

Site visit, move licor, diagnose sampling issue, dead TRH fan

Feb 2, 2010: Patton, Golubieski, Maclean on site at 10:30 MST

Planned tasks:

- Move Licor 7500 from 30 meters to 2 meters
- Investigate why data system can't sample 4 7500's at 20 Hz
- Measure guy tensions

Noticed a high-pitch sound from a TRH fan. Chris determined it was the 16m TRH. The propeller had come off the shaft, and was not repairable. Swapped the 16m and 2m TRHs, so that it will be easy for someone to replace the low unit.

Therefore the TRH at 16m has not had fan ventilation for an unknown period of time up to Feb 2, and likewise for the 2m TRH after Feb 2, until it is replaced.

Initial licor 7500 serial port configuration:

port	height	status
2	2m	not connected
7	7m	OK, 9600 baud, 10Hz
17	16m	OK, 9600 baud, 10Hz
14	30m	OK, 9600 baud, 10Hz
11	43m	OK, 9600 baud, 10Hz

Looked at RS232 transmit signal from Licors with oscilloscope and a serial breakout box. Ports 17,11 and 7 all showed clean, square signals, ranging from -7V to +7V.

Moved 30m licor to 2m.

Looked at the signal ground of the 2m licor inside the Licor box, with the oscilloscope probe ground connected to power ground. Saw hair-like spikes with a range of +- 1V at the bit frequency of the signal. By shorting signal ground to power ground we could get rid of these spikes.

Temporarily switched the cables on the 7m and 2m Licors, so that the 2m was plugged into port 7. Port 7 is on a Diamond Emerald serial card, which are the ports (5-20) that have not been working at 20Hz.

Up'd the sampling frequency of the 2m licor in port 7 to 20Hz, 19200 baud. Saw an increase in "spurious interrupts" which did not diminish when we shorted the signal and power grounds together, so those spikes do not seem to be the issue.

Swapped dsm chassis boxes, replacing box #1 with box #8. Also swapped PC104 stacks. This configuration did not work well at all, with data_stats showing bad data rates. Swapped original PC104 stack back, and still saw problem. Eventually noticed that the input from the licor on port 17 had lots of gibberish. Moved this to port 20 and it cleaned up and the data_stats looked OK. So now believe this sampling issue was due to a bad port 17 on the new box and not an issue with the pc104 stack.

The PC104 stack (which is what has been at the site all along):

card	SN
viper	#7, 3284
serial ports 5-12, EMM-8M	W25001 7
serial ports 13-20, EMM-8M	W23719 1
power	W24806 0

This stack is now in box #8, which means it has a new Viasala barometer. rserial shows this is unit 9: B9 752.08 5.2\r\n. The barometer in box#1 was unit B7.

Tried increasing the sampling rates of the licors to 20 Hz, 19200 baud. The number of spurious interrupts increased to somewhere around 600+. The system was generally keeping up, as shown by data_stats, but sometimes things looked bad. So reduced the rates back to 10Hz, 9600 baud. The system runs well, with a background level of around 170 spurious interrupts/sec, as it was before this visit.

The licor message length is between 44 and 49 characters. So at 20Hz this is roughly 10bits * 49 * 20/sec = 9800 bits/sec, so we must use 19200 baud instead of 9600 when sampling at 20 Hz.

Around mid-day Ned and Chris measured the guy tensions and those values have been added to the matrix in the blog entry.

Conclusions

The problem with sampling Licors at 20Hz seems to be a data system issue, in that it cannot keep up with the total serial interrupt load from the sensors on the tower. Based on what we saw on the scope, it is not an issue with the quality of RS232 signals. Since it didn't change when we swapped system enclosures and the PC104 stacks, it is not related to interface panels, the CPU or the serial cards. The power to the Licors looks good.

Our simulation of this configuration in the lab did not include 5 TRHs (1 sample/sec), the barometer (1/sec) or the GPS (2 samples/sec). The addition of these inputs seems to break the camel's back.