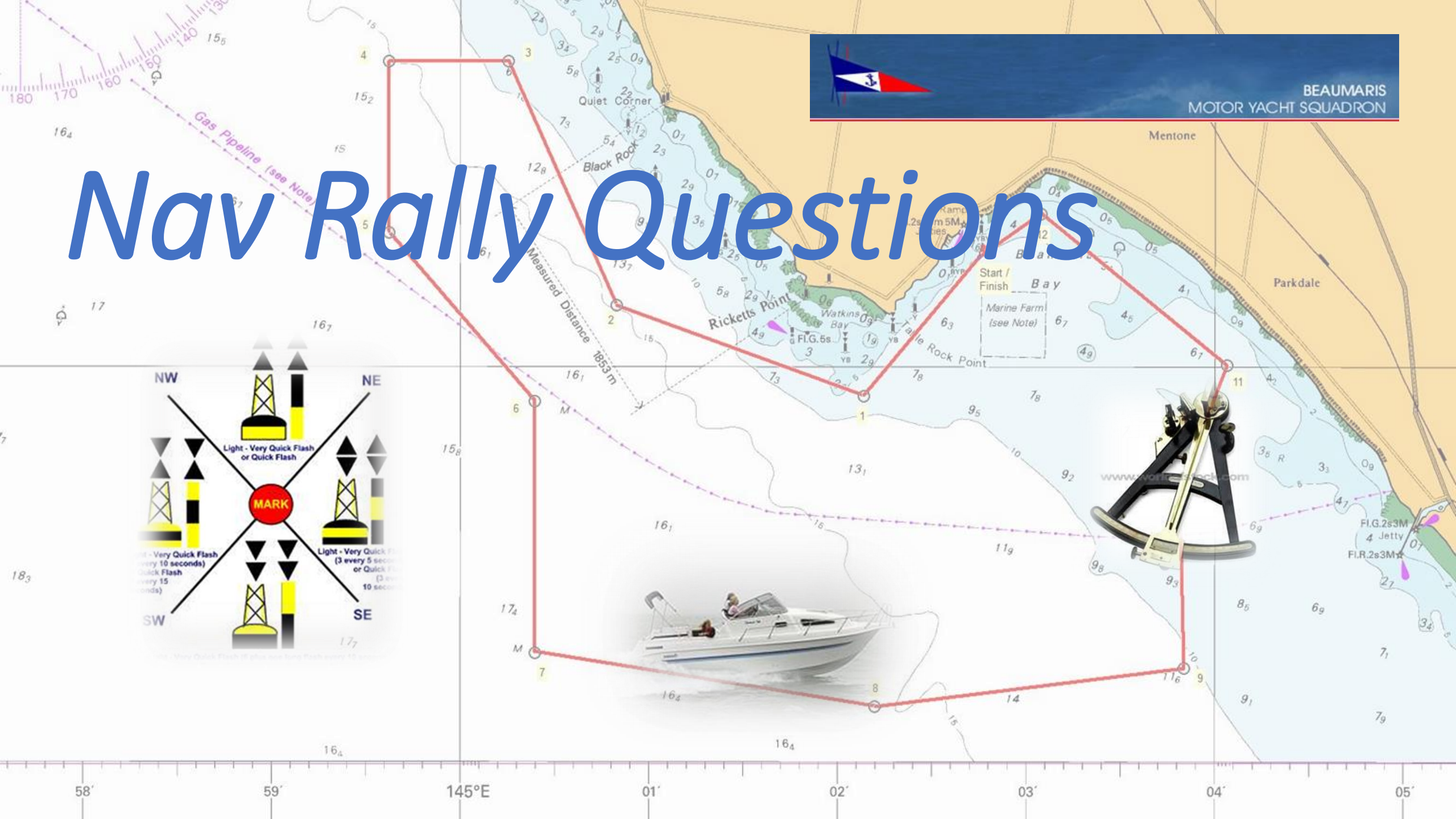
Start

- **Practice start timing run to start line. E.g. 25 secs from pre-start**

- **Start : 37 59.5500 S 145 02.7500 E**

- **Be at Start line at allocated time on run sheet.**

- **Running the course know where you are and meet target times**
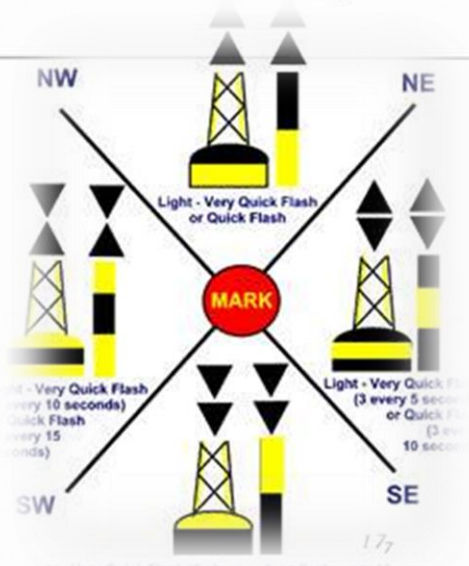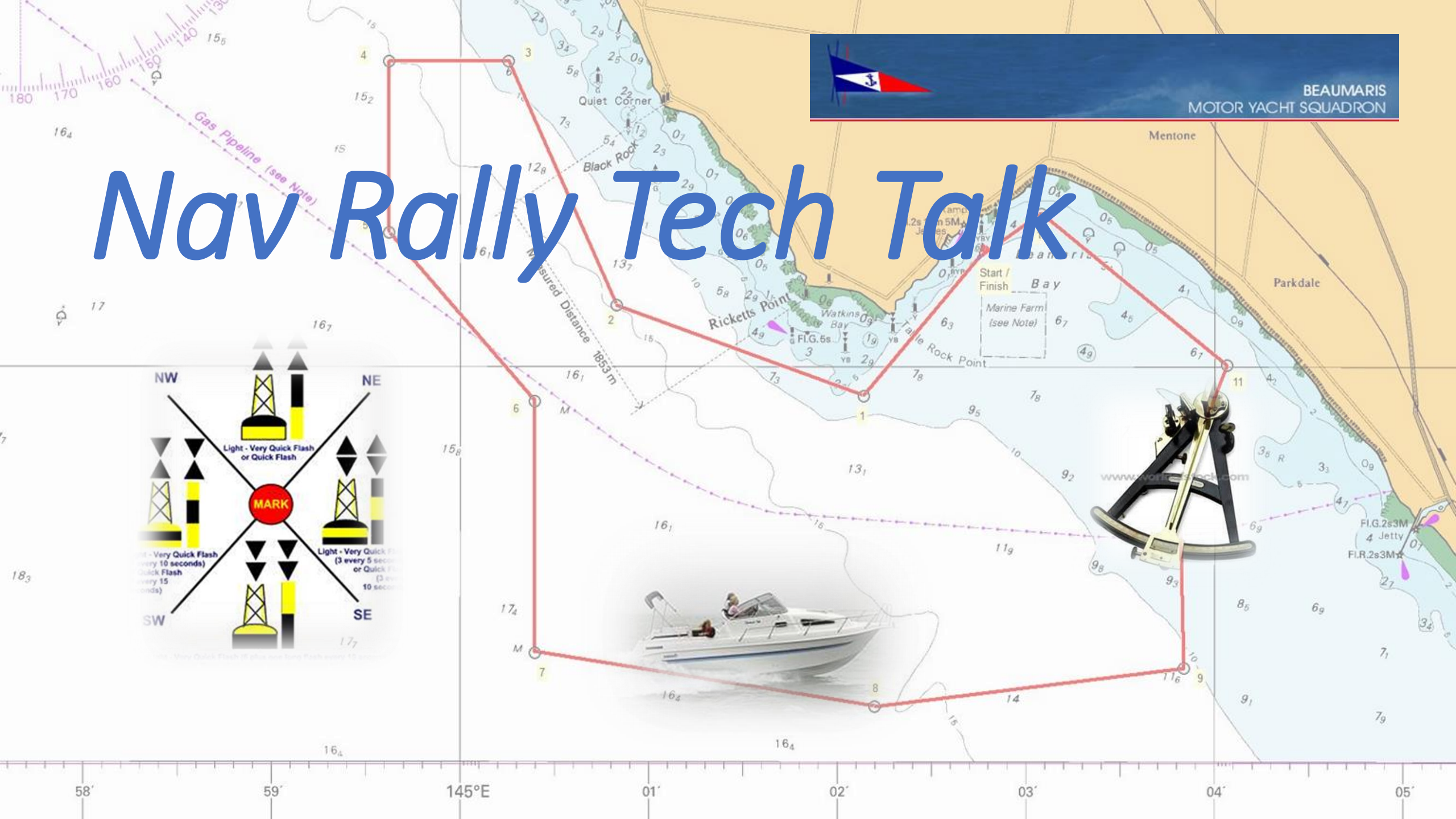
- **Keep it simple**

Useful Links and Resources

- http://www.gpsvisualizer.com/calculators
- http://www.bmys.com.au/want-to-know-how-to-do-a-nav-rally/
- http://williams.best.vwh.net/gccalc.htm
- http://edwilliams.org/gccalc.htm
- http://tacktracker.com/cloud/home/bmysnav
- http://opencpn.org/ocpn/
- http://opencpn.org/ocpn/download
- http://www.gpsoz.com.au/magellan_old/magellan_mapsendlite.htm
- http://www.movable-type.co.uk/scripts/latlong.html
- http://www.navigationplanner.com/
- http://www.lowrance.com/en-AU/Support/Documents/
- http://www.eaglenav.com.au/Downloads/GPS-Data-Manager-GDM/

Nav Rally Questions

Plotting the Course – Waypoint Coordinates

GPS Visualizer

http://www.gpsvisualizer.com/calculators

Find the coordinates at a given distance and bearing

This form will tell you what point lies at any distance and bearing from another point. If you don't supply units in the distance box itself (e.g., "100 mi"), it will default to kilometers. (The formula used here was adapted from "Sprong" by Dale Bickel at the FCC.)

Starting Lat., Lon.	Distance	Bearing		Ending Lat., Lon.	output format:
-37 59.55, 145 02.75	0.9 nm	220 °	—>	-38.0039829379, 145.0336	Google Map

Convert to DMM/DMS format

Turn 1 from Start
0.9 NM at
220 degrees

Leg 1 Intermediate
Change distance 1-2
to 0.1 NM

Tracks:
0.9 nm at 220° from
-37.9925,145.04583333333
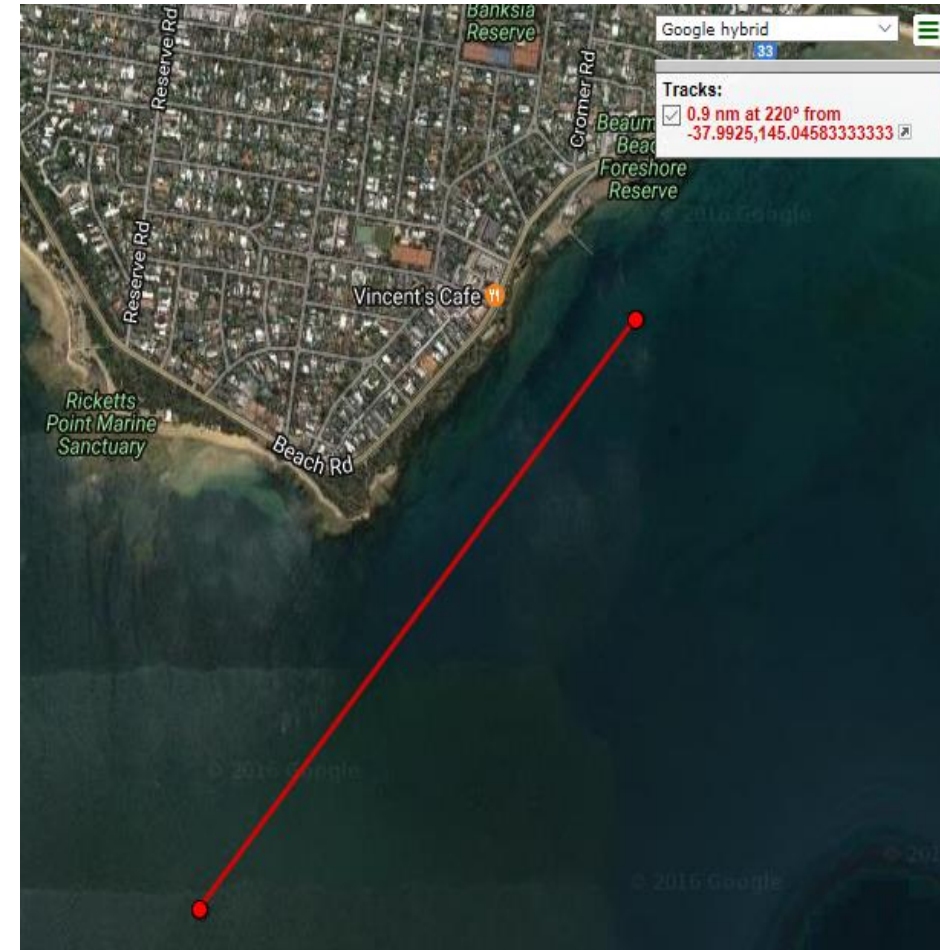
Plotting the Course – Waypoint Coordinates 2

Great Circle Calculator
http://edwilliams.org/gccalc.htm

Compute lat/lon given radial and distance from a known point

Enter lat/lon of initial point, true course and distance. Select distance units and earth model and click "compute". Lat/lons may be entered in DD.DD, DD:MM.MM or DD:MM:SS.SS formats.

Input data

Lat1		Lon1	
37:59.5500	S ⌄	145:02.750	E ⌄
Course 1-2		**Distance 1-2**	
220		0.9	

**Turn 1 from Start
0.9 NM at
220 degrees**

**Leg 1 Intermediate
Change distance 1-2
to 0.1 NM**

Output

Lat2		Lon2	
38:0.2402	S	145:2.0181	E

Units: nm ⌄ Earth model: WGS84/NAD83/GRS80 ⌄

Latitude Facts

- **1 NM = 1852 M**

- **1 degree Lat = 60NM**

- **1 minute Lat = 1 NM**

- **0.1 minute = 185.2M**

- **0.001 minute = 1.852M**

- **0.0001 minute = 0.1852M**

Plotting the Course – Waypoint Coordinates 3

Movable Type Scripts
http://www.movable-type.co.uk/scripts/latlong.html

Destination point given distance and bearing from start point
Given a start point, initial bearing, and distance, this will calculate the destination point and final bearing travelling along a (shortest distance) great circle arc.

Destination point along great-circle given distance and bearing from start point

Start point: 37°59.55'S , 145°02.75'E
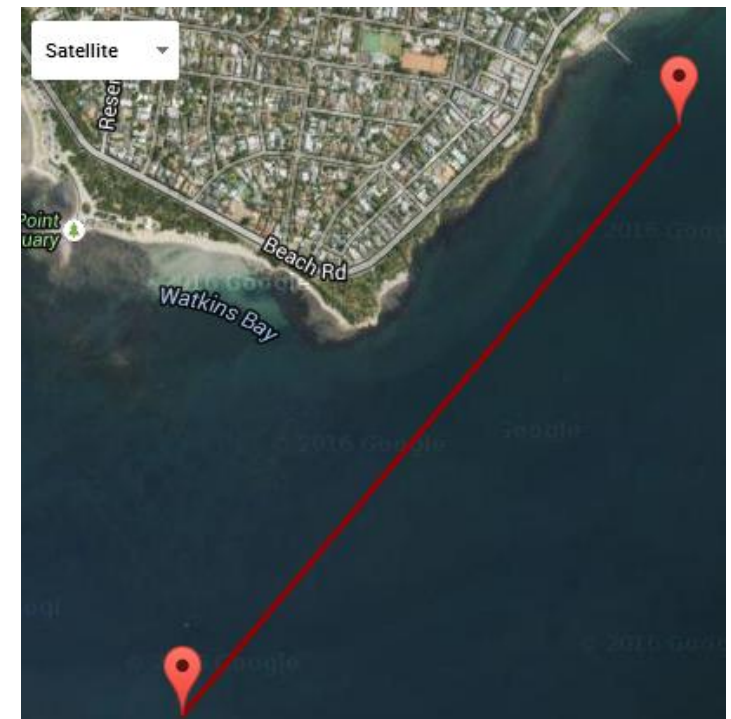
Bearing: 220°

Distance: 1.67 km

Destination point: **38°00'14"S, 145°02'01"E**

Final bearing: **220°00'27"**

hide map

**Turn 1 from Start
0.9 NM at
220 degrees**

**Leg 1 Intermediate
Change distance 1-2
to 0.1 NM**

Navigation Basics - 1

- Waypoint – set of coords for point in physical space. Used for navigation.

- Datum – WGS84 World Geodetic System Used by GPS

- Standard coordinate system for the Earth

- Route – set of connected waypoints. Nav Rally follows a Route. Setup route in your GPS

Navigation Basics - 2

- Chart AUS 155.
  Great reference. Not essential

- Time
  Telstra – 1194
  GPS satellites (very accurate)
  https://time.is/

- Know the time and where you
  are all the time

- Lots of free resources on the web
  (see ref slide)
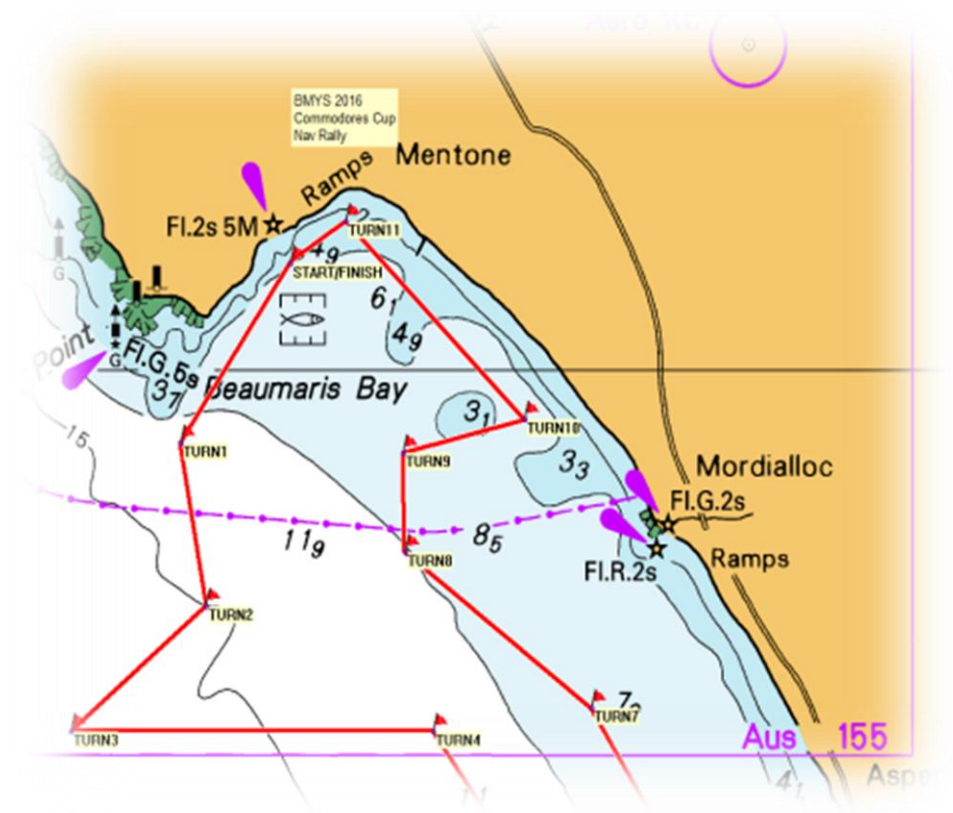
Time.is

Your clock is 1.5 seconds behind.
Accuracy of synchronization was ±0.142 seconds.
Time in Melbourne, Australia now:

15:28:27
Tuesday, January 3, 2017, week 1

What Information do you have?

- **Course Document has all key info**

- **Chart – AUS 143**
- **Timing - 1194**
- **Datum / Start**
- **Legs / Degrees**
- **Coordinates**

- **Running Sheet**

THE BEAUMARIS MOTOR YACHT SQUADRON

THE COMMODORE, BOATING COMMITTEE & MEMBERS

Present

THE WACKETT TROPHY NAV RALLY
On Sunday the 14th June 2015

Members of all clubs are invited to attend this event to be held at the Beaumaris Motor Yacht Squadron

Followed by lunch starting at 12:30 pm
Free to all Skippers & Navigators —$10 per head others

ENTER NOW FOR THIS GREAT EVENT

Entries close on Sunday 7th June 2015

Note: (This is a Kerr trophy event)

CHART: AUS 143   WGS 84

OFFICIAL TIME: Telstra **1194**, GPS Time

OFFICIAL START TIME: **0900** Hours

DATUM POINT: 1.0 Cable 145 degrees True from the seaward end of the BMYS jetty. (37 59.550 S   145 02.750 E WGS 84)

START / FINISH LINE: A line 145 degrees True through a flagpole on the seaward end of the BMYS jetty to three red lights on the clubhouse roof.

COURSE INSTRUCTIONS

LEG	DEGREES (TRUE)	DISTANCE (Nm)	TOTAL DISTANCE (Nm)	LATITUDE		LONGITUDE	
Start				37 59.550	S	145 02.750	E
1	220	0.9	0.90	38 00.239	S	145 02.017	E
2	190	2.22	3.12	38 02.423	S	145 01.528	E
3	138	0.79	3.91	38 03.010	S	145 02.198	E
4	48	1.0	4.91	38 02.342	S	145 03.141	E

SKIPPER NAME: Roger Hartley

NAVIGATOR NAME: Brendan O'Donoghue

SPEED: 10 KN

BOAT NAME

TACK-TRACK

POSITION	DIST	SPEED	TIME	TOTAL DIST	TOTAL TIME	ETA
START HEAD 220 TRUE	0.000	10	0:00:00	0.000	0:00:00	9:30:00
	0.000					
TURN TO 190 TRUE	0.900	10	0:05:24	0.900	0:05:24	9:35:24
Intermediate Position 1A	0.450	10	0:02:42	1.350	0:08:06	9:38:06
Intermediate Position 1B	0.480	10	0:02:53	1.830	0:10:59	9:40:59
Intermediate Position 1C	0.670	10	0:04:01	2.500	0:15:00	9:45:00
	0.000					
TURN TO 138 TRUE	2.220	10	0:13:19	3.120	0:18:43	9:48:43
	0.000					
TURN TO 48 TRUE	0.790	10	0:04:44	3.910	0:23:28	9:53:28

Plotting the Course – Legs and Turns

COURSE INSTRUCTIONS

LEG	DEGREES (TRUE)	DISTANCE (Nm)	TOTAL DISTANCE (Nm)	LATITUDE		LONGITUDE	
Start				37 59.550	S	145 02.750	E
1	55	0.31	0.31	37 59.372	S	145 03.072	E
2	141	0.79	1.1	37 59.986	S	145 03.702	E
3	160	0.62	1.72	38 00.568	S	145 03.971	E
4	232	0.76	2.48	38 01.035	S	145 03.212	E
5	136	1.31	3.79	38 01.977	S	145 04.366	E
6	210	0.73	4.52	38 02.609	S	145 03.903	E
7	295	2.2	6.72	38 01.680	S	145 01.373	E
8	355	0.39	7.11	38 01.292	S	145 01.330	E
9	270	0.61	7.72	38 01.292	S	145 00.556	E
10	4	0.82	8.54	38 00.474	S	145 00.629	E
11	85	1.03	9.57	38 00.384	S	145 01.930	E
12	44	0.44	10.01	38 00.068	S	145 02.318	E
Finish	33	0.62	10.63	37 59.550	S	145 02.750	E

=>
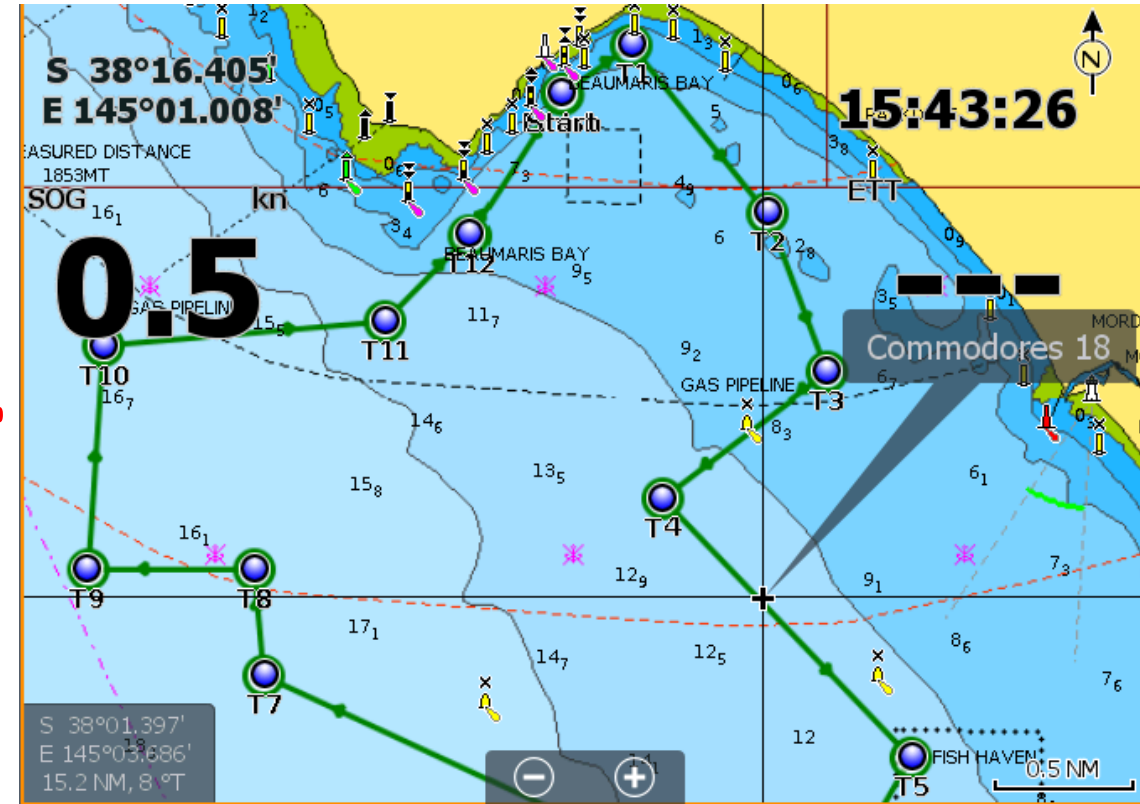
Course Instructions becomes Navigation Route – See how later ?

Plotting the Course – Easy GPS -> GPX File

- **Navigation Route for the Nav Rally Course.**
- **Route is a series of connected waypoints.**
- **Each waypoint has a name and Latitude Longitude coordinates.**
- **When running course need to be at each point at target time**

- **Easy GPS freeware in example**

Save course as GPX file

isle of mordy 2017.gpx

NEVER write to map card !

Plotting the Course – Transfer GPX to GPS

Details - isle of mordy 2017.gpx

Type	gpx
Size	11.2 kB
Created	31/01/2018
Modified	29/04/2017
User data file	

| Import | Copy | Rename | Delete |

Waypoints, Routes and Trails

Waypoints | Routes | Trails

| Name	Start	End	Legs	Distance (NM)
Commodores 18	Start	Finish	13	10.6
ISLE OF MORDY	pre start	finish	46	11.9
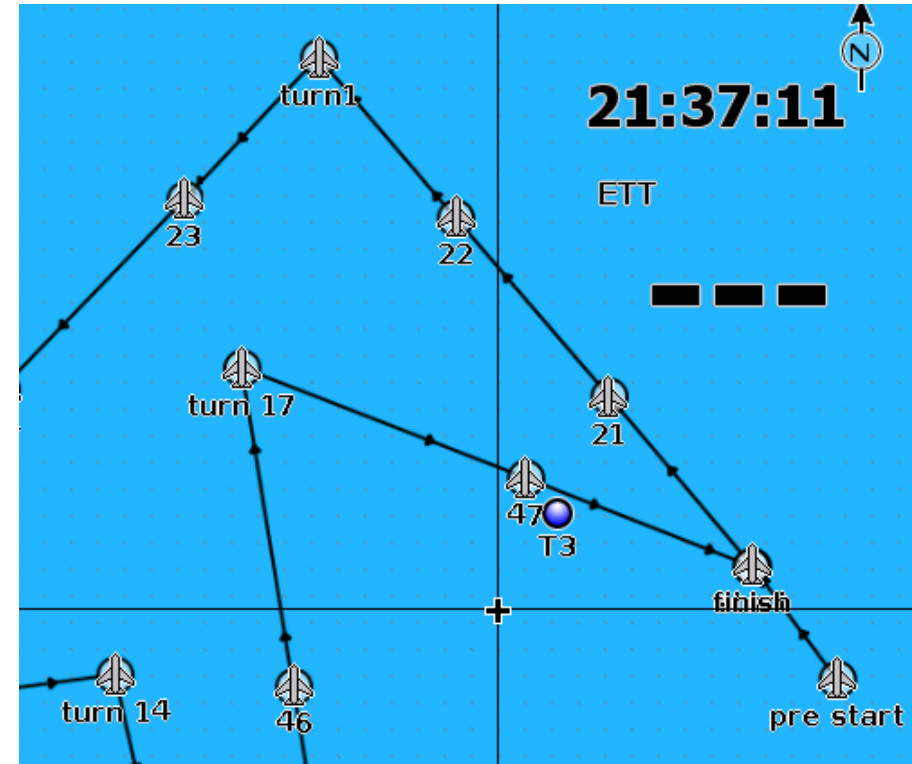
- **Import GPX file**

- **Creates waypoints and course**

- **Do all the work on laptop in the lounge room**

Enter & Setup your Boat

- Assemble crew – Skipper and Navigator

- Email entry to Brendan – week before event

- You will receive Running Sheet, event details, start time

- Prepare your navigation / GPS – Keep it simple

- Setup boat

- Other details from event manager - Brendan

GPS – Course Plotting Demo
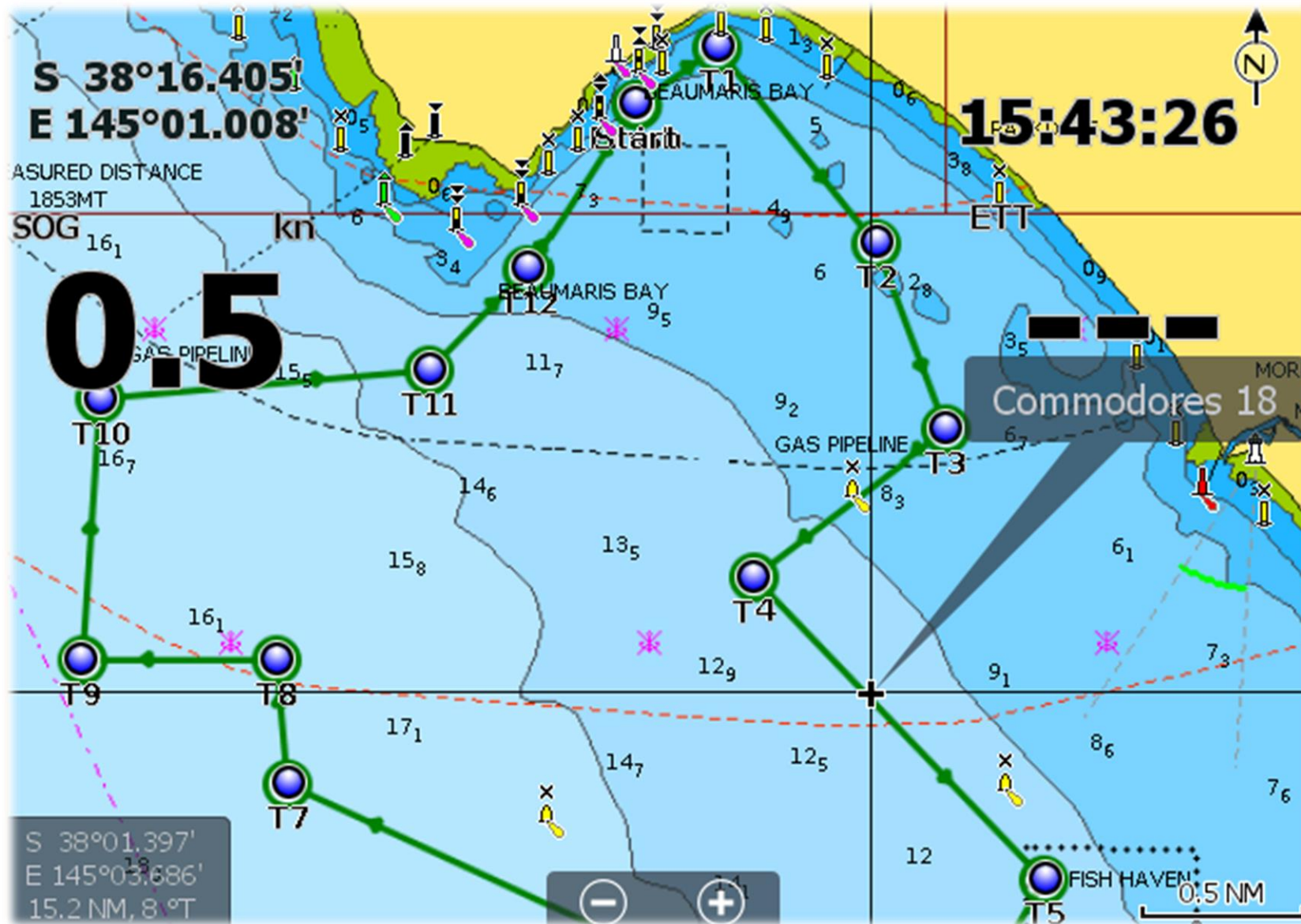
- **GPS Waypoints and Routes.**

- **How to create NavRally Route for the course**

- **Example with common GPS**

Tack Tracker – Demo

- **Tack Tracker used by BMYS to run events.**

- **Data logger in boat**

- **BMYS Home Page**

http://tacktracker.com/cloud/home/bmysnav