B&G Fastnet Protocol

Physical Layer:

Differential network with signal levels compatible to CAN. Async serial transmission with 28800 baud, 8 data bits, 2 stop bits, odd parity.

Frame distinction can be done by recognizing a time between the frames. (minimum time between frames was testet to be about 100ms.

Frame format:

The frame consist of the 5 byte header. After the header, a header checksum is applied. Then the channel data are sent, where a number of channels can be sent in one frame.

TO	FROM	FrameSize	Command	Header Checksum	ChannelID	Format	Channel data 2/4 bytes	ChannelID	Format	Format	Channel data 2/4 bytes	More channels	Checksum Frame

To: Destination Address

From: Source Address:
        01H Depth
        05H Wind
        09H Performance
        0DH Expansion
        10H Halcyon 2000 Compass
        11H to 12H (Typ. 12H) Auto-Pilot
        20H to 2FH FFDs
        30H to 3FH Halcyon FFDs
        40H to 4FH 20/20's
        50H to 5FH Pilot FFDs
        60H to 6FH NMEA FFDs
        112H to 127H Loadcell Amplifiers
        128H Tank Level Sensor

FrameSize: Number of Bytes of Payload, excluding Header and Checksums

Command: B&G Command, see table. For data transfer, only command 0x01 is used, with the exception that the position lat/lon are sent with command 0x03.

> **0x01: Data Values**
> **0x03: Position Lat/Lon**

Header checksum is computed by starting with a zero and summing all of the bytes in the header (with only 8 bit ->char). The checksum is then calculated to be 0x100 – sum.

Channel ID: See Appendix File for Channel IDs.

Format Byte:

This is the format of the respective channel:

Digit1	Digit0	Size1	Size0	Format3	Format2	Format1	Format0

Digits: The position of the comma digit, or, more precicely the divisor of the data value:

Digit 1	Digit0	Divisor
0	0	1.0
0	1	10.0
1	0	100.0
1	1	1000.0

This means the following value will be divided by the divisor.

Size: The size is used to give the amount of digits the B&G display will show. This can be used for values with leading zeros.

Size1	Size0	Digits
0	0	0000
0	1	000
1	0	00
1	1	0

For example, if the Size is 3 (01) then the value will be displayed with 3 digits, independent of the value itself.

Format: The format codes the data format of the following bytes:

0x00: Only used for ASCII Text in Position Lon/Lat Message

0x01: 16 bit signed value

0x02: 6 bit segment code (see excel file) + 10 bit unsigned value

0x03: 7 bit segment code + 9 bit unsigned

0x04: 8 bit ?? + 24 bit unsigned value

0x05: Timer format; XX YY ZZ WW

> XX: useless
> YY: hours
> ZZ: minutes
> WW: seconds

0x06: Text with segments
    Used for displaying 7 segment text or symbols
            XX YY ZZ WW

> XX: 1st 7-segment digit
> YY: 2nd
> ZZ: 3rd
> WW:4th 7-segment digit
    For example: the text "OFF" is coded to be 0x00BEE8E8

0x07: 15 bit unsigned with segment

> XX YY ZZ WW

> XX: unused
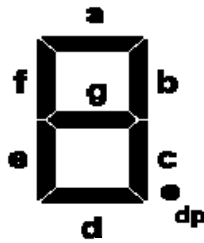> YY: Segment code
> ZZ: 7 bit MSB
> WW: 8 bit LSB

0x08: 7bit segment code + 9 bit unsigned

0x0A: 16 bit signed + 16 bit signed

There are formats not described which are very rarely used, they all have 4 Byte in size!

Segment Codes:

7 Segment Format

SEGCODE_A

msb   lsb

7 6 5 4 3 2 1 0

x f g e d a b c

x= 1, seg before data, (on Left)

x= 0, seg after data (on Right)

SEGCODE_B

msb   lsb

7 6 5 4 3 2 1 0

f g e d a b c x

x is part of next byte

Segcode B is used for all formats which have 7 bit digit + 9 bit data.

Frame checksum is computed by starting with a zero and summing all of the bytes in the frame (with only 8 bit ->char). The checksum is then calculated to be 0x100 – sum.

Appendix: B&G Channels in dec and hex

Rudder Angle	11	0B
Linear 5	12	0C
Linear 6	13	0D
Linear 7	14	0E
Linear 8	15	0F
Linear 9	16	10
Linear 10	17	11
Linear 11	18	12
Linear 12	19	13
Linear 13	20	14
Linear 14	21	15
Linear 15	22	16
Linear 16	23	17
Air Temperature degrees F	28	1C
Air Temperature degrees C	29	1D
Sea Temperature degrees °F	30	1E
Sea Temperature degrees °C	31	1F
Head/Lift Trend	39	27
Off Course	41	29
Tacking Performance	50	32
Reaching Performance	51	33
Heel Angle	52	34
Optimum Wind Angle	53	35
Depth Sounder Receiver Gain	54	36
Depth Sounder Noise	55	37
Linear 1	56	38
Linear 2	57	39
Linear 3	58	3A
Linear 4	59	3B
Roll Rate	60	3C
Boatspeed, Knots	65	41
Boatspeed, raw	66	42
Yaw rate	68	44
Lon/Lat in ascii send as an 03 cmd	71	47
Lon/Lat in ascii send as an 03 cmd	72	48
Heading	73	49
Heading, Raw	74	4A
Apparent Wind Speed knots	77	4D
Apparent Wind Speed, raw	78	4E

Apparent Wind Speed m/s	79	4F
from nmea	78	50
Apparent Wind Angle	81	51
Apparent Wind Angle, raw	82	52
Target TWA	83	53
True Wind Speed, knots	85	55
True Wind Speed M/S	86	56
True Wind Angle	89	59
Average Speed, knots	100	64
Request for data	104	68
Course	105	69
Act for data	106	6A
True Wind Direction	109	6D
Next Leg Apparent Wind Angle	111	6F
Next Leg Target Boat Speed	112	70
Next Leg Apparent Wind Speed	113	71
Timer	117	75
Polar Performance	124	7C
Target Boatspeed	125	7D
Velocity Made Good, K	127	7F
Dead Reckoning Distance	129	81
Leeway	130	82
Tidal Drift	131	83
Tidal Set	132	84
Upwash	133	85
Barometric Pressure Trend	134	86
Barometric Pressure	135	87
Battery Volts	141	8D
Heading on Next Tack	154	9A
Fore/Aft Trim	155	9B
Mast Angle	156	9C
Wind Angle to the Mast	157	9D
Pitch Rate	158	9E
Depth Meters	193	C1
Depth Feet	194	C2
Depth Fathoms	195	C3
Stored Log, NM	205	CD
Trip Log, NM	207	CF
Dead Reckoning Course	211	D3
Local Time	220	DC
UTC Time	221	DD
Bearing Wpt. to Wpt, true	224	E0
Bearing Wpt. to Wpt., mag.	225	E1

Distance to Layline	226	E2
Bearing to Waypoint, rhumb true	227	E3
Bearing to Waypoint, rhumb mag.	228	E4
Bearing to Waypoint, G.C. true	229	E5
Bearing to Waypoint, G.C. mag.	230	E6
Distance to Waypoint, Rhumb	231	E7
Distance to Waypoint, G.C.	232	E8
Course Over Ground, True	233	E9
Course Over Ground, Mag.	234	EA
Speed Over Ground	235	EB
Vel. Made Good, Course	236	EC
Time to Waypoint	237	ED
Cross Track Error	238	EE
Remote 0	239	EF
Remote 1	240	F0
Remote 2	241	F1
Remote 3	242	F2
Remote 4	243	F3
Remote 5	244	F4
Remote 6	245	F5
Remote 7	246	F6
Remote 8	247	F7
Remote 9	248	F8
Course to Sail	249	F9
Next Waypoint Distance	250	FA
Time to Layline	252	FC