

# COMPUTATION BOOK

NAME

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*Book 3*



AMPAD, Dallas, TX. 75202

12-156

1/31/01 Retesting inlet line THAT I cleaned for C<sub>3</sub>

<u>CONDITION</u>	<u>DASIBI</u>	<u>TECO</u> (use for test)
NO inlet	124-125	126.7 - 124.2
Filter + inlet line	127	65 → 10:18
		78 10:21
	128 ———	86.2 10:44
	131 ———	92.3 11:21
		95.9 12:50
Filter alone	133	133-131 ✓

↳ looks like it's not getting any better  
 Filter looks O.K.

My first way of cleaning

- FLUSHED w/ Acetone
- THEN MeOH
- THEN High purity H<sub>2</sub>O
- THEN UHP N<sub>2</sub> flowed overnight

AFTER ABOVE -

- FLUSHED w/ HNC<sub>3</sub> solution
- THEN HIGH PURITY H<sub>2</sub>O
- THEN UHP N<sub>2</sub>

2/1/01 TESTING TUBING AGAIN

<u>CONDITION</u>	<u>DASIBI</u>	<u>TECO</u>
FILTER ONLY	133	126.8 - 127.4
INLET line	133	83.1 10:36
	113	81. 11:12
	122	82 1:20 ⇒ STILL NOT CLEAN?

TEST 3/8" TUBING

SMALL PIECE w/

SS FITTINGS

Put in LONG 3/8" PIECE

121

107.6 - 108.4

120

101.9 - 100.9 (losing 6-7 ppb)

123

98.8

↓ summary went down (?)

Condition	DASIB1	TECO
TEFLON H3 25ft	119	102.9 - 103.3
TAKE CLE	118	108.1
FE. #4	119	106.9 85.3 - 86.3

NOT  
BAD

2/6/01 New program in Fast23r logger  
using Fast23r4.csi

outputs: u, v, w, te, diag, oz stat, co2 ec, tec, pec, h2o.ec, h2o.kr,  
ec.ftot, analog-8, co2.obs, h2o.obs, ~~pressure~~,  
co2anal, h2oanal

Last 5 ARE 50M from Li-7500

put program in around 11:00 AM

Restarted DUCK AT 12:42

w/ changes to prep-config (covar. config?)  
yes-added  
pressure

New Dessicant in profiler - 11:45 - 11:57 AM

New CO2 standard

CSTAND = 345.7 ppm

RUN	SPAN				sample			[CO2] ppm
	ZERO	T	P	Vcor	T	P	Vcor	
1	6.000	20.73	722	1364	20.36	720	1519	399.73
2	6.000	20.52	720	1363 ✓	20.56	719	1518	399.76
3	0.000	20.89	719	1361	21.00	"	1518	400.48
4	"	21.24	"	1360	21.41	719	1512	398.77
5	"	21.71	718	1358	21.81	718	1514	400.64
6	"	22.14	718	1357	22.24	718	1512	400.01

399.82  
0.58 ppm

NEW CAL TANK ON AT 2:15 PM

2/9/00 Testing some more TUBING $F_{\text{TOT}} = 3 \text{ SLPM}$ 

1:15

<u>CONDITION</u>	<u>DAS1/1</u>	<u>TECG</u>
Nothing (filter)	82-83	86.6 <sup>7</sup> - 79.6 - 82.5
TEFLON #5	87-88-89 → 90 LAMP not stable, but	67.1 - 68.9 69.8
TEFLON #6	97-98	91.4 - 94.3 - 95.4 - 96.8 ✓
TEFLON #7	101-100	97.2 - 95.4 - 98.3 ✓
TEFLON #8	110-111	79.8 - 78.4
TEFLON #10	115-119	96.7 - 98.0
Nothing	120	115.2 - 114.3
TEFLON #9	121	103.0 - 104.3 - 101.9

JOHN BIRKS H<sub>2</sub>O test // O<sub>3</sub> off

NO H <sub>2</sub> O	11-12	1.0-2.2
TURN H <sub>2</sub> O ON	41 (goes up??) ↓ BACK DOWN TO 15 → 12	goes down to -140 THEN starts coming back ↓ -44.3 → -35.5
TURNED O <sub>3</sub> ON let it RUN for a while	up to 108	was originally -100 or so creeps back to 46 (2:38)
3:21	126-127	93.4-92.8
O <sub>3</sub> off ⇒	9-10	-9.8 →



~~1-10 on, O<sub>3</sub> off~~

CONDITION	DATA 1	TECO	Intensity A	Intensity B
200, $\phi$ AIR	9-11	-9.97-9.8	0.90387	0.88612
120 off	10 4) pulse (22)	P16 4) pulse (27) B16 4) pulse (-81)		

2/19

New  $\phi$  AIR (CO<sub>2</sub> std AT 760 ps.)

New RADIMETER TILT -  $\pm y = 0.000$  (BACK TO LEVEL)  
 $\pm x = 0.114$

AT 12:42 PM

(OLD READING  $\pm y \sim 1.2$  V  $\rightarrow$  LOTS OF FLUCTUATIONS  
 $\pm x = 0.104$ )

EC CO<sub>2</sub> OFF AT 12:45  $\Rightarrow$  CHANGE PUMP VEINS  
RUNNING AGAIN AT 2:00  
RUNNING AT 9 slpm, 48 kPa

Thermocouples for handheld Omega  
1 - 87 cm  
2 - 95 cm  
3 - 95 cm

3/2/01 Screw-up on Gold files to correct later.

At times  $F(\text{CO}_2)$  &  $F(\text{CO}_2)_{\text{filtered}}$  are not same value.

(see Oct. 1999 as example)  $\rightarrow$  175 pts (12%)

Even after throwing out all possible substitution options  
(gap-filling)

$\rightarrow$  Such low  $\mu^*$ , E-Balance, MicroNet violations.

What seems to be happening is:

$\left\{ \begin{array}{l} F(\text{CO}_2) \text{ is getting values from } F(\text{CO}_2) \text{ measured by IRGA using IRGA Webb conn.} \\ F(\text{CO}_2)_{\text{filtered}} \text{ is getting values from } F(\text{CO}_2) \text{ using KN Webb conn.} \end{array} \right.$

$\rightarrow$  probably only important in winter when IRGA underestimates LE due to freezing in lines.

Must be happening in gap-filling somewhere??

Don't know where

$\Rightarrow$  Also probably more noticeable in 99  $\Rightarrow$  w/ our gap-filling

June 2000  $\Rightarrow$  looks perfectly fine!!

3/7/01  $\Rightarrow$  went to site = nothing needed

3/9/01 Cleaned TEECOW #1 with:

- ① 4 volumes of pentane
- ② 2 volumes HPLC MeOH
- ③ Dried w/ UHP  $\text{N}_2$

3/19/01 - Downloaded SOIL DATA logger

TRAVIS DOWNLOADED 23x on South Tower (HAS ENTIRE WINTER) CO<sub>2</sub> STD = 345.7

New Cal Mixture SPAN					SAMPLE			[CO <sub>2</sub> ] ppm
RUN	ZERO	T	P	V	T	P	V	
1	0.00	21.68	788	1379	21.8	788	1536	399.77
2	"	22.20	788	1377	22.27	788	1535	400.30
3	0.003	22.59	788	1376	22.24	787	1535	400.80



New p AIR

New CO<sub>2</sub> STD. (2:30)

New Dessicant (2:30)

SOIL SAMPLES\* TRAVIS took some from Middle Tower - Treatment  
South Tower - NO Treatment

Treatment ⇒ Soil looked like fudge cake

Non-treatment ⇒ Soil looked like cold soil

4/12/01 - CNR logger off 10:38 → 11:49 DOWNLOADING

- New EC FILTER 11:09 - 11:28 AM

- Cleaned Kr hyg. 11:30 - 12:00 (H<sub>2</sub>O was freezing on windows may not be much enhancement)

4/13/01 Testing #1 Tel. for O<sub>2</sub> again (after pentane/NaOH wash)

Condition	Disbi.	TEL
- NOTHING -	108	88.6 - 89.9 - 91.9
PLT IN Tel #1	116	35 → 29.6 → 27.7
TURN F <sub>1</sub> DOWN TO crank up		[O <sub>2</sub> ]
"	177	38 (2:47)
	190	78 (2:55)
	223	112 9.09
crank up F <sub>1</sub> = 305 slpm		
	132	92.8 - 91.7 - 93.9 - 96.5 - 91.2
		90.8 - 91.6
TAKE out Tel #1		
	123	131.7 - 130 - 129.9
ZERO	10	still losing ~ 40ppb

4/16 Soil Samples

#5, #10 Irrigation, N tower

#6, ~~#8~~ #3 BY MAIN TOWER

#13, #4 - Ref. snow pit

New Cal. Standard

$C_{\text{std}} = 345.7 \text{ ppm}$

SPAN

Sample

Run	$\phi$	P	T	V	P	T	V	$\overline{CO_2}$
1	0	809	21.28	1376	805	24.41	1531	402.07
2	0	808	24.28	1323	805	25.15	1531	400.54
3	0	804	25.75	1370	805	25.95	1526	400.59
4	0	804	26.4	1368	805	26.55	1525	400.28
5	0	809	26.86	1367	805	26.96	1531	402.97

401.3 ppm

TREE

SOIL SAMPLES

10 cm

50 cm

125

100 cm

100

150 cm

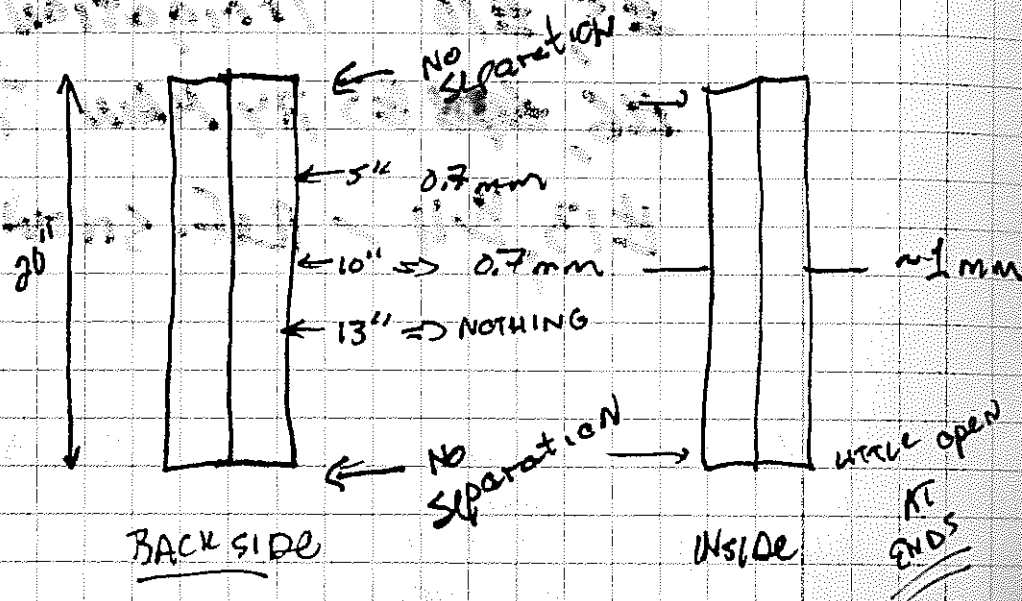
- 90 cm - From other tree

200 cm

110



4/20/01 looks like Probe <sup>SW</sup> on Tower leg  
 Need to TALK TO Jack Fox



4/18/01 Trans switched out  
 cal tank AT 3:00 PM

4/23/01 => Power out => tripped breaker AT ~11:00 AM

4/26/01 => switched out Blanken DATA logger 12:50-1:30

5/7/01 Downloaded ~~Blanken~~ Soil DATA logger - looks OK

10:45-11:00

~~11:45-12:00~~ Downloaded MET30 logger  
 - changed dessicant in profiler

11:- 11:30 Downloaded prof data logger

3:30 TEE #3 RUNNING AGAIN  
 used black TE, TEE #3 & TEE #6  
 AS INLET LINE

5/11/00 New  $\phi$  AIR

Prof12-2.CSI

Double ProfilerEvery 238 min  $\Rightarrow$  Sub.13 Levels

Level	C1 - C4	Status
1	1000	-8000
2	<del>1100</del>	-7000
3	1010	-6000
4	1110	-5000
5	1001	-4000
6	1101	-3000
7	0000	-2000
8	0100	-1000
9	0010	0
10	0110	1000
11	0001	2000
12	0101	3000
13	1011	4000
14	0011	5000

CAN USE: 

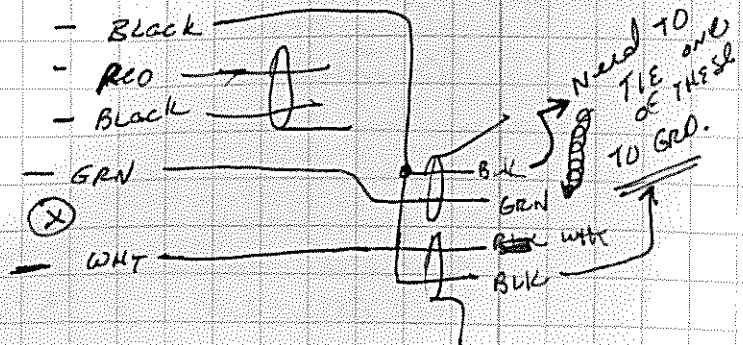
1111
0111

 ✓AS control port codes  
for 2 more lines

- ATI OFF AT 12:30 (Need Repair)
- CHANGED PROFILER FILTERS  $\Rightarrow$  12:30-1:45 PM

5/14/01 (In Lab) HANDAR Test Cable

- PIN 3 - GROUND (0V)  
 11 - +12V  
 12 - REF VOLT (FOR DIRECTION)  
 13 - DIRECTION SIGNAL  
 14 - FREQ. SIGNAL (N/A)  
 15 - SPEED SIGNAL



5/16/01 empties Brought down ✓

UHP N<sub>2</sub>: T641151  
22696657  
1596583  
TD-001290  
φAIR = 34-5119

"  
1  
+

Hern's pumps: Pumps DRAW 0.5-0.6 kW/pump  
4 pumps (I THINK) =

Normally

Extra = < 1A ⇒ ~0 W = P  
Top - 1A ⇒ 120 W (0.12 kW) P = VI  
Mid. - 2.5A ⇒ 300 W (0.3 kW)  
Bottom - 5A ⇒ 600 W (0.6 kW)

Hern = TOTAL = 2.4 kW  
(70%)

TOTAL = 3.42

5/23 New cal. Standard

C<sub>SPAN</sub> 345.7 ppm

Run	ZERO	SPAN			Sample			[CO <sub>2</sub> ] ppm
		T	P	V	T	P	V	
1	0	29.63	793	1355	29.68	793	1518	402.55
2	0	29.34	794	1354	29.39	792	1521	404.16
3	0	29.56	792	1353	29.58	792	1530	404.16
4	0	29.73	793	1352	29.76	792	1528	407.15
5	0	29.84	793	1352				
6	0	29.90	792	1352	29.96	792	1522	405.3
7	0	30.10	792	1351	29.30.2	791	1527	407.5

CO<sub>2</sub> inlet is 1 1/2 + 1 inch from path

406.9  
± 1.1 ppm

New std on = 3:00 PM

New Dessicant = 3:00 PM

Double profiler

For calibration

- Level 14

- level 15

WAS

Level	Relay
1	T-0
2	T-1
3	T-2
4	T-3
5	T-4
6	T-5
7	T-6
8	T-7
9	B-0
10	B-1
11	B-2
12	B-3
13	
14	B-4, 5 & 7
15	B-4, 6 & 7

Relays  
4, 5 & 7 on BOTTOM - ON

4, 6 &amp; 7 on BOTTOM - ON

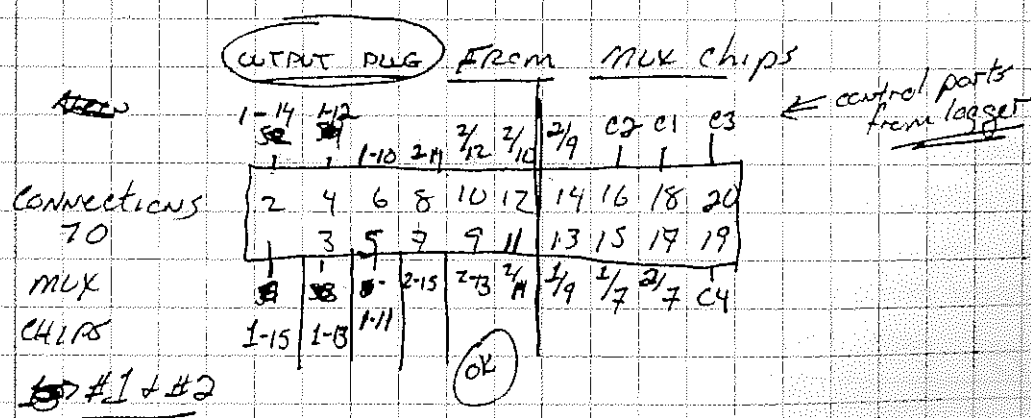
[Level 13(?)]

C4-C1

Level	Relay	C4-C1
1	T-0	1000
2	T-1	1100
3	T-2	1010
4	T-3	1110
5	T-4	1001
6	T-5	1101
7	T-6	0000
8	T-7	0100
9	B-0	0010
10	B-1	0110
11	B-2	0001
12	B-3	0101
13	B-4	1011
14	B-5	0011
15	B-6	1111
16	B-7	0111

No LEVEL 13

4, 5, 6 &amp; 7



Designated (mux# - PIN#)



Output plug →	Relay BOARD	CARD EDGE CONN	
Output plug	card (T or B)	PIN (B-#)	PIN 25 → +5V
	T	B-2	
2	T	B-3	
3	T	B-4	
4	T	B-5	
5	T	B-6	
6	T	B-7	
7	T	B-8	
8	T	B-9	
9	B	B-2	
10	B	B3	
11	B	B4	
12	B	B5	
13	B	B6	
14	B	B7	
15	B	B8	
16	N/C	—	
17	B	B9	
18	N/C	—	
19	N/C	—	
20	N/C	—	

Relays & Logger program seem to be working!!

After calibration - Resets to Level I (no matter where it is)

Some measurements

CO<sub>2</sub> inlet → 30 cm  
 Ke Pys → 45 cm

DOUBLE PROFILER BACK ON AT 2:53 PM  
 RUNNING 12 LEVELS

For Rebs ventilator - 1/2" o.d. x 2' (24")

5/31/01 ATI BACK-UP

(\*) (\*) TURNED OFF Li7500  $\Rightarrow$  THIS INADVERTANTLY SCREWS UP THE CSAT SONIC SDM  $\Rightarrow$  NO DATA FROM  $\approx$  1:00 - 3:30 PM

$\Rightarrow$  KR Ltg. OFF 1-1:30  $\Rightarrow$  cleaned optic  
 VN 0.55V  $\Rightarrow$  STILL OK BUT FAADING FAST  
 WILL PROBABLY TAKE DOWN & SEND BACK  
 TO CAMPBELL SCEN

$\Rightarrow$  ATI BACK ON AT 21.5m AT 3:00 PM

$\Rightarrow$  Li7500 reading junk (SITTING ON TOWER)

(\*) NOTE 3-3:30 PERIODICALLY CLOUDY  
 SEE 2 DISTINCT LIGHT LEVELS  $\Rightarrow$  WAY TO  
 LOOK AT DIFFUSE LIGHT!!

6/1/01

10:30-10:50 ~~PAR-HAZE~~ DISCONNECTED Li7500 SDM  $\Rightarrow$  MAY HAVE  
 LOST SONIC DATA

11-11:30 RECALIBRATED Li7500

$Z_{CO2} = 0.85$  (WAS 0.84)

$Z_{H2O} = 1.08$  (WAS 1.08)

$S_{CO2} = 1.01$  (WAS 1.01)

11:45-11:50 = DOWNLOADED CNR DATA LOGGER

1  $\Rightarrow$  1:30 DOWNLOADED Prof & Met LOGGERS ON TOWER

1:30-2:00 MOVED Li7500  $\Rightarrow$  AT 2:00  $\Rightarrow$  RUNNING AGAIN (\*)

NEXT TO ATI SONIC AT 21.5m

2:10  $\Rightarrow$  MAN ZERO & SPAN OF Eddy SYSTEM

NOTE  $\Rightarrow$  ASPEN <sup>leafing</sup> ~~butting~~ out!!

$\Downarrow$   
 MAY HAVE  
 LOST  
 CSAT  
 DATA

Some conversion TO remember

Latent heat of fusion -  $L_f = 3.34 \times 10^5 \text{ J/kg}$   
for  $\text{H}_2\text{O}$

Carbon Sums

~~NEE~~  $\left( \text{NEE} \frac{\mu\text{mol}}{\text{m}^2 \text{ s}} \right)$

DAILY sum =  $\sum_{t=1}^{1800} \text{NEE} \left( \frac{\mu\text{mol}}{\text{m}^2 \text{ s}} \right)$

$$\left( \frac{\mu\text{mol CO}_2}{\text{m}^2 \text{ day}} \right) \left( \frac{1 \text{ mol CO}_2}{10^6 \mu\text{mol CO}_2} \right) \left( \frac{12 \text{ g}}{1 \text{ mole C}} \right) = \frac{\text{gC}}{(1.2 \times 10^{-5})} \text{ m}^2$$

CO<sub>2</sub> Flux

$$\left( \frac{\text{mg}}{\text{m}^2 \text{ s}} \right) \left( \frac{1 \text{ mmol CO}_2}{44 \text{ mg CO}_2} \right) \frac{10^3 \mu\text{mol CO}_2}{1 \text{ mmol CO}_2} = 22.7273 \frac{\mu\text{mol}}{\text{m}^2 \text{ s}}$$

specific humidity:  $q = \frac{P_v(\text{H}_2\text{O})}{P_a(d-y \text{ air})}$  ↖ densitier

Gas Constant:

$$8.3145 \frac{\text{Pa m}^3}{\text{K mol}}$$

For  $\text{H}_2\text{O}$ :  $R_v = 0.4619 \frac{\text{Pa m}^3}{\text{K g}(\text{H}_2\text{O})}$  (or  $\frac{\text{kPa m}^3}{\text{K kg}(\text{H}_2\text{O})}$ )

For air:  $R_a = 0.287 \frac{\text{Pa m}^3}{\text{K g}(\text{air})}$  (or  $\frac{\text{kPa m}^3}{\text{K kg}(\text{air})}$ )

H<sub>2</sub>O Flux  $\frac{\text{mmol}}{\text{m}^2 \text{ s}} \Rightarrow \text{mm/time}$

$$\left( \frac{\text{mmol}}{\text{m}^2 \text{ s}} \right) \left( \frac{18 \text{ mg}}{\text{mmol}} \right) \left( \frac{1 \text{ g}}{1000 \text{ mg}} \right) \left( \frac{1 \text{ cm}^3}{1 \text{ g}} \right) \left( \frac{1 \text{ m}^3}{10^6 \text{ cm}^3} \right) \left( \frac{1000 \text{ mm}}{1 \text{ m}} \right) = \frac{\text{mm}}{\text{s}}$$

$\frac{1}{\rho}$  density of liq.  
 $\text{H}_2\text{O}$

DO cumulative sum to get daily/yearly, etc.

Error in Webb connection

$$LE = L_v (1 + \mu_w) w' q' \quad \mu = 1.6077$$

$$\sigma = \frac{p_v}{p_a} \left( \frac{H_2O}{air} \right)$$

Worst case SCENARIO AT OUR SITE

$$T = 25^\circ C \quad RH = 100\% \quad P = 71 \text{ kPa}$$

$$e_{sat} = 3.32 \text{ kPa} = e$$

$$p_v = 24.15 \text{ g m}^{-3} \quad \rho = 830.2 \text{ g m}^{-3} \quad p_a = 806 \text{ g m}^{-3}$$

$$\mu_w = 0.045 \text{ (5\%)}$$

6/26/01 New Cal. Standard

Cspan = 345.7 ppm

RUN	ZERO	span		✓	sample			CO <sub>2</sub> (ppm)
		T	P		T	P	✓	
1	0	33.23	812	1346	33.3	812	1522	407.36
2	0	33.66	812	1345	33.78	812	1521	407.66
3	0	33.97	812	1344	34.1	812	1518	406.98
4								
								407.3 ± 0.3 ppm

ON AT 12:15 PM

6/27/01 - 1st off (to be sent back) ~ 10:00 AM

- put jumper between low & gnd on propuane  
wind speed read-outs (~10:00)seems to be working on 16m propuane - no effect  
on 26m vane- Rearranging plugs => moved met & profile loggers to  
EXTRA outlet at bottom (which RARELY pops)  
(NO DATA LOSS)

- Plugged TECO into BOTTOM

→ Plugged IRGA's into top circuit (~3:30)  
IRGA's off for ABOUT 30 min? 3-3:30

THIS frees up middle circuits for PIR-MS



### Notes on DOUBLE profiles

Levels 12  $\rightarrow$  7 (our tower) are in reverse order

Level 12  $\rightarrow$  1m

Level 11  $\rightarrow$  2m

10  $\rightarrow$  4.5m

9 - (?) 11m

8 - ~~2m~~

7 - 26m

Debris Tower

6

5

4

3

2

1

3<sup>rd</sup> Tower

14 - 6.1m

13 - 6m

Order goes from TOP to BOTTOM ON EACH TOWER

7/2/01 New Power Supply, IN DUCK

DATA Down from 9  $\rightarrow$  9:30

Also lost some undercanopy wind data from  
11  $\rightarrow$  12:00

7/9/01

Tested ATI sonic (hooked up to laptop)

Running in factory default mode (not what I  
picked)

Resetting mode  $\Rightarrow$  (outputting spikes)  $\Rightarrow$  runs  
for a minute or 2  $\Rightarrow$  THEN gives lots of  
ERRORS  $\Rightarrow$  finally gives  
bad checksum & quits

IF it comes back - it comes back in  
factory default mode

7/10/01 = New boom ON Li7500 (~11:00 AM)

Took ATI down (had screwed up again - even in just terse mode)

↳ BACK AT TRAILER → appeared dead.

Switch battery in Fast 23x logger

Fast data down from 11:30 - 12:30

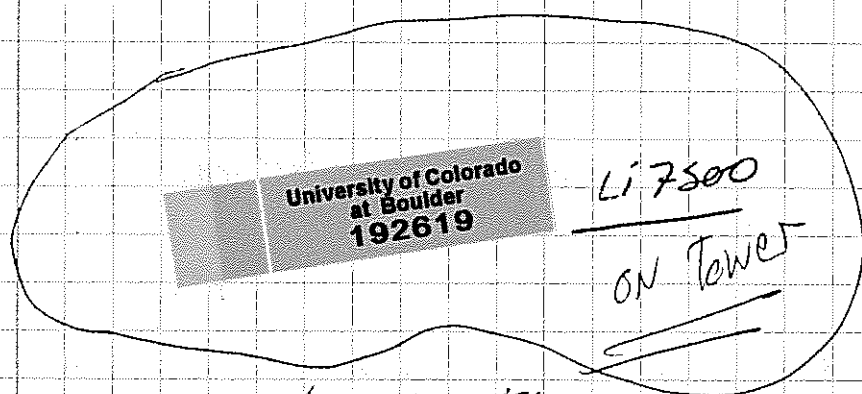
Peter hooked up shadow band ~12:00  
but doesn't seem to be working

New standard ASG std ( $\frac{1}{2}$ -cyl.)

Span = 345.7 ppm

Run	ZERO	span T	P	V	sample T	P	V	[CO <sub>2</sub> ]
1	0	28.28	812	1363	28.34	812	1576	420.26
2	0	28.40	812	1362	28.42	812	1577	420.73
3	0	28.45	814	1363	28.47	814	1577	420.56
4	0	28.52	814	1363	28.53	814	1578	421.00
5								

420.7 ± 0.2 ppm



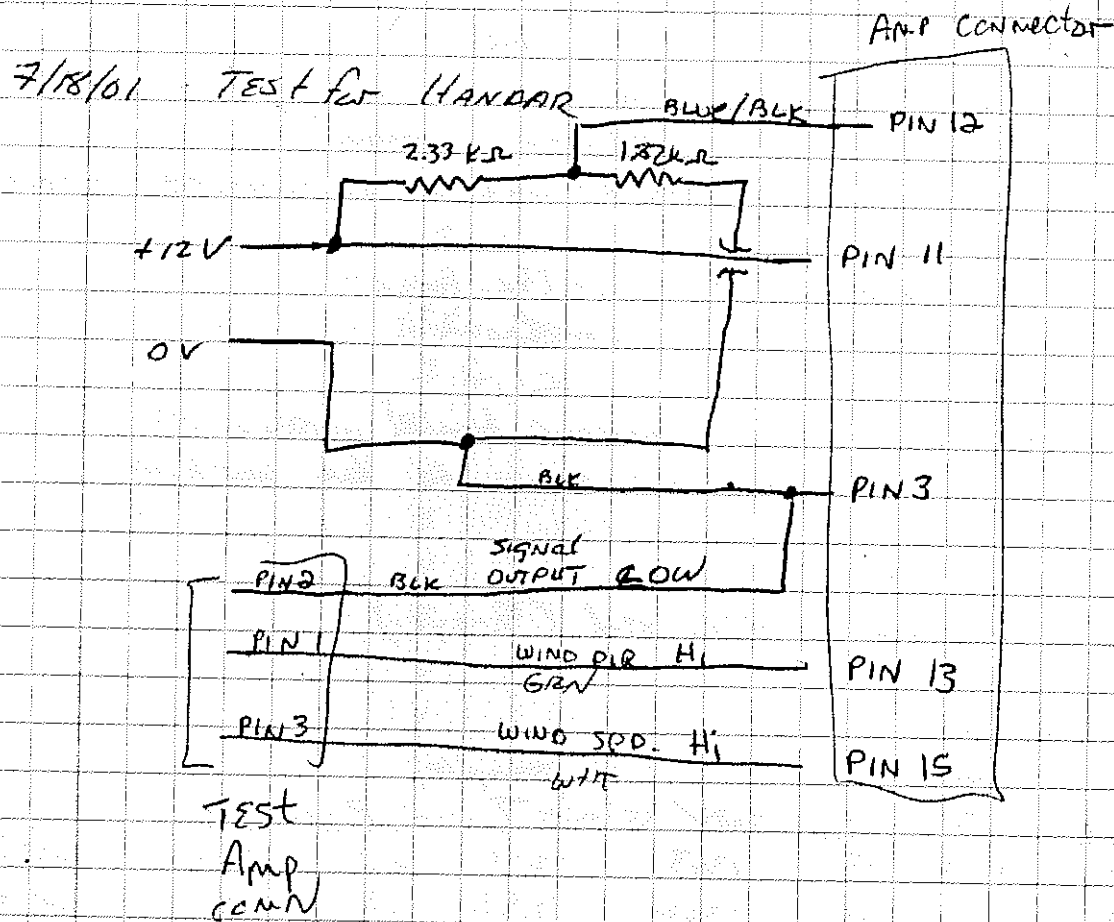
up ON 7/16, 17 & 18, 19

7/23 (F) BRIAN took plugged SF<sub>6</sub> line into EC line  
Flow RATE went up to 9.18 slpm (from ~8.5 slpm)  
Need to Re-calculate Lag Times

(2) ATI on AT ~11:30 AM

(3) New EC FILTER - 11:10-11:20 AM

charged prep. config & covar. config  $\Rightarrow$  just NAMES of channels  
 THINGS we USING fast O<sub>3</sub> Becomes fast SF<sub>6</sub> !!



$$\begin{aligned} 11 \rightarrow 3 &\Rightarrow 12V \\ 12 \rightarrow 3 &\Rightarrow 1.08V \end{aligned}$$

THIS APPEARS TO BE WORKING for both wind speed & direction

7/23 Added HANDAR channel to met23x (program = met30C.csi)  
~~And~~  $\hookrightarrow$  Not put into data logger yet

7/24 HANDAR RUNNING AT 6.5 m  $\Rightarrow$  connected TO UNDERCANY  
 23x (see Instrument book for wiring)  
 $\hookrightarrow$  2:00 PM  
 Appears to be working but winds are very light & variable so it is hard to say for sure  
 (ALSO started RAINING)

Noreon scaling wind direction  $0 \rightarrow 5V = 0 \rightarrow 360^\circ$   
 with  $0^\circ$  Being magnetic North  
 wind speed  $0 \rightarrow 1V = 0 \rightarrow 125 \text{ mph}$

PAR Diode use  
241-1  
multiplier

7/25/01 12:00 New CO<sub>2</sub> std. 420.7ppm

7/27/01 met logger off 9:30-10:30 for REWIRING  
Downloaded met logger 2:30PM  
New program w/ HANDAR INCLUDED  
logging data from HANDAR AT ~3:00PM (to run)

- (\*) Note Autocal's off on EC system (w/ new program)  
Plug in next time I'm here
- (\*) Handar oriented to magN. North
- (\*) Check covars data from campus  $\Rightarrow$  IS IT WORKING?
- (\*) SHADOW band PAR sensor IS IN FULL SUNLIGHT

8/2/01 - Autocal's for EC BACK ON ~ 11:30 AM  
- Downloaded 23xx  $\Rightarrow$  Bate + Robt T<sub>c</sub> on South Tower  
54.71 net working !!  
- Put ~~old~~ Prof 14C-Csi back into  
DOUBLE profiler  $\Rightarrow$  W70 SF<sub>6</sub> channels !!  
~ 11:10 AM

8/6/01 10:30 AM  $\Rightarrow$  Profiler logger off;  
Downloaded logger // changed dissicant  
in profiler  
11:00-11:30  $\Rightarrow$  Kr Hyg. back on  
New FILTER on TECO

(\*) Lower breaker had popped; however under canopy  
wind sensors didn't come back on when power  
restored  
At 3:30  $\Rightarrow$  Running again. Battery pack had  
drained way down (~3.4V) + was taking time  
to charge up // Switch battery packs w/  
SOIL 23xa



8/7/01 Sealed Target # 20

10:20-10:40 Downloaded CNR logger  
Relevelled CNR-1

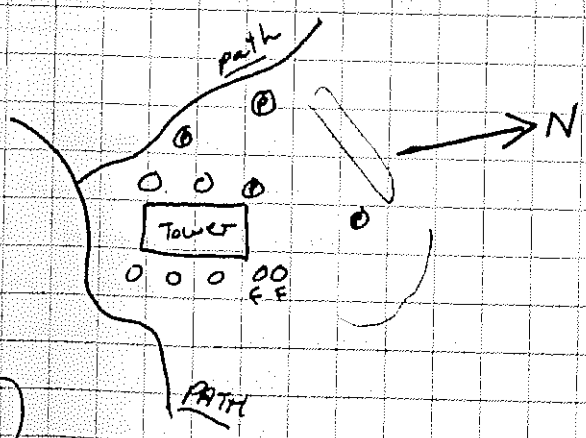
10:40-11:20 Switched Rebs Q\*7.1 // Replaced w/ Riet #2  
(2nd Rebs)!!  
Need to remember cal coeff.!!  
update

8/9/01 => Looking at July DATA => Precip gauge gave crazy value on July 28, 16100  
Big spike - Is it still working??  
↳ seems OK

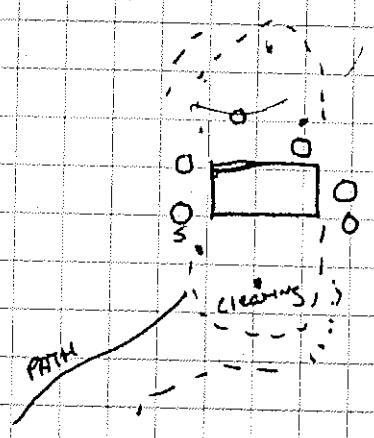
8/10/01 Tried hooking up Sealed but when turned voltage on - signal  
messed out!?! Took Down + back to TRAILER

- THINKING ABOUT WINTER/spring exp.  
May shut down south + main tower exp + move THINGS to  
MIDDLE + North towers.

MIDDLE Tower



NORTH Tower



Totals

TOTAL # of Tc's	57 - Campbell's	multiplexers:	10 AM416
	49 - Omega's		2 x 25T
# of SMPs	8 - Campbell TDR's		
PHOTOLOGUES:	81	DATA LOGGERS	2 x 23x
			2 x 21x
			1 x 10x
		other light =>	1 x Q*7.1 Riet

#Tc's Already on Mid. Tower

30 - Campbell's (where do they all go?)

13 - Omegas

#Tc Already on North Tower

12 Campbell's

12 Omegas

10 of these go to south Tower

- ① Bring 3 Denometers From S-Tower to Mid. Tower  
2 Denometers From Main Tower to North Tower (if cables reach)

Extra: 14 Campbell Tc's + 10 on South Tower  $\Rightarrow$  5 more somewhere (??)  
24 Omegas  
5 RTD's

Where are all the Campbell Tc's going on middle Tower!

(??) use Omegas as Reference Tc's ??

or put mux's in box w/ logger!!

+ 25T have their own Reference

### Plan

- $\Rightarrow$  Main Tower Take down  $\Rightarrow$  ① Downlead logger  
② Leave connected & running & TEST Thermocouples (Dump in ice water)  
Also Find out what's running & what's not?  
③ THEN Take apart & Label everything (if not already labelled)  
④ Repeat for south Tower!  
⑤ Move heat flux plates & RTD's // calibrate RTD's along the way  
(can leave connected to 23ra  $\Rightarrow$  just move THE multiplexer)

Take apart  $\Rightarrow$  (4)  $\Rightarrow$  may want to put up WOOD on middle tower & use U-bolts thru, WOOD on UNISTRUT!  
To MOUNT STUFF vertically AT BOTTOM

④ For Thermocouples  $\Rightarrow$  TRY to put mux in box w/ data logger so I can use panel TEMP AS REFERENCE!!

6/01 Preparation - OCEV Down by 12:00

New cal standard

Crip & 345.4 ppm

RUN	ZERO	SPAN T	P	V	Sample T	P	V	ICC-7
1	0.000	30.35	825	1360	30.39	829	1531	405.35
2	"	30.45	824	1359	30.49	823	1538	<del>408.11</del>
3	"	30.57	"	1359	30.64	"	1531	405.79
4	"	30.76	"	1358	30.82	821	1531	405.39
5	"	30.93	823	1357	30.96	822	1531	406.34

405.47 ppm  
± 0.22 (1σ)

Selected cable

9-pin AMO

- 1 signal
- 2 sig. grd
- 3
- 4 +12
- 5 Pow. Grd.
- 6

New std. on AT 3:30 PM

Main Tower Tc's

- PINE SW Temp - Zen pine
- SOIL T A 30cm - At Pine Root
- PINE HW Temp -
- SOIL T D 10cm - Root - Spruce
- SOIL T B 8cm - Root - Fir
- SOIL T C - Root - Fir

8/23/01

~10:15

changed dessicant in profiler

~10:30

New program in Fast23x

Fast23x5.csj

Saves Licor diagnostics to Fin. St. #2

② working - I THINK

5 min Averages

8/24/01

26 m cable

AMP	1	→	white	} wind dir
	2	→	BLK	
	3	→	sh	
	4	→	GRN	} wind spd
	5	→	BLK	
	6	→	SHIELD	
	7	→	RED	} +12V
	8	→	BLK	
	9	→	shield	

cable looks; Tested THS 16 m ov tower - looks OK.

16 m cable

1	-	RED	} +12V
2	-	BLK	
3	-	SHIELD	
4	-	WHT	} 0V (Ref)
5	-	BLK	
6	-	NC	
7	-	GRN	} 0V (Ref)
8	-	BLK	
9	-	SHI	



16 m vane

Wind Speed

RPM (motor)	V
off	0.03 (3.2 mV)
1000	234 mV
<del>1500</del> 1500	349
2500	580
3500	811
4499	1042
5500	1275
6500	1508.5
0	
500	118
700	165
332	79
425/419	102/100
242	61
0	0.03

3rd vane

0	0.00
1500	0.00

$$V_{16} = 2.89 + 0.2311 (\text{RPMs})$$

$\pm 8 \times 10^{-5}$

$$\frac{10}{26} = 1.039$$

26 m Vane

Wind speed

\* Not good well

RPM	V
0	102 mV (offset)
1500	414
1000	303
2000	524
2500	634
!! 3500 unsteady	850
475-3515	
4500	1084
<del>5500</del>	
4771	1137
won't go faster	

Try new cable w/ grd

500	187 (sec. $\pm 0.3$ )
1500	409
2500	633
3500	853
4500	1084
5500	1310
6500	1539
325	186
0	0.100

(mV)

$$V_{26} = 84.32 + 0.2224 (\text{RPMs})$$

$(\pm 0.0016)$

0.02224

## WIND DIRECTION

16 m V

Angle °	V
50	0.04
60	0.52
120	1.03
180	1.57
240	2.08
300	2.60
360	3.13
420	3.66
480	4.18
540	4.71

↪ switches back

$$V_0 = -8.55 + 8.727(N.DIR.)$$

(mV)  $\pm 0.012$

For wind dir. slope

was using = 9.259  
(6% larger)

Wind spd. slope

= 50.00  
6% larger

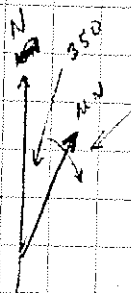
26 m VANE

Angle (°)	V
25°	<del>1.9</del> 1.93
30	2.44
90	2.88
150	3.42
210	3.97
270	4.49
330	4.80
360	
5°	0.14
30°	0.27
60°	0.52
90°	0.74
120	0.99
150	1.23
180	1.50
210	1.80
240	2.09
270	2.33
300	2.60
330	2.85
360	3.11
390	3.38
450	3.93
540	4.75
↪ 25°	1.62

↪ switches BACK

$$V_0 = -17.53 + 8.728(W.dir.)$$

(mV)



0.108

8/27 Calibrating 16m VANE at tower

With ~~new~~ set ring  $\Rightarrow$  looks like Vane reads  $20^\circ$  clockwise from magnetic North. Put in  $12^\circ$  declination (originally set to true N)  $\Rightarrow$  means we were  $8^\circ$  off.  
Reset to magn. N

WIND DIRECTION $^\circ$	Logger $V_0$	WIND speed RPM	Logger $V_0$
2	3	0	3.4
60	528	520	122
120	1043	700	165
180	1585	1500	350
240	2109	2500	580
300	2623	3500	812
360	3058	4500	1045
420	3690	5500	1274
480	4204	6500	1514
530	4661		
540			
550			

$$V_0 = 1.74 + 47.337(U)$$

(mV)

$$V_0 = -7.17 + 8.795(\text{Wind dir})$$

(mV)

$$2.54 \quad 0.7311$$

2) 16m VANE ON AT 3:30 - Appears to be working, but need to check tomorrow!  
 $\Rightarrow$  set to Magnetic North (not true North)

8/30/01

Worked on 26m VANE

⊛ NOTE - THE way I set the wind direction on 16m VANE may be wrong  $\Rightarrow$  set up 26m VANE just below 16m VANE for comparison

Wind direction seemed to be working:

Wind Dir	mV
0	23 → FLIPS TO 3330
60	558
120	1110
180	1615
240	2184
300	2720
360	3284 ←
420	3821
480	4375
<del>540</del> 530	4866
6	64

Hooked up calibration meter  $\Rightarrow$  was not working ???  
 Went ahead & mounted vane at 13m for comparison of wind direction - when I hooked up  $\Rightarrow$  wind speed now appears to be working (at 12:00 PM)

$\Rightarrow$  Back at trailer - noted wind speed on 16m vane quit working ???!

$\Rightarrow$  looks like shield on 26m vane w.spd shorted out the 16m wind speed. Turned power off/on  $\Rightarrow$  then 16m vane appeared to be working!

Ⓢ RH sensor at 2m not working  
 Temp. is working  $\Rightarrow$  seems to be getting 12V  
 (need to check cables)

$\Rightarrow$  looks like wind dir. on 16m vane needs to be reset  
 (probably just offset)

#### VANE HEIGHTS

RW4 16m = 15m  
 RW4 26m = 13m  
 Handar 9 = 9.35m  
 Handar 6 = 6.7m (should check this)



- 9/1
- Bottom breaker popped day before.
  - NO UNDERCANY wind
  - Propvanes  $\Rightarrow$  wind direction looks OK
    - $\Rightarrow$  wind speed - screwed up (very windy)
    - $\Rightarrow$  16m vane "came to life" while watching data

- 9/4
- UNDERCANY logger still not working !!?
  - (Breaker is OK  $\Rightarrow$  7500 RUNNING)
  - Wind speeds on props look screwy
    - 16m vane 10 (But very light winds)
    - 26m vane  $\sim$  400 mV ???
    - TRY grounding better.

Looking AT DATA from 8/30 onward

WIND DIR. on 16m vane seems fine

on 26m vane is crazy (all over the place)

WIND SPD on 16m vane is OK  $\Rightarrow$  but dies often

26m vane is OK  $\Rightarrow$  but dies almost the whole time

(when wind spd data is there - looks OK)

9/5/01 At site

- Downloaded 23x + 21x MIDDLE TOWER BLANKEN'S DATA LOGGER
- Hooked Battery charger + battery TO UNDERCANY 23x (BATTERY voltage was AT 4.8V = Not 12V)
- Re-Downloaded program - seemed to be working AT DATA logger - but NOT seeing data AT SUN  $\Rightarrow$  need to figure out what's going on. check short haul modems!!
- Propvanes still look screwy

W) P. Blanken - decided North Tower is the best place to set up experiment for spring!

Not working

9/6/01 Redial the ground on RMY vanes  
Not sure it helped any

(E35a)

P2a, P2b, ~~F35a~~, F35b  
S33a, S33b, Fa, Fb, Pa,  
Pb, Sa, Sb,

Calibration of forest sensor  
STARTING w/ 23x2 logger

11:30 → 3:10

Program Name	<del>New</del> NAME	H <sub>2</sub> O BATH	H <sub>2</sub> O TEMP (Handheld) Tc
RTD 1	0.0051	R 1	16.82
RTD 2	0.560	R 2	13.91
RTD 3	0.658	R 3	17.18 (.39)
RTD 4	0.977	R 4	15.30
RTD 5	0.0205	R 5	14.682

Tree 1		T 1			
P-root	-0.0895 // 0.156	T 2	0	16.3	14.9 ✓
F-root	0.74 - 0.816	T 3	0	16.67	16.0 ✓
S-root	0.82 → 1.21	T 4	0	17.58	15.9 ✓
P-sap	1.24	T 5	0	16.33	15.3 ✓
F-sap	0 0.658	T 6	0	16.44	15.9 ✓
S-sap	0 1.63	T 7	0	16.69	16.3 ✓
P-heart	1.00 → 0.68 - 0.75	T 8	0 (H2O)	16.72	14.35
F-heart	0 0.46	T 9		16.77	16.1 ✓
S-heart	0 1.21	T 10	0	16.65	16.1 ✓
P2-root	0 -0.57 →	T 11	0	15.72	15.3 ✓
F35-root	-1.29 / (-1.26)	T 12	0	12.25	12.5 ✓
S33-root	0 0.84	T 13	0	13.52	13.7 ✓
F37-root	0 -0.74 → -0.61	T 14	0	13.34	14.0
S39-root	0 -0.474 → -0.58	T 15	0	13.94	14.0 ✓
P2-sap	-2.14 - 3.06	T 16	0	10.95	12.3 ✓
F35-sap	-0.92	T 17		12.18	12.9 ✓
S33-sap	0 -0.4 - 0.68	T 18	0	13.25	13.8 ✓
F37-sap	0 -0.61 → -0.66	T 19	0	13.94	13.9 ✓
S39-sap	0 -0.09 → -0.03	T 20	0	14.14	14.7
P2-heart	-2.105 // -1.89	T 21	0	11.14	12.4 ✓
F35-heart	-0.69 - -0.67	T 22		14.27	13.2 ✓
S33-heart	0 -0.026	T 23	0	13.07	13.9 ✓
F37-heart	0 -0.22	T 24	0	13.59	14.3 ✓
S39-heart	-0.019 → -0.047	T 25		15.13	16.7
Tree 2	-0.313 // -0.28	T 26		17.059	16.2 ✓
Tree 3	0.40 (set for 25 min.)	T 27		12.581	12.3°C (-0.1)

Resistance Ratio in Ice

$R_s/R_o$ - 1	1.00000
2	1.0022
3	1.0026
4	1.0038
5	1.0001

AT TRAILER

12 Campbell Tcs

4 SMP 615's

4 Omega Tcs

New Standard on AT 3:30 — No calibration

7/14

New @ AIR

JACK DOWN SOUTH Tower Station —

615 WIRING

(DCC) H7

- GREEN

+12V

- RED

C7

Orange

G

- BLUE &amp; CLEAR

USE 23A + AM25T TO TEST TcsTIME

15:50

(into ice)

REF TEMP = 20.9

 $\Rightarrow 20.78$ HANDHELD  $\Rightarrow 20.8 \rightarrow 21.0$  $\Rightarrow 20.6$ Ice Temp  $\pm 0.1^\circ\text{C} \Rightarrow 0.3^\circ\text{C}$  (other handheld)

OUT OF ICE 16:50

(\*) water bath changing Temp —

Ref. Temp = 20.71

Handheld = 20.6

Bath Temp = ~~19.7~~<sup>19.6</sup>  $18.6 - 19.8^\circ\text{C}$  AT 16:30

Handheld = 19.7

## THERMOCOUPLES - Acc Campbells

		Visual Aug. (Ice)	Logsk (Ice)	Vis. Aug. (BATH)	m	Logsk (BATH)
(A)	1	0.34	0.323	19.76	1.073	19.70
Soil T 10cm	2	0.17	0.15	19.74	1.064	19.69
Fir SW T	3	0.32	0.33	19.67	1.079	19.61
Fir HW	4	0.04	0.036	19.67	1.062	19.63
—	5	0.05	0.047	19.73	1.059	19.68
Soil T B 3cm	6	0.76	0.86 (?)	19.78	1.103	19.71
Soil T 10cm	7	0.09	0.09	19.62	1.068	19.56
Spr. NW T	8	0.11	0.09	19.68	1.064	19.64
Fir HW T	9	0.85 Spr Sep T	0.83 (?)	19.70	1.064	19.63
Pine HW T	10	0.34	0.42	19.67	1.085	19.59
Soil T A 3cm	11	0.14	0.19	19.63	1.073	19.57
W Soil 10cm	12	0.74	0.63 (?)	19.79	1.090	19.72
SE soil T 10cm	13	0.18	0.17	19.74	1.067	19.67
SE soil T 3cm	14	0.60	0.58	19.73	1.090	19.66
NW soil 3cm	15	1.27	1.19 (?)	19.75	1.125	19.68
Pine SW T	16	1.14	1.14 (?)	19.76	1.124	19.65
(T26)	17	1.33	1.33 (?)	19.76	1.133	19.69
Pine #2 Hrt	18	0.38	0.41	19.71	1.081	19.66
Pine #2 Sep	19	0.48	0.50	19.88	1.078	19.79
Pine #2 Root	20	0.39	0.42	19.82	1.077	19.74
Spr 33 Hrt	21	0.08	0.11	19.75	1.063	19.67
Spr 33 Root	22	0.02	0.10	19.82	1.058	19.75
Spr 33 Sep	23	0.02	0.03	19.77	1.057	19.70
Fir 3 Hrt	24 (T22)	0.06	0.07	19.67	1.064	19.61
Fir 2 Sep	25	0.83	0.84 (?)	19.83	1.101	19.73

Ref Temp

~~20.70~~

20.70

Hano Held Ref

~~20.8~~ ± 0.1

Hano Held Ref

20.8

(4)

20.69

19.6-19.7°C

20.6



9/18/01 2ND Round of Tc's

From logger ICE

H<sub>2</sub>O BATH

HP well	B1	(*)	-0.03	1.0065	19.84	F35 Root
	B2	(*)	-0.03	1.0040	19.89	F37 sap
	B3	(*)	-0.03	1.0060	19.85	S39 root
	B4	(*)	-0.02	1.0035	19.91	S39 sap
	B5	(*)	-0.006	1.0050	19.89	S39 Int
	B6	(*)	-0.03	1.0065	19.84	F.R 37 Root
	B7	(*)	-0.05	1.0045	19.86	37 (?)
	B8	→	?	1.0050	19.90 (?)	
	B9	(*)	-0.13	1.0070	19.73	←
	B10	Not working				
	B11		-0.18	1.0055	19.71	
	B12	too short (15.74)				
	B13	-0.08	<del>15.74</del> Ice	1.0055	19.81	
	B14		-0.02	1.0076	19.83	
	B15		0.05	1.0013	19.8	
	B16		-0.05	1.007	19.81	
	B17		-0.002	1.009	19.82	
	B18		-0.12	1.004	19.80	
	B19		-0.04	1.003	19.91	
	B20		-0.12	0.9985	19.91	
	B21		-0.06	1.0035	19.87	
	B22		-0.13	0.9985	19.90	
	B23		-0.14	0.9985	19.89	
	B24		-0.06	1.0045	19.85	
	B25		-0.13	1.0030	19.81	
	Ref. =		14.63		16.45	

Starting RUNNING in ICE

AT 11:10

REF TEMP (HANDHELD) = 14.4°C - 14.5°C

ICE TEMP (HANDHELD) = 0.2°C

H<sub>2</sub>O BATH 11:42

AT 20.0°C

New Dessicant on mollier 12:30

PLUGGED IN Heater on RAIN GAUGE

DOWNLOADED 23x, 21(dendron), 10(N.Tower)

615						South Tower	
Time	1 <sup>st</sup> Peak	Slope	#	Tower		Cable length = 0.905m	
11:15	.964	1.164	131	M		u/114	= 0.961
Have heard DELAY = 0.83							
11:30	"set to 0"	.184	131	M			
11:40	0.975	1.087	132	M			
11:46	UH 14% 0.98ms	0.962	1.038	68	S		
11:52	14% 0.98ms	0.966	1.050	134	S		
11:56	15% 0.98ms	0.961	1.149	114	S		
12:20	11% 0.96ms	0.963	1.161	131	M		
12:25	11% 0.96ms	0.969	1.169	132	M		
12:40	38% 1.02ms	0.965	1.189	114	S		
12:42	52% 1.02ms	0.965	1.093	134	S		
12:43	38% 1.02ms	0.961	1.049	68	S		
13:00	54% 1.11ms	0.961	1.165	131	M		
13:02	54% 1.11ms	0.965	1.157	132	M		
13:10	24% 0.94ms	0.965	1.201	114	S		
13:12	24% 0.94ms	0.969	1.105	134	S		
13:14	24% 0.94ms	no power	68	S			
13:50	47% 1.07	0.968	1.068	132	M		
13:50	" "	0.964	1.008(1.176)	131	M		
13:56		0.966	(1.042)(1.206)	114	S		
		0.970	(1.100)(1.266)	134	S		
13:14:00		0.970	(1.058)( )	68	S		

12:30 add unknown "m"  
UH 30% max → 15% within 20 seconds

(\*)

DEAD!!

## 9/20 Denrometers

- At N-Tower - #2 4 & 8
- #8 - bad (N)
  - #9 looks good (mid)
  - #7 looks good (mid)
  - #6 " " "
  - #5 " " (mid)
  - #4 looks shitty (N)
  - #3 - BAD (mid)
  - #2 - OK But not great (N)
  - #1 - looks OK
  - #10 - (S)

## TDR AGAIN

	<u>Peak</u>	<u>INT</u>	<u>#</u>	<u>Tower</u>	
12:30	<u>.976</u>	<u>1.236</u>	<u>134</u>	<u>5</u>	(X)
	.976	1.196	114	5	
12:30-35	.966	1.106	132	M	
	.966	1.256	131	M	

C Thermocouples

		<u>ICE</u>	<u>BATH</u>	
C1	(*)	-0.09	19.84	1.0035 Psoil T 10cm
C2	(*)	-0.08	19.86	1.0025 <del>Psoil T 10cm</del> Stem Temp
C3	(*)	-0.03	19.89	1.0010 Psoil T 3cm
C4	(*)	-0.03	19.84	1.0065 No label
C5	(*)	-0.03	19.88	1.0045 P. NO 32 root
C6	(*)	0.007	19.86	1.0071 Ssoil T 10cm
C7	(*)	0.0075	19.86	1.0070 Fir 34 Root
C8	(*)	0.02	19.83	1.0086 Spruce 38 Root
C9	(*)	0.03	19.86	1.0086
C10	(*)	0.04	19.84	1.0102 10cm
C11	(*)	0.097	19.86	0.9993 1.012 10cm
C12	'	-0.27	19.88	0.9993
C13	(*)	-0.095	19.85	0.9995 1.0022
C17		-0.16	19.85	1.0055 0.9995
C15	(*)	-0.03	19.86	1.0069 1.0055
C16	(*)	-0.002	19.86	1.0069 1.0069
C12	(*)	-0.006	19.86	1.0068
C18	(*)	-0.003	19.91	1.0086 1.0044
C19	(*)	0.0008	19.83	1.0086
C20		Not working		
C21	(*)	0.03	19.86	1.0086
C22	(*)	0.08	19.83	1.013
C23	(*)	-0.03	19.81	1.0081
C24	(*)	-0.002	19.83	1.0085
C25	(*)	0.05	19.85	1.0104
1702.		15.19	17.95	

RANGE

3cm

(Camp)

9/26/81

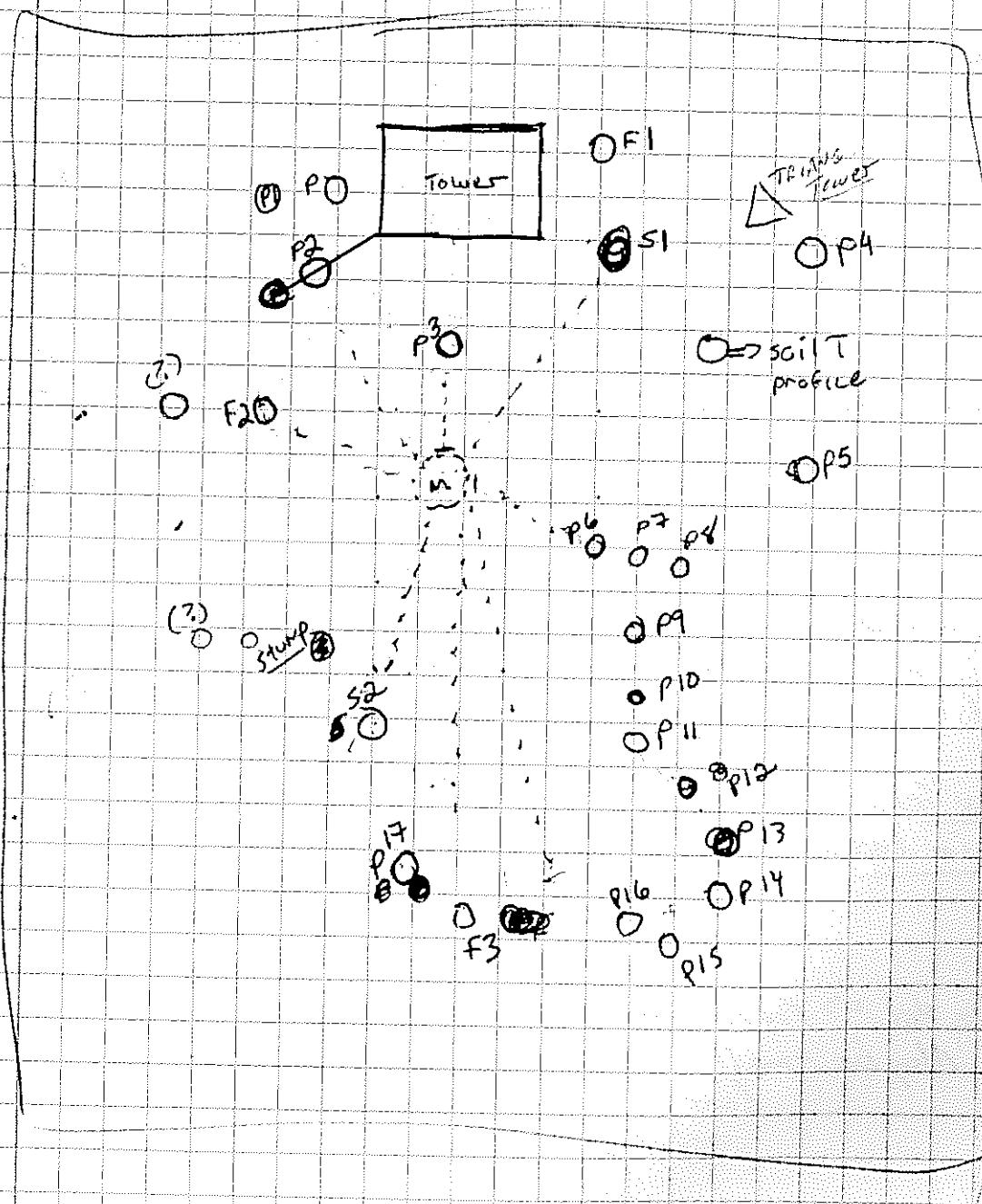
TDR AGAIN

Time = 10:30 AM

$1^{\text{st}}$ peak	Int	#	Tower
0.96	1.18 (Hump)	114	S
0.97	1.19 (1.15?)	134	S
0.97	1.09 (?)	132	S
0.97	1.200 (?)	131	M
			M

Site map

1" = 0.5 m





Next Round of Tc's

①

	Ice	H <sub>2</sub> O BATH	set at 20.3
1	0.08 *	<del>20.07</del> 20.07	0.986
2	0.08 *	<del>20.07</del> 20.12	0.983
3	0.17 *	<del>20.12</del> 20.12	0.9875
4	0.08 *	<del>20.12</del> 20.09	0.9845
5	0.04 *	<del>20.09</del> 20.06	0.9890
6	0.03 *	<del>20.06</del> 20.10	0.9816
7	0.04 *	<del>20.10</del> 20.07	0.9835
8	0.03 *	<del>20.07</del> 20.07	0.9830
9	0.06 *	<del>20.07</del> 20.10	0.9830
10	0.13 *	20.08	0.9875
11	No connection		
12	0.36 ] ?	20.23	0.9914
13	0.49 ] ?	20.20	0.9925
14	0.49 ] ?	20.17	0.9910
15	0.06	20.13	0.9816
16	0.16	20.06	0.9895
17	0.11	20.14	0.9835
18	40.70 (??)	24.24	<del>0.9827</del> 0.9827
19	BAD		
20	0.16	20.53	0.967
21	0.36 ] ?	20.26	<del>0.989</del> 0.990

No more

Ref Handheld = 22.3

Ref = 20.88 (DRIFTING)

Handheld

22.21

13:30 =&gt; in ice

15:30 =&gt; in bath =&gt; 20.3°C =&gt; went up to 20.6 THEN

4:00 = 19.7°C =&gt; stayed till 4:25 - 4:30

Downloaded data

New CO<sub>2</sub> std. => Scott Martin Tank 3419 ppmMaybe small leak somewhere in the line  
(not in regulator, except for maybe past  
shot-off valve.)

For hooking up  $\Rightarrow$  have 3 Tc mux's = numbered I, II, III  
(Each w/ 25 Tc's)

Will relabel Tc AS we hook THEM IN AS: I-1, etc.

Below is a map To give

mux I				mux II			
Tc		Col. Label	Location	Tc		Col. Label	Location
1	✓	—	S1 - Tapwood 1.5m	1	✓	—	S1 - Tapwood 1.5m
2	✓	—	S1 - hrtwd 1.5m	2	✓	—	S1 - hrtwd 1.5m
3	✓	A5	S1 - 6.5m	3	✓	A5	S1 - 6.5m
4	✓	A21	S1 - root (5cm)	4	✓	A21	S1 - root (5cm)
5	soil 1	A2	S1 $\rightarrow$ M 1m	5	soil 1	A2	S1 $\rightarrow$ M 1m
6	soil 2	A13	S1 $\rightarrow$ M 2m	6	soil 2	A13	S1 $\rightarrow$ M 2m
7	✓	A8	P3 - bole 1.5m	7	✓	A8	P3 - bole 1.5m
8	✓	A4	P3 - bole 0.5m	8	✓	A4	P3 - bole 0.5m
9	✓	A6	P3 - base	9	✓	A6	P3 - base
10	✓	A18	P3 - soil	10	✓	A18	P3 - soil
11	✓	A22	P2 - bole 1.5m	11	✓	A22	P2 - bole 1.5m
12	✓	A19	P2 - bole 0.5m	12	✓	A19	P2 - bole 0.5m
13	✓	A17	P2 - Bole - base	13	✓	A17	P2 - Bole - base
14	✓	A23	P2 - soil	14	✓	A23	P2 - soil
15	soil 3	A3	P2 $\rightarrow$ M 1m	15	soil 3	A3	P2 $\rightarrow$ M 1m
16	soil 4	C3	P2 $\rightarrow$ M 2m	16	soil 4	C3	P2 $\rightarrow$ M 2m
17	✓	A11	S1 - bole - base	17	✓	A11	S1 - bole - base
18	✓	—	P1 - sepwood	18	✓	—	P1 - sepwood
19	✓	—	P1 - hrtwood	19	✓	—	P1 - hrtwood
20	✓	—	F1 - sep	20	✓	—	F1 - sep
21	✓	—	F1 - hrt	21	✓	—	F1 - hrt
22				22			
23				23			
24				24			
25				25			

Therefore  
mux's  
Tc location

## Mux III

	Tc		Cal. Label	Location	
57	1	✓	D9	P16 2m bole	+
58	2	✓	D6	P16 0.5m bole	0
59	3	✓	D10	P16 base bole	✓
60	4	✓	D5	P16 soil @ bole	0
61	5	soil 112	D8	Soil 1m from P16	
62	6	soil 113	D7	Soil 2m from P16	
63	7	soil 114	D2	Soil 3m from P16	
64	8	soil 115	D4	Soil 4m from P16	
65	9	soil 116	D3	Soil middle 5m from P16	
66	10	✓	C11	S2 2m bole	+
67	11	✓	C10	S2 0.5m bole	0
68	12	✓	A10	S2 base bole	✓
69	13	✓	C7	S2 base soil @ bole	0
70	14	✓	C25	F4 2m bole	1
71	15	✓	<del>D9</del> D20	F4 0.5m bole	0
72	16	✓	C8	F4 base bole	✓
73	17	✓	C5	F4 base soil @ bole	0
74	18	✓	C1	F2 2.0m bole	1
75	19	✓	C4	F2 0.5m bole	0
76	20	✓	C2	F2 base bole	✓
77	21	✓	D1	F2 base soil @ bole	0
78	22	soil 117	A1	Soil 1m from F4	
79	23				
80	24				
81	25				

Thermocouples to be wary of: (Bad Zeros)

~~A6~~, A9, ~~A10~~, A12, A14, A15, A16, ~~A17~~, ~~A18~~, ~~A19~~, A20, A25

C12

~~D12~~, D13, D14, D21

4

11

8+7

5+5

4

6

5+5

5+5

6+8

11

8+7

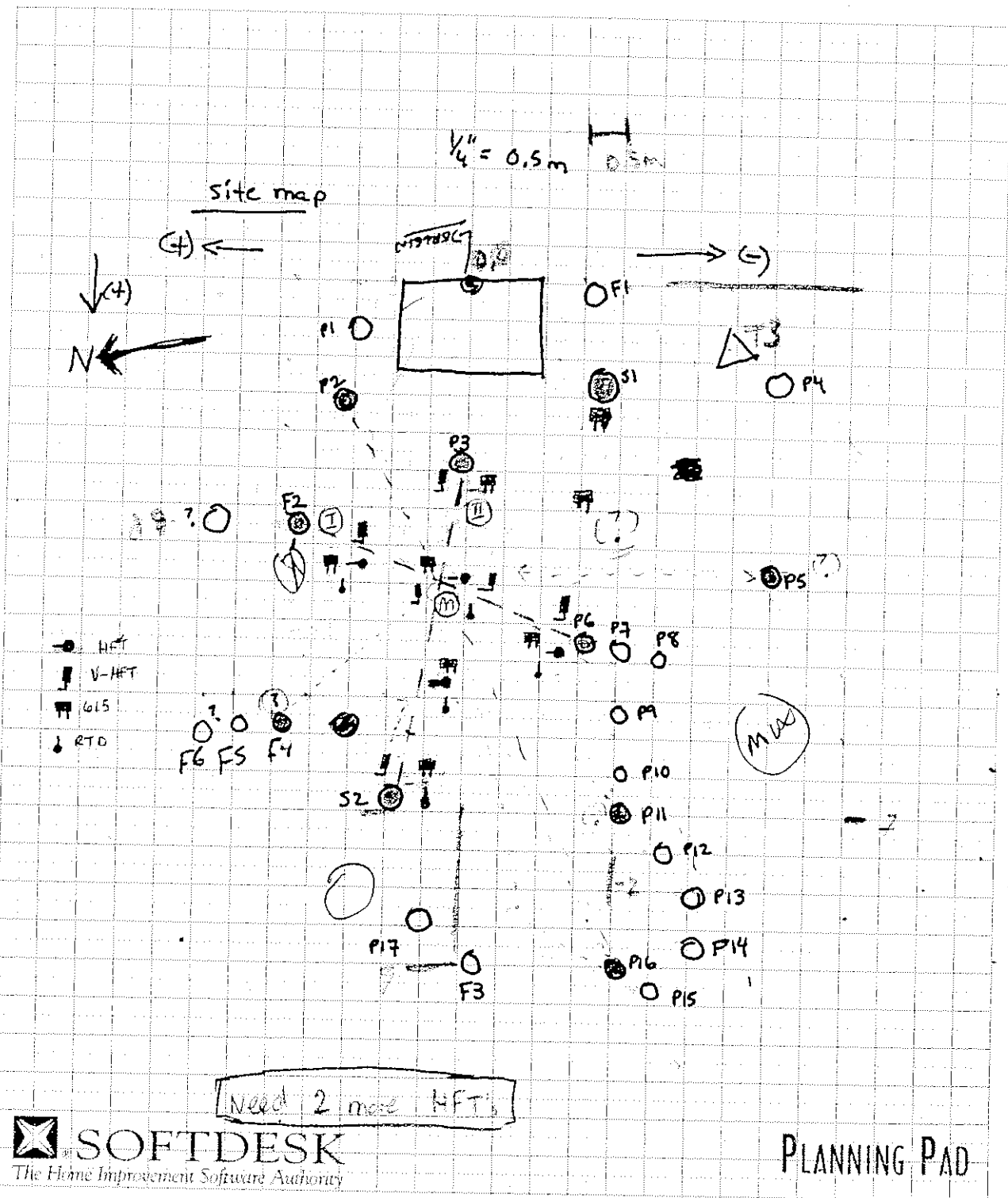
5+5

## Mux II

	Tc		Col. Label	Location	
31	1	soil 5	C6	Soil 1m from P11	
32	2	soil 6	B1	Soil 2m from P11	
33	3	✓	B3	P5 base soil @ bole	0
34	4	✓	B4	P5 base bole	✓
35	5	soil 7	B5	Soil 1m from P5	
36	6	soil 8	B6	Soil 2m from P5	
37	7	soil 9	B7	Soil 3m from P5	
38	8	✓	A24	P11 soil - base	0
39	9	✓	B2	P11 <del>soil</del> bole - base	✓
40	10	✓	C14	P11 bole - 2m	—
41	11	✓	B20	P11 bole - 0.5m	0
42	12	✓	B13	P6 soil - base	0
43	13	soil 10	B8	P6 → M - 1m	
44	14	✓	B25	P6 - <del>soil</del> bole - base	✓
45	15	✓	D17	P6 - bole - 2m	—
46	16	✓	D15	P6 - bole - 0.5m	0
47	17	✓	B19	P5 - bole 2m	→
48	18	✓	C21	P5, bole 0.5m	0
49	19	soil 11	A7	P5 - clearing	
50	20		B17	Ref for mux III	!! 11/9/01
51	21		D18	P8 Branch 1m	
52	22		D13	P8 Branch 2m	
53	23		B16	P5 Branch 2m	
54	24		B14	P8 Branch to 42m - 35cm from bole	
55	25		B23	P8 Branch 0.57m - 13cm from bole	

Column 8  
 P11  
 P5  
 P8  
 4.4  
 5.5

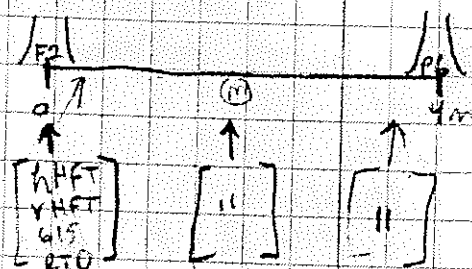




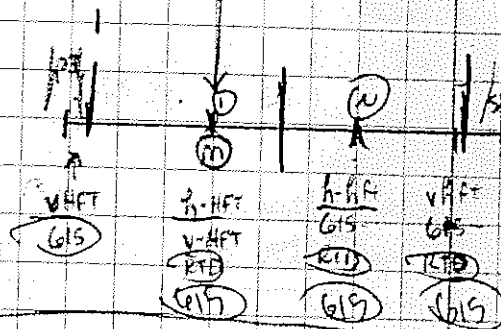
Phone: (816) 891-2800 • Fax: (816) 891-8018 • Internet: <http://www.softdesk.com>

Initial plan for sensorsTransect (I) (From F2  $\rightarrow$  P6)

3 Normal HFTs      3 vertical HFTs  
 3 GLSs  
 3 RTD

Transect (II) (From P3  $\rightarrow$  S2)

3 vertical HFTs      1 (additional) Per. HFT  
 3 more GLSs  
 2 more RTDs

Thermocouples

- ① Trees for gradients: P2, P3, S1, P5, F2, P6, S2 (?), P16, P11 (10 trees) F4  
 In each tree  $\Rightarrow$  Tc at 1.5, 0.5, BASE & SOIL (near root) = 4  
 $4 \times 10 = 40$  Tc's
- ② Needle Temp for P2, P3, S1 (maybe F1)  
 2 Heights for each tree       $3 \times 2 = 6$  Tc's
- ③ Soil Transects:

[ Transect 1  $\Rightarrow$  3 m Tc's every 1 m ] ✓

[ Transect 2  $\Rightarrow$  2 more (every 1 m) ] ✓

P2  $\rightarrow$  M  $\Rightarrow$  2 (1 m) ✓

S1  $\rightarrow$  M  $\Rightarrow$  3 (1/0.75 m) ✓

P11  $\rightarrow$  M  $\Rightarrow$  6 (1 m) ✓

P5  $\rightarrow$  M  $\Rightarrow$  3 (1 m)

P16  $\rightarrow$  M  $\Rightarrow$  6 (1 m) ✓

P  $\rightarrow$  M  $\Rightarrow$  2 (1 m)

27 Tc's

F4  $\rightarrow$  M  $\Rightarrow$  1 (1 m) ✓

$$\textcircled{1} + \textcircled{2} + \textcircled{3} = 73 \Rightarrow \underline{\underline{3 \text{ Tc max's}}}$$

Other SENSORS TO THINK ABOUT -

- PFED  $\Rightarrow$  Vertical distribution
- Long Wave Rad  $\Rightarrow$  Spatial distribution
- IR THERMISTOR  $\Rightarrow$

10/2/01

## IR Calibration -

Time	$I_{\text{peak}}$	$I_{\text{int}}$	#	Tower
11:00	0.776	1.120	134	S
11:05	0.968	1.152	114	S Screening
	0.972	1.072	132	M
			131	M

DOWNLOADED 23x AT 11:15  $\Rightarrow$   
 THEN 23x - disconnected !!

## CO<sub>2</sub> calibrations

(1) OLD STANDARD (in small tank - not much left)  
 Span 345.7

Run	ZERO	Span	P (mV)	T (°C)	V <sub>calc</sub> (mV)	Sample	T	V	[CO <sub>2</sub> ] ppm
1	0	793	27.90	1359	✓	792	27.93	1535	407.24
2	0	792	28.01	1358	✓	792	28.06	1535	407.42
3	0	792	28.13	1358		792	28.19	1534	407.23
4	0								407.30 $\pm 0.11$

AG-1 (Air-Gas #1)

1	0	792	28.4	1357	792	28.44	1618	438.39
2	0.001	792	28.55	1356	792	28.59	1615	437.49
3	0	791	28.71	1355	791	28.86	1614	437.62
4	0	791	28.98	1354	791	29.01	1615	438.23
5	0	791	29.12	1354	790	29.18	1608	435.59
								437.5 $\pm 0.95$

AG-2

1	0	790	29.59	1352	789	29.63	1608	436.77
2	0.001	789	29.73	1351	789	29.77	1609	437.35
3	0.001	789	29.82	1351	789	29.83	1620	441.55 (BAD SPAN)
4	0	788	30.55	1348	788	30.60	1603	436.43
5		788	30.74	1347	788	30.79	1604	437.07
								436.91 $\pm 0.40$

was jumped?

	HFT	orientation (V/H)	location
✓	1	V	F2 base
✓	2	V	middle of F2 - P6
-	3	H	P3 base
•	4	V	P3 base
✓	5	V	P6 base
-	6	H	P3 - 1m from P3
•	7	V	middle of P3 - S2
-	8	H	1m from S2
•	9	V	S2 base
-	10	H	S2 base

615's (TDL-soil moisture)

1  
2  
3  
4  
5  
6  
7  
8  
9

- F2 base
- P3 base
- Middle of F2 - P6, ~1m from P3
- P6 base
- 1m from S2 (prev. middle tower)
- S2 base (prev. @ South tower)
- P11 - clearing
- P5 - clearing

RTD

1  
2  
3  
4  
5

- P11 - clearing
- P3 base
- 1m from P6
- 1m from S2
- S2 base

T<sub>c</sub> not working =  
B8, B10, C20, D11, D19

Heat flux  
plates (HFT)  
TDL's (615's)  
↓  
Soil Temp's (RTD)

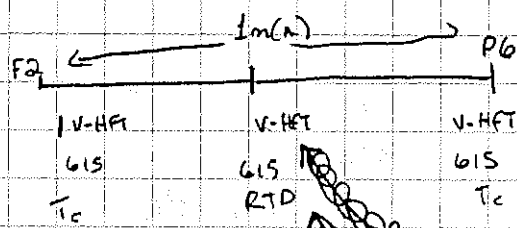


# TDR-GIS calibrations

Time	Delay Mid	Del. S.	$\theta(m)$	$\theta S$	S-131	S-114	M-131	M-132
11:00	0.905	0.87	0.121	0.097	0.144	—	0.100	0.184
10:30	0.988	0.895	0.176(0.168)	0.115	0.22	0.22	0.23 <del>0.23</del>	0.12 ?
12:30	1.158	0.900	0.305	0.124	0.26	0.22		
12:35	"	0.910	0.305	0.134			0.29	0.14
11:40	1.026	0.824	0.204	0.071			0.184	0.112
11:50	0.992	0.88	0.179	0.105	0.087	0.188		
12:20	1.352	1.228	0.482	0.364			0.198	0.20
12:40	1.419	0.967	0.54	0.162	0.128	0.224		
13:00	1.383	1.008	0.505	0.191			0.204	0.192
13:10	1.357	1.015	0.48	0.196	0.136	0.236		
13:50	1.392	1.026	0.514	0.204			0.212	0.10
14:00	1.355	1.014	0.478	0.195	0.296	0.24		

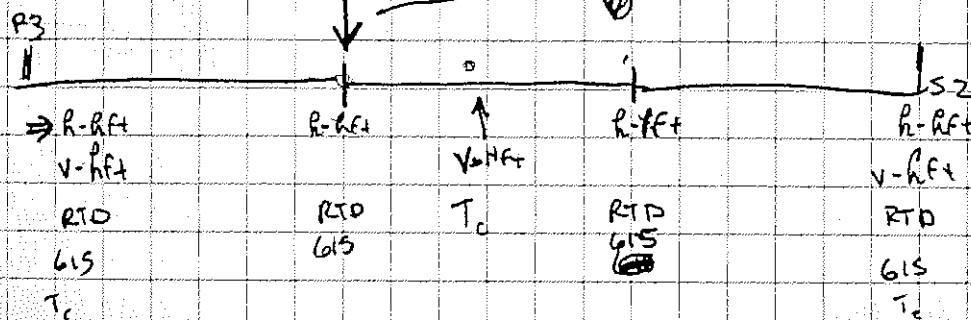
= After first day of installation at North Tower  
What we did -

## TRANSECT I F2 → P6



⇒ vertical HFTs ⇒ white dots pointing to F2 (Box not 100% sure)

## TRANSECT II P3 → S2



⇒ vertical = white dots towards P3

2 more GIS's  
① near P5 - clearing  
② near P11 - clearing

Use examples

Mux III  $\Rightarrow$  Taking care of Trees: P16, S2, F4, F2

	<u>2m</u> <u>Bore</u>	<u>Bore 0.5m</u>	<u>Bore Base</u>	<u>Soil base</u>	<u>Soil Transect <math>\rightarrow</math> M</u>
P16	✓	✓	✓	✓	5 (1m, includes M)
S2	✓	✓	✓	✓	—
F4	✓	✓	✓	✓	1 (1m)
F2	✓	✓	✓	✓	—

3 openings on mux

Mux I  $\Rightarrow$  Taking care Trees: P2, P3, S1

	<u>2m(A)</u>	<u>0.5m(B)</u>	<u>Base(B)</u>	<u>Base(soil)</u>	<u>Soil Transect <math>\rightarrow</math> M</u>
P2	✓	✓	✓	✓	2 (1m)
P3	✓	✓	✓	✓	—
S1	✓(2)	✓	✓	✓	2 (1m)

8 openings on muxMux II

TAKING care of TREES: P5, P6, P11

	<u>2m(B)</u>	<u>0.5m(B)</u>	<u>Base(B)</u>	<u>Base(soil)</u>	<u>Soil Transect <math>\rightarrow</math> M</u>
P5	✓	✓	✓	✓	3 (1m)
P6	✓	✓	✓	✓	1 (1m)
P11	✓	✓	✓	✓	2 (1m)

18 openings left

Need at least 10 more  
(still have 8 available)

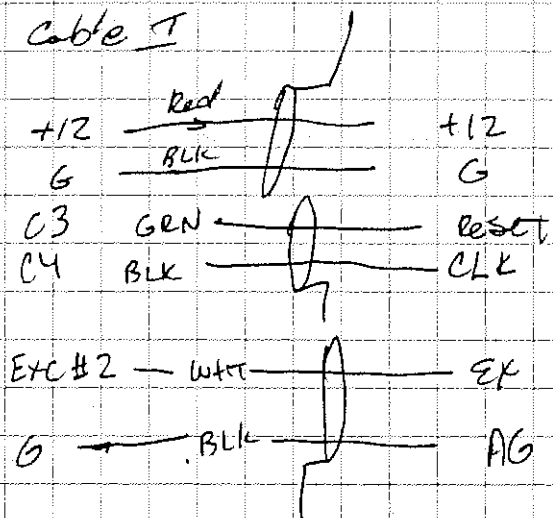
Needle Temps = Find out how many fine-wire Tc's we have  
(use these first)

Bolts = Have Sap+RM on 2 more trees (P1 + F1)  $\Rightarrow$  4 more Tc's  
(could measure directly on logger as well), Not thru mux!  
Still have 9 channels on Tc logger!!!

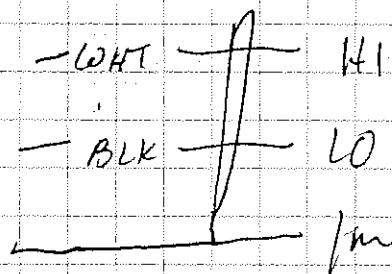
Soil Profile = 1-2cm, 5cm, 10cm, 20cm, 50cm (5 Tc's)

## Mux II WIRING

Cable I



CABLE 2



- Heat Flux plates logger  $\Rightarrow$  RUNNING  $\sim$  12:00 PM
- Tc mux logger  $\Rightarrow$  RUNNING  $\sim$  3:00 PM (Mux I & II)
- Mux III not hooked up yet
- ④ ALSO Tc's not in holes except at P1, F1 & S1 (sep + hot)

- New cal stat. AG-1  $\Rightarrow$  ~~1:00~~ - 2:00  $\Rightarrow$  leaks checked

### To do for spr. exp.

- ① ~~Drill hole in Tc Mux III box or make cable~~
- ② ~~Hook up Tc Mux III  $\Rightarrow$  use 16 wire cables? need voltmeter!!~~
- ③ ~~Drill holes in holes  $\Rightarrow$  put hole Tc's in~~
- ④ Start hooking up Tc's in needles
- ⑤ A soil Temp profile ??  $\Rightarrow$  0-50 cm at most! (Do I have Tc's)
- ⑥ Hook up grounds on logger & mux's (use Cu already there!)  
ALSO - connect ground red to AC ground on charger!!  
- grd - Mux II
- ⑦ THINK ABOUT light sensors - shadow band / PAR  
Rnet (Anything else?)
- ⑧ ~~Snow profile sensor (lostaken, Rind)~~
- ⑨ ~~Finally switch Dendrometer wires & Repower 212 to measure Dendrometers (have some more?)~~
- ⑩ ~~Need DBH of TREES~~

10/16 11:20-11:30 New DESSICANT IN profiler // Zeroed + spanned EC system  
 - Turned off FAN IN DUCK  $\Rightarrow$  Later found out turned off ATI sonic  
 11:30-12:00 Downloaded CNR logger  
 $\Rightarrow$  Disconnected shadow band + brought down  
 12:00-1:00 Downloaded Fast 23x DATA logger

$\Rightarrow$  12:20  $\Rightarrow$  Disconnected Pressure sensor tube inside Li-7500

$\Rightarrow$  At sometime  $\Rightarrow$  HANDAR AT 9m had flipped over  
 Brought in + RETIGHTENED pipes  $\Rightarrow$  back out  $\sim$  12:45

$\Rightarrow$  THINGS TO DO for winter

① EC system showed big offset (off the pot.)

$\Rightarrow$  need to change both filters

$\Rightarrow$  TRY TO flush sample + reference cells  
 back w/ high pressure

② Clean optics on Kt lys.

③ new filters on profiler

④ Download new operating system into Li-7500

10/17  $\sim$  11:00  $\Rightarrow$  FIXED PAR sensor (bad connection AT logger)  
 $\Rightarrow$  Downloaded profile logger

$\Rightarrow$  Downloaded Tc23x logger = was ~~logging~~  
 on 10/16  $\Rightarrow$  was logging data every 5 min  
 changed to 15 minutes  
 Downloaded again on 10/17  $\Rightarrow$  loads OK

$\Rightarrow$  Mux III working  $\sim$  12:00  $\Rightarrow$  Reference Temp seem way off  
 ( $\sim$  25-27°C)

Other temps seems OK relative to this  
 TEMPERATURE

$\Rightarrow$  change Tc #15 MUX III / not working for some reason

$\Rightarrow$  Tc's put into bores AT 0 cm, 50 cm + 175 cm  $\Rightarrow$  IN ALL

study trees -

Inserted 3 cm into bores

$\Rightarrow$  Put Tc IN MUX III box  $\Rightarrow$  hooked up the channel 14



0

CAN try to use THIS AS THE REFERENCE Temp.

Need to figure out program  $\Rightarrow$  NOT use the 25T THERMISTOR as reference.

(\*) 10/18  $\Rightarrow$  on campus - figured this out - I THINK

$\Rightarrow$  How many more T's can I measure?

Mux I -	4
<u>II</u> -	3
<u>III</u> -	6

Tc23x - 8 (DIFF. channels open!)

ON SOIL23x  $\Rightarrow$

SE channel #6

DIFF channels - 4  $\rightarrow$  12

C-parts (?)

#  $\Rightarrow$  how many QUANTUM sensors

- CAN use a 4/6  $\Rightarrow$  channel #  $\Rightarrow$  PAR sensors  
channel 2  $\Rightarrow$  other things (Rebs, IR-T, Parameters?)

- Next is it worth setting up <sup>4/6</sup> multiplexer w/ THERMOCOUPLES IN NEEDLES??!

(\*) count - how many T's I have left!

10/22 Realized fast23x has been running AT 5 Hz SINCE ~Aug. 24 - Right when I changed program to fast23x5.csi to save li-cor diagnostic.

PTI ECU shows that this ADDS ~35 msec to processing time - need to put fast23x4.csi back into data logger on Thursday AM!!

⇒ Also need to update Tc23x w/ new ref. Temp. for  
Mux II

10/25

Tree DBH's

	DBH (cm)	radius (cm)	$r = \frac{DBH}{2}$
✓ P2	<del>49</del> 50	7.96	
✓ F2	51	8.12	
✓ P3	76	12.10	
✓ S1	76	12.10	
P5	86	12.73	
P6	37	5.89	
P11	38.5	6.13	
✓ S2	79	12.57	
✓ F4	18.5	2.94	

used F1 + P1 + P16

11:30 AM - Put new program in Post23x (Post23x4.csi)  
 ⇒ Is now outputting data at 10 Hz  
 ↳ Stoppro/restarted DATA ⇒ looks OK!

10:45 AM New Tc23x program in Tc23x ⇒ uses Tc A5  
 Ref. Temp. ⇒ program works BUT...

- Tmux reference was reading 31°C (obviously wrong)
- using Tc A5 reference ⇒ Tref = -11°C which  
 seems too cold. Panel Temp, Mux I + Mux II  
 ARE ALL BETWEEN -1° → -4°.
- May need new thermocouple (long one)

10/29/01      Testing MPS TEMP PROBES

- Got 3 to work -      2 long ones + 1 short one

2 Td

1:15    PLACED ① = short one      IN ice bath  
          + ③ = long one      (Room Temp ~ 18-20°C)

2:45 - Repackaged in ice - seemed like there were  
          gradients IN THE water!

1/b

3:15 - SWITCHED OUT #1 + #3  
       Put #2 in ice bath  
       => + Note - Laptop time is incorrect - Reads 1 hour behind

11/1/01      Rewired Denonimeters

<u>Input Channel (GMP00)</u>		<u>Deno. #</u>	<u>Tree</u>
1	—————>	1	—————
2	—————	3	—————
3	—————	2	—————
4	—————	5	—————
5	—————	4	—————
6	—————	7	—————
7	—————	6	—————
8	—————	9	—————
9	—————	8	—————
10	—————	10	—————

4  
22  
36  
3  
22  
16  
5

11/8/01

Hooked up MRS TEMP. PROBES

#	#Therm.	Location	Tc # AT Ground	
1	11	2.1 m from S2	#9 → grad. level	need to recheck
2	21	1 m from S2	#18 →	
3	21	34 cm from S2	#19 →	

Running about 3:00

⊛ Note DATA logger time may be off - need to check that.

11/9/01

Downloaded - 23xa  
 - Tc23x  
 - Denor. 21x  
 - MRS10

Notes: ① 23xa ⇒ looked fine -

Reset Time to Standard Time

② Tc23x ⇒ Mux III still looks screwed -

ReTemp was  $-11^{\circ}$  (Don't Believe)⇒ Rewired Tc\_45 (from Mux II) to be  
REFERENCE IN Mux III - looked  
like it was working

③ Added Tc's #20 → 25 to Mux II

~~④ 45 → 50 Tc~~ Tc\_45 → Tc\_50

④ Also Reset to Standard Time

⑤ Denominator - looked OK ⇒ Time was 1 hr too early  
 - Reset to standard time  
 - Put new program in ⇒ only does denominator  
 Denoro.csi

⑥ MRS Temp probes still running OK, but  
 forgot to set data logger time ⇒ way screwed  
 up time tags.  
 Reset to std. time.



11/28/01 At site

- New  $\phi$  AIR  $\Rightarrow$  ~ 10:30 AM
- Turned off Fan in Duck ~ 11:00

Started lots of Trouble

- ① DATA LOOKED REAL SCREWY
  - ② THEN ALL DATA WENT DEAD
  - ③ Power was OK; looked like data was coming in
  - ④ SHUTDOWN DUCK & restarted - No good
  - ⑤ Finally lost contact w/ Duck
- $\Rightarrow$  Realized what was going on - Hard drive was freezing up - everytime I breathed on it  $\Rightarrow$  got worse
- turned Duck off
- $\Rightarrow$  Put new desiccant in around hard drive, turned off fan & used heat gun to warm up hard drive - THEN turned on & closed up box - when got (~15 min.) back to TRAILER - everything was working fine! (see if it makes it thru night)

- Check tension in guys - only 2 were slightly loose (~550 lbs) re-tightened to 600 lbs

- Need to:
- ① Change filters on EC & profiler DID some of these
  - ② Clean Kr hygrometer  $\rightarrow$  2 more
  - ③ switch out EC IRGAs
  - ✓ ④ ~~Bring FCO back to TRAILER TO WORK ON~~
  - ⑤ ~~Try light test on 7500~~
  - ⑥ ~~New desiccant in profiler~~
  - ⑦ Back to snow melt setup  $\Rightarrow$  needle temps
  - ✓ ⑧ ~~Download loggers (after Nov. 30)~~

UP ON Dec. 7

need to:

① SET UP EC system UNDER canopy! (AT 1.5-2m)

① CSAT-3 SONIC (1 or 3m sonic)

② MOVE ATI TO REPLACE THAT SONIC.

③ USE UNUSED LI7500 (good for H<sub>2</sub>O)

② Bring DOWN Kipp & Zonen Radiometer (Hook TO SOL23x) => THINK I have enough free channels

③ IR Thermometer (which data logger)

④ Few more needle temps -

~~⑤ DOWNLOAD loggers~~

~~⑥ HAND OUT THE 7500~~

✓ ⑦ TAKE 7500 => a) work on Press. inlet  
b) FLIP UPSIDE DOWN & see if light leak is better

Programming -

need to HAVE ON text file THAT ALL my FLUXCALCS.csh programs feed into to get input & output file names  
=> THEN can just edit this & not have to recompile functions

12/26/01 11:00 - Reset LI7500

- changed P-inlet; put 1/8" TEFLON EXTENSION & cable-tied to top of box

- flipped sensor orientation => NOW POINTS DOWN

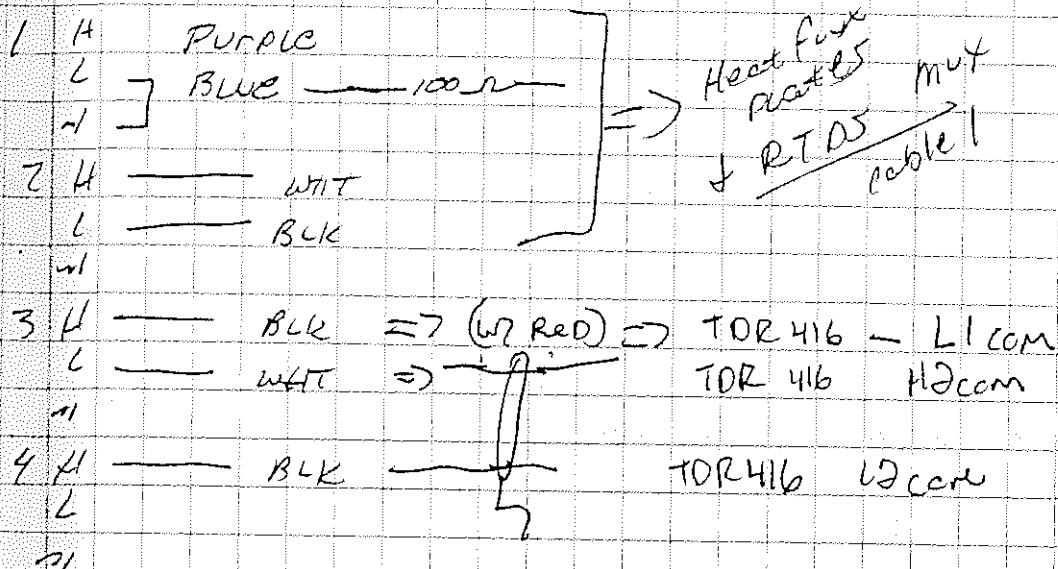
-> Downloaded loggers (soil, T<sub>c</sub>, dendro + MRTEMP.)

DATA looks OK

-> Replaced 2um FILTER in profiler

-> Replaced 5m inlet filter on profiler

SOIL 23x



12V — Grn — TRR 416  
G — Blue — 12V/Gnd

Exc 1 — BLK → HGT mux — Cable 2  
Exc 2 — Grn → GND → HGT mux — Cable 2

12V — Red → HGT mux — Cable 2

GND — BLK → HGT mux — Cable 2

C1 — White → HGT mux — Cable 2

C2 — Grn — RES (TOR 416)  
C3 — BLK — CLK (TOR 416)

C4 — Red — H1 com

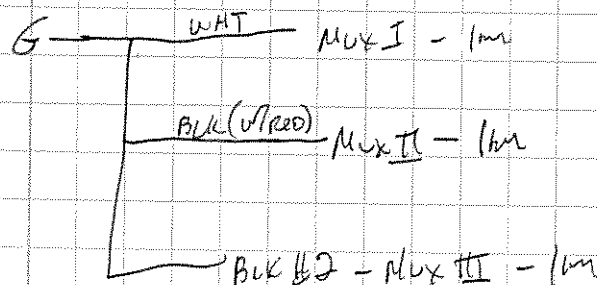
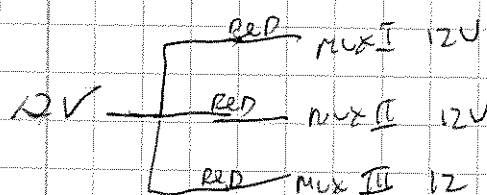
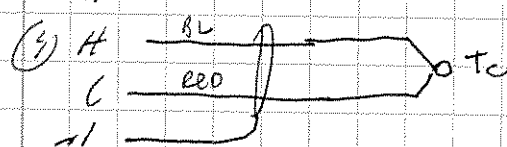
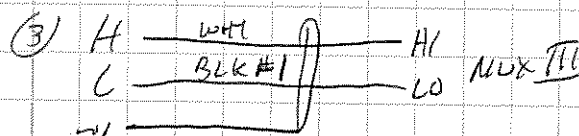
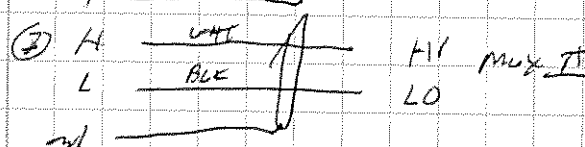
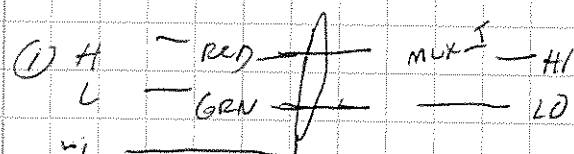
C5

C6

ALL THE  
TRRS

12V Red — TOR — See manual  
||  
Wired straight  
out of there!

Tc23x



C1 — BLUE — MUX I — RESET

C2 — WHT — MUX I — CLK

C3 — GRN — MUX II — RES

C4 — BLK — MUX II — CLK

C5 — BLUE — MUX III — RES

C6 — BLK #3 — MUX III — CLK

EXC1 — PULS GEN — MUX I — EXC

EX2 — WHT — MUX II — EXC

EX3 — GRN — MUX III — EXC

w/ — BLK #4 — MUX III

w/

w/ — BLK — MUX I shield

BLK  
TO GND  
/

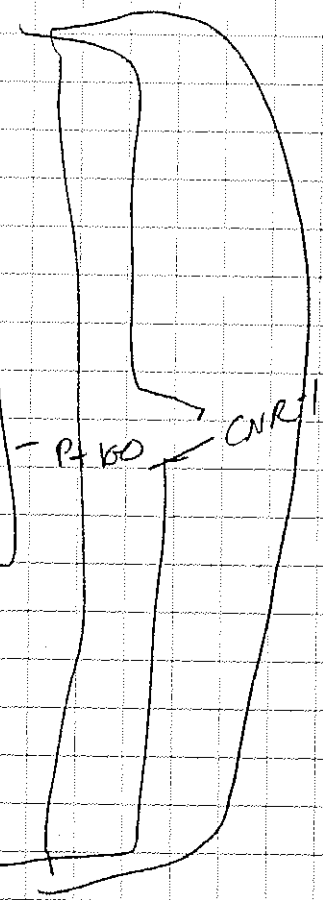
1/15/01 SONIC (CSAT) had gone down on SUNDAY, JAN 13  
ALONG w/ Li7500 => logger looks OK - looks like  
SDM screw-up.

- ① => 10:30 - Reset Li7500 => everything started responding
- ② DOWNLOADED CNR logger (~10:30-11:00) => changed to MST
- ③ New filter of EC system (~11:00)
- ④ Li7500 REALIGNMENT - now horizontal
- ⑤ Tightened up Heron's boom (about to fall off)



CNR 231

Exc 1 - RED } PT 100 - CNR-1  
-A - BLK }



- 1 H RED
- L BLUE
- M
- 2 H WHT
- L BLK
- M
- 3 H BLUE
- L GRN
- M GRN
- 4 H YEL
- L DK GRN
- M
- 5 H GRAY
- L YELL
- M
- 6 H BRN
- L GRN
- M
- 7 H GRN
- L BLUE
- M
- 8 H GRN
- L BLUE
- M
- 9 H
- L
- M
- 10 H
- L
- M
- 11 H RED
- L BLK
- M SHIEL
- 12 H GRN
- L BLK
- M SHIELD

} PAR

} PAR

} REBS #1

} REBS #2 => DISCON.

1 H RED  
1 BLK  
SHI  
2 GRN  
BLK  
SHIEL

CG-2

3 WHIT  
BLK  
SHIEL

4 RED  
BLK  
SHIELD

H2O

5 CLEAR  
BLK  
SHIELD

IKC

6 GRN  
BLK  
SHIEL

EC  
FLOW

7 WHIT  
BLK  
SHIELD

Nothing

8 RED  
BLK  
SHIEL

seclcd

9 WHIT  
BLK  
SHIEL

Flow

11 WHIT  
BLK  
SHI

12 RED  
BLK  
SHIELD

UNKNOWN  
L: 7500  
ANALOG

12U → CSAT-3 (Red)

G → BLK, CLR (CSAT-3)

G → BLK CLR

C1 GRN (CSAT) Red (7500)

C2 WHIT (CSAT) BLK (7500)

C3 BRN (CSAT) GRN (7500)

C4  
G - WHIT  
SHIEL → 7500

# PLAN for DATA LOGGERS

- ① Replace Twesnic ~~10~~ 23x w/ 21x  
 WILL RUN = 1 CSAT-3 + 1 HANDAR (2 channels)  
 CH. outputs 7 values #2, #3  
 $u, v, w, T, \text{diag}, U_{\text{hand}}, U_{\text{dir}}(\text{hand})$
- ② Take 23x  $\Rightarrow$  move to north tower  
 - Take Peter Blanken cable & short haul modem  
 - Hook up new channel w/ fast data - CSAT-3 + Li7500  
 (maybe CNR-1 eventually)  
 8 outputs:  $u, v, w, T, \text{diag}, \text{CO}_2, \text{H}_2\text{O}, \text{press.}$   
 [Note  $\Rightarrow$  could run w/ Ed Swiatek's program for 15 min. averages]  
 $\Rightarrow$  need to hook up & configure Li7500 (power cable)

1/28/02 - Profiter left 10:50 AM for downloading  
 - Manual zero/span of profiler -  
 $C_{\text{span}} = 437.5$

$$P_{\text{sampling}} = V = 0.138 \rightarrow 0.121$$

4.6666

ECORING  $P = 0.130 = 60.950 \text{ kPa}$

$$V_{\text{meas}} = 38 \mu\text{V} \quad V_{\text{set}} = 6.000$$

SPAN:  $P = 0.1307 \times 61.057$   $P/P_0 = 0.6027$   $[CO_2] = 437.5 \text{ ppm}$   
 $T = 12.00$   $T/T_0 = 0.92297$   
 $V_{\text{calc}} =$

$$CO_2 \frac{T_0}{T} \Rightarrow 2355 \text{ mV} \Rightarrow V \frac{P_0}{P}$$

$$V_{\text{calc}} = 1419$$

$$V_{\text{meas}} = 1369$$

$\downarrow$   
 Set to 1419

BACK ON-LINE AT 11:03

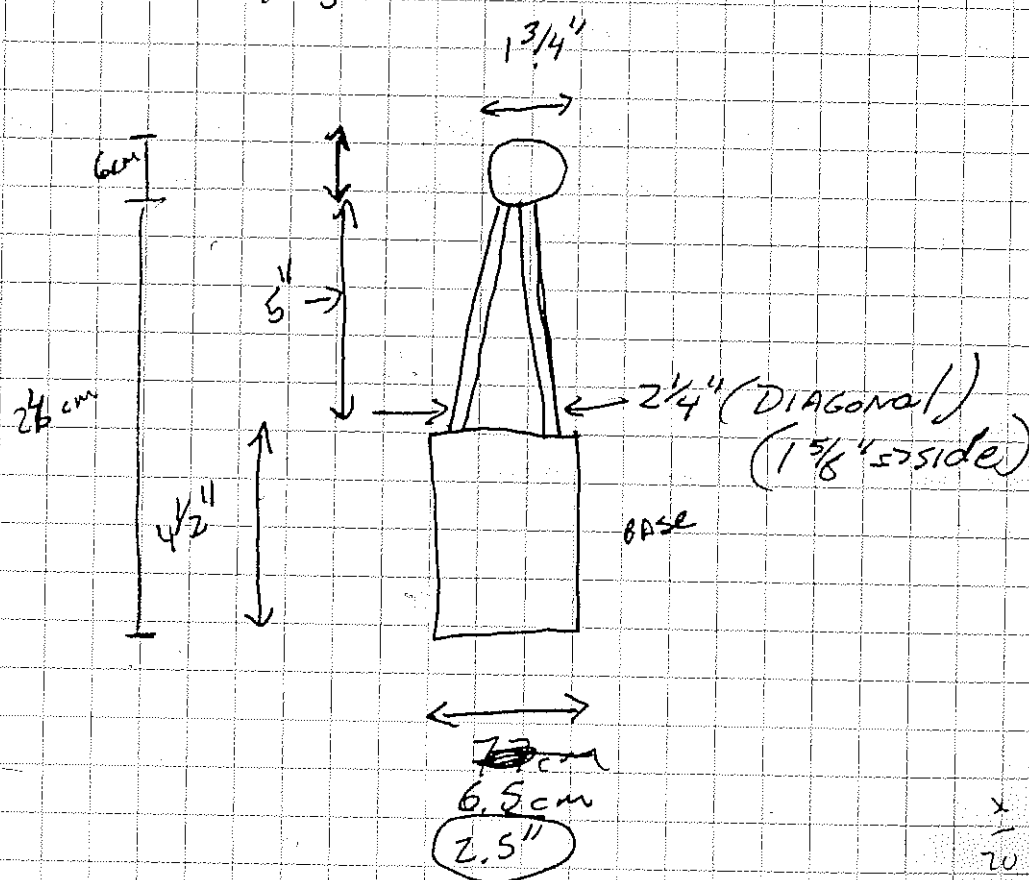
# NEW 7500

DAC #1  $\text{CO}_2 \text{ mmol m}^{-3}$  0-5V  $\Rightarrow$  0  $\rightarrow$  20  $\text{mmol m}^{-3}$   
 DAC #2  $\text{H}_2\text{O mmol m}^{-3}$  0-5V  $\Rightarrow$  0  $\rightarrow$  300  $\text{mmol m}^{-3}$

should change this scale to something larger

Updated the software on laptop -  
 Zeroed + spanned  $\Rightarrow$  looks OK  $\Rightarrow$  will use DAC outputs

## 7500 DIMENSIONS



should be 5V  $\Rightarrow$

$$\frac{x}{20} = \frac{y}{5000} = 0$$

1/29/02

Downloaded 23xa, 23xtc, MR5temp

(\*) Doesn't look like MR5temp is dumping data to the Pencil card?

$\Rightarrow$  Rechecked program  $\Rightarrow$  Is a statement to do this MAYBE THE card was full??

$\Rightarrow$  Disconnected CSAT-3 at 3 m

changed prep. config etc.  $\Rightarrow$  got rid of this sonic

$\Rightarrow$  Mounted sonic ON TRIANG. section of North tower.

Along w/ L7500



To finish hooking up we need:

- ① Power Junction - Need 12V for
  - a) logger
  - b) CSAT-3
  - c) Li7500

Possibly make a big junction at battery  $\rightarrow$  Too many THINGS hooked to battery now anyway!

- ② Get ~~20~~ short haul cable from P. Blenkins tripool & run to North tower.  $\Rightarrow$  hook up to surge protector

!! ③ 8-pin - 9-pin connector logger  $\rightarrow$  SC932 translator

- ④ hook up wire connection

(\*) Note - test to see if we could measure Pressure voltage somewhere

- ⑤ Laptop w/ program to dump!

McGuck's

✓ Terminal strip

✓ hole saw  $\Rightarrow$  just under 2" diameter

1/31/02 NOT AT SITE:

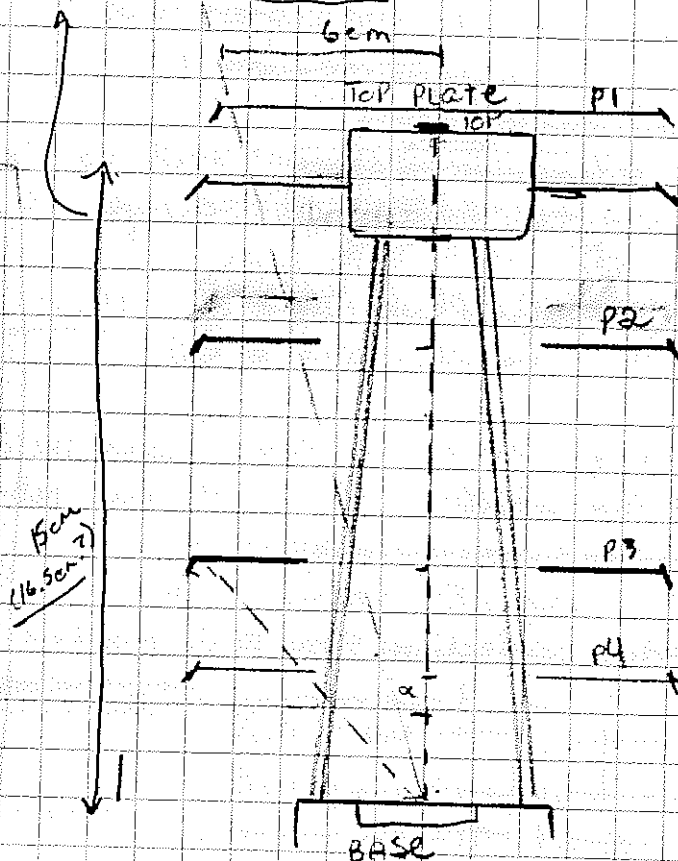
Designing L:7500 Beehive

New plate  
Plate at 2.5-3.0cm  
- 6-6.5cm  
- 14.2-14.7cm



TOP Plate:  $\alpha = \tan^{-1} \frac{6}{13.7}$   
 $\alpha = 17.8^\circ$

Let's try  
 $d_1 = P1 - P2 = 6cm$   
 $d_2 = P2 - P3 = 5cm$   
 $d_3 = P3 - P4 = 3cm$   
  
same as below  
 $d_1 = 21.3^\circ$   
 $d_2 = 37.9^\circ$   
  
 $d_3 = 32.6^\circ$   
 $d_4 = 51.9^\circ$   
  
 $d_3 = 3.5$   
 $d_4 = 35.5$   
 $d_5 = 55^\circ$



= IF use ONE LOT smaller hole  $\rightarrow$  DISTANCE = 16.5cm

16.7cm

$\Rightarrow$  HOLES ARE BIG ENOUGH

EACH PLATE = width = 3cm  
( $\leftarrow$  P2  $\rightarrow$ ) 5cm down from top:

$\alpha_i = \tan^{-1} \left( \frac{3}{13.7} \right)$   
 $\alpha_i = 12.4^\circ$

$\alpha_o = \tan^{-1} \left( \frac{6}{13.7} \right)$   
 $\alpha_o = 23.7^\circ$

move P2 Down 1 more cm

$\alpha_i = \tan^{-1} \left( \frac{3}{12.7} \right)$

How far down P2 to get  $\alpha_i = 16^\circ$   
 $\tan(16^\circ) = \frac{3}{x}$   $x = 10cm$

P3  $\rightarrow$  Another 6cm down  
 $\alpha_i = \tan^{-1} \left( \frac{3}{6.7} \right) = 24^\circ$

$\alpha_o = \tan^{-1} \left( \frac{6}{6.7} \right) = 41.8^\circ$

To get  $\alpha_o = 60^\circ$   
Need  $x = 3.46cm$

2/5/02

10:30AM  $\Rightarrow$  Disconnected & Took down CNR-1  
 Released REBs (east-west)  $\Rightarrow$  need  
 Turn Buckle to 20 N/s  
 $\Rightarrow$  was quite a bit off

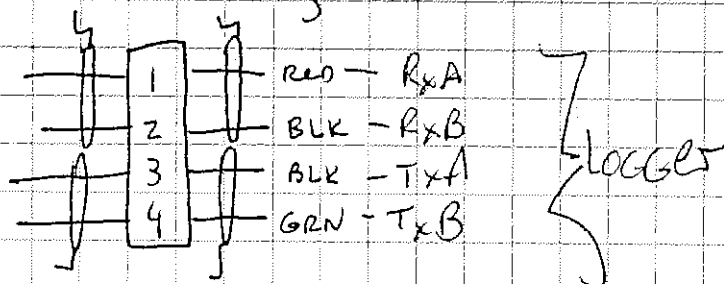
Craig:

- Downloaded, ~~ALL~~ LOGGERS
  - Hooked up Fast2k (power, etc.)
- Seems to be working AT DATA Logger end!!

$\Rightarrow$  got long "Blank" cable  
 Has 2 places that were eaten  $\Rightarrow$  need to fix  
 $\leftarrow$  (ALL THAT'S left to hook up under canopy EC system)  
 $\langle$  Hooked to channel 206 in DUCK  $\rangle$

(\*) Note: Hooked up 2<sup>nd</sup> Battery to RUN  
 Fast2k, CSAT-3 & Li7500 } Looks like it  
 runs better // Voltage  
 more constant

~~Long cable~~ CABLE connecting shore level modems



2/7/02  $\Rightarrow$  Found bad cable on UC EC system  
 should be ready to go once hooked up!  $\Rightarrow$  made new cable

2/12/02 - New cable on UC EC system - still not working  
 checked - cable  $\rightarrow$  surge protector  
 switched out SC932 box

- Put Li7500  $\Rightarrow$  straight up orientation ( $\sim$  1:30 PM)  
 - Levelled AT1 SONIC  $\Rightarrow$  OFF 10:30 - 2:30  
 used level  $\Rightarrow$  electronic level appears to be  
 screwy (tx is dead  
 tx is reading 0.24 V when level)

2 1/8"

- ⊛ Note - Recheck wiring on UCEC surge protector  
otherwise - check short haul modems at either end

List of some things to do => for field stuff

- In lab:
- ① Add ~~ENR-1~~ to ~~fast23~~ program = ~~need new fast23 program~~ ~~AT TRAILER~~
  - ② ~~new Dessicant traps~~
  - ③ ~~new connectors // 9 pin + 25 pin~~  
Need to buy connectors
  - ④ ~~test other tilt meter // needs a cable~~
  - ⑤ ~~Modify fast23 for Hi/Low Res~~ (9 pin - 9 pin)
- ⇒ New spec AT TRAILER to be made

- AT trailer:
- ① Put new pump in TECO (wait for new one to arrive)
  - ② Rebs radiometer - New device  
- ~~new connector~~ (look at wiring in office)  
- ~~new desiccant~~

⊛ => should we just replace existing one?

- ③ ~~calibrate new standard~~
  - ④ Figure out Blanken IRT
  - ⑤ ~~Make new light shield for Li7500 on tower~~
- ~~At tower~~ ① new spec

- AT Tower:
- ① New operating system in Li7500
  - ② New fast23 program // High + low Res. data fast23x6.15
  - ③ Clean kr hyg. optics
  - ④ ~~Test components of UCEC system~~  
= short haul modems at either end  
= wiring  
= cable (again?)  
⊛ check output commands for ~~TECO~~
  - ⑤ Recheck level of ATL sonic (new tiltmeter?)
  - ⑥ Switch out 6262 for 6251 in EC system
  - ⑦ Radiometer mount (Craig??)  
↳ IRT mount(?)



2/15/02 New Duane - cal standard  
 $C_{CO_2} = 345.7 \text{ ppm}$

(\*) Note  
 check Rebs  
 Manual - wiring  
 on D7.1

Run	ZERO	SPAN		V <sub>cell</sub>	SAMPLE			$C_{CO_2} \text{ ppm}$
		T	P		T	P	V	
1	0	16.45	789	1398 (set)	16.60	786	1476	372.112
2	0	17.00	788	1396	17.14	787	1478	373.59
3	0	17.55	788	1393	17.82	787	1483	376.87
4	0	18.35	788	1391 (*)	18.47	787	1470	372.57
5	0	18.66	788	1389	18.84	787	1472	373.73
6	Break							
6	0	21.9	787	1378 (*)	22.00	786	1458	373.06
7	0	22.40	787	1376	22.52	785	1457	373.48

Electronic level #2 -

$\pm x \text{ offset} = +0.047 \text{ V}$   
 $\pm y \text{ offset} = -0.05 \text{ V}$

373.09  
 $\pm 0.64 \text{ ppm}$   
 (1σ)

From 11-2:00 Undercanopy logger running intermittently  
 TEST KC-EC connections

Found - BAO short haul modem AT DUE !!  
 Everything up & running ~ 2:00 PM !!

Now need RADIOMETERS !!

(\*) substantial span shift  
 (\*) (\*) even bigger span shift ??

### Programs

Fast23x6 - csi  $\Rightarrow$  1 high res. output (CO<sub>2</sub>.ec) dial #7  
 TC23x - csi  $\Rightarrow$  Added code for CNR-1  
 SW in/out - channel 6 & 7  
 P+100 - channel 7 & 8 & 9  
 LW in/out - channels 6 & 7 & 11

THINK ABOUT  
 switching w/  
 heater ??

KNF pump in Seccol = UN815 KN1

I ordered UN828 KN1

New Light Shield

New List of stuff

- In Lab:
- ① Check Rebs wiring on 0.7.1 [LCD=4) BULK=5) (OE) ✓
  - ② Start looking into programming - move DEMONSTRATORS to  
9 SOIL 23x.csi
  - ③ Contact John Franks about Seccol electronics

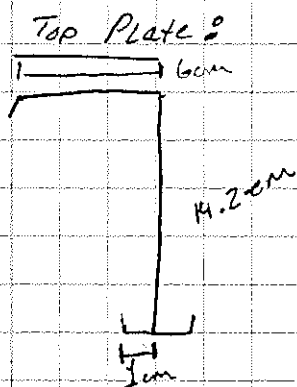
- At trailer:
- ① Redo Seccol pump box w/ new pump
  - ② Put old Seccol pump in TECO (test)
  - ③ Start trying to rewire Seccol op amp
  - ④ Heat shrink Rebs connector
  - ⑤ Figure out Blanken IRT

- At Tower:
- ① New Li7500 operating system
  - ② Light shield on Li7500 (Both)
  - ③ Fast 23x6 program in logger → Hi + Lo Res. DATA
  - ④ Switch out Rebs radiometers - relevel (hook up cables)
  - ⑤ New tiltmeter on AT1
  - ⑥ Clean K hyg. optics
  - ⑦ Switch out 6251 for Fast 6262

- Spew stuff:
- ① Mount + hook up CNR-1 radiometer
  - ② more needle temps

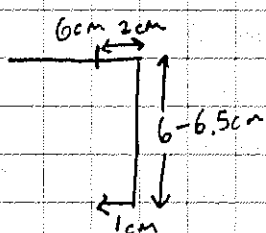
- Code to write:
- ① Undercavity fluxes
  - ② Something to look at soil temps

# New light shield for Li7500



From center  $\alpha = \tan^{-1} \frac{6}{14.2} = 22.9^\circ$   
 outside  $\alpha = \tan^{-1} \left( \frac{5}{14.2} \right) = 19.4^\circ$

## 2nd plate



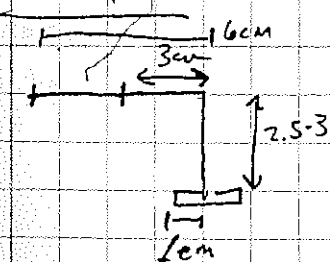
From center:  $\alpha_i = \tan^{-1} \frac{2}{(6-6.5)} = 17.1-18.4^\circ$

$\alpha_o = \tan^{-1} \frac{6}{(6-6.5)} = 42.7-45^\circ$

From outside:  $\alpha_i = \tan^{-1} \frac{1}{(6-6.5)} = 8.7-9.4^\circ$

$\alpha_o = \tan^{-1} \frac{5}{(6-6.5)} \Rightarrow 35.8-37.6^\circ$

## 3rd plate



From center:  $\alpha_i = \frac{3}{(2.5-3)} = 45-50^\circ$

$\alpha_o = \frac{6}{(2.5-3)} = 63.4-67.4^\circ$

From outside

$\alpha_i = \tan^{-1} \frac{2}{2.5-3} \Rightarrow 33.7-38.7^\circ$

$\alpha_o = \tan^{-1} \frac{5}{(2.5-3)} \Rightarrow 59-63.4^\circ$

From center: TOP - 0-22°

MID - 18-45°

BOTTOM - (45-50)  $\rightarrow$  (63-67°)

< possible gap?

side: TOP - 0-19°

MID - (8.7-9.4)  $\Rightarrow$  (37.6-39.8°)

BOTTOM - (33.7-38.7)  $\Rightarrow$  (59-63.4°)

< possible gap?

3/5/02 AT site

- ⇒ Added CNR-1 to E23x ⇒ ~ 12:00 PM
- ⇒ will need new cal. std. next week

Hooked up IR Thermometer to Soil23x logger - but  
Not logging data (next week!)  
DOWNLOADED soil loggers

- ⇒ Tested new Li7500 light shield - will probably work ABOVE canopy!

~~⇒ March 8~~

3/8/02 Not AT site

Appears pressure sensor on IRGA has gone bad - reading  
-6999's

3/11/02 ⇒ 3/9/02 1:41 AM (not at site)

Duck crashed (not sure why)

looks like it came back on about 4 hrs later  
BUT NO DATA!

- ⇒ Appears that Musster & Quacker are trying to  
take data ⇒ NO channels ARE ACTIVE?

Likely possibilities:

- ① No Power supply or popped breaker  
going to that supply (cuts off short haul  
modules if nothing else)
- ② Serial Input card (Hope not)

Need to go up tomorrow

3/12/02

Breaker had popped - however Power supply to  
SERIAL BOARDS was FLAKY TOO.

⇒ REFLIPPED Breaker

⇒ SHUT DOWN DUCK

⇒ TURNED Ser. BOARD switch on/off ⇒ VOLTAGE  
came back up to ~10V (was at 3V)

⇒ TURNED ON DUCK & data started flowing!  
~ 11:00 AM



sensor orientation  $310^\circ - 312^\circ \Rightarrow$  mag. N  
2.35m ABOVE ground.

- $\Rightarrow$  Reloaded program into Undercanopy logger
- $\Rightarrow$  added IR-7 to SOIL23X (~11:30AM) + downloaded
- $\Rightarrow$  Downloaded other loggers

couldn't find data for Tc Between 2/5 + 2/26  
+ since we added CNR  $\Rightarrow$  data was erased on  
DATA logger.

Also lost some data last week  $\Rightarrow$  Seibold said power  
was out at MRS ALL week-end

$\rightarrow$  NOTED PROFILO pump was dead // will have to check  
data to find out how long it has been dead.  
Replaced pump & RUNNING ~ 3:30 PM

$\rightarrow$  Also put new pump in T&CO  $\Rightarrow$  seems to be  
working fine now

laughter - Mauser

3/18/02  $\rightarrow$  Replaced EL IRGA w/ 6251  
 $\rightarrow$  IRGA off 11:30  $\rightarrow$  12:00  $\Rightarrow$  NO water channel

3/27/02 = ~10-10:30 cleaned Ir hyg. optics  
Voltage went from 40mV  $\rightarrow$  nearly 4 volts!!  
- Reset Li7500; THEN put in new operating system  
- Put Light shield over sensor (& cable tied on!)  
(~11:00-11:30)  
- New ZERO gas (~10:30)  
OLD CYLINDER was dead

AFTER lunch -

Downloaded SOIL23XA  $\Rightarrow$  Appeared to only have data  
up until Julian day 78 (March 19th)  
TODAY is: Julian day 86

Lacks like we missed 8 days of data on this logger  
- Don't know why logger wasn't keeping data - had funny  
message on screen when I opened the box  $\Rightarrow$  should have  
been in power-saving mode.

312  
-12  
300

- IT was somehow in some funky standby mode
- Re-sent program after collecting data - then downloaded 45 min later  $\Rightarrow$  DATA was being sent To Final Storage.

$\Rightarrow$  Downloaded 23met + 23xprof loggers on the tower.

4/2/02

1. Tower was in convergence zone - storm front pushed up just to our tower  $\Rightarrow$  moved back further (watched from 10:30-11:30AM)
  2. Turned TECO back on (~11:00AM)
  3. ~~Too~~ Moved 6m Handler down to 2m  
Moved 1m PSAT to 2m  
Handler off  $\Rightarrow$  11:30  $\rightarrow$  2:30 (oriented to mag. N)
- > changed CSAT off  $\Rightarrow$  1  $\rightarrow$  2:00  
4. Check MRS temp logger  $\Rightarrow$  Had to reload program THEN seemed OK
5. Downloaded CNR logger
  6. Took down 26m propvane (~3:00PM)
  7. Light shield on 7500 was partly off  $\Rightarrow$  pushed it back on.
- > Realized that EC pressure sensor was reading off-scale  $\Rightarrow$  was reading -1100 mV ( $\pm 1000$  mV scale)  
changed inlet filter (no change)  
changed filter in box  $\Rightarrow$  big change, flow went up + pressure went to normal value (-500 mV)

### THINGS TO DO

- (1) Need Natgene bottle for Profile inlet covers  $\Rightarrow$  need filter & cover on 2.5m inlet, cover on 10m inlet
- (2) Test Hi Resolution data (early)
- (3) Switch out & Re-level Rees radiometer
- (4) ~~Relevel~~ both sonics
- (5) Epoxy light shield on 7500
- (6) Epoxy 21.5m RH/T sensor ventilator
- (7) ~~Reconnect wire to date~~ Dock
- (8) Hack up Seclode

McGuck's  
small wire nuts  
cable ties  
M. (#25)  
(#45)

4/5/02 -

- ① DOWNLOADED Forest loggers  
Soil23x  $\Rightarrow$  had not been apply calibration to heat flux plates (program screw-up)  
Put in new program - looks OK
- ② ~~Soil~~ Battery running loggers is screwed - switched - everything AT North access tower running on the 2<sup>ND</sup> battery  $\Rightarrow$  everything seems OK // rechecked all loggers
- ③ Put wire nut on DUCK bad wire  
No data loss
- ④ Put 16m vane back up - is working - really tightened  
Nut on propeller  $\Rightarrow$  hopefully won't come off  
 $\Rightarrow$  If came loose - propeller could turn w/out turning shaft  $\Rightarrow$  lose signal
- ⑤ New filter on 21.5m inlet
- ⑥ Re-leveled AT, sonic (messing w/ filter screwed it up)
- ⑦ Pulled in 7500 - TRIED TO EPOXY light shield on  
(may not work - epoxy was too cold & gooey)  
kind of made a mess
- ⑧ Took down 26m propane - has not worked in a while.

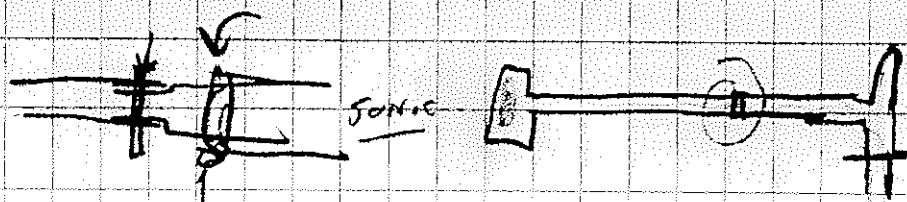
= cleaned up trailer a bit.

4/8/02 At site

$\Rightarrow$  connection battery charger went off

BATTERY running - MRstemp; Tc23x, soil23x  
& 21x sonic died

Reconnected & reloaded programs  
(minimize ~~data~~ data loss)



## To Do

### At Tower

- ① Put up new ~~sonic~~ AT 11.5m
- ② Switch out Rebs radiometer
- ③ Test hi. resolution data
- ④ New cover for 10m profile inlet
- ⑤ ~~check 1.7500 light shield~~
- ⑥ Epoxy ventilator shafts (for RH/T sensors)
- ⑦ Switch out tilt sensor on AT1
- ⑧ ~~keep check on soil forest loggers~~
- ⑨ Mount & hook up shadow band

→ Get 6262 back & switch it back in  
 → Try to connect directly to ~~UC~~ sonic  
 (check cables etc.)  
 Check power in Box

### Sealed

- ① Test S/N vs. flow rate
- ② Get ~~box~~ for pump (Tool box perhaps)  
 (put pump in box)
- ③ Take it up & start running.

// need some ventilation  
 PVC Bulkhead  
 [put together AT TRAILER]

### DATA Analysis

- ① ~~dirtying~~ → put in cal. func. for March
  - ② get March data All fixed up & plotted
- data for constance?

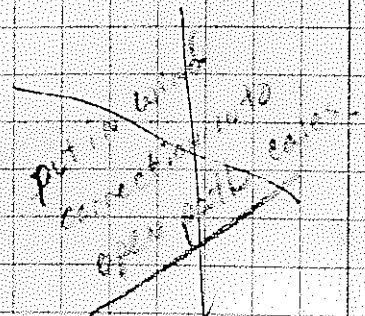
### [03]

- ① Bring up Birks detector // why is analog output so flaky
- ② TEST // Switch INeed TUBING

analog output → maybe datalogger

### Programming

- ① undercavity EC
- ② Sealed O<sub>3</sub> Furnes





4/18/02

SWITCHED BACK TO IR638 (10:45-11:45)

- TC 23x  $\Rightarrow$  wrong time on logger

logger  
4/16 9:07

Real Time  
4/18 11:47

$\Rightarrow$  Reset clock &  
Downloaded

- Soil 23x

logger

Wrong  
38:55

Real Time

$\Rightarrow$  was on standard time  $\Rightarrow$  Reset to MDT

- Denoram  $\Rightarrow$  was on standard time, otherwise OK  
Reset to MDT

- Fixed under canopy, sonic  $\Rightarrow$  criffer had chomped the wires

$\Rightarrow$  Mounted Seccol + hooked up -

- Recheck wiring to glate logger (relays etc.)
- Need to wire up & hook up pump
- Change Fast 23x program for Seccol

$\Rightarrow$  RMY 26  $\Rightarrow$  ON AT 21.5 m  $\sim$  3:00 PM

$\hookrightarrow$  (New Vane)

Reset RMY AT 16 m (really at 14.9 m)

$\hookrightarrow$  for some reason wind speed was giving zeroes  
cycled power & it started working

4/19/02 ON campus

New version of Fast 23x6.csi

$\Rightarrow$  ready for Seccol  $\Rightarrow$  signal - channel 7

Flow - channel 8

Empty - channel 9

Use Control part 7

(\*) need to figure out what signals are from where!!

4/27/02

Bill hooked up Birk's O<sub>3</sub> sensor next to TELCO  
(Bottom of tower)

Using analog signal  $\Rightarrow$  to Profiler 23x

DIFF channel #5  $\Rightarrow$  currently listed as anal5 in  
prep config

Loaded fast23x6.csi into fast23x

Sealed cal's Not working - Sealed is hooked up & ready  
to go ONCE cal's are working (pump & everything)

Running around 2:30 PM

(\*) (\*) Need to check further - After hooking up  
saw lots of Noise on other profiler channels  
- (??) -

Especially the leaf wetness sensor (A single-ended  
measurement!)

$\Rightarrow$  could be a ground screw-up

Birk's instrument is not really grounded in  
any way & BNC ADAPTER connects to chassis

$\Rightarrow$  try either  $\Rightarrow$  (1) grounding Birk's instrument

(2) removing BNC ADAPTER from chassis  
or bypassing BNC ALTOGETHER.

$\Rightarrow$  Be sure to check & see if data looks screwed up!!

Current Dev. settings

DevPro.csi

21x

10x

Port 4  $\rightarrow$  Res  $\rightarrow$  Port #1

Ex #3  $\rightarrow$  CLK  $\rightarrow$  Port 2

DIFF CHANNEL #6

1 -42  
2 -117  
3 -8  
4 -97  
5 -6.8  
6 -127  
7 -45  
8 -156  
-42

10 - -415

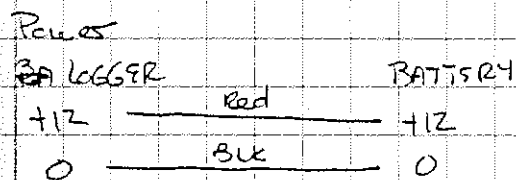
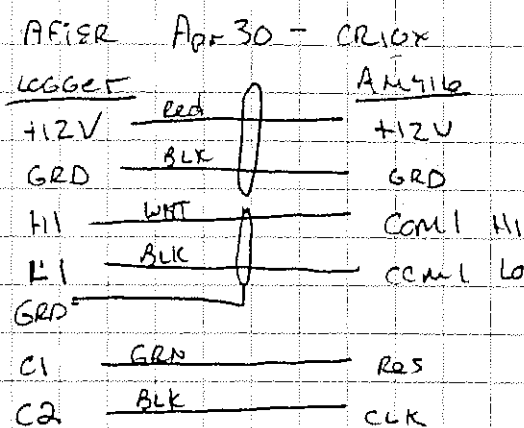
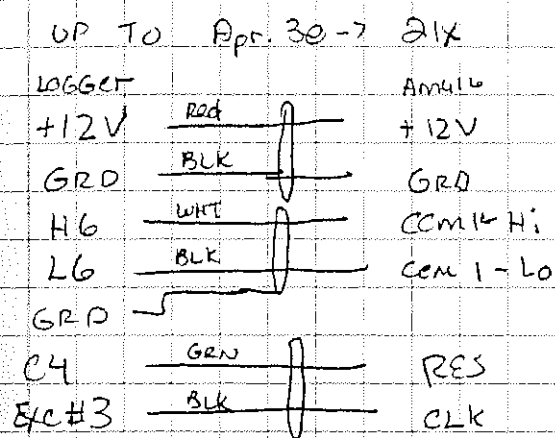
- 4/30/02
- (1) Fast O<sub>2</sub> & farked around for a while  
=> started running w/ right did Names  
around 2:00 PM En 9 hpm
  - (2) Grounded BIRKS O<sub>2</sub> sensor & funny noise  
on datalogger ceased (~2:00)
  - (3) 2:30 => Reset voltage scale on undercanopy  
L: 7500 => Now 5V = 600 mmol m<sup>-3</sup>  
for H<sub>2</sub>O (No change in CO<sub>2</sub>)
  - (4) Downloaded Denrometers  
THEN switched out 24x for 10x  
seems to be working (also output  
std. deviations) ≈ 12500
  - (5) Between 2-2:30 Downloaded  
23Tc, 23KA & CR10MRS
  - (6) Switched out D AIR AT 1:00  
Replaced fitting (may need to leak check)

5/1/02 - Figuring out time shift  
on 23xTc datalogger

=> Know - THE DOWNLOADED ON 4/18 WAS SCREWED UP  
Question - what ABOUT data prior to 4/15 & 4/2  
Downloads  
=> Re-saved ~~data~~ raw data file from 4/18 w/7  
correct time tags - need to look at  
March to see ~~if~~ how far time error  
goes back!

=> Looking at DATA - Denrometers died in  
December => DATA SUCKS AFTER THAT.

# — WIRING ON Denodrometers logger —



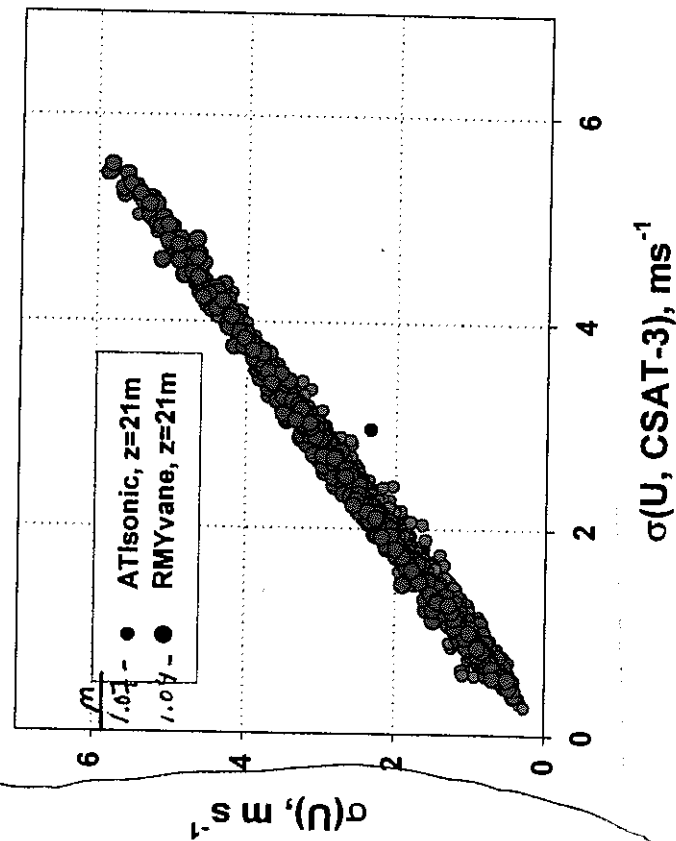
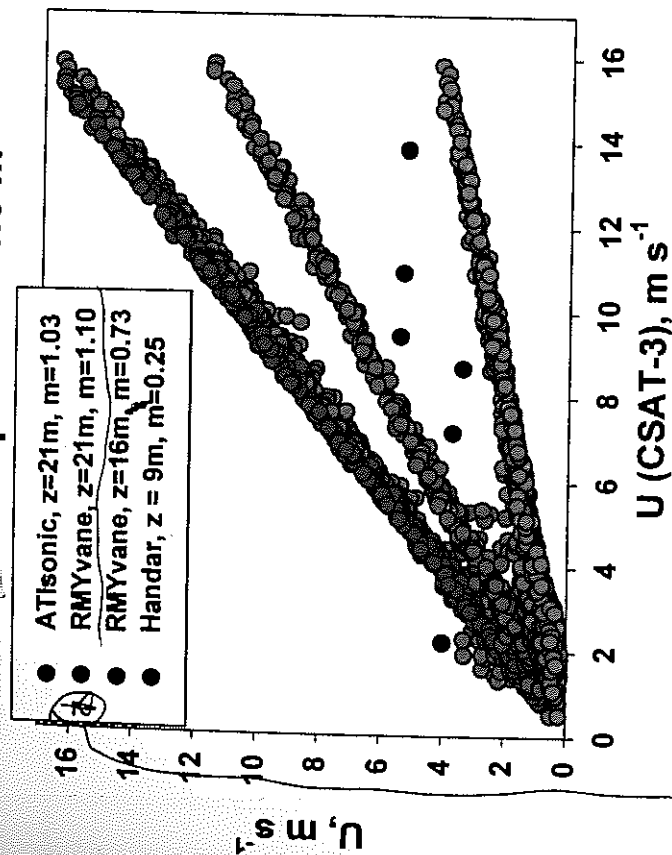
← some power configs.

Probably doesn't matter - looks like POD still working in December

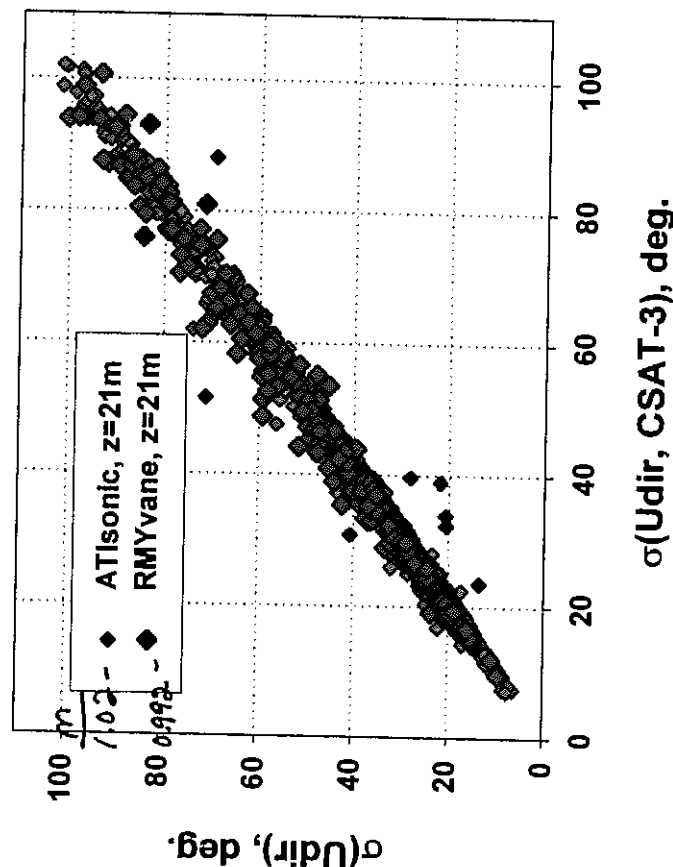
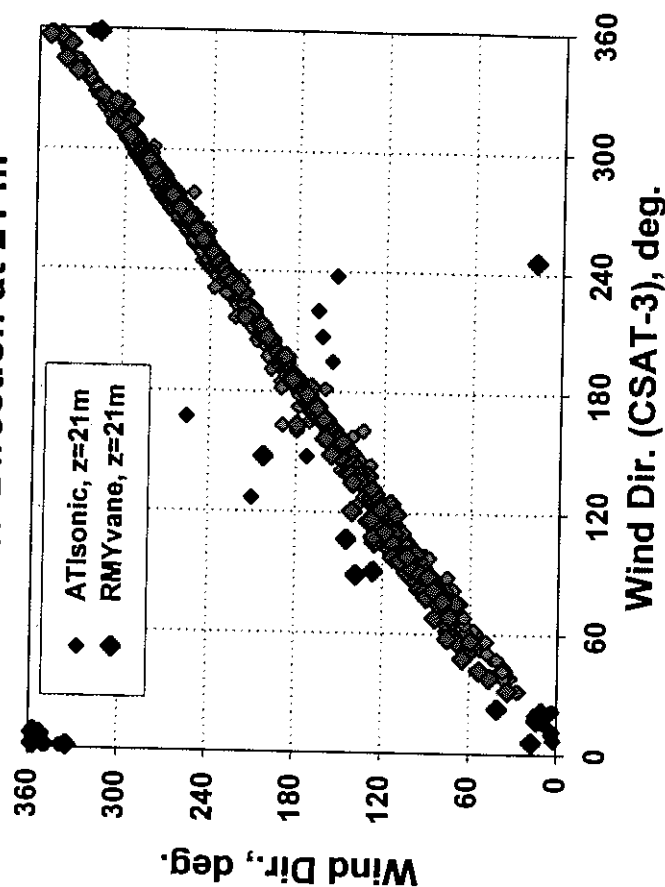


WIND speed & Direction comparisons for the month of April 2002  
 CSAT-3, ATI-1K & RMY vane ALL set at same height ( $z = 21.5m$ )

Wind Speed at 21.5 m

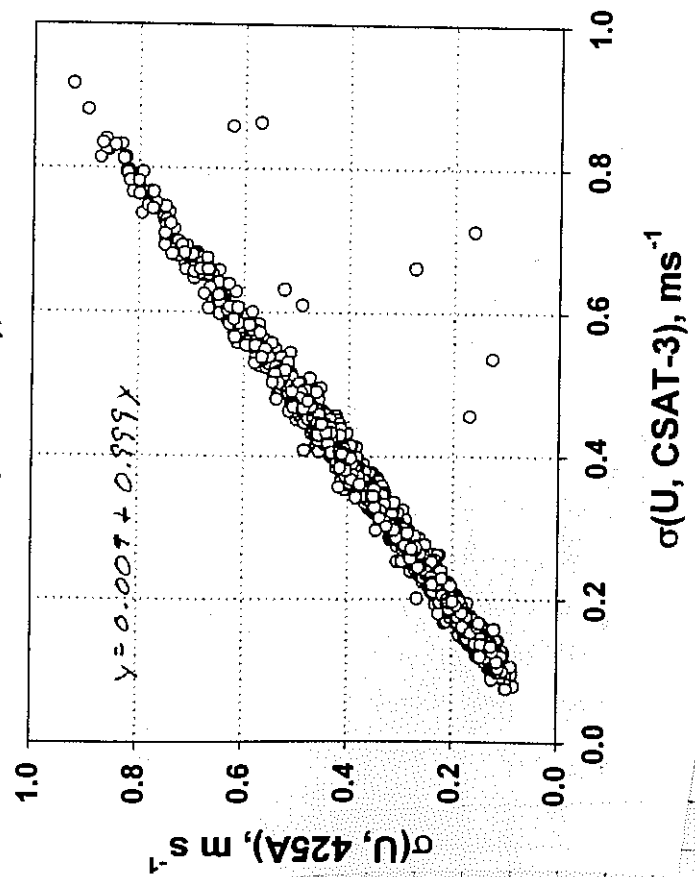
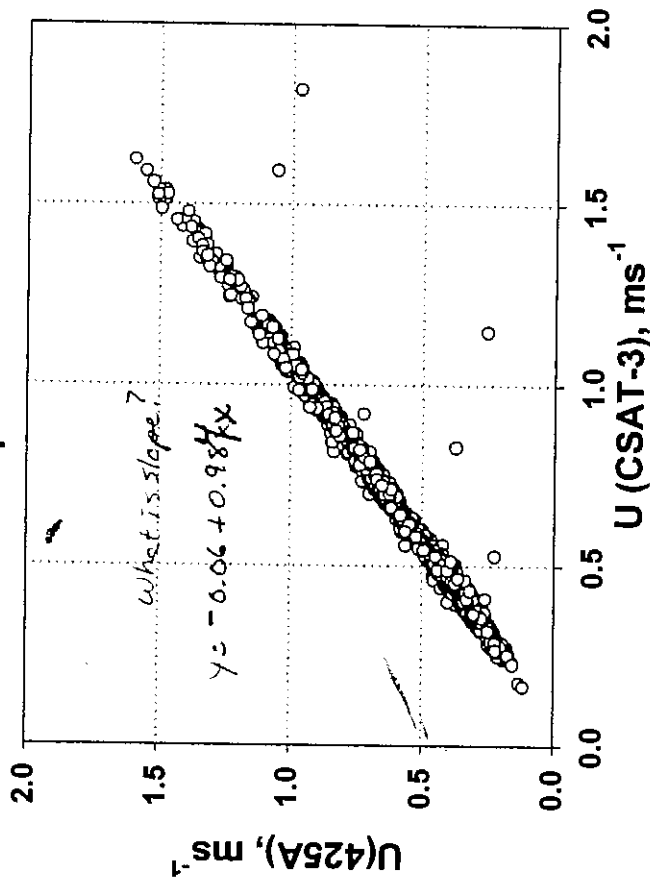


Wind Direction at 21 m

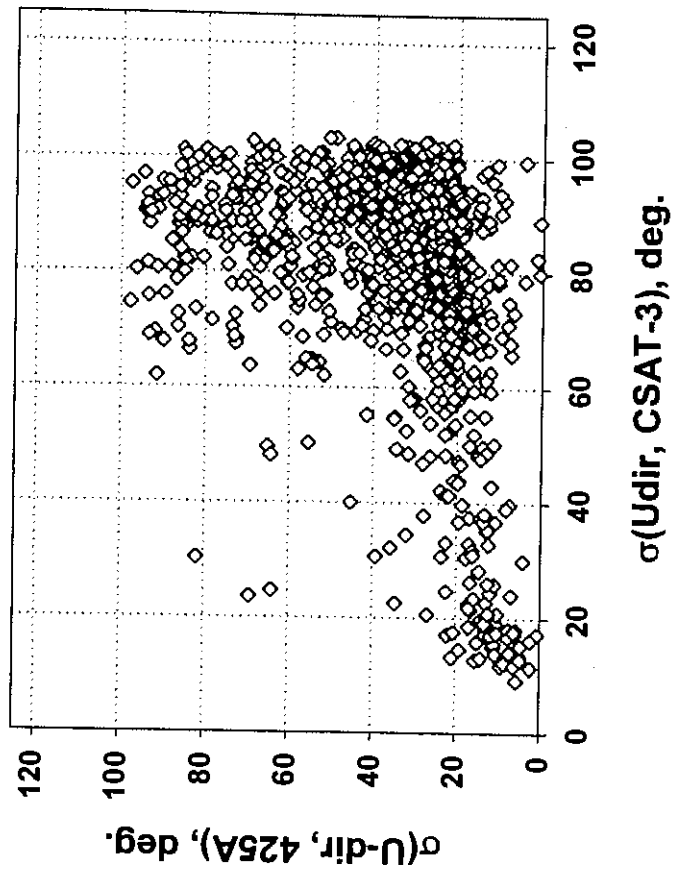
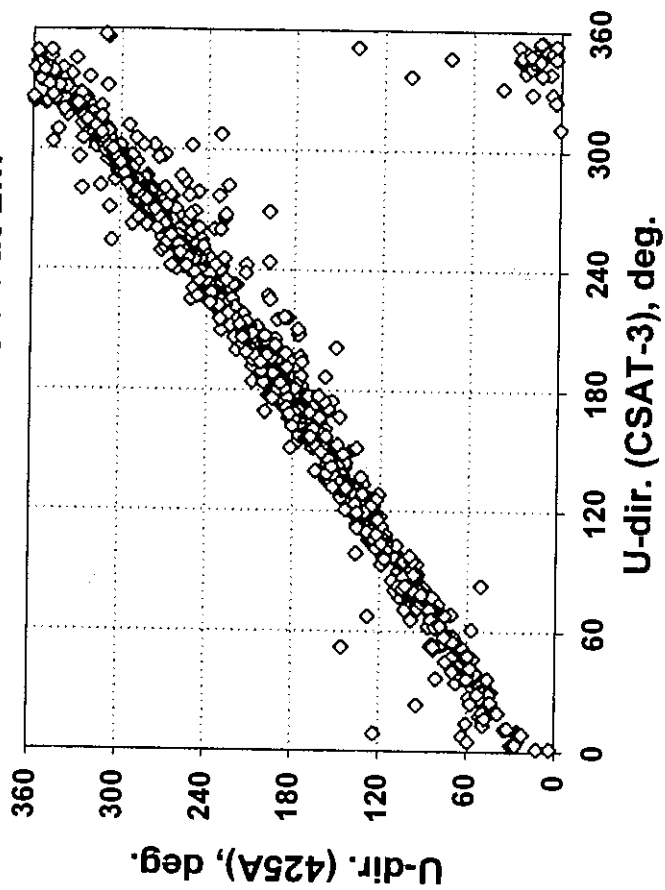


Note on RMYvane at 26m  $\Rightarrow$  was using incorrect cal.  $\# \Rightarrow$  slope should be ~~0.992~~ 1.002 very good!!

Wind Speed at 2m



Wind Direction at 2m



5/10/02 ① Bill  $\Rightarrow$  switched dessicant on profiler - ~10:30 AM

②  $\Rightarrow$  switch positions on Handar 6m + CSAT-1m

Reversed positions - still running  
comparisons AT 2m

~~computer~~ 11:00-12:00

③ Put new program E5423x7.csi IN

$\Rightarrow$  has hi resolution for CO<sub>2</sub> channel

loaded about 10:30 - Restarted DUCK AROUND 11:00

Seems to be working

④ Took out voltage divider in EC-inga ~1:00 PM

⑤ Bill fixed ventilator shaft ~~and~~ RH/T sensor AT 2.5m

⑥ switched out REBs radiometers & releveled  $\Rightarrow$  1:30-2:15

⑦ Hooked up CNR-1 back top of tower.

(Disconnected undercanopy AT 11:30 AM)

Running AROUND 3:30 (logger was off from  
3:00-3:30)

\* Note looks like PAR-up had a bad connection

AFTER THIS  $\Rightarrow$  Bill went back out to check at 4:00 PM

⑧ Sec100

Signal had gone way down overnight  
From 400 mV  $\rightarrow$  ~0 mV (w/ -150 mV offset)  
Target still looked quite yellow

$\Rightarrow$  Accidentally left turned off from  
11:00  $\rightarrow$  3:00 PM

$\Rightarrow$  When turned back on  $\Rightarrow$  hooked old electronics  
board up  $\Rightarrow$  saw only 64 mV of signal!  
(very low!! need more dye on targets)

⑨ Turned off dendrometer power supply  
was giving -5.2V & +3.8V

ON 5/9/02  $\Rightarrow$  Took light shield off at Li7500 (~11:00 AM)

Took down Sec100  $\Rightarrow$  put in new electronics & new target

$\Rightarrow$  Back running ~3:00 PM

5/16/02 - UC/EC system off at ~ 11:00 AM

- moved little  $\Delta$  Tower

moved IR-T ~ 11-11:30 AM (did not disconnect)

5/23/02 - New O<sub>3</sub> TARGET (10:45)

- Put Light SHIELD BACK ON L:7500 (11:00)

- Short inlet line on Barts O<sub>3</sub> (no real difference)

ZEROPING O<sub>3</sub> ANALYZERS  $\Rightarrow$  12:15  $\rightarrow$  1:15

New Sealed inlet line ~ 12:30

SIGNAL WENT DOWN ??!

can't find a good inlet (clean tube)

NEW 7' AIR ~ 1:15 PM (~800 psi)

5/29/02

2 THINGS wrong w/ profiles

① Hole in one of lines (BEHIND profile)

Fixed: 10:30 AM

② Leak at Dessicant trap  $\Rightarrow$  won't zero

Replaced dessicant - then zeroed OK

(Pressure lower than usual  $\Rightarrow$  ~40 mV)

$\Rightarrow$  1:00 PM  $\Rightarrow$  everything OK

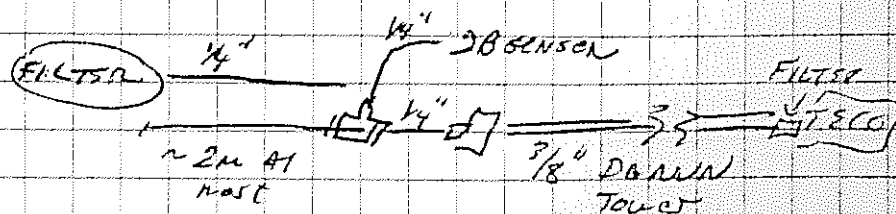
NEW (O<sub>3</sub>) inlet line  $\Rightarrow$  sort of running AT 12:00

THEN moved 2B O<sub>3</sub> SENS to top of tower

$\hookrightarrow$  DEC between 1-2:00; THEN running again

For slow

O<sub>3</sub> SENSORS



Downloaded met & profile loggers



5/30/02

- New Target in Scaled (~~12:30 PM~~)
  - ⇒ may have fried Tehu Franks electronics - doesn't seem to be working now.
  - ⇒ Switch inlet tubing again - no real change in  $O_3$  signal
  - ⇒ Signal was still very small ( $\sim 150 \text{ mV}$ ) even THOUGH warm SUNNY upstate day (but didn't look at flow sensors to see  $[O_3]$ )

Bill downloaded CNR logger

\* [ - 1:00-3:00; moved Hander on small tower back to 6.5m (END of comparison)  
moved CSAT-3 back to 1m height

⇒ Turned fans on in Duck &amp; EC system

Put in new double profile program AT  $\sim 3:00 \text{ PM}$   
watched thru one cycle & it looks OK

5/31/02

Lab tests on new disjunct sampler

- ① Flow Rate thru Sampler - (Reservoir + valves + some  $\frac{1}{2}"$  TUBING)  
⇒ scale of 150 slpm meter

RAN $\phi$ AIR THRU my 0-10 lpm → THEN thru big controller
0-10 slp MFC
9.99
5.00
0-150 MFC
0.068 ⇒ $\times 147$
0.036

using ALS small pump  
Big pump

Flow = 0.108 ⇒  $\sim 16 \text{ Lpm}$   
= 0.51 ⇒  $75 \text{ Lpm}$

- ② Volume of Reservoir

weight empty = 41 g (106 g) (tare)  
weight full ( $H_2O$ ) = 367.2  
 $\Delta M = 326.2 \text{ g}$   
 $\rho(H_2O) = 1 \text{ g/ml}$

$V = 326 \text{ ml}$

## (3) Residence Time

$$F = 75 \text{ Lpm} = 1.25 \text{ L/sec} \quad V = 0.326 \text{ L}$$

$$f = F/V = 3.83 \text{ Hz} \quad (1/f = T_{res} = 0.26 \text{ sec})$$

can operate at 4 Hz (at least) <sup>To flush</sup>

(4) Testing O<sub>3</sub> inlet line that's been up since last year

CONDITION	O <sub>3</sub> , ppb	
No tubing	106-108	(steady for 5 min.)
Entire Inlet tubing	104-105	<u>Good!</u>
No tubing	108-109	
	113-114	

Black portion of inlet only 110 ---→ 117 ---→ 120

→ looks good - probably our new sealed inlet!

6/6/02

→ Took down 2B O<sub>3</sub> sensor (10:00 AM)

→ Replaced inlet line on Sealed - used black Teflon that I lab-tested for O<sub>3</sub>

→ Replaced PMT w/ new one

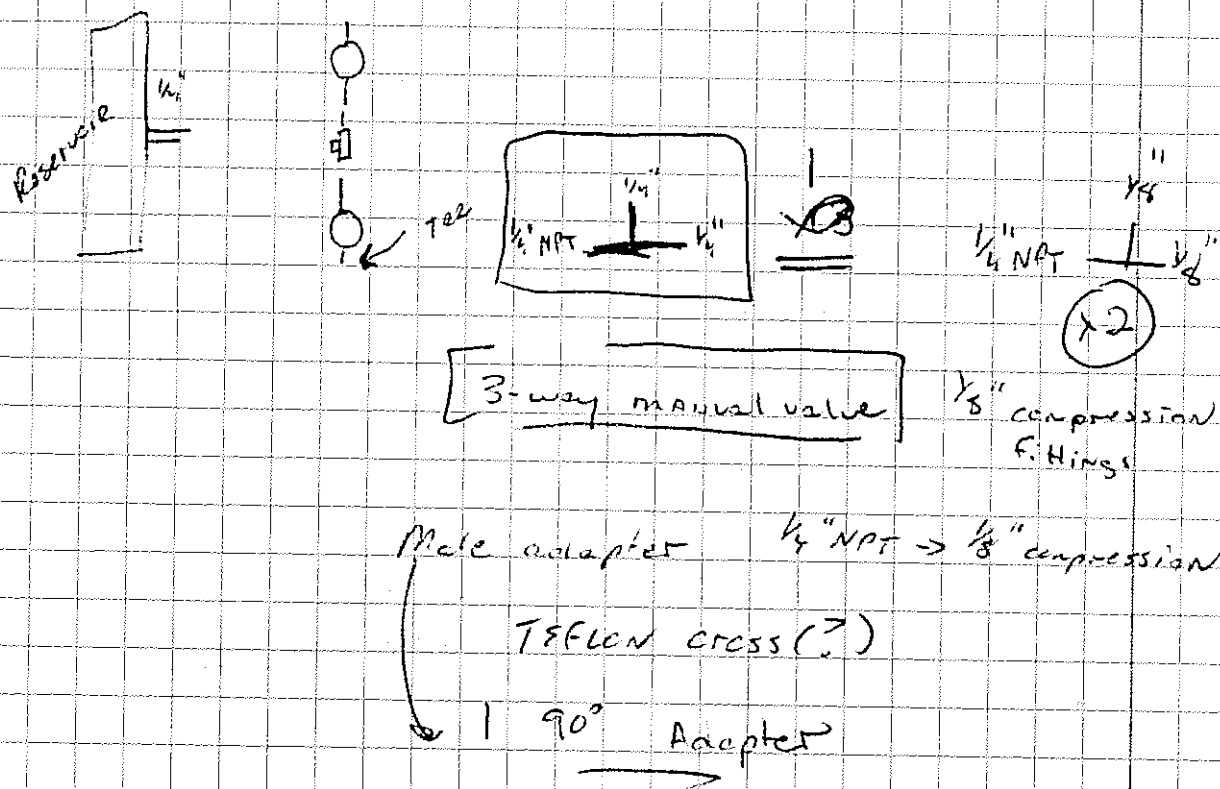
→ Replaced target

Running w/  $F_{in} = 6.06 \text{ Lpm}$

⇒ Signal ⇒ 950 mV; -- probably a factor of 4-5 better w/ new tubing & PMT!!  
THIS should do the trick!

⇒ Possible problem - w/ new target, may go off scale (0-1000 mV range on logger)

⇒ easiest solution is to turn down PMT voltage a bit!!



# 6/11/02 Downloading loggers

Tc 23x => Clock is off again

SHOULD BE 10:37 6/11/02  
Redds 10:35 5/8/02  
- Reset clock -

- Sealed. New Target ~ 10:30 AM
- 2B O3 sensor - running ~ 10:15 AM
- > New power supply on dendrometers ~ 11:00 AM

looks like it ran from JD 129 -> 130  
suddenly switched to JD 96  
=> DID NOT even miss a 15-min period

- > Under canopy system running on small base tower  
Z = 2.5m, Time = ~ 12:00 noon
- > Bill reoriented Hardar at 6m (2:00 PM)
- > new reference gas
- > cleaned Kr hyg. optics (~ 1:30 PM)

Need logger  
DATA from  
~ 10/02

6/12/07 -

Looking AT Sealed Spectra from yesterday

See O<sub>3</sub> Lab bookOverall  $\Rightarrow$  looks OK

6/27/02 - Things to DO:

AT Tower

- change inlet filters
- put up shadowband
- Download dataloggers (Dendrometers too)
- move VANE up to 26m
- Add undercanopy radiometer
- check clock ON 23KTC
- keep Sealed running (more Targets?)

USE Gasband  
RUSSIAN Inga In-line

Data processing

- check radiometer coefficients
- check O<sub>3</sub> comparison
- Handar - CSAT comparison
- Are there differences in ECOT diurnality  $\Rightarrow$  new filters

Code - O<sub>3</sub> fluxes  $\Rightarrow$  write calculator  
NO<sub>x</sub> fluxes  
 $\Rightarrow$  DISJUNCT stuff

For disjunct sampler - start w/ 28 O<sub>3</sub> sensor  
- 46262

6/11  $\rightarrow$  6/28

order MgClO<sub>4</sub>  
email Brad Hall  
Gases for SF<sub>6</sub> exp.



7/5/02 Quake DIED AT 5:30 AM

Try to change data logger code

Met logger

analog 1  $\rightarrow$  8 Status OUT (EC system)

1/2 hr aug.  $\rightarrow$  analog 1  $\rightarrow$  8

Wind Direction could be funky, but otherwise OK

need to convert wind speed & direction on logger  
Don't just average the voltage.

Fast 23x -

Krypton  $\rightarrow$  DIFE channel 1 (found this & shift to DIFE channel 5)  
[loaded in ~ 3:30 PM]

Back to met

1 - w. die

2 - w. spd

3 - w. dir

4 - w. spd

10 - w. dir HAN

analog 9

11 - w. spd HAN

analog 10

Calibrating Deans Standard

Run	Zero	T	P (m)	Veer	Sample T	P	V	ECO <sub>2</sub> ppm
1	0	35.43	807	1337	35.39	<del>809</del> 806	1662	463.51
2	0	35.30	807	1336 (OK)	35.28	806	1666	464.885
3	0	35.23	807	1339 ✓	35.22	806	1666	464.795
4	0	35.17	807	1338 ✓	35.17	806	1666	464.720
5	0	35.16	807	1338 ✓	35.15	806	1666.5	464.883

Last 4  $\Rightarrow$   $464.82 \pm 0.08$   
 All  $\Rightarrow$   $464.56 \pm 0.59$

New met program - will output

Udir-26	analog	3
Udir-16		
Udir-9	Real units	9
U-26		2
U-16		4
U-9		10
RH1		5
RH2		6
RH3		7
Pressure		8
Status.ec	Status.out	

6 → 5 rps

met30D.csi → should output  $u, \bar{u}, \sigma, \sigma(\theta)$  for  $k_2$  - h.c. AVG.

Profiles 1  
2  
3  
4 >  
5 /  
Wet  
PR1  
PR2  
PR3

$4 \times 3 = 12$

22

7/7/02

met logger - still on std. Time - reset to MET  
New program met30D.csi (~7:30 AM)

2  
540  
0.6  
3240  
0.0108  
3000  
32400

0.106

5000 = 540  
8.12  
5000.00  
4320  
680.0  
540.0  
140.0  
108.0  
320.0

8.12

3000 = 0.6  
5000

WIND DIR  
CHANGED COEFFICIENT TO 0.108

3000 / 0.0108

3000 / 0.0108

1.5 min

$$\begin{array}{r} 1.666 \\ 60 \overline{) 100.00} \\ \underline{60} \\ 40.0 \\ \underline{36.0} \\ 4.00 \end{array}$$

ProFilter also ON std. time - Reset to MOT

HAD TO REASSESS proFilter -

Now spends 60 sec. on each level  
RUNNING Avg of 15 sec.

ToDo:

- ① Move 2:7500 BACK over near A71
- ✓ ② CHANGE filters on proFilter (All 6 levels)  
↳ put rain shield on 10m
- ✓ ③ change dessicant in proFilter
- ④ change inlet filter on EC system (AT service)
- ⑤ clean Kr hyg. optics
- ⑥ Change met30D program - put in correct cal. constants  
+ reload program

7/11 13:30

7/8 => Replaced Duck hard drive

7/11 DAC config. on Peters Lieco -

CO<sub>2</sub> => OV ~~25~~ ppm  
5V = ~~50~~ ppm  
475

H<sub>2</sub>O OV = 0 mmol mol<sup>-1</sup>  
5V = 25 mmol mol<sup>-1</sup>  
25

CHECKING cal.

Zero -

83.3 ppm - CO<sub>2</sub>

TRY TO ZERO => 59.1 ppm

4.96 - H<sub>2</sub>O

=> 4.30 mmol mol<sup>-1</sup>

CO<sub>2</sub> = 345.7 ppm Span -

	AMP
1 - WHI.	1
2 - RED	2
3 - BLK 1	3
4 - BLK 2	4
5 - BLK 3	5
6	6

SIGNAL CABLE

CO<sub>2</sub> DAC1 - RED  
GRD - BLK

H<sub>2</sub>O DAC2 - WHI  
GRD - BLK

# Catching up on Site work

Double Profiler program on 5/30/02

## OLD configuration

## new configuration

Level	Location	Port	New Position	New Level
1	USGS - TOP	1000	USGS - TOP	1
2	USGS 10m	1100	N - 6m	7
3	USGS 6m	<del>1100</del> 1010	USGS 8m	3
4	USGS 4m	<del>1001</del> 1110	USGS - 5m	5
5	USGS 2m	<del>1101</del> 1001	USGS 2m	9
6	USGS 1m	<del>0000</del> 1101	USGS 1m	11
7	CU 26m	<del>0000</del> 0000	CU 26m	2
8	CU 10	<del>0010</del> 0100	N 1m	13
9	CU 6	<del>0110</del> 0010	CU 8	4
10	CU 4	<del>0001</del> 0110	CU 5	6
11	CU 2	<del>0001</del> 0001	CU 2	10
12	CU 1	<del>0101</del> 0101	CU 1	12
13	S 6	<del>0101</del> 1011	S 6	8
14	S 1	0011	S 1	14

order

TOP → BOTTOM

N = North

USGS → CU → N → S

S = South

ON July 3

- Downloaded data loggers (soil, Tc23+ dendrometers)

July 5TH - Bill downloaded tower data loggers while Duck was Dead. Moved Li7500 close to CSAT-3

July 7TH - loaded new met + profile programs into loggers  
Downloaded tower loggers

July 8TH - Duck up & running again (put Fast23x7.csi back into fast logger (downloaded 1st))



7/11/02

Bill -

- Replaced profiler dessicant & filters
- Moved Li7500 back close to ATI
- cleaned Kr hyg. optics
- change EC inlet filter

new Target?



- ~~deleted~~ put in new met30D.csi program (Did he download data first?)
- Also put in 21sonic.csi in UCEC logger (had lost power)

⇒ 3:00 = shutdown DUCK  
& replaced UPS (also plugged ATI sonic into surge suppressor)  
When restarted - 2<sup>nd</sup> power supply in DUCK didn't come back up  
Had to replace power supply ⇒ then seemed to be working fine

15/02 Starting disjunct sampler

Before - zero + span IRGA

	CO <sub>2</sub>	H <sub>2</sub> O
zero	18.5 ppm	2.349 mmol mol <sup>-1</sup>
SPAN	368.2 (set)	same

→ [CO<sub>2</sub>] = 375.7 ppm

Reset DAC channels

CO<sub>2</sub> 0-5V ⇒ 0 ppm → 450 ppm  
H<sub>2</sub>O 0-5V ⇒ 0 → 25 mmol mol<sup>-1</sup>

new selected TARGET

⊛ At least 2 more trips just to restart DUCK

7/18/02 New CO<sub>2</sub> cal. tank

RUN	ZERO	span			V <sub>cal</sub>	sample			ECO <sub>2</sub>
		T	P			T	P	V	
1	0.0	35.63	816		1337.3	35.82	815	1357	416.61
2	0.0	36.48	816		1336.5	36.70	815	1535	416.32
3	0.0	37.15	816		1334.8	37.33	814	1535	417.29
4	0.0	37.58	815		1332.6	37.68	814	1532	416.52
5	0.0	37.92	815		1331.5	38.00	814	1531	416.71

416.7 ± 0.4 ppm

[Put on at ~2:00 PM]

7/24/02

Duck Dimensions10 1/2" deep  
23 1/2" wide  
30" TALL

PORT 4 1/2" → 10"

12" TO TOP OF power supplies

- New Sealed target (7/18/02 PM)
- ~~new~~ Clean restrictor in NO<sub>2</sub> sensor
- [Back on AT 2:00 ⇒ using AIR (not O<sub>2</sub>)]
- CHANGED DOUBLE Profile program calibrates every 2 hrs.

New change

7/25/02

Want to:

- < Replace Flow controller w/ meter in DISJUNCT sampler (needle valve)
- < TEST values ⇒ Do we need to switch air α-value?

Deans CO<sub>2</sub> tank

RUN	ECO <sub>2</sub>
1	413.67
2	414.02
3	414.43
4	414.57
5	414.33

414.2 ± 0.4 ppm

7/30/02 - Moved south canopy access tower  
to new location

8/22 16000  
File  
channel 204 !!  
screwing up!!

7/31/02 → Aug. 2

Replacing DUCK ⇒ Antennas likely shot (lost data)  
Evenings running old DUCK  
on Aug 2 (Friday) - left running channels 200, 201 + 202, 3  
Power out over weekend

8/5/02 - Brian Lamb arrives

⇒ Hooked up rest of channels to new DUCK  
⇒ New standard on Double Profiler  
⇒ New program in Double Profiler ⇒ Added SE<sub>6</sub>

8/6/02 Jeilun + Sean up ⇒ Big Rainstorm

8/7/02 Took GPS readings

8/8/02 New Dessicant in profiler  
Downloaded loggers  
New Sealed target

// [ NGy sensor out of CO  
turned off ]

8/12/02 Brought up balloon w/ Alex, Jim + Peter

8/13-14 worked on balloon

~~Notes~~ To Do:

- Data - ① Run Fumes for Aug 1-10 ⇒ [Berun wind profiles]
- ② Run logger input, wind combine for July ✓  
↳ Rewrite for new met data ✓
- ③ THEN RUN monthly.g. >> print off graphs

- Site: Disjunct Sampler
- Switch out AT1 sonic
- Switch 2-value
- Try different pump

// need to copy  
new DUCK code  
to russter !!

At site

For Bill - ① Buy some shelf hardware

⇒ shelves - Greenbergs lab

⇒ hardware - McGuckius

3 - strips

6-8 shelf supports

[8" shelves] ⇒ Plexiglass would  
be best!!

② Switch out REBr radiometer

③ Make some new dessicant traps

⇒ Disjunct sampler -

- Run at trailer (can hook up NCAR ATL sonic)

↳ set up like mine w/ Hyperterminal

→ switch out α-valve

→ put MFC back in (use AMP connector)

→ Test some pumps - pumping out of reservoir

8/20/02

Hooked up Teuluns TC array

TD channel 207 = 1 Hz

Working - but intermittent noise

↳ Not logging at 1 Hz ⇒ seems to be missing  
some bytes in the data stream

8/22/02

Not at site -

Channel 204 - Began looking like channel 207  
missing data bytes

8/26/02

- Tried cycling power on logger ⇒ still messing up

- Turned off channel 207 ⇒ momentarily channel  
204 looked ok, but didn't last

8/27/02

⇒ ~~Used~~ Monitored ATL sonic directly w/ laptop  
Nothing funky w/ data stream - sonic is  
not reason for wrong rep. rate?

→ Channel 207 - back on ~ 4:00 PM

→ Moved L7500 close to Campbell sonic (~ 2:30 PM)



To Do:

Bill

- ① Put shelves in DLRK?
- ② ~~Disjoint in Profiter~~
- ③ New Filter in EC system
- ④ Move equipment to top of tower

→ Help Teresa as much as possible  
→ Get cable for her

me

- ① switch channels 204 & 206  
↳ check router (can check from quacker)
- ② New ~~Disjoint~~ for quacker
- ③ Switch out AT1 sonic (move L2500 back over)
- ④ Help Teresa hook up CO to Fast 23x

⊗ If time - Try to monitor data logger output directly ⇒ have to output in ASCII

⑤ New Target for SUCCESS !!

Then help w/ ballast

- Depending how this goes -  
Add everything into to Undercan. 23x !!
- Try -
- ① switch channels
  - ② switch short hauls (at quacker)
  - ③ switch cabling (at quacker)

make sure I have level in bag

8/26/02

10:30 → 12:00 PLAYING w/ Switching channels around.

Found bad short haul modem on channel 204

Replaced & it seems data is being recorded

At 10 Hz now

New Seclod Target ( $\sim 10:30$ )

- B:11 ⇒
- Switched decimeter in profiler  $\sim 11:00$
  - Switched EC Filter  $\sim 11:30$
  - Moved RMY vane from 24 m → 26 m ( $\sim 1:00$  running)

⇒ switched out All sonic; now its Rop rate was 10 Hz ⇒ seems like it could have been the sensor

cockpit problem - suddenly gives dead channels, but rserial & data-stats indicate data is OK!!

- 8/26 ⇒ Data-stats shows some funny things for channel 206
- ~~seem~~ look at start & end times
  - seems to drop out for hours at a time
  - No apparent reason.
  - Need to look at ~~some~~ data w/ Splur

① combine channels 204 + 206

into 1 data logger (have to make an extension cable for Li7500)

② Move quacker to new box (Restart quacker & ruster!!)

③ check data; Aug. 21-31 = does it look OK?

(try working w/ graphing! ⇒ still need to look at undercanopy winds though?!)

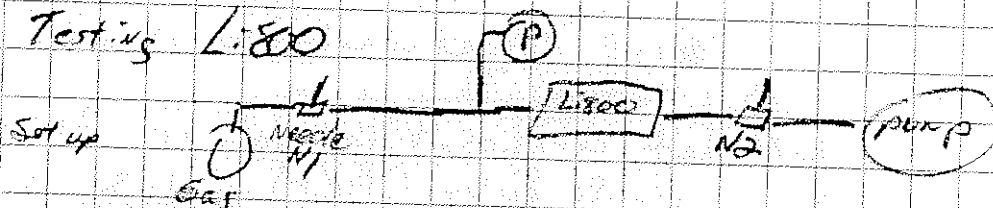
④ back ATI (make some graphs)  
more short haul modems (Back box)

Kathleen Barney lewney@ucar.edu  
Wind Sys Sonic K

Property tag #, Serial #, model #

9/11

Testing Li800



Adjust N1 & N2 to vary pressure

Run #1 Filename 020911a.txt

<del>P</del>	<del>T</del>	P (KMS)	T (K)	N (KMS)
Start →	1	699		384
	2	627		384
	3	536		377
	4	569		379
	5	586/7		378.3
	6	509		37
	7	Readjusted flows (High flow rate)		
		502		370-370
	8	475		366.0
	9	645		~ 385
		Pump off		
	10	802		390 → back to 386-7

Allowed a few  
minutes at  
each pressure

Pretty unstable

Sampling

checking Pressure Sensor vs. MKS

Li800	MKS
1060 (AAAAH)	809
848	645
754	574
724	551
673	512
625	476
802	609
923	760

9/3/02 To try & fix cockpit bug - tried rebooting quacker over the net - she never came back

9/4/02 At site - quacker was locked up - ~~didn't~~ rebooted ~~it~~  
some file errors - tried to fix

THEN rebooted - came up but now ALL channels were missing data!

See Duck manual for further description of problem & the eventual fix

⇒ ~~Just~~ combined channels 204 & 206 into 204  
Also set up 1/2-hr back-up of undercanopy wind speeds & directions.  
(~ 5:00 PM)

Other times at site:

- Friday - Sept. 6

- Mon. - Sept. 9

THURS. - Sept. 12 ⇒ finally think we've fixed quacker problem

9/16/02 Repeating 9/11 exp. on Li800 w/ pressure compensation off!

No compensation

started 11:22

File 020916a.txt

<u>P (Nks)</u>	<u>Torr</u>	<u>~ [CO<sub>2</sub>]</u>	<u>P (ing)</u>	<u>Time</u>
737		380 ppm		11:22
813		439.5		
660		325		11:29
591		2?		11:30
[504		221		11:32
469		199.6		11:33
547		249		11:35
612		291.4		11:38
695		349.2		11:42

Quit ⇒ 11:43



W7 pressure compensation

File: 0209166.txt

<u>Time</u>	<u>MKS</u>	<u>~CO<sub>2</sub></u>
11:44	694	387.1
11:46.7	805	391.8
11:49	611	381.7
11:51	532	374.2
11:52	470	366.3
11:55	499	370.7
11:57.58	574	379.2
11:59	751	389.8
12:01	651	385.0

Left Pressure Compensation ON

020916 PDA. POB

cycled power on L1800

New recording data w/ PDA

<u>Time (my watch)</u>	<u>MKS</u>	<u>~CO<sub>2</sub> (on PDA)</u>
1:16	652	387.
1:19	750	392
1:21	616	384.
1:25	574	381.5
1:26	522	376
1:27	476	<del>365.4</del> → 370 ppm
1:30	690	389.4

TURNED P-comp. off // Powered L1800 off/on

<u>Time</u>	<u>MKS</u>	<u>~CO<sub>2</sub> (on PDA)</u>
1:43	687	<del>38</del> 346
1:47	764	400
1:50	623	300.7
1:52	493	216
1:55	541	247
1:58	592 → 588	279 → 277
2:00	738	384

on and/over/edu

under /or/turnip/empdata

## ANALYZING L800 START

Run from 9/11A:

Press. Comp = ON

⊕ AVG of 50 points

Point

Pressure (L800)

P (MKS)

TC027 ⊗

1

920.4 whor

 $386.88 \pm 0.45$ 

2

824.0

 $384.67 \pm 0.32$ 

3

704.3

 $376.88 \pm 1.21$ 

4

742.3

 $379.68 \pm 0.51$ 

5

771.5

 $381.08 \pm 0.47$ 

6

668.9

 $369.31 \pm 3.08$ 

7

660.4

 $371.74 \pm 0.54$ 

8

623.8

 $369.95 \pm 0.49$ 

9

849.4

 $385.74 \pm 0.46$ 

10

1057.05

 $388.62 \pm 0.34$ 

From 9/16:

Press. Comp = off

972.9

 $380.24 \pm 0.096$ 

1074.2

 $439.42 \pm 0.112$ 

874

 $325.51 \pm 0.15$ 

779.2

 $276.28 \pm 0.096$ 

665.3 (!)

 $250.0 \pm 0.00$ 

722.7

 $248.5 \pm 0.092$ 

809.3

 $291.97 \pm 0.40$ 

918

 $349.33 \pm 0.103$ Press. Comp = ON

916.7

 $387.34 \pm 0.17$ 

1062

 $391.97 \pm 0.14$ 

806.9

 $381.83 \pm 0.16$ 

701.9

 $374.41 \pm 0.16$ 

620.1

 $366.27 \pm 0.14$ 

659.2

 $370.79 \pm 0.24$ 

756.8

 $378.84 \pm 0.13$ 

991.2

 $390.02 \pm 0.16$ 

860.6

 $384.97 \pm 0.16$ Gonport  
Hill  
ChapmanSingle 2 par.  
Single 8 par.  
Log.

(\*) THESE go backwards in time  
most recent at top of files!!

DATA from PDA - P-comp=ON

Point	P(Li800)	P(MKS)	ECO <sub>2</sub> (A <sub>5</sub> - 50pts)	Hpts
1	910.6		389.81 ± 0.71	29
2	628.7		376.85 ± 0.22	30
3	689.7		376.55 ± 0.30	"
4	757.3		381.54 ± 0.13	
5	813.0		384.85 ± 0.21	
6	994.8		392.08 ± 0.14	
7	860.60		387.61 ± 0.22	
			<del>385.95 ± 0.143</del>	
8	811.8		386.36 ± 0.82	

DATA from PDA: P-comp=off

1	715.96	247.48 ± 0.40
2	650.44	216.29 ± 0.25
3	822.6	300.81 ± 0.30
4	1004.6	400.93 ± 0.48
5	905.8	345.39 ± 0.12
6	908.2	342.98 ± 0.499

could  
be  
old

910.6

974.12  
777.5

389.80 ± 0.70  
376.85 ± 0.22

OLD  
File!

383.42 ± 0.65  
277.81 ± 0.56

For P-comp, P < 900 mbar

$$ECO_2 = 320.2 + 0.07825[P] \\ \pm 3.60 \quad \pm 0.0048$$

$$R^2 = 0.936$$

For UN-comp, = ALL PTS.

$$ECO_2 = -134.0 + 0.5299[P] \\ (\pm 5.694) \quad \pm 0.00658$$

$$R^2 = 0.9982$$

If we look at uncompensated data

Plot  $[CO_2] \frac{P_0}{P}$  vs.  $P$  where  $P_0 = 1013 \text{ mbar} = 1 \text{ atm}$

~~Linear~~ Linear -

$$Y = 215.287 + 0.1868[P] \quad R^2 = 0.9961$$

At  $1013 \text{ mbar} \Rightarrow [CO_2] \frac{P_0}{P} = \underline{404.5 \text{ ppm}}$

If extrapolate fit of P-comp data

to  $P = 1013 \quad [CO_2] = 399.5 \text{ ppm}$

What is Pressure Range balloon will see:

$$\Delta Z = \cancel{10000} 2500 \text{ ft} = 12400 - 9900 \\ = 3758 \text{ m} - 3000 \text{ m}$$

Pressure as func. of  $Z \Rightarrow \log(P) = 3.043 - (6.529 \times 10^{-5}) Z$   
( $Z$  in m)

①  $\Delta Z \Rightarrow$  corresponds to  $\Delta P$  Between  $703 \rightarrow 628 \text{ mbar}$   
 $P_{\text{comp}} = 5.9 \text{ ppm}$

$P_{\text{uncomp}}(w/P_0) = 14.0 \text{ ppm}$

② What if only 500 ft:  $152 \text{ m} \Rightarrow 703 \rightarrow 687 \text{ mbar}$

$P_{\text{comp}} = 1.3 \text{ ppm}$

$P_{\text{uncomp}}(w/P_0) = 2.8 \text{ ppm}$

298

20  $\rightarrow$  P  
21  $\rightarrow$  CO<sub>2</sub>



9/19/02 Calibrating Li800 AT TRAILER  
calibrated at  $P = 748 \text{ mbar}$

THEN TURNED ON PUMP

Time	$P(\text{mV})$ on 6251	$V$	$T$	$\sim \text{LiCO}_2 800$
3:43	<del>-287</del> -42	1095	22.22 (330.76)	$\sim 350.2$
3:47				
<del>3:47</del> 3:49	266 $\rightarrow$ 256 $\rightarrow$ 247	1180	22.14 (330.8)	$\sim 349$
352	67 mV	1127	22.12	$\sim 349.5$
3:54	768			$\sim 365.5$

STEP & calibrate — Bern JRGAs

4:01	70.56	768	1371	22.04	345.5	345.7
4:03	73.35	952	1426	22.03	345.7	345.4
4:05	71.56	834	1389	22.04	345.02	345.05
4:07	69.36	689	1346	22.16	345.05	345.7
4:10	68.26	616 (68 kPa)	1324	22.22	344.95	346.3
4:12	67.39	559	1307	22.36	345.03	346.1
4:14	66.19	480 (66 kPa)	1282	22.43	344.49	346.6
4:17	64.62	376	1250	22.60	344.16	346.9
4:19	63.37	294 (63 kPa)	1227	22.66	344.63	347.1

4:22	$\Rightarrow$ check zero		$\Rightarrow$ looks OK $\Rightarrow$ back to span gas
4:24	61.87	195	1197 22.80 344.45 347.2
4:26	60.4	100 (60.4 kPa)	1170 22.90 (344.5) 347.6
			69 344.71

Stopped at 4:29

w/ pump off / disconnected  $\rightarrow$  Li800 back to  $\sim 345.6 \text{ ppm}$

Pressure	$\text{LiCO}_2, \text{ppm}$	$P$	$\text{LiCO}_2$
701.9	$345.56 \pm 0.15$	615.2	$347.59 \pm 0.18$
730	$345.04 \pm 0.19$	600.6	$348.25 \pm 0.14$
711.7	$345.69 \pm 0.18$		
689.7	$345.85 \pm 0.11$		
678.7	$346.28 \pm 0.20$		
670.2	$346.30 \pm 0.15$		
658	$346.59 \pm 0.17$		
642.1	$347.17 \pm 0.18$		
629.9	$347.32 \pm 0.18$		

$$\text{LiCO}_2 = 362.2 - 0.0235 P$$

$$R^2 = 0.981$$

$$\Delta P = 130 \text{ mbar}$$

$$\Delta \text{CO}_2 = 3.2 \text{ ppm}$$

Now calibrating Peter's standard.

Row	Spot	P	T	V	P	T	V	CO <sub>2</sub>
1	0	762	23.3	1366	763	<del>23.3</del> 23.38	1741.5	481.61
2		762	23.2	1366	763	23.16	1736	479.12
3					"	23.19	1741	481.11
4					"	23.24	1736	480.03
5					764	23.33	1736	479.49
6					763	23.35	1740	480.96

Fit from my 6251

$$\text{CO}_2 = 339.04 + 0.0087 P(\text{in bar})$$

$$R^2 = 0.623$$

$$480.04 \pm 1.0 \text{ mmHg}$$

(1σ)

10/7/02 UMBS DISJUNCT DATA

DAY	Time	$\bar{w}^+_{up}$	# samples	$\bar{w}^-_{dn}$	# samples	TOTAL
<del>176</del>	<del>10-11:30</del>	<del>0.886</del>	<del>29</del>	<del>0.873</del>		
176	1030-11:00	0.732	42	-0.7294	33	75
	11-11:30	0.886	29	-0.873	26	55 (11:21)
wich	12-12:30	0.496	30	-0.589	42	72
	11:30-12:00	0.769	29	-0.685	46	75
	12:30-13:00	0.737	37	-0.671	36	73
	13-13:30	0.669	33	<del>0.698</del> -0.500	31	64 (13:24)
	13:30-14:00	0.605	34	-0.698	40	74
	14-14:30	0.989	40	-0.909	33	73
	14:30-15:00	0.762	44	-0.865	30	
	15:00-15:30	0.773	32	-0.907	43	
	15:30-16:00	1.158	39	-1.155	31	
	16-16:30	0.8177	35	-0.9795	40	
NO DATA IN 1630 file						
177	10-10:30	0.930	19	-0.805	51	
	10:30-11:00	0.714	21	-0.707	12	
	11-11:30	0.533	19	-0.944	52	
	11:30-12	0.831	39	-0.597	34	
	12-12:08	0.583	5	-0.734	6	

10/28/02 looking at balloon calibrations

Spt. 23

#	Time span	Low ~ 343 ppm	High ~ 480 ppm
1	13:09 - 13:12	344.17	474.85
2	17:10 - 17:13	348.39	478.97
3	15:18 - 15:20	346.84	477.16
4	16:39 - 16:41	349.05	480.00
5	17:38 - 17:41	348.74	<del>471.34</del> 478.49
6	19:46 - 19:47	348.57	479.15
7	20:54 - 20:56	350.17	480.49

FLIGHT #	calibrations	Low	High	Int.	Slope
1	1, 2	346.28	476.91	19.238 <del>19.238</del>	0.9535
2	2, 3	347.62	478.07	<del>21.019</del> 21.019	0.9522
3	3, 4	347.95	479.08	<del>19.646</del> 19.646	0.9572
4	4, 5	348.90	479.75	21.297 21.297	0.9551
5	5, 6	348.66	478.82	22.785 22.785	0.9501
6	6, 7	349.37	479.82	22.769 22.769	0.9522

$$y = \frac{P - \text{INT}}{\text{Slope}} \times (\text{CO}_2)$$

Sep. 24

#	Time span	Low (~343 ppm)	Hi. (~480 ppm)
1	15:01 - 15:03	347.13	477.72
2	18:07 - 18:09	348.96	478.98



FLIGHTS

Sept. 23rd

<u>FLIGHT #</u>	<u>Time span</u> <u>From IRGA (#pts)</u>	<u>From met sonde (#pts)</u>
1	13:27:18 - 14:02:18	
2	14:21:00 - 14:52:48	14:21:00 - 14:58:52
3	15:40:30 - 16:27:30	
4	16:45:30 - 17:25:30	
5	17:58:31 - 18:16:18	
6	19:51:00 - 20:51:09	

Sept 24

1	17:08 <sup>00</sup> - 17:46:42
2	18:12:00 - 19:08:54

Mileage - DATES AT SITE -  
 [ AUG. 1, 2, 5, 6, 7, 8, 20, 26, 27, 28  
 [ Sept. 4, 6, 9, 12, 19  
 [ Oct. 7, 18  
 Nov. 4

DATE DESTIN  
 52  
 #miles

11/12/02 Looking at soil heat flux plate data  
 in Sept.  $\Rightarrow$  Looks like plates # 3, 4, 5, 8, & 10  
 Are giving strange values - sometimes ~~100~~  
 $\sim 100 \text{ W m}^{-2}$  offset - sometimes 0°C

Need to look at this sometime

~~11/13/02~~ Analysis of balloon data from ~~9/23/02~~  
 using NBL method of ~~Patterson et al.~~

11/13/02 Analysis of balloon data from 9/23/02  
 Using NBL method of Patterson et al., *Ag & For. Met* (2002), 113, 145-158

For all flights:

(I) Lined up sonde & CO<sub>2</sub> time series by matching pressure max & mins.  
 $\Rightarrow$  Used clock on the PDA for time tags

(II) Since sampling rates were different  $\Rightarrow$  read sonde & Licor data  
 into spss &  $\Rightarrow$  made my own time tags which are equally  
 spaced in time (based on start, end times of time series & # of points  
 from the sonde data - which is at a faster sampling rate)  
 $\Rightarrow$  THEN ROUNDED OFF real time tags & made them "fit" w/ new  
 time tags - THEN combined sonde & Licor  $\Rightarrow$  THIS fills in NAs  
 in either series where there is no measurement. THEN filled  
 in NAs by repeating ~~the~~ last value.

$\Rightarrow$  THIS gives time series where times are not exactly the true time  
 tag, but very close (& averages out to the right times overall)  
 & fills in empty data records

Now  $\Rightarrow$  can line sonde & Licor time series up!!

Now Break up each Flight -  
 Flight #6  $\Rightarrow$  19:52  $\Rightarrow$  20:51

Some Flight Info used:

CO<sub>2</sub> cal. on pg. 105

FLIGHT	Times - IRGA	#PTS	Times - SOURCE	#PTS	$P_{max} = P_0$ (*)
1	13:29:54 - 14:02:18	692	13:29:15 - 14:02:18	1192	703.5
2					
3	15:41:00 - 16:27:30	999	15:41:01 - 16:27:31	1805	714.24
4	16:47:21 - 17:25:30	816	16:47:21 - 17:25:30	1481	714.35
5	17:58:31 - 18:16:18	368	17:58:31 - 18:23:55	3315	714.51
6	19:52:06 - 20:31:06	1254	19:52:01 - 20:51:00	2248	714.3

(\*) Used as reference pressure to calculate altitude

Hysonetic Eqn:

$$gz = RT \ln \left( \frac{P_0}{P_z} \right)$$

$$g = 9.8 \text{ m s}^{-2}$$

$$R = 287.04 \text{ m}^2 \text{ s}^{-2} \text{ K}^{-1}$$

$$T = \text{Temp. (K)}$$

Now look at individual flights :

FLIGHT #6

Ascent/descent	Rows (#pts)	Time (decimal)	Median time	<del>Alt (m)</del>
1	1 - 985	19.8669 - 20.2261	20:02:49	
2	986 - 1729	20.2261 - 20.4828	20:21:15	
3	1730 - 2254	20.4828 - 20.6756	20:34:45	
4	2255 - 2735	20.6756 - 20.8517	20:45:50	

Access

For Flux calc.  $\Rightarrow$

- (A) Get each asc/descent  $\Rightarrow$  sort by altitude  
 (B) Get AVG. of both profiles  $\Rightarrow$  AVG. all points within a given  $\Delta z$   
 $\Rightarrow$  Chose  $\Delta z = 2\text{m} \Rightarrow$  gives Avg. Profile

$$(C) \quad F - Adv = \sum_{i=12}^{186} \frac{\langle C_i - C_{i-1} \rangle_i}{\Delta t} \Delta z$$

$\Delta t$  = difference in median time  
 $\Delta z = 2\text{m}$

Start at 18m and integrate up to 187m (top of profile)

FLIGHT #6

$\Delta$ asc/desc	$\Delta t(s)$	$\Sigma F(184m) \text{ } \mu\text{g } \mu\text{m}^2 \text{ s}^{-1}$	$\Sigma F(80m)$
4-1	2581	0.0763	0.0507
2-1	1106	0.0636	0.0261
4-3	665	0.0972	0.1003

Note = multiply by 2 ?? ( $\Delta Z$ )

FLIGHT #3

Asc/desc	Rows	Decimal Time	median time
1	1 $\rightarrow$ 712	15.6833 $\rightarrow$ 15.9378	15.811 $\rightarrow$ 15:48:40
2	713 $\rightarrow$ 1201	15.9381 $\rightarrow$ 16.1167	16.027 16:01:37
3	1202 $\rightarrow$ 1691	16.1172 $\rightarrow$ 16.2908	16.204 16:12:14
4	1692 $\rightarrow$ 2180	16.2911 $\rightarrow$ 16.4569	16.374 16:22:26

$\Delta$ asc/desc	$\Delta t$	$\Sigma F(185m) \text{ } \mu\text{g } \mu\text{m}^2 \text{ s}^{-1}$	
4-1	<del>2027</del> 2027	0.0436	} Positive Fluxes
2-1	778	0.0129	
4-3	612	0.0847	

Look at as fnc. of  $Z$ .

11/15/02 OLD DISJUNCT sampler  
 Hook up ANALOG signal  
 Red - #4 on DAC Breakout (Hi)  
 WHT - #5 " " (Hi)  
 BLK - #9



11/21/02 - List of things to DO

### AT TOWER/TRAILER:

- ① ~~Take up~~ ~~con standards~~ (for Diane to ~~obtain~~ up)
- ② ~~Calibrate~~ ~~Diane's standard~~
- ③ ~~Backup~~ ~~laptop~~ (Get most recent data)
- ④ ~~Download~~ ~~Jeitun data~~ ~~logger~~
- ⑤ ~~At least 1 more~~ ~~Secol~~ ~~target~~
- ⑥ ~~Take up~~ ~~thermometer~~ - put back up
- ⑦ Duck: a) add another direct channel  
b) ~~rearrange~~ ~~for the~~ ~~1 the channels~~  
c) loopback tests  $\Rightarrow$  (Need to consult w/ Gordon)
- ⑧ Troubleshoot heat flux plates  $\Rightarrow$  why are some bad??

calibrate  
in the  
field

⊗ Bring down  
big pickup (sled)

### CU Lab:

- ① Buy new Vaisala RH/T sensor
- ② Make some graphs of ATI problems - take to ATI
- ③ ~~Check some~~ ~~2um~~ ~~inter~~ ~~filters~~
- ④ Make new batch of Secol targets

### Logger data

- ① ~~After trailer laptop backup~~  $\Rightarrow$  get data all on 1 computer  
& ~~burn several~~ ~~CDs~~ ~~of~~ ~~data~~ ~~on~~ ~~it~~.
- ⊗ ~~Also~~ ~~get~~ ~~zip~~ ~~disks~~ ~~from~~ ~~CU~~
- ✓ ② Write code to convert profiler ~~data~~ into Splos  
(\*need no figure out calibrations)
- ③ Get ~~Splos~~, tower data for October  $\Rightarrow$  fill in gaps, ~~MISSA~~

diffg  
monthly recap  
logger info  
monthly 9

### Gap-filling

- ① ~~Get~~ ~~NSE relationships~~ ~~at~~ ~~PRD~~ ~~temp.~~ (Need to re-analyze the data & keep night-time stuff)
- ② ~~At~~ ~~2m~~ ~~relationships~~ ~~for~~ ~~October~~
- ③ Put ~~Sept~~ ~~data~~ ~~into~~ ~~1~~ ~~file~~ ~~(s.net, s.data)~~  $\Rightarrow$  ~~then~~ ~~run~~  
 $\Rightarrow$  ~~now~~ ~~needle~~ ~~storage~~ ~~for~~ ~~Sept.~~  $\Rightarrow$  ~~then~~ ~~run~~ ~~monthly~~ ~~filler~~
- ④ Run monthly view to see how well we did (All months - bill)
- ⑤ ~~finally~~ ~~start~~ ~~gap~~ ~~fill~~
- ⑥ Need ~~at~~ ~~filter~~ ~~for~~ ~~2nd~~ ~~half~~ ~~of~~ ~~year~~ (need Oct. data)
- ⑦ THEN start running gap-filler  
(can already start for last winter)

DISTINCT samples

- ① ~~fix to be wiring~~
- ② Test extra  $\alpha$ -value
- ③ TEST ① FLUSHING OF SYSTEM - use the L5800 gashound // ~~DID SOME NEED TO ANALYZE~~  
 $\rightarrow$  ~~Need to read Analog channels at 10 Hz & CO<sub>2</sub> standard~~
- ④ Test ② - Fill cans w/ accumulator  
 (flow bug / flow rates, etc.)  
 Test for CO<sub>2</sub> (should I bring my Scott-Martin std. down?)
- ⑤ THEN move to isoprene std. (should have new pump by then)
- ⑥  $\Rightarrow$  move to a roof somewhere - ~~to~~ to  
 will need to do EC & CO<sub>2</sub>

can also try  
cartridges

Balloon

- ① SEND Jim some figures from NR
- ② Talk to Ned about his system (left message)
- ③ Set up meeting w/ Roger, Jim, Ned, etc.
- ④ Talk to Eliot about CH<sub>2</sub>I<sub>2</sub> methodology (Get  
 cartridges - GC/ms)

TRACE GAS FLUXES

- ① ~~no~~ make text file of Detlev's data files
- ② ~~rewrite code to read in Aster files~~
- ③ ~~Get Detlev's calibration~~
- ④ Start churning thru Detlev's data
- ⑤ ~~Go back & look at CO data again - Is there a flux?~~  
 $\rightarrow$  CONCENTRATION data
- ⑥ ~~NO<sub>2</sub> & TALK TO Ted about his plans~~

input / output  
about / structure

Need calibration  
NO

Other

- ① ~~Benefits~~ NCAR
- ② ~~Site location~~ - CU ~~there is still~~
- ③ ~~Send reprint out~~
- ④ Rewrite profiler code
- ⑤ UC fluxes for Sept 11-20
- ⑥ "mode" in ASTER setup (Gordon)
- ⑦ despiker in Splus (Gordon)
- ⑧ Get NCAR computer setup (back up old one)  $\Rightarrow$  Dec. 12+L

⑨ NCAR 5-year plan  
weekend

TALK TO TURN IN

11/22/02 At site

- ① Downloaded Jettens logger
- ② Bill reported no recent of  $N_2$  in 2 weeks - maybe a leak  
I leak tested  $N_2$  lines - found only 1 small leak  
Bill reported 1100 psi yesterday - it was running at  
1000 psi today - seems like a leak. SHOULD RETHINK  
PLACES TO CHECK (valves?)
- ③ Downloaded CC. wind 23x  $\Rightarrow$  something had screwed  
up - the date was messed up  
Actual date - 11/22 12:07:30  
Reading - 9/13/05 10:09:30  
Reset timed downloaded

- ④ Put channel 204 into Port J on USB hub

## — Calibrated Dean's Standard

Run	FLAP	SPAN		V	sample			ECG27
	Zero	T	P		T	P	V	
1	0	20.89	784	1380	20.99	785	1506	388.47
2	0	21.10	784	1380	21.23	785	1508	389.50
3	0	21.44	785	1379	21.52	785	1507	389.53
4	0	21.66	785	1378	21.77	783	1506	389.74
5	0	21.96	785	1377	22.01	783	1506	390.05
6	0	22.26	782	1375	22.30	782	1506	390.565
(*) Adjusted span					22.37		1502	389.24

## Current logger Program

Channel	NAME	PROGRAM
204 $\rightarrow$ 209	23x wind	twosonic.dld
207	NCARTc	NCARTc.dld
dend10x	dend10x	DEND10x.dld
- GLO 206 -		21sonic.dld
23x UCAN	Peter Bunker	FLR232-5.dld
23x TCs	23x TC	TC23x B.dld
23x SOIL	23x SOIL	Soil23x B.dld
201	23x fast	Fast23x7.dld
205	23x rad	CNR30.dld
CR10 MRS	SNOW profiles	MRSTEMP.dld

203  
21x dend  
CR10X/1  
202

23x prot  
21x dend  
CR10X/1  
23x met

PROF30B.dld  
DENDRO.dld  
PROF4TB.dld  
met30D.dld

13:48 - Switched channel 204 to channel 200  
got rid of ATI channel for time being  
(in ARCHIVE, covers channel configs too)

2:30 - New Sected target

- more leak checks on EC system - some valve tightened + appeared to seal.
- Changed dessicant in prefilter
- checked new w/ heat flux plates - ALL seemed to be reading 0.00 mV (expected)
- Need to bring out laptop & see what's going on
- marked N<sub>2</sub> regulator

⊗ on Orquell - need to change ops.config  
for find.loggers.g

12/1/02 - L800 ANALOG output -  
what is the scale?

445 ppm	-	2.10 V
356 ppm		1.69 V
1000 ppm		4.77 V

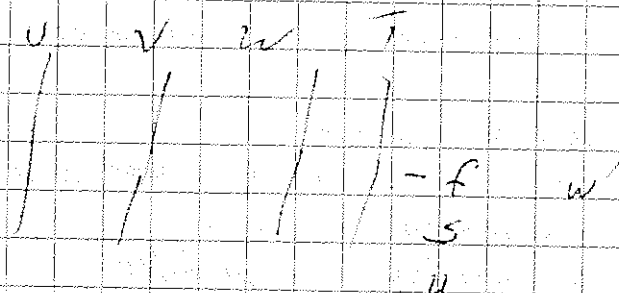


DESA.VI

save w/ options - Development Distribution

saves all associated v's

creates lib  $\Rightarrow$  library of bundled v's  
(All one's used by DESA.VI)



12/1/02 Eiko modified DESA TO save Flow, Pressure & ANALOG  
CHANNELS ~~STOP~~

ANALOG Set-up

ACH0	-	1	-	Flow
ACH1	-	2	-	Pressure (cell)
ACH2	-	3	-	P2
ACH3	-	4	-	P3
ACH4	-	5	-	ANALOG 1 $\Rightarrow$ L/COR 800 now
ACH5	-	6	-	Analog 2
ACH6	-	7	-	Analog 3
ACH7	-	8	-	Analog 4

output

IN file  $\Rightarrow$  ADDS, Flow, Pressure, A1, A2, A3, A4 ~~to~~ 10 Hz

TTAG, U, V, W, Tc, Flow, P, A1, A2, A3, A4 (DESA FLOWS)

1 2 3 4 5

SOME FLOW TESTSusing Peter's standard - 352 ppm in N<sub>2</sub>

Flush time = 10 sec

Sample time = 20 sec DEC mode

11:30 - Started sample (w/ room air)  
 ~ 11:34 - Turned on Peter's standard

Time	T <sub>flush</sub>	T <sub>sample</sub>	Flow
11:30	10	20	200 (2.0)
11:42	"	"	100 (1.0)
11:44	15	15	100 (1.0)
11:47	15	15	150 (1.5)
11:50	"	"	200 (2.0)
11:53	"	"	250 (2.5)
11:56	"	"	300 (3.0)
11:59 - 12:00	11	11	400 (4.0)
<del>12:00 - 12:05 = lunch</del>			
12:00	"	"	400 <del>(4.0)</del> (4.05)
12:03	"	"	500 5.0 ctrl off

12:06 - stopped

Lost file - (opened file while still collecting)

— DO same thing over — — using KNF Blue pump —

2:00	15	15	200 (2.0)
2:05	"	"	100 (1.0)
2:08	"	"	150 (1.5)
2:10	"	"	200 (2.0)
2:12	"	"	250 (2.5)
2:14	"	"	300 (3.0)
2:16	"	"	350 (3.5)
2:19	"	"	400 (4.0)
2:20	"	"	450 (4.5)
2:24			<del>300</del> 250 (2.5)

⊗ Pump starts to lose it  
 can't maintain flow for 15 sec.  
 → Decays to zero lock a bit  
 funny - probably something  
 to do w/ soda line trap

⊗ Note - select mode DEC or DEA Before running v.  
 otherwise it can get its brain scrambled

Put in a long piece of connecting tubing ( $\frac{1}{8}$ " o.d.) 84.25" long  
old piece =  $4\frac{1}{2}$ "

Put in place at 2:29 PM - Repeat last test

TUBING i.d. =

(B)	Time	$T_{\text{cush}}$	$T_{\text{sample}}$	Flow	
	2:30	15	15	250	(2.5)
	2:33	"	"	100	
	2:36	"	"	150	
	2:39	"	"	200	
	2:43	"	"	300	(3.0)
	2:46	"	"	<del>300</del> 400	
	2:49			250	

Pump off

Using FIS pump // Long tubing  
started

(C)	Time			Flow	
	3:04	"	"	250	} Pump looks bad - leaking!!
	3:08	"	"	100	
	3:10	"	"	400	
	3:16			300	

↳ Turned off

N79 pump + Long tubing

(D)	Time			Flow	
	3:30	"	"	200	
	3:33	"	"	100	
	3:36	"	"	300	
	3:39	"	"	400	⇒ losing it - but not as bad as 1" KNF pump
	3:42	"	"	<del>450</del> 500	

3:45 > put in short tubing

	Time	Flow
	3:47	200
	3:49	100
	3:52	300
	3:54	400

12/6 At site

- ① Turned off fast O<sub>3</sub> (too windy to bring down)  
~11:30 AM
- ② Tried loopback test - didn't recognize command ??  
Restarted data - new UC wind looks OK (~10 Hz)
- ③ Downloaded wind loggers - Bill said he had trouble, but went fine for me - did take a while to connect.
- ④ Looked at heat flux plates - No resistance on leads of real plates. Good plates do have contact - likely cables got eaten - need to trace down & reconnect.

New cal tank

ASG-A

RUN	Zero	Span T	P	V	Sample T	P	V	Ecarr
1	0	17.07	757	1386 ✓	17.17	758	1586	414.74
2	0	17.45	758	1385 ✓	17.52	757	1583	414.27
3	0	17.92	757	1383 ✓	17.96	757	1583 (1453)	414.89
4	0	18.23	758	1382 ✓	18.36	757	1583	415.46
5	0	18.71	758	1380 ✓	18.76	757	1582	415.70
6	0	19.12	758	1379	19.21	757	1583 (?)	416.68

415.0 ± 0.6  
PPM



12/9/02 To Do ListAt Tower -

- ① ~~Replace  $N_2$  (Bill)~~ Keep check on  $N_2$
- ② Duck - still do loopback tests - email Gordon again
- ③ Trace lines of heat flux plates & reconnect. (Bill)
- ④ ~~New Insignificant traps~~

(calibrate other standards)

In Lab

- ① ~~Place new designed traps~~
- ② ~~Trace filters to site~~
- ③ Get more cylinders up to site
- ④ New batch of sealed targets
- ⑤ New RFT sensor
- ⑥ Graph of  $AT$  soil profile to  $AT$

Logger data

- ① ~~Sort data for new~~
- ② ~~Logger data to MMS~~

Co - filling - ~~IF Bill finished up as they visit ->~~

① Start running graph/see 2.5 => Do we need to rerun??

\* ② ~~Make new data for table~~

③ Clean up last bit of data (see how data in Sept. Oct.?)  
=> Look at Oct & Sept soil heat flux => put in replaced values

Miscellaneous

- ① Rewrite probe code
- ② Uffens Sept 10-20
- ③ "make" in ASTER
- ④ despike in Spis
- > ⑤ Responses to Paper Review (talked to Russ)
- ⑥ Make some drawings of system  
Es. Sean
- ⑦ ~~Geology review~~
- ⑧ CO<sub>2</sub> conc. to Sean // Also 5-min. temperatures

NCAR projectsDESH

- monday
- ① ~~analyze D. Form for data I took~~
  - ② Test extra valve
  - ③ Use Accumulator to fill cans - (test for  $CO_2$ ) need to do
  - ④ Then move to isoprene - a) cans // Jim w/ GC/MS  
b) cartridges
  - ⑤ Move to roof ??  
↳ somewhere to measure a flux of  $CO_2$  or  $H_2O$
  - ⑥ Run variants of disjunct sampling code

Balloon

- ① Keep up w/ Jim/Roger
- ② Talk to Ned
- ③ Talk to Ewert about  $CH_2I_2$
- ④ Jim  $\Rightarrow$  GC/MS

 $O_3/NO_x/CO$ 

- ① Need Teresa's calc's to estimate flux detection limit
- ② ~~Make graphs up for  $NO_x$  (send to him)~~  
~~that problem is fixed~~
- ③ Keep up w/ Ted about  $NO_y$  sensor
- ④ Ask Ted about PAN uptake w/ coiflers
- ④ Greg Harey // Duke
- ⑤ Make Drawing of possible  $NO_y$  inlet  
(Talk to Frank Facke / Brian Ridley)

Bad Heat Flux plates are:

- |    |     |                 |
|----|-----|-----------------|
| 3  | (H) | #3, 4, 5, 8, 10 |
| 4  | (V) |                 |
| 5  | (V) |                 |
| 8  | (H) |                 |
| 10 | (H) |                 |

Good ones are

- |   |   |
|---|---|
| 1 | V |
| 2 | V |
| 6 | H |
| 7 | V |
| 9 | V |

More heat flux stuff = when did they go bad

June

OK

July

#5 went bad - no need to replace -

Aug

#3 went bad ~ Aug 29. #8 went bad ~ Aug 174h  $\Rightarrow$  will need  
 $\hookrightarrow$  #10 went bad ~ Aug 20

Sep

Oct

Nov.

Bad

To  
Substitute  
here

(or throw these  
out)

## 12/11/02 ANALYZING Flow DATA on DISTINCT sampler

Group (A)

$\rightarrow$  Time between valve switch + start of  $CO_2$

$\rightarrow$  Exp. Time constant for decay/growth

Time	Flow RATE	(F <sub>0</sub> s)	F <sub>0</sub> /smp	T <sub>long</sub> (s)	T <sub>exp</sub> (s)	Full state flush
00:03	<del>203.76</del> 203.76	S $\rightarrow$ F		2.1	rows	5.8 sec
	198.03	F $\rightarrow$ S	2.5	<del>2.5</del> (238)		5.6 s
	201.95	S $\rightarrow$ F		2.5	(293)	5.5 s
	198.02	F $\rightarrow$ S		2.5	(138)	5.2 s
01:01	201.98	S $\rightarrow$ F		2.5	(583)	5.6 s
	198.06	F $\rightarrow$ S		2.5	(728)	5.5 s
	202.0	S $\rightarrow$ F		2.5	(873)	5.2 s
	198.1	F $\rightarrow$ S		2.6	(1018)	5.7 s
	202.40	S $\rightarrow$ F		2.6	(1163)	5.7 s
2:28	198.08	F $\rightarrow$ S		2.5	(1309)	5.6 s
5:22	99.92	S $\rightarrow$ F		3.9	(1)	9.1 s
	99.79	F $\rightarrow$ S		3.7	(146)	8.7 s
	100.42	S $\rightarrow$ F		3.7	(288)	8.9 s
	99.69	F $\rightarrow$ S		3.7	(434)	8.9 s
	100.52	S $\rightarrow$ F		3.7	(579)	8.9 s
	99.73	F $\rightarrow$ S		3.7	(724)	8.9 s
8:16	150.66	S $\rightarrow$ F		3.0	(1)	7.1 s
	149.12	F $\rightarrow$ S		2.9	(1468)	6.5 s
	150.65	S $\rightarrow$ F		2.8	(292)	7.0
	149.15	F $\rightarrow$ S		2.9	(437)	6.5
	150.65	S $\rightarrow$ F		2.9	(582)	6.8
	149.16	F $\rightarrow$ S		3.0	(727)	6.5
10:27	198.40	S $\rightarrow$ F		2.6	(1)	5.2
	201.79	F $\rightarrow$ S		2.5	(146)	5.6
	198.16	S $\rightarrow$ F		2.5	(291)	5.1

1.53

1.47

⊗ Note looks like Li80 updates every ~0.3 sec

case/decay

Reaches 95% of final value

Time	Flow	F/S	$T_{lag}$	$T_{exp}$	$T$ (Full scale)
12.23	246.10	F→S	2.7 (1)		4.3
	254.27	S→F	2.1 (146)		5.2
	246.08	F→S	2.1 (129)		4.2
	254.20	S→F	2.2 (136)		4.7
	246.06	F→S	2.2 (581)		4.2
	254.23	S→F	1.7 (726)		4.8
	246.09	F→S	2.2 (871)		4.3
12.19	271.21	F→S	2.3 (1)	1.45 .35	3.8
	310.82	S→F	1.7 (146)		4.3
	290.07	F→S	2.2 (231)		3.3
	310.72	S→F	1.7 (436)		3.8
	290.75	F→S	2.3 (581)		3.3
	310.66	S→F	1.3 (726)		2.8
	290.79	F→S	1.8 <del>2</del> (871)		3.4
	310.68	S→F	1.3 (1016)		2.9
12.30	353.49	S→F	1.5 (1)		3.6 ⇒ Pump??
	320.68	F→S	1.9 (146)		3.0
	353.00	S→F	1.4 (291)		3.5
	320.05	F→S	1.9 (437)		2.9
	353.81	S→F	1.4 (582)		3.5
	320.05	F→S	1.9 (727)		3.0
	353.90	S→F	1.4 (872)		3.5
	320.46	F→S	2.0 (1017)		3.0

likely empties the trap (w/ CO<sub>2</sub> completely scrubbed) -



Still - 6-cup (4)

brothers @ vgs/500

Time	Flow	F/S	$T_{lag}$	$T_{exp}$	$T$ (Full scale)	Flow settling time $\approx 2.7s$
1:19:24	400.04	S→F	1.2 (1)		- pump -	(*) ~2.7s
	330.34	F→S	1.6 (146)		2.7	
	400.11	S→F	1.5 (292)		3.6 (pump)	
	331.75	F→S	1.6 (437)		2.6	
✓	400.06	S→F	1.6 (582)		3.6 (pump)	
	331.62	F→S	1.6 (727)		2.7	
	400.03	S→F	1.1 (1.7) (872)		3.2	
	331.48	F→S	1.7 (1017)		2.7	
1:21:31	336.62	<del>S</del> F→S	1.8 (1)		2.4	
	450.73	<del>S</del> S→F	1.2 (146)		3.3	pump - larger
	335.7	<del>S</del> F→S	1.3 (289)		2.3	higher zero
✓	450.20	<del>S</del> S→F	1.3 (434)		—	signal
	335.79	<del>S</del> F→S	1.2 (580)		2.3	
	450.40	S→F	1.2 (725)		—	
(*)	335.6	F→S	1.3 (870)		2.3	

These appear to be sampling 0.5 sec (rate on Li800)

(B)

Time	Flow	F/S	$T_{lag}$	$T_{exp}$	$T$ Full scale
30:02	254.7	S→F	2.8 (1)		5.4 (1.38)
	245.9	F→S	2.7 (146)		4.8 (1.58)
	254.6	S→F	2.7 (291)		5.3 (1.39)
	245.8	F→S	2.7 (436)		4.8 (1.6)
33:25	99.96	S→F	5.0 (2032)		9.2 (1.39)
	99.84	F→S	5.0 (2177)		9.7 (1.5)
✓	99.72	S→F	5.0 (2323)		9.1
	100.39	S→F	4.9 (2614)		9.1 (1.39)
	99.75	F→S	4.9 (2759)		9.6
36:20	150.72	S→F	4.1 (3772)		7.2 (1.33)
	149.2	F→S	4.0 (3918)		7.1 (1.5)
	150.71	S→F	4.0 (4063)		7.1 (1.34)
	149.16	F→S	4.1 (4208)		7.2 (1.56)
39:14	201.97	S→F	3.3 (5513)		5.8 (1.37)
	197.94	F→S	3.2 (5659)		5.3 (1.31)
✓	202.23	S→F	3.2 (5804)		5.3 (1.45)
	197.98	F→S	3.2 (5949)		5.3 (1.5)

(\*) missed a S/F flag line -

CONTINUED

Time	Flow	F/S	T <sub>log</sub>	T <sub>exp</sub>	T <sub>cell scale</sub>	
13:20	295.11	F→S	2.5 (7980)		3.5 (1.5)	49=0
	326.9	S→F	2.0 (8125)		4.0 (.55)	
	295.08	F→S	2.0 (8270)		3.6	
✓	326.64	S→F	2.0 (8415)		4.1 (.55)	
16:15	384.3	F→S	1.6 (8720)		2.7	
	433.13	S→F	1.7 (9866)		2.7 (1.66→hump)	
✓	383.44	F→S	1.7 (10011)		2.7	
	433.12	S→F	1.7 (10156)		2.8 (on hump)	
<hr/>						
0:07	202.05	S→F	4.2 (1)		7.8 (365)	
✓	199.01	F→S	4.1 (146)		7.8 (1.5)	
	201.91	S→F	4.2 (291)		7.8 (2.4)	
	199.02	F→S	4.2 (436)		7.8	
33:11	99.68	F→S	7.2 - <del>3.2</del> (1887)		12.6	
	100.59	S→F	7.0 (2032)		13.1 (<0.4)	
✓	99.73	F→S	6.9 (2178)		12.6	
	100.80	S→F	7.0 (2322)		13.2	
36:20	301.82	S→F	3.0 (3773)		5.6	
	297.52	F→S	3.0 (3918)		5.6	
✓	304.80	S→F	2.6 - 3.0 (4063)		5.7	
	297.56	F→S	3.1 (4208)		5.7	
39:43	411.07	S→F	1.7 (5804)		3.3 (hump)	
✓	393.3	F→S	2.3 (5549)		3.8	
	414.60	S→F	1.8 (6094)		2.8 (hump)	100pt Avg Flow
	393.29	F→S	2.2 (6240)		3.8	
<hr/>						
2:22	434.33	F→S	1.4 (7400)		1.9	
	461.46	S→F	1.4 (7545)		2.5 (hump)	
	433.93	F→S	1.5 (7690)		2.0	
	463.33	S→F	1.5 (7835)		2.5	
46:56	201.80	S→F	3.8 (10153)		2.4 (<.4)	
✓	199.10	F→S	<del>3.8</del> 3.8 (10302)		2.4	
	201.83	S→F	3.8 (10447)		2.5	
	199.09	F→S	3.8 (10592)		2.5	
49:23	100.17	S→F	(5.9) 6.4 (11609)		12.1	
	89.85	F→S	6.5 (11754)		12.2	
✓	100.73	S→F	6.5 (11899)		12.2	
	89.73	F→S	6.5 (12044)		12.2	

continued

Time	Flow	Tag	Temp	Temp scale	F/S
15:52:17	303.88	2.5 (13350)		5.1 (<0.4)	S→F
	297.85	2.5 (13495)		5.1	F→S
	304.34	2.4 (13641)		5.6	S→F
	297.85	2.6 (13785)		5.2	F→S
15:54:28	395.05	2.1 (14656)		3.1	F→S
	412.11	1.6 (14801)		2.6 (hump)	S→F
	394.03	2.2 (14946)		3.2	F→S
	412.53	1.7 (15091)		2.7 (hump)	S→F

SYNTH

Flow

100

150

Flow (sccm)	Long/short	F/S trans.	pump	t lag	t exp	t full scale
100 S		both	A	3.7		8.9
L		both	A	5		9.3
S		both	B	6.4		12.2
L		both	B	7		12.9
150 S		both	A	2.9		6.7
L		both	A	4		7.1
200 S		both	A	2.5		5.5
L		both	A	3.3		5.5
S		both	B	3.8		7.4
L		both	B	4.1		7.8
250 S		both	A	2.2		4.5
L		both	A	2.7		5.1
300 S		F to S	A	2.2		3.5
S		S to F	A	1.7		3.5
L		F to S	A	2		3.5
L		S to F	A	2		4.1
S		both	B	2.5		5.2
L		both	B	4.2		7.8
350 S		F to S	A	1.9		3
		S to F	A	1.4		3.5
400 S		F to S	A	1.6		2.6
S		S to F	A	1.3	n/a	
L		both	A	1.7		2.7
S		S to F	B	1.6	n/a	
S		F to S	B	2.1		3.2
L		S to F	B	1.7	n/a	
L		F to S	B	2.2		3.8
450 S		S to F	A	1.2		
		F to S	A	1.3		2.3
L		both	B	1.4		2.3

A = KNF box

B = other

(A or B)

Pump

A

A

B

B

Pump A → KNF in box

B → other KNF

Extra tubing volume -

 $\frac{1}{8}$ " tubing by 84.25" long  
( $\frac{1}{16}$ " i.d.)

$d = 0.1588 \text{ cm}$

$r = 0.0794 \text{ cm}$

$A = 0.0198 \text{ cm}^2$

$L = 213.995 \text{ cm}$

$V = 4.237 \text{ cm}^3$

$T_R = \frac{V}{\text{Flow}}$

Flow ( $\text{cm}^3/\text{min}$ )	$T_{\text{res. (calc.)}}$ in $V = 4.237 \text{ cm}^3$	$\Delta T_{\text{exp}}$
100	2.54 sec	1.3
200	1.27 sec	0.8
300	0.85 sec	0.3
450	0.56 sec	

Always smaller  
than calculated?  
(Is Area wrong?)

- No change - within time  
resolution of Hi800

$\Rightarrow$  ALSO - Full scale  $T$  doesn't change much w/ long tubing - suggests  
MAJOR lag may be due to flushing lines  $\Rightarrow$  not tube transit.  
(Need to look at  $T_{\text{exp}} \Rightarrow$  does it stay the same?)

12/16/02 Filling some cans w/ CO<sub>2</sub> (Accumulator mode)  
5 sec. flush, 4 sec purge, 20 sec sample 2L cans

Time	UP CAN	DN CAN	Up	Var	Flow
14:00 (14:02) <sup>STARTED</sup>	BA1-204	BA1-200	600 (30 min)	600 (30 min)	3.00
14:30 (14:35)	BA1-202	BA1-210	785 (30 min)	765 (30 min)	
			711 (60 min)	1226 (60 min)	
STARTED 15:55	<del>212</del>	<del>210</del>	700 (90 min)	1226 (90 min)	
16:00 <del>(16:05)</del>	212	210	1255 (30 min)	1785 (30 min)	4.00
Stopped at 16:40					

once filled up flow is dropping to zero

Assuming it is using last  $w_{\text{var}}$  to base its max. sample time on.

90 min sample won't well above 2L sample volume - pump still  
operating properly except on big samples - started to lock  
it!! (one at 3.53-3.54)

$\otimes \otimes \Rightarrow$  change last  $w_{\text{var}}$  to 0.5 (from 0.8)  
to get more sample

ALSO - fitting on  
diff CAN on 90 min  
sample was loose &  
sample was lost



12/20 To Do List

At tower/site

- ① Get more  $N_2$  to site = keep check on  $N_2$  - ~~is it working~~
- \* ② ~~Trace lines of heat flux sensors & splice back together~~ (Bill)
- ✓ ③ ~~put the hygrometer back up~~ (Bill)
- \* ④ Try loopback tests on Duck
- ⑤ Calibrate other standard at trailer ✓ ~~Download logs~~ (Bill)

CU-LAB

- ① More Sealed targets
  - ② Order new HMP 45D
  - ③ Fix ATI sonic
- Get Linux  
new RAM for old desktop

CU-DATA management

- ① Tigger input for Nov. (done already?)
- ② ~~look at finalized gap-filled data & then put on web~~
- ③ Calculate daily sums, etc.
- ④ UC Fluxes Sept 11-20

CU - for Sean

- ① send profiler data & temp. profiles to Sean
  - ② Draw some figures describing system (~~flow diagram~~)
    - a) tower diagram
    - b) other data diagram
    - c) DATA flow & ANALYSIS
- TABLE of loggers/locations  
& programs/channels

CU-Miscellaneous

- ① Rewrite profiler code
- ② from Gordon - "mode" in ASTER, Splus despike

Fast O<sub>3</sub>

- ① ~~meet w/ Deller JAN 14, 9:00-9:30~~
- ② ~~Exp. fits of targets - look at residuals vs. met conditions~~
- ③ Figure out how to do spectral corrections (Rubinet paper)
- ④ How to figure out  $H_2O$  interference??

Nov

- ① Make drawing of hypothetical Master Blaster STARTED  
(Ask Ted about PAN  
UPTAKE of confifers)

CO

- ① Get cal. concentrations from Teresa Campos

Disjunct Sampler~~(1) Measure  $CO_2$  in cans~~AND decay on flow DATA  
→ somewhere!

(2) Look at simulations - did they work?

(3) Fill some cans w/ isoprene  $\Rightarrow$  measure on GC/MS (learn from Jim) $\hookrightarrow$  maybe cartridges too(4)  $\Rightarrow$  Pump issue - talk to Eiko

(5) Test on ROOF somewhere (February?)

 $\hookrightarrow$  FRIDAY

MONDAY

Balloon(1) Talk to J. & Eiko about ~~CH<sub>2</sub> methodology~~ set up meeting

(2) see what status of balloon sends is - Jim will need this for Mexico City

PAPERS

## I. Review Response -

(1) ~~Can we get electronic version of comments (scanner)~~ $\Rightarrow$  THEN write responses & send to Ross, Peter & Dean(2) ~~Get copy of Eiko's comments to Dean~~(3) ~~Wind speed comparisons  $\Rightarrow$  how to incorporate~~(4) ~~Planar fit vs.  $u^*$  (have already done vs.  $z/L$ )~~✓ (5) ~~Make table of sensors & measurement heights~~(6) Eiko - comments - look at  $u_z/u_0$  vs.  $u^*$  for other heights (9m, 16m)  
2.5m, 26m $\hookrightarrow$  (But below the displacement height) $\hookrightarrow$  look at tilt errors for standard error? (NO)- stationarity of  $\bar{u}$  over 120 min $\hookrightarrow$  independent of  $u^*$  = just decays exponentially

## II. (1) Put in Peter's comments

(2) Put in Dean's comments

(3) Long  $\rightarrow$  2 hr co-spectra of upslopes vs. downslopesRecommendations  $\hookleftarrow$  (4) Figure out how to ~~figure out~~ if look for night-time waves  
(spectral analysis - look at power spectrum peaks (or co-spectra peaks))

(5) Get website from Peter to try &amp; look at some specific weather patterns on different days

CAN we incorporate some of Finnigan's stuff

look at  $\bar{u}^2$  for upslopes/downslopes

10

12/23/02 ANALYZING CO<sub>2</sub> IN CANS FROM ~~12/16~~ DESA TEST  
ON 12/16

	CAN #	up/dn	[CO <sub>2</sub> ]	Voltage	Time
100 CW Pressure ↓ Screwed up 200 RY 204W7 EMPTY CAN AS VACUUM	200				2:00 <sup>port</sup>
	204			(unsteady) 1.67-1.70	2:14-2:16
	212			1.694	1:58 ✓
	228			1.695	1:56
	210			1.775 V	1:54
	202			1.76 V	1:51
				<del>1.77</del>	

(\*) Saved in 2 files - 022223.txt  
021223b.txt ⇒ can# 204 only

1/9/03

WIND Logger

Time = 8/9/05 9:59:29

Real time 1/9/03 15:49:26

④ Bill tried downloading at ~ 2:00 ⇒ got Telecommunications Failed (Repeatedly)

⇒ Probably a timing error - logger is trying to send out data AT 10 Hz - then gets interrupted.

About 30 min later - I tried again - this time it took awhile but connected - however clock was way off, looking at downloaded data - clock screwed up on last 1/2-hour sample ⇒ when Bill (or I?) tried connecting. Somehow trying to connect was screwing up logger clock.

⇒ ~11:00 TECO  $O_3$  dt

~ 3:30 - New  $CO_2$  calibration standard (X) DID we leave it open?  
I THINK SO!

11:45 - 3:00 ⇒ found breaks in Heat Flux plates &  
repaired - All seemed to be working

⇒ Note on JAN 7TH - Bill downloaded loggers

Hooked up K<sub>r</sub> hygrometer - signal was too high  
& was reading off scale for a day or 2

⇒ CHECK MRS TEMP logger - was running perfectly (as well as  
before) ⇒ so downloaded.



1/10/03

Control EG

FID  $\Rightarrow$  MENU BAR

Eol. 7 Setup -

Analog IN - Tc

A13

Page 2  $\Rightarrow$  MFCsAnalog Out  $\Rightarrow$  control flow controllers A0#  
except carrier gasDig. Out  $\Rightarrow$  Runs relays

DO#

Force  $\Rightarrow$  program controls

H = OFF L = ON

GC START  $\Rightarrow$  sends signal to GC program

Calculation -

Display <sup>THO</sup> set pointsPID  $\Rightarrow$ sets the set points

Sequences -

main program

seq 0  $\Rightarrow$  default  $\Rightarrow$  sitting idleseq. 5  $\Rightarrow$  security sequenceTHINGS get too hot  $\Rightarrow$  turns off  
(or cold)seq. 4  $\Rightarrow$  push button to start (on rack)

sets it up - turns on seq. 3

Adds up volume

Step 17  $\Rightarrow$  where you change sample volume !! $\hookrightarrow$  once you get to set volume  
 $\hookrightarrow$  turn on seq. 6.Seq. 6  $\Rightarrow$  Dry purge(backflush)  $\Rightarrow$  Flows He thru trap to vacuumTo dry ~~the~~ sample (in cartridge) $\Rightarrow$  sets to 40°C

RAMPs

Flashes for 10 min

THEN seq. 7

Add internal stds

for checking MS response!

NOT for determining if sample is good

DO22  $\Rightarrow$  H  $\Rightarrow$  puts into lineL  $\Rightarrow$  TAKES out of line

THEN

to seq. 1  $\Rightarrow$  Descriptionmove E1  $\rightarrow$  E2DO13  $\Rightarrow$  starts GCAdds 50cc  
very quickly!  
(source of  
error)

send signal to GC + waits 10 min  
 This same time - GC is cooling from  $150^{\circ} \rightarrow -50^{\circ}C$

After 10 min - inject // Enable heat  
 Heat up to  $150^{\circ}$  turn off cooling  
 wait up 5 min to inject

go back to beginning sequence

Seq. 2 - sets up delay for cal. overnight // (THIS IS CONFUSING part)

Under Displays menu

Sequence status - tells you where you are in sequence.

usually Barograph

ON HP

change method AT TOP level

SCAN METHOD

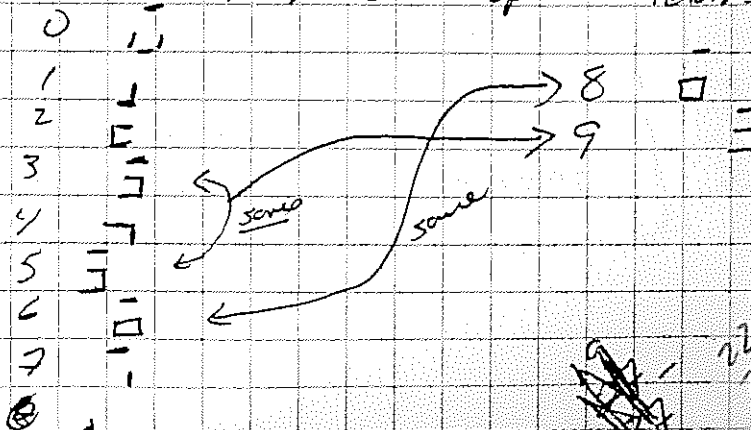
under sample name - change file name + info

HIT start RUN  
 THEN WAIT

RUN UNDER  
 "Instrument  
 Control"

Flow Controller Dilution

0-10 Scan - Display messed up  $\Rightarrow$  tenths place



## DEA TESTS

Isoprene 1.7-2.4 ppm std.

 $F_{ISOP} = 5.06 \text{ sccm}$  $F_{AIR} = 3120 \text{ sccm}$ [Try to stop around  
1500 ml ( $\rightarrow$  2000 ml)]

RUN	T <sub>START</sub>	T <sub>END</sub>	UP CAN	DN CAN	CAN Exhaust
1	1:34 2:03	2:30	250 (V = 1894)	220 (V = 1350)	222 start 201 off at 2:25
④ 2	2:34 3:01		252	224	214 (at start) 203 (3-3:27)

④ CHANGED  $F_{STD} = 7.04 \text{ sccm}$ 

1/13/02

New Cartridges

Ours to Empty  
~~Empty~~

Empty

✓ J99200 (6)

✓ J99226

✓ J99209

led backwards J99232

[J99222]

Refilled:

0.2095 g C-trap

99.7 mg C-sieve

0.2029 g C-trap

0.1065 g C-sieve

0.1038 g C-sieve

0.5349 - 0.3295 Tenax

0.3563 - 0.0836 Tenax

0.2494 - 0.0149 Tenax

0.5461 g - 0.2345 Tenax

0.3295 - 0.0475 Tenax

0.5603  
- 0.3255  
0.2345

J99200

209.5 mg C-trap

205.4 mg Tenax

J99209

202.9 mg C-trap

234.5 mg Tenax

J99226

99.7 mg C-sieve

272.7 mg Tenax

J99222

103.8 mg C-sieve

280.0 mg Tenax

Russ' Isoprene std. at NCAR

Dot- 3AL2216 5527033 LUXFER 01A91

- ① Load 6L sample
- ② Load at 35°C (dry)
- ③ Load humidified → figure this out

### Loading cartridges

Seq. 2

CLOSE DATA BASE

Go to

File Load - precl file

Quantitate → update data base

Load next file - update

HPCHSM/custm report/biosim7.crd

Sequence - Load

Give unique names to files -

Sequence Run - THEN wait

Change Seq 14 - line 17

Under

I/O (on Control EG)

Seq

Seq. Reset (Seq. 2)

THEN

Seq ON (Seq 2)



1/20/03

To Do

At Site

- (1) More  $N_2$  (contact Duane)
- (2) ~~Get PC card - Amy DREITZ (JAN. 22)~~
- (3) Calibrate new standard (not critical)
- (4) ~~Replace or fix EC pump & CHECK WHY IT'S NOT RUNNING?~~
- (5) Loopback tests on Duck
- (6) Download MRStep; NPARIC (maybe soil23x)
- (7) ~~Put up IR-Therm. sensor~~
- (8) ~~Bring down data on zip drive~~

Check dissection

To Take

- 1 (A) Zip drive & disk
- 1 (B) NPAR tester
- (C) Extra pump

(D) List of stuff to do at Tower

XU-Lab

- (1) ~~New Deck targets~~ NO - we have
- (2) ~~Check Amy's Dissection~~ Amy plenty.
- (3) Order new HMP45D
- (4) Get ATI fixed

Disjunct Sampler

- (1) Run isoprene cans - bring other pump up  
THEN pump decision
- (2) Talk to Eiko - w/c term  
Relock at simulations
- (3) Isoprene in the field

Data Management

- (1) Calculate DAILY sums for 2002

Balloon

- (1) Read Iodine stuff
- (2) THINK ABOUT how to  
calibrate
- (3) Talk to Ned??

Data - Miscellaneous

- (1) Re-write prof. Ter code

Fast 03

- (1) Figure out if AUG. 870-LS does anything
- (2) Spectral Corrections
- (3) More about  $H_2O$  interference

Ney

- (1) Get Ted's instrument - start from there

Papers

- (I). ① Perleak references, etc.  
 ② Gilko's stationarity comment  
 ③ Prod Dean, Peter & Russ for comments
- (II) ① Combine Peter & Dean's comments  
 (where's Dean's electronic version?)  
 ② Look for nighttime waves,  
 - ① Richardsons #  
 ② Spectra (w/ freq.)  
 ③ Vector plot + Peter's pressure map for 1 figure  
 ④ Look at Finnigan et al. corrections - USE ALL DATA  
 (day + night obs)

IR-T

5 H - BLUE > IR-T  
 L - WHITE  
 +5V - RED  
 G - BLACK

~~To get 23k = 260s~~

AT	300 secm i	1 L =	TIME	
			min	sec
		2 L =	6.66	40"
		3 L =	10	min
		4 L =	13 $\frac{1}{3}$	min
		5 L =	16 $\frac{2}{3}$	min
		6 L =	20	min

DATE = 10.08.03

1/22/03 Filling Cartridges on ~~Auto Sampler~~ Auto Sampler(I) Dry - ~~Auto~~We want 6L on each  
At 300 sccm - 20 minutes

<u>Position</u>	<u>Cartridge #</u>	<u>Flow Rate</u>	<u>Time</u>	<u>Volume</u>
1	J99209	300	20:00	6L
2	J99200	"	20:00	6L
3	J99222	"		
4				

$$\text{Std. Flow} = 0.94(-0.18) V = 0.76 V \Rightarrow 1.52 \text{ sccm}$$

$$1^{\text{st}} \text{ Stage} = 100 \text{ sccm}$$

$$2^{\text{nd}} \text{ Stage} = 1000 \text{ sccm}$$

~~Isoprene~~

$$\text{Dilution Factor} = 0.00137$$

$$\text{For isoprene} = 10 \text{ ppm} \Rightarrow 13.7 \text{ ppb}$$

$$\alpha\text{-pinene} = 5 \text{ ppm}$$

$$n\text{-heptane} = 10 \text{ ppm}$$

$P_f = 53.6$

$\sim 4$  cc/ digit

100 Torr  $\sim \frac{1}{2}$  L

SRI-310 GC

How to use

IN STANDBY: 6-way  
Valves: L AND B  
(Vac) (Backflush)

on box: vac.  $\Rightarrow$  open

sample  $\Rightarrow$  closed

Heat off (switch on right)

To load - close vac.  $\Rightarrow$  Read initial pressure

Pick up can to inlet line

TURN - BACKFLUSH  $\rightarrow$  Sample (6-way)

open Sample (on/off)

open can & fill (watch pressure)  
( $\sim 50$  Torr works  $\sim 250$  cc)

When full - shut off can

To inject - 6-way L  $\rightarrow$  I (load to inject)

HIT SPACE BAR in "Peak sample"

& TURN ON heat (quickly as possible)

somewhere down line - open vacuum (close sample)

To pump out

move I  $\rightarrow$  L

S  $\rightarrow$  B

~~Turn~~ Turn off heat

Disconnect can



OTE- CAN #214  
was messed up  
- Nothing in it. 171

⊗ Isoprene Peak at 3.26 min

DRIFTING  
Baseline

	CAN #	OP	AREA 1	File	AREA 2
	222	50 TORR	51.9030	A80	55.9005
	222	44 TORR	41.7780	A81	44.3430
- Temp ⊗	250	50 TORR	32.3100	A82	—
sp may	250	50.0 TORR	32.832	A83	—
been too	201	50.0	39.629	A84	43.8610
during	201	31.7 TORR	25.604	A85	27.881
ling - will	224	50.6 TORR	53.323	A87	61.165
e sample!!	224	47.0	45.1825	A88	45.3718
	220	61.5 TORR	55.193	A89	72.8165
DIRTY	220	38.6 TORR	32.385	A92	34.931
CANS.	203	47.3 TORR	53.494	A96	55.756
??	203	30.8 TORR	18.6035	A101	⊗ Sensitivity change
250 + 214	252	47.9	74.970	A102	
	252	47.4	74.225	A103	

LONG RETENTION TIME - acetone - not isoprene

1124 Refilling cartridges - using Russ isoprene standard

Position	Cartridge	Flow Rate	Time	Volume	Can #
1	J99 200	60% → 300 sccm	20.00	6L	225
2	L 209	" "	" "	" "	205

⇒ Last fill didn't work ⇒ Nothing loaded on cartridge  
CHECKED: ① sampler - seemed like flows were OK  
(sampling proper cartridges)

Only thought ⇒ using low flow on DILUTION system may not  
standard

have actually gotten standard in (using lowest flow  
I could measure)

THIS TIME ⇒ USING Manson standard (~2ppm)

- cranked regulator pressure to ~50psi
- using low concentration - bigger flow

$$\begin{aligned}
 F_{STD} &= 8.05 \text{ V} = 8.1 \text{ sccm} \quad \text{Assuming 2ppm} \\
 F_{1ST \text{ stage}} &= 5.00 = 100 \text{ sccm} \\
 F_{2ND \text{ stage}} &= 4.98 = 996 \text{ sccm} \\
 &\quad \left( 2 \text{ ppm} \times \frac{8.1}{108.1} \right) \times \frac{996}{108.1} = 0.075 \text{ ppm}
 \end{aligned}$$

54212

sigma ALDRICH

username:

password:

ATurnipseed  
ATurnipseed

0.150

~~2.075~~ ppm

$$\left( \frac{108.1}{1104} \right) = 0.0147$$

0.0147

~~0.66734~~

$$= \frac{17.7 \text{ ppb}}{1000}$$

Also - placed a CAN on the exhaust to see if isoprene in the flow (tell us if problem is dilution system or cartridge sampler) -

1/27/03

Another try at filling cartridge  
Still gave blank(?)

⇒ use my dilution system / Isoprene std.

Cartridge	F(isop)	F(air)	F(sample)	Time	Volume	CAN #
BLANK	0	1.36 (slpn)	—	—	—	205
J 99 209	7.09	1.03	4.38 V(114.4 sec)	52' 11"	5953 cm <sup>3</sup>	225
200	7.09	1.03	4.34 (118.8 sec)	51' 58"	6173.6 cm <sup>3</sup>	205 (again)
Humid sample (97% humidity)						
209	7.09	1.03	4.50 V	52' 03"	—	225
Humid - BAI standard (77% humidity)						
200	3.03	3.01	4.54 V / 4.44 V	52' 10"	—	205
209	"	"	4.41 - 4.59 (after 36 min)	52' 51"	—	—
200 (dry)						
200 (dry)	3.03	3.01	4.52	52' 02"	—	—

un. rps help  
x 26096

$$\begin{array}{r} 101.0 \\ 53.1 \\ \hline 47.9 \end{array} \quad \begin{array}{r} 100.6 \\ 53.2 \\ \hline 47.4 \end{array}$$

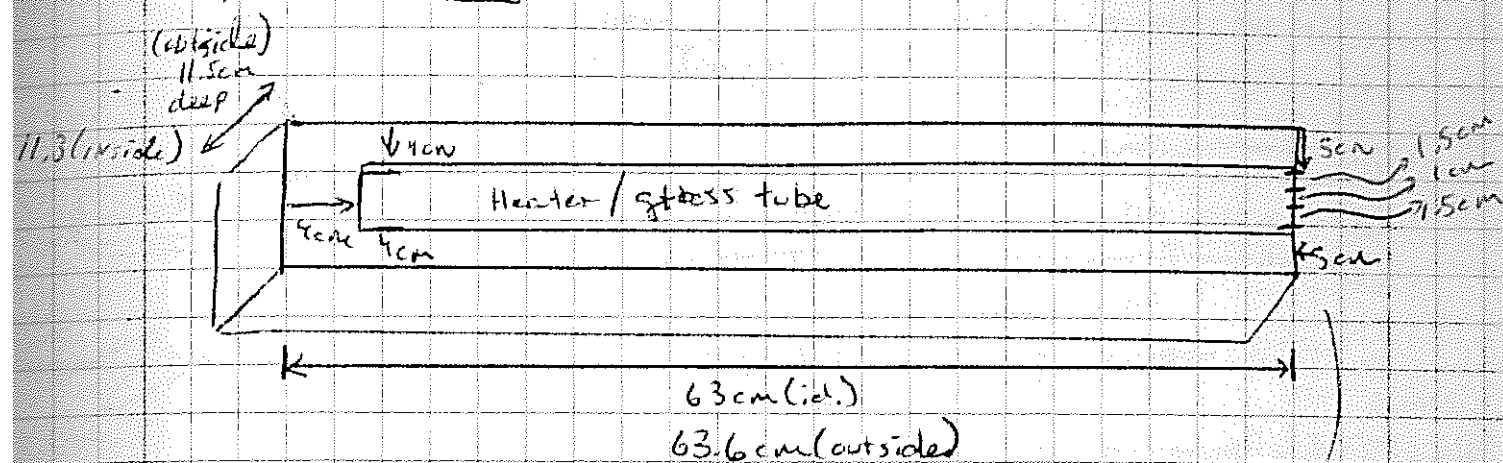
## Summary of DEA TEST - Pg 132

CAN	Description	Area/P (from GC)	Notes
✓ 250	UP	<del>1.646</del> 3.646, 0.657	
✓ 220	DOWN	1.184, 0.905	DIRECT CAN
✓ 222	1 <sup>st</sup> Flush	1.118, 1.006	IS <del>NOT</del> CAN RUN
✓ 201	2 <sup>nd</sup> Flush	0.877, 0.899	
✓ 252	UP	1.565, 1.566	⇒ AFTER CHANGE - peaks are
✓ 204	DN	1.801, 0.965	- DIRECT CAN
214	1 <sup>st</sup> Flush	NA	Nothing there??
✓ 203	2 <sup>nd</sup> Flush	1.179, 0.604	change of H <sub>2</sub> flow Between runs

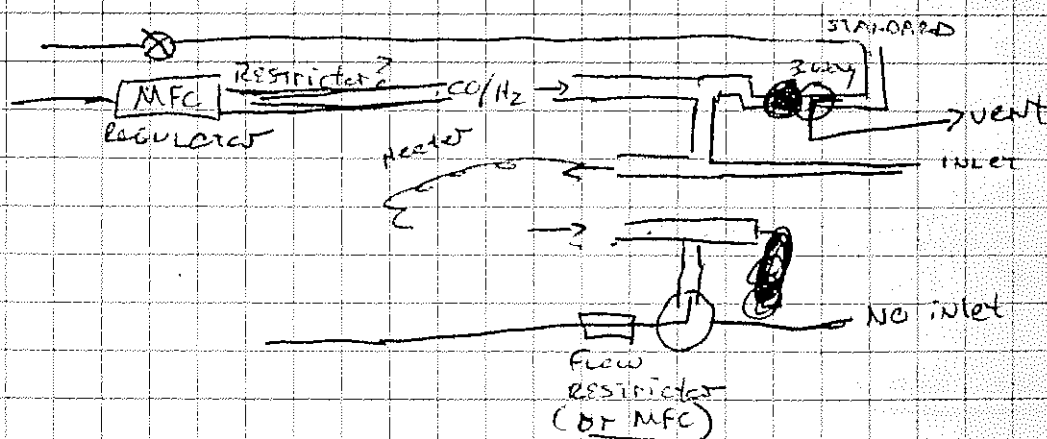
Overall note - with exception of CANS 252 + 203 - ALL suffer from leak in GC inlet system - Is usually worse on 2<sup>nd</sup> run since SP is less - thus loading injection loop is slower,

Mostly - a big failure - leak in inlet system + dirty cans really screwed things up.

Ng Master Blaster



## Punching





2/17/03 List of things to do.

### At Tower

- (1) ~~check for  $H_2$  leak~~
- (2) check out kr hygrometer hook-up  $\Rightarrow$  Now look at data
- (3) ~~Add  $H_2$  data to  $CO_2 + H_2O$  from Li7500~~  
 $\hookrightarrow$  w/ Sam go thru whole process
- (4) ~~Grounding questions & laptop tests~~  
 $\hookrightarrow$  w/ Gordon (Wed or Thurs)
- (5) ~~Get data that Bill downloaded  $\Rightarrow$  get laptop~~

### Stuff to order or repair

- (1) Swagelok fitting for profiler
- (2) All repaired
- (3) RMY valve repaired

### Fast 03

- (1) look at spectral connections!!
- (2) Make an  $H_2O$  interference

### Data Processing

- (1) Daily Sums  $\Rightarrow$  need met sums
- (2) Rewrite Profiler code

### Misc

- (1) Send disjunct sampler to Brian Lamb (Tuesday)

### Duke Exp

Organization: (1) Talk to Gabby about services

(2) Get together w/ Eiko/Thomas about Fast data

- (A) Ncy - (1) make drawing of Master Blaster (Eric on Wed started)
- (2) Get Labview driver to IBM (talk to Eiko)

- (B) PAN (1) Call Jim Roberts - what  $V_d$  would you expect?
- (2) Make up graph for Greg - try to figure out what we might see!

### (C) Disjunct Sampler

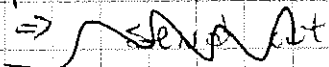
$\hookrightarrow$  Need laptop from Eiko

Think about situation when J.N gets back

- (1) Repeat can experiment w/ Isoprene/can plume standard
- (2) Move towards doing some field DEC measurements
- (3) Get back to simulations

Iodine/Balloon stuff

- ① Read papers  
② Postpone til Jim gets back

Turbulence PapersPART I  $\Rightarrow$  

- PART II  $\Rightarrow$  (1) PLOT IN Peter + Deans comments —  
 (2) Vector plot for Figure — Almost there  
 (3) check out Spectral screening of nighttime waves.  
 (4) Re-check Finnigan et al. corrections!

2/26/03

To RUN DESA right now—

- (1) RUN DESA-Analogues/20Y  
 (2) RUN ~~SENSE~~ SENSE File. 11h  $\Rightarrow$  Eddy Correlation  
 under finalization

1/28/03 Re-doing DES TEST — using KNF pump (after trying to clean  
 (could be MeOH present) Sample flows 250 sccm  
 Flows = 5.03 (STD) sccm ~ 10 ppb concentration  
 5.01 (AID) SLPM of isoprene

UP  
 = Flush/EC  
 DN

RUN	START TIME	FLUSH CAL	UP CAL	BE SWITCHED
1	10:30	250 (at 11:50)	252	201 * pressure above ambient!
		✓ 226		
2	11:37	100	222	203 → pressures look good
		205 (AT 12:17)		

201 ✓  
 203 ✓  
 252 ✓  
 250 ✓  
 226 ✓  
 100 ✓  
 205 ✓  
 222 ✓

3/3/03 More stuff to do

### Tower

- ① ~~Hook up 2m Visc. to RH/T~~
- ② ~~Download loggers (end of month)~~
- ③ ~~See Gert w/ MRS + download card - THEN switch card.~~
- ④ ~~Fix TC's~~
- ⑤ Look again at kr data (after flux calculations)

### OTHER

- ① ~~Fittings for profiler~~
- ② ~~RH valve~~
- ③ check on ~~AX~~, ~~Li7500~~

### O3

- ① Water Corrections
- ② Look at 1 sec. data
- ③ Spectral Corrections
- ④ Detlev's data

### DATA Processing

- ① ~~Data sums (not only)~~
- ② Get up Dean on Trut comparisons
- ③ Rewrite profiler code

### NCAR

#### Disjunct Sampler

- ① Simulations - get back to
- ② Run cans on GC/MS (if its running)  
↳ Fill a few more cans
- ③ Buy a new pump etc
- ④ Move towards making some measurements in field.
- ⑤ Automation - when Jim gets back

#### Miscellaneous

- ① Make up some cartridges



- Wdy
- ① ~~Tell to Sam - Mon - March 10~~
  - ② Order Master-Blaster box
  - ③ Take apart PMT housing - look for preamp board
  - ④ Think about Labview program w/ Eiko

FRAN ① Send Darlene/Greg something on what precision you need for a given  $V_0$

Overall

- ① Email FRAM (Questions & what we're doing)
- ② Continue w/ how to set up
- ③ How to sync up data for everyone.

✓ Also - Turb. Paper II

3/28/07 - Quick test w/ DES &  
With big pump on + running - what is pressure drop in cell?

RT 1 m inlet line - 3 m DES  $\rightarrow$  Pump line (all  $\frac{1}{2}$ " Teflon)

$$\Rightarrow \Delta P = 80 - 70 \approx 10 \text{ kPa}$$

w/ inlet disconnected:  $P = 72 - 73 \text{ kPa}$

Residence Time = 500 cc

$$\text{For } \tau = 0.1 \text{ sec} \rightarrow$$

$$1 \text{ sec} \rightarrow$$

$$5000 \text{ cm}^3 \cdot \text{s}^{-1} (5 \text{ L} \cdot \text{s}^{-1}) \Rightarrow 300 \text{ Lpm}$$

$$30 \text{ Lpm}$$

	$\tau$
10	3 sec
30	1 sec
50	0.6 sec
75	0.4 sec
100	0.3 sec



4/2/03- Hooked up SR1310 GC AGAIN  
New set of cans

500 cc ~ 35 P-units

700 cc ~ 50 P-units

1 P-unit ~ 14 cm<sup>3</sup>

T<sub>trap</sub> = -22°C

CAN #	Description	File	P <sub>1</sub>	P <sub>2</sub>	ΔP	T <sub>trap</sub>
202	Standard	A271. CHL/BROMOAN	107.3	154.8	47.5	-22°C
		A272	107.2	158.8	51.6	-7°C →
224	Standard	A273	106.7	182.5	75.8	
		A274	106.6	158.4	51.8	-19°C
202	Standard	A275	106.5	160.0	53.5	"
		A276	106.2	144.4	38.2	"
224	Standard	A277	106.2	164.3	58.1	"
		A278	106.3	147.5	41.2	-16°C
226	FUSU/DEA	A279	106.1	147.6	41.5	"
		A280	106.2	136.6	30.4	"

Ⓢ Note - Filled cans 202 + 224  
with standard

F<sub>520</sub> = 5.04 sec/cm

F<sub>100</sub> = 5010 sec/cm

Isoprene RT ~ 3.0 min

Heptane RT ~ 5.8 min

α-pinene RT ~ 11.95

CAN	File	A(Iso)	A/ΔP (Isoprene)	A(W <sub>p</sub> )	A/ΔP (heptane)
202	A271	3.1346	0.06599	48.284	1.0165
	A272	5.9844	0.1160	49.2218	0.9539
	A273	8.4836	0.1119	93342	0.1231
	A274	7.3706	0.11423	8.7732	0.1694
	A275	51.2484	0.9579	79.225	1.4808
	A276	37.5921	0.9811	59.2622	1.5514
	A277	47.7070	0.8211	62.837	1.083
	A278	39.6114	0.9614	49.1186	1.1922
	A279	5.5045	0.1326	53.264	1.2835
	A280	4.3371	0.1427	41.2568	1.357

Dipty

1.101

New batch of cartridges

<u>Cartridge #</u>	<u>mg Carbotrap</u>	<u>mg Tenax</u>
0J99 221	<del>195.6</del> 217.3	205.4
0 232	<del>204.7</del> 196.6	213.0
0 223	<del>207.7</del> 207.7	207.9
0 203	<del>207.7</del> 209.7	208.0
0 227	<del>205.4</del> 206.2	202.7
0 202	<del>205.6</del> 205.4	208.3
0 230	<del>207.7</del> 208.6	211.4
0 224	204.7	211.7
0 228	202.7	209.3

239	206.1
217	204.3
231	211.3
229	209.5
219	205.5
238	207.6
236	200.0
210	206.1
207	209.1
234	204.7
214	206.4

A/SP (w pin)A/SP (w pin)

20.2831	[ 0.3791
15.0376	[ 0.3937
39.995	[ 0.6884
30.5327	[ 0.7411

$R_t(\text{isop.}) = 29.3.0 \text{ min}$   
 $R_t(\text{Hep.}) = 5.8 \text{ min}$   
 $\Delta P = 11.95$

4/4/03    more GC runs

CAN #	Descrip	File	P <sub>1</sub>	P <sub>2</sub>	$\Delta P$	A (isop.)	A/ $\Delta P$
100	DEA/FLUSH	A284	105.8	<del>106.1</del> 154.5	48.7	<del>255.7</del> <del>14.28</del> 78	<del>0.4977</del> 0.5252
100	"	A285	106.0	170.7	34.7	17.246	0.4971
222	DEA/up	A286	105.8	152.2	46.4	<del>116.4</del> <del>10.14</del> 2	<del>2.242</del> 2.396
(+) 222	"	A287	105.9	171.7	33.8	<del>81.8</del> <del>12.37</del> 4	<del>2.230</del> 2.399
→ MAY have filled w/ He same (oops)							
205	DEA/FLUSH	A288	106.0	<del>155.6</del> 155.6	49.6	-	- No isoprene
203	DEA/DN.	A289	106.0	177.4	38.3	16.364	1.2105
203	DEA/DN.	A290	106.0	136.6	30.6	37.70	1.232
252	DEA/up	A291	106.1	143.6	37.5	-	- No isoprene -
250	DEA/FLUSH	A292	106.0	143.6	37.6	-	- No isoprene -
201	DEA/DN	A293	106.1	* → screwed up - don't know volume - but this			

MORE DEA TESTS - using humidified air

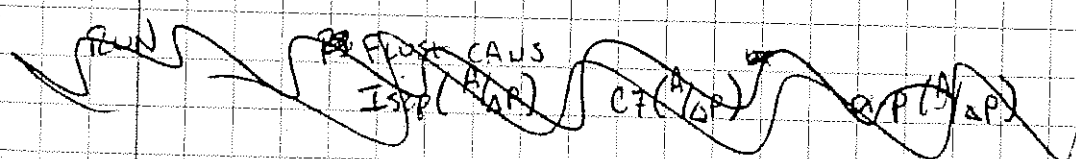
$F_{STR} = 5. \text{ sec/cm}$     5 sec flush  
 $F_p = 5000 \text{ sec/cm}$     20 sec Transp  
 $F_{sample} = 250 \text{ sec/cm}$

RUN	T Start	T END	FLUSH CAN	up can	DN CAN
1	11:00	11:00	✓ 202 ✓ 224 (11:27)	✓ 225	✓ 208
2	1:00	2:00	✓ 204 ✓ 214 (1:27)	✓ 212 DIRECT	✓ 200
3	2:05	3:03	✓ 222 [ 210 ] (2:29) (?)	220 ✓ DIRECT	✓ [ 210 ] DIRECT

4/7/03 GC runs of humidified samples (TAKEN at 4/4/03)

Retention Times (min)  
 Isoprene ~ 2.9-3  
 heptane - 5.7-5.8  
 $\alpha$ -pin - 11.95  
 11.43

Can#	File	Description	P <sub>i</sub>	P <sub>e</sub>	$\Delta P$	A (Isop.)	A (Rep.)
202	A294	DGA/FLUSH	107.4	142.1	34.7	43.9253	67.1205
"	A295	"	107.8	140.6	32.8	40.8218	63.0810
225	A296	up can	107.3	142.2	34.9	36.8670	58.0064
"	A297	<del>FLUSH</del> "	107.3	139.3	32.0	34.9358	51.6703
- 224	A298	flush can	107.2	142.6	35.4	60.2832	<del>10.243</del> 216.319
206	A299	down can	107.03	140.2	32.9	39.6066	45.6546
"	A300	"	107.43	135.6	28.3	46.5204	38.252
200	A301	down can	107.5	142.8	35.3	53.0720	51.935
- 204	A302	flush	107.3	140.5	33.3	<del>50.1400</del> 41.5112	<del>50.1400</del> 63.7208
- 204	A303	FLUSH	107.0	136.4	29.4	39.2822	57.1190
200	A304	DN CAN	107.0	134.6	27.6	49.6407	43.8626
212	A305	UP CAN	106.9	143.6	36.7	53.9372	70.0060
"	A306	"	106.9	134.0	27.1	43.7792	51.1582
210	A307	DN CAN	107.0	140.9	33.9	70.6136	49.0682
201	A308	FLUSH	107.8	138.9	30.7	52.0238	21.1272
220	A309	up can	106.7	150.6	44.1	58.4796	78.0268
222	A310	FLUSH	106.7	149.0	42.3	64.1902	89.910
214	A311	FLUSH	106.7	143.4	36.7	44.2254	72.7496



4/11 Isolated purp/MFC from disp. samples

⇒ Filled cans just by pushing -

Time on	can#	Time off	FLUSH CAN
11:28	252	12:01	-
12:05	203	12:35	205
12:39	214	1:40	222
1:48	220	2:45	201



Further DIA TEST - could we get contamination from 3-way valve  
 Just upstream of pump  $\Rightarrow$  Put Hydrocarbon trap on that line  
 SHOULD get rid of "junk"  $\Rightarrow$  still see "loss" (dilution)

Time start	trend	FLUSH CAN	up can	DN CAN
3:37		210	203	205

\*Note - Port way thru - more volume in the "up" can - but pressure is higher in the "down" can. Suggests a leak in down line!

Will try to pump out some cans & then run in DE can mode (just watch the leak rate -)

Fitting to Down P-sensor was loose

For Monday - Recheck all fittings

- THEN - Hook up evacuated cans to up/down - run in D3. Eddy can mode & watch pressure increase

- THEN TRY RUNNING some cans in mid-afternoon w/ HC Trap

4/14 - Leak checking back end (cans  $\rightarrow$  up/down selection valves)

Time	P <sub>up</sub>	P <sub>dn</sub>	Condition	P <sub>cell</sub>
1:09	71.0	79.0	Ambient	79.5
1:10 $\Rightarrow$ T=0	12.00	12.00	- CANS OPEN -	
4:38	12.00	15.88 $\Rightarrow$ FANT can & it goes up fast!!		
6:02	12.00	19.50 $\Rightarrow$ closed can		
13:30	12.00 $\Rightarrow$	UP side looks fine! - close can		
0		21.70		
1:30		27.00		
5:00	16.30	28.729.00		
0		12.0		
6:00		12.0	- looking OK -	
10:30		12.0		