

# M10478 & M10578 Modules MTK NMEA Packet Commands



## MTK NMEA Packet Format

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

### Packet Length:

The maximum length of each packet is restricted to **255** bytes

### Packet Contents:

**Preamble:** One byte character.

'\$'

**TalkerID:** Four bytes character string.

"PMTK"

**PktType:** Three bytes character string.

From "000" to "999"

An identifier used to tell the decoder how to decode the packet

**DataField:** The DataField has variable length depending on the packet type.

A comma symbol ',' must be inserted ahead each data field to help the decoder process the DataField.

\*: 1 byte character.

The star symbol is used to mark the end of DataField.

**CHK1, CHK2:** Two bytes character string.

CHK1 and CHK2 are the checksum of the data between Preamble and '\*'.

**CR, LF:** Two bytes binary data.

The two bytes are used to identify the end of a packet.

### Sample Packet:

\$PMTK000\*32<CR><LF>

## 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.

## MTK NMEA Packet List:

Packet Type: 000 PMTK_TEST .....	7
Packet Type: 001 PMTK_ACK .....	7
Packet Type: 010 PMTK_SYS_MSG.....	7
Packet Type: 011 PMTK_TXT_MSG .....	7
Packet Type: 101 PMTK_CMD_HOT_START.....	8
Packet Type: 102 PMTK_CMD_WARM_START .....	8
Packet Type: 103 PMTK_CMD_COLD_START.....	8
Packet Type: 104 PMTK_CMD_FULL_COLD_START .....	8
Packet Type: 120 PMTK_CMD_CLEAR_FLASH_AID.....	9
Packet Type: 127 PMTK_CMD_CLEAR_EPO .....	9
Packet Type: 161 PMTK_CMD_STANDBY_MODE (NOT supported in AXN3.0) .....	9
Packet Type: 183 PMTK_LOCUS_QUERY_STATUS .....	9
Packet Type: 184 PMTK_LOCUS_ERASE_FLASH.....	10
Packet Type: 185 PMTK_LOCUS_STOP_LOGGER .....	10
Packet Type: 186 PMTK_LOCUS_LOG_NOW .....	10
Packet Type: 187 PMTK_LOCUS_CONFIG .....	11
Packet Type: 220 PMTK_SET_POS_FIX.....	11
Packet Type: 223 PMTK_SET_AL_DEE_CFG (NOT supported in AXN3.0) .....	11
Packet Type: 225 PMTK_SET_PERIODIC_MODE (NOT supported in AXN3.0) .....	12
Packet Type: 250 PMTK_SET_DATA_PORT .....	13
Packet Type: 251 PMTK_SET_NMEA_BAUDRATE .....	14
Packet Type: 253 PMTK_SET_OUTPUT_FMT .....	14
Packet Type: 255 PMTK_SET_SYNC_PPS_NMEA.....	15
Packet Type: 256 PMTK_SET_TIMING_PRODUCT (Support after AXN3.8).....	15
Packet Type: 257 PMTK_SET_TUNNEL_SCENARIO (Support after AXN3.8) .....	16
Packet Type: 262 PMTK_SET_FLP_MODE (Only support in AXN2.5 after 2014/12/10).....	16
Packet Type: 285 PMTK_SET_PPS_CONFIG_CMD.....	17
Packet Type: 286 PMTK_SET_AIC_CMD.....	17
Packet Type: 299 PMTK_SET_OUTPUT_DEBUG .....	17
Packet Type: 301 PMTK_API_SET_DGPS_MODE .....	18
Packet Type: 311 PMTK_API_SET_ELEV_MASK .....	18
Packet Type: 313 PMTK_API_SET_SBAS_ENABLED.....	18
Packet Type: 314 PMTK_API_SET_NMEA_OUTPUT .....	18
Packet Type: 326 PMTK_API_SET_PPS.....	20
Packet Type: 330 PMTK_API_SET_DATUM .....	20
Packet Type: 331 PMTK_API_SET_DATUM_ADVANCE .....	20
Packet Type: 335 PMTK_API_SET_RTC_TIME .....	21

Packet Type: 351 PMTK_API_SET_SUPPORT_QZSS_NMEA .....	21
Packet Type: 352 PMTK_API_SET_STOP_QZSS .....	21
Packet Type: 353 PMTK_API_SET_GNSS_SEARCH_MODE .....	22
Packet Type: 355 PMTK_API_QUERY_GNSS_SEARCH_MODE.....	22
Packet Type: 356 PMTK_API_SET_HDOP_THRESHOLD .....	23
Packet Type: 357 PMTK_API_GET_HDOP_THRESHOLD.....	23
Packet Type: 386 PMTK_API_SET_STATIC_NAV_THD.....	23
Packet Type: 399 PMTK_API_SET_FLASH_DATA.....	24
Packet Type: 400 PMTK_API_Q_FIX_CTL .....	24
Packet Type: 401 PMTK_API_Q_DGPS_MODE.....	24
Packet Type: 411 PMTK_API_Q_ELEV_MASK .....	24
Packet Type: 413 PMTK_API_Q_SBAS_ENABLED.....	25
Packet Type: 414 PMTK_API_Q_NMEA_OUTPUT .....	25
Packet Type: 430 PMTK_API_Q_DATUM .....	25
Packet Type: 431 PMTK_API_Q_DATUM_ADVANCE .....	26
Packet Type: 435 PMTK_API_Q_RTC_TIME .....	26
Packet Type: 449 PMTK_API_Q_EPH_STATUS .....	26
Packet Type: 499 PMTK_API_GET_FLASH_DATA .....	26
Packet Type: 500 PMTK_DT_FIX_CTL.....	27
Packet Type: 501 PMTK_DT_DGPS_MODE .....	27
Packet Type: 513 PMTK_DT_SBAS_ENABLED .....	27
Packet Type: 514 PMTK_DT_NMEA_OUTPUT.....	28
Packet Type: 530 PMTK_DT_DATUM.....	28
Packet Type: 535 PMTK_API_DT_RTC_TIME.....	28
Packet Type: 599 PMTK_DT_FLASH_DATA .....	28
Packet Type: 602 PMTK_Q_DATA_PORT .....	29
Packet Type: 605 PMTK_Q_RELEASE .....	29
Packet Type: 607 PMTK_Q_EPO_INFO.....	29
Packet Type: 622 PMTK_Q_LOCUS_DATA .....	30
Packet Type: 660 PMTK_Q_AVAILABLE_SV_EPH.....	30
Packet Type: 661 PMTK_Q_AVAILABLE_SV_ALM .....	30
Packet Type: 667 PMTK_Q_UTC_CORRECTION_DATA .....	31
Packet Type: 668 PMTK_Q_GPS_KEP.....	32
Packet Type: 669 PMTK_Q_BDS_KEP.....	33
Packet Type: 670 PMTK_Q_GPS_IONO .....	34
Packet Type: 702 PMTK_DT_DATA_PORT.....	34
Packet Type: 705 PMTK_DT_RELEASE.....	35
Packet Type: 707 PMTK_DT_EPO_INFO.....	35
Packet Type: 740 PMTK_DT_UTC.....	36



Packet Type: 721 PMTK_DT_SV_EPO .....	36
Packet Type: 741 PMTK_DT_POS .....	37
Packet Type: 810 PMTK_TEST_ALL .....	38
Packet Type: 811 PMTK_TEST_STOP .....	39
Packet Type: 812 PMTK_TEST_FINISH .....	39
Packet Type: 813 PMTK_TEST_ALL_ACQ .....	40
Packet Type: 814 PMTK_TEST_ALL_BITSYNC .....	40
Packet Type: 815 PMTK_TEST_ALL_SIGNAL .....	40
Packet Type: 837 PMTK_TEST_JAMMING (NOT supported in AXN3.0) .....	41
Packet Type: 869 PMTK_EASY_ENABLE .....	42
Packet Type: 875 PMTK_PMTKLSC_STN_OUTPUT .....	43
Packet Type: 886 PMTK_FR_MODE .....	43
Appendix A: Datum List .....	45



### Packet Type: 000 PMTK\_TEST

**Packet Meaning:**

Test Packet.

**DataField:**

None

**Example:**

\$PMTK000\*32<CR><LF>

### Packet Type: 001 PMTK\_ACK

**Packet Meaning:**

Acknowledge of PMTK command

**DataField:**

***PMTK001,Cmd,Flag***

Cmd: The 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

**Example:**

\$PMTK001,604,3\*32<CR><LF>

### Packet Type: 010 PMTK\_SYS\_MSG

**Packet Meaning:**

Output system message

**DataField:**

Msg: The system message.

- '0': UNKNOWN
- '1': STARTUP
- '2': Notification: Notification for the host aiding EPO
- '3': Notification: Notification for the transition to Normal mode is successfully done

**Example:**

\$PMTK010,001\*2E<CR><LF>

### Packet Type: 011 PMTK\_TXT\_MSG

**Packet Meaning:**

Output system message

**DataField:**

Message of this is MTK GPS

**Example:**

\$PMTK011,MTKGPS\*08 <CR><LF>

**Packet Type: 101 PMTK\_CMD\_HOT\_START**

**Packet Meaning:**

Hot Restart: Use all available data in the NV Store.

**DataField:**

None

**Example:**

\$PMTK101\*32<CR><LF>

**Packet Type: 102 PMTK\_CMD\_WARM\_START**

**Packet Meaning:**

Warm Restart: Don't use Ephemeris at re-start.

**DataField:**

None

**Example:**

\$PMTK102\*31<CR><LF>

**Packet Type: 103 PMTK\_CMD\_COLD\_START**

**Packet Meaning:**

Cold Restart: Don't use Position, Almanacs and Ephemeris data at re-start.

**DataField:**

None

**Example:**

\$PMTK103\*30<CR><LF>

**Packet Type: 104 PMTK\_CMD\_FULL\_COLD\_START**

**Packet Meaning:**

Full Cold Restart: It's essentially a Cold Restart, but additionally clear system/user configurations at re-start. That is, reset the receiver to the factory status.

**DataField:**



None

**Example:**

\$PMTK104\*37<CR><LF>

### Packet Type: 120 PMTK\_CMD\_CLEAR\_FLASH\_AID

**Packet Meaning:**

Erase aiding data stored in the flash memory.

**DataField:**

None

**Example:**

\$PMTK120\*31<CR><LF>

### Packet Type: 127 PMTK\_CMD\_CLEAR\_EPO

**Packet Meaning:**

Erase EPO data stored in the flash memory.

**DataField:**

None

**Example:**

\$PMTK127\*36<CR><LF>

### Packet Type: 161 PMTK\_CMD\_STANDBY\_MODE

**Packet Meaning:**

Enter standby mode for power saving.

**DataField:**

***PMTK161, Type***

Type: Standby type

'0' = Stop mode

'1' = Sleep mode

**Example:**

\$PMTK161,0\*28<CR><LF>

### Packet Type: 183 PMTK\_LOCUS\_QUERY\_STATUS

**[Packet Meaning]**

Query Logging status

**[Data Field]**

NONE

**[Return]**

\$PMTKLOG,Serial#,Type, Mode, Content, Interval, Distance, Speed, Status, Log number, Percent\*CH

Serial#: Logging serial number : 0~65535  
 Type: Logging type - 0: Overlap, 1: FullStop  
 Mode: Logging mode - 0x08 : Interval logger  
 Content: Logging contents of configuration  
 Interval: Logging interval setting (valid when interval mode is selected)  
 Distance: Logging distance setting (valid when distance mode is selected)  
 Speed: Logging speed setting (valid when speed mode is selected)  
 Status : Logging status – 1: Stop Logging, 0: Logging  
 Percent : Logging life used percentage

**[Example]**

Input : PMTK183\*38<CR><LF>

Output : \$PMTKLOG,32,1,b,31,1,0,0,0,8032,100\*2F<CR><LF>

## Packet Type: 184 PMTK\_LOCUS\_ERASE\_FLASH

**[Packet Meaning]**

Erase Logger Flash

**[Data Field]**

***\$PMTK184,Type***

Type: Erase type '1': erase all logger internal flash data

**[Example]**

Input : PMTK184,1\*22<CR><LF>

Output : \$PMTK001,184,3\*3D<CR><LF>

## Packet Type: 185 PMTK\_LOCUS\_STOP\_LOGGER

**[Packet Meaning]**

Stop logging data

**[Data Field]**

***\$PMTK185,Status***

Status: Stop logging '1': Stop logging

'0': Start logging

**[Example]**

Input : PMTK185,1\*23<CR><LF>

Output : \$PMTK001,185,3\*3C<CR><LF>

## Packet Type: 186 PMTK\_LOCUS\_LOG\_NOW

**[Packet Meaning]**

Snapshot write log

**[Data Field]*****\$PMTK186, Type***

Type: '1': means snapshot log data.

**[Example]**

Input : \$PMTK186,1\*20<CR><LF>

Output : \$PMTK001,186,3\*3F<CR><LF>

**Packet Type: 187 PMTK\_LOCUS\_CONFIG****[Packet Meaning]**

Configure Locus setting by command.

**[Data Field]*****\$PMTK187, Mode,Setting***

Type: '1': means interval mode. (1sec ≤ Interval ≤ 12hours)

Setting: New setting instead of the original configuration (e.g. change to 5 seconds interval as the example below)

**[Example]**

Input: \$PMTK187,1,5\*38

Output: \$PMTK001,187,3\*3E

**Packet Type: 220 PMTK\_SET\_POS\_FIX****Packet Meaning:**

Position Fix Interval

**DataField:**

Interval: Position fix interval [msec]. [Range: 100 ~ 10000].

**Example:**

\$PMTK220,1000\*1F<CR><LF>

**Packet Type: 223 PMTK\_SET\_AL\_DEE\_CFG****Packet Meaning:****DataField:*****\$PMTK223,SV,SNR,Extension threshold, Extension gap***

Below parameters can be modified by Host command message

Default value: SV = 1 [Range: 1 ~ 4]

Default value: SNR = 30 [Range: 25 ~ 30]

Default value: Extension threshold = 180000 msec [Range: 40000 ~ 180000]

Default value: Extension gap = 60000 msec [Range: 0 ~ 3600000]

(Extension gap is the limitation between neighbor DEE)

## Packet Type: 225 PMTK\_SET\_PERIODIC\_MODE

### Packet Meaning:

Periodic Power Saving Mode Settings: (See following chart)

In RUN stage, the GPS receiver measures and calculates positions.

In SLEEP stage, the GPS receiver may enter two different power saving modes. One is “Periodic Standby Mode”, and another is “Periodic Backup Mode”. Due to hardware limitation, the maximum power down duration (SLEEP) is 2047 seconds. If the configured “SLEEP” interval is larger than 2047 seconds, GPS firmware will automatically extend the interval by software method. However, GPS system will be powered on for the interval extension and powered down again after the extension is done.

### DataField:

***\$ PMTK225, Type, Run time, Sleep time, Second run time, Second sleep time***

Type : Set operation mode of power saving

- '0': Back to normal mode
- '1' Periodic backup mode
- '2' Periodic standby mode
- '4': Perpetual backup mode
- '8': AlwaysLocate™ standby mode
- '9': AlwaysLocate™ backup mode

Run time: Duration [msec] to fix for (or attempt to fix for) before switching from running mode back to a minimum power sleep mode.

'0': Disable

>= '1000': Enable

**[Range: 1000~518400000]**

Sleep time: Interval [msec] to come out of a minimum power sleep mode and start running in order to get a new position fix.

**[Range: 1000~518400000]**

Second run time: Duration [msec] to fix for (or attempt to fix for) before switching from running mode back to a minimum power sleep mode.

'0': Disable

>= '1000': Enable

**[Range: Second set both 0 or 1000~518400000]**

Second sleep time: Interval [msec] to come out of a minimum power sleep mode and start running in order to get a new position fix.

**[Range: Second set both 0 or 1000~518400000]**

Note the Second run time should larger than First run time when non-zero value.

### Example: How to enter Periodic modes

Periodic Backup mode

PMTK225,0

PMTK223,1,25,180000,60000

PMTK225,1,3000,12000,18000,72000

Periodic Standby mode

PMTK225,0

PMTK223,1,25,180000,60000

PMTK225,2,3000,12000,18000,72000

#### Example : How to enter AlwaysLocate modes

AlwaysLocate™ Standby

PMTK225,0

PMTK225,8

AlwaysLocate™ Backup

PMTK225,0

PMTK225,9

#### Packet Type: 250 PMTK\_SET\_DATA\_PORT

##### [Packet Meaning]

Set data port input/output data type and baudrate

##### [Data Field]

##### **PMTK250,InType,OutType,Baudrate**

InType: Data port input data type

'0' = DPORT\_IN\_NONE (No data input)

'1' = DPORT\_IN\_RTCM (RTCM input)

'3' = DPORT\_IN\_NMEA (MTK NMEA)

OutType: Data port input data type

'0' = DPORT\_OUT\_NONE (No data output)

'3' = DPORT\_OUT\_NMEA (MTK NMEA)

Baudrate: Baudrate setting

4800

9600

14400

19200

38400

57600

115200

460800

921600

##### [Example]

\$PMTK250,1,3,9600\*14<CR><LF>

## Packet Type: 251 PMTK\_SET\_NMEA\_BAUDRATE

### [Packet Meaning]

Set NMEA port baudrate. Using PMTK251 command to setup baud rate setting, the setting will be back to default value in the two conditions.

1. Full cold start command is issued
2. Enter standby mode

### [Data Field]

#### **PMTK251,Baudrate**

Baudrate: Baudrate setting

0 – default setting

4800

9600

14400

19200

38400

57600

115200

230400

460800

921600

### [Example]

```
$PMTK251,38400*27<CR><LF>
```

**NOTE:** The option “Allow change of baudrate” at the “NMEA” page in the CoreBuilder should be checked before using this command.

## Packet Type: 253 PMTK\_SET\_OUTPUT\_FMT

### [Packet Meaning]

Set data output format for current port

### Data Field:

**\$PMTK253,Flag**

Flag (unsigned 1 byte): **0 - NMEA mode**

**1 - binary mode**

### [Example]

```
$PMTK253,1*2B<CR><LF> //Change output format from NMEA mode to binary mode
```

### Note:

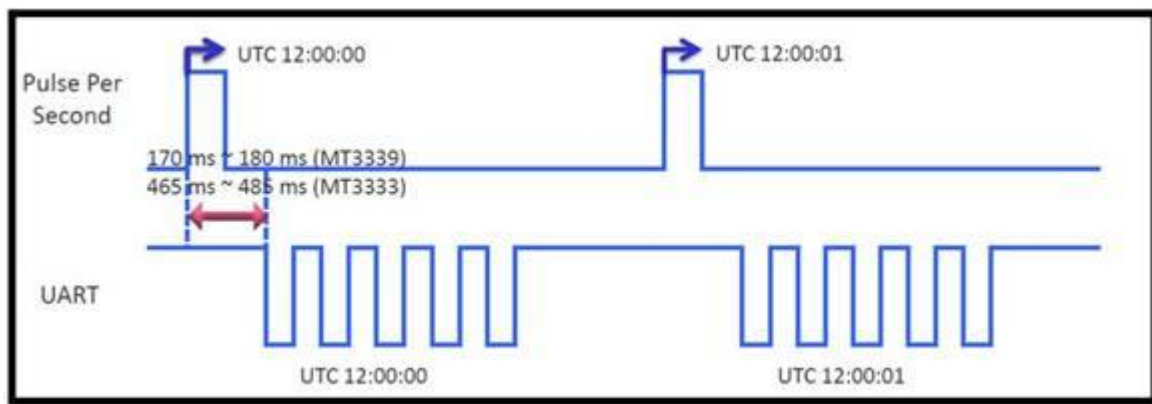
When you switch from binary mode to NMEA mode, you will receive a binary ACK after the command is processed.

When you switch from NMEA mode to binary mode, **NO ACK** will be sent.

## Packet Type: 255 PMTK\_SET\_SYNC\_PPS\_NMEA

### [Packet Meaning]

Enable or disable fix NMEA output time behind PPS function. (Default off) The latency range of the beginning of UART Tx is between 170 ms and 180 ms at MT3339 platform (465 ms~485ms at MT3333 platform) and behind the rising edge of PPS.



### [Data Field]

#### **PMTK255,Enabled**

Enabled: Enable or disable

'0' = Disable

'1' = Enable

### Example:

\$PMTK255,1\*23<CR><LF>

### Note:

Only support in AXN 3.6(8) and 2.3(5) after 2014/4/21.

## Packet Type: 256 PMTK\_SET\_TIMING\_PRODUCT (Support after AXN3.8)

### [Packet Meaning]

Enable or disable timing product mode (Default off). The timing product mode will enhance the PPS output timing accuracy which is listed in below table.

Constellation	Previous	AXN 3.8
GPS	20 ns	<15 ns
G+G	35 ns	<15 ns
G+B	50 ns	<15 ns

**[Data Field]*****PMTK256, Enabled***

Enabled: Enable or disable

'0' = Disable

'1' = Enable

**Example:**

\$PMTK256,1\*2E<CR><LF>

**Note:**

Please measure the accuracy after the device collect all satellites almanac.

### Packet Type: 257 PMTK\_SET\_TUNNEL\_SCENARIO (Support after AXN3.8)

**[Packet Meaning]**

Enable fast TTFF or high accuracy function when out of the tunnel or garage. (Default enabled high accuracy function).

**[Data Field]*****PMTK257, Functionality***

Functionality:

'0' = Enable fast TTFF when out of the tunnel or garage

'1' = Enable high accuracy when out of the tunnel or garage

**Example:**

\$PMTK257,1\*2F<CR><LF>

### Packet Type: 262 PMTK\_SET\_FLP\_MODE (Only support in AXN2.5 after 2014/12/10)

**[Packet Meaning]**

Enable or disable FLP mode.

**[Data Field]*****PMTK262, Enabled***

Enabled:

'0' = Disable FLP mode

'1' = Enable FLP mode

**Example:**

\$PMTK262,1\*29<CR><LF>



## Packet Type: 285 PMTK\_SET\_PPS\_CONFIG\_CMD

### Packet Meaning:

Config PPS setting.

### DataField:

**PMTK285,PPSType,PPSPulseWidth**

PPSType: Availability

'0' = Disable

'1' = After the first fix

'2' = 3D fix only

'3' = 2D/3D fix only

'4' = Always

PPSPulseWidth: PPS Pulse Width (Unit: ms)

### Example:

\$PMTK285,2,100\*23<CR><LF>

## Packet Type: 286 PMTK\_SET\_AIC\_CMD

### Packet Meaning:

Enable or disable active interference cancellation function.

### DataField:

**PMTK286,Enabled**

Enabled: Enable or disable

'0' = Disable

'1' = Enable

### Example:

\$PMTK286,1\*23<CR><LF>

## Packet Type: 299 PMTK\_SET\_OUTPUT\_DEBUG (Only support in AXN 3.6(8) and 2.3 after 2014/5/12)

**[Packet Meaning]** Enable or disable Debug log output

### [Data Field]

**PMTK299,Enabled**

Enabled: Enable or disable

'0' = Disable

'1' = Enable

### [Example]

\$PMTK299,1\*2D<CR><LF>

### Packet Type: 301 PMTK\_API\_SET\_DGPS\_MODE

**Packet Meaning:**

API\_Set\_Dgps\_Mode

DGPS correction data source mode.

**DataField:**

***PMTK301,Mode***

Mode: DGPS data source mode.

'0': No DGPS source

'1': RTCM

'2': SBAS(Include WAAS/EGNOS/GAGAN/MSAS)

**Example:**

\$PMTK301,1\*2D<CR><LF>

### Packet Type: 311 PMTK\_API\_SET\_ELEV\_MASK

**Packet Meaning:**

API\_Set\_Elev\_Mask

Set satellite elevation mask.

**DataField:**

***PMTK311,Degree***

Degree: Satellite elevation-mask.

**Example:**

\$PMTK311,5\*28<CR><LF>

### Packet Type: 313 PMTK\_API\_SET\_SBAS\_ENABLED

**Packet Meaning:**

API\_Set\_Sbas\_Enabled

Enable to search a SBAS satellite or not.

**DataField:**

Enabled: Enable or disable

'0' = Disable

'1' = Enable

**Example:**

\$PMTK313,1\*2E<CR><LF>

### Packet Type: 314 PMTK\_API\_SET\_NMEA\_OUTPUT

**Packet Meaning:**

API\_Set\_NMEA\_Out

Set NMEA sentence output frequencies.

**DataField:**There are totally **10** data fields that present output frequencies for the **10** supported NMEA sentences individually.Supported NMEA Sentences

0 NMEA_SEN_GLL,	// GPGLL interval - Geographic Position - Latitude longitude
1 NMEA_SEN_RMC,	// GPRMC interval - Recommended Minimum Specific GNSS Sentence
2 NMEA_SEN_VTG,	// GPVTG interval - Course Over Ground and Ground Speed
3 NMEA_SEN_GGA,	// GPGGA interval - GPS Fix Data
4 NMEA_SEN_GSA,	// GPGSA interval - GNSS DOPS and Active Satellites
5 NMEA_SEN_GSV,	// GPGSV interval - GNSS Satellites in View
6 NMEA_SEN_GRS,	// GPGRS interval - GNSS Range Residuals
7 NMEA_SEN_GST,	// GPGST interval - GNSS Pseudorange Errors Statistics
17 NMEA_SEN_ZDA,	// GPZDA interval – Time & Date
18 NMEA_SEN_MCHN,	// PMTKCHN interval – GNSS channel status

Supported 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

**Example:**

\$PMTK314,1,1,1,1,1,5,0,0,0,0,0,0,0,0,0,1,1\*2C&lt;CR&gt;&lt;LF&gt;

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&lt;CR&gt;&lt;LF&gt;

**Note:**

Settings of GST and GRS are valid only when firmware supports GST/GRS sentences.

### Packet Type: 326 PMTK\_API\_SET\_PPS

#### Packet Meaning:

This packet contain the local millisecond and phase where the PPS should be placed.

#### DataField:

**PMTK326,PPS\_BY\_USER,Local\_ms,phase**

PPS\_BY\_USER

1:PPS output by user.

0:PPS output automatically.

Local\_ms: Local receiver time tick. Range:0-4294967295( $2^{32}-1$ ).

Phase:Time tick phase 0-262143.

#### Example:

\$PMTK326,1,1345,555\*3F<CR><LF>

### Packet Type: 330 PMTK\_API\_SET\_DATUM

#### Packet Meaning:

API\_Set\_Datum

Set default datum.

#### DataField:

**PMTK330,Datum**

Datum: 0: WGS84

1: TOKYO-M

2: TOKYO-A

Support 219 different datums. The total datums list in the Appendix A.

#### Example:

\$PMTK330,0\*2E<CR><LF>

### Packet Type: 331 PMTK\_API\_SET\_DATUM\_ADVANCE

#### Packet Meaning:

Set user defined datum.

#### DataField:

**PMTK331,majA,ecc,dX,dY,dZ**

majA: User defined datum semi-major axis [m] [Range: 0 ~ 7000000]

ecc: User defined datum eccentric [m] [Range: 0 ~ 330]

dX: User defined datum to WGS84 X axis offset [m]

dY: User defined datum to WGS84 X axis offset [m]

dZ: User defined datum to WGS84 X axis offset [m]

#### Example:

\$PMTK331, 6377397.155, 299.1528128, -148.0, 507.0, 685.0\*16<CR><LF>

### Packet Type: 335 PMTK\_API\_SET\_RTC\_TIME

#### Packet Meaning:

API\_Set\_RTC\_Time

This command set RTC UTC time. To be noted, the command doesn't update the GPS time which maintained by GPS receiver. After setting, the RTC UTC time finally may be updated by GPS receiver with more accurate time after 60 seconds.

#### DataField:

**PMTK335,Year,Month,Day,Hour,Min,Sec**

Year: Year

Month: 1 ~ 12

Day: 1 ~ 31

Hour: 0 ~ 23

Min: 0 ~ 59

Sec: 0 ~ 59

#### Example:

\$PMTK335,2007,1,1,0,0,0\*02<CR><LF>

### Packet Type: 351 PMTK\_API\_SET\_SUPPORT\_QZSS\_NMEA

#### Packet Meaning:

The receiver support new NMEA format for QZSS. The command allow user enable or disable QZSS NMEA format.

Default is disable QZSS NMEA format. (use NMEA 0183 V3.01)

#### DataField:

**PMTK351,Enabled**

Enabled: '0': Disable

'1': Enable

#### Example:

\$PMTK351,0\*29 : Disable QZSS NMEA format

\$PMTK351,1\*28 : Enable QZSS NMEA format

### Packet Type: 352 PMTK\_API\_SET\_STOP\_QZSS

#### Packet Meaning:

Since QZSS is regional positioning service. The command allow user enable or disable QZSS function.

Default is enable QZSS function.

#### DataField:

**PMTK352,Enabled**

Enabled: '0': Enable

'1': Disable

**Example:**

\$PMTK352,0\*2A : Enable QZSS function

\$PMTK352,1\*2B : Disable QZSS function

**Packet Type: 353 PMTK\_API\_SET\_GNSS\_SEARCH\_MODE****Packet Meaning:**

This command is used to configure the receive to start searching of which satellite system.

The setting will be kept available when NVRAM data is valid.

**DataField:****PMTK353, GPS\_Enable, GLONASS\_Enable, GALILEO\_Enable, GALILEO\_FULL\_Enable, BEIDOU\_Enable**

GPS\_Enabled: '0': disable (DO NOT search GPS satellites)

'1' or non-ZERO: search GPS satellites

GLONASS\_Enabled: '0': disable (DO NOT search GLONASS satellites)

'1' or non-ZERO: search GLONASS satellites

GALILEO\_Enabled: '0': disable (DO NOT search GALILEO satellites)

'1' or non-ZERO: search GALILEO satellites

GALILEO\_FULL\_Enabled: '0': disable (DO NOT search GALILEO FULL mode satellites)

'1' or non-ZERO: search GALILEO satellites

BEIDOU\_Enabled: '0': disable (DO NOT search BEIDOU satellites)

'1' or non-ZERO: search BEIDOU satellites

**Example:**

\$PMTK353,0,1,0,0,0\*2A : Search GLONASS satellites only

\$PMTK353,1,0,0,0,0\*2A : Search GPS satellites only

\$PMTK353,1,1,0,0,0\*2B : Search GPS and GLONASS satellites

\$PMTK353,1,1,1,0,0\*2A : Search GPS GLONASS, GALILEO satellites

\$PMTK353,0,0,0,0,1\*2A : Search BEIDOU satellites only

\$PMTK353,1,0,0,0,1\*2B : Search GPS and BEIDOU satellites

Note: GLONASS only, BEIDOU only, and GALILEO only mode is only for testing purpose. Please use GPS + GLONASS or GPS + BEIDOU in the real application, GLONASS and BEIDOU can not be enabled at the same time.

**Packet Type: 355 PMTK\_API\_QUERY\_GNSS\_SEARCH\_MODE****Packet Meaning:**

This command is to get GLONASS, BEIDOU and GALILEO search setting.

**DataField:****None**

**Example:**

\$PMTK355\*31

Return \$PMTK001,353,3,0,1,0

"\$PMTK001,355,3,GLON\_Enable,BEIDOU\_Enable,GALILEO\_Enable"

The Beidou search mode is enabled.

**Packet Type: 356 PMTK\_API\_SET\_HDOP\_THRESHOLD****Packet Meaning:**

This command is to set the HDOP threshold. If the HDOP value is larger than this threshold value, the position will not be fixed.

**DataField:**

***PMTK356,HDOPThreshold Set OK!***

HDOPThreshold: '0': Disable this function

Other value: Enable set the HDOP threshold

**Example:**

\$PMTK356,0.8

Return \$PMTK356,0.8 Set OK!\*5F

**Packet Type: 357 PMTK\_API\_GET\_HDOP\_THRESHOLD****Packet Meaning:**

This command is to get the HDOP threshold.

**DataField:**

***PMTK357,HDOPThreshold***

HDOPThreshold: '0': Disable

Other value: Enable

**Example:**

\$PMTK357

Return \$PMTK357,0.8\*39

**Packet Type: 386 PMTK\_API\_SET\_STATIC\_NAV\_THD****Packet Meaning:**

Set the speed threshold for static navigation. If the actual speed is below the threshold, output position will keep the same and output speed will be zero. If threshold value is set to 0, this function is disabled.

**DataField:**

***PMTK386, speed\_threshold***

Speed\_trhreshold: 0~2 m/s

The minimun is 0.1 m/s, the max is 2.0 m/s

**Example:**

\$PMTK386, 0.4\*19<CR><LF>

### Packet Type: 399 PMTK\_API\_SET\_FLASH\_DATA

#### [Packet Meaning]

Write data to the flash.

#### [Data Field]

PMTK399, Address, Length, Data0, Data1, Data2, .....

Address: the starting address in hex format (the address is fixed at 0x1C0)

Length: the number of bytes of incoming data fields in hex format (Max length = 7 bytes)

DataN: data byte in hex format

#### [Example]

\$PMTK399,1c0,7,30,5C,22,1D,02,04,01\*4F<CR><LF>

### Packet Type: 400 PMTK\_API\_Q\_FIX\_CTL

#### Packet Meaning:

API\_Query\_Fix\_Ctl

#### DataField:

None

#### Return:

PMTK\_DT\_FIX\_CTL (See Packet Type: 500)

#### Example:

\$PMTK400\*36<CR><LF>

### Packet Type: 401 PMTK\_API\_Q\_DGPS\_MODE

#### Packet Meaning:

API\_Query\_Dgps\_Mode

#### DataField:

None

#### Return:

PMTK\_DT\_DGPS\_MODE (See Packet Type: 501)

#### Example:

\$PMTK401\*37<CR><LF>

### Packet Type: 411 PMTK\_API\_Q\_ELEV\_MASK

#### Packet Meaning:

API\_Query\_Elev\_Mask

Query satellite elevation mask.



**Example:**

\$PMTK411\*36<CR><LF>

**Return:**

\$PMTK511,Degree

**Note:**

Only support in AXN3.8 after 2015/6/17, and AXN2.5 after 2015/10/19.

**Packet Type: 413 PMTK\_API\_Q\_SBAS\_ENABLED****Packet Meaning:**

API\_Query\_Sbas\_Enabled

**DataField:**

None

**Return:**

PMTK\_DT\_SBAS\_ENABLED (See Packet Type: 513)

**Example:**

\$PMTK413\*34<CR><LF>

**Packet Type: 414 PMTK\_API\_Q\_NMEA\_OUTPUT****Packet Meaning:**

API\_Query\_NMEA\_Out

Query current NMEA sentence output frequencies.

**DataField:**

None

**Return:**

PMTK\_DT\_NMEA\_OUTPUT (See Packet Type: 514)

**Example:**

\$PMTK414\*33<CR><LF>

**Packet Type: 430 PMTK\_API\_Q\_DATUM****Packet Meaning:**

API\_Query\_Datum

Query default datum

**DataField:**

None

**Return:**

PMTK\_DT\_DATUM

**Example:**

\$PMTK430\*35<CR><LF>

### Packet Type: 431 PMTK\_API\_Q\_DATUM\_ADVANCE

#### Packet Meaning:

API\_Query\_Datum\_Advance

Query user defined datum

#### DataField:

None

#### Return:

PMTK\_DT\_DATUM

#### Example:

\$PMTK431\*34<CR><LF>

### Packet Type: 435 PMTK\_API\_Q\_RTC\_TIME

#### [Packet Meaning]

API\_Query\_RTC\_Time

Query current RTC UTC time

#### [Data Field]

None

#### Return:

PMTK\_API\_DT\_RTC\_TIME

#### [Example]

\$PMTK435\*30<CR><LF>

### Packet Type: 449 PMTK\_API\_Q\_EPH\_STATUS

#### Packet Meaning:

This command is to query the current status of ephemeris downloading

#### Example:

**PMTK449\*3B**

#### Return:

\$PMTK001,449,3,**1**\*24 : The ephemeris downloading is finished.

\$PMTK001,449,3,**0**\*25 : The ephemeris downloading is not finished yet.

### Packet Type: 499 PMTK\_API\_GET\_FLASH\_DATA

#### [Packet Meaning]

Read the flash memory.

#### [Data Field]

PMTK499, Address, Length



Address: the starting address in hex format. (The address is fixed at 0x1C0)

Length: the number of bytes requested in hex format (Max length is 7 bytes)

**Return:**

PMTK\_DT\_FLASH\_DATA

**[Example]**

\$PMTK499,1C0,7\*43<CR><LF>

### Packet Type: 500 PMTK\_DT\_FIX\_CTL

**Packet Meaning:**

These parameters show the rate of position fixing activity.

**DataField:**

FixInterval: Position fix interval. (msec). [Range: 100 ~ 10000].

**Example:**

\$PMTK500,1000,0,0,0,0\*1A<CR><LF>

### Packet Type: 501 PMTK\_DT\_DGPS\_MODE

**Packet Meaning:**

DGPS Data Source Mode

**DataField:**

Mode: DGPS data source mode

'0': No DGPS source

'1': RTCM

'2': WAAS

**Example:**

\$PMTK501,1\*2B<CR><LF>

### Packet Type: 513 PMTK\_DT\_SBAS\_ENABLED

**Packet Meaning:**

Enable to search a SBAS satellite or not.

**DataField:**

Enabled: Enable or disable

'0' = Disable

'1' = Enable

**Example:**

\$PMTK513,1\*28<CR><LF>

## Packet Type: 514 PMTK\_DT\_NMEA\_OUTPUT

### Packet Meaning:

NMEA sentence output frequency setting

### DataField:

There are totally **19** data fields that present output frequencies for the **19** supported NMEA sentences individually.

Please refer to PMTK\_API\_SET\_NMEA\_OUTPUT for the Supported NMEA Sentences and Frequency Setting.

### Example:

```
$PMTK514,1,1,1,1,1,5,1,1,1,1,1,0,1,1,1,1,1*2A<CR><LF>
```

## Packet Type: 530 PMTK\_DT\_DATUM

### Packet Meaning:

Current datum used.

### DataField:

#### ***PMTK530,Datum***

Datum: 0: WGS84  
1: TOKYO-M  
2: TOKYO-A

### Example:

```
$PMTK530,0*28<CR><LF>
```

## Packet Type: 535 PMTK\_API\_DT\_RTC\_TIME

### [Packet Meaning]

This packet carries current RTC UTC time.

### [Data Field]

#### ***PMTK535,Year,Month,Day,Hour,Min,Sec***

Year: Year  
Month: 1 ~ 12  
Day: 1 ~ 31  
Hour: 0 ~ 23  
Min: 0 ~ 59  
Sec: 0 ~ 59

### [Example]

```
$PMTK535,2007,1,1,0,0,0*04<CR><LF>
```

## Packet Type: 599 PMTK\_DT\_FLASH\_DATA

### [Packet Meaning]

The data in the flash memory.

**[Data Field]**

There are totally 'length+2' data fields that present the followings:

1. Starting address in hex format
2. Length in hex format
- 3~n: Data bytes in hex format

**[Example]**

\$PMTK599,1C,7,30,5C,22,1D,02,04,01\*58<CR><LF>

**Packet Type: 602 PMTK\_Q\_DATA\_PORT****[Packet Meaning]**

Read data port input/output data type and baudrate

**[Data Field]**

None

**[Return]**

PMTK\_DT\_DATA\_PORT

**[Example]**

\$PMTK602\*36<CR><LF>

**Packet Type: 605 PMTK\_Q\_RELEASE****Packet Meaning:**

Query the firmware release information.

**DataField:**

NONE

**Return:**

PMTK\_DT\_RELEASE

**Example:**

\$PMTK605\*31<CR><LF>

**Packet Type: 607 PMTK\_Q\_EPO\_INFO****Packet Meaning:**

EPO Data Valid day check

**DataField:**

NONE

**Return:**

PMTK\_DT\_EPO\_INFO

**Example:**

\$PMTK607\*33<CR><LF>

## Packet Type: 622 PMTK\_Q\_LOCUS\_DATA

### [Packet Meaning]

Dump LOCUS flash data.

### [Data Field]

#### **Case 1: \$PMTK622,type**

Type: 0-Dump full LOCUS flash data.

1-Dump partial in used LOCUS flash data

#### **Case 2: \$PMTK622,type,offset,size\*hh**

Type: 2-Dump specified sectors' LOCUS flash data

offset: The start address for dump ( $0 \leq \text{offset} < 32$ , the unit is sector[4KB])

size: The dump length ( $0 \leq \text{size} \leq 32$ , the unit is sector[4KB])

### [Example]

Input: \$PMTK622,0\*28 //Dump full LOCUS flash data

Input: \$PMTK622,1\*29 //Dump partial in used LOCUS flash data

Input: \$PMTK622,2,3,2\*2B //Skip sector 1,2,3. Dump sector4 and sector5 LOCUS flash data

### [Note]

If the input values of offset and size are out of range, it will dump all LOCUS flash like using \$PMTK622,0\*28.

## Packet Type: 660 PMTK\_Q\_AVAILABLE\_SV\_EPH

### Packet Meaning:

Support PMTK660 which report valid Ephemeris SV

(a) Host -> MT3329: A PMTK660 command to request the EPH info, together with a time interval parameter (for example, 1800sec).

(b) MT3329 -> Host: Reply 32-bit flags of 32SV to indicate which EPHs will be available after the specified time interval.

### DataField:

#### **PMTK660, Time interval**

Time interval: Set the time interval for MT3329 to reply 32-bit flags of 32SV. Note that the Time interval  $> 0$  and  $\leq 7200$  (2 hours).

### Example:

Indicate which EPHs will be available after 1800 seconds

\$PMTK660,1800\*17<CR><LF>

### Return:

\$PMTK001,660,3,40449464\*17<CR><LF>

Note the Hex 40449464 means 0100 0000 0100 0100 1001 0100 0110 0100 and the Valid SV's numbers are 3, 6, 7, 11, 13, 16, 19, 23, 31.

## Packet Type: 661 PMTK\_Q\_AVAILABLE\_SV\_ALM

### Packet Meaning:

Support PMTK661 which report valid Almanac SV

(a) Host -> MT3329: A PMTK661 command to request the Almanac info, together with a time interval parameter (for example, 30 days).

(b) MT3329 -> Host: Reply 32-bit flags of 32SV to indicate which Almanac will be available after the specified time interval.

#### DataField:

##### **PMTK661, Time interval**

Time interval: Set the time interval for MT3329 to reply 32-bit flags of 32SV. Note that the Time interval > 0 and <= 365 (1 year for maximum)

#### Example:

Indicate which Almanac will be available after 30 days

\$PMTK661,30\*1C<CR><LF>

#### Return:

\$PMTK001,661,3,fe0bfff\*49<CR><LF>

Note the Hex fe0bfff means 111111011000000101111111111111 and the Valid SV's numbers are 1,2,3,4,5,6,7,8,9,10,11,12,13,14,16,23,24,26,27,28,29,30,31,32.

[Packet Type: 667 PMTK\\_Q.UTC\\_CORRECTION\\_DATA](#)

#### [Packet Meaning]

Get UTC correction data.

#### [Data Field]

\$PMTK001,667,3,A0,A1,dtLS,Tot,WNt,WNLSF,DN,dtLSF\*CS<CR><LF>

Name	Unit	Description
PMTK667		Reference UTC correction
Action flag		'3' means UTC correction data are available '2' means UTC correction data are not available
A0	(seconds)/(2 <sup>30</sup> )	UTC parameter A0
A1	(seconds/second)/(2 <sup>50</sup> )	UTC parameter A1
dtLS	seconds	UTC time difference due to leap seconds before event
Tot	seconds	UTC reference time of week
WNt	weeks	UTC reference week number
WNLSF	weeks	UTC week number when next leap second event occurs
DN	days	UTC day of week when next leap second event occurs
dtLSF	seconds	UTC time difference due to leap seconds after event
CS		Checksum

#### [Example]

\$PMTK667

#### [Return]

If UTC correction data are available, the receiver returns

\$PMTK001,667,3,0,0,16,507904,237,237,3,17\*0A

If UTC correction data are not available, the receiver returns

\$PMTK001,667,2\*36

## Packet Type: 668 PMTK\_Q\_GPS\_KEP

### [Packet Meaning]

Get GPS ephemeris data in kepler format.

### [Data Field]

#### **PMTK668,PRN**

PRN: The SVID of the satellite. Choose which satellite's ephemeris you want to get.

### [Example]

\$PMTK668,3\*25<CR><LF>

### [Return]

If ephemeris data of specified satellite is available, the receiver returns

\$PMTK668,PRN,WeekNo,URAI,IDOT,IODE,Toc,af2,af1,af0,IODC,Crs,dn,M0,Cuc,e,Cus,SqrtA,Toe,Cic,Omega0,Cis,i0,Crc,w,OmegaDot,Tgd,SVHealth\*CS

Field	Description
PMTK668	PMTK command ID
PRN	SVID of satellite
WeekNo	Reference week number[weeks]
URAI	Figure of Merit – Defines URA
IDOT	Rate of inclination angle[rad/s]
IODE	Issue of data counter
Toc	Reference time of week[s]
af2	SV clock correction polynomial coefficient[s/s/s]
af1	SV clock correction polynomial coefficient[s/s]
af0	SV clock correction polynomial coefficient[s]
IODC	Issue of data counter
Crs	Ampof sin harmonic corr term orbit radius[m]
dn	Delta n mean motion diff from computed value[rad/s]
M0	Mean anomaly at reference time[rad]
Cuc	Amplitude of cos harm corr term arg of latitude[rad]
e	Eccentricity
Cus	Amplitude of sin harm corr term arg of latitude[rad]
SqrtA	Square root of the semi-major axis
Toe	Reference time of week[Ephemeris terms][s]
Cic	Amplitude of cos harm corr term ang of inclination[rad]
Omega0	Longitude of ascending node of orbit plane[rad]
Cis	Amplitude of sin harm corr term ang of inclination[rad]
i0	Inclination angle at reference time[rad]
Crc	Amplitude of cos harm corr term orbit radius[rad]
w	Argument of perigee[rad]
OmegaDot	Rate of right ascension[rad/s]
Tgd	Group delay[s]
SVHealth	The 5 LSBs of the NAV data's health status from the ephemeris.
CS	Checksum

**Note:** please use the factor scale(refer to ICD-GPS-200c, page 96) to calculate the actual value.

example:



\$PMTK668,3,804,0,1378,97,18900,0,211,348491,97,1529,14047,-433441886,1302,8251567,3333,2702051329,18900,26,935  
176585,4,655529795,8214,-2063355058,-23169,3,0\*3D

If ephemeris data of specified satellite is not available, the receiver returns

\$PMTK001,668,3,0\*24

## Packet Type: 669 PMTK\_Q\_BDS\_KEP

### [Packet Meaning]

Get BDS ephemeris data in kepler format.

### [Data Field]

**PMTK669,PRN**

PRN: The SVID of the satellite. Choose which satellite's ephemeris you want to get.

### [Example]

\$PMTK669,3\*25<CR><LF>

### [Return]

If ephemeris data of specified satellite is available, the receiver returns

\$PMTK669,PRN,WeekNo,URAI,IDOT,IODE,Toc,af2,af1,af0,IODC,Crs,dn,M0,Cuc,e,Cus,SqrtA,Toe,Cic,Omega0,Cis,i0,Crc,w,Ome  
gaDot,Tgd,SVHealth\*CS

Field	Description
PMTK669	PMTK command ID
PRN	SVID of satellite
WeekNo	Reference week number[weeks]
URAI	Figure of Merit – Defines URA
IDOT	Rate of inclination angle[rad/s]
IODE	Issue of data counter
Toc	Reference time of week[s]
af2	SV clock correction polynomial coefficient[s/s/s]
af1	SV clock correction polynomial coefficient[s/s]
af0	SV clock correction polynomial coefficient[s]
IODC	Issue of data counter
Crs	Amplitude of sin harmonic corr term orbit radius[m]
dn	Delta n mean motion diff from computed value[rad/s]
M0	Mean anomaly at reference time[rad]
Cuc	Amplitude of cos harm corr term arg of latitude[rad]
e	Eccentricity
Cus	Amplitude of sin harm corr term arg of latitude[rad]
SqrtA	Square root of the semi-major axis
Toe	Reference time of week[Ephemeris terms][s]
Cic	Amplitude of cos harm corr term ang of inclination[rad]
Omega0	Longitude of ascending node of orbit plane[rad]
Cis	Amplitude of sin harm corr term ang of inclination[rad]
i0	Inclination angle at reference time[rad]
Crc	Amplitude of cos harm corr term orbit radius[rad]
w	Argument of perigee[rad]
OmegaDot	Rate of right ascension[rad/s]
Tgd	Group delay[s]

SVHealth	The 5 LSBs of the NAV data's health status from the ephemeris.
CS	Checksum

Note: please use the factor scale(refer to BeiDou Navigation Satellite System Signal In Space Interface Control Document) to calculate the actual value.

Example:

\$PMTK669,3,804,0,1567,2,38250,0,-26092,-4263927,0,-21176,581,1267572402,-23869,2546953,66039,3404432795,38250,-126,22528884,-260,55957758,-59905,-1898601724,2465,6,0\*19

If ephemeris data of specified satellite is not available, the receiver returns

\$PMTK001,669,3,0\*25

### Packet Type: 670 PMTK\_Q\_GPS\_IONO

#### [Packet Meaning]

Query ionospheric parameters.

#### [Data Field]

\$PMTK001,670,3,  $\alpha_0$ ,  $\alpha_1$ ,  $\alpha_2$ ,  $\alpha_3$ ,  $\beta_0$ ,  $\beta_1$ ,  $\beta_2$ ,  $\beta_3$  \*CS<CR><LF>

Name	Unit	Description
$\alpha_0$	Seconds	
$\alpha_1$	sec/semi-circle	IONO parameter $\alpha$
$\alpha_2$	sec/(semi-circle)^2	
$\alpha_3$	sec/(semi-circle)^3	IONO parameter $\alpha_3$
$\beta_0$	Seconds	IONO parameter $\beta_0$
$\beta_1$	sec/semi-circle	IONO parameter $\beta_1$
$\beta_2$	sec/(semi-circle)^2	IONO parameter $\beta_2$
$\beta_3$	sec/(semi-circle)^3	IONO parameter $\beta_3$

#### [Example]

\$PMTK670\*33<CR><LF>

#### [Return]

If ionospheric parameters are available, the receiver returns

\$PMTK001,670,3,19,3,-2,-1,63,10,-3,-4\*15

If ionospheric parameters are not available, the receiver returns

\$PMTK001,670,2\*30

### Packet Type: 702 PMTK\_DT\_DATA\_PORT

#### [Packet Meaning]

Display Data port input/output data type and baud rate

#### [Data Field]

InType: Data port input data type

'0' = DPORT\_IN\_NONE

'1' = DPORT\_IN\_RTCM

'2' = DPORT\_IN\_NA

:

OutType: Data port input data type

'0' = DPORT\_OUT\_NONE

'1' = DPORT\_OUT\_DEBUG

:

Baud: Baudrate setting

4800

9600

19200

38400

57600

115200

#### [Example]

\$PMTK702,1,1,9600\*14<CR><LF>

### Packet Type: 705 PMTK\_DT\_RELEASE

#### Packet Meaning:

Firmware release information.

#### DataField:

***PMTK705,ReleaseStr,Build\_ID,Product\_Model,(SDK\_Version,)***

ReleaseStr: Firmware release name and version

3318 : Mcore\_x.x

3329 : AXN\_x.x

Build\_ID: Build ID set in CoreBuilder for firmware version control

Product\_Model: Product Model set in CoreBuilder for product identification

SDK\_Version: Showing SDK version if the firmware is used for SDK

#### Example:

\$PMTK705,AXN\_0.2,1234,ABCD,\*14<CR><LF>

### Packet Type: 707 PMTK\_DT\_EPO\_INFO

#### [Meaning]

EPO data status stored in GPS chip

#### [Format]

***PMTK707,Set,FWN,FTOW,LWN,LTOW,FCWN,FCTOW,LCWN,LCTOW***

Set: Total number sets of EPO data stored in chip

FWN, FTOW: GPS week number & TOW of the first set of EPO data stored in chip respectively

LWN, LTOW: GPS week number & TOW of the last set of EPO data stored in chip respectively

FCWN, FCTOW: GPS week number & TOW of the first set of EPO data that are currently used respectively

LCWN, LCTOW: GPS week number & TOW of the last set of EPO data that are currently used respectively

**[Example]**

\$PMTK707,56,1468,172800,1470,151200,1468,259200,1468,259200\*1F<CR><LF>

**Packet Type: 740 PMTK\_DT\_UTC**

**[Packet Meaning]**

The packet contains current UTC time. Please do not use local time, which has time-zone offset. To have faster TTFF, the accuracy of reference UTC shall be better less than 3 seconds.

**[Packet Format]**

*\$PMTK740,YYYY,MM,DD,hh,mm,ss\*CS<CR><LF>*

Name	Unit	Range	
\$PMTK740			Reference UTC Time
YYYY	year	> 1980	
MM	month	1 - 12	UTC time: month
DD	day	1 - 31	UTC time: day
hh	hour	0 - 23	
mm	minute	0 - 59	UTC time: minute
ss	second	0 - 59	UTC time: second
CS			8-bit accumulative checksum of all bytes in-between the \$ and * characters in hexadecimal

**[Example]**

The packet indicates that the current UTC time 2010/Feb/10 09:00:58.

\$PMTK740,2010,2,10,9,0,58\*05<CR><LF>

**Packet Type: 721 PMTK\_DT\_SV\_EPO**

**[Packet Meaning]**

The packet contains GPS EPO data for a single satellite.

**[Packet Format]**

\$PMTK721,SatID,W[0],...,W[17]\*CS<CR><LF>

Name	Unit	Range	Description
\$PMTK721	---	---	GPS EPO data (Navigation Model) for a single satellite
SatID	---	1 ~ 32	Satellite PRN number [Represented in HEX characters] for the EPO data to follow

W[0] ~ W[17]	---	---	words [LSB first] of one EPO segment data (total 72 bytes)
CS			8-bit accumulative checksum of all bytes in-between the \$ and * characters in hexadecimal

**[Sample Packet]**

The packet contains EPO data of satellite PRN 17.

\$PMTK721,11,6a043d2f,d52e00,0d2f1a3d,...,.....\*CS<CR><LF>

**[Note]**

The PRN is input with hex format.

**Packet Type: 741 PMTK\_DT\_POS****[Packet Meaning]**

The packet contains reference location for the GPS receiver. To have faster TTFF, the accuracy of the location shall be better than 30km.

**[Packet Format]**

*PMTK741,Lat,Long,Alt,YYYY,MM,DD,hh,mm,ss \*CS<CR><LF>*

Name	Unit	Range	
\$PMTK741			Reference location without accuracy information
Lat	degree	-90.0 ~ 90.0	WGS84 geodetic latitude. NOTE: suggest to express this value in floating-point with 6 decimal points Minus: south; Plus: north
Long	degree	-180.0 ~ 180.0	WGS84 geodetic longitude. NOTE: suggest to express this value in floating-point with 6 decimal points Minus: west; Plus: east
Alt	m	---	WGS84 ellipsoidal altitude.
YYYY	year	> 1980	Reference UTC time: year in 4 digits
MM	month	1 - 12	Reference UTC time: month
DD	day	1 - 31	Reference UTC time: day
hh	hour	0 - 23	Reference UTC time: hour
mm	minute	0 - 59	Reference UTC time: minute
ss	second	0 - 59	Reference UTC time: second
CS			8-bit accumulative checksum of all bytes in-between the \$ and * characters in hexadecimal

**[Range Check]**

GPS chip will check value range for the following parameters:

Lat: -90.0 ~ 90.0

Long: -180.0 ~ 180.0

#### [Example]

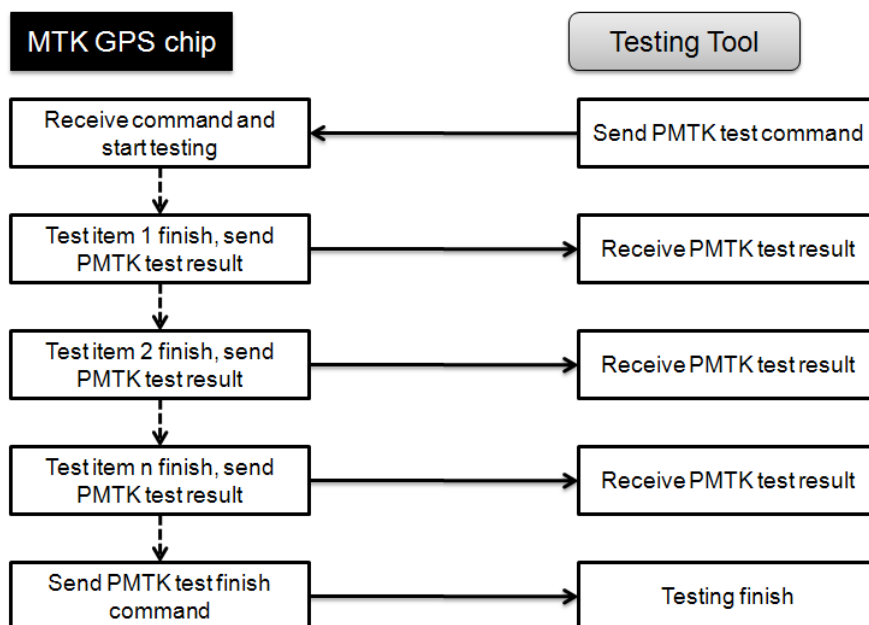
The packet indicates that the GPS receiver is at latitude 24.772816 degrees, longitude 121.022636 degrees, and altitude 160m.

\$PMTK741,24.772816,121.022636,160,2011,8,1,08,00,00

#### Packet Type: 810 PMTK\_TEST\_ALL

##### [Packet Meaning]

Enter MP test mode and set test item and SV id.



##### [Packet Format]

\$PMTK810,Bitmap,SVID\*CS<CR><LF>

Bitmap: The first data field means the test items.

Each bit of test item field means one test item. List these test items below.

Supported Test Items

Bit0 TEST\_INFO // Include f/w version, NMEA type and NMEA output rate

Bit1 TEST\_ACQ // the time of acquiring the specific SV

Bit2 TEST\_BITSYNC // the time of bit sync

Bit3 TEST\_SIGNAL // Include phase error, TCXO clock/drift and CNR mean/sigma

Bit4 -15 (Reserved)

SVID: The second means the SV id.



The value of SV id is between 1 and 20 in Hex format.

The value of Glonass SVID is Frequency ID which is between C9 and D6 in Hex format.

Note. Glonass frequency id representation

- 7 = C9
- 6 = CA
- 5 = CB
- 4 = CC
- 3 = CD
- 2 = DE
- 1 = CF
- 0 = D0
- 1 = D1
- 2 = D2
- 3 = D3
- 4 = D4
- 5 = D5
- 6 = D6

**[Example]** \$PMTK810,0003,1D\*4D<CR><LF>

This command only tests TEST\_INFO and TEST\_ACQ test items. The specific SV id is PRN29.

#### Packet Type: 811 PMTK\_TEST\_STOP

##### **[Packet Meaning]**

Testing tool could send this command to GPS receiver to leave MP test mode.

##### **[Packet Format]**

No Data Field.

##### **[Example]**

\$PMTK811\*3A<CR><LF>

#### Packet Type: 812 PMTK\_TEST\_FINISH

##### **[Packet Meaning]**

GPS receiver will send out this PMTK packet to show that MP testing has finished.

**[Packet Format]**

No Data Field.

**[Example]**

\$PMTK812\*39<CR><LF>

**Packet Type: 813 PMTK\_TEST\_ALL\_ACQ****[Packet Meaning]**

The result of TEST\_ACQ item.

**[Packet Format]**

\$PMTK813,<SVid>,<Acq Time>\*<Checksum><CR><LF>

**[Example]**

\$PMTK813,29,2\*01<CR><LF>

The target device acquires SV29 within 2 seconds.

**Packet Type: 814 PMTK\_TEST\_ALL\_BITSYNC****[Packet Meaning]**

The result of TEST\_BITSYNC item.

**[Packet Format]**

\$PMTK814,<SVid>,<BitSync Time>\*<Checksum><CR><LF>

**[Example]**

\$PMTK814,29,1\*05<CR><LF>

Regard to SV29, the target device reach bit sync state within 1 second.

**Packet Type: 815 PMTK\_TEST\_ALL\_SIGNAL****[Packet Meaning]**

The result of TEST\_SIGNAL item.

**[Packet Format]**

\$PMTK815,<SVid>,<Testing Time>,<Phase>,<TCXO Offset>,<TCXO Drift>,<CNR mean>,<CNR sigma>\*<Checksum><CR><LF>

The unit of <Phase>,<CNR mean>,<CNR sigma> is 0.01.



The unit of <TCXO Offset>,<TCXO Drift> is 0.001.

**[Example]**

\$PMTK815,29,16,98,10000,30,4100,0\*18<CR><LF>

Regard to SV29, take 16 seconds to test and the result is ...

Phase Error : 0.98

TCXO offset/drift(Hz) : 10/0.03

CNR mean/sigma : 41/0

**Packet Type: 837 PMTK\_TEST\_JAMMING**

**Packet Meaning:**

Jamming scan test command.

**DataField:**

***\$PMTK837, JamScanType, JamScanNum***

JamScanType: '1' enable jamming scan

JamScanNum: Jamming scan test times.

**Example:**

\$PMTK837,1,50\*0A<CR><LF>

Jamming scan test 50 times

**Return:**

\$PMTKJAM, sentence type, sentence content

***The meaning of sentence type and its content***

Sentence type = 0 : Jammer scan end

Sentence type = 1 : Jammer scan start, total number of testing

Sentence type = 2 : Jammer scan result, sentence ID, the JNR of each frequency

(base frequency = 1573379250, resolution = 21000)

Sentence type = 3 : Jammer scan test round, round of test

Sentence type = 4 : No jammer scan data

***Example:***

\$PMTKJAM,1,10\*74

- Jammer scan start, total number of testing = 10;

\$PMTKJAM,3,5\*42

- Jammer scanning, the round of test = 5

\$PMTKJAM,2,1,101,81,50,48,56,94,74,69,68,62,56,58,64,82,99,83,83,71,81,93,88,79,85,104,85,91,82,77,96,94,104,86,108,101,102,95,147,110,128,97,113,104,125,101,111,126,103,150,112\*61

- Sentence type = 2,
- Sentence ID = 1,
- JNR of 1573379250 Hz = 101,
- JNR of 1573400250 Hz = 81,
- ...

### Packet Type: 869 PMTK\_EASY\_ENABLE

#### Packet Meaning:

Enable or disable EASY function. Query if EASY is enabled or disabled..

#### DataField:

**PMTK869, CmdType, [Enable], [Extension Day]**

CmdType: Set or query

0: Query

1: Set

2: Result for Query operation

Enabled: Enable or disable

0: Disable

1: Enable

Extension Day: Finished extension day.

#### Example:

To enable EASY, use

\$PMTK869,1,1\*35<CR><LF>

To disable EASY, use

\$PMTK869,1,0\*36<CR><LF>

To query if EASY is enabled or disabled, use

\$PMTK869,0\*29<CR><LF>

If EASY is disabled, the receiver returns

\$PMTK869,2,0,0\*37<CR><LF>

If EASY is enabled and is not finished yet, the receiver may returns

\$PMTK869,2,1,0\*2A<CR><LF>

If EASY is enabled and is finished 1-day extension, the receiver may returns

\$PMTK869,2,1,1\*2B<CR><LF>

If EASY is enabled and is finished 2-day extension, the receiver may returns

\$PMTK869,2,1,2\*28<CR><LF>

If EASY is enabled and is finished 3-day extension, the receiver may returns

\$PMTK869,2,1,3\*29<CR><LF>

## Packet Type: 875 PMTK\_PMTKLSC\_STN\_OUTPUT

### [Packet Meaning]

Enable or disable PMTKLSC Sentence output. Query if PMTKLSC Sentence output enabled or disabled.

### [Data Field]

***\$PMTK875,CmdType,[Enable]***

CmdType: Set or Query

‘0’: Query

‘1’: Set

‘2’: Result for Query operation

Enable: Enable or disable

‘0’: Disable

‘1’: Enable

### [Example]

\$PMTK875,1,1\*38<CR><LF> :Enable PMTKLSC and PMTKLSCB Sentence output

\$PMTK875,1,0\*39<CR><LF> :Disable PMTKLSC and PMTKLSCB Sentence output

### [Return]

\$PMTKLSC, Parameter1, Parameter2, Parameter3\*CS

\$PMTKLSCB, Parameter1, Parameter2, Parameter3\*CS

where Parameter 1 : current leap second

Parameter 2 : leap indicator, 1 means updated from broadcast data

Parameter 3 : next leap second

## Packet Type: 886 PMTK\_FR\_MODE

### [Packet Meaning]

Set navigation mode.

### [Data Field]

***\$PMTK886,CmdType***

CmdType: ‘0’: Normal mode: For general purpose

‘1’: Fitness mode: For running and walking purpose that the low-speed (< 5m/s) movement will have more effect on the position calculation.

'2': Aviation mode: For high-dynamic purpose that the large-acceleration movement will have more effect on the position calculation.

'3': Balloon mode: For high-altitude balloon purpose that the vertical movement will have more effect on the position calculation.

**[Example]**

\$PMTK886,0\*28<CR><LF> :Enter normal mode.

\$PMTK886,1\*29<CR><LF> :Enter fitness mode.

\$PMTK886,2\*2A<CR><LF> :Enter aviation mode.

\$PMTK886,3\*2B<CR><LF> :Enter balloon mode.

**[Return]**

\$PMTK001,886,3\*36<CR><LF>

## Appendix A: 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	
14	American Samoa1962	American Samoa Islands
15	Anna 1 Astro1965	
16	Antigua Island Astro1943	
17	Arc1950	Botswana
18	Arc1950	
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
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)	
54	Dos 1968	New Georgia Islands (Gizo Island)
55	Easter Island 1967	
56	Estonia Coordinate System1937	
57	European 1950	Cyprus
58	European 1950	
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
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, Denmark,France, W Germany, Netherlands , Switzerland
69	European 1950	Mean For Iraq, 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 Datum 1970	New Zealand
76	Graciosa Base SW1948	Azores (Faial, Graciosa, Pico, Sao, Jorge, Terceira)
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	
91	Indian 1975	Thailand
92	Indonesian 1974	
93	Ireland 1965	
94	ISTS 061 Astro 1968	South Georgia Islands
95	ISTS 073 Astro 1969	
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
103	Leigon	Ghana
104	Liberia 1964	Liberia
105	Luzon	Philippines (Excluding Mindanao)
106	Luzon	Philippines (Mindanao)
107	M'Poroloko	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	
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	
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)
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 Britain 1936	England
155	Ordnance Survey Great Britain 1936	England, Isle of Man, Wales
156	Ordnance Survey Great Britain 1936	Mean For England ,Isle of Man, Scotland, Shetland Island, Wales
157	Ordnance Survey Great Britain 1936	Scotland, Shetland Islands
158	Ordnance Survey Great Britain 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, Madeira Islands
164	Provisional South American 1956	
165	Provisional South American 1956	
166	Provisional South American 1956	
167	Provisional South American 1956	
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
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	
199	South American 1969	Ecuador
200	South American 1969	
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
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