NMEA Manual based on MediaTek chipset

For u-blox, Fastrax IT500 series GPS/GNSS modules

Manual

locate, communicate, accelerate

Abstract

This document provides NMEA command manual for u-blox, Fastrax IT500 series GPS/GNSS modules based on MediaTek chipset. This NMEA command manual serves as a reference tool.

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Document Information

Title	NMEA Manual based on MediaTek chipset
Subtitle	For u-blox, Fastrax IT500 series GPS/GNSS modules
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Document status information

Objective Specification	This document contains target values. Revised and supplementary data will be published later.
Advance Information	This document contains data based on early testing. Revised and supplementary data will be published later.
Preliminary	This document contains data from product verification. Revised and supplementary data may be published later.
Released	This document contains the final product specification.

This document applies to the following products:

Name	ROM/FLASH version	PCN reference
IT530M	Flash	N/A
IT530	Flash	N/A
UC530M	Flash	N/A
UC530	Flash	N/A
UP501	Flash	N/A
UP501B	Flash	N/A
UP501D	Flash	N/A
UP501R	Flash	N/A
IT520	Flash	N/A
IT500	Flash	N/A

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Contents

1 NMEA default output messages

IT500 series receivers support standard NMEA0183 messages.

In the default configuration, output messages are GGA, RMC, GSV and GSA messages. The receiver can be configured to have a user defined set of output messages, by command PMTK314 as described in chapter 2.12.

Output messages are utilized in Fastrax Workbench 5 to visualize the GPS/GNSS data. Default output messages cover most of the applications.

1.1 GGA - Global Positioning System Fix Data

Time, position and fix related data for a GPS receiver.

Example:

$GPGGA,114353.000,6016.3245,N,02458.3270,E,1,10,0.81,35.2,M,19.5,M,,*50

Format:

$GPGGA,hhmmss.dd,xxmm.dddd,<N|S>,yyymm.dddd,<E|W>,v,ss,d.d,h.h,M,g.g,M,a.a,xxxx*hh<CR><LF>

Type	Description
hhmmss.dd	UTC time of the fix. hh=hours; mm=minutes; ss=seconds; dd=decimal part of seconds
xxmm.dddd	Latitude coordinate. xx=degrees; mm=minutes; dddd=decimal part of minutes
<N/S>	Character denoting either N=North or S=South.
yyymm.dddd	Longitude coordinate. yyy=degrees; mm=minutes; dddd=decimal part of minutes
<E/W>	Character denoting either E=East or W=West.
v	Fix valid indicator 1 = GPS fix (SPS) 2 = DGPS fix 3 = PPS fix 4 = Real Time Kinematic 5 = Float RTK 6 = estimated (dead reckoning) (2.3 feature) 7 = Manual input mode 8 = Simulation mode
ss	Number of satellites used in position fix, 00-12. Notice: Fixed length field of two letters.
d.d	HDOP - Horizontal Dilution Of Precision.
h.h	Altitude (mean-sea-level, geoid)
M	Letter M.
g.g	Difference between the WGS-84 reference ellipsoid surface and the mean-sea-level altitude.
M	Letter M.
a.a	-
xxxx	-

1.2 GLL – Geographic Position – Latitude/Longitude

Latitude and Longitude, UTC time of fix and status.

Example:

$GPGLL,6012.5674,N,02449.6545,E,072022.000,A,A*50

Format:

$GPGLL,xxmm.dddd,<N|S>,yyymm.dddd,<E|W>,hhmmss.ddd,S,M*hh<CR><LF>

Type	Description
xxmm.dddd	Latitude coordinate. xx=degrees; mm=minutes; dddd=decimal part of minutes
<N|S>	Character denoting either N=North or S=South.
yyymm.dddd	Longitude coordinate. yyy=degrees; mm=minutes; dddd=decimal part of minutes
<E|W>	Character denoting either E=East or W=West.
hhmmss.ddd	UTC time of the fix. hh=hours; mm=minutes; ss=seconds; ddd=decimal part of seconds
S	Status indicator. A=valid; V=invalid
M	Mode indicator. A=autonomous; N=data not valid

1.5   RMC - Recommended Minimum Specific GNSS Data.

Time, date, position, course and speed data.

☞   Message start as "$GNRMC" in IT530M default mode both GPS and Glonass constellation.

Example:
$GPRMC,114353.000,A,6016.3245,N,02458.3270,E,0.01,0.00,121009,,,A*69

Example IT530M hybrid mode:
$GNRMC,105440.000,A,6012.5669,N,02449.6536,E,0.00,0.00,061112,,,D*70

Format:

$GPRMC,hhmmss.dd,S,xxmm.dddd,<N\|S>,yyymm.dddd,<E\|W>,s.s,h.h,ddmmyy,d.d, <E\|W>,M*hh<CR><LF>

Type	Description
hhmmss.dd	UTC time of the fix. hh=hours; mm=minutes; ss=seconds; dd=decimal part of seconds
S	Status indicator. A=valid; V=invalid
xxmm.dddd	Latitude coordinate. xx=degrees; mm=minutes; dddd=decimal part of minutes
<N|S>	Character denoting either N=North or S=South.
yyymm.dddd	Longitude coordinate. yyy=degrees; mm=minutes; dddd=decimal part of minutes
<E|W>	Character denoting either E=East or W=West.
s.s	Speed in knots.
h.h	Heading
ddmmyy	UTC Date of the fix. dd=day of month; mm=month; yy=year
d.d	Magnetic variation in degrees, not supported
<E|W>	Letter denoting direction of magnetic variation. Either E=East or W=West. Not supported
M	Mode indicator A=autonomous; N=data not valid

1.6   GSV - Satellites in view

Number of satellites in view, satellite ID (PRN) numbers, elevation, azimuth and SNR value. The information for four satellites is a maximum per one message, additional messages up to maximum of eight are sent if needed. The satellites are in PRN number order.

☞ Message starting with "$GNGSV" will be output in IT530M default mode, including both GPS and Glonass constellation satellite data.

Example:

$GPGSV,3,1,11,29,68,228,47,30,59,151,47,31,44,284,45,02,38,062,44*7C

$GPGSV,3,2,11,12,28,130,41,10,14,102,35,05,12,110,35,04,11,040,34*70

$GPGSV,3,3,11,21,05,196,29,16,05,297,28,13,02,021,30*4E

Format:

$GPGSV,n,m,ss,xx,ee,aaa,cn,............. ,xx,ee,aaa,cn*hh<CR><LF>

Type	Description
n	Total number of messages, 1 to 9
m	Message number, 1 to 9
ss	Total number of satellites in view
xx	Satellite ID (PRN) number
ee	Satellite elevation, degrees 90 max
aaa	Satellite azimuth, degrees True, 000 to 359
ch	Signal-to-noise ration (C/No) 00-99 dB-Hz. Value of zero means that the satellite is predicted to be on the visible sky but it isn't being tracked.

1.7   GSA - DOP and Active Satellites

GPS receiver operating mode, satellites used in the navigation solution reported by the GGA sentence, and DOP values.

☞ Message starting with "$GNGSA" will be output in IT530M default mode including both GPS and Glonass constellation satellite data.

Example:

$GPGSA,A,3,02,21,30,04,16,05,10,12,31,29,,,1.33,0.81,1.06*02

Example IT530M hybrid mode:

$GNGSA,A,3,26,21,16,22,18,06,19,15,30,03,07,08,1.03,0.55,0.87*1D

$GNGSA,A,3,78,71,80,86,65,79,88,87,72,,,,1.03,0.55,0.87*19

Format:

$GPGSA,a,b,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,p.p,h.h,v.v*hh<CR><LF>

Type	Description
a	Mode: M = Manual, forced to operate in 2D or 3D mode. A = Automatic, allowed to automatically switch 2D/3D.
b	Mode: 1 = Fix not available, 2 = 2D, 3 = 3D
xx	ID (PRN) numbers of GPS satellites used in solution
p.p	PDOP
h.h	HDOP
v.v	VDOP

1.8 VTG – Course Over Ground and Ground Speed

Course and speed.

Example:

$GPVTG,0.00,T,,M,0.00,N,0.00,K,A*3D

Format:

$GPVTG,h.hh,T,m.m,M,s.ss,N,s.ss,K,M*hh<CR><LF>

Type	Description
h.hh	Heading in degrees.
T	Letter 'T' denoting True heading in degrees.
m.m	Magnetic heading in degrees.
M	Letter 'M' denoting Magnetic heading in degrees.
s.ss	Speed in knots.
N	Letter 'N' denoting speed in knots.
s.ss	Speed, km/h.
K	Letter 'K' denoting speed in km/h.
M	Mode indicator. A=autonomous; N=data not valid

1.9 ZDA – Time and Date

Current UTC time and date.

Example:

$GPZDA,071850.000,31,08,2011,,*55

Format:

$GPZDA,hhmmss.ddd,dd,mm,yyyy,xx,yy*hh

Type	Description
hhmmss.ddd	UTC time in hours, minutes, seconds and fractions of a second.
dd	UTC day of month
mm	UTC month
yyyy	UTC year
xx	Local zone hours. Not implemented
yy	Local zone minutes. Not implemented

2 NMEA commands

NMEA commands are used to change or query settings of the module.

Command Length:

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

Command Contents:

Preamble: One byte character. '**$**'

NMEA ID: This will identify for the NMEA parser that it will receive commands for MediaTek.

Four bytes character string. "**PMTK**"

Command Number: Three-byte character string.

An identifier, from "**000**" to "**999**", is used to tell the decoder how to decode the command.

DataField:

The DataField has a variable length depending on the command type.

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

*: 1 byte character.

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

CHK1, CHK2:   Two-byte character string.

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

CR, LF: Two bytes binary data.

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

Sample Command:

$PMTK000*32<CR><LF>

You can use your preferred terminal emulator to enter commands. For example, you can use TeraTerm, whichcan be downloaded from here: http://en.sourceforge.jp/projects/ttssh2/releases/

Remember to set the CR+LF for sending the command from the terminal program.
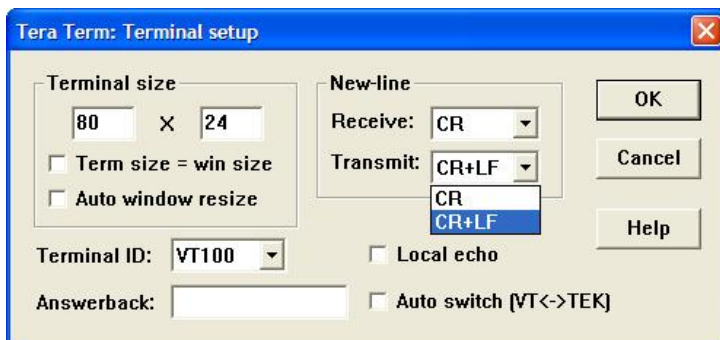
Figure 1: Tera Term terminal setup

Other possible terminal emulators to use include Putty and HyperTerminal.
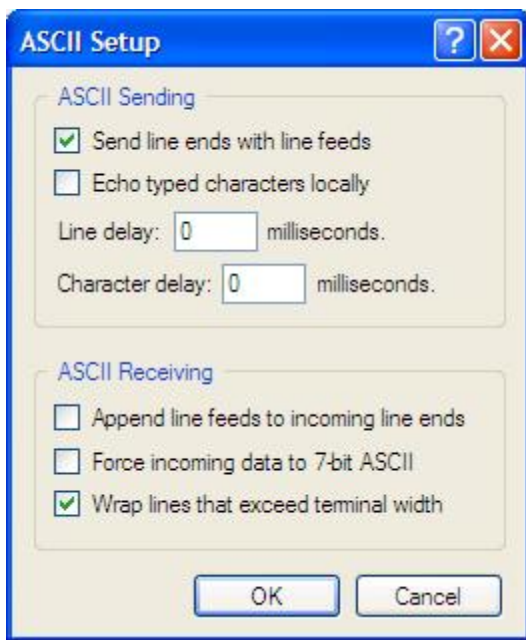
Figure 2: HyperTerminal setup

2.1 PMTK000 TEST

Command purpose:
Test the communication between the receiver and host.
Command number: 000
DataField: None
Example:
$PMTK000*32<CR><LF>
Reply: see next chapter.

2.2 PMTK001 ACK

Command purpose:
Acknowledge a PMTK000 command.
Command number: 001
DataField:
PMTK001,Cmd,Flag
Cmd: The command / packet type to be acknowledged.
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   PMTK010 Startup message

Command purpose:
Output system message.
Command number: 010
DataField:
Msg: The system message.

'0': UNKNOWN

'1': STARTUP

'2': Notification for the host aiding EPO

'3': Notification for the transition to Normal mode is successfully done

☞   Message '2' and '3' apply only for MT333X based receivers IT530, IT530M, UC530 and UC530M.

Example:
$PMTK010,001*2E<CR><LF>

2.4   PMTK011 Output System Text

Command purpose:
Output system text message.
Command number: 011
DataField:
Message of this is MTK GPS
Example:
$PMTK011,MTKGPS*08 <CR><LF>

2.5   PMTK101 CMD HOT START

Command purpose:
Hot restart: Use all available data in the NV Store.
Command number: 101
DataField: None
Example:
$PMTK101*32<CR><LF>

2.6   PMTK102 CMD WARM START

Command purpose:
Warm restart: Don't use ephemeris at re-start.
Command number: 102
DataField: None
Example:
$PMTK102*31<CR><LF>

2.7 PMTK103 CMD COLD START

Command purpose:

Cold restart: Don't use time, position, almanacs and ephemeris data at re-start.

Command number: 103

DataField: None

Example:

$PMTK103*30<CR><LF>

2.8 PMTK104 CMD FULL COLD START

Command purpose:

Full cold restart: It's essentially a cold restart, but additionally it clears system/user configurations at re-start. That is, reset the receiver to the factory status.

Command number: 104

DataField: None

Example:

$PMTK104*37<CR><LF>

2.9 PMTK120 CLEAR FLASH AID

Command purpose:

Erase aiding data stored in the flash memory.

Command number: 120

DataField: none

Example:

$PMTK120*31<CR><LF>

Reply:

$PMTK001,120,3*33

☞ This message applies only for MT333X based receivers IT530, IT530M, UC530 and UC530M.

2.10 PMTK127 CLEAR EPO FILE

Command purpose:

Clear predicted ephemeris file (EPO) from flash memory.

Command number: 127

DataField: '0' Clear

Example:

$PMTK127,0*2A<CR><LF>

Reply:

$PMTK001,127,3*34

☞ This message applies only for MT333X based receivers IT530, IT530M, UC530 and UC530M.

2.11 PMTK161 ENTER STANDBY MODE

Command purpose:

Enter standby mode for power saving.

In this mode the receiver stops navigation and the internal processor enters standby state.

The receiver will wake up as soon as any command or text is sent to the receiver.

Command number: 220

DataField:

'0' = Stop mode

'1' = Sleep mode

Example:

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

Reply:

None – receiver stop output.

☞ This message applies only for MT333X based receivers IT530, IT530M, UC530 and UC530M.

2.12 PMTK183 LOCUS QUERY LOGGING STATUS

Command purpose:

Query LOCUS logging status.

Command number: 183

DataField: None

Return:

$PMTKLOG, Serial#, Type, Mode, Content, Interval, Distance, Speed, Status, Number, Percent*CH

Serial#:	Logging serial number: 0~65535
Type:	Logging type -0: Overlap, 1: FullStop
Mode:	Logging mode – 0x08: Interval logger
Content:	Logging contents of configuration
Interval:	Logging interval setting (valid when Interval mode selected)
Distance:	Logging distance setting (valid when Distance mode selected)
Speed:	Logging speed setting (valid when Speed mode selected)
Status:	Logging status – 1: Stop Logging, 2: Logging
Number:	Logging number of data record
Percent:	Logging life used percentage (0%~100%)

Example:

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

Output: $PMTKLOG,456,0,11,31,2,0,0,0,3769,46*48

Reply:

$PMTK001,183,3*3A

☞ This message applies only for MT333X based receivers IT530, IT530M, UC530 and UC530M.

2.13 PMTK184 LOCUS ERASE FLASH

Command purpose:
Erase logger flash
Command number: 184
DataField:
$PMTK184, Type
Type: Erase type -1:erase all logger internal flash data
Example:
$PMTK184*3F<CR><LF>
Reply:
$PMTK001,184,3*3D

☞   This message applies only for MT333X based receivers IT530, IT530M, UC530 and UC530M.

2.14 PMTK185 LOCUS START/STOP LOGGER

Command purpose:
Stop or start logging data.
Command number: 185
DataField:
$PMTK185, Status
Status: Stop logging -   0: Stop logging
                                    1: Start logging
Example:
$PMTK185,1*23<CR><LF>
Reply:
$PMTK001,185,3*3C

☞   This message applies only for MT333X based receivers IT530, IT530M, UC530 and UC530M.

2.15 PMTK186 LOCUS LOG NOW

Command purpose:
Snapshot write log.
Command number: 186
DataField:
$PMTK185, Type
Type: 1 means snapshot log data
Example:
$PMTK186,1*20<CR><LF>
Reply:
$PMTK001,186,3*3F

☞   This message applies only for MT333X based receivers IT530, IT530M, UC530 and UC530M.

2.16 PMTK622 LOCUS QUERY DATA

Command purpose:

Dump Locus flash data

Command number: 622

DataField:

$PMTK622, Type

Type: 0: dump full flash data

        1: dump partial in used flash data

Output data:

PMTKLOX packet type:

        Type1: LOCUS start (n is the number PMTKLOX packets will be sent

                PMTKLOX,0,n

        Type2: LOCUS data (data will be sent by 8-byte HEX sting, at most 24 events)

                ("FFFFFFFF" if empty) commas separate one log item.

        Type3: LOCUS end

                PMTKLOX,2

        UTC: 4 bytes

        Fix: 1 byte

        Lat: 4 bytes

        Lon: 4 bytes

        Alt: 2 bytes

        Spd: 2 bytes

        Sat: 2 bytes

        Cks: 1 byte

Example:

Input: $PMTK622,1*29<CR><LF>

Output:

$PMTKLOX,0,43*6E

$PMTKLOX,1,0,0100010B,1F000000,0F000000,0000100B,00000000,7FFFFFFF,FFFFFFFF,FFFFFFFF,FFFFFFFF,FFFFFFFF,FFFFFFFF,FFFFFFFF,FFFFFFFF,FFFFFFFF,FFFFFF
FF,00FC8C1C,0B37464F,027FD670,42DC9EC6,4113007A,1A37464F,027FD670,42DC9EC6,4113006B*25

$PMTKLOX,1,1,2037464F,027FD670,42DD9EC6,41130050,2437464F,027FD670,42DD9EC6,41130054,2837464F,027FD670,42DD9EC6,41130058,2B37464F,027FD670,42DD9E
C6,4113005B,2E37464F,027FD670,42DD9EC6,4113005E,3D37464F,027FD670,42DC9EC6,4113004C*59

$PMTKLOX,1,2,4C37464F,027FD670,42DC9EC6,4113003D,5B37464F,027FD670,42DC9EC6,4113002A,6A37464F,027FD670,42DD9EC6,4113001A,7937464F,027FD670,42DD9E
C6,41130009,8837464F,027FD670,42DD9EC6,411300F8,9737464F,027FD670,42DD9EC6,411300E7*5C

$PMTKLOX,1,3,A637464F,027FD670,42DD9EC6,411300D6,B537464F,027FD670,42DD9EC6,411300C5,C437464F,027FD670,42DD9EC6,411300B4,D337464F,027FD670,42DD9E
C6,411300A3,E237464F,027FD670,42DD9EC6,41130092,F137464F,027FD670,42DD9EC6,41130081*59

$PMTKLOX,1,4,0038464F,027FD670,42DD9EC6,4113007F,0F38464F,027FD670,42DC9EC6,41130071,1E38464F,027FD670,42DC9EC6,41130060,2D38464F,027FD670,42DC9E
C6,41130053,3C38464F,027FD670,42DC9EC6,41130042,4B38464F,027FD670,42DD9EC6,41130034*58

$PMTKLOX,1,5,5A38464F,027FD670,42DD9EC6,41130025,6938464F,027FD670,42DC9EC6,41130017,7838464F,027FD670,42DC9EC6,41130006,8738464F,027FD670,42DC9E
C6,411300F9,9638464F,027FD670,42DC9EC6,411300E8,A538464F,027FD670,42DD9EC6,411300DA*5D

$PMTKLOX,1,6,B438464F,027FD670,42DC9EC6,411300CA,FFFFFFFF,FFFFFFFF,FFFFFFFF,FFFFFFFF,FFFFFFFF,FFFFFFFF,FFFFFFFF,FFFFFFFF,FFFFFF
FF,FFFFFFFF,FFFFFFFF,FFFFFFFF,FFFFFFFF,FFFFFFFF,FFFFFFFF,FFFFFFFF,FFFFFFFF,FFFFFFFF*58

$PMTKLOX,1,7,FFFFFFFF,FFFFFFFF,FFFFFFFF,FFFFFFFF,FFFFFFFF,FFFFFFFF,FFFFFFFF,FFFFFFFF,FFFFFFFF,FFFFFFFF,FFFFFFFF,FFFFFFFF,FFFFFFFF,FFFFFFFF
,FFFFFFFF,FFFFFFFF,FFFFFFFF,FFFFFFFF,FFFFFFFF,FFFFFFFF,FFFFFFFF,FFFFFFFF,FFFFFFFF,FFFFFFFF*58

...
$PMTKLOX,2*47
$PMTK001,622,3*36

☞   This message applies only for MT333X based receivers IT530, IT530M, UC530 and UC530M.

2.17 PMTK869 ENABLE EASY

Command purpose:
Enable or disable EASY function. Query if EASY is enabled or disabled.
Command number: 869
DataField:
$PMTK869, Cmd Type, [Enable]
CmdType: Set or query
                '0' = Query
                '1' = Set
                '2' = Result for Query operation
                Enable: Enable or Disable
                '0' = Disable
                '1' = Enable
Example:
To query if EASY is enabled or disabled, use
$PMTK869,0*29<CR><LF>
If EASY is enabled, the receiver returns
$PMTK869,2,1*36<CR><LF>
If EASY is disabled, the receiver returns
$PMTK869,2,0*37<CR><LF>
To Enable EASY, use
$PMTK869,1,1*35<CR><LF>
To Disable EASY, use
$PMTK869,1,0*36<CR><LF>

☞   This message applies only for MT333X based receivers IT530, IT530M, UC530 and UC530M.

2.18 PMTK220 SET POS FIX

Command purpose:
Set position fix interval.
Command number: 220
DataField:
Interval: Position fix interval [msec]. Must be larger than 200.
Example:
$PMTK220,1000*1F<CR><LF>
Reply:

$PMTK001,220,3 *30<CR><LF>

2.19 PMTK223 SET ALWAYS LOCATE DEFAULT CONFIGURATION

Command purpose:
Set Always Locate default configuration.
Command number: 223
DataField:
$PMTK223,SV,SNR,Extension threshold, Extension gap
SV: Default value 1, Range 1 ~4
SNR: Default value 30, Range 25 ~30
Extension threshold = 180000 msec, Range: 40000 ~180000
Extension gap = 60000 msec, Range 0 ~3600000
(Extension gap is the limitation between neighbor DEE)
Example:
$PMTK223,1,25,180000,60000*38<CR><LF>
Reply:
$PMTK001,223,3*33<CR><LF>

☞ This message applies only for MT333X based receivers IT530, IT530M, UC530 and UC530M.

2.20 PMTK225 SET PERIODIC MODE

Command purpose:
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 limitations, the maximum power down duration (SLEEP) is 2047 seconds. If the configured "SLEEP" interval is larger than 2047 seconds, the GPS firmware will automatically extend the interval by software method. However, the GPS system will be powered on for the interval extension and powered down again after the extension is done.
With mode (type) AlwaysLocate™, you can leave other parameters set to zero, because the wake and sleep times are controlled automatically.
Command number: 225
DataField:
*$PMTK225, Type, Run time, Sleep time, Second run time, Second sleep time*CS<CR><LF>*
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': AlwaysLocate™ standby mode
'9': AlwaysLocate™ backup mode
Run time: Duration [msec] to fix for (or attempt to fix for) before switching from running mode back to a minimum power sleep mode. With AlwaysLocate™ you cannot set run time, since sleep and wakeup is controlled automatically.

'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. With AlwaysLocate™ you cannot set sleep time, since sleep and wakeup are controlled automatically.

[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. With AlwaysLocate™ you cannot set second run time, since sleep and wakeup are controlled automatically.

'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 be larger than the first run time when non-zero value.

Example: How to enter Periodic modes

Periodic Backup mode

$PMTK225,0*2B

$PMTK223,1,25,180000,60000*38

$PMTK225,1,3000,12000,18000,72000*16

Periodic Standby mode

$PMTK225,0*2B

$PMTK223,1,25,180000,60000*38

$PMTK225,2,3000,12000,18000,72000*15

Example: How to enter AlwaysLocate modes

AlwaysLocate™ Standby

$PMTK225,0*2B

$PMTK225,8*23

AlwaysLocate™ Backup

$PMTK225,0*2B

$PMTK225,9*22

☞ This message applies only for MT333X based receivers IT530, IT530M, UC530 and UC530M.

2.21 PMTK251 SET NMEA BAUD RATE

Command purpose:

Set NMEA port baud rate.

Command number: 251

DataField:

PMTK251,Baud rate

Baud rate: Baud rate setting

0 – default setting

4800

9600

14400

19200

38400

57600

115200

Example:

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

2.21.1 Setting 5 Hz navigation

For 5 Hz you need to change the baud rate to 38400 in order to handle the increased message load in serial port.

Command for changing the baud rate to 38400:

$PMTK251,38400*27

The output in the terminal should show obscured data.

Then you need to change the baud rate from the terminal program to 38400.

After you can see NMEA sentences again, you are ready to give next command.

Command for setting the Fix Rate to 5 Hz:

$PMTK300,200,0,0,0,0*2F

2.21.2 Setting 10 Hz navigation

☞   10 Hz setting works only with IT500 receiver

You can do it with first giving command PMTK251(baud rate) followed by command PMTK300(fixrate).

Command for changing the baud rate to 115200:

$PMTK251,115200*1F

The output in the terminal should show obscured data.

Then you need to change the baud rate from the terminal program to 115200.

After you can see NMEA sentences again, you are ready to give next command.

Command for setting the Fix Rate to 10 Hz:

$PMTK300,100,0,0,0,0*2C

You can reset the settings by powering off the module and removing the backup battery jumper from application board.

Remember to set the CR+LF for sending the command from the terminal program.

E.g. in the Tera Term program, see Figure 1 for the settings.

2.22 PMTK286 ENABLE AIC

Command purpose:

Enable Active Interference Cancellation (AIC).

The Active Interference cancellation feature provides effective narrow-band interference and jamming elimination. The GPS signal could be recovered from the jammed signal and let the user get better navigation quality.

By default this feature is disabled.

Command number: 286
DataField:
Enabled: Enable or disable
    '0' = Disable
    '1' = Enable
Example:
$PMTK286,1*23<CR><LF>
Reply:
$PMTK001,286,3*3C<CR><LF>

☞   This message applies only for MT333X based receivers IT530, IT530M, UC530 and UC530M.

2.23 PMTK300 Set Fix Interval

Command purpose:
Set fix interval.
Command number: 300
DataField:
PMTK300,Fixinterval,0,0,0,0
Fixinterval: Unit is milliseconds [Range: 100 ~ 10000]
Example:
$PMTK300,1000,0,0,0,0*1C<CR><LF> :Set fix interval to 1000 milliseconds
Reply:
$PMTK001,300,3*33

2.24 PMTK301 API SET DGPS MODE

Command purpose:
DGPS correction data source mode.
Command number: 301
DataField:
PMTK301,Mode
Mode: DGPS data source mode.
    '0': No DGPS source
    '1': RTCM
    '2': WAAS
Example:
$PMTK301,1*2D<CR><LF>
Reply:
$PMTK001,301,3*32

2.25 PMTK313 API SET SBAS ENABLED

Command purpose:
Enable/disable search of SBAS satellite.

Command number: 313

DataField:

Enabled: Enable or disable

'0' = Disable

'1' = Enable

Example:

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

Reply:

$PMTK001,313,3*31<CR><LF>

☞ SBAS can be used only with 1Hz (Default) output rate!

2.26 PMTK314 API SET NMEA OUTPUT

Command purpose:

Set NMEA sentence output frequencies.

Command number: 314

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 - 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

6 NMEA_SEN_GRS, // GPGRS interval - GNSS Range Residuals **(not supported on fw 150M)**

7 NMEA_SEN_GST, // GPGST interval - GNSS Pseudorange Erros Statistics **(not supported on fw 150M)**

13 NMEA_SEN_MALM, // PMTKALM interval - GPS almanac information **(not supported, all versions)**

14 NMEA_SEN_MEPH, // PMTKEPH interval - GPS ephmeris information **(not supported, all versions)**

15 NMEA_SEN_MDGP, // PMTKDGP interval - GPS differential correction information **(not supported, all versions)**

16 NMEA_SEN_MDBG, // PMTKDBG interval – MTK debug information **(not supported, all versions)**

17 NMEA_SEN_ZDA, // GPZDA interval – Time & Date

18 NMEA_SEN_MCHN, // PMTKCHN interval – GPS channel status

Supported Frequency Setting

0 - Disabled or not supported sentence

1 - Output once every one position fix

2 - Output once every two position fixes

3 - Output once every three position fixes

4 - Output once every four position fixes

5 - Output once every five position fixes

Example:

$PMTK314,1,1,1,1,1,5,1,1,1,1,1,0,1,1,1,1,1,1*2C<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.

Reply:

$PMTK001,314,3*36<CR><LF>

You can also restore the system default setting via issue:

$PMTK314,-1*04<CR><LF>

☞   Messages ALM, EPH, DGB and DBG are not currently supported.

☞   Messages GRS, GST, ZDA and MCHN are not supported on 150M firmware.

2.27 PMTK330 API SET DATUM

Command purpose:

Set default datum.

Command number: 330

DataField:

PMTK330,Datum

Datum: 0: WGS84

1: TOKYO-M

2: TOKYO-A

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

Example:

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

Reply:

$PMTK001,330,3*30<CR><LF>

2.28 PMTK331 API SET DATUM ADVANCE

Command purpose:

Set user defined datum.

Command number: 331

DataField:

PMTK331,majA,ecc,dX,dY,dZ

majA: User defined datum semi-major axis [m]

ecc: User defined datumeccentric [m]

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>

Reply:

$PMTK001,331,3*31<CR><LF>

2.29 PMTK335 API SET RTC TIME

Command purpose:

This command sets RTC UTC time.

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

Command number: 335

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>

Reply:

$PMTK001,335,3*35<CR><LF>

2.30 PMTK351 SET QZSS NMEA FORMAT

Command purpose:

The receiver supports the new NMEA format for QZSS. The command allows the user to enable or disable QZSS NMEA format. Default is to disable QZSS NMEA format (use NMEA 0183|V3.01).

Command number: 351

DataField:

PMTK351,Enabled

Enabled: '0': Disable

              '1': Enable

Example:

$PMTK351,0*29: Disable QZSS NMEA format

$PMTK351,1*28: Enable QZSS NMEA format

Reply:

$PMTK001,351,3*37<CR><LF>

☞ This message applies only for MT333X based receivers IT530, IT530M, UC530 and UC530M.

2.31 PMTK352 SET QZSS SUPPORT

Command purpose:

Since QZSS is a regional positioning service, the command allows the user to enable or disable the QZSS function.

Default is to enable the QZSS function.

Command number: 352

DataField:

PMTK352,Enabled

Enabled: '0': Disable

                        '1': Enable

Example:

$PMTK352,0*2A : Disable QZSS

$PMTK352,1*2B : Enable QZSS

Reply:

$PMTK001,352,3*34<CR><LF>

☞   This message applies only for MT333X based receivers IT530, IT530M, UC530 and UC530M.

2.32 PMTK353 API SET GNSS SEARCH MODE

Command purpose:

This command is used to configure the constellations used in navigation.

Default setting is both Glonass and GPS enabled.

Command number: 353

DataField:

PMTK353,GPS_Enabled,GLONASS_Enabled

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

Example:

$PMTK353,0,1*36<CR><LF> : Search GLONASS satellites only

$PMTK353,1,0*36<CR><LF> : Search GPS satellites only

$PMTK353,1,1*37 : Search GPS and GLONASS satellites

Reply:

$PMTK001,353,3*35<CR><LF>

☞   This message applies only for MT3339 based receivers IT530M and UC530M

2.33 PMTK386 API SET STATIC NAV THD MT333X

Command purpose:

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

Command number: 386

DataField:

PMTK386,speed_threshold

speed_threshold: 0=disable; >0 = speed threshold in m/s

The minimum is 0.1 m/s, the maximum is 2.0 m/s.

Example:

$PMTK386,0.7*3A<CR><LF>

Reply:

$PMTK001,386,3*3D<CR><LF>

☞   This message applies only for MT333X based receivers IT530, IT530M, UC530 and UC530M.

2.34 PMTK397 API SET STATIC NAV THD MT332X

Command purpose:

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.

Command number: 397

DataField:

PMTK397,speed_threshold

speed_threshold: 0=disable; >0 = speed threshold in m/s

Example:

$PMTK397,0.7*3A<CR><LF>

Reply:

$PMTK001,337,3*3D<CR><LF>

☞   This message applies only for MT332X based IT500, IT520 and UP501.

2.35 PMTK390 API SET USER OPTION

Command purpose:

Change default settings of the NMEA output permanently. Write the user setting to the flash to override the default setting. Maximum 8 times without erase the chip.

Command number: 390

DataField:

PMTK390, Lock, Update_Rate, Baud_Rate, GLL_Period, RMC_Period, VTG_Period, GSA_Period, GSV_Period, GGA_Period, ZDA_Period, MCHN_Period, Datum, DGPS_Mode, RTCM_Baud_Rate

Lock: nonzero: freeze the setting; 0: allow further setting.

Update_Rate: 1~5 (Hz)

Baud_Rate: 115200, 57600, 38400, 19200, 14400, 9600, 4800

RTCM_Baud_Rate: 115200, 57600, 38400, 19200, 14400, 9600, 4800

XXX_Period: NMEA sentence output period

DGPS_Mode: 0 (disable), 1 (RTCM), 2 (SBAS)

Datum: We support more than 200 datum. Please refer to Appendix A for the supported datum list.

The typical value is: 0 (WGS84), 1 (Tokyo-M), 2 (Tokyo-A)

Example:

$PMTK390,0,1,38400,1,1,1,1,1,1,1,0,0,2,9600*0A<CR><LF>

Reply:

$PMTK001,390,3

⚠   **Keep the lockbit zero. If you enable lockbit, you might corrupt the firmware!**

☞   This message applies only for MT332X based IT500, IT520 and UP501.

2.35.1 Setting 4800 baud rate permanently

☞ This setting is not supported with UP500 AGPS enabled firmware. 5Hz is the maximum rate that can be set for navigation with this command.

Please note that with the default NMEA message mask, the 4800 baud rate is not enough in conditions where there are many tracked satellites. GSV messages might have four lines and exceed the capacity of 4800 bit/second.

$PMTK390,0,1,4800,0,1,0,1,1,1,0,0,0,2,9600*38

and back to default 9600:

$PMTK390,0,1,9600,0,1,0,1,1,1,0,0,0,2,4800*38

☞ Command PMTK390 settings are stored to non-volatile flash memory. It is restricted to allow only 8 setting changes per module. If exceeding the limit, settings cannot be changed until the module is re-flashed.

☞ This message applies only for MT332X based IT500, IT520 and UP501.

2.36 PMTK740 SET UTC TIME

Command purpose:

Init UTC time. Please do not use local time, which has time-zone offset.

To have faster TTFF, the accuracy of reference UTC should be less than 3 seconds.

Command number: 740

DataField:

*PMTK740,YYY,MM,DD,hh,mm,ss*CS<CR><LF>*

YYYY: year in 4 digits, range >1980

MM: month, range 1 - 12

DD: day, range 1 - 31

hh: hour, range 0 – 23

mm: minute, range 0 – 59

ss: second, range 0 – 59

CS: Checksum

Example:

$PMTK740,2012,9,28,10,29,00*09<CR><LF>

Reply:

$PMTK001,740,3*33<CR><LF>

☞ This message applies only for MT333X based receivers IT530, IT530M, UC530 and UC530M.

2.37 PMTK741 SET INITIAL POSITION AND TIME

Command purpose:

Initialize position and UTC in cold starts. To have faster TTFF, the accuracy of the location should be better than 30km.

The accuracy of reference UTC should be less than 3 seconds.

Command number: 741

DataField:

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

> Lat: WGS84 geodetic latitude. Note: suggest to express this value in floating-point with 6 decimal points, Minus:south; Plus: north, Range -90.0 ~90.0

> Long: WGS84 geodetic longitude. Note: suggest to express this value in floating-point with 6 decimal points, Minus:west; Plus: east, Range -180.0 ~180.0

> Alt: WGS84 ellipsoidal altitude in meters.

> YYYY: year in 4 digits, range >1980

> MM: month, range 1 - 12

> DD: day, range 1 - 31

> hh: hour, range 0 – 23

> mm: minute, range 0 – 59

> ss: second, range 0 – 59

> CS: Checksum

Example:

$PMTK741,24.772816,121.022636,160,2012,9,28,10,29,00*29<CR><LF>

Reply:

$PMTK001,741,3*32<CR><LF>

☞ This message applies only for MT333X based receivers IT530, IT530M, UC530 and UC530M.

3 Query commands

These commands are for querying the settings on the receiver.

3.1 PMTK400 API Q FIX CTL

Command purpose:
Query Position fix interval.
Command number: 400
DataField: None
Return:
PMTK_DT_FIX_CTL
Example:
$PMTK400*36<CR><LF>

3.2 PMTK401 API Q DGPS MODE

Command purpose:
Query DGPS mode.
Command number: 401
DataField: None
Return:
PMTK500 DT DGPS MODE
Example:
$PMTK401*37<CR><LF>

3.3 PMTK413 API Q SBAS ENABLED

Command purpose:
Query SBAS status.
Command number: 413
DataField: None
Return:
PMTK513 DT SBAS ENABLED
Example:
$PMTK413*34<CR><LF>

3.4 PMTK414 API Q NMEA OUTPUT

Command purpose:
Query current NMEA sentence output frequencies.
Command number: 414
DataField: None

Return:
PMTK514 DT NMEA OUTPUT
Example:
$PMTK414*33<CR><LF>

3.5 PMTK430 API Q DATUM

Command purpose:
Query default datum.
Command number: 430
DataField: None
Return:
PMTK530 DT DATUM
Example:
$PMTK430*35<CR><LF>

3.6 PMTK431 API Q DATUM ADVANCE

Command purpose:
Query user defined datum.
Command number: 431
DataField: None
Return:
PMTK_DT_DATUM
Example:
$PMTK431*34<CR><LF>
Reply:
$PMTK530,6377397.155,299.152812800,-148.0,507.0,685.0*11

3.7 PMTK490 API GET USER OPTION

Command purpose:
Returns the current user setting from the flash memory.
Command number: 490
DataField: None
Return:
PMTK590 DT FLASH USER OPTION
Example:
$PMTK490*3F<CR><LF>
Reply:
$PMTK590,8,1,9600,0,1,0,1,1,1,0,0,0,0,9600*37

4 Firmware STATUS

4.1 PMTK605 QUERY FIRMWARE INFO

Command purpose:
Query the firmware release information.
Command number: 605
DataField: NONE
Return:
PMTK705 DT RELEASE
Example:
$PMTK605*31<CR><LF>
Reply:
$PMTK705,AXN_1.50,1139,Fastrax IT500,*6C

4.2 PMTK607 QUERY EPO STATUS

Command purpose:
Query the status of EPO file loaded into flash memory.
Command number: 607
DataField:
    '0' Status
Example:
$PMTK607,0*2F<CR><LF>
Reply:
PMTK707,56,1565,345600,1567,324000,1565,367200,1565,367200*1E
Explanation:
Receive: PMTK_DT_EPO_INFO
Number Epoch:56
First Epoch Week:1565
First Epoch TOW:345600
Final Epoch Week:1567
Final Epoch TOW:324000
Crnt Min Epoch Week:1565
Crnt Min Epoch TOW:388800
Crnt Max Epoch Week:1565
Crnt Max Epoch TOW:388800

4.3 PMTK660 Q AVAILABLE SV EPH

Command purpose:
Query valid ephemeris after specified interval.
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.

Command number: 660

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:

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

Reply:

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

☞ 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.

4.4 PMTK661 Q AVAILABLE SV ALM

Command purpose:

Query valid almanac after specified interval.

(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.

Command number: 661

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

Example:

Indicate which almanac will be available after 30 days

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

Reply:

$PMTK001,661,3,fec0bfff*49<CR><LF>

☞ 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.

5 FIX Valid Flag

☞ This chapter concerns only the UP500 antenna module.

It is important to note that the current UP500 receiver firmware output position coordinates in RMC and GGA messages even if the position is flagged as invalid in the NMEA RMC message.

This is contrary to most other GPS receivers, and the consequence is that a trace displayed on a map might look inaccurate. The advantage for some applications is that you do get some kind of position even if you know the output is not validated.

This is a feature that can very easily be filtered by monitoring Valid "A" flag and invalid "V" flag in the RMC message.

Here is an example of a NOT VALID output fix:

    $GPRMC,000040.026,V,6016.3376,N,02458.3604,E,0.00,0.00,060180,,,N*73
    $GPVTG,0.00,T,,M,0.00,N,0.00,K,N*32
    $GPGGA,000041.026,6016.3376,N,02458.3604,E,0,0,,130.5,M,19.5,M,,*42
    $GPGSA,A,1,,,,,,,,,,,,,*1E
    $GPGSV,1,1,00*79

And here is an example of a VALID output fix:

    $GPRMC,065343.000,A,6016.3204,N,02458.3279,E,0.02,0.00,190309,,,A*69
    $GPVTG,0.00,T,,M,0.02,N,0.03,K,A*3C
    $GPGGA,065344.000,6016.3206,N,02458.3278,E,1,7,1.06,29.3,M,19.5,M,,*6A
    $GPGSA,A,3,03,22,16,21,27,06,08,,,,,,1.33,1.06,0.81*01
    $GPGSV,3,1,12,06,66,201,48,03,65,236,48,22,56,163,48,21,30,090,42*7E
    $GPGSV,3,2,12,37,21,183,,08,14,331,34,16,13,204,33,27,09,026,33*76
    $GPGSV,3,3,12,07,03,296,30,19,,,45,18,,,48,15,,,37*4C

6 Appendix A

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

Table 1: Map datums

Related documents

[1]   NMEA0183 specification.

Revision history

Revision	Date	Name	Status / Comments
1.0	02.June.2009	kkai	Initial release
1.1	09.Jun.2009	kkai	Added chapters 2.9.1 and 2.92. Fixed some typos. Added notes to 2.14.2 and 2.14.3.
1.2	15.Sep.2009	kkai	Added numbering into command title. Removed chapter 2.14.2 and 2.14.3.
1.3	09.Oct.2009	kkai	Added description of default output messages.
1.4	20.Nov.2009	kkai	Some changes to command 300 text.
1.5	17.Feb.2010	kkai	Addition to GGA message status field. Added clear EPO and query EPO status commands. Integrated reply messages to configuration commands.
1.6	18.Apr.2010	kkai	GGA message fix valid indicator values updated. Note for enabling SBAS with PMTK313. Added note about supported NMEA messages.
1.7	21.Jul.2010	kkai	Added datums. Fixed PMTK30x responses.
1.8	31.Aug.2011	kkai	PMTK390: modified msg support. Changed lockbit to zero on example. Added message descriptions: GLL – Geographic position VTG – Course and speed ZDA – Time and date
1.9	23.Feb.2012	kkai	Added support to IT530 specific commands and messages. PMTK010 added two items. PMTK127 Clear EPO file. PMTK161 Enter standby mode. PMTK120 Clear Flash aid. PMTK225 Set Periodic Mode. PMTK286 Enable AIC. PMTK300 Set Fix Interval. PMTK352 Set QZSS support. PMTK183 LOCUS query logging status. PMTK184 LOCUS erase flash. PMTK185 LOCUS stop logger. PMTK186 LOCUS log now. PMTK869 Enable or disable EASY
2.0		kkai	Some notes added to PMTK225 Set Periodic Mode. Notes added on messages that are not supported in all IT500 series receivers. Corrected checksum on examples. Added messages: PMTK223 SET AL DEE CFG PMTK351 SET support for QZSS NMEA format PMTK352 SET QZSS SUPPORT PMTK353 API SET GNSS SEARCH MODE PMTK386 API SET STATIC NAV THD MT333X PMTK740 SET UTC TIME PMTK741 SET INITIAL POSITION AND TIME
2.1		kkai	Added GNSS message support to default output messages.
A	31.Jan.2013	julu	Converted to u-blox version

Contact

For complete contact information visit us at www.u-blox.com

u-blox Offices

North, Central and South America

u-blox America, Inc.
Phone: +1 (703) 483 3180
E-mail: info_us@u-blox.com

Regional Office West Coast:
Phone: +1 (703) 483 3184
E-mail: info_us@u-blox.com

Technical Support:
Phone: +1 (703) 483 3185
E-mail: support_us@u-blox.com

Headquarters
Europe, Middle East, Africa

u-blox AG
Phone: +41 44 722 74 44
E-mail: info@u-blox.com
Support: support @u-blox.com

Asia, Australia, Pacific

u-blox Singapore Pte. Ltd.
Phone: +65 6734 3811
E-mail: info_ap@u-blox.com
Support: support_ap@u-blox.com

Regional Office China (Beijing):
Phone: +86 10 68 133 545
E-mail: info_cn@u-blox.com
Support: support_cn@u-blox.com

Regional Office China (Shenzhen):
Phone: +86 755 8627 1083
E-mail: info_cn@u-blox.com
Support: support_cn@u-blox.com

Regional Office India:
Phone: +91 959 1302 450
E-mail: info_in@u-blox.com
Support: support_in@u-blox.com

Regional Office Japan:
Phone: +81 3 5775 3850
E-mail: info_jp@u-blox.com
Support: support_jp@u-blox.com

Regional Office Korea:
Phone: +82 2 542 0861
E-mail: info_kr@u-blox.com
Support: support_kr@u-blox.com

Regional Office Taiwan:
Phone: +886 2 2657 1090
E-mail: info_tw@u-blox.com
Support: support_tw@u-blox.com