Licor 7500 diagnostic value

Some documentation for the Licor 7500 diagnostic value is in the manual:

ftp://ftp.licor.com/perm/env/LI-7500/Manual/LI-7500Manual_V4.pdf

The following excerpts are from the manual.

Setup and Operation, page 3-36:

> The cell diagnostic value is a 1 byte unsigned integer (value between 0 and 255) with the following bit map:
> bit 7 Chopper 1=ok
> bit 6 Detector 1=ok
> bit 5 PLL 1=ok
> bit 4 Sync 1=ok
> bit 3-0: AGC/6.25
>
> Example: a value is 125 (01111101) indicates Chopper not ok, and AGC = 81% (1101 is 13, times 6.25)

If bits 4-7 are 1 (OK), the value will be greater than or equal to 240, with the remainder being the AGC percentage. I've not seen values below 248. Note that the values on the plots and in the netcdf files are 5 minute averages.

We're seeing values of 248 and above, indicating the following:

lidiag	Chopper	Detector	PLL	Sync	AGC %
248	ok	ok	ok	ok	50-56
249	ok	ok	ok	ok	56-63
250	ok	ok	ok	ok	63-69
251	ok	ok	ok	ok	69-75
252	ok	ok	ok	ok	75-81
253	ok	ok	ok	ok	81-87
254	ok	ok	ok	ok	88-94
255	ok	ok	ok	ok	94-100

The manual doesn't define AGC, but contains this info, on pages 3-50,51, indicating that an AGC value near 100% likely indicates a water droplet remaining in the optical path, but that temporary droplets can effect the measurements without an indication in AGC:

> Dew
> The LI-7500 can tolerate droplets on the windows to a certain extent; the AGC value will increase, but the calibration is unchanged. If the droplets coalesce and get big enough, the AGC will go to 100%, and eventually the readings will become bad. This can be minimized by sensor orientation, and by coating the windows with a wax such as RainX®.
>
> Rain/Snow
> Flying droplets and flakes in the optical path will affect the performance of the LI-7500, even if the total light blockage is small enough that the AGC does not reach 100%. The reason is that the objects are moving, and if a droplet or flake is in the path for a sample measurment, but out of the path for a reference measurement (or vice versa), it will influence the resulting reading. Figure 3-4 illustrates a strip chart trace made during a light snow shower. The occasional spikes are due to blockage changes between sample and reference readings. Notice that in some cases both CO2 and H2O are affected, and sometimes just one. Also, the spikes are equally likely to be up or down.