

Sunburst SuperCO₂ System

pn: IRC-Std

sn: IRØ12

mfr: June 2017

Licor CO₂/H₂O Gas Analyser

VIGI Valco Inst (8 Inc. 2 multiport

Item # C25-6186 EUHB } valve

SN # 17S-0249L

Air pumps (x2) PN: H054B-11 (Atmospheric Air)

PN: L045B-11 (Sample Air)

Sunburst SuperCO₂ System

First use was on CCGS

Louis S St-Laurent Sep 2018

on IOS program 2017-11 J01S

~~For~~ Next use on CCGS sir Wilfrid

Laurier July 2018 on IOS program

2018-63 Canada's Three Oceans a

Sunburst shower head Equilibriator was used.

7 July 2018

2018-63 C30

Marky Davelaar set up the pCO_2 system on the SWL. Sensor loop was turned on evening of the 6th. The pCO_2 system was turned on morning of the 7th.

Adjustments made through the day w/ standard gas pressure set to 20 PSI and tablet time adjusted by ~1 min to match GPS (UTC) time.

File: "2018-63- pCO_2 -0002-~~4100~~"
and program adds " pCO_2 -~~ddmmhhhh~~"

So in future could just use "2018-63"

Flow measured in bucket as 4L in 65 sec
Target Flow is 4L/minute

Valves show water flow with top of floating valve @ 5.

Peltier traps set up on sample and air lines. Marky was the fans working now.

Standards are: O_2 , ~~380~~³⁸⁴ ppm, 710 ppm

08 July 2018 0545 SZ (UTC)

Ship stopped in Port Hardy for fuelling.

Ran "last standards + shut down". However it ran standards then started running the sample again.

So just hit exit. Turned off gases. & Powered off the pCO_2 box.

09 July 2018 0354 SZ UTC

~~pCO₂~~

Seawater loop turned back on as we left Port Hardy.

Flow established

Gases turned back on (23 PSI)

Peltier traps plugged back in

Box turned on
software restarted.

(note Fluorometer is reading high ~ 8 $\mu\text{g/L}$)

09 10 Jul 2018 0833 UTC

Emptied Peltier trap, only ~ 3.1 mL in it.

11 July 2018

Questions:

Gas Flow rate in front-of-box
Flow meter shows 7250 at all times
Book says sample ~ 250 ml/min
atm + standards at 100 ml/min

2) Pressure connection ~~is~~ has lab air
going into pressure port ~~have~~
Book says ~~these~~ should be the external
connector should go to a port @ top of
SHEQ or "T" to the sample outlet of
the MEQ

our SHEQ (double system) doesn't have a
pressure input?

3) Both Atm and Sample lines coming
from the pumps have T's. In the
book these both have restriction valves
on them. The "T"s pull air/sample
into the ~~line~~ into the multiport
valve.

4) Make up air valve on SHEQ is
has no plumbing attached.

- a) is this closed?
b) from this is drawing in lab air?

Values in Gulf of Ak Center:

Sample 470

Atm 650

Ostd 0

384 Std 330 increasing ~30 ppm during STD

710 Std 670 " " " " "

Atm is hanging out window - wouldn't expect
it to be getting exhaust? But it is high.

Sent email to Marly w/ these questions.

~~the~~

Marly Davelaar asked that the standards
be set to 10PSI (had been 20PSI)
so these ~~were changed~~ ^{will be} were changed

~~11 July 1830 UTC~~
12 July 00:14

So! After hearing back from Marly -
he suggested I try adjusting flow to match
the manual.

- There are no flow regulators for the 'T's
coming from ~~gas~~ sample or atmosphere so
these can't be changed. ~~There~~ There
are ~~reg~~ restriction valves on the sample +
~~gas~~ atmosphere lines on the outflow
of post pump, post T, just before exiting box
but these are left open (sample decre
flow is supposed to be 1000 ml/min).

12x these
turns }

• For the cases:

gas cylinders set to 10 PSI
Flow restriction valves cycled from closed to open but flow meter did not change. Broken?

$\left(\begin{array}{l} \text{O CO}_2 \Rightarrow \text{no change in valve w/ flow} \\ 384 \text{ CO}_2 \Rightarrow \text{no flow} = 370 ; \text{high-flow} = 410 \\ 710 \text{ CO}_2 \Rightarrow \text{no flow} = 680 ; \text{high-flow} = 780 \end{array} \right)$

Left valves in half way position
~~Left~~ and retightened locking nut.

→ Note! A closed restriction valve is still partly ~~above~~ has exposed threads. Open valve has is unscrewed all the way until it meets a "stop".

• Tubing on "exhaust" removed per instr. in manual. But no change w/ flow meter.

• Have not adjusted pressure tubing or make-up air question.

Tanks @ 10 PSI
HUGO ATM tubing farther out the window
→ set ATM + std sampling to 180 sec (from 90 sec)

ATM = High! ~730 sensor is 483
O = 0.8

384 = 379 steady after initial adjustment
710 = 701 steady

* Had removed ~~flow~~ Licor outflow from flow meter to confirm flow meter was broken (still reads 2250ml/min)

~~Now reinstalled - hope this doesn't affect readings?~~

Couldnt blow through the meter so did not reattach.

Licor gas exiting straight into box

14 July 0300 UTC - SZ

Sewater Pump turned off after docking @ Dutch Harbor, AK. Box turned off. Software closed.

14 July 2000 UTC SZ

Sewater pump turned on. System powered on + software started @ 20:40 UTC

SeaWtr: 430

ATM: 423 - Much lower than usual!

O: 14

STDS: 384: 390

710: 710

Running STDS for 180 seconds.

Down from 240 seconds.

Before restarting removed Peltier water trap from atmospheric line (possible leak!) per Marty's instruction. Note - this trap has been dry for the duration of the trip.

Noticed that by ~~the~~ wiggling line to peltier trap the value of CO₂ would change. Took off, found that tubing easily came out. Reattached and covered all junctions w/ "wag type" (stretching self sticking rubber tape).

15 July 0123 - sample peltier trap ~~not~~ put back on. (525)

Values had been ~500 just sucking in lab air as sample.

After reattaching trap, values went to ~~440~~ 440, not much different than before.

Data between 14 July 2000 and 15 July 0123 should be tossed. ^{old}

see if this lowers w/ time as air gets flushed out of equilibrator.

15 July 2018 2333 UTC
Sikh Anna noticed drops of water in the Atm line (It's been raining outside)
Atm unplugged and Peltier trap put back into line.

Plugged in and put together by 16 July 00:04 UTC And tubing between btw Vicker's Box and peltier. Replaced w/ jst while working on Atm line, ^{thing}

notice that sample values have gone up to 540. Seems like there must be a leak or and it's taking in lab air as I move & wiggle the tubing lines. OR maybe water did get in the line...

16 July 0357

→ Atmosphere tubing removed again and there ~~was~~ was moisture in the line btw Peltier trap and box. Maybe due to try'n to drain trap and ~~had~~ having air from lab bubble into the trap. Fussy out and line getting blocked w/ water? ^{outside}

Licor spikes ~~to~~ from 410 to 520? even though using sample not atmosphere.

Leaks in line? Wiggling affecting the sample lines? Moisture in Licor?

18 July 2018 1356 UTC

Atm still open to lab.

Tried breath test... blew on connectors of box and had spike in CO₂ (370-400) waited ~3 min and value went ^{back} down, blew again & value went back to 410, then back down...

CO₂ spikes 1100

so at 14:11

I detached the external ports lines (To SHEQ, FROM SHEQ, To MEQ, FROM MEQ) trimmed end off tubing and reinserted in connector.

Also took lines out of coupler in "To SHEQ" line, trimmed edges and resealed.

It is now dry outside (no more fog / dripping fog) and reattached lab-atmosphere line to peltier trap.



This was where it was disconnected.

1741 UTC - SZ

Gave the "breath test" again. Still have spike response in CO₂

19 July 1139 UTC - SZ

TRY BY-PASS of sample peltier trap spHe + 1100 as tubing changed. Will need to wait to see result.

1144 - still spikes back

1203 - changed out connector in the middle of the "To SHEQ" line and the instant large spikes are gone. Notice tubing on box end of this connector is a different type

15

than the that join in the SHEQ

Does the connector work w/ both equally well?

Still can get spike in system w/ breath but its a slower response. Now. Hum...

1209 - Reattached Peltier trap to sample line to keep moisture out of Lincor

20 July 2018 0711 UTC SZ

- swapped out line btw box and black connector "To SHEQ"

Wanted to swap out the whole line + get rid of connectors but saw that

the line going to SHEQ actually goes right in side... didn't know if it needs tightening / loosening... didn't want to damage.

Removed tube was a slightly harder plastic?

Put in the "BEV-A-Line"

This significantly reduced the breath-test spikes ~~at~~ @ the black connector.

However, blowing on box @ the all the pass through ports still shows leaks.

Blowing near the peltier trap shows strong leak, even just handling the trap puts in spikes.

072430 - breathing near trap.

~~DATA~~ just wiggling doesn't seem to do it.

Peltis traps - please add back
plate so fingers can't get in the
Faus.