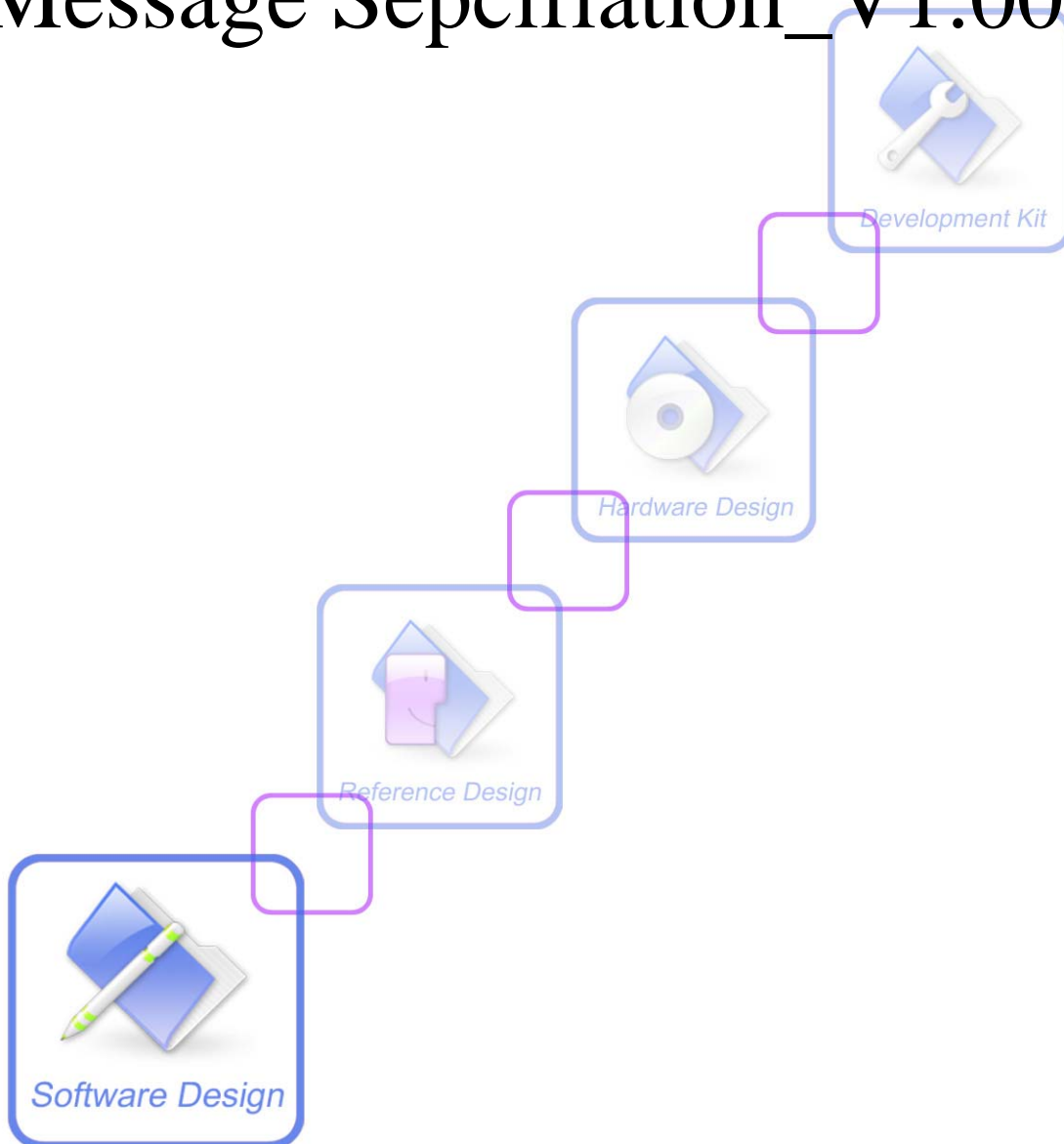


SIM28/68R/68V_NMEA Message Sepcification_V1.00



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Version History

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V1.00	Original version	Original

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1 Introduction

1.1 Scope of the document

This document presents details of the frequently used NMEA messages supported by SIMCom SIM28/SIM68R/SIM68V GPS module, does not provide information about the complete NMEA-0183, user can refer to the related documents for more information.

1.2 Related documents

- (1). NMEA-0183 Standard For Interfacing Marine Electronic Devices
- (2). MTK NMEA Packet User Manual(**Revision: 2.01**)

1.3 Term abbreviation

Table 1-1: Term abbreviation

Term	Definition
1PPS	1 pulse per second
ABP	Almanac Based Position
ACK	ACKnowledge
DGPS	Differential Global Positioning System
NMEA	National Marine Electronics Association
OSP	One Socket Protocol
SBAS	Satellite Based Augmentation System
SDK	Software Development Kit
SRAM	Static Random Access Memory
SW	Software
SVs	Satellites
PDOP	Position Dilution of Precision
HDOP	Horizontal Dilution of Precision
VDOP	Vertical Dilution of Precision

2 NMEA Messages

2.1 General Format of NMEA Messages

NMEA messages use the ASCII character set and have a defined format. Each message begins with a \$ (hex 0x24) and end with a carriage return and line feed (hex 0x0D 0x0A, represented as <CR><LF>). Each message consists of one or more fields of ASCII letters and numbers, separated by commas. After the last field, and before the <CR><LF> is a checksum consisting of an asterisk (*, hex 0x2A) followed by two ASCII characters representing the hexadecimal value of the checksum. The checksum is computed as the exclusive OR of all characters between the \$ and * characters.

Table 2-1 illustrates the NMEA output/input message parameters.

Table 2-1: NMEA output/input message parameters

Parameter	Example	Contents
Start	\$GPGGA \$PSRF<MID>	Message Identifier. Input messages begin at MID 100.
Sequence	Data	Message specific data. Refer to a specific message section for <data>...<data> definition.
Checksum	*CKSUM	CKSUM is a two-hex ASCII character. Checksums is required in all input messages.
Payload	<CR> <LF>	Each message is terminated using Carriage Return (CR) Line Feed (LF) which are \r\n. Because \r\n are not printable ASCII characters, they are omitted from the example strings, but must be sent to terminate the message and cause the receiver to process that input message.

Note:

- (1). All fields in all proprietary NMEA messages are required, none are optional and are comma delimited.
- (2). In some numeric fields representing a single data element, leading zeros before a decimal are suppressed. A single "0" character preceding the decimal point is maintained. In compound numeric structures (such as LAT or LONG), leading zeros are suppressed only on the leftmost element. Trailing zeros are not suppressed.

2.2 Standard NMEA Output Messages

Table 2-2: SIM28/SIM68R/SIM68V Frequently Used NMEA Output Messages

Message	Description
GGA	Time, position and fix type data
GLL	Latitude, longitude, UTC time of position fix and status
GSA	GPS receiver operating mode, satellites used in the position solution, and DOP values
GSV	Number of GPS satellites in view satellite ID numbers, elevation, azimuth, & SNR values
RMC	Time, date, position, course and speed data
VTG	Course and speed information relative to the ground
ZDA	PPS timing message (synchronized to PPS)

A full description of the listed NMEA messages is provided in the following sections.

2.2.1 Message ID GGA: Global Positioning System Fixed Data

Table 2–3 contains the values for the following example:

```
$GPGGA,091926.000,3113.3166,N,12121.2682,E,1,09,0.9,36.9,M,7.9,M,,0000*56<CR><LF>
```

Table 2-3: GGA Data Format

Name	Example	Unit	Description
Message ID	\$GPGGA		GGA protocol header
UTC Time	091926.000		hhmmss.sss
Latitude	3113.3166		ddmm.mmmm
N/S Indicator	N		N=north or S=south
Longitude	12121.2682		dddmm.mmmm
E/W Indicator	E		E=east or W=west
Position Fix Indicator	1		See Table 2-4
Satellites Used	09		Range 0 to 12
HDOP	0.9		Horizontal Dilution of Precision
MSL Altitude	36.9	meters	
Units	M	meters	
Geoid Separation	7.9	meters	Geoid-to-ellipsoid separation. Ellipsoid altitude = MSL Altitude + Geoid Separation.
Units	M	meters	
Age of Diff. Corr.		sec	Null fields when DGPS is not used
Diff. Ref. Station ID	0000		
Checksum	*56		
<CR><LF>			End of message termination

Table 2-4: Position Fix Indicator

Value	Description
0	Fix not available or invalid
1	GPS SPS Mode, fix valid
2	Differential GPS, SPS Mode, fix valid
3-5	Not supported
6	Dead Reckoning Mode, fix valid

Note: A valid status is derived from all the parameters set in the software. This includes the minimum number of satellites required, any DOP mask setting, presence of DGPS corrections, etc. If the default or current software setting requires that a factor is met, then if that factor is not met, the solution will be marked as invalid.

2.2.2 Message ID GLL: Geographic Position - Latitude/Longitude

Table 2-5 contains the values for the following example:

```
$GPGLL,3113.3157,N,12121.2684,E,094051.000,A,A*59<CR><LF>
```

Table 2-5: GLL Data Format

Name	Example	Unit	Description
Message ID	\$GPGLL		GLL protocol header
Latitude	3113. 3157		ddmm.mmmm
N/S Indicator	N		N=north or S=south
Longitude	12121. 2684		dddmm.mmmm
E/W Indicator	E		E=east or W=west
UTC Time	094051. 000		hhmmss.sss
Status	A		A=data valid or V=data not valid
Mode	A		A=Autonomous, D=DGPS, E=DR N = Output Data Not Valid R = Coarse Position 1
Checksum	*59		
<CR><LF>			End of message termination

Note: Position was calculated based on one or more of the SVs having their states derived from almanac parameters, as opposed to ephemerides.

2.2.3 Message ID GSA: GNSS DOP and Active Satellites

Table 2-6 contains the values for the following example:

```
$GPGSA,A,3,07,02,26,27,09,04,15, , , , ,1.8,1.0,1.5*33<CR><LF>
```

Table 2-6: GSA Data Format

Name	Example	Unit	Description
Message ID	\$GPGSA		GSA protocol header
Mode 1	A		See Table 2-7
Mode 2	3		See Table 2-8
Satellite Used ^[1]	07		SV on Channel 1
Satellite Used ^[1]	02		SV on Channel 2
....		
Satellite Used ^[1]			SV on Channel 12
PDOP ^[2]	1.8		Position Dilution of Precision
HDOP ^[2]	1.0		Horizontal Dilution of Precision
VDOP ^[2]	1.5		Vertical Dilution of Precision
Checksum	*33		
<CR><LF>			End of message termination

Note:

^[1]Satellite used in solution.

^[2]Maximum DOP value reported is 50. When value 50 is reported, the actual DOP may be much larger.

Table 2-7: Mode 1

Value	Description
M	Manual – Forced to operate in 2D or 3D mode
A	2D Automatic – Allowed to automatically switch 2D/3D

Table 2-8: Mode 2

Value	Description
1	Fix not available
2	2D (<4 SVs used)
3	3D (>3 SVs used)

2.2.4 Message ID GSV: GNSS Satellites in View

Table 2-9 contains the values for the following example:

```
$GPGSV,3,1,11,26,68,023,37,15,64,251,33,05,45,058,34,29,33,253,33*75<CR><LF>
```

```
$GPGSV,3,2,11,27,32,164,30,21,25,315,29,02,24,140,31,08,19,048,29*70<CR><LF>
```

```
$GPGSV,3,3,11,09,16,180,25,18,08,284,27,10,08,085,18*4E<CR><LF>
```

Table 2-9: GSV Data Format

Name	Example	Unit	Description
Message ID	\$GPGSV		GSV protocol header
Number of Messages ^[1]	2		Total number of GSV messages to be sent in this group
Message Number ^[1]	1		Message number in this group of GSV messages
Satellites in View ^[1]	11		
Satellite ID	26		Channel 1 (Range 1 to 32)
Elevation	68	degrees	Channel 1 (Maximum 90)
Azimuth	023	degrees	Channel 1 (True, Range 0 to 359)
SNR (C/N0)	37	dBHz	Range 0 to 99, null when not tracking
....		
Satellite ID	29		Channel 4 (Range 1 to 32)
Elevation	33	degrees	Channel 4 (Maximum 90)
Azimuth	253	degrees	Channel 4 (True, Range 0 to 359)
SNR (C/N0)	33	dBHz	Range 0 to 99, null when not tracking
Checksum	*75		
<CR><LF>			End of message termination

Note:

^[1] Depending on the number of satellites tracked, multiple messages of GSV data may be required. In some software versions, the maximum number of satellites reported as visible is limited to 12, even though more may be visible.

2.2.5 Message ID RMC: Recommended Minimum Specific GNSS Data

Table 2-10 contains the values for the following example:

```
$GPRMC,094330.000,A,3113.3156,N,12121.2686,E,0.51,193.93,171210,,,A*68<CR><LF>
```

Table 2-10: RMC Data Format

Name	Example	Unit	Description
Message ID	\$GPRMC		RMC protocol header
UTC Time	094330.000		hhmmss.sss
Status ^[1]	A		A=data valid or V=data not valid
Latitude	3113.3156		ddmm.mmmm
N/S Indicator	N		N=north or S=south
Longitude	12121.2686		dddmm.mmmm
E/W Indicator	E		E=east or W=west
Speed Over Ground	0.51	knots	
Course Over Ground	193.93	degrees	True
Date	171210		ddmmyy
Magnetic Variation ^[2]		degrees	E=east or W=west
East/West Indicator ^[2]			E=east
Mode	A		A=Autonomous, D=DGPS, E=DR, N = Output Data Not Valid R = Coarse Position ^[3]
Checksum	*68		
<CR><LF>			End of message termination

Note

^[1] A valid status is derived from all the parameters set in the software. This includes the minimum number of satellites required, any DOP mask setting, presence of DGPS corrections, etc. If the default or current software setting requires that a factor is met, then if that factor is not met, the solution will be marked as invalid.

^[2] does not support magnetic declination. All “course over ground” data are geodetic WGS84 directions relative to true North.

^[3] Position was calculated based on one or more of the SVs having their states derived from almanac parameters, as opposed to ephemerides.

2.2.6 Message ID VTG: Course Over Ground and Ground Speed

Table 2-11 contains the values for the following example:

```
$GPVTG,83.37,T,,M,0.00,N,0.0,K,A*32<CR><LF>
```

Table 2-11: VTG Data Format

Name	Example	Unit	Description
Message ID	\$GPVTG		VTG protocol header
Course	83.37	degrees	Measured heading
Reference	T		True
Course		degrees	Measured heading
Reference	M		Magnetic1 ^[1]
Speed	0.00	knots	Measured horizontal speed
Units	N		Knots
Speed	0.0	km/hr	Measured horizontal speed
Units	K		Kilometers per hour
Mode	A		A=Autonomous, D=DGPS, E=DR, N = Output Data Not Valid R = Coarse Position ^[2]
Checksum	*32		
<CR><LF>			End of message termination

Note:

^[1]Does not support magnetic declination. All “course over ground” data are geodetic WGS84 directions.

^[2]Position was calculated based on one or more of the SVs having their states derived from almanac parameters, as opposed to ephemerides.

2.2.7 Message ID ZDA: Time & Date

This message is included only with systems which support a time-mark output pulse identified as “1PPS”. Outputs the time associated with the current 1PPS pulse. Each message is output within a few hundred ms after the 1PPS pulse is output and tells the time of the pulse that just occurred.

Table 2-12 contains the values for the following example:

```
$GPZDA,091926.000,17,12,2010,*,55<CR><LF>
```

Table 2-12: ZDA Data Format

Name	Example	Unit	Description
Message ID	\$GPZDA		ZDA protocol header
UTC time	091926.000	Hhmmss.sss	The UTC time units are: hh = UTC hours from 00 to 23 mm = UTC minutes from 00 to 59 ss = UTC seconds from 00 to 59 .sss= UTC micro seconds Either using valid IONO/UTC or estimated from default leap seconds
Day	17		Day of the month, range 1 to 31
Month	12		Month of the year, range 1 to 12
Year	2010		1980 to 2079
Local zone hour ^[1]		hour	Offset from UTC
Local zone minutes ^[1]		minute	Offset from UTC
Checksums	*55		
<CR><LF>			End of message termination

Note:

^[1]Not supported.

2.3 MTK NMEA Messages

2.3.1 Packet Type: 000 PMTK_TEST

Packet Meaning:

Test Packet.

DataField:

None

Example:

\$PMTK000*32<CR><LF>

2.3.2 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>

2.3.3 Packet Type: 010 PMTK_SYS_MSG

Packet Meaning:

Output system message

DataField: *PMTK010, Msg*

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>

2.3.4 Packet Type: 011 PMTK_TXT_MSG

Packet Meaning:

Output system message

DataField:

Message of this is MTK GPS

Example:

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

2.3.5 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>
```

2.3.6 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>
```

2.3.7 Packet Type: 103 PMTK_CMD_COLD_START

Packet Meaning:

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

DataField:

None

Example:

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

2.3.8 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>
```

2.3.9 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>
```

2.3.10 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>
```

2.3.11 Packet Type: 220 PMTK_SET_POS_FIX

Packet Meaning:

Position Fix Interval

DataField: *PMTK220, Interval*

Interval: Position fix interval [msec]. Must be larger than 200.

Example:

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

2.3.12 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)

2.3.13 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’: AlwaysLocateTM standby mode

‘9’: AlwaysLocateTM 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

AlwaysLocateTM Standby

PMTK225,0

PMTK225,8

AlwaysLocateTM Backup

PMTK225,0

PMTK225,9

2.3.14 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>

2.3.15 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>

2.3.16 Packet Type: 300 PMTK_API_SET_FIX_CTL**Packet Meaning:**

Set Fix interval.

DataField: *PMTK300,Fixinterval,0,0,0,0***Fixinterval:** Unit is milliseconds [Range: 100 ~ 10000]**Example:**

\$PMTK300,1000,0,0,0,0 :Set fix interval to 1000 milliseconds

Return:

\$PMTK001,300,3

2.3.17 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’: WAAS

Example:

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

2.3.18 Packet Type: 313 PMTK_API_SET_SBAS_ENABLED

Packet Meaning:

API_Set_Sbas_Enabled

Enable to search a SBAS satellite or not.

DataField: *PMTK313, Enabled*

Enabled: Enable or disable

'0' = Disable

'1' = Enable

Example:

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

2.3.19 Packet Type: 314 PMTK_API_SET_NMEA_OUTPUT

Packet Meaning:

API_Set_NMEA_Out

Set NMEA sentence output frequencies.

DataField:

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

Supported NMEA Sentences:

0	NMEA_SEN_GLL,	// GPGLL interval - Geographic Position - Latitude longitude
1	NMEA_SEN_RMC,	// GPRMC interval - Recomend 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
17	NMEA_SEN_ZDA,	// GPZDA interval - Time & Date

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:

```
$PMTK314,1,1,1,1,1,5,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,1,0*2 D <CR><LF>
```

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>
```

2.3.20 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>
```

2.3.21 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>
```

2.3.22 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>

2.3.23 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

2.3.24 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*2B : Enable QZSS function

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

2.3.25 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 minimum is 0.1 m/s, the max is 2.0 m/s

Example:

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

2.3.26 Packet Type: 389 PMTK_API_SET_TCXO_DEBUG

Packet Meaning:

Set the switch of showing TCXO clock drift at every fix

DataField: *PMTK389,on_off*

on_off:

0=off;

1=on (turn on \$PMTK589 output at every fix)

Example:

```
$PMTK389,1*2D<CR><LF>
```

2.3.27 Packet Type: 400 PMTK_API_Q_FIX_CTL

Packet Meaning:

API_Query_Fix_Ctl

DataField:

None

Return:

PMTK_DT_FIX_CTL

Example:

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

2.3.28 Packet Type: 401 PMTK_API_Q_DGPS_MODE

Packet Meaning:

API_Query_Dgps_Mode

DataField:

None

Return:

PMTK_DT_DGPS_MODE

Example:

\$PMTK401*37<CR><LF>

2.3.29 Packet Type: 413 PMTK_API_Q_SBAS_ENABLED

Packet Meaning:

API_Query_Sbas_Enabled

DataField:

None

Return:

PMTK_DT_SBAS_ENABLED

Example:

\$PMTK413*34<CR><LF>

2.3.30 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

Example:

\$PMTK414*33<CR><LF>

2.3.31 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>

2.3.32 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>

Note:

The execution result depend on firmware version.

2.3.33 Packet Type: 500 PMTK_DT_FIX_CTL

Packet Meaning:

These parameters control the rate of position fixing activity.

DataField: *PMTK500, FixInterval*

FixInterval: Position fix interval. (msec). [>= 200]

Example:

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

Note:

The execution result depend on firmware version.

2.3.34 Packet Type: 501 PMTK_DT_DGPS_MODE

Packet Meaning:

DGPS Data Source Mode

DataField:

PMTK501,*Mode*

Mode: DGPS data source mode

‘0’: No DGPS source

‘1’: RTCM

‘2’: WAAS

Example:

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

2.3.35 Packet Type: 513 PMTK_DT_SBAS_ENABLED

Packet Meaning:

Enable to search a SBAS satellite or not.

DataField: *PMTK513,Enabled*

Enabled: Enable or disable

'0' = Disable

'1' = Enable

Example:

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

Note:

The execution result depend on firmware version.

2.3.36 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>

2.3.37 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>

Note:

The execution result depend on firmware version.

2.3.38 Packet Type: 589 PMTK_DT_SET_TCXO_DEBUG**Packet Meaning:**

The TCXO clock drift value

DataField: *PMTK589,valid,UTC,TCXO_drift_ppm*

valid: 0=data is not reliable; 1=data is ready

UTC: UTC time

TCXO_drift_ppm: TCXO clock drift in ppm

Example:

\$PMTK589,1,052130.000,-0.4712*03<CR><LF>

Note:

The execution result depend on firmware version.

2.3.39 Packet Type: 605 PMTK_Q_RELEASE**Packet Meaning:**

Query the firmware release information.

DataField:

NONE

Return:

PMTK_DT_RELEASE

Example:

\$PMTK605*31<CR><LF>

2.3.40 Packet Type: 607 PMTK_Q_EPO_INFO**Packet Meaning:**

EPO Data Valid day check

DataField: *\$PMTK607*

Example:

\$PMTK607*33<CR><LF>

2.3.41 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 <= 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.

2.3.42 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,fec0bfff*49<CR><LF>
```

Note the Hex fec0bfff 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.

2.3.43 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>

2.3.44 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	Description
\$PMTK740			Reference UTC Time
<i>YYYY</i>	year	> 1980	UTC time: year in 4 digits
<i>MM</i>	month	1 - 12	UTC time: month
<i>DD</i>	day	1 - 31	UTC time: day
<i>hh</i>	hour	0 - 23	UTC time: hour
<i>mm</i>	minute	0 - 59	UTC time: minute
<i>ss</i>	second	0 - 59	UTC time: second
<i>CS</i>			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>

2.3.45 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	Description
\$PMTK741			Reference location without accuracy information
<i>Lat</i>	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
<i>Long</i>	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
<i>Alt</i>	m	---	WGS84 ellipsoidal altitude.
<i>YYYY</i>	year	> 1980	Reference UTC time: year in 4 digits
<i>MM</i>	month	1 - 12	Reference UTC time: month
<i>DD</i>	day	1 - 31	Reference UTC time: day
<i>hh</i>	hour	0 - 23	Reference UTC time: hour
<i>mm</i>	minute	0 - 59	Reference UTC time: minute
<i>ss</i>	second	0 - 59	Reference UTC time: second
<i>CS</i>			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

2.3.46 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.

[Example]

```
$PMTK810,0003,1D*4D<CR><LF>
```

This command only tests TEST_INFO and TEST_ACQ test items. The specific SV id is PRN29.

2.3.47 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>
```

2.3.48 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>

Note:

The execution result depend on firmware version.

2.3.49 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.

Note:

The execution result depend on firmware version.

2.3.50 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.

Note:

The execution result depend on firmware version.

2.3.51 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

Note:

The execution result depend on firmware version.

2.3.52 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

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	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
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

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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
67	European 1950	Mean For Austria, Belgium,Denmark, Finland, France, W Germany, Gibraltar, Greece, Italy, Luxembourg, Netherlands, Norway, Portuga,l Spain, Sweden, Switzerland
68	European 1950	Mean For Austria, Debnmark,France, W Germany, Netherland , 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 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 1 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
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, Quebec)
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)
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

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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

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

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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

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