



*GPS Engine Board  
UART Port Command*

Specifications subject to change without prior notice.  
© 2010 TRANSYSTEM INC. all rights reserved.

Ultimate

EB

ISO 9001 Certified



TRANSYSTEM INC.

An A+ supplier of RF microwave & GPS products

Ver 1.4

# EB UART Port Command

---

## Table of Contents

---

1	User Interface .....	3
1.1	Protocol .....	3
1.2	NMEA Protocol.....	3
1.3	MTK NMEA Packet Format .....	4
1.4	MTK NMEA Packet Protocol .....	4
1.5	MTK NMEA Packet List .....	4
1.6	Checksum algorithm .....	14

ISO 9001 Certified

# EB UART Port Command

## 1 User Interface

This document applies to all TSI EB-series products. 2-wire digital UART port is used for communication of GPS position data using NMEA protocol or MTK extension protocol. UART port is capable of 4800 to 115200 baud rate.

### 1.1 Protocol

EB-series products are default to support standard NMEA-0183 protocol. In addition, a series of MTK extensions (PMTK messages) have been developed that can be used to provide extended capabilities common to many applications.

To achieve optimal compatibility it is intended to implement 100% compatible operating modes to existing protocols since these protocols are largely symmetrical and designed to provide a bi-directional exchange of data between GPS equipments.

### 1.2 NMEA Protocol

EB-series products are capable of supporting following NMEA formats:

NMEA Prefix	Format	Direction
\$GPGGA	GPS fix data	Out
\$GPGLL	Geographic position Latitude / Longitude	Out
\$GPGSA	GNSS DOP and active satellites	Out
\$GPGSV	Satellites in view	Out
\$GPRMC	Recommended minimum specific GNSS data	Out
\$GPVTG	Velocity and track over ground	Out
\$GPZDA	Date and time	Out

# EB UART Port Command

## 1.3 MTK NMEA Packet Format

Preamble	TalkerID	PktType	DataField	*	CHK1	CHK2	CR	LF
----------	----------	---------	-----------	---	------	------	----	----

Maximum packet length is restricted to 255 bytes.

Field	Length	Type	Description
Preamble	1 byte	Character	"\$"
TalkerID	4 byte	Character string	"PMTK"
PktType	3 byte	Character string	From "000" to "999", an identifier used to tell the decoder how to decode the packet
DataField	Variable		A "," must be inserted before each data field to help decoder process the DataField
*	1 byte	Character	The star symbol is used to mark the end of DataField
CHK1, CHK2	2 byte	Character string	Checksum of the data between preamble "\$" and "*"
CR, LF	2 byte	Binary data	Used to identify the end of a packet

Sample Packet: \$PMTK000\*32<CR><LF>

## 1.4 MTK NMEA Packet Protocol

In order to inform the sender whether the receiver has received the packet, an acknowledge packet PMTK\_ACK should return after the receiver receives a packet.

## 1.5 MTK NMEA Packet List

Pkt Type	Abbreviation / Syntax	Data Field	Meaning / Example / Return
000	PMTK_TEST	None	Test Packet \$PMTK000*32<CR><LF>
001	PMTK_ACK <i>PMTK001,Cmd,Flag</i>	Cmd: Command / packet type the acknowledge responds Flag: 0 = Invalid command / packet 1 = Unsupported command / packet type 2 = Valid command / packet, but action failed 3 = Valid command / packet, and action succeeded	Acknowledge of PMTK command \$PMTK001,604,3*32<CR><LF>
010	PMTK_SYS_MSG <i>PMTK001,Msg</i>	Msg: System message. 0 : Unknown 1: Startup	Output system message \$PMTK010,001*2E<CR><LF>

# EB UART Port Command

Pkt Type	Abbreviation / Syntax	Data Field	Meaning / Example / Return
101	PMTK_CMD_HOT_START	None	Hot Restart: Use all available data in the NV storage <b>\$PMTK101*32&lt;CR&gt;&lt;LF&gt;</b>
102	PMTK_CMD_WARM_START	None	Warm Restart: Don't use Ephemeris at re-start <b>\$PMTK102*31&lt;CR&gt;&lt;LF&gt;</b>
103	PMTK_CMD_COLD_START	None	Cold Restart: Don't use Time, Position, Almanacs and Ephemeris data at re-start <b>\$PMTK103*30&lt;CR&gt;&lt;LF&gt;</b>
104	PMTK_CMD_FULL_COLD_START	None	Essentially a Cold Restart, but additionally clear system/user configurations at re-start. Reset the receiver to factory default <b>\$PMTK104*37&lt;CR&gt;&lt;LF&gt;</b>
251	PMTK_SET_NMEA_BAUDRATE <b>PMTK251,Baudrate</b>	Baudrate: Baud rate setting 0 – default setting, 4800, 9600, 14400, 19200, 38400, 57600, 115200	Set NMEA port baud rate <b>\$PMTK251,38400*27&lt;CR&gt;&lt;LF&gt;</b>
300	PMTK_API_SET_FIX_CTL <b>PMTK300,FixInterval,0,0,0,0</b>	FixInterval: Position fix interval [msec]. Must be larger than 200	This parameter controls the rate of position fixing activity <b>\$PMTK300,1000,0,0,0,0*1C&lt;CR&gt;&lt;LF&gt;</b>
301	PMTK_API_SET_DGPS_MODE <b>PMTK301,Mode</b>	Mode: DGPS data source mode. 0 : No DGPS source 1 : RTCM 2 : WAAS	DGPS correction data source mode <b>\$PMTK301,1*2D&lt;CR&gt;&lt;LF&gt;</b>
313	PMTK_API_SET_SBAS_ENABLED	0 = Disable 1 = Enable	Enable to search a SBAS satellite or not <b>\$PMTK313,1*2E&lt;CR&gt;&lt;LF&gt;</b>
314	PMTK_API_SET_NMEA_OUTPUT	See below note 1	Set NMEA sentence output frequency <b>\$PMTK314,1,1,1,1,1,5,1,1,1,1,1,1,0,1,1,1,1,1*2C&lt;CR&gt;&lt;LF&gt;</b>
320	PMTK_API_SET_PWR_SAVE_MODE <b>PMTK320,Mode</b> ( Internal testing ONLY )	Mode: 0: power saving mode off 1: power saving mode on	Set power saving operation mode <b>\$PMTK320,0*26&lt;CR&gt;&lt;LF&gt;</b>
330	PMTK_API_SET_DATUM <b>PMTK330,Datum</b>	Datum: 0 : WGS84 1 : TOKYO-M 2 : TOKYO-A	Set default datum <b>\$PMTK330,0*2E&lt;CR&gt;&lt;LF&gt;</b>
331	PMTK_API_SET_DATUM_ADVANCE <b>PMTK331,majA,ecc,dX,dY,dZ</b>	majA: User defined datum semi-major axis [m] ecc: User defined datum eccentric [m] dX: User defined datum to WGS84 X axis offset [m] dY: User defined datum to WGS84 Y axis offset [m] dZ: User defined datum to WGS84 Z axis offset [m]	Set user defined datum <b>\$PMTK331, 6377397.155, 299.1528128, -148.0, 507.0,685.0*16&lt;CR&gt;&lt;LF&gt;</b>

# EB UART Port Command

Pkt Type	Abbreviation / Syntax	Data Field	Meaning / Example / Return
390	PMTK_API_SET_USER_OPTION <b>PMTK390, Lock, Update_Rate, Baud_Rate, GLL_Period, MC_Period, VTG_Period, GSA_Period, GSV_Period, GGA_Period, ZDA_Period, CHN_Period, Datum, DGPS_Mode, RTCM_Baud_Rate</b>	Lock: nonzero: freeze the setting; 0: allow further setting Update_Rate: 1~5 (Hz) Baud_Rate: 115200, 57600, 38400, 19200, 14400, 9600, 4800 XXX_Period: NMEA sentence output period Datum : More than 200 datum supported. Please refer to NOTE 2 for support list. Typical value is: 0 (WGS84), 1 (Tokyo-M), 2 (Tokyo-A) DGPS_Mode : 0 (disable), 1 (RTCM), 2 (SBAS) RTCM_Baud_Rate: 115200, 57600, 38400, 19200, 14400, 9600, 4800	Write the user setting to the flash to override the default setting. Maximum 8 times without erase the chip. This feature may not be available <b>\$PMTK390,1,1,38400,1,1,1,1,1,1,0*2B&lt;CR&gt;&lt;LF&gt;</b>
400	PMTK_API_Q_FIX_CTL	None	API_Query_Fix_Ctl <b>\$PMTK400*36&lt;CR&gt;&lt;LF&gt;</b> PMTK_DT_FIX_CTL
401	PMTK_API_Q_DGPS_MODE	None	API_Query_Dgps_Mode <b>\$PMTK401*37&lt;CR&gt;&lt;LF&gt;</b> PMTK_DT_DGPS_MODE
413	PMTK_API_Q_SBAS_ENABLED	None	API_Query_Sbas_Enabled <b>\$PMTK413*34&lt;CR&gt;&lt;LF&gt;</b> PMTK_DT_SBAS_ENABLED
414	PMTK_API_Q_NMEA_OUTPUT	None	Query current NMEA sentence output frequencies <b>\$PMTK414*33&lt;CR&gt;&lt;LF&gt;</b> PMTK_DT_NMEA_OUTPUT
420	PMTK_API_Q_PWR_SAVE_MODE ( Internal testing ONLY )	None	Query power saving operation mode <b>\$PMTK420*3F&lt;CR&gt;&lt;LF&gt;</b> PMTK_DT_PWR_SAVE_MODE
430	PMTK_API_Q_DATUM	None	Query default datum <b>\$PMTK430*35&lt;CR&gt;&lt;LF&gt;</b> PMTK_DT_DATUM
431	PMTK_API_Q_DATUM_ADVANCE	None	Query user defined datum <b>\$PMTK431*34&lt;CR&gt;&lt;LF&gt;</b> PMTK_DT_DATUM
490	PMTK_API_GET_USER_OPTION	None	Returns current user setting from flash memory. Refer to packet type 590 for detail <b>\$PMTK490*33&lt;CR&gt;&lt;LF&gt;</b> PMTK_DT_FLASH_USER_OPTION
500	PMTK_DT_FIX_CTL	FixInterval: Position fix interval in msec [ >= 200]	These parameters control the rate of position fixing activity <b>\$PMTK500,1000,0,0,0,0*1A&lt;CR&gt;&lt;LF&gt;</b>
501	PMTK_DT_DGPS_MODE	Mode: DGPS data source mode 0 : No DGPS source 1 : RTCM 2 : WAAS	DGPS Data Source Mode <b>\$PMTK501,1*2B&lt;CR&gt;&lt;LF&gt;</b>
513	PMTK_DT_SBAS_ENABLE	0 = Disable 1 = Enable	Enable to search a SBAS satellite or not <b>\$PMTK513,1*28&lt;CR&gt;&lt;LF&gt;</b>

# EB UART Port Command

Pkt Type	Abbreviation / Syntax	Data Field	Meaning / Example / Return
514	PMTK_DT_NMEA_OUTPUT	Total 19 data fields that present output frequency for the 19 supported NMEA sentences. Refer to packet type 314 for supported NMEA sentences and frequency	NMEA sentence output frequency setting <b>\$PMTK514,1,1,1,1,1,1,5,1,1,1,1,1,1,0,1,1,1,1,1*2A&lt;CR&gt;&lt;LF&gt;</b>
520	PMTK_DT_PWR_SAV_MODE <b>PMTK520,Mode</b> ( Internal testing ONLY )	0: power saving mode off 1: power saving mode on	Power saving operation mode <b>\$PMTK520,0*24&lt;CR&gt;&lt;LF&gt;</b>
530	PMTK_DT_DATUM <b>PMTK530,Datum</b>	0 : WGS84 1 : TOKYO-M 2 : TOKYO-A	Current datum used <b>\$PMTK530,0*28&lt;CR&gt;&lt;LF&gt;</b>
590	PMTK_DT_FLASH_USER_OPTION	There are totally 11 data fields that present the followings: 1: Available number of times for recording the user setting. 2: Update_Rate: 1~5 3: Baud_Rate: in bps 4~11: NMEA sentence output period (GLL, RMC, VTG, GSA, GSV, GGA, ZDA, MCHN) 12: Datum 13: DGPS mode: 0 (disable), 1 (RTCM), 2 (SBAS) 14: RTCM baud rate in bps	The user setting in the flash memory <b>\$PMTK590,0,1,9600,1,1,0,1,5,1,0,0,0,2,9600*2A&lt;CR&gt;&lt;LF&gt;</b>
604	PMTK_Q_VERSION	None	Query FW version <b>\$PMTK604*6D&lt;CR&gt;&lt;LF&gt;</b> PMTK_DT_VERSION
605	PMTK_Q_RELEASE	None	Query FW release information <b>\$PMTK605*31&lt;CR&gt;&lt;LF&gt;</b> PMTK_DT_RELEASE
704	PMTK_DT_VERSION <b>PMTK704,FWVrsn1,FWVrsn2, FWVrsn3</b>	Vrsn: MainVersion _ReleaseNumber	Version information of FW <b>\$PMTK704,1.881_06,0606_m0138,0000*52&lt;CR&gt;&lt;LF&gt;</b>
705	PMTK_DT_RELEASE <b>PMTK705,ReleaseStr,ModelID</b>	ReleaseStr: Firmware release name & version ModelID: Model ID	Firmware release information <b>\$PMTK705,Mcore_1.3,0000*15&lt;CR&gt;&lt;LF&gt;</b>

## Note 1:

Total 19 data fields representing output frequency for each of the 19 supported NMEA sentences.

- 0 NMEA\_SENT\_GLL, // GPGLL interval - Geographic Position - Latitude longitude
- 1 NMEA\_SENT\_RMC, // GPRMC interval - Recommended Min. specific GNSS sentence
- 2 NMEA\_SENT\_VTG, // GPVTG interval - Course Over Ground and Ground Speed
- 3 NMEA\_SENT\_GGA, // GPGGA interval - GPS Fix Data
- 4 NMEA\_SENT\_GSA, // GPGSA interval - GNSS DOPS and Active Satellites
- 5 NMEA\_SENT\_GSV, // GPGSV interval - GNSS Satellites in View
- 6 NMEA\_SENT\_GRS, // GPGRS interval - GNSS Range Residuals
- 7 NMEA\_SENT\_GST, // GPGST interval - GNSS Pseudorange Error Statistics
- 13 NMEA\_SENT\_MALM, // PMTKALM interval - GPS almanac information
- 14 NMEA\_SENT\_MEPH, // PMTKEPH interval - GPS ephemeris information
- 15 NMEA\_SENT\_MDGP, // PMTKDGP interval - GPS differential correction information

# EB UART Port Command

16 NMEA\_SEN\_MDBG, // PMTKDBG interval – MTK debug information  
17 NMEA\_SEN\_ZDA, // GPZDA interval – Time & Date  
18 NMEA\_SEN\_MCHN, // PMTKCHN interval – GPS channel status

## Support Frequency Setting :

- 0 - Disabled or not supported sentence
- 1 - Output once every one position fix
- 2 - Output once every two position fixes
- 3 - Output once every three position fixes
- 4 - Output once every four position fixes
- 5 - Output once every five position fixes

This command set GLL output frequency to be outputting once every 1 position fix, and RMC to be outputting once every 1 position fix, and so on.

You can also restore the system default setting via issue: \$PMTK314,-1\*04<CR><LF>

## Note 2: Datum List

No	Datum	Region
0	WGS1984	International
1	Tokyo	Japan
2	Tokyo	Mean For Japan, South Korea, Okinawa
3	User Setting	User Setting
4	Adindan	Burkina Faso
5	Adindan	Cameroon
6	Adindan	Ethiopia
7	Adindan	Mali
8	Adindan	Mean For Ethiopia, Sudan
9	Adindan	Senegal
10	Adindan	Sudan
11	Afgooye	Somalia
12	Ain El Abd1970	Bahrain
13	Ain El Abd1970	Saudi Arabia
14	American Samoa1962	American Samoa Islands
15	Anna 1 Astro1965	Cocos Island
16	Antigua Island Astro1943	Antigua(Leeward Islands)
17	Arc1950	Botswana
18	Arc1950	Burundi
19	Arc1950	Lesotho
20	Arc1950	Malawi
21	Arc1950	Mean For Botswana, Lesotho, Malawi, Swaziland, Zaire,Zambia, Zimbabwe
22	Arc1950	Swaziland
23	Arc1950	Zaire
24	Arc1950	Zambia
25	Arc1950	Zimbabwe
26	Arc1960	Mean For Kenya Tanzania
27	Arc1960	Kenya



# EB UART Port Command

28	Arc1960	Tanzania
29	Ascension Island1958	Ascension Island
30	Astro Beacon E 1945	Iwo Jima
31	Astro Dos 71/4	St Helena Island
32	Astro Tern Island (FRIG) 1961	Tern Island
33	Astronomical Station 1952	Marcus Island
34	Australian Geodetic 1966	Australia, Tasmania
35	Australian Geodetic 1984	Australia, Tasmania
36	Ayabelle Lighthouse	Djibouti
37	Bellevue (IGN)	Efate and Erromango Islands
38	Bermuda 1957	Bermuda
39	Bissau	Guinea-Bissau
40	Bogota Observatory	Colombia
41	Bukit Rimpah	Indonesia(Bangka and Belitung Ids)
42	Camp Area Astro	Antarctica(McMurdi Camp Area)
43	Campo Inchauspe	Argentina
44	Canton Astro1966	Phoenix Island
45	Cape	South Africa
46	Cape Canaveral	Bahamas, Florida
47	Carthage	Tunisia
48	Chatham Island Astro1971	New Zealand(Chatham Island)
49	Chua Astro	Paraguay
50	Corrego Alegre	Brazil
51	Dabola	Guinea
52	Deception Island	Deception Island, Antarctica
53	Djakarta (Batavia)	Indonesia(Sumatra)
54	Dos 1968	New Georgia Islands (Gizo Island)
55	Easter Island 1967	Easter Island
56	Estonia Coordinate System1937	Estonia
57	European 1950	Cyprus
58	European 1950	Egypt
59	European 1950	England, Channel Islands, Scotland, Shetland Islands
60	European 1950	England, Ireland, Scotland, Shetland Islands
61	European 1950	Finland, Norway
62	European 1950	Greece
63	European 1950	Iran
64	European 1950	Italy (Sardinia)
65	European 1950	Italy (Sicily)
66	European 1950	Malta

# EB UART Port Command

67	European 1950	Mean For Austria, Belgium,Denmark, Finland, France, W Germany, Gibraltar, Greece, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland
68	European 1950	Mean For Austria, Debnmark,France, W Germany, Netherland , Switzerland
69	European 1950	Mean For Irag, Israel, Jordan, Lebanon, Kuwait, Saudi Arabia, Syria
70	European 1950	Portugal, Spain
71	European 1950	Tunisia,
72	European 1979	Mean For Austria, Finland ,Netherlands ,Norway, Spain, Sweden, Switzerland
73	Fort Thomas 1955	Nevis St Kitts (Leeward Islands)
74	Gan 1970	Republic Of Maldives
75	Geodetic Dataum 1970	New Zealand
76	Graciosa Base SW1948	Azores (Faial, Graciosa, Pico, Sao, Jorge, Terceria)
77	Guam1963	Guam
78	Gunung Segara	Indonesia (Kalimantan)
79	Gux I Astro	Guadalcanal Island
80	Herat North	Afghanistan
81	Hermannskogel Datum	Croatia-Serbia, Bosnia-Herzegovina
82	Hjorsey 1955	Iceland
83	Hongkong 1963	Hongkong
84	Hu Tzu Shan	Taiwan
85	Indian	Bangladesh
86	Indian	India,Nepal
87	Indian	Pakistan
88	Indian 1954	Thailand
89	Indian 1960	Vietnam (Con Son Island)
90	Indian 1960	Vietnam (Near 16 deg N)
91	Indian 1975	Thailand
92	Indonesian 1974	Indonesian
93	Ireland 1965	Ireland
94	ISTS 061 Astro 1968	South Georgia Islands
95	ISTS 073 Astro 1969	Diego Garcia
96	Johnston Island 1961	Johnston Island
97	Kandawala	Sri Lanka
98	Kerguelen Island 1949	Kerguelen Island
99	Kertau 1948	West Malaysia and Singapore
100	Kusaie Astro 1951	Caroline Islands
101	Korean Geodetic System	South Korea
102	LC5 Astro 1961	Cayman Brac Island

# EB UART Port Command

103	Leigon	Ghana
104	Liberia 1964	Liberia
105	Luzon	Philippines (Excluding Mindanao)
106	Luzon	Philippines (Mindanao)
107	M'Poraloko	Gabon
108	Mahe 1971	Mahe Island
109	Massawa	Ethiopia (Eritrea)
110	Merchich	Morocco
111	Midway Astro 1961	Midway Islands
112	Minna	Cameroon
113	Minna	Nigeria
114	Montserrat Island Astro 1958	Montserrat (Leeward Island)
115	Nahrwan	Oman (Masirah Island)
116	Nahrwan	Saudi Arabia
117	Nahrwan	United Arab Emirates
118	Naparima BWI	Trinidad and Tobago
119	North American 1927	Alaska (Excluding Aleutian Ids)
120	North American 1927	Alaska (Aleutian Ids East of 180 degW)
121	North American 1927	Alaska (Aleutian Ids West of 180 degW)
122	North American 1927	Bahamas (Except San Salvador Islands)
123	North American 1927	Bahamas (San Salvador Islands)
124	North American 1927	Canada (Alberta, British Columbia)
125	North American 1927	Canada (Manitoba, Ontario)
126	North American 1927	Canada (New Brunswick, Newfoundland, Nova Scotia, Qubec)
127	North American 1927	Canada (Northwest Territories, Saskatchewan)
128	North American 1927	Canada (Yukon)
129	North American 1927	Canal Zone
130	North American 1927	Cuba
131	North American 1927	Greenland (Hayes Peninsula)
132	North American 1927	Mean For Antigua, Barbados, Barbuda, Caicos Islands, Cuba, Dominican, Grand Cayman, Jamaica, Turks Islands
133	North American 1927	Mean For Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua
134	North American 1927	Mean For Canada
135	North American 1927	Mean For Conus
136	North American 1927	Mean For Conus (East of Mississippi, River Including Louisiana, Missouri, Minnesota)
137	North American 1927	Mean For Conus (West of Mississippi, Rive Excluding Louisiana, Minnesota, Missouri)

ISO 9001 Certified

# EB UART Port Command

138	North American 1927	Mexico
139	North American 1983	Alaska (Excluding Aleutian Ids)
140	North American 1983	Aleutian Ids
141	North American 1983	Canada
142	North American 1983	Conus
143	North American 1983	Hahawii
144	North American 1983	Mexico, Central America
145	North Sahara 1959	Algeria
146	Observatorio Meteorologico 1939	Azores (Corvo and Flores Islands)
147	Old Egyptian 1907	Egypt
148	Old Hawaiian	Hawaii
149	Old Hawaiian	Kauai
150	Old Hawaiian	Maui
151	Old Hawaiian	Mean For Hawaii, Kauai, Maui, Oahu
152	Old Hawaiian	Oahu
153	Oman	Oman
154	Ordnance Survey Great Britian 1936	England
155	Ordnance Survey Great Britian 1936	England, Isle of Man, Wales
156	Ordnance Survey Great Britian 1936	Mean For England ,Isle of Man, Scotland, Shetland Island, Wales
157	Ordnance Survey Great Britian 1936	Scotland, Shetland Islands
158	Ordnance Survey Great Britian 1936	Wales
159	Pico de las Nieves	Canary Islands
160	Pitcairn Astro 1967	Pitcairn Island
161	Point 58	Mean For Burkina Faso and Niger
162	Pointe Noire 1948	Congo
163	Porto Santo 1936	Porto Santo, Maderia Islands
164	Provisional South American 1956	Bolovia
165	Provisional South American 1956	Chile (Northern Near 19 deg S)
166	Provisional South American 1956	Chile (Southern Near 43 deg S)
167	Provisional South American 1956	Colombia
168	Provisional South American 1956	Ecuador
169	Provisional South American 1956	Guyana
170	Provisional South American 1956	Mean For Bolivia Chile,Colombia, Ecuador, Guyana, Peru, Venezuela
171	Provisional South American 1956	Peru
172	Provisional South American 1956	Venezuela

ISO 9001 Certified

# EB UART Port Command

173	Provisional South Chilean 1963	Chile (Near 53 deg S) (Hito XVIII)
174	Puerto Rico	Puerto Rico, Virgin Islands
175	Pulkovo 1942	Russia
176	Qatar National	Qatar
177	Qornoq	Greenland (South)
178	Reunion	Mascarene Island
179	Rome 1940	Italy (Sardinia)
180	S-42 (Pulkovo 1942)	Hungary
181	S-42 (Pulkovo 1942)	Poland
182	S-42 (Pulkovo 1942)	Czechoslovakia
183	S-42 (Pulkovo 1942)	Lativa
184	S-42 (Pulkovo 1942)	Kazakhstan
185	S-42 (Pulkovo 1942)	Albania
186	S-42 (Pulkovo 1942)	Romania
187	S-JTSK	Czechoslovakia (Prior 1 Jan1993)
188	Santo (Dos) 1965	Espirito Santo Island
189	Sao Braz	Azores (Sao Miguel, Santa Maria Ids)
190	Sapper Hill 1943	East Falkland Island
191	Schwarzeck	Namibia
192	Selvagem Grande 1938	Salvage Islands
193	Sierra Leone 1960	Sierra Leone
194	South American 1969	Argentina
195	South American 1969	Bolivia
196	South American 1969	Brazil
197	South American 1969	Chile
198	South American 1969	Colombia
199	South American 1969	Ecuador
200	South American 1969	Ecuador (Baltra, Galapagos)
201	South American 1969	Guyana
202	South American 1969	Mean For Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Trinidad and Tobago, Venezuela
203	South American 1969	Paraguay
204	South American 1969	Peru
205	South American 1969	Trinidad and Tobago
206	South American 1969	Venezuela
207	South Asia	Singapore
208	Tananarive Observatory 1925	Madagascar
209	Timbalai 1948	Brunei, E Malaysia (Sabah Sarawak)
210	Tokyo	Japan
211	Tokyo	Mean For Japan, South Korea, Okinawa
212	Tokyo	Okinawa
213	Tokyo	South Korea

ISO 9001 Certified

# EB UART Port Command

214	Tristan Astro 1968	Tristam Da Cunha
215	Viti Levu 1916	Fiji (Viti Levu Island)
216	Voirol 1960	Algeria
217	Wake Island Astro 1952	Wake Atoll
218	Wake-Eniwetok 1960	Marshall Islands
219	WGS 1972	Global Definition
220	WGS 1984	Global Definition
221	Yacare	Uruguay
222	Zanderij	Suriname

## 1.6 Checksum algorithm

Checksum is calculated using data between command preamble "\$" and "\*". XOR operation is performed vertically for each byte in the designated area.

For example : \$PMTK001\* $\langle$ Check Sum $\rangle$  $\langle$ CR $\rangle$  $\langle$ LF $\rangle$

Check Sum=0x50; ('P')  
Check Sum $\wedge$ =0x4D; ('M')  
Check Sum $\wedge$ =0x54; ('T')  
Check Sum $\wedge$ =0x4B; ('K')  
Check Sum $\wedge$ =0x30; ('0')  
Check Sum $\wedge$ =0x30; ('0')  
Check Sum $\wedge$ =0x31; ('1')

Check Sum will be 0x33

The NMEA should be \$PMTK001\*33 $\langle$ CR $\rangle$  $\langle$ LF $\rangle$

