24	U4	vAcc	-	mm	Vertical accuracy estimate

3.15.11 UBX-NAV-PVT (0x01 0x07)

3.15.11.1 Navigation position velocity time solution

Message	**UBX-NAV-PVT** **Navigation position velocity time solution**					
Type	Periodic/polled					
Comment	This message combines position, velocity and time solution, including accuracy figures. Note that during a leap second there may be more or less than 60 seconds in a minute. See description of leap seconds in the integration manual for details.					
Message structure	*Header*	*Class*	*ID*	*Length (Bytes)*	*Payload*	*Checksum*
	0xb5 0x62	0x01	0x07	92	*see below*	CK_A CK_B

Payload description:

Byte offset	*Type*	*Name*	*Scale*	*Unit*	*Description*
0	U4	iTOW	-	ms	GPS time of week of the navigation epoch. See section iTOW timestamps in the integration manual for details.
4	U2	year	-	y	Year (UTC)
6	U1	month	-	month	Month, range 1..12 (UTC)
7	U1	day	-	d	Day of month, range 1..31 (UTC)
8	U1	hour	-	h	Hour of day, range 0..23 (UTC)
9	U1	min	-	min	Minute of hour, range 0..59 (UTC)
10	U1	sec	-	s	Seconds of minute, range 0..60 (UTC)
11	X1	valid	-	-	Validity flags
bit 0	$U_{:1}$	validDate	-	-	1 = valid UTC Date (see section Time validity in the integration manual for details)
bit 1	$U_{:1}$	validTime	-	-	1 = valid UTC time of day (see section Time validity in the integration manual for details)
bit 2	$U_{:1}$	fullyResolved	-	-	1 = UTC time of day has been fully resolved (no seconds uncertainty). Cannot be used to check if time is completely solved.
bit 3	$U_{:1}$	validMag	-	-	1 = valid magnetic declination
12	U4	tAcc	-	ns	Time accuracy estimate (UTC)
16	I4	nano	-	ns	Fraction of second, range -1e9 .. 1e9 (UTC)
20	U1	fixType	-	-	GNSSfix Type: • 0 = no fix • 1 = dead reckoning only • 2 = 2D-fix • 3 = 3D-fix • 4 = GNSS + dead reckoning combined • 5 = time only fix
21	X1	flags	-	-	Fix status flags
bit 0	$U_{:1}$	gnssFixOK	-	-	1 = valid fix (i.e within DOP & accuracy masks)
bit 1	$U_{:1}$	diffSoln	-	-	1 = differential corrections were applied
bits 4...2	$U_{:3}$	psmState	-	-	Power save mode state (see Power management section in the integration manual for details.

					• 0 = PSM is not active • 1 = Enabled (an intermediate state before Acquisition state • 2 = Acquisition • 3 = Tracking • 4 = Power Optimized Tracking • 5 = Inactive
bit 5	U:1	headVehValid	-	-	1 = heading of vehicle is valid, only set if the receiver is in sensor fusion mode
bits 7...6	U:2	carrSoln	-	-	Carrier phase range solution status: • 0 = no carrier phase range solution • 1 = carrier phase range solution with floating ambiguities • 2 = carrier phase range solution with fixed ambiguities (not supported for protocol versions less than 20.00)
22	X1	flags2	-	-	Additional flags
bit 5	U:1	confirmedAvai	-	-	1 = information about UTC Date and Time of Day validity confirmation is available (see section Time validity in the integration manual for details) This flag is only supported in Protocol Versions 19.00, 19.10, 20.10, 20.20, 20.30, 22.00, 23.00, 23.01, 27 and 28.
bit 6	U:1	confirmedDate	-	-	1 = UTC Date validity could be confirmed (see section Time validity in the integration manual for details)
bit 7	U:1	confirmedTime	-	-	1 = UTC Time of Day could be confirmed (see section Time validity in the integration manual for details)
23	U1	numSV	-	-	Number of satellites used in Nav Solution
24	I4	lon	1e-7	deg	Longitude
28	I4	lat	1e-7	deg	Latitude
32	I4	height	-	mm	Height above ellipsoid
36	I4	hMSL	-	mm	Height above mean sea level
40	U4	hAcc	-	mm	Horizontal accuracy estimate
44	U4	vAcc	-	mm	Vertical accuracy estimate
48	I4	velN	-	mm/s	NED north velocity
52	I4	velE	-	mm/s	NED east velocity
56	I4	velD	-	mm/s	NED down velocity
60	I4	gSpeed	-	mm/s	Ground Speed (2-D)
64	I4	headMot	1e-5	deg	Heading of motion (2-D)
68	U4	sAcc	-	mm/s	Speed accuracy estimate
72	U4	headAcc	1e-5	deg	Heading accuracy estimate (both motion and vehicle)
76	U2	pDOP	0.01	-	Position DOP
78	X2	flags3	-	-	Additional flags
bit 0	U:1	invalidLlh	-	-	1 = Invalid lon, lat, height and hMSL
bits 4...1	U:4	lastCorrectionAge	-	-	Age of the most recently received differential correction: • 0 = Not available • 1 = Age between 0 and 1 second • 2 = Age between 1 (inclusive) and 2 seconds • 3 = Age between 2 (inclusive) and 5 seconds

					• 4 = Age between 5 (inclusive) and 10 seconds • 5 = Age between 10 (inclusive) and 15 seconds • 6 = Age between 15 (inclusive) and 20 seconds • 7 = Age between 20 (inclusive) and 30 seconds • 8 = Age between 30 (inclusive) and 45 seconds • 9 = Age between 45 (inclusive) and 60 seconds • 10 = Age between 60 (inclusive) and 90 seconds • 11 = Age between 90 (inclusive) and 120 seconds • >=12 = Age greater or equal than 120 seconds
bit 13	U:1	authTime	-	-	Flag that indicates if the output time has been validated against an external trusted time source • 0 = Time is not authenticated • 1 = Time is authenticated
80	U1[4]	reserved0	-	-	Reserved
84	I4	headVeh	1e-5	deg	Heading of vehicle (2-D), this is only valid when headVehValid is set, otherwise the output is set to the heading of motion
88	I2	magDec	1e-2	deg	Magnetic declination. Only supported in ADR 4.10 and later.
90	U2	magAcc	1e-2	deg	Magnetic declination accuracy. Only supported in ADR 4.10 and later.

3.15.12 UBX-NAV-RESETODO (0x01 0x10)

3.15.12.1 Reset odometer

Message	**UBX-NAV-RESETODO** **Reset odometer**					
Type	Command					
Comment	This message resets the traveled distance computed by the odometer (see UBX-NAV-ODO). UBX-ACK-ACK or UBX-ACK-NAK are returned to indicate success or failure.					
Message structure	*Header*	*Class*	*ID*	*Length (Bytes)*	*Payload*	*Checksum*
	0xb5 0x62	0x01	0x10	0	*see below*	CK_A CK_B
Payload	This message has no payload.					

3.15.13 UBX-NAV-SAT (0x01 0x35)

3.15.13.1 Satellite information

Message	**UBX-NAV-SAT** **Satellite information**					
Type	Periodic/polled					
Comment	This message displays information about SVs that are either known to be visible or currently tracked by the receiver. All signal related information corresponds to the subset of signals specified in Signal Identifiers.					
Message structure	*Header*	*Class*	*ID*	*Length (Bytes)*	*Payload*	*Checksum*
	0xb5 0x62	0x01	0x35	8 + numSvs·12	*see below*	CK_A CK_B

Payload description:

Byte offset	*Type*	*Name*	*Scale*	*Unit*	*Description*
0	U4	iTOW	-	ms	GPS time of week of the navigation epoch. See section iTOW timestamps in the integration manual for details.
4	U1	version	-	-	Message version (0x01 for this version)