

Re: GPS M12+ Motorola: Time accuracy

Source: <http://sci.tech-archive.net/Archive/sci.geo.satellite-nav/2004-09/0144.html>

fm_at_nowhere.invalid

Date: 09/03/04

Date: Fri, 3 Sep 2004 11:17:06 +0000 (UTC)

In comp.protocols.time.ntp Mayte <maytemanrique@hotmail.com> wrote:

> *Thanks for your answers.*

>> *If you want to get the best precision out of
>> your receiver, you will have to use the PPS
>> signal.*

> *We want to use the PPS signal to synchronize our
> system to the GPS time with a high accuracy. The
> problem that we have is that we are not sure how
> we get the time stamp for this PPS signal. We
> start the GPS receiver and send the @@Hb command
> setting the Output rate to 1 time each second.
> We wait until the GPS tracks minimum 4
> satellites, after this we start to get data
> position and time, but which time?*

> *The time included in the @@Hb answer has the
> format hmsffff: hours, minutes, seconds,
> fractional second(ns). Is this the exact GPS
> time?*

Not exactly.

My understanding of that time, is that it is the receiver local time (used internally) vs GPS time or UTC time. The difference with GPS time is supposed to be allways less than 1 ms.

> *in this case, is the GPS time of the last PPS
> signal or of the next PPS signal ? What means
> the fractional second? Why with only one track
> satellite we got sometimes inside 1 second two
> time stamps for example
>
> 12:40:15 99926 and 12:40:15 99999987?*

That is surprising. I could figure out a 15.00099926 and a 15.99999987 (in that case, the

receiver local time crosses the 1 ms requirement ;
so a backward 1 ms jump occur in local time,
explaining the 2 timestamps in the same second),
but not 15.99926 15.99999987...

But you do not have to deal with those details to
get precise time : the 1 PPS rising edge is
sync'ed to GPS (or UTC time), GPS time reference
is given by the 1 PPS. The corresponding Hb
message is supposed to be issued on the serial
line within 50 ms after that. The closest integer
second (16 in your example) gives you the exact
GPS time (as estimated by your receiver) of the
last 1 PPS rising edge.

> *Why the answer includes sometimes more track
> satellites than visible ones?*

The only reason I can see for that is an outdated
almanach, but that cannot last, and the receiver
should definitely fix that within less than 15
minutes

> 5.- @@ Hn: with this command it is requested a
> T-RAIM status message. The data received from
> this command include:
> Pulse Status: 01 (ON)
> Pulse Synced to: 01 (GPS)
> T-RAIM Solution Status: 00 (OK)
> T-RAIM Status: 00 (detection and isolation possible)
> Accuracy estimate: 0000
> Error next PPS:-8

>> *If you want to get the best precision out of
>> your receiver, you will have to use the PPS
>> signal. You will also have to apply a timing
>> correction factor that you can get from the
>> @@En status message (negative sawtooth...); in
>> effect, the receiver is telling you that the
>> next PPS tick is going to be
>> <n> nanoseconds late (or early).*

> *This "Error next PPS" value is the time
> correction (the same that I could get with the
> @@En status message) that I have to apply to the
> time set by the PPS signal?*

Yes.

> *What means the Accuracy estimate value?*

This is an estimation made using the redundancy provided when the number of satellites currently being tracked is superior to what is needed in the current tracking mode.

> *We get always 0000.*

This is clearly optimistic :) But the TRAIM solution status being OK, you can trust the time solution to be within the bounds you specified.

— francois meyer