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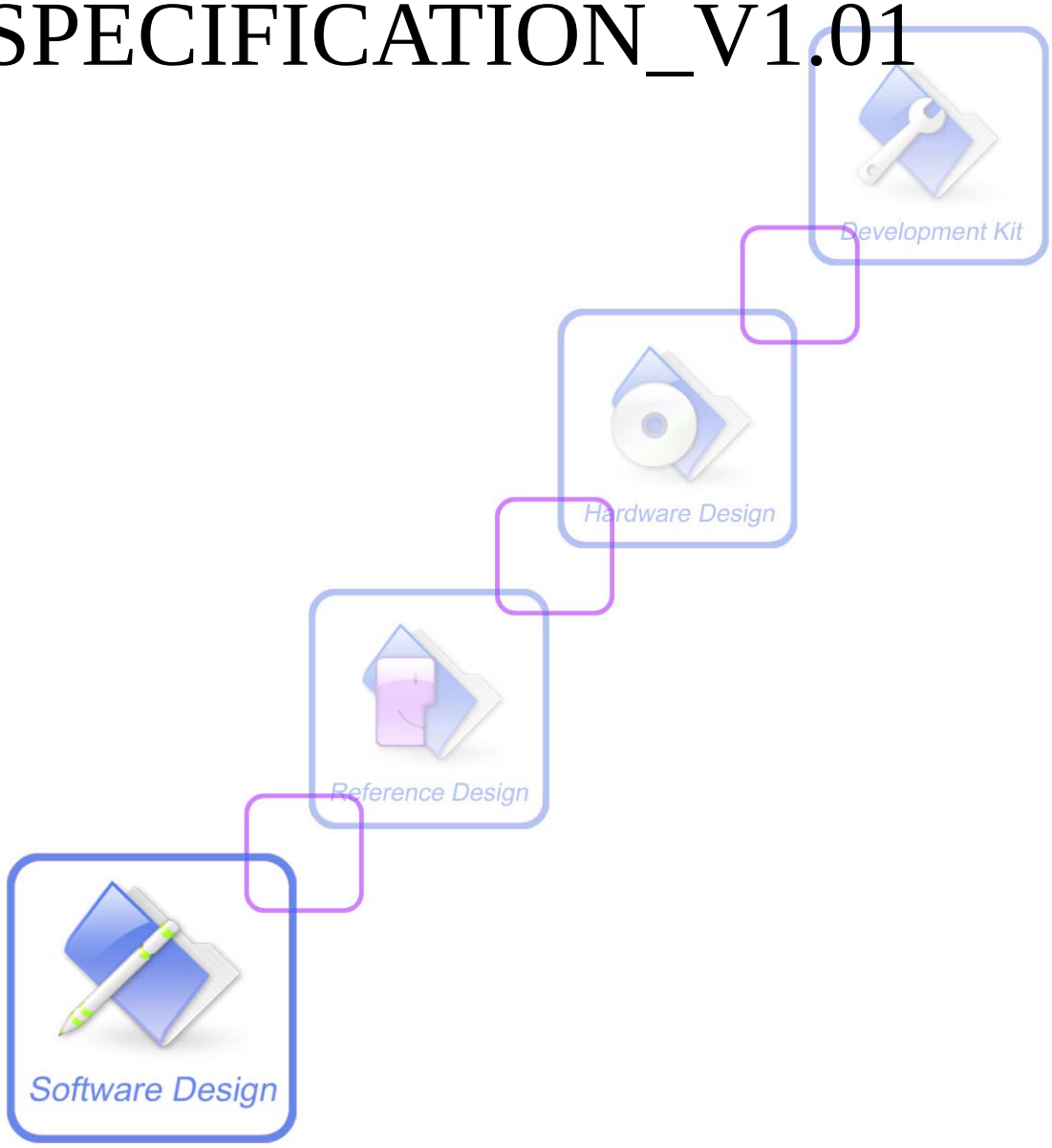
SIM28/68R/68V_NMEA SPECIFICATION_V1.01



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Version History

Version	Chapter	What is new
V1.00	Original version	Original
V1.01	2.2	Add Possible Talker Identifiers to Standard NMEA Output Messages Table Add command PMTK353

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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: 2.03**)

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	Message Identifier. Input messages begin at MID 100.
Payload	<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.
End	<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	Possible Talker Identifiers
GGA	Time, position and fix type data	GP
GLL	Latitude, longitude, UTC time of position fix and status	GP,GN
GSA	GNSS receiver operating mode, satellites used in the position solution, and DOP values	GP, GN
GSV	Number of GNSS satellites in view satellite ID numbers, elevation, azimuth, & SNR values	GP,GL
RMC	Time, date, position, course and speed data	GP,GN
VTG	Course and speed information relative to the ground	GP
ZDA	PPS timing message (synchronized to PPS)	GP

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: GGA Data Format

Example: $GPGGA,091926.000,3113.3166,N,12121.2682,E,1,09,0.9,36.9,M,7.9,M,,0000*56<CR><LF>			
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: GLL Data Format

Example: $GPGLL,3113.3157,N,12121.2684,E,094051.000,A,A*59<CR><LF>			
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: GSA Data Format

Example: $GPGSA,A,3,07,02,26,27,09,04,15, , , , , ,1.8,1.0,1.5*33<CR><LF>			
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: GSV Data Format

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>

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: RMC Data Format

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

2.2.6 Message ID VTG: Course Over Ground and Ground Speed

Table 2-11: VTG Data Format

Example: $GPVTG,83.37,T,,M,0.00,N,0.0,K,A*32<CR><LF>			
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
Checksum	*32		
<CR><LF>			End of message termination

Note:

1. Does not support magnetic declination. All "course over ground" data are geodetic WGS84 directions.

2.2.7 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: ZDA Data Format

Example: $GPZDA,091926.000,17,12,2010,,*55<CR><LF>			
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 Proprietary NMEA Messages

2.3.1 Packet Type: 000 PMTK_TEST

Test Packet.

Table 2-13: 000 PMTK_TEST Data Format

DataField: PMTK000			
Example: $PMTK000*32<CR><LF>			
Name	**Unit**	**Defalult**	**Description**
--	--	--	--

2.3.2 Packet Type: 001 PMTK_ACK

Acknowledge of PMTK command.

Table 2-14: 001 PMTK_ACK Data Format

DataField: PMTK001,Cmd,Flag			
Example: $PMTK001,604,3*32<CR><LF>			
Name	**Unit**	**Defalult**	**Description**
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

2.3.3 Packet Type: 010 PMTK_SYS_MSG

Output system message.

Table 2-15: 010 PMTK_SYS_MSG Data Format

DataField: PMTK010,Msg			
Example: $PMTK010,001*2E<CR><LF>			
Name	**Unit**	**Defalult**	**Description**
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

2.3.4 Packet Type: 011 PMTK_TXT_MSG

Output system message.

Table 2-16: 011 PMTK_TXT_MSG Format

DataField: PMTK011, txt			
Example: $PMTK011,MTKGPS*08 <CR><LF>			
Name	**Unit**	**Defalult**	**Description**
txt	--	--	Message of this is MTK GPS

2.3.5 Packet Type: 101 PMTK_CMD_HOT_START

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

Table 2-17: 101 PMTK_CMD_HOT_START Data Format

DataField: PMTK101			
Example: $PMTK101*32<CR><LF>			
Name	**Unit**	**Defalult**	**Description**
--	--	--	--

2.3.6 Packet Type: 102 PMTK_CMD_WARM_START

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

Table 2-18: 102 PMTK_CMD_WARM_START Data Format

DataField: PMTK102			
Example: $PMTK102*31<CR><LF>			
Name	**Unit**	**Defalult**	**Description**
--	--	--	--

2.3.7 Packet Type: 103 PMTK_CMD_COLD_START

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

Table 2-19: 103 PMTK_CMD_COLD_START Data Format

DataField: PMTK103			
Example: $PMTK103*30<CR><LF>			
Name	**Unit**	**Defalult**	**Description**
--	--	--	--

2.3.8 Packet Type: 104 PMTK_CMD_FULL_COLD_START

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.

Table 2-20: 104 PMTK_CMD_FULL_COLD_START Data Format

DataField: PMTK104			
Example: $PMTK104*37<CR><LF>			
Name	**Unit**	**Defalult**	**Description**
--	--	--	--

2.3.9 Packet Type: 161 PMTK_CMD_STANDBY_MODE (NOT supported in AXN3.0)

Enter standby mode for power saving.

Table 2-21: 161 PMTK_CMD_STANDBY_MODE Data Format

DataField: PMTK161,Type			
Example: $PMTK161,0*28<CR><LF>			
Name	**Unit**	**Defalult**	**Description**
Type	--	--	Standby type: '0' = Stop mode '1' = Sleep mode

2.3.10 Packet Type: 120 PMTK_CMD_CLEAR_FLASH_AID

Erase aiding data stored in the flash memory.

Table 2-22: 120 PMTK_CMD_CLEAR_FLASH_AID Data Format

DataField: PMTK120			
Example: $PMTK120*31<CR><LF>			
Name	**Unit**	**Defalult**	**Description**
--	--	--	--

2.3.11 Packet Type: 220 PMTK_SET_POS_FIX

Position Fix Interval

Table 2-23: 220 PMTK_SET_POS_FIX Data Format

DataField: PMTK220, Interval			
Example: $PMTK220,1000*1F<CR><LF>			
Name	**Unit**	**Defalult**	**Description**
Interval	msec	--	Position fix interval , Must be larger than 200.

2.3.12 Packet Type: 223 PMTK_SET_AL_DEE_CFG (NOT supported in AXN3.0)

Below parameters can be modified by Host command message

Table 2-24: 223 PMTK_SET_AL_DEE_CFG Data Format

DataField: PMTK223,SV,SNR,Extension threshold, Extension gap			
Example:			
Name	**Unit**	**Defalult**	**Description**
SV	msec	*1*	Range: [1 ~ 4]
SNR		30	Range: [25 ~ 30]
Extension threshold	msec	180000	Range: [40000 ~ 180000]
Extension gap	msec	60000	Extension gap is the limitation between neighbor DEE. Range: [0 ~ 3600000]

2.3.13 Packet Type: 225 PMTK_SET_PERIODIC_MODE (NOT supported in AXN3.0)

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 sytem will be powered on for the interval extension and powered down again after the extension is done.

Table 2-25: 225 PMTK_SET_PERIODIC_MODE Data Format

DataField: PMTK225, Type, Run time, Sleep time, Second run time, Second sleep time			
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			
Name	**Unit**	**Defalult**	**Description**
Type	--	--	Set operation mode of power saving : ‘0’: Back to normal mode ‘1’ Periodc backup mode ‘2’ Periodic standby mode ‘4’: Perpetual backup mode ‘8’: AlwaysLocateTM standby mode ‘9’: AlwaysLocateTM backup mode
Run time	msec		Duration 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	msec		Interval 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	msec		Duration [] 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	msec		Interval 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.

2.3.14 Packet Type: 251 PMTK_SET_NMEA_BAUDRATE

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

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

Table 2-26: 251 PMTK_SET_NMEA_BAUDRATE Data Format

DataField: PMTK251,Baudrate			
Example:$PMTK251,38400*27<CR><LF>			
Name	**Unit**	**Defalult**	**Description**
Baudrate	--	--	Baudrate setting 0 – default setting 4800 9600 14400 19200 38400 57600 115200 230400 460800 921600

2.3.15 Packet Type: 286 PMTK_SET_AIC_CMD

Enable or disable active interference cancellation function.

Table 2-27: 286 PMTK_SET_AIC_CMD Data Format

DataField: PMTK286,Enabled			
Example: $PMTK286,1*23<CR><LF>			
Name	**Unit**	**Defalult**	**Description**
Enabled	--	--	Enable or disable ‘0’ = Disable ‘1’ = Enable

2.3.16 Packet Type: 300 PMTK_API_SET_FIX_CTL

Set Fix interval.

Table 2-28: 300 PMTK_API_SET_FIX_CTL Data Format

DataField: PMTK300,Fixinterval,0,0,0,0			
Example: $PMTK300,1000,0,0,0,0 **Return:** $PMTK001,300,3			
Name	**Unit**	**Defalult**	**Description**
Fixinterval	milliseconds	--	Range: [100 ~ 10000]

2.3.17 Packet Type: 301 PMTK_API_SET_DGPS_MODE

Set DGPS correction data source mode.

Table 2-29: 301 PMTK_API_SET_DGPS_MODE Data Format

DataField: PMTK301,Mode			
Example: $PMTK301,1*2D<CR><LF>			
Name	**Unit**	**Defalult**	**Description**
Mode	--	--	DGPS data source mode. '0': No DGPS source '1': RTCM '2': WAAS

2.3.18 Packet Type: 313 PMTK_API_SET_SBAS_ENABLED

Enable to search a SBAS satellite or not.

Table 2-30: 313 PMTK_API_SET_SBAS_ENABLED Data Format

DataField: PMTK313,Enabled			
Example: $PMTK313,1*2E<CR><LF>			
Name	**Unit**	**Defalult**	**Description**
Enabled	--	--	Enable or disable '0' = Disable '1' = Enable

2.3.19 Packet Type: 314 PMTK_API_SET_NMEA_OUTPUT

Set NMEA sentence output frequencies.
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 - Recomended 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:

$PMTK314,1,1,1,1,1,5,0,0,0,0,0,0,0,0,0,0,0,1,0*2D<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

Set default datum.

Table 2-31: 330 PMTK_API_SET_DATUM Data Format

DataField: PMTK330,Datum			
Example: $PMTK330,0*2E<CR><LF>			
Name	**Unit**	**Defalult**	**Description**
Datum	--	--	0: WGS84 1: TOKYO-M 2: TOKYO-A Support 219 different datums. The total datums list in the Appendix A.

2.3.21 Packet Type: 331 PMTK_API_SET_DATUM_ADVANCE

Set user defined datum.

Table 2-32: 331 PMTK_API_SET_DATUM_ADVANCE Data Format

DataField: PMTK331,majA,eec,dX,dY,dZ			
Example: $PMTK331,6377397.155,299.1528128,-148.0,507.0,685.0*16<CR><LF>			
Name	**Unit**	**Defalult**	**Description**
majA	m	--	User defined datum semi-major axis Range: [0 ~ 7000000]
ecc	m	--	User defined datumeccentric Range: [0 ~ 330]
dX	m	--	User defined datum to WGS84 X axis offset x
dY	m	--	User defined datum to WGS84 Y axis offset
dZ	m	--	User defined datum to WGS84 Z axis offset

2.3.22 Packet Type: 335 PMTK_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.

Table 2-33: 335 PMTK_API_SET_RTC_TIME Data Format

DataField: PMTK335,Year,Month,Day,Hour,Min,Sec			
Example: $PMTK335,2007,1,1,0,0,0*02<CR><LF>			
Name	**Unit**	**Defalult**	**Description**
Year	--	--	year
Month	--	--	1 ~ 12
Day	--	--	1 ~ 31
Hour	--	--	0 ~ 23
Min	--	--	0 ~ 59
Sec	--	--	0 ~ 59

2.3.23 Packet Type: 351 PMTK_API_SET_SUPPORT_QZSS_NMEA

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)

Table 2-34: 351 PMTK_API_SET_SUPPORT_QZSS_NMEA Data Format

DataField: PMTK351,Enabled			
Example: $PMTK351,0*29 : Disable QZSS NMEA format $PMTK351,1*28 : Enable QZSS NMEA format			
Name	**Unit**	**Defalult**	**Description**
Enabled	--	--	'0': Disable '1': Enable

2.3.24 Packet Type: 352 PMTK_API_SET_STOP_QZSS

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

Table 2-35: 352 PMTK_API_SET_STOP_QZSS Data Format

DataField: PMTK352,Enabled			
Example: $PMTK352,0*2B : Enable QZSS function $PMTK352,1*2A : Disable QZSS function			
Name	**Unit**	**Defalult**	**Description**
Enabled	--	--	‘0’: Disable ‘1’: Enable

2.3.25 Packet Type: 353 PMTK_API_SET_GNSS_SEARCH_MODE (NOT supported in AXN3.0)

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

Table 2-36: 353 PMTK_API_SET_GNSS_SEARCH_MODE Data Format

DataField: PMTK353,GPS_Enabled,GLONASS_Enabled			
Example: $PMTK353,0,1*36 : Search GLONASS satellites only $PMTK353,1,0*36 : Search GPS satellites only $PMTK353,1,1*37 : Search GPS and GLONASS satellites			
Name	**Unit**	**Defalult**	**Description**
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

Note:

SIM68R and SIM68V support this command, but SIM28 not support this command.

2.3.26 Packet Type: 386 PMTK_API_SET_STATIC_NAV _THD

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.

Table 2-37: 386 PMTK_API_SET_STATIC_NAV _THD Data Format

DataField: PMTK386, speed_threshold			
Example: $PMTK386,0.4*19<CR><LF>			
Name	**Unit**	**Defalult**	**Description**
Speed_trhreshold	m/s	--	0~2 The minimun is 0.1 m/s, the max is 2.0 m/s

2.3.27 Packet Type: 389 PMTK_API_SET_TCXO_DEBUG

Set the switch of showing TCXO clock drift at every fix

Table 2-38: 389 PMTK_API_SET_TCXO_DEBUG Data Format

DataField: PMTK389,on_off			
Example: $PMTK389,1*2D<CR><LF>			
Name	**Unit**	**Defalult**	**Description**
on_off	m/s	--	0=off; 1=on (turn on $PMTK589 output at every fix)

2.3.28 Packet Type: 400 PMTK_API_Q_FIX_CTL

Query Fix Control.

Table 2-39: 400 PMTK_API_Q_FIX_CTL Data Format

DataField: PMTK400			
Example: $PMTK400*36<CR><LF> **Return:** PMTK_DT_FIX_CTL			
Name	**Unit**	**Defalult**	**Description**
--	--	--	--

2.3.29 Packet Type: 401 PMTK_API_Q_DGPS_MODE

Query DGPS mode.

Table 2-40: 401 PMTK_API_Q_DGPS_MODE Data Format

DataField: PMTK401			
Example: $PMTK401*37<CR><LF> **Return:** PMTK_DT_DGPS_MODE			
Name	**Unit**	**Defalult**	**Description**
--	--	--	--

2.3.30 Packet Type: 413 PMTK_API_Q_SBAS_ENABLED

Query Sbas Enabled or disabled.

Table 2-41: 413 PMTK_API_Q_SBAS_ENABLED Data Format

DataField: PMTK413			
Example: $PMTK413*34<CR><LF> **Return:** PMTK_DT_SBAS_ENABLED			
Name	**Unit**	**Defalult**	**Description**
--	--	--	--

2.3.31 Packet Type: 414 PMTK_API_Q_NMEA_OUTPUT

Query current NMEA sentence output frequencies.

Table 2-42: 414 PMTK_API_Q_NMEA_OUTPUT Data Format

DataField: PMTK414			
Example: $PMTK414*33<CR><LF> **Return:** PMTK_DT_NMEA_OUTPUT			
Name	**Unit**	**Defalult**	**Description**
--	--	--	--

2.3.32 Packet Type: 430 PMTK_API_Q_DATUM

Query default datum.

Table 2-43: 430 PMTK_API_Q_DATUM Data Format

DataField: PMTK430			
Example: $PMTK430*35<CR><LF> **Return:** PMTK_DT_DATUM			
Name	**Unit**	**Defalult**	**Description**
--	--	--	--

2.3.33 Packet Type: 431 PMTK_API_Q_DATUM_ADVANCE

Query user defined datum.

Table 2-44: 431 PMTK_API_Q_DATUM_ADVANCE Data Format

DataField: PMTK431			
Example: $PMTK431*34<CR><LF> **Return:** PMTK_DT_DATUM			
Name	**Unit**	**Defalult**	**Description**
--	--	--	--

Note:

The execution result depend on firmware version.

2.3.34 Packet Type: 500 PMTK_DT_FIX_CTL

These parameters control the rate of position fixing activity.

Table 2-45: 500 PMTK_DT_FIX_CTL Data Format

DataField: PMTK500, FixInterval			
Example: $PMTK500,1000,0,0,0,0*1A<CR><LF>			
Name	**Unit**	**Defalult**	**Description**
FixInterval	msec	--	Position fix interval [>= 200]

Note:

The execution result depend on firmware version.

2.3.35 Packet Type: 501 PMTK_DT_DGPS_MODE

DGPS Data Source Mode

Table 2-46: 501 PMTK_DT_DGPS_MODE Data Format

DataField: PMTK501,Mode			
Example: $PMTK501,1*2B<CR><LF>			
Name	**Unit**	**Defalult**	**Description**
Mode	--	--	DGPS data source mode ‘0’: No DGPS source ‘1’: RTCM ‘2’: WAAS

2.3.36 Packet Type: 513 PMTK_DT_SBAS_ENABLED

Enable to search a SBAS satellite or not.

Table 2-47: 513 PMTK_DT_SBAS_ENABLED Data Format

DataField: PMTK513,Enabled			
Example: $PMTK513,1*28<CR><LF>			
Name	**Unit**	**Defalult**	**Description**
Enabled	--	--	Enable or disable ‘0’ = Disable ‘1’ = Enable

Note:

The execution result depend on firmware version.

2.3.37 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:

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

2.3.38 Packet Type: 530 PMTK_DT_DATUM

Current datum used.

Table 2-48: 530 PMTK_DT_DATUM Data Format

DataField: PMTK530,Datum			
Example: $PMTK530,0*28<CR><LF>			
Name	**Unit**	**Defalult**	**Description**
Datum	--	--	0: WGS84 1: TOKYO-M 2: TOKYO-A

Note:

The execution result depend on firmware version.

2.3.39 Packet Type: 589 PMTK_DT_SET_TCXO_DEBUG

The TCXO clock drift value.

Table 2-49: 589 PMTK_DT_SET_TCXO_DEBUG Data Format

DataField: PMTK589,valid,UTC,TCXO_drift_ppm			
Example: $PMTK589,1,052130.000,-0.4712*03<CR><LF>			
Name	**Unit**	**Defalult**	**Description**
valid	--	--	0=data is not reliable; 1=data is ready
UTC	--	--	UTC time
TCXO_drift_ppm	ppm	--	TCXO clock drift in ppm

Note:

The execution result depend on firmware version.

2.3.40 Packet Type: 605 PMTK_Q_RELEASE

Query the firmware release information.

Table 2-50: 605 PMTK_Q_RELEASE Data Format

DataField: PMTK605			
Example: $PMTK605*31<CR><LF> **Return:** PMTK_DT_RELEASE			
Name	**Unit**	**Defalult**	**Description**
--	--	--	--

2.3.41 Packet Type: 607 PMTK_Q_EPO_INFO

EPO Data Valid day check

Table 2-51: 607 PMTK_Q_EPO_INFO Data Format

DataField: PMTK607			
Example: $PMTK607*33<CR><LF>			
Name	**Unit**	**Defalult**	**Description**
--	--	--	--

2.3.42 Packet Type: 660 PMTK_Q_AVAILABLE_SV_EPH

Support PMTK660 which report valid Ephemeris SV:

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

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

Table 2-52: 660 PMTK_Q_AVAILABLE_SV_EPH Data Format

DataField: PMTK660, Time interval			
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.			
Name	**Unit**	**Defalult**	**Description**
Time interval	sec	--	Set the time interval for MT3329 to reply 32-bit flags of 32SV. The Time interval > 0 and <= 7200 (2 hours).

2.3.43 Packet Type: 661 PMTK_Q_AVAILABLE_SV_ALM

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.

Table 2-53: 661 PMTK_Q_AVAILABLE_SV_ALM Data Format

DataField: PMTK661,Time interval			
Example: Indicate which Almanac will be available after 30 days $PMTK661,30*1C<CR><LF> **Return:** $PMTK001,661,3,fec0bfff*49<CR><LF>			
Name	**Unit**	**Defalult**	**Description**
Time interval	day	--	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)

Note:

The Hex fec0bfff means 11111110110000001011111111111111 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.

2.3.44 Packet Type: 705 PMTK_DT_RELEASE

Firmware release information.

Table 2-54: 705 PMTK_DT_RELEASE Data Format

DataField: PMTK705,ReleaseStr,Build_ID,Product_Model,(SDK_Version,)			
Example: $PMTK705,AXN_0.2,1234,ABCD,*14<CR><LF>			
Name	**Unit**	**Defalult**	**Description**
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

2.3.45 Packet Type: 740 PMTK_DT_UTC

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.

Table 2-55: 740 PMTK_DT_UTC Data Format

DataField: PMTK740,YYYY,MM,DD,hh,mm,ss			
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>			
Name	**Unit**	**Range**	**Description**
YYYY	year	> 1980	UTC time: year in 4 digits
MM	month	1 - 12	UTC time: month
DD	day	1 - 31	UTC time: day
hh	hour	0 - 23	UTC time: hour
mm	minute	0 - 59	UTC time: minute
ss	second	0 - 59	UTC time: second

2.3.46 Packet Type: 741 PMTK_DT_POS

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

Table 2-56: 741 PMTK_DT_POS Data Format

DataField: PMTK741,Lat,Long,Alt,YYYY,MM,DD,hh,mm,ss			
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			
Name	**Unit**	**Range**	**Description**
Lat	degree	-90.0 ~ 90.0	WGS84 geodetic latitude. Minus: south; Plus: north
Long	degree	-180.0 ~ 180.0	WGS84 geodetic longitude. 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

Note:

GPS chip will check value range for the following parameters: Lat: -90.0 ~ 90.0 ,Long: -180.0 ~ 180.0

2.3.47 Packet Type: 810 PMTK_TEST_ALL

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

Table 2-57: 810 PMTK_TEST_ALL Data Format

DataField: PMTK810,Bitmap,SVID			
Example: $PMTK810,0003,1D*4D<CR><LF> This command only tests TEST_INFO and TEST_ACQ test items.The specific SV id is PRN29.			
Name	**Unit**	**Range**	**Description**
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	--	1~20	The second means the SV id. The value of SV id is between 1 and 20 in Hex format.

2.3.48 Packet Type: 811 PMTK_TEST_STOP

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

Table 2-58: 811 PMTK_TEST_STOP Data Format

DataField: PMTK811			
Example: $PMTK811*3A<CR><LF>			
Name	**Unit**	**Defalult**	**Description**
--	--	--	--

2.3.49 Packet Type: 812 PMTK_TEST_FINISH

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

Table 2-59: 812 PMTK_TEST_FINISH Format

DataField: PMTK812			
Example: $PMTK812*39<CR><LF>			
Name	**Unit**	**Defalult**	**Description**
--	--	--	--

Note:

The execution result depend on firmware version.

2.3.50 Packet Type: 813 PMTK_TEST_ALL_ACQ

The result of TEST_ACQ item.

Table 2-60: 813 PMTK_TEST_ALL_ACQ Data Format

DataField: PMTK813,<SVid>,<Acq Time>			
Example: The target device acquires SV29 within 2 seconds. $PMTK813,29,2*01<CR><LF>			
Name	**Unit**	**Range**	**Description**
SVid	--	--	
Acq Time	sec		

Note:

The execution result depend on firmware version.

2.3.51 Packet Type: 814 PMTK_TEST_ALL_BITSYNC

The result of TEST_BITSYNC item.

Table 2-61: 814 PMTK_TEST_ALL_BITSYNC Data Format

DataField: PMTK814,<SVid>,<BitSync Time>			
Example: Regard to SV29, the target device reach bit sync state within 1 second. $PMTK814,29,1*05<CR><LF>			
Name	**Unit**	**Range**	**Description**
SVid	--	--	
BitSync Time	sec		the target device reach bit sync state within

Note:

The execution result depend on firmware version.

2.3.52 Packet Type: 815 PMTK_TEST_ALL_SIGNAL

The result of TEST_SIGNAL item.

Table 2-62: 815 PMTK_TEST_ALL_SIGNAL Data Format

DataField: PMTK815,<SVid>,<Testing Time>,<Phase>,<TCXO Offset>,<TCXO Drift>,<CNR mean>,<CNR sigma>*<CheckSum>			
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			
Name	**Unit**	**Range**	**Description**
SVid	--	--	
Testing Time	sec	--	test Duration
Phase	0.01	--	Phase Error
TCXO Offset	0.01	--	
TCXO Drift	0.01	--	
CNR mean	0.001	--	
CNR sigma	0.001	--	

Note:

The execution result depend on firmware version.

2.3.53 Packet Type: 837 PMTK_TEST_JAMMING (NOT supported in AXN3.0)

Jamming scan test command.

Table 2-63: 837 PMTK_TEST_JAMMING Data Format

DataField: PMTK837, JamScanType, JamScanNum			
Example: Jamming scan test 50 times: $PMTK837,1,50*0A<CR><LF>			
Name	**Unit**	**Range**	**Description**
JamScanType	--	--	0:disable jamming scan 1: enable jamming scan
JamScanNum	--	--	Jamming scan test times.

3 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	Tamzamia
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	Guuinea-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, Antarctia
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 (Slcily)
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 Irag, Israel, Jordan, Lebanon, Kuwait, Saudi Arabia, Syria
70	European 1950	Portugal, Spain
71	European 1950	Tunisia,
72	European 1979	Mean For Austria, Finland ,Netherlands ,Norway, Spain, Sweden, Switzerland
73	Fort Thomas 1955	Nevis St Kitts (Leeward Islands)
74	Gan 1970	Republic Of Maldives
75	Geodetic Dataum 1970	New Zealand
76	Graciosa Base SW1948	Azores (Faial, Graciosa, Pico, Sao, Jorge, Terceria)
77	Guam1963	Guam
78	Gunung Segara	Indonesia (Kalimantan)
79	Gux l Astro	Guadalcanal Island
80	Herat North	Afghanistan
81	Hermannskogel Datum	Croatia-Serbia, Bosnia-Herzegoivna
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, Qubec)
127	North American 1927	Canada (Northwest Territories, Saskatchewan)
128	North American 1927	Canada (Yukon)
129	North American 1927	Canal Zone
130	North American 1927	Cuba
131	North American 1927	Greenland (Hayes Peninsula)
132	North American 1927	Mean For Antigua, Barbados, Barbuda, Caicos Islands, Cuba, Dominican, Grand Cayman, Jamaica, Turks Islands

133	North American 1927	Mean For Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua
134	North American 1927	Mean For Canada
135	North American 1927	Mean For Conus
136	North American 1927	Mean For Conus (East of Mississippi, River Including Louisiana, Missouri, Minnesota)
137	North American 1927	Mean For Conus (West of Mississippi, Rive Excluding Louisiana, Minnesota, Missouri)
138	North American 1927	Mexico
139	North American 1983	Alaska (Excluding Aleutian Ids)
140	North American 1983	Aleutian Ids
141	North American 1983	Canada
142	North American 1983	Conus
143	North American 1983	Hahawii
144	North American 1983	Mexico, Central America
145	North Sahara 1959	Algeria
146	Observatorio Meteorologico 1939	Azores (Corvo and Flores Islands)
147	Old Egyptian 1907	Egypt
148	Old Hawaiian	Hawaii
149	Old Hawaiian	Kauai
150	Old Hawaiian	Maui
151	Old Hawaiian	Mean For Hawaii, Kauai, Maui, Oahu
152	Old Hawaiian	Oahu
153	Oman	Oman
154	Ordnance Survey Great Britian 1936	England
155	Ordnance Survey Great Britian 1936	England, Isle of Man, Wales
156	Ordnance Survey Great Britian 1936	Mean For England ,Isle of Man, Scotland, Shetland Island, Wales
157	Ordnance Survey Great Britian 1936	Scotland, Shetland Islands
158	Ordnance Survey Great Britian 1936	Wales
159	Pico de las Nieves	Canary Islands
160	Pitcairn Astro 1967	Pitcairn Island
161	Point 58	Mean For Burkina Faso and Niger

162	Pointe Noire 1948	Congo
163	Porto Santo 1936	Porto Santo, Maderia Islands
164	Provisional South American 1956	Bolovia
165	Provisional South American 1956	Chile (Northern Near 19 deg S)
166	Provisional South American 1956	Chile (Southern Near 43 deg S)
167	Provisional South American 1956	Colombia
168	Provisional South American 1956	Ecuador
169	Provisional South American 1956	Guyana
170	Provisional South American 1956	Mean For Bolivia Chile,Colombia, Ecuador, Guyana, Peru, Venezuela
171	Provisional South American 1956	Peru
172	Provisional South American 1956	Venezuela
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)	Czechoslavakia
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	Czechoslavakia (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	Brazial
197	South American 1969	Chile
198	South American 1969	Colombia
199	South American 1969	Ecuador
200	South American 1969	Ecuador (Baltra, Galapagos)
201	South American 1969	Guyana
202	South American 1969	Mean For Argentina, Bolivia, Brazil,Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Trinidad and Tobago, Venezuela
203	South American 1969	Paraguay
204	South American 1969	Peru
205	South American 1969	Trinidad and Tobago
206	South American 1969	Venezuela
207	South Asia	Singapore
208	Tananarive Observatory 1925	Madagascar
209	Timbalai 1948	Brunei, E Malaysia (Sabah Sarawak)
210	Tokyo	Japan
211	Tokyo	Mean For Japan, South Korea, Okinawa
212	Tokyo	Okinawa
213	Tokyo	South Korea
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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