

Re: GPS 12Ch, 16CH 32CH 50Ch

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- *From:* "Joe G (Home)" <joe.g@xxxxxxxxxxxxxxxx>
 - *Date:* Wed, 30 Jul 2008 00:12:18 +1000
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"Phil Pemberton" <usenet08@xxxxxxxxxxxxxxxx> wrote in message news:r9j1m5-hg.ln1@xxxxxxxxxxxxxxxxxxxxxxxxxxxx

Joe G (Home) wrote:

What's the difference between the number of GPS channels?

More channels allows the receiver to track more satellites — you're still at the mercy of the number of satellites in view and signal quality, though. Also most receivers may track satellites that are ≤ 30 degrees above the horizon, but they won't use them in triangulation as the signal will likely have suffered enough atmospheric delay and degradation to foul up the position fix.

What is the performance difference

The receiver will be able to track more satellites, so if you've got e.g. a six-channel receiver and four satellites in view, the receiver will use the other two channels to scan for satellites that (according to the almanac data) should be coming into view. Startup time should be reduced significantly too, as e.g. a twelve-channel receiver will be able to search for more satellites at a time.

The GPS sats send out a pseudorandom sequence (the C-code or Standard Positioning Service) that changes at a rate of 1.024MHz. This is different for each satellite, so you need to know which satellite you're looking for before you go looking for it.

From a cold-start (no ephemeris, almanac or timing data), most receivers will start hunting for a single available satellite (or more) to get a timing lock, then go hunting for the almanac (coarse orbit data). If you've got 12 channels, you pick (say) SVs 1 through 12 for the first search. Chances are, you'll find at least one satellite in that range that's visible. If there's something there (carrier lock) then the receiver will attempt to get a "code lock" (synchronise the PRBS generator

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against the satellite) and acquire timing data. If there's physically nothing there, it'll go hunting for a different satellite on that channel.

Next you need the Almanac data to find other satellites. This takes about 15 minutes to download, but ISTR that some modern receivers will do a download from multiple satellites — bad packets in the stream are replaced with ones from other satellites. I suspect if one sat is sending (say) block 30 of 50 and another is sending block 49, some receivers will grab blocks 30–50 from one sat, then wait for the sat sending #49 to roll back to #1, and grab the rest of the data from there. I'm not sure if that's how it works in real life, or if all the sats send the same part of the Almanac at the same time.

Once the receiver has the Almanac, it goes looking for the Ephemeris (which is transmitted individually for and by each satellite). This improves the precision of the Almanac and allows the receiver to calculate a position fix (assuming at least three satellites are in view and locked).

A better place to ask this question would be the newsgroup alt.satellite.gps...

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Phil.

<http://www.philpem.me.uk/>

Thankd – Joseph