MTK GPS Module NMEA Protocol Manual

GNSS Module Series

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Shanghai Mobiletek Communication Ltd

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Version History

Date	Version	Modify records	Author
2016-11-09	V1.0	Initial	wangwei

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Tables

1. Introduction

1.1 Document scope

This manual describes the NMEA protocol of the MTK GPS system or the Beidou + GPS dual GNSS system module.

1.2 Terminology abbreviation

Table 1-1: Terminology Abbreviation

Abbreviation	Terminology
PPS	Pulse Per Second
ASCII	American Standard Code for Information Interchange
ACK	ACKnowledge
DGPS	Differential Global Positioning System
NMEA	National Marine Electronics Association
SBAS	Satellite Based Augmentation System
SDK	Software Development Kit
SW	Software
SV	Space Vehicle
PDOP	Position Dilution Of Precision
HDOP	Horizontal Dilution Of Precision
VDOP	Vertical Dilution Of Precision
BDS	BeiDou Navigation Satellite System
GPS	Global Positioning System
GLONASS	GLObalnaya NAvigatsionnaya Sputnikovaya Sistema

GNSS	Globle Navigation Satellite System
BAUD	Baud rate
RTC	Real Time Clock
AIC	Active Interference Cancellation
SPS	Standard Positioning Service
CR	Carriage Return
LF	Line Feed
TCXO	Temperature Compensate X'tal (crystal) Oscillator
EPO	Extended Prediction Orbit
PPM	Parts Per Million

2. NMEA Sentence

2.1 NMEA Sentence Format

NMEA communication protocol provided by the communication statements are based on ASCII code, NMEA-0183 protocol statement data format is as follows:

'$' Is the sentence preamble.

',' Is the parameter separator.

'*' Is the check code identifier.

The last two digits are the checksum.

The checksum field consists of a '*' and two hex digits representing an 8 bit exclusive OR of all characters between, but not including, the '$' and '*'. A checksum is required on some sentences.

<CR> <LF> is the terminator，All sentences must end with a carriage return line feed, which is the "carriage return" and "line feed" of the ASCII characters.

Table 2-1 Describes NMEA Output Format/ parameters of input message.

Table 2-1: NMEA Output Format/ parameters of input message

Field	Example	Description
Start Field	$GPGGA	Message identification
Data Valid	<Data>	Related message parameters
Checksum	*4F	The checksum field consists of a '*' and two hex digits
Terminator	<CR> <LF>	Each sentence ends with a carriage return/line feed sequence

⚠ **NOTE：**

1. All fields must be present, but valid data parameters can be null ("," or "*" means empty).

2.2 Standard NMEA Sentences

Table 2-2: Standard NMEA Sentences

Field	Description	Possible prefix
GGA	Time, position and fix type data	GP,GN,BD
GLL	Latitude, longitude, UTC time of position fix and status	GP,GN,BD
GSA	GNSS receiver operating mode, satellites used in the position solution, and DOP values	GP, BD
GSV	Number of GNSS satellites in view satellite ID numbers, elevation, azimuth, & SNR values	GP, BD
RMC	Time, date, position, course and speed data	GP,GN, BD
VTG	Course and speed information relative to the ground	GP,GN, BD
ZDA	UTC Date/Time and Local Time Zone Offset	GP,GN, BD

⚠ **NOTE：**

1. **Prefix “GP” means GPS.**
2. **Prefix “GN” means GNSS (Global Navigation Satellite System).**
3. **Prefix “GL” means GLONASS(Globalnavigation Satellite System).**
4. **Prefix “BD” means Beidou Global Navigation Satellite System.**

In the following sections, the standard NMEA sentences above are described in detail.

2.2.1 GGA

Table 2-3: GGA

Example: $GPGGA,091926.000,3113.3166,N,12121.2682,E,1,09,0.9,36.9,M,7.9,M,,0000*56<CR><LF>			
Field	**Example**	**Unit**	**Description**
Message ID	$GPGGA		GGA sentence header
UTC Time	091926.000	hhmmss.sss	

Latitude	3113.3166	ddmm.mmmm	degree and minutes
N/S	N		N=North S=South
Longitude	12121.2682	dddmm.mmmm	degree and minutes
E/W	E		E=East W=West
Fix Status	1		0=Invalid 1=GNSS fix 2=DGPS fix
Number of SV	09		Number of satellites being used (0~12)
HDOP	0.9		Horizontal Dilution Of Precision
Altitude	36.9	meter	Altitude in meters according to WGS84 ellipsoid
Unit	M	meter	Fixed field, meter
GeoID Separation	7.9	meter	Height of GeoID (mean sea level) above WGS84 ellipsoid, meter
Unit	M	meter	Fixed field, meter
DGPS Age		second	Age of DGPS data in seconds, empty if DGPS is not used
DGPS Station ID	0000		DGPS station ID, empty if DGPS is not used
Checksum	*56		Checksum
Terminator	<CR><LF>		Each of message

Table 2-4: Positioning Type Indication

Value	**Description**
0	Nnvalid Positioning
1	SPS mode，Positioning is valid
2	DGPS mode，Positioning is valid

2.2.2 GLL

Table 2-5: GLL

Example: $GPGLL,3113.3157,N,12121.2684,E,094051.000,A,A*59<CR><LF>			
Field	**Example**	**Unit**	**Description**
Message ID	$GPGLL		GLL sentence header
Latitude	3113.3166	ddmm.mmmm	degree and minutes
N/S	N		‘N’=North ‘S’=South
Longitude	12121.2682	dddmm.mmmm	degree and minutes
E/W	E		‘E’=East ‘W’=West
UTC Time	091926.000	hhmmss.sss	
Data Valid	A		‘V’=Invalid ‘A’=Valid
Positioning Mode	A		‘A’=No fix, ‘D’=DGPS
Checksum	*59		Checksum
Terminator	<CR><LF>		Each of message

2.2.3 GSA

Table 2-6: GSA

Example: $GPGSA,A,3,07,02,26,27,09,04,15, , , , , ,1.8,1.0,1.5*33<CR><LF>			
Field	**Example**	**Unit**	**Description**
Message ID	$GPGSA		GSA sentence header
Mode 1	A		See Table 2-7
Mode 2	3		See Table 2-8
Satellite Used [1]	07		Satellite used on channel 1

Satellite Used [1]	02		Satellite used on channel 2
....			....
Satellite Used [1]			Satellite used 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		Checksum
Terminator	<CR><LF>		Each of message

⚠ **NOTE:**

1. Satellite Used ID.

2. The default DOP limit is set to 50.

Table 2-7: Mode 1

Value	Description
M	Manual, forced to switch 2D/3D mode
A	Allowed to automatically switch 2D/3D mode

Table 2-8: Mode 2

Value	Description
1	No fix
2	2D fix
3	3D fix

2.2.4 GSV

Table 2-9: GSV

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>

Field	Example	Unit	Description
Message ID	$GPGSV		GSV sentence header
Number of Message	2		Number of messages, total number of GPGSV messages being output (1~3)
Sequence Number	1		Sequence number of this entry (1~3)
Satellites in View	11		Total satellites in view
Satellite ID 1	26		Satellite ID 1
Elevation 1	68	Degree	Elevation in degree (0~90)
Azimuth 1	023	Degree	Azimuth in degree (0~359)
SNR 1	37	dBHz	Signal to Noise Ration in dBHz (0~99), empty if not tracking
....			....
Satellite ID 4	29		Satellite ID 1
Elevation 4	33	Degree	Elevation in degree (0~90)
Azimuth 4	253	Degree	Azimuth in degree (0~359)
SNR 4	33	dBHz	Signal to Noise Ration in dBHz (0~99), empty if not tracking
Checksum	*75		Checksum
Terminator	<CR><LF>		Each of message

2.2.5 RMC

Table 2- 10: RMC

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

Field	Example	Unit	Description
Message ID	$GPRMC		RMC sentence header
UTC Time	091926.000	hhmmss.sss	
Data Valid [1]	A		A= Invalid V= Valid
Latitude	3113.3166	ddmm.mmmm	degree and minutes
N/S	N		N=North S=South
Longitude	12121.2682	dddmm.mmmm	degree and minutes
E/W	E		E=East W=West
Speed	0.51	Knot	Speed over ground in knots
COG	193.93	Degree	Course over ground in degree
Date	171210	ddmmyy	Date in format 'ddmmyy'
Magnetic Variation [2]		Degree	Magnetic variation in degree, not being output
E/W [2]			Magnetic variation E/W indicator, not being output
Positioning Mode	A		A=Autonomous GNSS fix D=Differential GNSS fix
Checksum	*75		Checksum
Terminator	<CR><LF>		Each of message

⚠ **NOTE:**

1. In software, this value comes from the combined status of each parameter, including the minimum number of satellites required, DOP cap, DGPS correction, etc. If these conditions are not met, the secondary fix will be marked as invalid.

2. The magnetic declination output is not supported. <Ground angle> is the true north output relative to the WGS-84 coordinate system.

2.2.6 VTG

Table 2- 11: VTG

Example: $GPVTG,83.37,T,,M,0.00,N,0.0,K,A*32<CR><LF>			
Field	**Example**	**Unit**	**Description**
Message ID	$GPVTG		VTG sentence header
COG(T)	83.37	degree	Course over ground (true) in degree
Unit	T		Fixed field, true
COG(M)		degree	Course over ground (magnetic), not being output
Unit	M		Fixed field, magnetic
Speed	0.00	Knot [2]	Speed over ground in knots
Unit	N		Fixed field, knots [2]
Speed	0.0	km/h[2]	Speed over ground in km/h
Unit	K	km/h	Fixed field.
Positioning Mode	A		A= Autonomous D=DGPS
Checksum	*32		Checksum
Terminator	<CR><LF>		Each of message

⚠ **NOTE：**

1. Does not support the magnetic declination output, <azimuth> is relative to the WGS-84 coordinate system true North output.

2. 1Knot =1.852 km/h.

2.2.7 ZDA

The sentence outputs the date and time.

Table 2- 12: ZDA

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

Field	Example	Unit	Description
Message ID	$GPZDA		ZDA sentence header
UTC Time	091926.000	hhmmss.sss	UTC Time Unit Format: hh= UTC hour（00~23） mm= UTC minute（00~59） ss= UTC second （00~59） .sss= .UTC millisecond（.000~.999）
Day	17		1~31
Mouth	12		1~12
Year	2010		1980~2079
Local Hours [2]		Hour	Local Hours
Local Minute[2]		Minute	Local Minute
Checksum	*55		Checksum
Terminator	<CR><LF>		Each of message

⚠ **NOTE：**

1. **By default, the software does not output the ZDA sentences.**
2. **Version is not supported, please contact MOBILETEK.**

2.3 Standard NMEA Sentence

In addition to the standard NMEA output sentences, the MTK GPS module complements the proprietary NMEA sentences, which has both input and output messages. Specific support instructions, see the following table：

Table 2- 13: Standard NMEA Sentence

Standard NMEA Sentence	Input	Output
PMTK000: PMTK_TEST	√	

PMTK001: PMTK_ACK		√
PMTK010: PMTK_SYS_MSG		√
PMTK011: PMTK_TXT_MSG		√
PMTK101: PMTK_CMD_HOT_START	√	
PMTK102: PMTK_CMD_WARM_START	√	
PMTK103: PMTK_CMD_COLD_START	√	
PMTK104: PMTK_CMD_FULL_COLD_START	√	
PMTK161: PMTK_CMD_STANDBY_MODE	√	
PMTK120: PMTK_CMD_CLEAR_FLASH_AID	√	
PMTK220: PMTK_SET_POS_FIX	√	
PMTK223: PMTK_SET_AL_DEE_CFG	√	
PMTK225: PMTK_SET_PERIODIC_MODE	√	
PMTK251: PMTK_SET_NMEA_BAUDRATE	√	
PMTK286: PMTK_SET_AIC_CMD	√	
PMTK300: PMTK_API_SET_FIX_CTL	√	
PMTK301: PMTK_API_SET_DGPS_MODE	√	
PMTK313: PMTK_API_SET_SBAS_ENABLED	√	
PMTK314: PMTK_API_SET_NMEA_OUTPUT	√	
PMTK330: PMTK_API_SET_DATUM	√	
PMTK331: PMTK_API_SET_DATUM_ADVANCE	√	
PMTK335: PMTK_API_SET_RTC_TIME	√	
PMTK351: PMTK_API_SET_SUPPORT_QZSS_NMEA	√	
PMTK352: PMTK_API_SET_STOP_QZSS	√	
PMTK353: PMTK_API_SET_GNSS_SEARCH_MODE	√	
PMTK386: PMTK_API_SET_STATIC_NAV	√	
PMTK400: PMTK_API_Q_FIX_CTL	√	

PMTK401: PMTK_API_Q_DGPS_MODE	√	
PMTK413: PMTK_API_Q_SBAS_ENABLED	√	
PMTK414: PMTK_API_Q_NMEA_OUTPUT	√	
PMTK430: PMTK_API_Q_DATUM	√	
PMTK431: PMTK_API_Q_DATUM_ADVANCE	√	
PMTK500: PMTK_DT_FIX_CTL		√
PMTK501: PMTK_DT_DGPS_MODE		√
PMTK513: PMTK_DT_SBAS_ENABLED		√
PMTK514: PMTK_DT_NMEA_OUTPUT		√
PMTK530: PMTK_DT_DATUM		√
PMTK589: PMTK_DT_SET_TCXO_DEBUG		√
PMTK605: PMTK_Q_RELEASE	√	
PMTK607: PMTK_Q_EPO_INFO	√	
PMTK660: PMTK_Q_AVAILABLE_SV_EPH	√	
PMTK661: PMTK_Q_AVAILABLE_SV_ALM	√	
PMTK705: PMTK_DT_RELEASE		√
PMTK707: PMTK_DT_EPO_INFO		√
PMTK740: PMTK_DT_UTC	√	
PMTK741: PMTK_DT_POS	√	
PMTK810: PMTK_TEST_ALL	√	
PMTK811: PMTK_TEST_STOP	√	
PMTK812: PMTK_TEST_FINISH		√
PMTK813: PMTK_TEST_ALL_ACQ		√
PMTK814: PMTK_TEST_ALL_BITSYNC		√
PMTK815: PMTK_TEST_ALL_SIGNAL		√
PMTK837: PMTK_TEST_JAMMING	√	

Table 2- 14: Standard NMEA Sentence Relationship

Input Sentence	Corresponding to the output Sentence (Proactive reporting/Acknowledgment/Response)
--	PMTK010: PMTK_SYS_MSG
--	PMTK011: PMTK_TXT_MSG
PMTK000: PMTK_TEST	PMTK001: PMTK_ACK
PMTK101: PMTK_CMD_HOT_START	See Note [1]
PMTK102: PMTK_CMD_WARM_START	See Note [1]
PMTK103: PMTK_CMD_COLD_START	See Note [1]
PMTK104: PMTK_CMD_FULL_COLD_START	See Note [1]
PMTK161: PMTK_CMD_STANDBY_MODE	PMTK001: PMTK_ACK,Cmd 161,Flag 3
PMTK120: PMTK_CMD_CLEAR_FLASH_AID	PMTK001: PMTK_ACK,Cmd 120,Flag 3
PMTK220: PMTK_SET_POS_FIX	PMTK001: PMTK_ACK,Cmd 220,Flag 3
PMTK223: PMTK_SET_AL_DEE_CFG	PMTK001: PMTK_ACK,Cmd 223,Flag 3
PMTK225: PMTK_SET_PERIODIC_MODE	PMTK001: PMTK_ACK,Cmd 225,Flag 3
PMTK251: PMTK_SET_NMEA_BAUDRATE	See Note[2]
PMTK286: PMTK_SET_AIC_CMD	PMTK001: PMTK_ACK,Cmd 286,Flag 3
PMTK300: PMTK_API_SET_FIX_CTL	PMTK001: PMTK_ACK,Cmd 300,Flag 3
PMTK301: PMTK_API_SET_DGPS_MODE	PMTK001: PMTK_ACK,Cmd 301,Flag 3
PMTK313: PMTK_API_SET_SBAS_ENABLED	PMTK001: PMTK_ACK,Cmd 313,Flag 3
PMTK314: PMTK_API_SET_NMEA_OUTPUT	PMTK001: PMTK_ACK,Cmd 314,Flag 3
PMTK330: PMTK_API_SET_DATUM	PMTK001: PMTK_ACK,Cmd 330,Flag 3
PMTK331: PMTK_API_SET_DATUM_ADVANCE	PMTK001: PMTK_ACK,Cmd 331,Flag 3
PMTK335: PMTK_API_SET_RTC_TIME	PMTK001: PMTK_ACK,Cmd 335,Flag 3
PMTK351: PMTK_API_SET_SUPPORT_QZSS_NMEA	PMTK001: PMTK_ACK,Cmd 351,Flag 3

PMTK352: PMTK_API_SET_STOP_QZSS	PMTK001: PMTK_ACK,Cmd 352,Flag 3
PMTK353: PMTK_API_SET_GNSS_SEARCH_MODE	PMTK001: PMTK_ACK,Cmd 353,Flag 3
PMTK386: PMTK_API_SET_STATIC_NAV	PMTK001: PMTK_ACK,Cmd 386,Flag 3
PMTK400: PMTK_API_Q_FIX_CTL	PMTK500: PMTK_DT_FIX_CTL
PMTK401: PMTK_API_Q_DGPS_MODE	PMTK501: PMTK_DT_DGPS_MODE
PMTK413: PMTK_API_Q_SBAS_ENABLED	PMTK513: PMTK_DT_SBAS_ENABLED
PMTK414: PMTK_API_Q_NMEA_OUTPUT	PMTK514: PMTK_DT_NMEA_OUTPUT
PMTK430: PMTK_API_Q_DATUM	PMTK530: PMTK_DT_DATUM,Datum
PMTK431: PMTK_API_Q_DATUM_ADVANCE	PMTK530: PMTK_DT_DATUM,Advance Data
PMTK605: PMTK_Q_RELEASE	PMTK705: PMTK_DT_RELEASE
PMTK607: PMTK_Q_EPO_INFO	PMTK707: PMTK_DT_EPO_INFO[3]
PMTK660: PMTK_Q_AVAILABLE_SV_EPH	PMTK001: PMTK_ACK,Cmd 660, EPH info
PMTK661: PMTK_Q_AVAILABLE_SV_ALM	PMTK001: PMTK_ACK,Cmd 661, ALM info
PMTK740: PMTK_DT_UTC	PMTK001: PMTK_ACK,Cmd 740, Flag 3
PMTK741: PMTK_DT_POS	PMTK001: PMTK_ACK,Cmd 741, Flag 3
PMTK810: PMTK_TEST_ALL	PMTK001: PMTK_ACK,Cmd 810, Flag 3
PMTK811: PMTK_TEST_STOP	PMTK001: PMTK_ACK,Cmd 811, Flag 3
PMTK810: PMTK_TEST_ALL[4]	PMTK813: PMTK_TEST_ALL_ACQ
	PMTK814: PMTK_TEST_ALL_BITSYNC
	PMTK815: PMTK_TEST_ALL_SIGNAL
	PMTK812: PMTK_TEST_FINISH
PMTK837: PMTK_TEST_JAMMING	PMTK001: PMTK_ACK,Cmd 837, Flag 3
	PMTKJAM[3]

⚠ **NOTE:**

1. **After the module is powered on or cold / warm / hot start, the following sentences will be outputted automatically:**

$PMTK011,MTKGPS*08
$PMTK010,001*2E
$PMTK011,MTKGPS*08
$PMTK010,002*2D
……

2. **Baud rate change setting, no command acknowledgment response；**
3. **The PMTKJAM and PMTK_DT_EPO_INFO sentences are documented in separate documents；**
4. **After the PMTK810 command is sent, the PMTK813, PMTK814, PMTK815, PMTK812 response will be reported according to the setting.**

PMTK 000 : PMTK_TEST

Test Command.

Table 2- 15: 000 PMTK_TEST

Data Field: PMTK000			
Example: $PMTK000*32<CR><LF>			
Field	**Unit**	**Default**	**Description**
--	--	--	--

PMTK 001 : PMTK_ACK

Acknowledge of PMTK command.

Table 2- 16: 001 PMTK_ACK

Data Field: PMTK001,<Cmd>,<Flag>			
Example: $PMTK001,604,3*32<CR><LF>			
Field	**Unit**	**Default**	**Description**
Cmd	--	--	The packet type that the acknowledge responds
Flag	--	--	‘0’=Invalid packet ‘1’=Unsupported packet type

			'2'=Valid packet, but action failed '3'=Valid packet, action succeeded

PMTK 010 : PMTK_SYS_MSG

Output system message.

Table 2-17: 010 PMTK_SYS_MSG

Data Field: PMTK010,<Message>			
Example: $PMTK010,001*2E<CR><LF>			
Field	**Unit**	**Default**	**Description**
Message	--	--	System message '0'=Unknown '1'=Startup '2'=Notification for the host aiding EPO '3'=Notification for the transition to normal mode is successfully done

PMTK 011 : PMTK_TXT_MSG

Output system message.

Table 2-18: 011 PMTK_TXT_MSG

Data Field: PMTK011,<Message>			
Example: $PMTK011,MTKGPS*08 <CR><LF>			
Field	**Unit**	**Default**	**Description**
Message	--	--	Module Message Text

PMTK 101 : PMTK_CMD_HOT_START

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

Table 2-19: 101 PMTK_CMD_HOT_START

Data Field: PMTK101			
Example: $PMTK101*32<CR><LF>			
Field	**Unit**	**Default**	**Description**
--	--	--	--

PMTK 102 : PMTK_CMD_WARM_START

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

Table 2-20: 102 PMTK_CMD_WARM_START

Data Field: PMTK102			
Example: $PMTK102*31<CR><LF>			
Field	**Unit**	**Default**	**Description**
--	--	--	--

PMTK 103 : PMTK_CMD_COLD_START

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

Table 2-21: 103 PMTK_CMD_COLD_START

Data Field: PMTK103			
Example: $PMTK103*30<CR><LF>			
Field	**Unit**	**Default**	**Description**
--	--	--	--

PMTK 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 2-22: 104 PMTK_CMD_FULL_COLD_START

Data Field: PMTK104			
Example: $PMTK104*37<CR><LF>			
Field	**Unit**	**Default**	**Description**
--	--	--	--

PMTK 161 : PMTK_CMD_STANDBY_MODE

This command is used to enter standby mode for power saving.

Table 2-23: 161 PMTK_CMD_STANDBY_MODE

Data Field: PMTK161,<Type >			
Example: $PMTK161,0*28<CR><LF>			
Field	**Unit**	**Default**	**Description**
Type	--	--	Standby Mode： ‘0’=Stop mode ‘1’ = enter standby mode

PMTK 120 : PMTK_CMD_CLEAR_FLASH_AID

Erase aiding data stored in the flash memory.

Table 2-24: 120 PMTK_CMD_CLEAR_FLASH_AID

Data Field: PMTK120			
Example: $PMTK120*31<CR><LF>			
Field	**Unit**	**Default**	**Description**
--	--	--	--

PMTK 220 : PMTK_SET_POS_FIX

Position Fix Interval.

Table 2-25: 220 PMTK_SET_POS_FIX

Data Field: PMTK220,< Interval >			
Example: $PMTK220,1000*1F<CR><LF>			
Field	**Unit**	**Default**	**Description**
Interval	Msec	1000	Position fix interval [msec]. Must be greater than 200.

PMTK 223 : PMTK_SET_AL_DEE_CFG

This message is used to configure DEE(NOT supported in AXN3.0).

Table 2-26: 223 PMTK_SET_AL_DEE_CFG

Data Field: PMTK223,<SV>,<SNR>,<Extension Threshold>,< Extension Gap >			
Example: $PMTK220,1000*1F<CR><LF>			
Field	**Unit**	**Default**	**Description**
SV	--	*1*	Range: 1~4
SNR	dBHz	30	Range: 25~30
Extension Threshold	Msec	180000	Range: 40000~180000
Extension Gap	Msec	60000	Range: 0~3600000

PMTK 225 : PMTK_SET_PERIODIC_MODE

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 2-27: 225 PMTK_SET_PERIODIC_MODE

Data Field: PMTK225, <Type>,<Run Time>,<Sleep Time>,<Second Run Time>,<Second Sleep Time>			
Example: Enter the cycle standby mode Regular Backup Mode PMTK225,0 PMTK223,1,25,180000,60000 PMTK225,1,3000,12000,18000,72000 Regular Standby Mode PMTK225,0 PMTK223,1,25,180000,60000 PMTK225,2,3000,12000,18000,72000 **Example: Enter AlwaysLocate™ Mode** AlwaysLocate™ Standby Mode PMTK225,0 PMTK225,8 AlwaysLocate™ Backup Mode PMTK225,0 PMTK225,9			
Field	**Unit**	**Default**	**Description**
Type	--	--	‘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	Msec		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	Msec		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	Msec		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	Msec		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:**

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

2. AlwaysLocate™ is a registered trademark of MediaTek.

PMTK 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 2-28: 251 PMTK_SET_NMEA_BAUDRATE

Data Field: PMTK251,<Baudrate>			
Example: $PMTK251,38400*27<CR><LF>			
Field	**Unit**	**Default**	**Description**
Baudrate	*bps*	--	Baudrate: Baudrate setting 0 – default setting 4800 9600 14400 19200 38400 57600 115200

			230400 460800 921600

PMTK 286 : PMTK_SET_AIC_CMD

This message is used to enable or disable AIC function. It is suggested to set cold start command first and then PMTK command.

Table 2-29: 286 PMTK_SET_AIC_CMD

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

PMTK 300 : PMTK_API_SET_FIX_CTL

This message is used to control the rate of position fixing activity.

Table 2-30: 300 PMTK_API_SET_FIX_CTL

Data Field: PMTK300,<Interval >,0,0,0,0			
Example: $PMTK300,1000,0,0,0,0 **返回:** $PMTK001,300,3			
Field	**Unit**	**Default**	**Description**
Interval	Msec	--	[Range:100 ~ 10000]

PMTK 301 : PMTK_API_SET_DGPS_MODE

This message is used to configure the source mode of DGPS correction data.

Table 2-31: 301 PMTK_API_SET_DGPS_MODE

Data Field: PMTK301,<Mode>			
Example: $PMTK301,1*2D<CR><LF>			
Field	**Unit**	**Default**	**Description**
Mode	--	--	Mode: DGPS data source mode. '0': No DGPS source '1': RTCM '2': SBAS(Include WAAS/EGNOS/GAGAN/MSAS)

PMTK 313 : PMTK_API_SET_SBAS_ENABLED

This message is used to enable or disable to search a SBAS satellite.

Table 2-32: 313 PMTK_API_SET_SBAS_ENABLED

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

PMTK 314 : PMTK_API_SET_NMEA_OUTPUT

This message is used to set NMEA sentence output frequencies. There are totally 19 data fields that present output frequencies for the 19 supported NMEA sentences individually.

Table 2-33: Supported Frequency Settings NMEA

No	**Default**	**Description**
0	*0*	--GLL sentence output frequency
1	*1*	--RMC sentence output frequency
2	*1*	--VTG sentence output frequency

3	*1*	--GGA sentence output frequency
4	*1*	--GSA sentence output frequency
5	*1*	--GSV sentence output frequency
17	*0*	--ZDA sentence output frequency

Supported Frequency Settings：

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>

PMTK 330 : PMTK_API_SET_DATUM

Set default datum.

Table 2- 34: 330 PMTK_API_SET_DATUM

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

PMTK 331 : PMTK_API_SET_DATUM_ADVANCE

Set user defined datum.

Table 2-35: 331 PMTK_API_SET_DATUM_ADVANCE

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

PMTK 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 2-36: 335 PMTK_API_SET_RTC_TIME

Data Field: PMTK335,<Year>,<Month>,<Day>,<Hour>,<Min>,<Sec>			
Example: $PMTK335,2007,1,1,0,0,0*02<CR><LF>			
Field	**Unit**	**Default**	**Description**
Year	--	--	Year
Month	--	--	1 ~ 12
Day	--	--	1 ~ 31

Hour	--	--	0 ~ 23
Min	--	--	0 ~ 59
Sec	--	--	0 ~ 59

PMTK 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 2-37: 351 PMTK_API_SET_SUPPORT_QZSS_NMEA

Data Field: PMTK351,< Enabled >			
Example: $PMTK351,0*29 : Disable QZSS NMEA format $PMTK351,1*28 : Enable QZSS NMEA format			
Field	**Unit**	**Default**	**Description**
Enabled	--	--	'0': Disable '1': Enable

PMTK 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 2-38: 352 PMTK_API_SET_STOP_QZSS

Data Field: PMTK352,<Enabled>			
Example: $PMTK352,0*2A : Enable QZSS function $PMTK352,1*2B : Disable QZSS function			
Field	**Unit**	**Default**	**Description**
Enabled	--	--	'0': Enable '1': Disable

PMTK 353 : PMTK_API_SET_GNSS_SEARCH_MODE

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.

Table 2-39: 353 PMTK_API_SET_GNSS_SEARCH_MODE

Data Field:PMTK353,<GPS_Enable>,<GLONASS_Enabled>,<Reserve>,<Reserve>,< BEIDOU_Enable >			
Example: $PMTK353,1,0,0,0,0*2A Search GPS satellites only $PMTK353,1,0,0,0,1*2B Search GPS and BEIDOU satellites $PMTK353,0,0,0,0,1*2A Search BEIDOU satellites only			
Field	**Unit**	**Default**	**Description**
GPS_Enable	--	--	'0': disable (DO NOT search GPS satellites) '1' or non-ZERO: search GPS satellites
GLONASS_Enabled	--	0	'0': disable (DO NOT search GLONASS satellites) '1' or non-ZERO: search GLONASS satellites
Reserve	--	0	Reserve Field
Reserve	--	0	Reserve Field
BEIDOU_Enable	--	--	'0': disable (DO NOT search BEIDOU satellites) '1' or non-ZERO: search BEIDOU satellites

⚠ **NOTE:**

N10B,N20B support GPS+BEIDOU.

PMTK 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 2-40: 386 PMTK_API_SET_STATIC_NAV _THD

Data Field: PMTK386, <Speed_threshold>
Example: $PMTK386,0.4*19<CR><LF>

Field	Unit	Default	Description
Speed_threshold	m/s	--	0~2

⚠ **NOTE:**

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

PMTK 400 : PMTK_API_Q_FIX_CTL

This command is used to query the rate of position fixing activity.

Table 2-41: 400 PMTK_API_Q_FIX_CTL

Data Field: PMTK400			
Example: $PMTK400*36<CR><LF>			
Field	**Unit**	**Default**	**Description**
--	--	--	--

PMTK 401 : PMTK_API_Q_DGPS_MODE

This command is used to query the setting of DGPS mode.

Table 2-42: 401 PMTK_API_Q_DGPS_MODE

Data Field: PMTK401			
Example: $PMTK401*37<CR><LF> **Return:** PMTK_DT_DGPS_MODE			
Field	**Unit**	**Default**	**Description**
--	--	--	--

PMTK 413 : PMTK_API_Q_SBAS_ENABLED

This command is used to query the setting of SBAS.

Table 2-43: 413 PMTK_API_Q_SBAS_ENABLED

Data Field: PMTK413			
Example: $PMTK413*34<CR><LF> **Return:** PMTK_DT_SBAS_ENABLED			
Field	**Unit**	**Default**	**Description**
--	--	--	--

PMTK 414 : PMTK_API_Q_NMEA_OUTPUT

Query current NMEA sentence output frequencies.

Table 2-44: 414 PMTK_API_Q_NMEA_OUTPUT

Data Field: PMTK414			
Example: $PMTK414*33<CR><LF> **Return:** PMTK_DT_NMEA_OUTPUT			
Field	**Unit**	**Default**	**Description**
--	--	--	--

PMTK 430 : PMTK_API_Q_DATUM

Query default datum.

Table 2-45: 430 PMTK_API_Q_DATUM

Data Field: PMTK430			
Example: $PMTK430*35<CR><LF> **Return:** PMTK_DT_DATUM			
Field	**Unit**	**Default**	**Description**
--	--	--	--

PMTK 431 : PMTK_API_Q_DATUM_ADVANCE

Query user defined datum.

Table 2-46: 431 PMTK_API_Q_DATUM_ADVANCE

Data Field: PMTK431			
Example: $PMTK431*34<CR><LF> **Return:** PMTK_DT_DATUM			
Field	**Unit**	**Default**	**Description**
--	--	--	--

PMTK 500 : PMTK_DT_FIX_CTL

These parameters show the rate of position fixing activity.

Table 2-47: 500 PMTK_DT_FIX_CTL

Data Field: PMTK500,<Interval >			
Example: $PMTK500,1000,0,0,0,0*1A<CR><LF>			
Field	**Unit**	**Default**	**Description**
Interval	msec	--	Position fix interval. (msec). [Range: 100 ~ 10000]

PMTK 501 : PMTK_DT_DGPS_MODE

DGPS Data Source Mode.

Table 2-48: 501 PMTK_DT_DGPS_MODE

Data Field: PMTK501,<Mode>			
Example: $PMTK501,1*2B<CR><LF>			
Field	**Unit**	**Default**	**Description**

Mode	--	--	DGPS data source mode ‘0’: No DGPS source ‘1’: RTCM ‘2’: WAAS

PMTK 513 : PMTK_DT_SBAS_ENABLED

Enable to search a SBAS satellite or not.

Table 2-49: 513 PMTK_DT_SBAS_ENABLED

Data Field: PMTK513,<Enabled>			
Example: $PMTK513,1*28<CR><LF>			
Field	**Unit**	**Default**	**Description**
Enabled	--	--	‘0’= Disable ‘1’ = Enable

PMTK 514 : PMTK_DT_NMEA_OUTPUT

NMEA sentence output frequency setting.

Table 2-50: 513 PMTK_DT_SBAS_ENABLED

Data Field: PMTK514,<GLL>,<RMC>,<VTG>,<GGA>,<GSA>,<GSV>,<Reserved>,<...>,<Reserved>			
Example: $PMTK514,1,1,1,1,1,5,1,1,1,1,1,1,0,1,1,1,1,1,1*2A<CR><LF>			
Field	**Unit**	**Default**	**Description**
1 GLL	--	--	GLL interval - Geographic Position - Latitude longitude
2 RMC	--	--	RMC interval - Recommended Minimum Specific GNSS Sentence
3 VTG	--	--	VTG interval - Course Over Ground and Ground Spee
4 GGA	--	--	GGA interval - GPS Fix Data
5 GSA	--	--	GSA interval - GNSS DOPS and Active Satellites
6 GSV	--	--	GSV interval - GNSS Satellites in View

7 Reserved	--	--	
.....	--	--	
11 Reserved	--	--	

PMTK 530 : PMTK_DT_DATUM

Current datum used.

Table 2-51: 530 PMTK_DT_DATUM

Data Field: PMTK530,<Datum>			
Example: $PMTK530,0*28<CR><LF>			
Field	**Unit**	**Default**	**Description**
Datum	--	--	0: WGS84 1: TOKYO-M 2: TOKYO-A

PMTK 605 : PMTK_Q_RELEASE

Query the firmware release information.

Table 2-52: 605 PMTK_Q_RELEASE

Data Field: PMTK605			
Example: $PMTK605*31<CR><LF> **Return:** PMTK_DT_RELEASE			
Field	**Unit**	**Default**	**Description**
--	--	--	--

PMTK 607 : PMTK_Q_EPO_INFO

EPO Data Valid day check.

Table 2-53: 607 PMTK_Q_EPO_INFO

Data Field: PMTK607			
Example: $PMTK607*33<CR><LF>			
Field	**Unit**	**Default**	**Description**
--	--	--	--

PMTK 660 : PMTK_Q_AVAILABLE_SV_EPH

The command is used to report the current ephemeris GPS satellites at set time intervals.

Table 2-54: 660 PMTK_Q_AVAILABLE_SV_EPH

Data Field: 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			
Field	**Unit**	**Default**	**Description**
Time interval	Second	--	Set the time interval for MT3329 to reply 32-bit flags of 32SV. Note that the Time interval > 0 and <= 7200 (2 hours).

PMTK 661 : PMTK_Q_AVAILABLE_SV_ALM

This command is used to report the current almanac GPS satellites at set time intervals.

Table 2-55: 661 PMTK_Q_AVAILABLE_SV_ALM

Data Field: 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> **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.

Field	Unit	Default	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)

PMTK 705 : PMTK_DT_RELEASE

Firmware release information.

Table 2-56: 705 PMTK_DT_RELEASE

Data Field: PMTK705,<ReleaseStr>,<Build_ID>,<Product_Model>,<SDK_Version>
Example: $PMTK705,AXN_0.2,1234,ABCD,*14<CR><LF>

Field	Unit	Default	Description
ReleaseStr	--	--	Firmware release name and version 3333 : 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

PMTK 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 2-57: 740 PMTK_DT_UTC

Data Field: PMTK740,<YYYY>,<MM>,<DD>,<hh>,<mm>,<ss>
Example: The packet indicates that the current：2010/02/10 09:00:58. $PMTK740,2010,2,10,9,0,58*05<CR><LF>

Field	Unit	Default	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

PMTK 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- 58: 741 PMTK_DT_POS

Data Field: 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			
Field	**Unit**	**Range**	**Description**
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	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

⚠ **NOTE:**

GNSS chip will check value range for the following parameters:

Lat: -90.0 ~ 90.0.

Long: -180.0 ~ 180.0

PMTK 810 : PMTK_TEST_ALL

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

Table 2-59: 810 PMTK_TEST_ALL

Data Field: PMTK810,<Bitmap>,<SV>			
Example: $PMTK810,0003,1D*4D<CR><LF> This command only tests TEST_INFO and TEST_ACQ test items.The specific SV id is PRN29.			
Field	**Field**	**Field**	**Field**
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)
SV	--	1~20	The second means the SV id.

PMTK 811 : PMTK_TEST_STOPTest

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

Table 2-60: 811 PMTK_TEST_STOP

Data Field: PMTK811			
Example: $PMTK811*3A<CR><LF>			
Field	**Unit**	**Default**	**Description**
--	--	--	--

PMTK 812 : PMTK_TEST_FINISH

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

Table 2-61: 812 PMTK_TEST_FINISH

Data Field: PMTK812			
Example: $PMTK812*39<CR><LF>			
Field	**Unit**	**Default**	**Description**
--	--	--	--

PMTK 813 : PMTK_TEST_ALL_ACQ

The result of TEST_ACQ item.

Table 2-62: 813 PMTK_TEST_ALL_ACQ

Data Field: PMTK813,<SV>,<Acq Time>			
Example: The target device acquires SV29 within 2 seconds $PMTK813,29,2*01<CR><LF>			
Field	**Unit**	**Default**	**Description**

SV	--	--	
Acq Time	Second		

PMTK 814 : PMTK_TEST_ALL_BITSYNC

This command is the response to the result of TEST_BITSYNC item.

Table 2-63: 814 PMTK_TEST_ALL_BITSYNC

Data Field: PMTK814,<SV>,<BitSync Time>*<CheckSum><CR><LF>			
Example: Regard to SV29, the target device reach bit sync state within 1 second. $PMTK814,29,1*05<CR><LF>			
Field	**Unit**	**Default**	**Description**
SV	--	--	
BitSync Time	秒		BitSync Time

PMTK 815 : PMTK_TEST_ALL_SIGNAL

The result of TEST_SIGNAL item.

Table 2-64: 815 PMTK_TEST_ALL_SIGNAL

Data Field: PMTK815,<SV>,<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			
Field	**Unit**	**Default**	**Description**
SV	--	--	
Testing Time	sec	--	Testing Time
Phase	0.01	--	Phase
TCXO Offset	0.01	--	

TCXO Drift	0.01	--	
CNR Mean	0.001	--	
CNR Sigma	0.001	--	

PMTK 837 : PMTK_TEST_JAMMING

Jamming scan test command.

Table 2-65: 837 PMTK_TEST_JAMMING

Data Field: PMTK837, <JamScanType>,<JamScanNum>			
Example: Jamming scan test 50 times $PMTK837,1,50*0A<CR><LF>			
Field	**Unit**	**Default**	**Description**
JamScanType	--	--	0: disable jamming scan 1: enable jamming scan
JamScanNum	--	--	Jamming scan test 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	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