



info on the bad sonic

7 messages

Christopher Cox - NOAA Affiliate <christopher.j.cox@noaa.gov>
To: Matthew Shupe - NOAA Affiliate <Matthew.Shupe@noaa.gov>

Mon, Jun 24, 2019 at 1:22 PM

Matt,

I have only seen the problem on one of our instruments, serial # 0111067255. The information I have on the problem is below. Maybe we should reach out for an opinion first and indicate that we are the same group that sent Ian Brooks' sonic for repairs c/o Matthias Lueck. This error is quite similar as it was suggested that the low air pressure could be a factor. I do not want to ship it all the way back there for them to say it works just fine.

-Chris

An example of the raw message at OI1=96:

```
010000963010110000000000000000,,,,,26.352,,,,,-0.473,-0.508,0.000
```

The message indicates that 1 of the 9 paths is unusable and that possibly this is associated with path 1 (it is unclear from the manual what the trailing zeros mean or how the 11% [chars 12-14] is providing added information to the value 1 at char 11 [referring to 1 of 9 paths = bad]).

The problem is nearly continuous.

There are two specific transducers, one upper and one lower, that are associated with the problem. When one of those transducers is intentionally blocked the error increases to 2/22% and 3/33%, and realistic looking data appear in place of no data. When any of the other transducers are blocked, the error is 4/44% (indicating the 3 blocked paths + the broken path) and "no data" continues as in the example above.

Interestingly, when I set any of the other OI output formats (e.g., OI=2), data appears in all columns and the values are similar to one another - i.e., there is no obvious problem at all. This error only occurs when the output string includes the processed x/y/z/T data (OI=32). The values for other data (like OI=2) do not look obviously spurious.

The error appears whether the system is run at 12VDC or 24VDC and does not appear to be associated with a grounding problem.

This is not a cable problem. The error appears in the network and data channels. Additionally, I swapped all serial cables with another sonic that was working without any noticeable change.

A similar problem recently occurred with an older model that was sent to Metek for repairs (Ian Books, c/o Matthias Lueck). Metek has been unable to reproduce that error at their factory. I was recently made aware that air pressure is a plausible factor for these instruments so it is important to note that all of our testing has been conducted at about 1600 m elevation (~830 hPa).

Matthew Shupe - NOAA Affiliate <matthew.shupe@noaa.gov>
To: Matthias Lueck <lueck@metek.de>
Cc: Christopher Cox - NOAA Affiliate <christopher.j.cox@noaa.gov>

Mon, Jun 24, 2019 at 1:35 PM

Matthias,

We are working our way through tests on all of the many sonics we purchased from Metek and have apparently found another issue in one more of our sonics. Oddly, this issue is somewhat similar to the issue that was observed on the older sonic from Ian Brooks that we were working with here in Colorado a few weeks ago (you now have that sonic and apparently are unable to duplicate the issue). In any case, please look at the summary of the issue as described below. There appears to be an issue with at least one transducer, and we clearly need to get this fixed very quickly as we will be shipping our equipment out to our year-long project in the central Arctic in about a month. Is there anything we can do on this end to further diagnose the potential issue? Is it appropriate to send this sonic to Metek to get fixed? As far as we can tell, there are no similar issues on any of our other sonics. Thanks much, Matthew

[Quoted text hidden]

Matthias Lueck <lueck@metek.de>
To: Matthew Shupe - NOAA Affiliate <matthew.shupe@noaa.gov>
Cc: Christopher Cox - NOAA Affiliate <christopher.j.cox@noaa.gov>

Tue, Jun 25, 2019 at 3:30 AM

Hello Matthew,

at first, quick test please record some data (5min) with heater off and also with heater on.

Set OI1=224 for this test. You will get the advanced state information. Please send me the recorded files.

Best regards Matthias

[Quoted text hidden]

Christopher Cox - NOAA Affiliate <christopher.j.cox@noaa.gov>
To: Matthias Lueck <lueck@metek.de>
Cc: Matthew Shupe - NOAA Affiliate <matthew.shupe@noaa.gov>

Tue, Jun 25, 2019 at 10:56 AM

Thanks for your response, Matthias. I've attached two files containing 5-10 min of data captured in a terminal at 20 Hz and OI=224, one for for heater on and one for heater off.


-Chris


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Christopher J. Cox
Research Scientist
CIRES/NOAA-ESRL
R/PSD3
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2 attachments

 **metek255_htm0_oi224.log**
1038K

 **metek255_htm1_oi224.log**
1374K

Matthias Lueck <lueck@metek.de>
To: Christopher Cox - NOAA Affiliate <christopher.j.cox@noaa.gov>
Cc: Matthew Shupe - NOAA Affiliate <matthew.shupe@noaa.gov>

Wed, Jun 26, 2019 at 6:13 AM

Hello Christopher,

thanks for the data.

The data show a possible deformation of transducer 5 and/or transducer 6. (the alignment of the sensorarm)

Please have a look at the attached manual at p. 62ff about sensor status information. The last digit in your recorded data is 4 most of the time.

This stands for

„4“: temperature measured along this path deviates too strongly from median of all measured radial temperatures“

You can verify this assumption while increasing the MTD parameter. Try a value of MTD=7.0 (or higher stepwise).

Before you can change the MTD parameter you have to enter the keylevel key=29015.

The MTD parameter is described on p.48 of the manual.

Please let me know your comments and if possible please send me a record of this session.

Best regards

Matthias

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Christopher Cox - NOAA Affiliate <christopher.j.cox@noaa.gov>
To: Matthias Lueck <lueck@metek.de>
Cc: Matthew Shupe - NOAA Affiliate <matthew.shupe@noaa.gov>

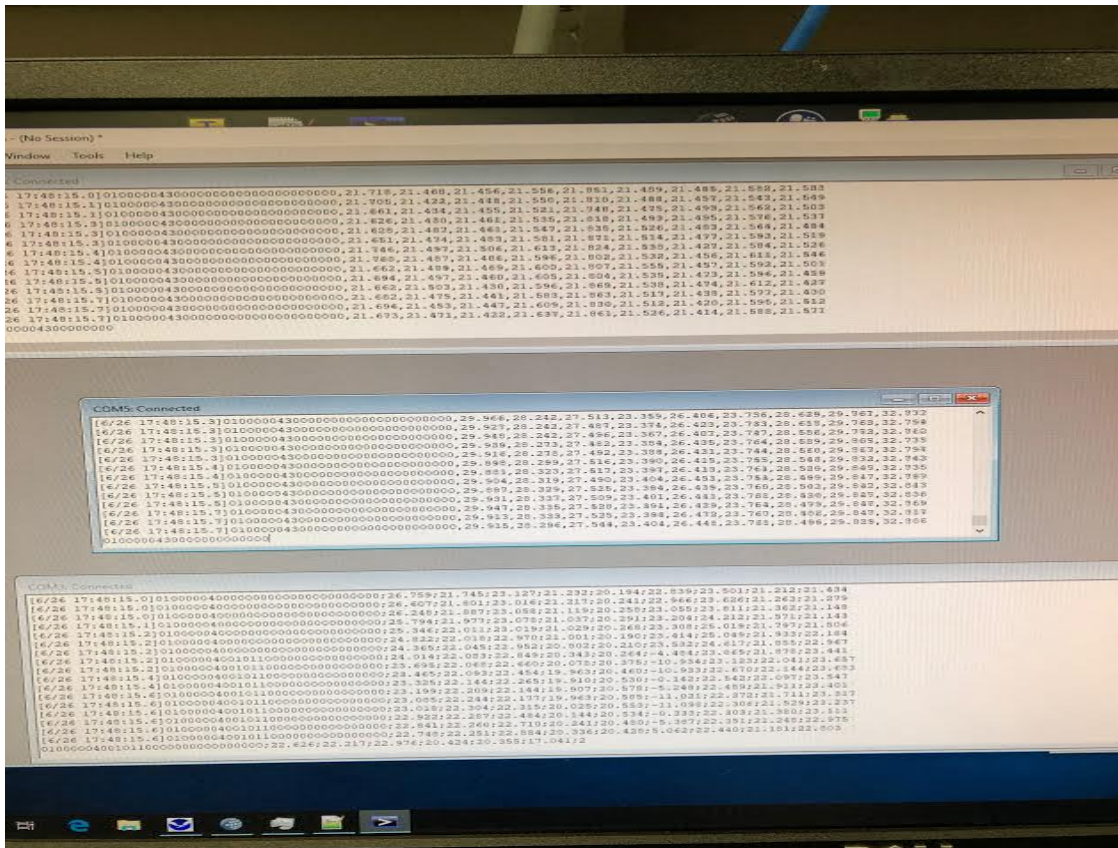
Thu, Jun 27, 2019 at 1:33 PM

Hello Matthias,

Thanks. The MTD parameter did address this issue. I've set it to 7 C, as you suggest.

I haven't had a chance to inspect any spectra, but I ran 3 instruments, including the one with the increased MTD parameter under a hood for a half hour or so in the lab at ~ 23 C. The x,y,z wind calculations for each were well within spec in terms of both the mean offset from 0 and the noise level (L). I'm curious about the absolute temperatures, though. MTD=5 resulted in many rejected samples from the instrument we have discussed. An example of the radial temperatures (OI=4) from this instrument is shown in the middle panel of the image attached. The individual estimates range from 23 to 32 C. You can compare this to the samples in the panels above and below from the other two sonics (with MTD=5), which are both closer to the ambient air temperature and have less variation between the components. During the hood test, the mean sonic Temps were 29.1, 24.5 and 22.4 C. Again, the noise characteristics (L) were good (0.011-0.016 C). I don't see anything in the new manual about calibrations for sonic temperature: I recall that in older models, the user calibrated it but of course, for the EC application the noise in T is more important than the mean bias. Since L for T is in range, the variability amongst the components and the mean bias appears stable. My question is, given that the noise characteristics are small and the winds are within spec, is there any reason to be concerned about the fact that the radial temperatures are both biased and variable in this instrument, or is it best to just relax the MTD threshold and rely on the uncertainty and L metrics, as well as verify the spectra look realistic?

-Chris



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Matthias Lueck <lueck@metek.de>

To: Christopher Cox - NOAA Affiliate <christopher.j.cox@noaa.gov>

Cc: Matthew Shupe - NOAA Affiliate <matthew.shupe@noaa.gov>

Tue, Jul 9, 2019 at 4:15 AM

Hello Chris,

I would ask you if the problem is solved or do you need further help?

Did you try the „sonic-signal-checker-program“ to display the signal levels? If you have please send me this file.

If the signal level is ok, you can solve the problem with a new calibration. It is possible to do it in your lab.

Please let me know your comments.

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