VBOX Sport Serial Data Stream

Default message format
$VBSPT$nnnniiii,stttaaaaoooovvhheeezzxxyybbmmmmffffddcc

The $VBSPT$ and commas are in ASCII, the rest is in binary.
The four bytes of the nnnn field indicate the presence of standard channels in the data stream.
The four bytes of the iiii field indicate the presence of extended channels in the data stream.

Standard channels examples:
1. If only 'sats' and 'speed' are present the corresponding bit masks 0x00000001 and 0x00000010 would equate to the nnnn field equaling 0x00000011.
2. If 'sats', 'time', 'latitude', 'longitude', 'speed', 'heading', 'height', 'vertical velocity', 'lat.acc.' and 'long.acc.' are present then the nnnn field would equal 0x000003FF.

Extended channels examples:
1. If only 'battery time to empty' is present the iiii field would equal 0x00000001.
2. If 'battery time to empty', 'media capacity', 'media free space' and 'HDOP' are all present the iiii field would equal 0x00000071.

Note

Some bit flags are not used, while others are not available in production units.

Default channels

Bluetooth
At the time of writing the default channels are:

Standard channels 0x000003FF:
Satellites, time, latitude, longitude, speed, heading, height, vertical speed, longitudinal acceleration and lateral acceleration.

Extended channels 0x00000071:
Battery time to empty, media capacity, media free space, HDOP.

USB
At the time of writing the default channels are:

Standard channels 0x000000FF:
Satellites, time, latitude, longitude, speed, heading, height, vertical speed.

Extended channels 0x00000000:
None.

Fields list

Note that for clarity the fields are colour coded.

The meta-data fields are shown as this colour.
The standard channel fields are this colour.
The extended channel fields are this colour.
Any unsupported channel is this colour.

Code in default message format above	Bytes	Description	Bit mask
$VBPBi$	8	**Header** $VBSPT$	
nnnn	4	**Standard Channel Flags** 0x000003FF	
iiii	4	**Extended Channel Flags** 0x00000071	
,	1	**Comma**	
s	1	**Satellites** Bits 0-6 are number of satellites used Bit 7 is set if the VBOX SPORT is using DGPS	**0x00000001**
ttt	3	**Time** Number of 10ms ticks since midnight UTC	**0x00000002**
aaaa	4	**Latitude** (minutes * 100,000) Positive value for North, negative for South	**0x00000004**
oooo	4	**Longitude** (minutes * 100,000) Positive value for West, negative for East	**0x00000008**
vv	2	**Speed** Speed in knots * 100	**0x00000010**
hh	2	**Heading** Degrees from true north * 100	**0x00000020**
eee	3	**Height** Altitude in metres WGS84 * 100 True signed 24 bit number	**0x00000040**

zz	2	**Vertical Speed** Vertical speed in m/s	**0x00000080**
xx	2	**Longitudinal acceleration (from GPS)** In G * 100	**0x00000100**
yy	2	**Lateral acceleration (from GPS)** In G * 100	**0x00000200**
	4	**Brake distance**	**0x00000400**
	4	**Distance** In m * 128000	**0x00000800**
	4	**Internal analogue 1**	**0x00001000**
	4	**Internal analogue 2**	**0x00002000**
	4	**Internal analogue 3**	**0x00004000**
	4	**Internal analogue 4**	**0x00008000**
	1	**Glonass sats**	**0x00010000**
	1	**GPS sats**	**0x00020000**
	2	**Yaw 0 value**	**0x00040000**
	2	**Yaw 0 LatAcc**	**0x00080000**

	2	**Yaw 0 Status**	**0x00100000**
	2	**Yaw 1 value**	**0x00200000**
	2	**Yaw 1 LatAcc**	**0x00400000**
	2	**Yaw 1 Status**	**0x00800000**
	4	**Velocity quality**	**0x01000000**
	4	**Temperature** In degrees C * 100	**0x02000000**
	2	**Buffer size**	**0x04000000**
	3	**Media Free Space** (0xEF7FF – ((percent_free / 100) * 0xEF7FF))	**0x08000000**
	4	**Event time 1**	**0x10000000**
	2	**Event time 2**	**0x20000000**
	2	**Internal voltage**	**0x40000000**
	2	**Battery voltage** In mV	**0x80000000**
bb	2	**Battery time to empty** In minutes. TTE field from gas gauge. A value of 0xFFFF is shown if the battery is not discharging.	**0x00000001**

	2	**Battery time to full** In minutes. TTF field from gas gauge. A value of 0xFFFF is shown if the battery is not charging	**0x00000002**
	2	**Battery charge when full** In mAh. FCC field from gas gauge.	**0x00000004**
	2	**Battery current charge** As a percentage of charge when full. RM field from gas gauge.	**0x00000008**
mmmm	4	**Media capacity** In kB.	**0x00000010**
ffff	4	**Media free space** In kB.	**0x00000020**
dd	2	**HDOP** Value * 100	**0x00000040**
Cc	2	**Checksum** CRC of message, see Note 1*	

***Note 1**

CRC Calculation example:
s[n] is a string containing the message
Polynomial:= 4129 (0x1021)

```
CRC:=0;
For Loop:=1 to Length(s) do
begin
Temp:=s[Loop];
CRC:= CRC xor (integer(Temp) * 256);
CRC:= CRC mod 65536;
for i:=7 downto 0 do
begin
if ( (CRC and 32768)=32768) then
begin
CRC:= CRC *2 ;
CRC:= CRC xor Polynomial;
end
else
begin
CRC:= CRC *2 ;
end;
CRC:=CRC mod 65536;
end;
end;
result:=CRC;
```

Troubleshooting

I am only receiving a message containing "$VBSPT" from the VBOX Sport.

Please interpret the data as binary to resolve this issue. "$VBSPT" is a header and is in ASCII whilst the rest of the data is binary. Please see the section entitled: 'Default message format' at the top of this document for further information.