

## 4.2.10 GNSS Attitude Blocks

AttEuler	Number: 5938
	"OnChange" interval: default PVT output rate (see 4.1.8)

The `AttEuler` block contains the Euler angles (pitch, roll and heading) at the time specified in the `TOW` and `WNc` fields (in the receiver time frame).

Parameter	Type	Units	Do-Not-Use	Description
Sync1	c1			Block Header, see 4.1.1
Sync2	c1			
CRC	u2			
ID	u2			
Length	u2	1 byte		
TOW	u4	0.001 s	4294967295	Receiver time stamp, see 4.1.3
WNc	u2	1 week	65535	
NrSV	u1		255	The average over all antennas of the number of satellites currently included in the attitude calculations.
Error	u1			<p>Bit field providing error information. For each antenna baseline, two bits are used to provide error information:</p> <p>Bits 0-1: Error code for Main-Aux1 baseline:  0: No error  1: Not enough measurements  2: Reserved  3: Reserved</p> <p>Bits 2-3: Error code for Main-Aux2 baseline, same definition as bit 0-1.  Bits 4-6: Reserved  Bit 7: Set when GNSS-based attitude not requested by user. In that case, the other bits are all zero.</p>
Mode	u2			<p>Attitude mode code:</p> <p>0: No attitude  1: Heading, pitch (roll = 0), aux antenna positions obtained with float ambiguities  2: Heading, pitch (roll = 0), aux antenna positions obtained with fixed ambiguities  3: Heading, pitch, roll, aux antenna positions obtained with float ambiguities  4: Heading, pitch, roll, aux antenna positions obtained with fixed ambiguities</p>
Reserved	u2			Reserved for future use, to be ignored by decoding software
Heading	f4	1 degree	$-2 \cdot 10^{10}$	Heading
Pitch	f4	1 degree	$-2 \cdot 10^{10}$	Pitch
Roll	f4	1 degree	$-2 \cdot 10^{10}$	Roll
PitchDot	f4	1 degree / s	$-2 \cdot 10^{10}$	Rate of change of the pitch angle
RollDot	f4	1 degree / s	$-2 \cdot 10^{10}$	Rate of change of the roll angle
HeadingDot	f4	1 degree / s	$-2 \cdot 10^{10}$	Rate of change of the heading angle
Padding	u1[.]			Padding bytes, see 4.1.5

AttCovEuler	Number: 5939
	"OnChange" interval: default PVT output rate (see 4.1.8)

This block contains the elements of the symmetric variance-covariance matrix of the attitude angles reported in the `AttEuler` block

$$\begin{pmatrix} \sigma_{\phi}^2 & \sigma_{\phi\theta} & \sigma_{\phi\psi} \\ \sigma_{\theta\phi} & \sigma_{\theta}^2 & \sigma_{\theta\psi} \\ \sigma_{\psi\phi} & \sigma_{\psi\theta} & \sigma_{\psi}^2 \end{pmatrix}$$

This variance-covariance matrix contains an indication of the accuracy of the estimated parameters (see diagonal elements) and the correlation between these estimates (see off-diagonal elements).

In case the receiver is in heading and pitch mode only, only the heading and pitch variance values will be valid. All other components of the variance-covariance matrix are set to their Do-Not-Use value.

Parameter	Type	Units	Do-Not-Use	Description
Sync1	c1			Block Header, see 4.1.1
Sync2	c1			
CRC	u2			
ID	u2			
Length	u2	1 byte		
TOW	u4	0.001 s	4294967295	Receiver time stamp, see 4.1.3
WNc	u2	1 week	65535	
Reserved	u1			Reserved for future use, to be ignored by decoding software
Error	u1			<p>Bit field providing error information. For each antenna baseline, two bits are used to provide error information:</p> <p>Bits 0-1: Error code for Main-Aux1 baseline:</p> <ul style="list-style-type: none"> <li>0: No error</li> <li>1: Not enough measurements</li> <li>2: Reserved</li> <li>3: Reserved</li> </ul> <p>Bits 2-3: Error code for Main-Aux2 baseline, same definition as bit 0-1.</p> <p>Bits 4-6: Reserved</p> <p>Bit 7: Set when GNSS-based attitude not requested by user. In that case, the other bits are all zero.</p>
Cov_HeadHead	f4	1 degree <sup>2</sup>	$-2 \cdot 10^{10}$	Variance of the heading estimate
Cov_PitchPitch	f4	1 degree <sup>2</sup>	$-2 \cdot 10^{10}$	Variance of the pitch estimate
Cov_RollRoll	f4	1 degree <sup>2</sup>	$-2 \cdot 10^{10}$	Variance of the roll estimate
Cov_HeadPitch	f4	1 degree <sup>2</sup>	$-2 \cdot 10^{10}$	Covariance between Euler angle estimates. Future functionality. The values are currently set to their Do-Not-Use values.
Cov_HeadRoll	f4	1 degree <sup>2</sup>	$-2 \cdot 10^{10}$	Covariance between Euler angle estimates. Future functionality. The values are currently set to their Do-Not-Use values.
Cov_PitchRoll	f4	1 degree <sup>2</sup>	$-2 \cdot 10^{10}$	Covariance between Euler angle estimates. Future functionality. The values are currently set to their Do-Not-Use values.
Padding	u1[.]			Padding bytes, see 4.1.5

EndOfAtt	Number: 5943 "OnChange" interval: default PVT output rate (see 4.1.8)
----------	--

This block marks the end of transmission of all GNSS-attitude related blocks belonging to the same epoch.

Parameter	Type	Units	Do-Not-Use	Description
Sync1	c1			Block Header, see 4.1.1
Sync2	c1			
CRC	u2			
ID	u2			
Length	u2	1 byte		
TOW	u4	0.001 s	4294967295	Receiver time stamp, see 4.1.3
WNc	u2	1 week	65535	
Padding	u1[.]			Padding bytes, see 4.1.5