

GPS TrackMaker®



GTM 211 Format

Technical Description

1.1

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GTM 211 Format Technical Description

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1 Overview

1.1 The GTM 211 Format

This document defines the GTM 211 (.gtm) spatial data format, providing all the technical information necessary for writing a computer program to create GTM files without the use of GPS TrackMaker® program for those that want to write their own data translator.

The GTM 211 file format has the extension “.gtm” (initials for GPS TrackMaker) and stores all Waypoints, Tracklogs and Routes as well as information related to the screen display, background and grid color, Waypoint text, User-defined text, etc. Digitized images are also included in the .gtm file.

The “.gtm” file was developed for compact data storage and enhanced recording speed when compared to Text formats.

Review of GTM format since 1998

Version 106 : allowed to store only single coordinates (GTM #6)

Version 108 : allowed to store one image of map (GTM #8)

Version 200 : Added 82 new icons (GTM #8.5)

Version 205 : allowed to store multiples images and 85 icons (GTM #9)

Version 210 : Added the Tracklog Styles (GPS TrackMaker #10 and GTM PRO 2.10)

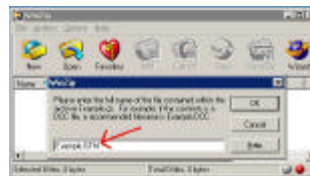
Version 211 : A complete change in the whole structure (GTM #11 and GTM PRO 3.0 or above)

1.2 GZ - The compressed GTM format

Files in GZ format created by **GPS TrackMaker®** are compressed GTM files in *gzip* format. The GZ format maintains the same accuracy of GTM files, but with half of the size of GTM files. Basically they are appropriate for those Users who want to transfer data to the Internet or save disk space. The compact data storage of GTM files reduces the risk of data corruption when downloading files from the Internet.

GZ files can be opened directly in **GPS TrackMaker®**. No decompression program is needed. The GZ file can also be decompressed using standard compression programs such as WinZip®.

The illustration to the side shows how to create a GTM file from a GZ file, using WinZip® program. It is necessary to indicate the “.gtm” extension when opening the GZ file:



The Author suggests the use of GZ format for saving **GPS TrackMaker®** files on the Internet, mainly in Unix-based Internet sites. This procedure, reduces the size of the GTM file, and also will reduce the probability of data corruption when downloading the file.

2 Data Definition

2.1 Byte Data Type

Byte variables are stored as single, unsigned, 8-bit (1-byte) numbers ranging in value from 0–255. The Byte data type is useful for containing binary data.

Examples:

Decimal	Byte Data Type (Hexadecimal)
01	01
10	0A
255	FF

2.2 Boolean Data Type

Boolean variables are stored as 16-bit (2-byte) numbers, but they can only be True or False.

Examples:

Value	Byte Data Type (Hexadecimal)
True	FF FF
False	00 00

2.3 Integer Data Type

Integer variables are stored as 16-bit (2-byte) numbers ranging in value from -32,768 to 32,767

You can also use Integer variables to represent enumerated values. An enumerated value can contain a finite set of unique whole numbers, each of which has special meaning in the context in which it is used.

Enumerated values provide a convenient way to select among a known number of choices, for example, black = 0, white = 1, and so on.

Examples:

Decimal	Byte Data Type (Hexadecimal Sequence)
-32768	00 80
-1000	18 FC
-100	9C FF
0	00 00
100	64 00
1000	E8 03
32767	FF 7F

2.4 Long Data Type

Long (long integer) variables are stored as signed 32-bit (4-byte) numbers ranging in value from -2,147,483,648 to 2,147,483,647.

Examples:

Decimal	Byte Data Type (Hexadecimal Sequence)
-1000000	C0 BD F0 FF
-32767	01 80 FF FF
-100	9C FF FF FF
0	00 00 00 00
100	64 00 00 00
32767	FF 7F 00 00
1000000	40 42 0F 00

2.5 Single Data Type

Single (single-precision floating-point) variables are stored as IEEE 32-bit (4-byte) floating-point numbers, ranging in value from -3.402823E38 to -1.401298E-45 for negative values and from 1.401298E-45 to 3.402823E38 for positive values.

Examples:

Decimal	Byte Data Type (Hexadecimal Sequence)
0	00 00 00 00
1	00 00 80 3F
10	00 00 20 41
10.25	00 00 24 41
141.6666667	AB AA 0D 43
-1	00 00 80 BF
-10	00 00 20 C1
-10.25	00 00 24 C1
-141.6666667	AB AA 0D C3

2.6 Double Data Type

Double (double-precision floating-point) variables are stored as IEEE 64-bit (8-byte) floating-point numbers ranging in value from -1.79769313486232E308 to -4.94065645841247E-324 for negative values and from 4.94065645841247E-324 to 1.79769313486232E308 for positive values.

Examples:

Decimal	Byte Data Type (Hexadecimal Sequence)
0	00 00 00 00 00 00 00 00
1	00 00 00 00 00 00 F0 3F
10	00 00 00 00 00 00 24 40
10.25	00 00 00 00 00 80 24 40
141.666666666667	61 55 55 55 55 B5 61 40
-1	00 00 00 00 00 00 F0 BF
-10	00 00 00 00 00 00 24 C0
-10.25	00 00 00 00 00 80 24 C0
-141.666666666667	61 55 55 55 55 B5 61 C0

2.7 Variable-Length String Data Type

Variable-length string can contain 1 to approximately 64K (2^{16}) characters, with one character per byte.

2 Bytes for the Length	XXXX Bytes for the Text
------------------------	-------------------------

The codes for String characters range from 0–255. The first 128 characters (0–127) of the character set correspond to the letters and symbols on a standard U.S. keyboard. These first 128 characters are the same as those defined by the ASCII character set. The second 128 characters (128–255) represent special characters, such as letters in international alphabets, accents, currency symbols, and fractions.

Examples:

Text	(Hexadecimal Sequence)
GPS TrackMaker	0E 00 47 50 53 20 54 72 61 63 6B 4D 61 6B 65 72
Waypoint 001	0C 00 57 61 79 70 6F 69 6E 74 20 30 30 31
<i>One Space Character</i>	01 00 20
<i>NO TEXT</i>	00 00

2.8 Fixed-Length String Data Type

A fixed-length string contains the number of characters indicated after “ * ”. There is no byte indicating the length before the Text.

Example: VAR as String * 20 (VAR has 20 bytes)

The codes for String characters range from 0–255. The first 128 characters (0–127) of the character set correspond to the letters and symbols on a standard U.S. keyboard. These first 128 characters are the same as those defined by the ASCII character set. The second 128 characters (128–255) represent special characters, such as letters in international alphabets, accents, currency symbols, and fractions.

Example of a fixed-length string with 20 characters:

Text	(Hexadecimal Sequence)
GPS TrackMaker	47 50 53 20 54 72 61 63 6B 4D 61 6B 65 72 20 20 20 20 20 20
Waypoint 001	57 61 79 70 6F 69 6E 74 20 30 30 31 20 20 20 20 20 20 20 20
<i>One Space Character</i>	20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20
<i>NO TEXT</i>	20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20

3 Structure of the GTM 211 Format

3.1 General Structure

The GTM 211 file format contains a fixed-length file header and datum information, followed by variable-length records.

1° - Header (Saved one time)

2° - Grid/Datum (Saved one time)

3° - Image information

4° - Waypoints

5° - Waypoint Styles

6° - Tracklogs

7° - Tracklogs Styles

8° - Routes

9° - Layers

10° - User icons

11° - Icon Images

12° - Map Images

3.2 Header

The main file header is saved one time. See below the fields in the file header with their byte position and type.

```
Type Header
  version As Integer
  code As String * 10
  wli As Byte
  vwt As Byte
  gradnum As Byte
  wptnum As Byte
  usernum As Byte
  coriml As Byte
  ndatum As Byte
  gradcolor As Long
  bcolor As Long
  nwptstyles As Long
  usercolor As Long
  nwpts As Long
  ntrcks As Long
  nrtes As Long
  maxlon As Single
  minlon As Single
  maxlat As Single
  minlat As Single
  n_maps As Long
  n_tk As Long
  layers As Single
  iconnum As Single
  rectangular As Boolean
  truegrid As Boolean
  labelcolor as long
  usernegrit As Boolean
  useritalic As Boolean
  usersublin As Boolean
  usertachado As Boolean
  map As Boolean
  labelsize As integer
  gradfont As String
  labelfont As String
  userfont As String
  newdatum As String
End Type
```

Structure of Header

Variable	Type	Comments
version	Integer	Version of GTM file – Place 211
code	String*10	Fixed-length String – Place <i>TrackMaker</i>
wli	Byte	Draws thick lines on Maps – Set to 0
vwt	Byte	Reservation – Set to 0
gradnum	Byte	Font size of the Grid Lines – Default = 8
wptnum	Byte	Reservation – Set to 0
usernum	Byte	Reservation – Set to 0
coriml	Byte	Icon color : 0 – black (Default) : used with clear background colors 1 – white : used with dark background colors
ndatum	Byte	Reservation – Set to 0
gradcolor	Long	Grid color – RGB – Default = 0 (Black)
bcolor	Long	Background color– RGB – Default = 16777215 (White)
nwptstyles	Long	Number of Waypoint Styles Defines the number of times that the <i>stylefont1</i> sequence will be repeated.
usercolor	Long	Text Color of default Waypoint – RGB – Default = 0 (Black)
nwpts	Long	Number of Waypoints Defines the number of times that the <i>Wpts1</i> sequence will be repeated
ntrcks	Long	Number of Trackpoints Defines the number of times that the <i>trcks1</i> sequence will be repeated
nrtes	Long	Number of RoutePoints Defines the number of times that the <i>rtes1</i> sequence will be repeated
maxlon minlon maxlat minlat	Single	Bounding Box that stores the actual extent of the data in the file. Represents the minimum-bounding rectangle orthogonal to the X and Y axes that contains all shapes. Basically used by the <i>Catalog of Images</i> .
n_maps	Long	Number of Map images Defines the number of times that the <i>images1</i> sequence will be repeated Also, defines the number of images saved in the end of the GTM file
n_tk	Long	Number of Tracklog Styles Defines the number of times that the <i>trknome1</i> sequence will be repeated
layers	Single	Reservation - Number of layers – Set to 0
iconnum	Single	Reservation - Number of User icon images – Set to 0
rectangular	Boolean	Activates Rectangular coordinates when GTM file is opened – Default = false
truegrid	Boolean	Activates <i>True Grid Mode</i> when GTM file is opened – Default = False
LabelColor	Boolean	Text Color of Tracklog Labels
wptachado	Boolean	Reservation – Set to False
usernegrit	Boolean	Reservation – Set to False
useritalic	Boolean	Reservation – Set to False
usersublin	Boolean	Reservation – Set to False
usertachado	Boolean	Reservation – Set to False
map	Boolean	Set to TRUE if there are maps
LabelSize	Boolean	Font Size of Tracklog Labels
gradfont	String	Font Name of the Grid Text – Default = <i>Times New Roman</i>
LabelFont	String	Font Name of Tracklogs Labels – Default = <i>Times New Roman</i>
userfont	String	Reservation – No Text
newdatum	String	Reservation – No Text

3.3 User Grid and User Datum

The parameters of User Grid and User Datum are basically used by GTM PRO®, except the “ndatum” field, common to GPS TrackMaker® and GTM PRO®. The *datum* definition is recorded one time.

```
Type datum
  ngrid As Integer
  origin As Double
  falseeast As Double
  scale1 As Double
  falsenorthing As Double
  ndatum As Integer
  axis As Double
  flattenig As Double
  dx As Integer
  dy As Integer
  dz As Integer
End Type
```

Variable	Type	Comments
Ngrid	Integer	Number of the predefined grid. See the table below.
Origin	Double	User Grid - Longitude of origin
falseeast	Double	User Grid - False Easting
scale1	Double	User Grid - Scale Factor
falsenorthing	Double	User Grid - False Northing (Set to 0)
ndatum	Integer	Number of Predefined Datum, which the data were stored in GTM File. See the Table of Datums below.
axis	Double	User Datum - Major Semi-Axe of the Earth (Set to 0)
flattenig	Double	User Datum - Flattening of the Earth (Set to 0)
dx	Integer	User Datum - Delta X (Set to 0)
dy	Integer	User Datum - Delta Y (Set to 0)
dz	Integer	User Datum - Delta Z (Set to 0)

Table for *ngrid* (Set to 0 if “*rectangular*” field in the *Header* is false)

0	UTM
1	User Grid (Reserved for GTM PRO)
2	New Zealand Grid
3	Swiss Grid
4	Swedish Grid
5	British National Grid
6	Irish National Grid
7	German Grid
8	Finnish National Grid (KKJ)
9	RTM (Reserved for GTM PRO)
10	LTM (Reserved for GTM PRO)
11	Grid of Colombia (Reserved to GTM PRO)
12	British Uniform Grid
13	Taiwan 67 Grid
14	Dutch Grid
	Note: Other grids can be implemented in the future

Table for *ndatum*

Note: WGS84 = 217 (Default)

ndatum	Datum	Region
1	Adindan	Burkina Faso
2	Adindan	Cameroon
3	Adindan	Ethiopia
4	Adindan	Mali
5	Adindan	Mean for Ethiopia ; Sudan
6	Adindan	Senegal
7	Adindan	Sudan
8	Afgooye	Somalia
9	Ain el Abd '70	Bahrain
10	Ain el Abd '70	Saudi Arabia
11	Am. Samoa '62	American Samoa Islands
12	Anna 1 A'65	Cocos Islands
13	Antigua Isd '43	Antigua (Leeward Islands)
14	Arc 1950	Botswana
15	Arc 1950	Burundi
16	Arc 1950	Lesotho
17	Arc 1950	Malawi
18	Arc 1950 Mean	Mean for Arc 1950
19	Arc 1950	Swaziland
20	Arc 1950	Zaire
21	Arc 1950	Zambia
22	Arc 1950	Zimbabwe
23	Arc 1960	Mean for Kenya ; Tanzania
24	Arc 1960	Kenya
25	Arc 1960	Tanzania
26	Ascension Isd '58	Ascension Island
27	Astro Beacon E'45	Iwo Jima
28	Astro DOS 71/4	St. Helena Island
29	Astro Tern Isd'61	Tern Island
30	Astron. Station '52	Marcus Island
31	Australian G. '66	Australia ; Tasmania
32	Australian G. '84	Australia ; Tasmania
33	Ayabelle Light.	Djibouti
34	Bellevue (IGN)	Efate & Erromango Islands
35	Bermuda 1957	Bermuda
36	Bissau	Guinea-Bissau
37	Bogota Obsty	Colombia
38	Bukit Rimpah	Indonesia (Bangka and Belitung Ids)
39	Camp Area Astro	Antarctica (McMurdo Camp Area)
40	Campo Inchauspe	Argentina
41	Canton Astro 1966	Phoenix Islands
42	Cape	South Africa
43	Cape Canaveral	Bahamas ; Florida
44	Carthage	Tunisia
45	Chatham Isd A. '71	New Zealand (Chatham Island)
46	Chua Astro	Paraguay
47	Corrego Alegre	Brazil
48	Dabola	Guinea
49	Deception Island	Deception Island ; Antarctica
50	Djakarta (Batavia)	Indonesia (Sumatra)
51	DOS 1968	New Georgia Islands (Gizo Island)
52	Easter Island 1967	Easter Island
53	Estonia System '37	Estonia
54	European 1950	Cyprus
55	European 1950	Egypt
56	European 1950	England Channel Islands ; Scotland ; Shetland Islands
57	European 1950	England ; Ireland ; Scotland ; Shetland Islands
58	European 1950	Finland ; Norway
59	European 1950	Greece
60	European 1950	Iran

61	European 1950	Italy (Sardinia)
62	European 1950	Italy (Sicily)
63	European 1950	Malta
64	European 1950	Mean for Austria ; Belgium ; Denmark ; Finland ; France ; W. Germany; Gibraltar ; Greece ; Italy ; Luxembourg ; Netherlands ; Norway; Portugal ; Spain ; Sweden ; Switzerland
65	European 1950	Mean for Austria ; Denmark ; France ; W. Germany ; Netherlands; Switzerland
66	European 1950	Mean for Iraq ; Israel ; Jordan ; Lebanon ; Kuwait ; Saudi Arabia ; Syria
67	European 1950	Portugal ; Spain
68	European 1950	Tunisia
69	European 1979	Switzerland
70	Fort Thomas 1955	Nevis ; St. Kitts (Leeward Islands)
71	Gan 1970	Republic of Maldives
72	Geod. Dat. '49	New Zealand
73	Graciosa SW '48	Azores (Faial ; Graciosa ; Pico ; São Jorge ; Terceira)
74	Guam 1963	Guam
75	Gunung Segara	Indonesia (Kalimantan)
76	GUX 1 Astro	Guadalcanal Island
77	Herat North	Afghanistan
78	Hermannskogel	Croatia-Serbia ; Bosnia-Herzegovina
79	Hjorsey 1955	Iceland
80	Hong Kong 1963	Hong Kong
81	Hu-Tzu-Shan	Taiwan
82	Indian	Bangladesh
83	Indian	India ; Nepal
84	Indian	Pakistan
85	Indian 1954	Thailand
86	Indian 1960	Vietnam (Com Son Island)
87	Indian 1960	Vietnam (Near 16øN)
88	Indian 1975	Thailand
89	Indonesian 1974	Indonesia
90	Ireland 1965	Ireland
91	ISTS 061 '68	SouthGeorgia Islands
92	ISTS 073 '69	Diego Garcia
93	Johnston Isld '61	Johnston Island
94	Kandawala	Sri Lanka
95	Kerguelen Isld '49	Kerguelen Island
96	Kertau 1948	West Malaysia and Singapore
97	Kusaie Astro1951	Caroline Islands
98	Korean System	South Korea
99	L. C. 5 Astro 1961	Cayman Brac Island
100	Leigon	Ghana
101	Liberia 1964	Liberia
102	Luzon	Philippines (Excluding Mindanao)
103	Luzon	Philippines (Mindanao)
104	M'Poraloko	Gabon
105	Mahe 1971	Mahe Island
106	Massawa	Ethiopia (Eritrea)
107	Merchich	Morocco
108	Midway Astro '61	Midway Islands
109	Minna	Cameroon
110	Minna	Nigeria
111	Montserrat '58	Montserrat (Leeward Islands)
112	Nahr wan	Oman (Masirah Island)
113	Nahrwan	Saudi Arabia
114	Nahrwan	United Arab Emirates
115	Naparima BWI	Trinidad & Tobago
116	NAD 1927	Alaska (Excluding Aleutian Ids)
117	NAD 1927	Alaska (Aleutian Ids East of 180øW)
118	NAD 1927	Alaska (Aleutian Ids West of 180øW)
119	NAD 1927	Bahamas (Except San Salvador Id)
120	NAD 1927	Bahamas (San Salvador Island)
121	NAD 1927	Canada (Alberta ; British Columbia)
122	NAD 1927	Canada (Manitoba ; Ontario)
123	NAD 1927	Canada (New Brunswick ; Newfoundland ; Nova Scotia ; Quebec

124	NAD 1927	Canada (Northwest Territories ; Saskatchewan
125	NAD 1927	Canada (Yukon)
126	NAD 1927	Canal Zone
127	NAD 1927	Cuba
128	NAD 1927	Greenland (Hayes Peninsula)
129	NAD 1927	Mean for Antigua ; Barbados ; Barbuda ; Caicos Islands ; Cuba ; Dominican Republic ; Grand Cayman ; Jamaica ; Turks Islands
130	NAD 1927	Mean for Belize ; Costa Rica ; El Salvador ; Guatemala ; Honduras;
131	NAD 1927	Mean for Canada
132	NAD 1927	Mean for CONUS
133	NAD 1927	Mean for CONUS (East of Mississippi ; River Including Louisiana; Missouri ; Minnesota)
134	NAD 1927	Mean for CONUS (West of Mississippi ; River Excluding Louisiana, Minnesota ; Missouri
135	NAD'27	Mexico
136	NAD'83	Alaska (Excluding Aleutian Ids)
137	NAD'83	Aleutian Ids
138	NAD'83	Canada
139	NAD'83	CONUS
140	NAD'83	Hawaii
141	NAD'83	Mexico ; Central America
142	North Sahara 1959	Algeria
143	Obs. Met. 1939	Azores (Corvo & Flores Islands)
144	Old Egyptian 1907	Egypt
145	Old Hawaiian	Hawaii
146	Old Hawaiian	Kauai
147	Old Hawaiian	Maui
148	Old Hawaiian	Mean for Hawaii ; Kauai ; Maui ; Oahu
149	Old Hawaiian	Oahu
150	Oman	Oman
151	OS G. Britain '36	England
152	OS G. Britain '36	England ; Isle of Man ; Wales
153	OS G. Britain '36	Mean for England ; Isle of Man ; Scotland; Shetland Islands ; Wales
154	OS G. Britain '36	Scotland ; Shetland Islands
155	OS G. Britain '36	Wales
156	Pico de las Nieves	Canary Islands
157	Pitcairn Astro '67	Pitcairn Island
158	Point 58	Mean for Burkina Faso & Niger
159	Pointe Noire 1948	Congo
160	Porto Santo 1936	Porto Santo ; Madeira Islands
161	PSA1956	Bolivia
162	PSA1956	Chile (Northern ; Near 19øS)
163	PSA1956	Chile (Southern ; Near 43øS)
164	PSA1956	Colombia
165	PSA1956	Ecuador
166	PSA1956	Guyana
167	PSA1956	Mean for Bolivia ; Chile ; Colombia ; Ecuador ; Guyana ; Peru; Venezuela
168	PSA1956	Peru
169	PSA1956	Venezuela
170	PS Chilean 1963	Chile (Near 53øS(Hito XVIII)
171	Puerto Rico	Puerto Rico ; Virgin Islands
172	Pulkovo 1942	Russia
173	Qatar National	Qatar
174	Qornoq	Greenland (South)
175	Reunion	Mascarene Islands
176	Rome 1940	Italy (Sardinia)
177	S42 (Pulkovo '42)	Hungary
178	S42 (Pulkovo '42)	Poland
179	S42 (Pulkovo '42)	Czechoslovakia
180	S42 (Pulkovo '42)	Latvia
181	S42 (Pulkovo '42)	Kazakhstan
182	S42 (Pulkovo '42)	Albania
183	S42 (Pulkovo '42)	Romania
184	S-JTSK	Czechoslovakia (Prior 1 Jan 1993)
185	Santo (DOS1965	Espirito Santo Island
186	Sao Braz	Azores (São Miguel ; Santa Maria Ids)

187	Sapper Hill 1943	East Falkland Island
188	Schwarzeck	Namibia
189	Selvagem G '38	Salvage Islands
190	Sierra Leone 1960	Sierra Leone
191	SAD 1969	Argentina
192	SAD 1969	Bolivia
193	SAD 1969	Brazil
194	SAD 1969	Chile
195	SAD 1969	Colombia
196	SAD 1969	Ecuador
197	SAD 1969	Ecuador (Baltra ; Galapagos)
198	SAD 1969	Guyana
199	SAD 1969 Mean	Mean for Argentina ; Bolivia ; Brazil ; Chile ; Colombia ; Ecuador;Guyana ; Paraguay ; Peru ; Trinidad & Tobago ; Venezuela
200	SAD 1969	Paraguay
201	SAD 1969	Peru
202	SAD 1969	Trinidad & Tobago
203	SAD 1969	Venezuela
204	South Asia	Singapore
205	Tananarive 1925	Madagascar
206	Timbalai 1948	Brunei ; E. Malaysia (Sabah Sarawak)
207	Tokyo	Japan
208	Tokyo	Mean for Japan ; South Korea ; Okinawa
209	Tokyo	Okinawa
210	Tokyo	South Korea
211	Tristan Astro '68	Tristão da Cunha
212	Viti Levu 1916	Fiji (Viti Levu Island)
213	Voirol 1960	Algeria
214	Wake Isld '52	Wake Atoll
215	W Eniwetok '60	Marshall Islands
216	WGS 1972	Global Definition
217	WGS 1984	Global Definition
218	Yacare	Uruguay
219	Zanderij	Suriname
220	Amersfoort	Netherlands
221	French NTF	France ; Nouvelle Triangulation Francaise
222	Potsdam	Germany
223	RT 90	Swedish
224	CH-1903	Swiss
225	Austria	Austria
226	European 1950	Belgium
227	Israeli	Israeli
228	Rome 1940	Luxembourg
229	Finland Hayford	Finland
230	Dionisos	Greece
231	SAD 69 (IBGE)	Brazil
232	Potsdam II	Germany
233	Datum 73	Portugal
234	WGS 1972 (GPS)	Global Definition
235	Adindan (GPS)	Burkina Faso
236	Ain el Abd 1970 (GPS)	Bahrain
237	Arc 1960 (GPS)	Kenya and Taanzania
238	Ascension Island 1958 (GPS)	Ascension Island
239	Belgium 1950 (GPS)	Belgium
240	Danish 1934 (GPS)	Denmark
241	Hu-Tzu-Shan (GPS)	Taiwan
242	Indian Bangladesh (GPS)	Bangladesh
243	Indian Maen (GPS)	Mean for India
244	Indian Thailand (GPS)	Mean for Thailand
245	Indonesian 1974 (GPS)	Mean for Indonesia
246	Johnston Isld 61 (GPS)	Johnston Island
247	Luzon Mean (GPS)	Mean for Philippines
248	NAD27 Caribbean (GPS)	Mean for Caribe
249	Nahrwan Saudi Arabia (GPS)	Mean for Saudi Arabia
250	Naparima BWI (GPS)	Trinidad and Tobago

251	Netherland Tri21 (GPS)	Mean for Netherland
252	Nou Triag France (GPS)	France
253	Nou Triag Luxemb (GPS)	Luxemburg
254	Old Hawaiian Kauai (GPS)	Kauai/Hawaii
255	Old Hawaiian Maui (GPS)	Maui/Hawaii
256	Old Hawaiian Oahu (GPS)	Oahu/Hawaii
257	Portugal 73 (GPS)	Portugal
258	RT 90 (GPS)	Swedish
259	Sapper Hill 1943 (GPS)	East Falkland Island
260	Timbalai 1948 (GPS)	Mean for Brunei; E. Malaysia (Sabah Sarawak)
261	Tokyo Mean (GPS)	Mean for Japan; South Korea; Okinawa
262	Wake-Eniwetok 1960 (GPS)	Marshall Islands

3.4 Information of Images

Each Image is saved in two parts:

Image Information: Saved in the beginning of GTM file, having all information about the calibration parameters.

Image File: attached in the end of GTM File, with the same binary structure of the image file. So, if it was used compressed images such as *JPG* and *GIF* instead of *BMP* (without compression), the GTM file length will be smaller.

“*n_maps*” variable in *Header* (Topic 3.2) defines the number of times that “*image1*” will be recorded.

```
Type images1
  name_map As String
  comments As String
  gposx As Single
  gposy As Single
  gwidth As Single
  gheight As Single
  imagelen As Long
  metax As Single
  metay As Single
  metamapa As Byte
  tnum As Byte
End Type
```

Variable	Type	Comments
name_map	string	Image name
comments	string	Image comments
Gposx	single	upper-left corner in degrees
Gposy	single	upper-left corner in degrees
Gwidth	single	Image width in degrees
Gheight	single	Image Height in degrees
imagelen	long	File image length
Metax	single	Reservation – Set to 0
Metay	single	Reservation – Set to 0
metamapa	byte	Reservation – Set to 0
Tnum	byte	Reservation – Set to 1

Example:

Point #1:

Longitude = gposx

Latitude = gposy

Point#2:

Longitude = gposx + gwidth

Latitude = gposy - gheight



Note: coordinates in the same datum of the map

3.5 Waypoints

The Waypoints are saved with the following structure:

```
Type Wpts1
  latitude As Double
  longitude As Double
  name As String * 10
  wname As String
  ico As Integer
  dspl As Byte
  wdate As Long
  wrot As Integer
  walt As Single
  wlayer As Integer
End Type
```

“*nwpts*” variable in *Header* (Topic 3.2) defines the number of times that “*Wpts1*” will be recorded.

Variable	Type	Comments
latitude	double	Latitude in degrees with 13 decimal places
longitude	double	Longitude in degrees with 13 decimal places
name	String*10	Waypoint Name
wname	string	Waypoint comments
ico	integer	Icon number. See the table below. (Default = 48)
dspl	byte	Display number. See the table below.
wdate	long	Waypoint date - Number of seconds since 31-Dec-1989. See the examples below.
wrot	integer	Angle of Rotation x10 – Example: 1800 = 180 degrees
walt	single	Altitude in meters
wlayer	integer	Reserved – Set to 0

Notes about *dspl*:

dspl	Waypoint Style
1	Predefined Style #1 : Name with Symbol
2	Predefined Style #2 : Only Symbol
3	Predefined Style #3 : Comment with Symbol (Default)
4	Predefined Style #4 : Comments in a Text Box
xx	User styles available only in GTM PRO

Numeric examples for *wdate*:

Date and Hour	wdate
7-April-2000 12:00:00 PM	331646400
3-April-2001 11:00:00 PM	352681200
1-February-1999 9:14:36 AM	284202876

Table of Icons (*ico*)

1	Airport	65	Forest	129	Letter – D	193	(Lowrance WPT)
2	Ball Park	66	Ghost Town	130	Letter – N	194	Lowrance WPT1
3	Bank	67	Levee	131	Crossing	195	Lowrance WPT2
4	Bar	68	Military	132	Cross	196	Mark (1)
5	Boat Ramp	69	Oil Field	133	Flag-Red	197	Mark (2)
6	Campground	70	Post Office	134	Curve1	198	Mark (3)
7	Car	71	Rv Park	135	Curve2	199	Cross(Red)
8	City Large	72	Scales	136	Curve3	200	Store
9	City Medium	73	Summit	137	Curve4	201	Exclamation
10	City small	74	Toll Booth	138	Letter – W	202	Flag (EUA)
11	Dam	75	Trail Head	139	Letter – L	203	Flag (CAN)
12	Danger Area	76	Truck Stop	140	Letter – R	204	Flag (BRA)
13	Drinking Water	77	Tunnel	141	Radio Beacon	205	Man
14	Fishing Area	78	Highway	142	Road Sign	206	Animals (1)
15	Gas Station	79	Gate	143	Geocache	207	Deer Tracks
16	Glider Area	80	Fall	144	Geocache Found	208	Tree Stand
17	Golf Course	81	Fence	145	Traffic Light	209	Bridge(1)
18	Heliport	82	Mata-Burro	146	Bus Station	210	Fence(1)
19	Hotel	83	Fitness Center	147	Train Station	211	Intersection
20	Animals	84	Movie Theater	148	School	212	Non-Direct Beacon
21	Information	85	Live Theater	149	Mile Marker	213	VHF Omni-Range
22	Man Overboard	86	Zoo	150	Conservation Area	214	Vor/Tacan
23	Marina	87	Horn	151	Magellan® Waypoint	215	Vor-Dme
24	Mine	88	Bowling	152	Box	216	1st Approach Fix
25	Medical Facility	89	Car Rental	153	Aerial	217	Localizer Outer
26	Parachute Area	90	City Capitol	154	Auto Repair	218	Missed Appr. Pt
27	Park	91	Controlled Area	155	Boat (1)	219	Tacan
28	Parking Area	92	Stadium	156	Exit Ramp	220	CheckPoint
29	Picnic Area	93	Museum	157	Fixed Nav Aid		
30	Private Field	94	Amusement Park	158	Floating Buoy		
31	Residence	95	Skull	159	Garden		
32	Restaurant	96	Department Store	160	Fish Farm		
33	Restroom	97	Pharmacy	161	Lighthouse		
34	Scenic Area	98	Pizza	162	Truck Service		
35	School	99	Diver Down	163	Resort		
36	Seaplane Base	100	Light	164	Scuba		
37	Shipwreck	101	Pin	165	Shooting		
38	Shopping Center	102	(Blank)	166	Sight Seeing		
39	Short Tower	103	Pigsty	167	Sounding		
40	Policy	104	Tree	168	Winery		
41	Skiing Area	105	Bamboo	169	Navaid (Amber)		
42	Soft Field	106	Banana Plant	170	Navaid (Black)		
43	Swimming Area	107	Arrow-Down	171	Navaid (Blue)		
44	Tall Tower	108	Bifurcation	172	Navaid (Green)		
45	Telephone	109	Cavern	173	Navaid (Green;Red)		
46	Tracback Point	110	River	174	Navaid (Green;White)		
47	Ultralight Area	111	Rock	175	Navaid (Orange)		
48	Waypoint	112	Arrow-up	176	Navaid (Red)		
49	Boat	113	Trunk	177	Navaid (Red;Green)		
50	Exit	114	Soccer Field	178	Navaid (Red;White)		
51	Flag	115	Sporting Court	179	Navaid (Violet)		
52	Duck	116	Flag-Green	180	Navaid (White)		
53	Buoy	117	Trench	181	Navaid (White;Green)		
54	Back Track	118	Ship-Yellow	182	Navaid (White;Red)		
55	Beach	119	Green Sign	183	Buoy (White)		
56	Bridge	120	Swamp	184	Dot (White)		
57	Building	121	Lake	185	Red Square		
58	Car Repair	122	Stop!	186	Red Diamond		
59	Cemetary	123	Fishing Area	187	Green Square		
60	Church	124	Speed Reducer	188	Green Diamond		
61	Civil	125	Stairway	189	Restricted Area		
62	Convenience	126	Cactus	190	Navaid (unlit)		
63	Crossing	127	Ship-Red	191	Dot (Small)		
64	Fast Food	128	Letter – S	192	Libraries		

3.6 Waypoint Styles

The Styles of Waypoints are saved with the following structure:

```
Type stylefont1
  Height As Long
  FaceName As String
  dspl As Byte
  color As Long
  Weight As Long
  scale1 As Single
  border As Byte
  background As Boolean
  backcolor As Long
  Italic As Byte
  Underline As Byte
  StrikeOut As Byte
  alignment As Byte
End Type
```

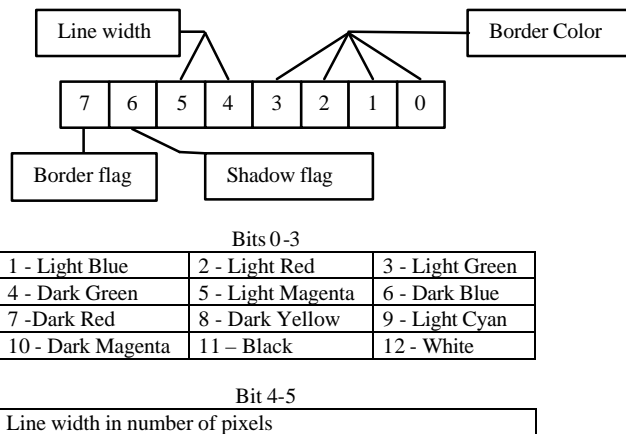
“*nwptstyles*” variable in *Header* (Topic 3.2) defines the number of times that “*stylefont1*” will be recorded.

Variable	Type	Comments
height	Long	Font Size x -1.333333. Example: If font size is 8, height will be -11
facename	String	Font name – Default = “Times New Roman”
dspl	Byte	Display mode. See the table below.
color	Long	Text color (RGB)
weight	Long	Normal = 400 / Bold = 700
scale1	Single	Maximum scale in Kilometers that the Waypoint appears on screen (Default = 0)
border	Byte	Border of the background box. See the table below.
background	Boolean	Background box – Used by Text Box Style
backcolor	Long	Color of the Background Box (RGB)
italic	Byte	Normal = 0 / Italic = 1
underline	Byte	Normal = 0 / Underline = 1
strikeout	Byte	Normal = 0 / Strikeout = 1
alignment	Byte	Text alignment in Text Box. See the table below.

Important:

- The Waypoint Styles must not be recorded if there are no waypoints recorded
- If there are waypoints recorded, it’s necessary to record at least the 4 basic Styles of Waypoints

Binary structure of border



Example:

boder = 139 : one pixel black border without shadow

Binary structure of alignment

Bits 0-3

0 - Left	1 - Center	2 - Right
----------	------------	-----------

Values for *dspl*

0	Name with symbol
1	Only Symbol
2	Comments with symbol
3	Text Box (without symbol)

The four basic Styles of Waypoints must be saved if there are Waypoints saved.
The example below shows suggested values for the basic styles:

Variable	Style #1 Name with Symbol	Style #2 Only Symbol	Style #3 Symbol with Comments	Style #4 Text Box
height	-11	-11	-11	-11
facename	Times New Roman	Times New Roman	Times New Roman	Times New Roman
dspl(*)	0	1	2	3
color	0	0	0	0
weight	400	400	400	400
scale1	0	0	0	0
border	0	0	0	139
background	False	False	False	True
backcolor	0	0	0	65535 (Yellow)
italic	0	0	0	0
underline	0	0	0	0
strikeout	0	0	0	0
alignment	0	0	0	1

(*)Warning: All value can be modified, except *dspl*.

3.7 Tracklogs

The Tracklogs are saved with the following structure:

```
Type trcks1
  latitude As Double
  longitude As Double
  tdate As Long
  tnum As Byte
  talt As Single
End Type
```

“*ntrcks*” variable in *Header* (Topic 3.2) defines the number of times that “*trcks1*” will be recorded.

Variable	Type	Comments
latitude	Double	Latitude in degrees with 13 decimal places
longitude	Double	Longitude in degrees with 13 decimal places
tdate	Long	Trackpoint date - Number of seconds since 31-Dec-1989. See the example below.
tnum	Byte	Tracklog flag : 1 = Start a new Tracklog / 0 = continue the tracklog
talt	Single	Altitude in meters

Numeric examples for *tdate*:

Date and Hour	wdate
7-April-2000 12:00:00 PM	331646400
3-April-2001 11:00:00 PM	352681200
1-February-1999 9:14:36 AM	284202876

Note: *LabelFont*, *LabelSize* and *LabelColor* located in *HEADER* define respectively the font, the color and the size of the text of Tracklog and Route labels. See the *Header Section* for further details.

3.8 Tracklog Styles

TrackMaker uses one Tracklog Style for each Tracklog different from the Waypoint Styles. The Tracklog Styles are saved with the following structure:

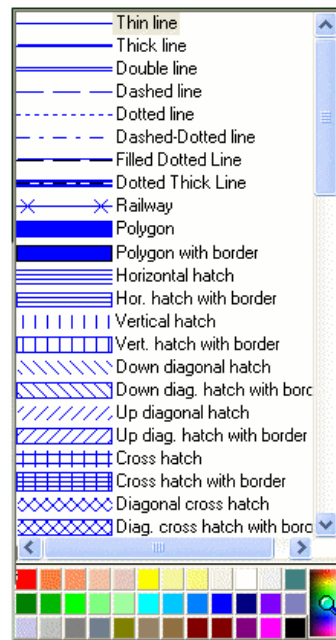
```
Type trknome1
  tname As String
  ttype As Byte
  tcolor As Long
  tscale As Single
  tlabel As Byte
  tlayer As Integer
End Type
```

“*n_ik*” variable in *Header* (Topic 3.2) defines the number of times that “*trknome1*” will be recorded.

Variable	Type	Comments
tname	String	Tracklog name
ttype	Byte	Tracklog type. See the table below.
tcolor	Long	Tracklog color (RGB)
tscale	Single	Maximum scale in Kilometers that the Tracklog appears on screen (Default = 0)
tlabel	Byte	Reservation – Set to 0
tlayer	Integer	Reservation – Set to 0

Values of *ttype*

- 1 - Thin line
- 2 - Thick line
- 3 - Double line
- 7 - Dashed line
- 8 - Dotted line
- 9 - Dashed-Dotted line
- 4 - Filled Dotted Line
- 5 - Dotted Thick Line
- 6 - Railway
-
- 17 - Polygon
- 18 - Polygon with border
- 19 - Horizontal hatch
- 20 - Hor. hatch with border
- 21 - Vertical hatch
- 22 - Vert. hatch with border
- 23 - Down diagonal hatch
- 24 - Down diag. hatch with border
- 25 - Up diagonal hatch
- 26 - Up diag. hatch with border
- 27 - Cross hatch
- 28 - Cross hatch with border
- 29 - Diagonal cross hatch
- 30- Diag. cross hatch with border



3.9 Routes

The Routes are basically sequences of Waypoints, saved with the following structure:

```
Type rtes1
  latitude As Double
  longitude As Double
  wname As String * 10
  wcomment As String
  rname As String
  ico As Integer
  dspl As Byte
  tnum As Byte
  tdate As Long
  wrot As Integer
  walt As Single
  wlayer As Integer
End Type
```

“*rtes*” variable in *Header* (Topic 3.2) defines the number of times that “*rtes1*” will be recorded.

Variable	Type	Comments
latitude	Double	Latitude in degrees with 13 decimal places
longitude	Double	Longitude in degrees with 13 decimal places
wname	String *10	Routepoint Name
wcomment	String	Routepoint Comments
rname	String	Route name
ico	Integer	Icon number . See the table of Icons. (Default = 48)
dspl	Byte	Display number. See the table of dspl.
tnum	Byte	Route flag : 1 = Start a new Route / 0 = continue the route
tdate	Long	Reservation – Set to 0
wrot	Integer	Reservation – Set to 0
walt	Single	Altitude in meters
wlayer	Integer	Reservation – Set to 0

The values of *ico* and *dspl* are the same of the Waypoints. See the tables in the “Waypoints” topic.

3.10 User Icons – Not Implemented Yet

This field will be implemented in the future.

```
Type user_icon
  name As String
  number As Byte
  size As Long
End Type
```

“*iconnum*” variable in *Header* (Topic 3.2) defines the number of times that “*user_icon*” will be recorded.

Variable	Type	Comments
name	Double	Name of user icor
number	Double	Number of user icon
size	String *10	Size of the image of icon

3.11 Layers – Not Implemented Yet

This field will be implemented in the future.

```
Type layers
  Index As Integer
  name As String
  color As Long
  lock As Byte
  view As Byte
  reserva1 As Byte
  reserva2 As Integer
End Type
```

“*n_layers*” variable in *Header* (Topic 3.2) defines the number of times that “*layers*” will be recorded.

Variable	Type	Comments
index	Integer	Layer index
name	String	Layer name
color	Long	Layer color
lock	Byte	Flag – Layer lock
view	Byte	Flag – layer visible
reserva1	Byte	Reservation
reserva2	Integer	Reservation

3.12 Image files

The images are attached in the end of GTM File with the same binary structure of the image file. So, if it was used compressed images such as *JPG* and *GIF* instead of *BMP* (without compression), the GTM file length will be smaller.

“*n_maps*” variable in *Header* (Topic 3.2) defines the number of recorded images.

The sequence of images must be the same sequence of “*image1*” (See Topic 3.4).