

RACE OFFICIALS NATIONAL CONFERENCE

Saturday 7th and Sunday 8th February 2015



GPS DECISIONS
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What we will cover:

- What GPS?
- What Settings?
- Do we need GPS?



What GPS?

- Personal Preference
- Cost
- Availability - Popularity
- Fixed or Hand Held



GPS Units





What GPS?

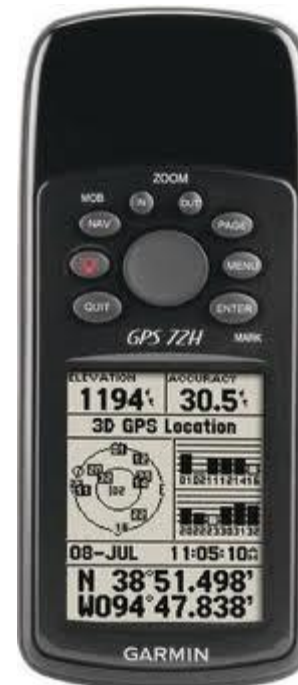
- Fixed Units
 - Touch screen
 - Keypads or Rocker Button
 - Resolution
- Handheld Units
 - Rocker control
 - Buttons
 - Screen Displays





The current Unit of Choice

Garmin GPS 72H





Whatever unit you decide to use:



Know the controls

Know how to use it!!!



What Settings?



Set up of GPS:

- Set up if NEW
- Select Units
- Language
- Bearings
- Display Screens



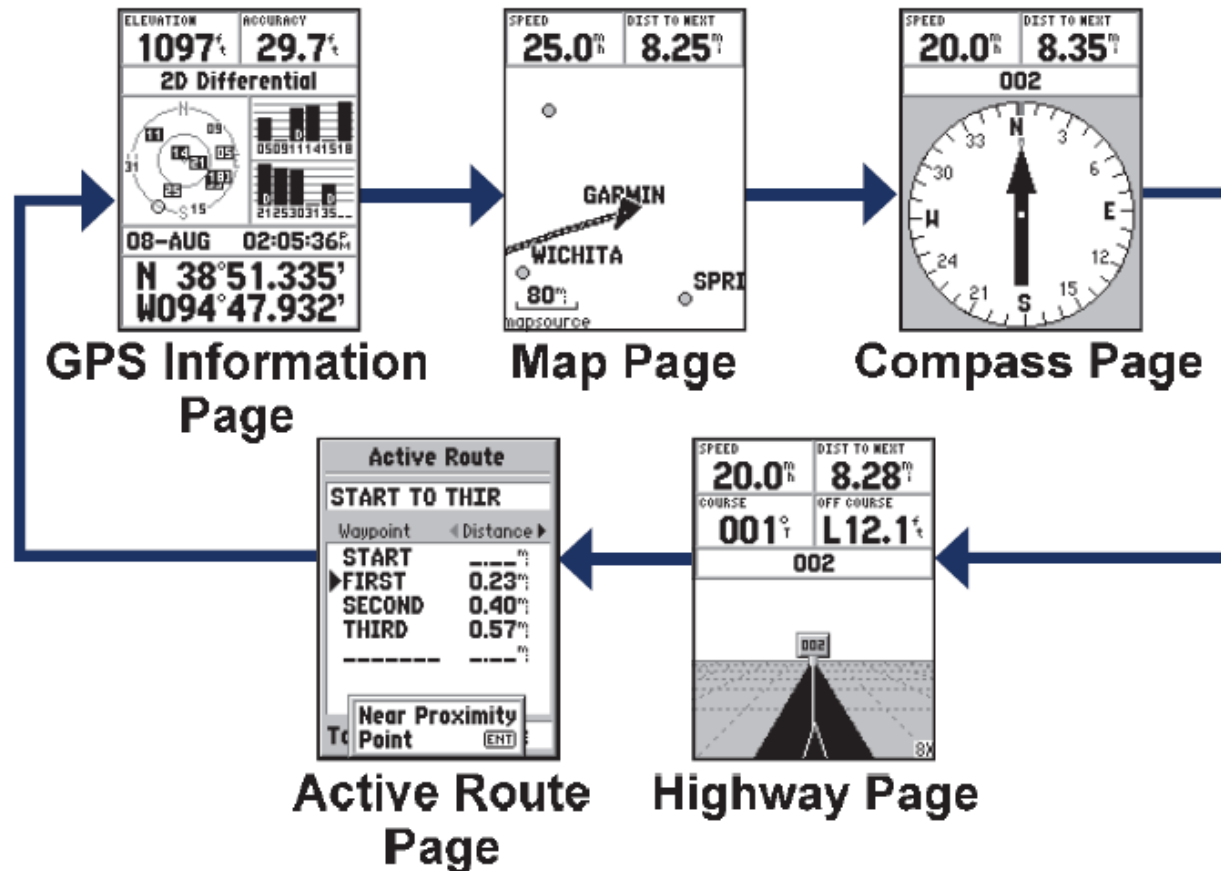
Select Units

It helps if everybody is on the same units:

- Time Format 24 Hour
- Time Zone UTC
- Daylight Saving Time
- Location Format hddd°mm.mmm'
- Map Datum WGS84
- North Reference Magnetic



Display Screens





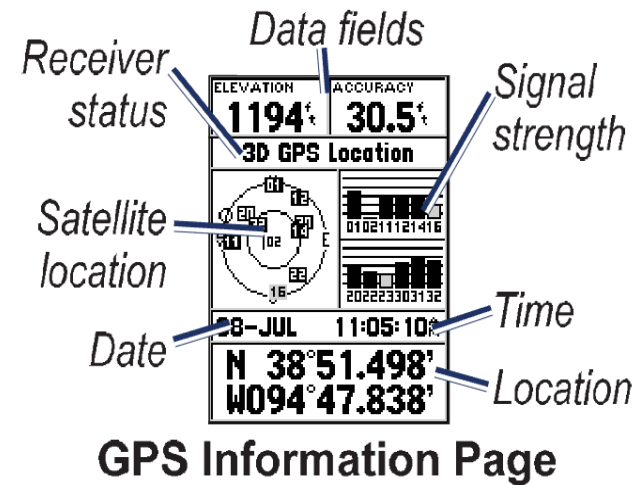
What screens do we need?

- GPS Information Page Yes-at start up
- Map Page Yes-our working screen
- Compass Page An option to above
- Active Route Page No
- Highway Page No



GPS Information Page

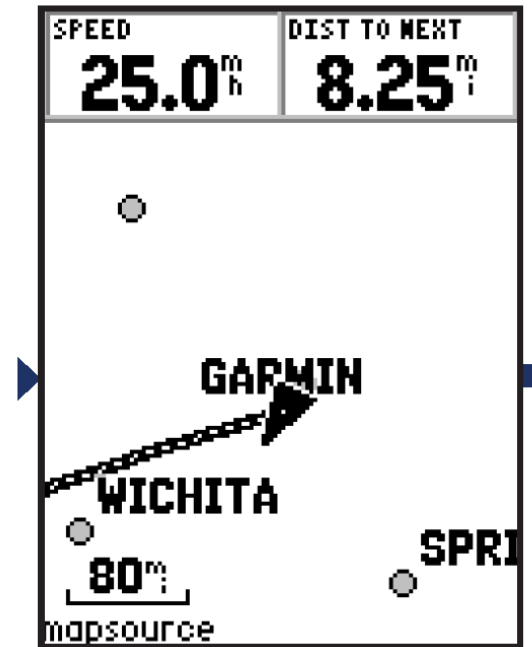
- Confirms unit is working
- Confirms receiving Satellite Signals
- Confirms Date and Time Settings
- Confirms correct Lat/Long format





Map Page

- This is your working screen.
- The screen can be set with a number of data fields from a fixed list.



Map Page



Data Fields

- A whole range to choose from.

Data Field	Description
Accuracy	The accuracy of the GPS signal.
Bearing	The direction from your current location to a destination.
Course	The direction from your starting location to a destination.
Depth	The depth of the water. Requires a NMEA 0183 device connection to acquire data.



Data Fields

Data Field	Description
Dist to Destination (distance)	The distance from a current location to a GO TO destination or final waypoint.
Dist to Next (distance)	Distance from a current location to a GO TO destination or the next waypoint.
ETA at Destination (estimated time of arrival)	Estimated time you will reach a GO TO destination or final waypoint.
ETA at Next (estimated time of arrival)	Estimated time you will reach a GO TO destination or next waypoint.
Elevation	Height above mean sea level (MSL).

Data Field	Description
Maximum Speed	The maximum speed.
Moving Avg Speed (average)	Average speed of the GPS 72H while moving.
Moving Trip Timer	Total time the GPS 72H has been moving.
Off Course	The distance (left or right) you are from the original course (path of travel).
Pointer	The data field arrow points in the direction you are traveling.
Speed	Displays rate of current speed.

Data Field	Description
Time of Day	Current time of day based on time settings. See page 25 .
Time to Destination	The estimated time required to reach a GO TO destination, or the final waypoint in a route.
Time to Next	The estimated time required to reach a GO TO destination, or the next waypoint in a route.
To Course	Direction you must travel to return to route.

Data Field	Description
Total Avg Speed (average)	Average speed of the GPS 72H for both moving and stopped speeds since last timer reset.
Total Trip Timer	Total time the device has been in operation since last reset of the trip timers.
Track	The direction of movement relative to a ground position.
Trip Odometer	A running tally of distance traveled since last reset. See page 20 .



Map Page – Data Fields

From the list the following are the most useful to Mark Layers

- Bearing
- Dist to Destination
- The compass bearing / direction from your current location to a destination
- The distance from a current position to a GO TO destination or waypoint



Course Setting

- Having 'set up' your GPS you can look at the actual course setting
- There are three 'games' that Mark Layers play to accurately set a course. All involve GPS
- GPS is used to accurately set Distances and Angles



Course Setting

- **Join the Dots** – one boat runs around the course and sets each mark in order
- **Chain Reaction** – Each boat has a mark and each mark is laid in relation to the previous
- **Numbers Game** – each boat has a mark and finds the position as a bearing and distance from a Reference Point



Do we need GPS?



No GPS?

- Course Distance – Boat Log / Guess
- Bearings – Hand Held Compass
- Course Laying – Join the dots / Chain Reaction



With GPS

- Enables Distance measurements
- Allows for courses set to a Target Time
- Enables use of Reference Method



With GPS

- Accuracy – Time / Speed Charts

SAILING COURSE TIMES

470 Men

TRAPEZOID COURSE

Target Time 50 minutes

Wind Range	5 - 8 Knots						8 - 12 Knots						12 - 15 Knots						15+ Knots					
	18 mins/mile			Up Time (mins)	Down Time (mins)	16 mins/mile			Up Time (mins)	Down Time (mins)	12 mins/mile			Up Time (mins)	Down Time (mins)	11 mins/mile			Up Time (mins)	Down Time (mins)				
	16 mins/mile					11 mins/mile					9 mins/mile					8 mins/mile								
	11 mins/mile					8 mins/mile					6 mins/mile					6 mins/mile								
Leg Length Nautical Miles	O2 / I2	O3 / I3	O4 / I4	O2 / I2	O3 / I3	O4 / I4	O2 / I2	O3 / I3	O4 / I4	O2 / I2	O3 / I3	O4 / I4	O2 / I2	O3 / I3	O4 / I4									
0.3	23.6	33.5	43.4	5.3	4.7	18.4	26.2	34.0	4.7	3.2	13.9	19.9	25.9	3.5	2.6	13.0	18.6	24.1	3.3	2.3				
0.4	31.0	44.2	57.4	7.0	6.2	24.1	34.5	44.9	6.2	4.2	18.3	26.3	34.3	4.6	3.4	17.1	24.5	31.9	4.4	3.0				
0.5	38.3	54.8	71.3	8.8	7.8	29.8	42.8	55.8	7.8	5.3	22.6	32.6	42.6	5.8	4.3	21.1	30.4	39.6	5.5	3.8				
0.6	45.6	65.4	85.2	10.5	9.3	35.6	51.2	66.8	9.3	6.3	27.0	39.0	51.0	6.9	5.1	25.2	36.3	47.4	6.6	4.5				
0.7	52.9	76.0	99.1	12.3	10.9	41.3	59.5	77.7	10.9	7.4	31.4	45.4	59.4	8.1	6.0	29.3	42.2	55.2	7.7	5.3				
0.8	60.3	86.7	113.1	14.0	12.4	47.0	67.8	88.6	12.4	8.4	35.7	51.7	67.7	9.2	6.8	33.3	48.1	62.9	8.8	6.0				
0.9	67.6	97.3	127.0	15.8	14.0	52.8	76.2	99.6	14.0	9.5	40.1	58.1	76.1	10.4	7.7	37.4	54.0	70.7	9.9	6.8				
1.0	74.9	107.9	140.9	17.5	15.5	58.5	84.5	110.5	15.5	10.5	44.5	64.5	84.5	11.5	8.5	41.5	60.0	78.5	11.0	7.5				
1.1	82.2	118.5	154.8	19.3	17.1	64.2	92.8	121.4	17.1	11.6	48.8	70.8	92.8	12.7	9.4	45.5	65.9	86.2	12.1	8.3				
1.2	89.6	129.2	168.8	21.0	18.6	69.9	101.1	132.3	18.6	12.6	53.2	77.2	101.2	13.8	10.2	49.6	71.8	94.0	13.2	9.0				
1.3	96.9	139.8	182.7	22.8	20.2	75.7	109.5	143.3	20.2	13.7	57.5	83.5	109.5	15.0	11.1	53.6	77.7	101.7	14.3	9.8				
1.4	104.2	150.4	196.6	24.5	21.7	81.4	117.8	154.2	21.7	14.7	61.9	89.9	117.9	16.1	11.9	57.7	83.6	109.5	15.4	10.5				
1.5	111.5	161.0	210.5	26.3	23.3	87.1	126.1	165.1	23.3	15.8	66.3	96.3	126.3	17.3	12.8	61.8	89.5	117.3	16.5	11.3				



Reference Method

- Allows Mark Boats to be spread around course area.
- Each Mark laid independent of all others
- You do need the charts



Trapezoid Course 70°, 110° interior angles

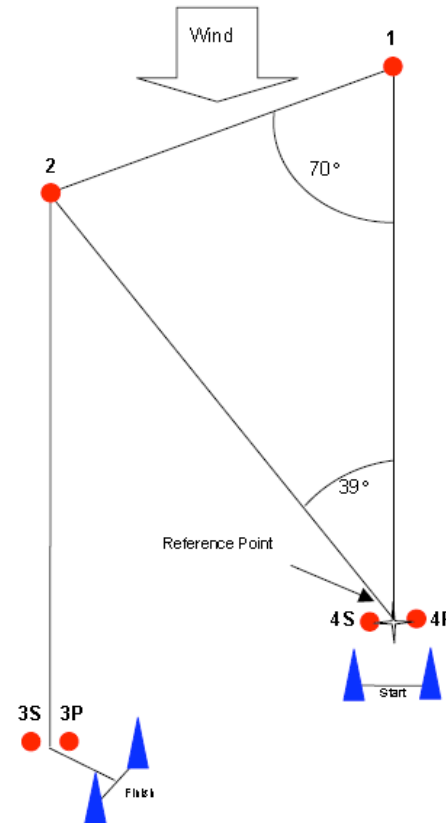
Course Axis	Trapezoid Course 70, 110 interior angles								
4 - 1	1 - 4	4 - 2	2 - 4	4 - 3	3 - 4	Signal	Pin -	3 -	Finish
3 - 2	2 - 3	4 - 2	2 - 4	1 - 2	2 - 1	- Pin	Signal	Finish	- 3
000	180	321	141	250	070	270	090	110	290
005	185	326	146	255	075	275	095	115	295
010	190	331	151	260	080	280	100	120	300
015	195	336	156	265	085	285	105	125	305
020	200	341	161	270	090	290	110	130	310
025	205	346	166	275	095	295	115	135	315
030	210	351	171	280	100	300	120	140	320
035	215	356	176	285	105	305	125	145	325
040	220	001	181	290	110	310	130	150	330
045	225	006	186	295	115	315	135	155	335
050	230	011	191	300	120	320	140	160	340
055	235	016	196	305	125	325	145	165	345
060	240	021	201	310	130	330	150	170	350
065	245	026	206	315	135	335	155	175	355
070	250	031	211	320	140	340	160	180	000
075	255	036	216	325	145	345	165	185	005
080	260	041	221	330	150	350	170	190	010
085	265	046	226	335	155	355	175	195	015
090	270	051	231	340	160	000	180	200	020
095	275	056	236	345	165	005	185	205	025
100	280	061	241	350	170	010	190	210	030
105	285	066	246	355	175	015	195	215	035
110	290	071	251	000	180	020	200	220	040
115	295	076	256	005	185	025	205	225	045
120	300	081	261	010	190	030	210	230	050
125	305	086	266	015	195	035	215	235	055
130	310	091	271	020	200	040	220	240	060
135	315	096	276	025	205	045	225	245	065
140	320	101	281	030	210	050	230	250	070
145	325	106	286	035	215	055	235	255	075
150	330	111	291	040	220	060	240	260	080
155	335	116	296	045	225	065	245	265	085
160	340	121	301	050	230	070	250	270	090
165	345	126	306	055	235	075	255	275	095
170	350	131	311	060	240	080	260	280	100
175	355	136	316	065	245	085	265	285	105

Course Axis	1 - 4	4 - 2	2 - 4	4 - 3	3 - 4	Signal	Pin -	3 -	Finish
3 - 2	2 - 3	4 - 2	2 - 4	1 - 2	2 - 1	- Pin	Signal	Finish	- 3
180	360	141	321	070	250	090	270	290	110
185	005	146	326	075	255	095	275	295	115
190	010	151	331	080	260	100	280	300	120
195	015	156	336	085	265	105	285	305	125
200	020	161	341	090	270	110	290	310	130
205	025	166	346	095	275	115	295	315	135
210	030	171	351	100	280	120	300	320	140
215	035	176	356	105	285	125	305	325	145
220	040	181	001	110	290	130	310	330	150
225	045	186	006	115	295	135	315	335	155
230	050	191	011	120	300	140	320	340	160
235	055	196	016	125	305	145	325	345	165
240	060	201	021	130	310	150	330	350	170
245	065	206	026	135	315	155	335	355	175
250	070	211	031	140	320	160	340	000	180
255	075	216	036	145	325	165	345	005	185
260	080	221	041	150	330	170	350	010	190
265	085	226	046	155	335	175	355	015	195
270	090	231	051	160	340	180	000	020	200
275	095	236	056	165	345	185	005	025	205
280	100	241	061	170	350	190	010	030	210
285	105	246	066	175	355	195	015	035	215
290	110	251	071	180	000	200	020	040	220
295	115	256	076	185	005	205	025	045	225
300	120	261	081	190	010	210	030	050	230
305	125	266	086	195	015	215	035	055	235
310	130	271	091	200	020	220	040	060	240
315	135	276	096	205	025	225	045	065	245
320	140	281	101	210	030	230	050	070	250
325	145	286	106	215	035	235	055	075	255
330	150	291	111	220	040	240	060	080	260
335	155	296	116	225	045	245	065	085	265
340	160	301	121	230	050	250	070	090	270
345	165	306	126	235	055	255	075	095	275
350	170	311	131	240	060	260	080	100	280
355	175	316	136	245	065	265	085	105	285



70° Trapezoid Course Lengths to Marks and Course Lengths – Equal beats 1-2 two thirds of beat length
Start 0.05 nm downwind of 4S/4P and Finish 0.15 nm from 3S/3P

Leg lengths		
4 - 1 & 1 - 4 2 - 3 & 3 - 2	4 - 2 & 2 - 4	1 - 2 & 2 - 1 4 - 3 & 3 - 4
0.20	0.20	0.13
0.25	0.25	0.17
0.30	0.30	0.20
0.35	0.35	0.23
0.40	0.40	0.27
0.45	0.45	0.30
0.50	0.50	0.33
0.55	0.55	0.37
0.60	0.60	0.40
0.65	0.65	0.43
0.70	0.70	0.47
0.75	0.75	0.50
0.80	0.80	0.53
0.85	0.85	0.57
0.90	0.89	0.60
0.95	0.94	0.63
1.00	0.99	0.67
1.10	1.09	0.73
1.20	1.19	0.80
1.30	1.29	0.87
1.40	1.39	0.93
1.50	1.49	1.00
1.60	1.59	1.07
1.70	1.69	1.13
1.80	1.79	1.20
1.90	1.89	1.27
2.00	1.99	1.33





When might you not use the GPS?

- GPS Accuracy
- Gates / Short Start Lines
- Range Finder





In summary

- GPS very good for longer distances
- Hand bearing compass to confirm GPS angles
- Combine technology with traditional methods



Any Questions?