Editing Garmin BlueCharts

Correcting Blue Chart Charts V1.0

BakuMatt 5/23/2007

This document is intended for those who wish to make minor corrections to BlueChart information displayed on a Garmin GPS, although the same principles could be extended to creating a chart from scratch. This is intended as a beginners guide, for more detail read the Marine Charts section in the cGPSMapper manual.

A short tutorial approach is used to walk the user through making a minor modification to a chart, to display with the base BlueChart on a Garmin GPS. Though this example uses a GPS 276c for the screen shots, the same approach should work for Garmin GPS units which support uploading charts from Mapsource.

This document assumes the user has some familiarity with MapSource and the principles of a GPS.

The following software is needed for the tutorial, as Shareware or Freeware.

GPSMapEdit - http://www.geopainting.com/en/ This is used to draw and trace the corrections to the chart.

cGPSmapper - http://cgpsmapper.com/marine.htmThe marine version of the compiler.

MapSetToolKit - http://cypherman1.googlepages.com/home A loader to load the files into MapSource.

OziExplorer - http://www.oziexplorer.com/ A GPS utility, though the only function this tutorial uses is the functionality in the free version of a two point image calibration for later use in GPSMapEdit

Optionally Google Earth may also be of value, as well as some image utilities to convert screenshots to Bitmaps, if the free version of OziExplorer is used, which only supports BitMap images.

I would like to acknowledge the authors of all of the above, and Rafal Fitt's work, without which this would not have been possible. Ken Marshall provided the TYP key at the end.

General tips can also be found on the Map Authors forum at http://tech.groups.yahoo.com/group/map_authors/

Editing Garmin BlueCharts

Correcting Blue Chart Charts V1.0

Garmin BlueCharts are an excellent source of data, but they do contain errors, they become out of date, and they are not always at a scale with the detail on them you would like.

Using this guide you will learn how to create corrections to the charts, compile them, and load them into your GPS along with your other maps, through the Garmin MapSource interface .

Getting started

I recommend starting with a very limited project and working that through to the point you can see it on the GPS, rather than embarking on a large project and not knowing where the problem lies. Possibly start by simply re compiling Rafal Fitts map near Stockholm that is downloaded with the marine version of cGPSMapper, so you can see the steps required. Note too that charts are not yet as WYSISWYG as land maps, so the other option is to use the more broadly available topographic map information first.

Why are charts so difficult ?

All the excellent work done for topographic maps has created tools that work well for topographic maps. However the hours of effort put into free tools by these developers have a broader user community than sailors. This means that the cryptic codes that tell the GPS what is a shoreline, or a depth contour, are not displayed by the tools as they would be on the GPS. However in other respects charts are simpler, as charts are created using a single map layer.

Assembling the input information

Before you jump in to a project, decide its scope, and what input data you want. This may include scanning paper charts, looking up details in pilot books, or taking snapshots of Google Earth or other satellite or aerial photo data. Any scans or snapshots need to be geo referenced, so ensure they are aligned to True North and ideally mark grid points in some way on the image.

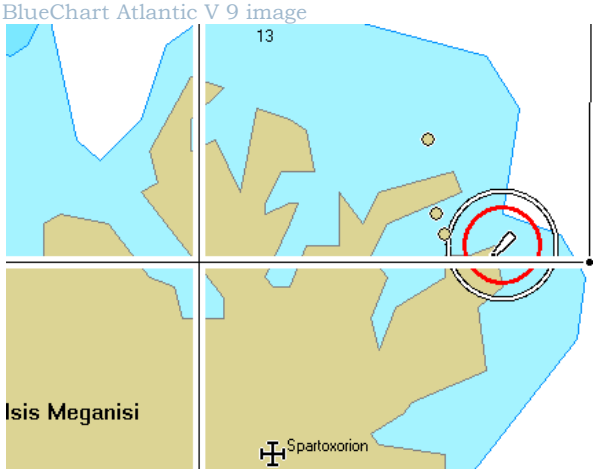
The project

Megannissi is a very popular sailing destination in the Ionian Sea. However this particular section of the BlueChart data is not at a detailed scale, and in some places is incorrect. The image below shows the north eastern end of the island with some sailing tracks from the GPS displayed. Note particularly the Green track, going round two small islands.

Google Earth image

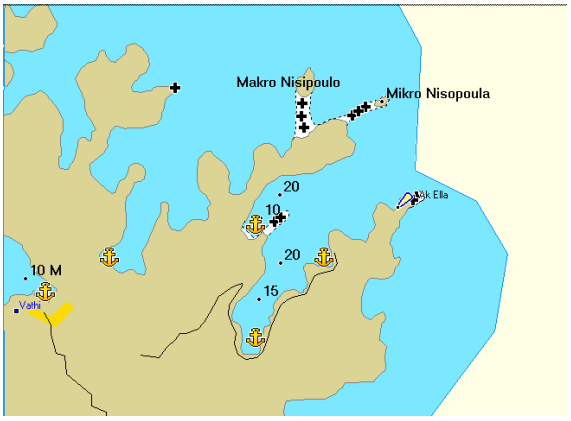
Compare this to the BlueChart of the same area. The small islands of Macro Nisipoulo and Micro Nisipoulo are misplaced, and you might think you could sail close to the headland. Much other coastal detail is vague.

BlueChart Atlantic V 9 image



Note also a track has been drawn in Mapsource to provide the gridlines for OziExplorer geo referencing of this image, so it is located in the correct place in MapSource.

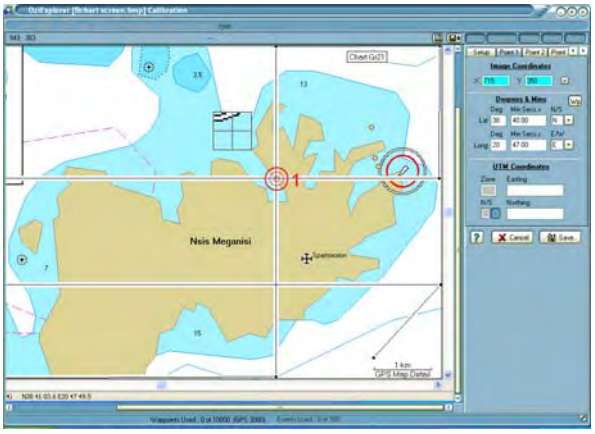
By the end of the project you will be able to have something closer to this on your GPS.



Time to begin

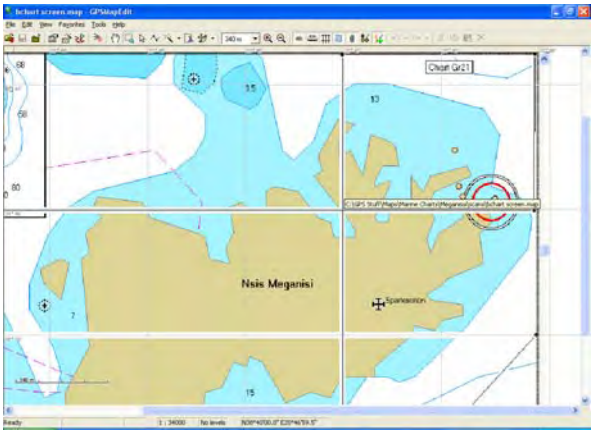
I am assuming that you will use the following as your base maps, but this might differ. 1) The original Blue Chart, so that the boundaries between your chart correction and the base Blue Chart either match, or intentionally contrast, depending on your preference, and 2) Some form of corrective data, such as a scanned paper chart, or in this case, a Google Earth capture. Oziexplorer is used to reference the screen shots so GPSMapedit puts them in the right place on the earth's surface.

We will do the drawing in GPSMapEdit, but need a base map to draw over. In Mapsource, draw a route that creates a grid, at a suitable scale, and at whole units of minutes, record the grid points as a note, and capture the screen, with <ALT Prt Screen>. Turn the screenshot into a bit map, and open OxiExplorer. File > Load and Calibrate Map Image.



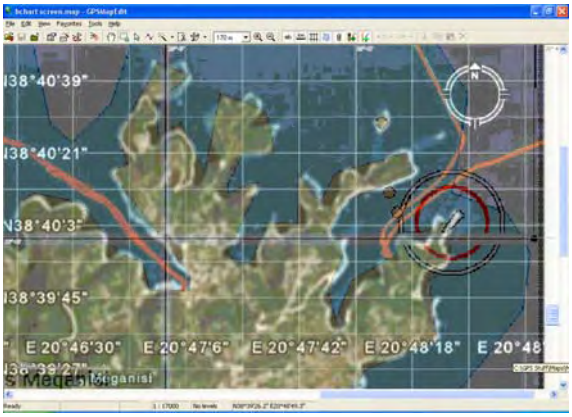
Repeat this for Point 2, ensuring the two points have the maximum diagonal separation. Save the file.

Open GPSMapEdit, File > Add and select the Ozi calibrated image. You should see this.

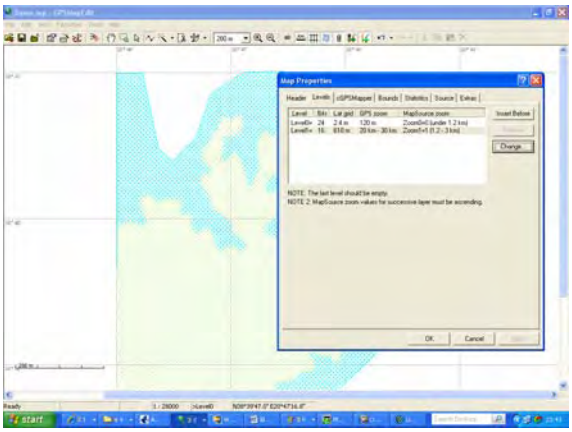


Repeat the process with Google Earth, capturing the screen shot after ensuring the image is set to North, and you are sure where the grid point are. (The Eastings can be hard to work out which line is which. Calibrate the image, and add to GPS Mapedit, and the two images should roughly be

aligned, confirming the georeferencing process has been correctly applied.

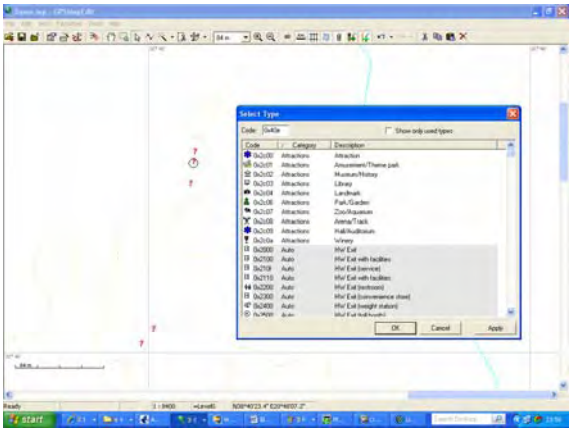


In GPSMapEdit, select the Polygon tool (Wand pull down > Polygon and draw a polygon over the 50 m contour, with an arbitrary western limit. Do not worry too much at this point what it is created as, so we will initially create this as a Glacier. Roughly draw in as a polygon, with the same western limit, the island and the two small islands, and cal l them scrub. With the backgrounds removed, you should see something like this.



Ensure the levels are set to 0. Go to File > Map Properties, and set the ID to an 8 digit number, the elevation to meters, and the levels to 24 and 16. Ensure the "Map Is Transparent" box is ticked in the cGPSMapper tab.

Start adding the detail, such as using points for the submerged rocks, but when you select the Type, use the code 0x040e . As this does not have a display type in MapEdit, it will show as a ?



This is where life can gets complicated as mistakes here will not show till after compiling the map. So, to accelerate that point, do the following.

Select the area of the island, and change the type from Glacier to 0x101. Select the 50 m contour and change the type to 0x304.

Short list of codes (Full list at end)

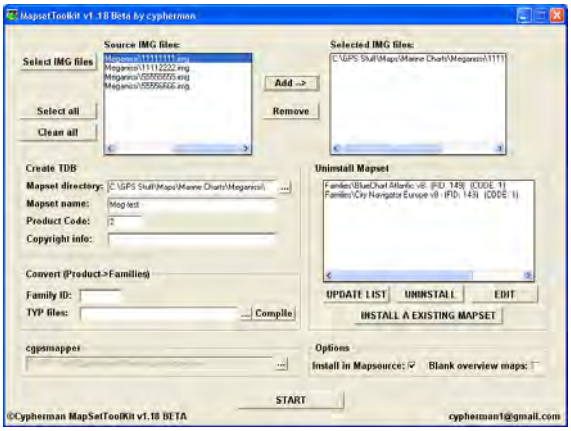
Symbol	Type Code
Land	0x101
Dark Blue sea	0x303
Light Blue Sea	0x304
Lighter Blue sea	0x305
Lightest Blue sea	0x306
White Sea	0x300
Rock	0x040e
Anchorage	0x701

Now as a test, select in GPSMapEdit, File > Export > Garmin IMG/ cgpsmapper.exe . Save the resulting file as an 8 digit number, for now just use 11111111.img . Ensure the path is pointing at the marine version of cgpsmapper, such as C:\GPS Stuff\Cgpsmapper\Marine\cgpsmapper.exe. Run.

You should get

Loading into MapSource

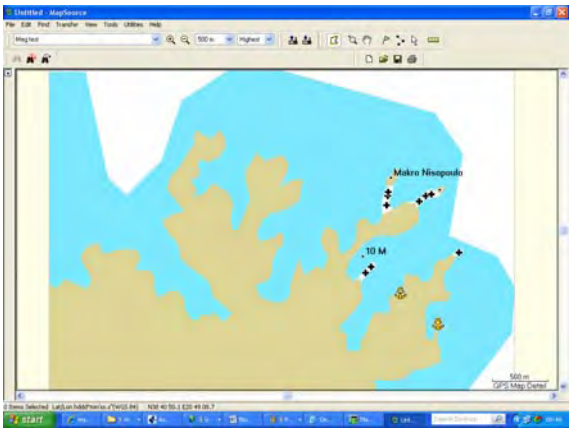
Now check Mapsource is closed, and start MapsetToolkit. Select the 8 digit .img file, Add it to the right hand pane. Point to the same directory to have the TDB file created in, give the file a name you want to see in MapSource, use an unused Product Code (2 should work), ensure you tick the box "Install in Mapsource" and press start.



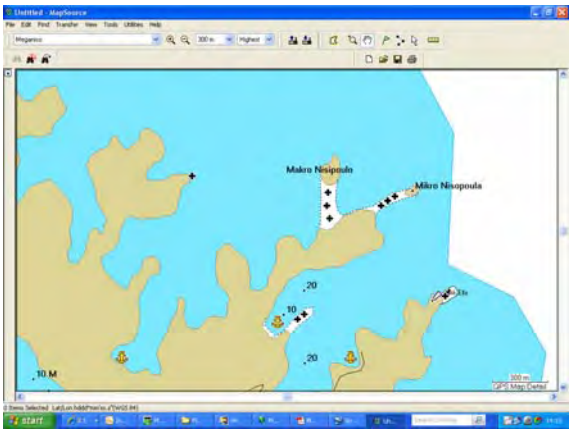
To reverse the process if something goes wrong, such as MapSource refusing to start, simply select the file and the uninstall option for your map.

A successful install gives the following message.

Start MapSource, and you should see your chart, though you might have to zoom right out to find it the first time. and hopefully you will see a map like this.

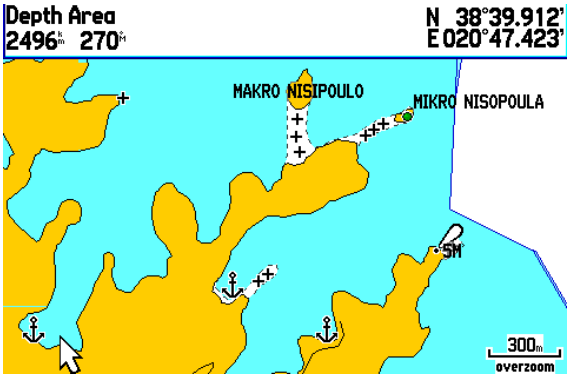


Next steps are simply cleaning up the detail and adding the outlines. Duplicate the polygons, and convert one copy to polylines, to give the line type for land edges, and contours, using type 0x101 or as required from the lists in the next few pages, or the cGPSMapper manual marine section..



Now all that remains is loading it into the GPS, along with the base BlueChart, using MapSource.

Verify the data in the GPS, and happy sailing !



GPSmapper Marine Element Types List

Marine points [RGN10/20 types] OR [POI]

Hex Code	Description	Symbol	Attributes	Dec Code	Filter
0x0100	Light		HAF,L,LT,N,Pe	256	1
0x0101	Light		HAF,L,LT,N,Pe	256	1
0x0102	Light w/ North Topmark		HAF,L,LT,N,Pe	258	1
0x0103	Light w/ South Topmark		HAF,L,LT,N,Pe	259	1
0x0104	Light w/ East Topmark		HAF,L,LT,N,Pe	260	1
0x0105	Light w/ West Topmark		HAF,L,LT,N,Pe	261	1
0x0106	Isolated Danger Light		HAF,L,LT,N,Pe	262	1
0x0107	Port Hand Light		HAF,L,LT,N,Pe	263	1
0x0108	Starboard Hand Light		HAF,L,LT,N,Pe	264	1
0x0109	Special Purpose Light		HAF,L,LT,N,Pe	265	1
0x010a	Safe Water Light		HAF,L,LT,N,Pe	266	1
	0x010b … 0x011f		HAF,L,LT,N,Pe		1
0x0200	Buoy		FC,L,LT,N	512	2
0x0201	Buoy		FC,L,LT,N	513	2
0x0202	Buoy w/ North Topmark		FC,L,LT,N	514	2
0x0203	Buoy w/ South Topmark		FC,L,LT,N	515	2
0x0204	Buoy w/ East Topmark		FC,L,LT,N	516	2
0x0205	Buoy w/ West Topmark		FC,L,LT,N	517	2
0x0206	Beacon		FC,L,LT,N	518	2
0x0207	Spar Buoy		FC,L,LT,N	519	2
0x0208	Isolated danger Buoy		FC,L,LT,N	520	2
0x0209	Port Hand Buoy		FC,L,LT,N	521	2
0x020a	Starboard Hand Buoy		FC,L,LT,N	522	2
0x020b	Special Purpose Buoy		FC,L,LT,N	523	2
0x020c	Safe Water Buoy		FC,L,LT,N	524	2
0x020d	Platform Buoy		FC,L,LT,N	525	2
0x020e	Beacon w/ North Topmark		FC,L,LT,N	526	2
0x020f	Beacon w/ South Topmark		FC,L,LT,N	527	
0x0210	Beacon w/ East Topmark		FC,L,LT,N	528	
0x0211	Beacon w/ West Topmark		FC,L,LT,N	529	
0x0212	Isolated Danger Beacon		FC,L,LT,N	530	
0x0213	Port Hand Beacon		FC,L,LT,N	531	
0x0214	Starboard Hand Beacon		FC,L,LT,N	532	

0x0215	Special Purpose Beacon		FC,L,LT,N	533	
0x0216	Mooring Buoy		FC,L,LT,N	534	
0x0217	Fixed Point		N	535	
0x0218	Pole		N	536	
	0x0219 … 0x021f		N		
0x0300	Depth Point	30	D,DU	768	3
0x0301	Depth Point (invisible)		D,DU	769	3
0x0302	Depth Point (underscore)	30	D,DU	770	3
0x0303	Spot Height	113	H,HU	771	3
0x0304	Building	209	H,HU	772	3
0x0305	Chimney			773	3
0x0306	Church			774	3
0x0307	Tanks			775	3
0x0308	Tower			776	3
0x0309	Rock			778	3
0x030a	Triangulation Point			779	3
0x030b	Radio Mast			780	3
0x030c	Artificial Reef			781	3
0x030d	Oil Rig			782	3
	0x030e … 0x031f	N/A			3
0x0400	Isolated Danger		Po	1024	4
0x0401	Obstruction		D,DF,DU,Po	1025	4
0x0402	Wreck			1026	4
0x0403	Wreck (Exposed)			1027	4
0x0404	Well			1028	4
0x0405	Foul			1029	4
0x0406	Explosive			1030	4
0x0407	Fish Haven			1031	4
0x0408	Obstruction (covers)			1032	4
0x0409	Marine Farm			1033	4
0x040a	Dangerous Rock			1034	4
0x040b	No Bottom Found			1035	4
0x040c	Exposed Rock			1036	4
0x040d	Dangerous Rock			1037	4
0x040e	Underwater Rock			1038	4
0x040f	Shoal			1039	4
	0x0410 ... 0x41f				4
0x0500	Label Point	Label	C	1280	5
	0x0501 ... 0x051f	N/A		1280	5

0x0600	Bottom Conditions	N/A		1536	6
	0x0600 ... 0x061f	N/A			6
0x0700	Misc Point			1792	7
0x0701	Recommended Anchorage			1793	7
0x0702	Pilot Boarding Place			1794	7
0x0703	Yacht Harbor			1795	7
0x0704	Pile			1796	7
0x0705	Anchoring Prohibited			1797	7
0x0706	Fishing Prohibited			1798	7
0x0707	Precautionary Area			1799	7
0x0708	Radio Report Point			1800	7
0x0709	Anchorage Berths			1801	7
0x070a	Rescue Station			1802	7
0x070b	Fishing Harbor			1803	7
0x070c	Airport			1804	7
0x070d	N/A			1804	7
	0x070e ... 0x071f				
0x0800 *	Information	N/A	T ?	2048	8
0x0900	N/A			2305	9
0x0901	Label			2305	9
0x0902	Fishing Information		Fp,T ?	2306	9
0x0903 **	Facility			2307	9
	0x0904 ... 0x0911	N/A			
					9

*** Does not perform correctly in Marine. No symbol displays on GPS.**
**** Does not perform correctly in Marine. May not display on GPS.**

Example for creating channel markers:

```
;Red Day Mark "30"
[POI]
Type=0x214
Label="30"
Data0=(25.84954,-81.39642)
FoundationColor=1 ; red
Light=00 ; unlit
LightType=0x00 ; unlit
[END]
```

```
;Green Day Mark "1"
[POI]
Type=0x213
Label="1"
Data0=(25.82987,-81.39243)
FoundationColor=2 ; green
Light=00 ; unlit
LightType=0x00 ; unlit
[END]
```

Example for creating channel marker Lights

```
;FL R 4s 12FT "28"
[POI]
Type=0x108
Label=FL R 4s "28"
Data0=(25.84502,-81.40127)
Light=01 ; red
HeightAboveFoundation=12
HeightAboveFoundationUnit=Ft
LightType=0x3 ; flashing
Period= x.x
[END]
```

```
;FL G 4S 16FT "33"
[POI]
Type=0x107
Label=FL G 4s "33"
Data0=(25.85373,-81.39221)
Light=02 ; green
HeightAboveFoundation=6
HeightAboveFoundationUnit=Ft
LightType=0x3 ; flashing
Period= x.x
[END]
```

Example for creating channel marker Buoys

```
;FL R 4s "2"
[POI]
Type=0x201
Label= FL R "2"
Data0=(25.84502,-81.40127)
FoundationColor=1 ; red
Light=01 ; red
LightType=0x3 ; flashing
[END]
```

```
;GREEN BUOY "3"
[POI]
Type=0x201
Label="3"
Data0=(25.85373,-81.39221)
FoundationColor=2 ; green
Light=00 ; unlit
LightType=0x00 ; unlit
[END]
```

Marine lines [RGN40] OR [POLYLINES]

Hex Code	Description	Symbol	Attributes	Dec Code
0x0100	Miscellaneous line			256
0x0101	Line			257
0x0102	Cartographic line			258
0x0103	Road			259
0x0104	Clearing line			260
0x0105	Contour line		D,DU	261
0x0106	Overhead cable		D,DU	262
0x0107	Bridge		D,DU	263
0x0108	Recommended route			264
0x0109	Chart border			265
0x0300	Depth contour		D,DU	768
0x0301	Depth contour value		D,DU	769
0x0302	Depth contour value		D,DU	770
0x0303	Depth contour value		D,DU	771
0x0304	Depth contour value		D,DU	772
0x0305	Depth contour value		D,DU	773
0x0306	Depth contour value		D,DU	774
0x0307	Intertidal zone border		D,DU	775
0x0400	Obstruction line		S,C	1024
0x0401	Submarine cable		S,C	1025
0x0402	Submarine pipeline		S,C	1026
0x0403	Pile barrier		S,C	1027
0x0404	Fishing stakes		S,C	1028
0x0405	Supply pipeline area		S,C	1029
0x0406	Submarine cable area		S,C	1030
0x0407	Dumping ground		S,C	1031
0x0408	Explosive dumping ground		S,C	1032
0x0409	Danger line		S,C	1033
0x040a	Overhead cable		S,C	1034
0x040b	Submerged construction		S,C	1035
0x040c	Pier/jetty		S,C	1036
0x0500	Restriction			1280
0x0501	Anchoring prohibited			1281

0x0502	Fishing prohibited			1282
0x0503	Prohibited area			1283
0x0504	Military practice area			1284
0x0505	Anchoring and fishing prohibited			1285
0x0506	Limit of nature reservation			1286
0x0507	Restricted area			1287
0x0508	Minefield			1288
0x0600	Miscellaneous line		S,C	1536
0x0601	Cartographic line		S,C	1537
0x0602	Traffic separation line		S,C	1538
0x0603	International maritime boundary		S,C	1539
0x0604	Straight territorial sea baseline		S,C	1540
0x0605	Seaward limit of territorial sea		S,C	1541
0x0606	Anchorage area		S,C	1542
0x0607	Quarantine anchorage area		S,C	1543
0x0608	Fishery zone		S,C	1544
0x0609	Swept area		S,C	1545
0x060a	Traffic separation zone		S,C	1546
0x060b	Limit of exclusive economic zone		S,C	1547
0x060c	Established direction of traffic flow		S,C	1548
0x060d	Recommended direction of traffic flow		S,C	1549
0x060e	Harbour limit		S,C	1550
0x060f	Inadequately surveyed area		S,C	1551
0x0610	Inshore traffic zone		S,C	1552
0x0611	Limit of traffic lane		S,C	1553
0x0701	River channel			1793
0x0702	Submerged object			1974
0x0703	N/A			N/A
0x0704	N/A			N/A
0x0705	N/A			N/A
0x0706	Chart boundary			1798

Example for creating contour lines

```
[POLYLINE]
Type=0x301
Data0=(xx.xxxx,xx.xxxx,……)
depth=3
[END]
```

Marine area [RGN80] OR [POLYGON]

Hex Code	Description	Symbol	Attributes	Dec Code
0x0100	Land - white			256
0x0101	Land - non-urban			257
0x0102	Land - urban			258
0x0103	Chart exclusion area			259
0x0104	Chart background			260
0x0105	Bridge		H,HU	261
0x0106			D,DU	
0x0107			D,DU	
0x0300	Depth area - white 1		D,DU	768
0x0301	Intertidal zone		D,DU	769
0x0302	Depth area - blue 1		D,DU	770
0x0303	Depth area - blue 2		D,DU	771
0x0304	Depth area - blue 3		D,DU	772
0x0305	Depth area - blue 4		D,DU	773
0x0306	Depth area - blue 5		D,DU	774
0x0307	Depth area - white		D,DU	775
0x0400	Obstruction (invisible)			1024
0x0401	Submarine cable (invisible)			1025
0x0402	Submarine pipeline (invisible)			1026
0x0403	Pile barrier (invisible)			1027
0x0404	Fishing stakes (invisible)			1028
0x0405	Supply pipeline area/line (invisible)			1029
0x0406	Submarine cable area/line (invisible)			1030
0x0407	Dumping ground (invisible)			1031
0x0408	Explosive dumping ground (invisible)			1032
0x0409	Danger line (invisible)			1033
0x040a	Overhead cable (invisible)			1034
0x040b	Submerged construction (invisible)			1035
0x040c	Pier/jetty (invisible)			1036
0x0500	Restriction area/line (invisible)			1280
0x0501	Anchoring prohibited (invisible)			1281
0x0502	Fishing prohibited (invisible)			1282
0x0503	Prohibited area (invisible)			1283
0x0504	Military practice area (invisible)			1284
0x0505	Anchoring and fishing prohibited (invisible)			1285
0x0506	Limit of nature reservation (invisible)			1286

0x0507	Restricted area (invisible)			1287
0x0508	Minefield (invisible)			1288
0x0600	Miscellaneous area			1536
0x0601	Cartographic area			1537
0x0602	Traffic separation area			1538
0x0603	International maritime boundary			1539
0x0604	Straight territorial sea baseline			1540
0x0605	Seaward limit of territorial sea			1541
0x0606	Anchorage area			1542
0x0607	Quarantine anchorage area			1543
0x0608	Fishery zone			1544
0x0609	Swept area			1545
0x060a	Traffic separation zone			1546
0x060b	Limit of exclusive economic zone			1547
0x060c	Established direction of traffic flow			1548
0x0700	N/A		T?	N/A
0x0701	Fishing area			1793
0x0702	Restricted area			1794
0x0703	Anchorage area			1795
0x0704	Map background area		T?	1796
0x0704	Fishing Hot Spots chart		T?	1796

Example for creating depth areas

```
[POLYGON]
Type=0x307
Data0=(xx.xxxx,xx.xxxx),…,…
Depth=10
[END]
```

Special Attributes

C	Color=##	See Color Attribute Values
D	Depth=##.#	Point depth value with one decimal (e.g. 20.1) The maximum value is 6553
DU	DepthUnit=x	m -> meters, f -> feet, default -> Elevation from [IMD ID]
FC	FoundationColor=#	See Color Attribute Values
H	Height=##.#	Same as depth. Can not be used when depth used.
HAF	HeightAboveFoundation=##	
HAFU	HeightAboveFoundationUnit=##	
HU	HeightUnit=x	Same as DepthUnit. Can not be used when DepthUnit is used.
L	Light=##	See Color Attribute Values
LT	LightType=0x##	See Light Type Attribute Values
P	Position=x	Position of obstruction. See Position Attributes
S	Style=##	See Style Attribute Values
T	Text=xxx	Very long description / information displayed in the properties windows of the object. There could be several Text entries in a single object. 16kb maximum (each entry).
TF	TextFile=filename	File containing a very long description / information displayed in the properties windows of the object. There could be several TextFile entries in a single object. The path could be either _ absolute or _ relative to the current directory. For platform portability, it is recommended to use slashes "/" instead of backslashes "\" to separate directories in the path. In Unix, file_name is case sensitive. 16kb maximum (each entry).

Color Attributes	
0	Color (0x00)
1	Color (0x01)
2	Color (0x02)
3	Color (0x03)
4	Color (0x04)
5	Color (0x05)
6	Color (0x06)
7	Color (0x07)
8	Color (0x08)
9	Color (0x09)
10	Color (0x0a)
11	Color (0x0b)
12	Color (0x0c)
13	Color (0x0d)
14	Color (0x0e)
15	Color (0x0f)

Position Attributes	
0	Unknown
1	(empty)
2	doubtful
3	Existence doubtful
4	approximate
5	reported

DepthFlag Attributes	
0	(empty)_
1	(Unknown, dangerous for navigation
2	Awash at chart datum
3	Unknown, safe for navigation
4	unknown

Foundation Color Attributes	
	Foundation Color (0x00)
	Foundation Color (0x01)
	Foundation Color (0x02)
	Foundation Color (0x03)
	Foundation Color (0x04)
	Foundation Color (0x05)
	Foundation Color (0x06)
	Foundation Color (0x07)
	Foundation Color (0x08)
	Foundation Color (0x09)
	Foundation Color (0x0a)
	Foundation Color (0x0b)
	Foundation Color (0x0c)
	Foundation Color (0x0d)
	Foundation Color (0x0e)
	Foundation Color (0x0f)
	Foundation Color (0x10)
	Foundation Color (0x11)
	Foundation Color (0x12)
	Foundation Color (0x13)
	Foundation Color (0x14)
	Foundation Color (0x15)
	Foundation Color (0x16)
	Foundation Color (0x17)
	Foundation Color (0x18)
	Foundation Color (0x19)

Foundation Color Attributes	
	Foundation Color (0x10) Light=0
	Foundation Color (0x10) Light=1
	Foundation Color (0x10) Light=2
	Foundation Color (0x10) Light=3
	Foundation Color (0x10) Light=4
	Foundation Color (0x10) Light=5
	Foundation Color (0x10) Light=6
	Foundation Color (0x10) Light=7

Light Color Attributes	
	Light=0
	Light=1
	Light=2
	Light=3
	Light=4
	Light=5
	Light=6
	Light=7