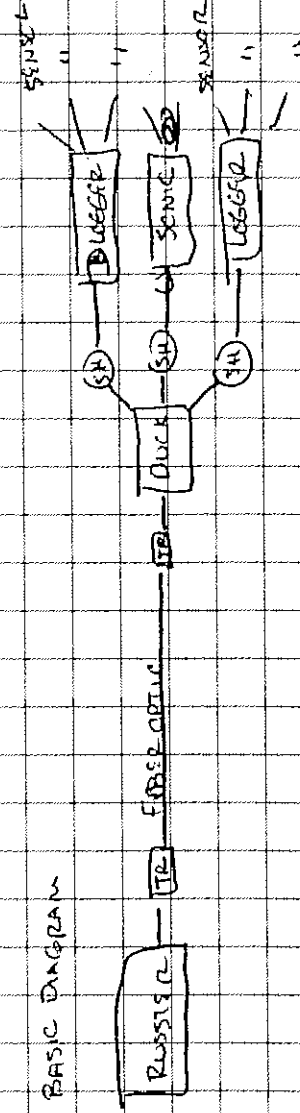


INDEX

6/5/98-

BEGINNING TO DECIDE HOW TO ORGANIZE NUCLEAR RIDGE
DATA COLLECTION.

BASIC DIAGRAM



DUCK = 16 SERIAL CHANNELS
15 ANALOG CHANNELS

CAMPBELL: 3 21x

2 23x

1 TC MULTIMETER

1 ANALOG MUX

25 TC Meters

~~21x~~ 21x

21x

8

12

4

2

4

8

N/A

1

1

DDE CHANNELS

EXC. CHANNELS

EAD CHANNELS

PULSE COUNTS

CONTROL I/O

SDM

112V

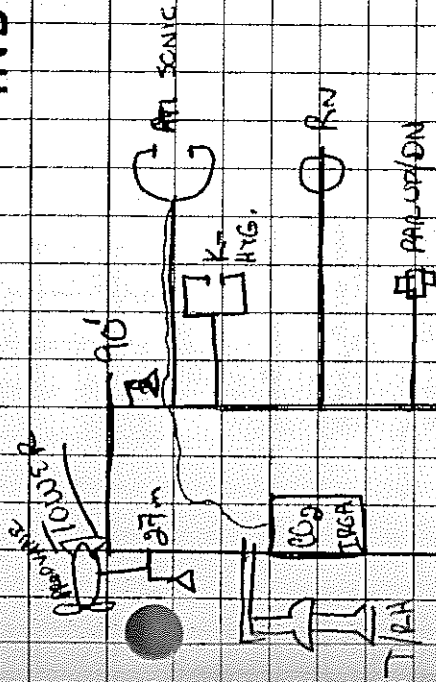
15V

TRY TO ORGANIZE BASED ON

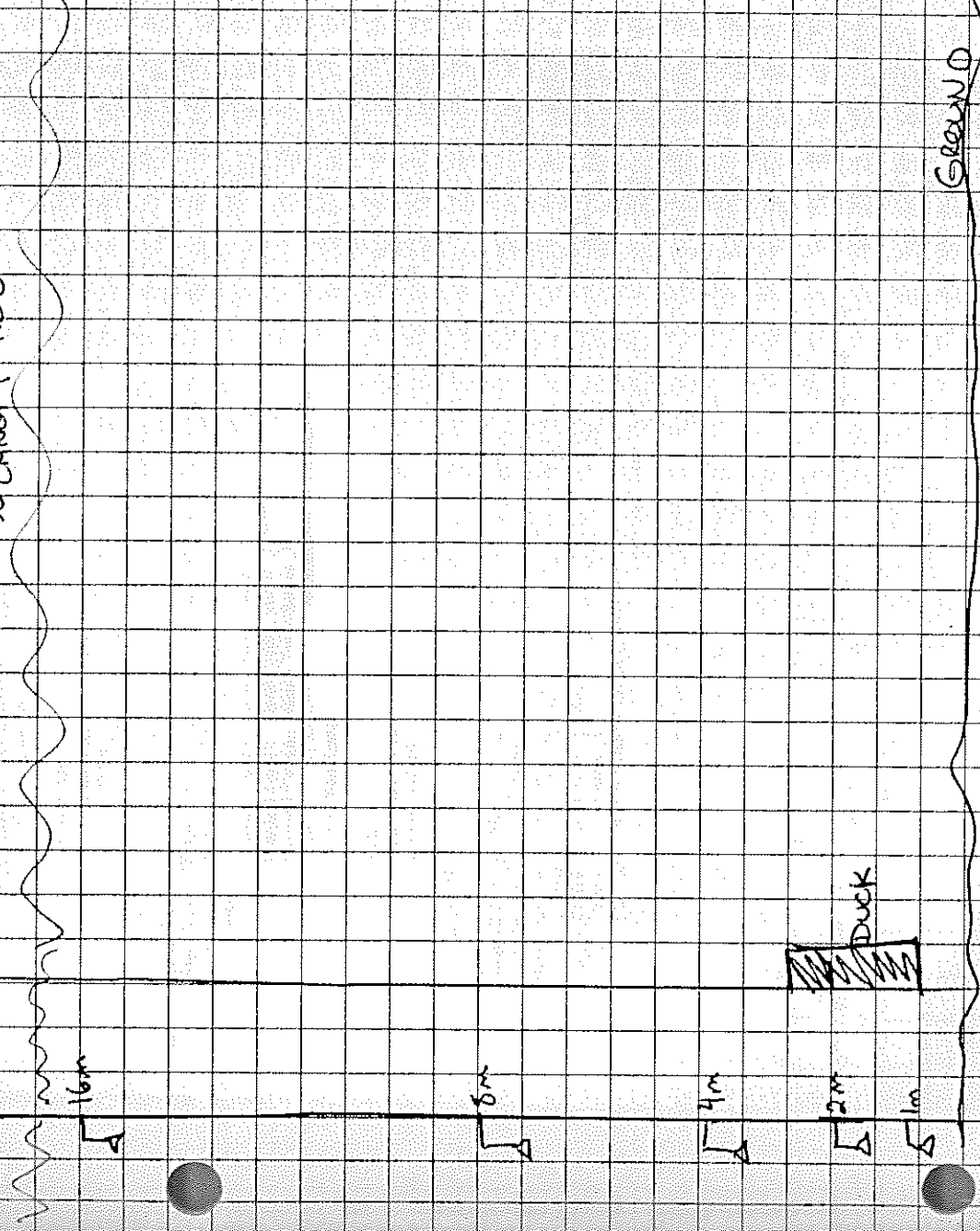
- 1 SIMPLIFY PROGRAMMING - NO DATA LOGGER DOES MORE THAN 1 COMPLICATED FUNCTION (RUN THE TC MUX, etc.)
- 2 POSITION ON TOWER - PROXIMITY TO SENSORS
- 3 SENSITIVE SENSITIVITY (NOT CRITICAL) - i.e. "LIGHT" SENSORS
- 4 ADVANCE OF USING DUCK ANALOG CHANNELS

INDEX

$\Delta \leftarrow \text{CO}_2 \text{ PREFLUE}$
INJECTS



SCANDY HEIGHT



INDEX

2 FIRST ATTEMPT

CUFF Data System Breakdown:

Main Data Collector : the DCU ("the DUCK")
15 Analog Channel inputs
16 Serial Channel inputs

Serial Channel #1 :
ATI Sonic Anemometer

Serial Channel #2 :
Campbell 23x - "Fast Data"
Located at the top of the tower.

Inputs:

Channel 1 : Licor CO2
Channel 2 : Licor Temp.
Channel 3 : Licor Press.
Channel 4 : Licor H2O
Channel 5 : Kt H2O → Kt Hygrometer
Channel 6 : EC total flow
Channel 7 : EC CO2 flow

Channel 8 - 10 : REA flows and status → only used when REA is operating
Channel 11 : Fast O3 (Delany ?)
Channel 12 : Rnet at top of tower (RAS)
Campbell Sonic anemometer

0 channels left
2 controls left (with sonic running)
4 control I/O left
All excite and pulse channels left

Serial Channel #3 :

Campbell 21x - "Temperature"
Located near bottom of tower

Inputs :

Channels 1 and 2 : Vaisala Temp. sensor
Channels 3 and 4 : Vaisala Temp. Sensor
Channels 5 and 6 : Vaisala Temp. Sensor
Channels 7 : Tc multiplexer → 25 thermocouples → could be anywhere
Pulse 1 : Rain Gauge

1 channel left
0 Exc. channels left
4 control I/O left
3 pulse inputs left

Serial Channel #4

Campbell 23x - "Profiler"
Located at bottom to middle of tower

Inputs :

Channel 1 : Licor CO2
Channel 2 : Licor Temp.
Channel 3 : Licor press.
Channel 4 : Profiler status fields vs. which level will be sampling

Channel 5 : Profiler flow
 Channel 6 : PAR up
 Channel 7 : PAR down
 Channel 8 : Barometer
 Channel 9 : Vaisala Humidity sensor
 Channel 10 : Vaisala Humidity sensor
 Channel 11 : Vaisala Humidity sensor
 Channel 12 : Leaf Wetness sensor (Maybe ???)

} LI600 PAR SENSORS
 } LOGGED ON TOWER

1 single-ended channel left
 1 control I/O left (Control channels 2-6 run the profiler)
 All excite and pulse channels left

Serial Channel #5

Campbell 21x - "Soil"
 Located at bottom of tower (in the forest??)

Inputs :

Channels 1 and 2 : AM416 analog multiplexer
 10 heat flux plates (REBS)
 Channel 3 : Soil Moisture Probe (single-ended) (REBS)
 Channels 4 and 5 : REBS Soil Temperature Probe
 Channels 6 and 7 : REBS Soil Temperature Probe
 1 differential and 1 single-ended channels (add more Moisture probes ???)
 0 Excitation channels left
 All pulse channels left
 5 control I/O channels left

Serial Channel #6

Dendrometer Output ??

Serial Channel #7

TECO O₃ measurement

Serial Channel #8

Fast Isoprene Sensor (??) USEFUL? MAY BE NOT!

Serial Channel #9

Propylene #1

Serial Channel #10

Propylene #2

Serial Channel #11

Propylene #3

*****Note - we still have all 15 analog channels open on the DUCK. I have avoided using them because we have had problems with the code that samples the analog data in the past. We have worked out most (if not all the bugs) on taking in serial data into the DUCK. Therefore, using the Campbell dataloggers to send serial data to the DUCK is the most reliable at this point. We also still have 5 serial channels to the DUCK open. I have no idea if the DUCK can actually handle 16 serial inputs without dropping samples. We have only run about 4 or 5 serial inputs into the DUCK and that seems fine.

CUFF Data System Breakdown:

Main Data Collector : the DCU ("the DUCK")
15 Analog Channel inputs
16 Serial Channel inputs

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ATI Sonic Anemometer

Serial Channel #2 :
Campbell 23x - "Fast Data"
Located at the top of the tower.
Inputs:

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- Channel 2 : Licor Temp.
- Channel 3 : Licor Press.
- Channel 4 : Licor H2O
- Channel 5 : K7 H2O
- Channel 6 : EC total flow
- Channel 7 : EC CO2 flow
- Channel 8 - 10 : REA flows and status
- Channel 11 : Fast O₂
- Channel 12 :
Campbell Sonic anemometer

- 1 channels left (Channel 7 may also be open)
- 2 controls left (with sonic running)
- 4 control I/O left
- All excite and pulse channels left

Serial Channel #3 :
Campbell 21x - "Temperature"
Located near bottom of tower
Inputs:

- Channels 1 and 2 : Vaisala Temp. sensor
- Channels 3 and 4 : Vaisala Temp. Sensor
- Channels 5 and 6 : Vaisala Temp. Sensor
- Channels 7 : Tc multiplexer -> 25 thermocouples
- Pulse 1 : Rain Gauge

- 1 channel left
- 0 Exc. channels left
- 4 control I/O left
- 3 pulse inputs left

new + 2

→ PROGRAM IS WRITTEN
(RUNNING AREA)

area.csi

→ WRITTEN BUT NOT TESTED

(PROCES HAVE BEEN TESTED)
(EVERY 5 SEC)

TABLE 1 - 60 msec EXECUTION

TABLE 2 - (EVERY 5 SEC)

EXECUTION TIME - 330 msec

* NEED TO CHECK FOR TIMING
INTERFERENCES + OVERLAPPING
STORAGE INPUTS !!

Serial Channel #4

Campbell 21x - "Radiation" → HUMIDITY
Located near top of tower.

Inputs:

- Channel 1: Rnet at top of tower
- Channel 2: PAR up
- Channel 3: PAR down
- Channel 4: Barometer
- Channel 5: Vaisala Humidity sensor
- Channel 6: Vaisala Humidity sensor
- Channel 8: Vaisala Humidity sensor
- CHANNEL 7: Rnet at bottom
- 0 differential-ended channel left
- All control, excite, and pulse channels left

LIGHT.CSI
(SAME AS FAST.CSI.)

THIS WORKS

Serial Channel #5

Campbell 21x - "Profiler"
Located at bottom to middle of tower

Inputs:

- Channel 1: Licor CO2
- Channel 2: Licor Temp.
- Channel 3: Licor Temp.
- Channel 4: Profiler status
- Channel 5: Profiler flow
- Channel 6: Rnet at forest floor

PROFILER.CSI

THIS WORKS - IF USE EDDY DILUTION
SYSTEM - NEED TO CHANGE
OF CALIBRATION PROGRAM

2 channels left

- 1 control I/O left (Control channels 2-6 run the profiler)
- All excite and pulse channels left

NOTE - TRIED USING 2
BUT PROGRAM WOULD

Serial Channel #6

Campbell 23x - "Soil"
Located at bottom of tower (in the forest??)

Inputs:

- Channels 1 and 2: AM416 analog multiplexer
- 10 heat flux plates
- Channel 3: Soil Moisture Probe (single-ended)
- Channels 4 and 5: REBS Soil Temperature Probe
- Channels 6 and 7: REBS Soil Temperature Probe

NOT
WRITTEN

- 1 differential and 1 single-ended channels (add more Moisture probes ???)
- 0 Excitation channels left
- All pulse channels left
- 5 control I/O channels left

Serial Channel #7

Dendrometer Output ??

Serial Channel #8

TECO O3 measurement

Serial Channel #9

Fast Isoprene Sensor

Serial Channel #10
Propylene #1

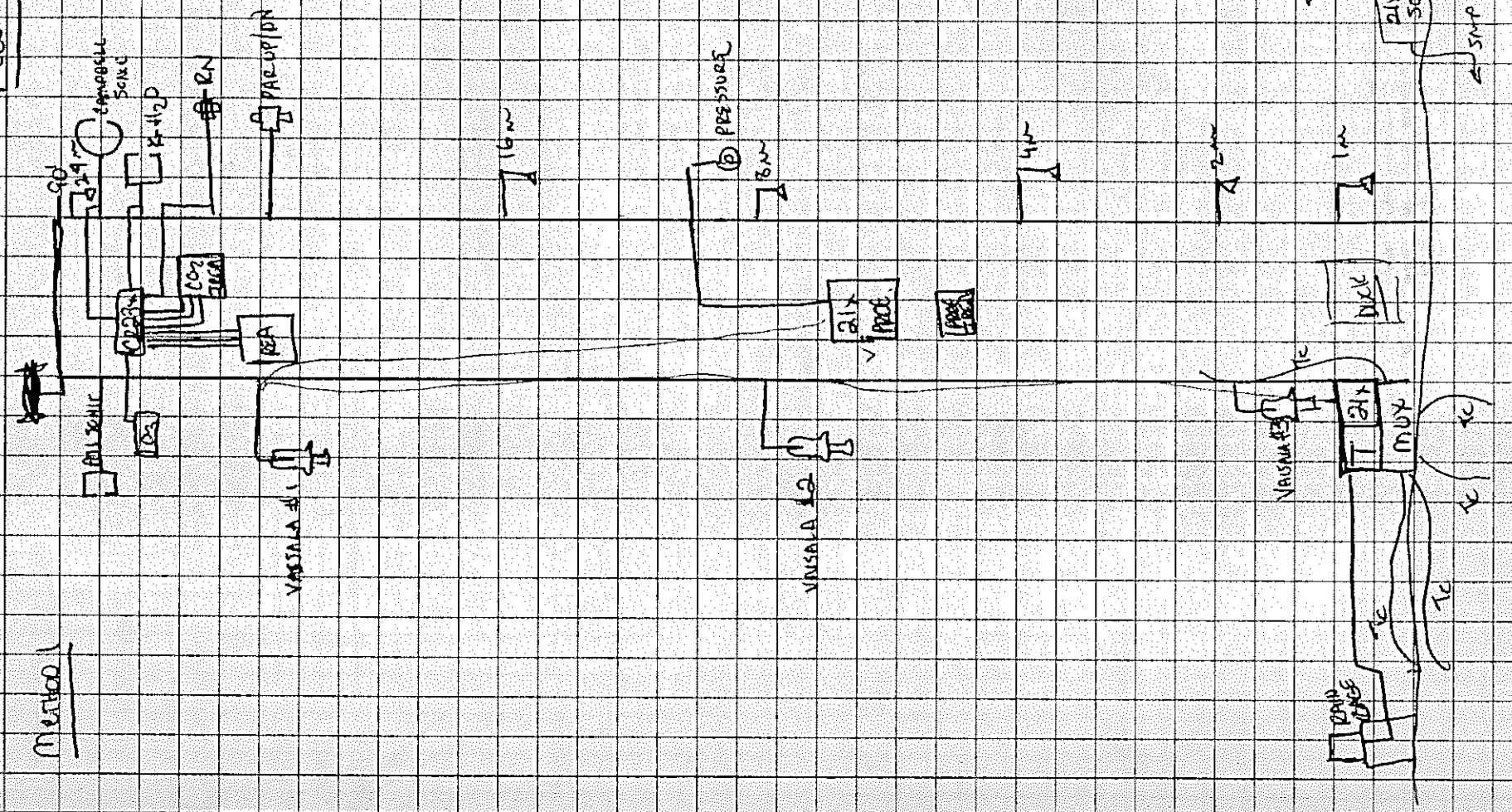
Serial Channel #11
Propylene #2

Serial Channel #12
Propylene #3

****Note - we still have all 15 analog channels open on the DUCK. I have avoided using them because we have had problems with the code that samples the analog data in the past. We have worked out most (if not all the bugs) on taking in serial data into the DUCK. Therefore, using the Campbell dataloggers to send serial data to the DUCK is the most reliable at this point. We also still have 5 serial channels to the DUCK open. I have no idea if the DUCK can actually handle 16 serial inputs without dropping samples. We have only run about 4 or 5 serial inputs into the DUCK and that seems fine.

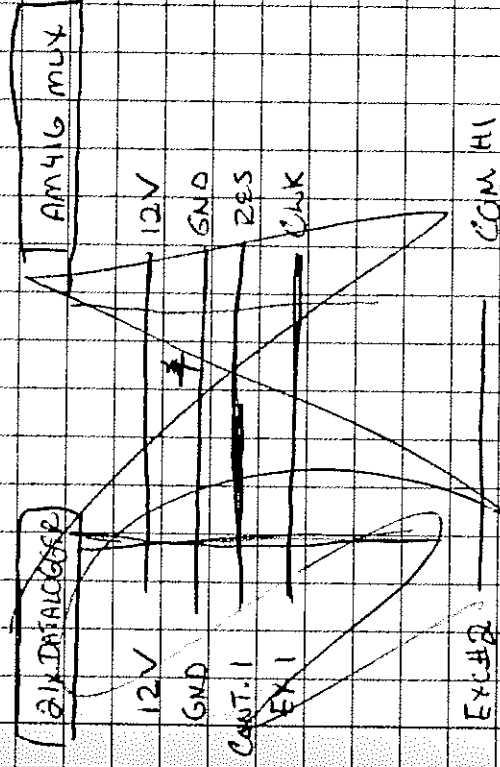
NEW TOWER DIAGRAM

Method



~~CHANNELS TO KEEP -~~

~~CHANNELS~~



6/19/ES CALIBRATING VAISALA TEMP/HUMIDITY SENSOR
 FOR TEMPERATURE -
 SEE 21X MANUAL - pg. 7-5 for wiring diagram
 & PROCEDURE FOR ICE BATH

IN ICE BATH

SENSOR #
#1
#2
#3

RES. RATIO	Temp	T ₀
1.0023	0.58°C	0.1°C
1.0020	0.51°C	0.0°C
1.0008	0.19°C	6.0°C

WT MULT MULTIPLIER (PA)
0.99771
0.9980
0.99920

TEMP MULTIPLIER - IN TEMP. BATH

TEMP.	#1	#2	#3
10.0°C	8.61°C	8.90°C	

#3

T₀ 8.6°C 8.90°C

6/23/98 READING TEMP. CALIBRATION IN H₂O BATHCAN ONLY DO TWO AT A TIME

BATH TEMP.	VAS. #1	VAS. #2	T _c
10.0°C	8.65°C	8.90°C	8.9°/8.8°C
15.0°C	13.8°C	14.08°C	14.0°C
20.0°C	18.8(4)°C	19.10°C	19.2°C
25.0°C	23.90°C	24.21°C	24.3°C/24.2°C
30.0°C	29.03°C	29.38°C	29.6/7°C
36.0°C	35.11°C	35.47°C	35.7°C

BATH TEMP.	VAS. #2	VAS. #3	T _c
10.0°C	8.95°C	8.71°C	9.2°C
15.0°C	13.98°C	13.79°C	14.2°C
20.0°C	19.09°C	18.84°C	19.2°C
25.0°C	24.21°C	23.91°C	24.2(3)
30.0°C	29.33°C	29.01°C	29.6°C
36.0°C	35.57°C	35.21°C	35.7°C

$$\left[\begin{array}{l} \text{VAS \#1} \\ (y) \end{array} \text{ vs. } \begin{array}{l} \text{VAS \#2} \\ (x) \end{array} \right]$$

$$y = -0.202 + 0.9955(x)$$

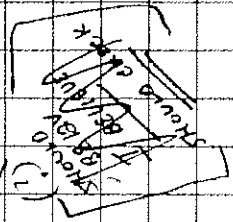
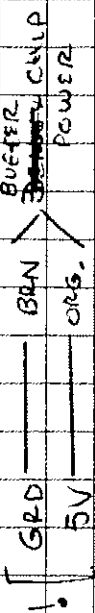
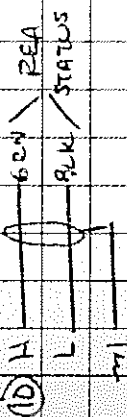
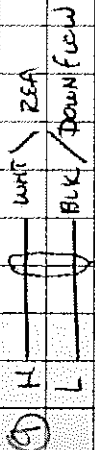
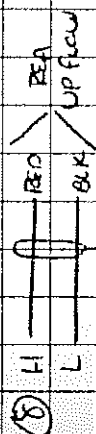
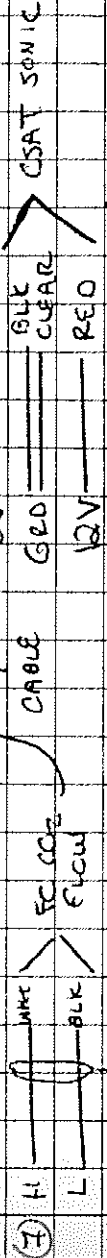
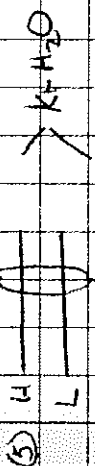
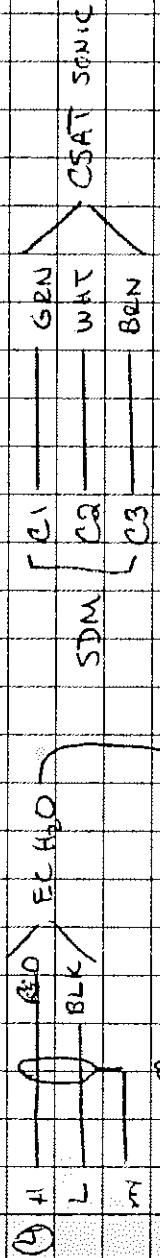
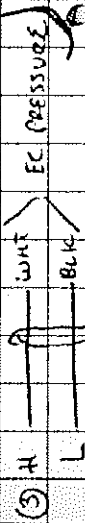
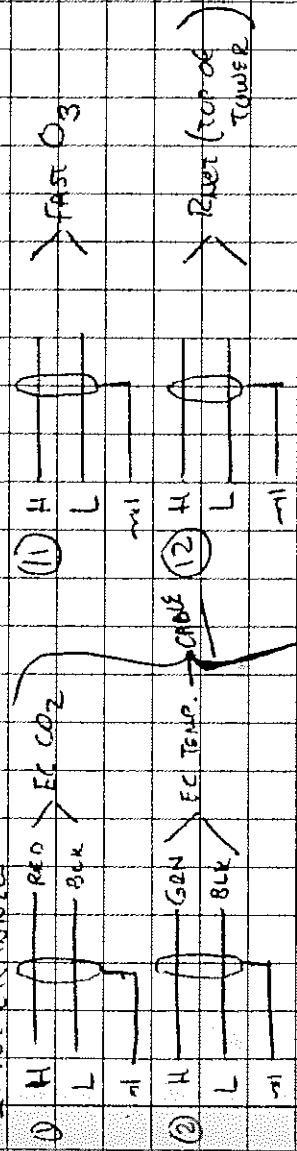
$$\left[\begin{array}{l} \text{VAS \#3} \\ (y) \end{array} \text{ vs. } \begin{array}{l} \text{VAS \#2} \\ (x) \end{array} \right]$$

$$y = -0.126 + 0.9931(x)$$

[WIRING DIAGRAMS for NUMOT R1006 DATA LOGGERS]

234 -> TOP FAST DATA + REA ; PROGRAM : HREA.CSI (THIS WORKS!)

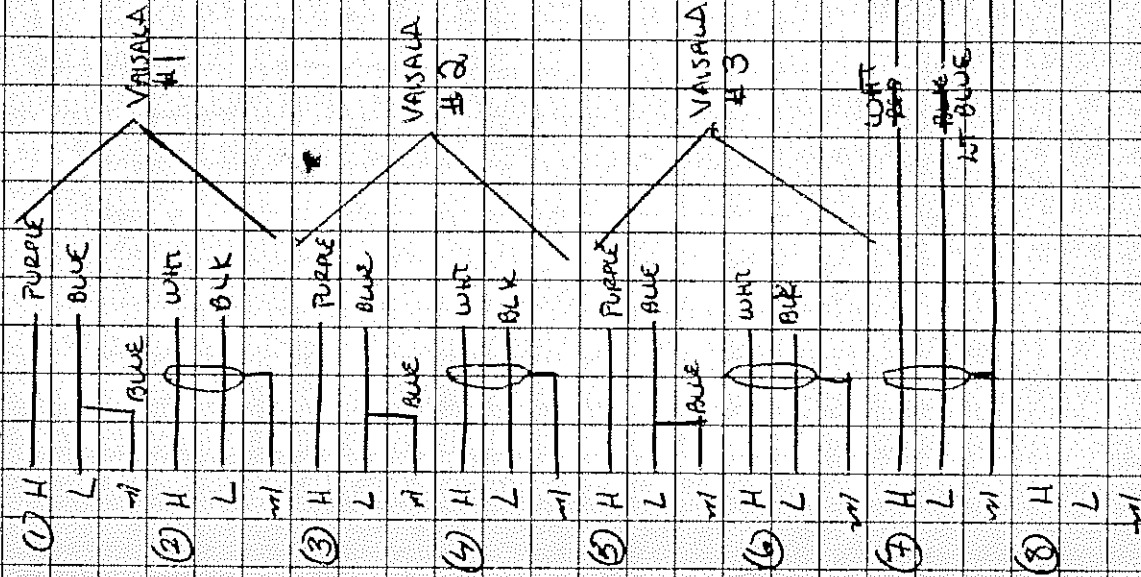
DIFF.
INPUT CHANNELS



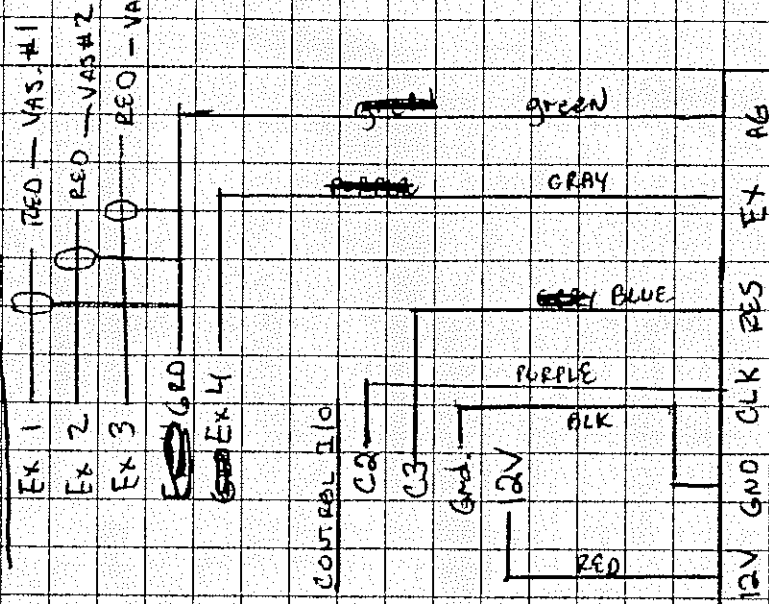
- 2k Air TEMPERATURE -
(AT BOTTOM OF TOWER)

PROGRAM 5 Temp.v; (THIS WORKS!!)

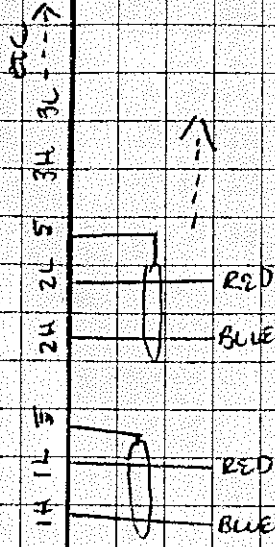
INPUTS



EXCITE CHANNELS



AM 25T
HI THERMOCOUPLE
LO
HWT



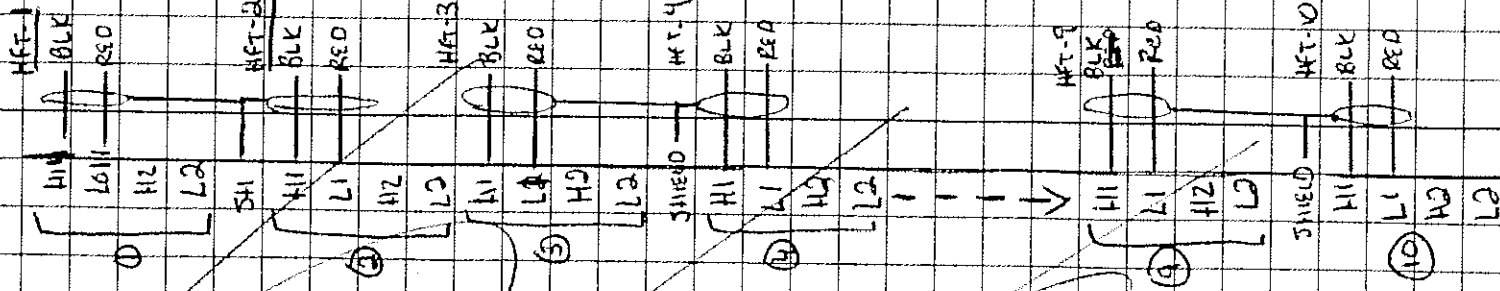
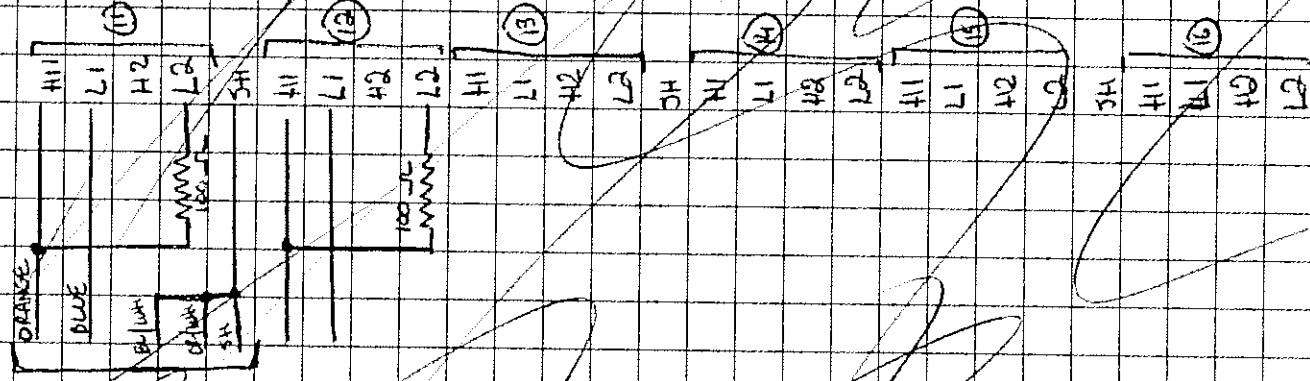
PULSE 1: BLK / Met One
PULSE 1: CLR / RAIN
PULSE 1: WHT / GAGE

21x - 5016

PROGRAM: 501K, CS-1

at bottom of tower

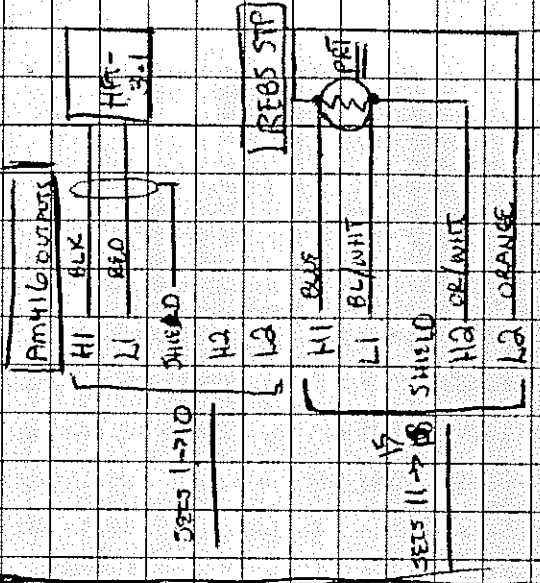
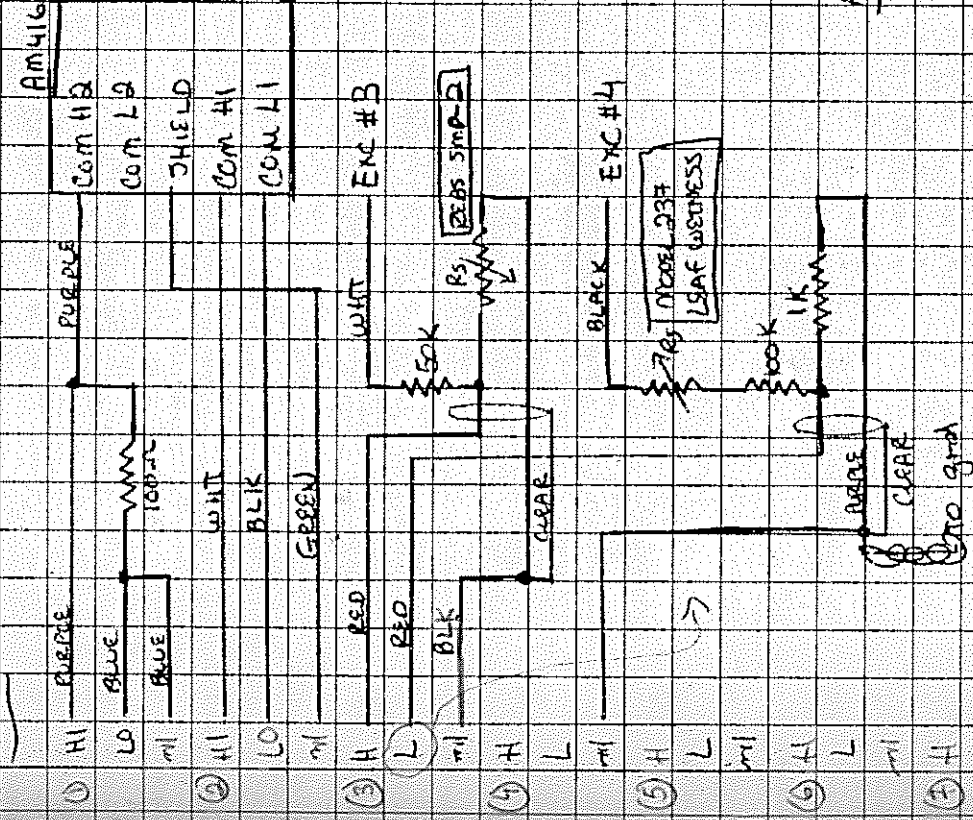
- [illegible]



6/23/98 SOIL 21K DATA LOGGER (BOTTOM OF TOWER)

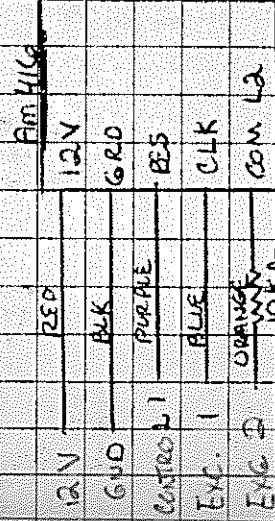
PROGRAM: 5012.CS (THIS WORKS!!)

INPUTS

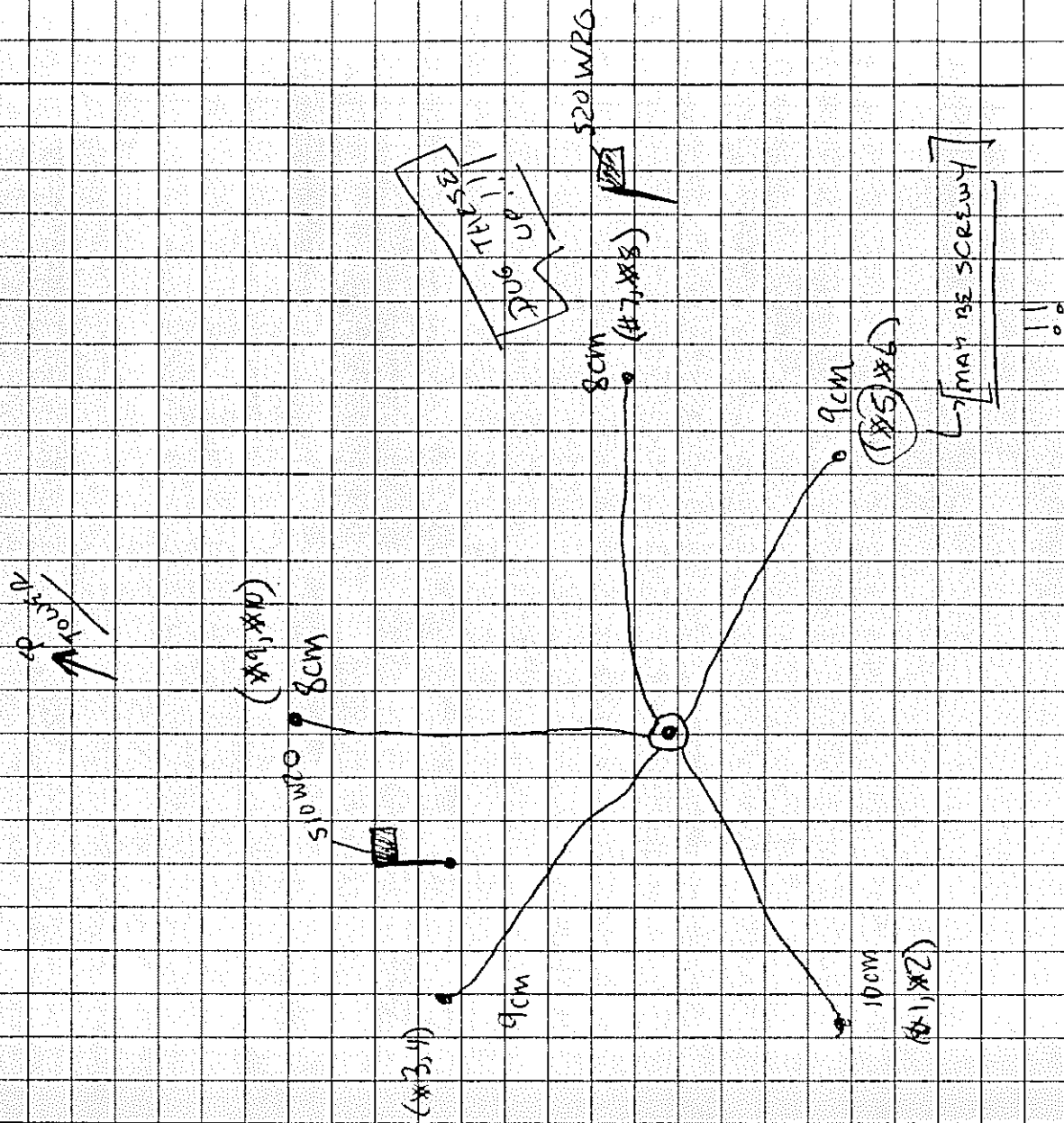


AM416 CHANNEL

- 1 H973078
- 2 H963431
- 3 H963430
- 4 H973075
- 5 H973077
- 6 H973079
- 7 H963432
- 8 H973076
- 9 H973074
- 10 H973073
- 11 STP96019
- 12 STP96018
- 13 STP96020



EXC 1
EXC 2
EXC 3
EXC 4
EXC 5
EXC 6
EXC 7
EXC 8
EXC 9
EXC 10
EXC 11
EXC 12
EXC 13
EXC 14
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EXC 98
EXC 99
EXC 100



10/12/98 STARTING TO SET INSTRUMENTS ON MOUNT RIDGE TOWER

ON FRIDAY, 10/9 \Rightarrow TURNED ON CAMPBELL SONIC & K HYGROMETER
AT GRASS LEVEL & RAN OVER THE WETLAND
 \hookrightarrow (1.5 meters).

STARTED RUNNING AT 4:00 PM 10/9/98

TURNED OFF AT 11:20 AM 10/12/98

10/13/98

2:30 PM - TURNED ON BOTH SONIC & K HYGROMETER

LEVEL 12 \Rightarrow 70 FT HEIGHT \Rightarrow CAMPBELL

LEVEL 10 \Rightarrow 23X DATA LOGGER \Rightarrow SONIC & K

CO₂ - SENSOR

10/10/98 3:21 PM - CO₂ ENTRY SYSTEM RUNNING

ZEROED & SPANNED !!

USING 6262; SERIAL # IR362 (I BELIEVE)

FLOW RATE CONVERSIONS

TURBULENT FLOW -

$$F_{TOT} = 4.75 \text{ SLPM} \quad P_{ATM} = 1.017$$

$$P_{ATM} \approx 70 \text{ KPA}$$

$$F_{TOT} = 6.87 \text{ LPM}$$

$$T \approx 273 \text{ K}$$

TUBING DIAMETER = 4 mm i.d. $A = 0.1257 \text{ cm}^2$

FOR $Re = 2500$

$$v = 0.002 \text{ m/s} \quad V = 9.13 \text{ m/s}$$

NEED A FLOW OF 6.9 LPM; VERY CLOSE !!

MAY NEED TO INCREASE THE FLOW - BUT NEED TO BE
CAREFUL AT THE PRESSURE TRANSDUCER FROM WHICH MAY
GO OFFSCALE

LAG TIME = \approx 17.6 METERS OF TUBING

$$LAG = 193 \text{ SEC}$$

10/22/98 - NET RADIOMETER TO INSTALL AT 26 METERS

Q7.1 SERIAL# 096333

CALC 9.22 W² M² V² (+)
11.30 W² M² V² (-)

REBURIED
2 HEAT FLUX
PLATES
HERE'S THE
NEW MAP!

11963432
#7 - HT
91793076
#8 - HT
STEP #96018
ANALYSIS
NEAR TESTS

11973074
#9 - HT
11973073
#10 - HT
STEP-96020
ANALYSIS
#13

STATIONARY
ROCKY

10432
ROCKY

10.5
MGR

10.5
MGR

670868 H HT 9#
11973077
#5 HT H
#2

DO NOT
TESTS

11963431
#2 HT
11973078
#1 HT

STATIONARY
ROCKY

STEP-96019
ANALYSIS

11973075
#3 HT
11963430
#4 HT

STATIONARY
ROCKY

10.5
MGR

10/22/99 3:45 PM: RECOVERED + SPANNED THE EC O₂ SYSTEM
SEEMS OK

TURNED FLOW UP TO 500 SLPM

MONITORED RAFT SENSORS

#1 => LEVEL 2 => 3 METERS (MAY MOVE THIS DOWN TO 2m)
#2 => LEVEL 4 => 8 METERS

10/29/98 CAME BACK FROM AMERIFLUX MEETING
DUCK WAS DEAD

STOP ARCHIVING DATA ON

OCT. 27 (TUESDAY) - 18:24 (6:30 PM)

COULD BE WHEN SNOW WAS FALLING
& SINCE NO KEYBOARD - DUCK
WILL NO REBOOT (IF POWER WENT OUT)

GOT NEW KEYBOARD FROM BILL BOWMAN & REBOOTED
- STILL DOESN'T WORK -

11/2/99 - CAME BACK OUT W/ MONITOR

DUCK SEEMS OK BUT BOWMAN/KEYBOARD
ISN'T WORKING

- SWITCHED KEYBOARDS & LOGGED INTO THE DUCK
IT'S ALSO BACK ON THE NETWORK!!
SEEMS OK

11/4/98 TURNED QUACKER BACK AT ~ 10:30 AM

2ND DATA LOGGER - CHANNEL 202 RUNNING AT 12:00 PM
(REL. HUM., P_{tot}, P_{NS2})

ALSO NOTICED AT 12:00 PM - ϕ AIR AIR EC LICOR WAS EMPTY

- REFILLED SMALL CYLINDER W/ ~ 550 PSI

- REATTACHED AT $\sim 12:50$ PM - SHOULD BE OK AFTER THIS.

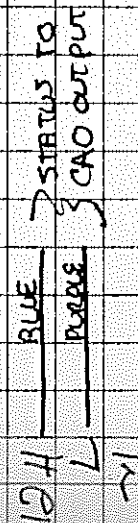
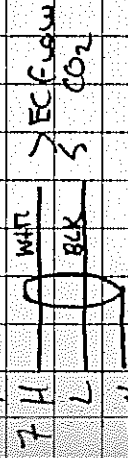
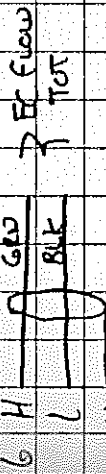
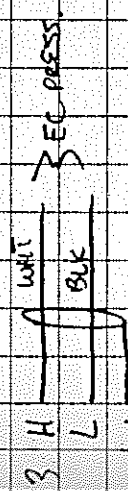
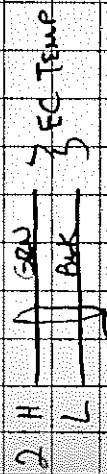
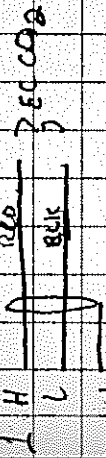
ϕ - FILLED SMALL CYLINDER W/ 1800 PSI OF US WELD. GAS. #1
(3500 PSI CO₂)

WILL CALIBRATE THE NEW TENS I'M UP HERE.

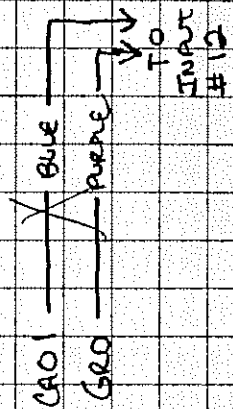
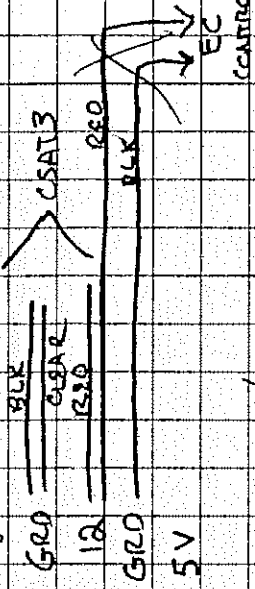
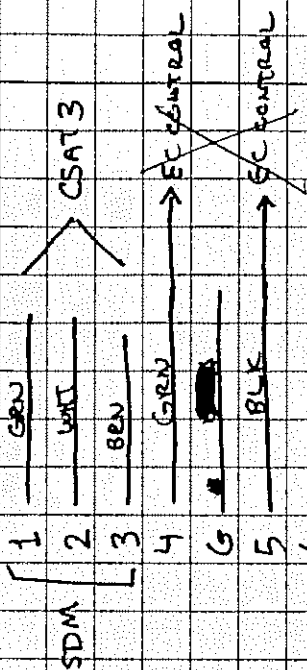
11/5/98 CURRENT WIRING FOR DATALOGGERS THAT ARE IN USE -

I. 23K - FAST DATA - LOCATED ON LEVEL 10

INPUT CHANNELS

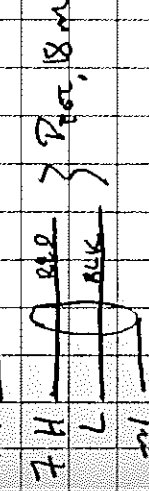
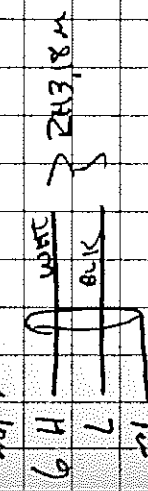
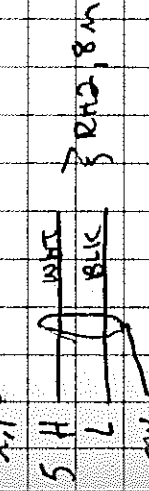
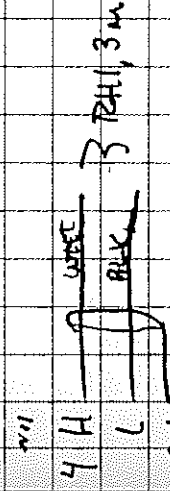
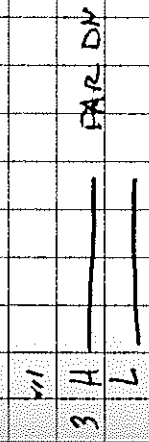
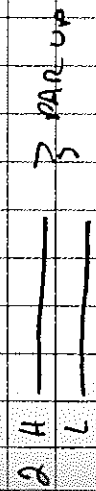


CONTROL I/O

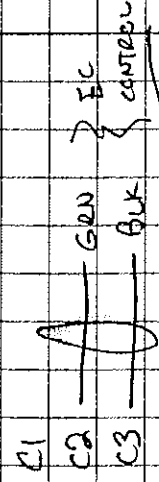
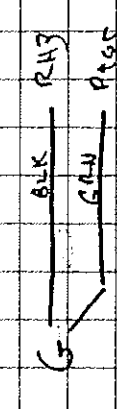
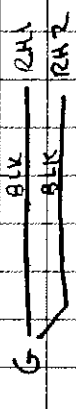
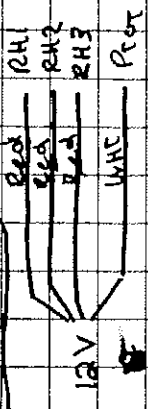


II. 2/x- LIGHT - LOCATED AT LEVEL 10

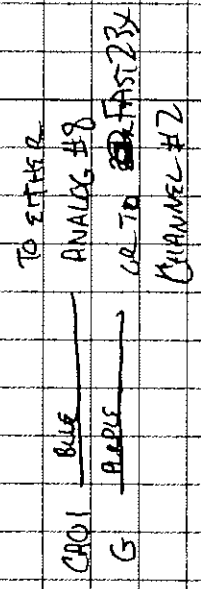
INPUT CHANNELS



CONTROL I/O



USED 12V AGAIN?



234 III PROFILE; LOCATED ON LEVEL 8

CHANNELS

1 H Red
L Blk
m

PROF.
CO₂

2 H GRN
L BLK
m

PROF.
T

3 H WHT
L BLK
m

PROF.
P

4 H BLU
L PURPLE
m

STATUS-TO
CAOI

5 H RED
L BLK
m

PROF.
FLOW

6 H
L
m

7 H PURPLE
L BLU
m

VAS. TEMP
#1, 2m

8 H WHT
L BLK
m

9 H PURPLE
L BLU
m

VAS. TEMP
#2, 8m

10 H WHT
L BLK
m

11 H PURPLE
L BLU
m

VAS. TEMP
#3, 18m

12 H WHT
L BLK
m

CONTROL I/O

CONTROL 1

2

3

4

5

6

7

8

PROFILE
CONTROL

EXECUTE

1

2

3

4

5

RED Temp #1

RED Temp #2

RED Temp #3

12V

G

CAOI

G

TO BNC INPORT
#4

CHECKING RESISTORS

RED → WHT ⇒ 100 KΩ

WHT → BLK ⇒ 100 Ω

PURPLE → BLUE ⇒ 100 Ω

$R_1 = 9969.9 \Omega$ #3

$R_4 = 100.043 \Omega$

11/6/98 DUCK WENT OUT AGAIN - BUT HAD REQUESTED
 A WDS ON-LINE EC TAGA WAS OUT TOP
 RESTRICTED AT ~ 11:15 AM

POWER MUST HAVE GONE OUT TO CAUSE BOTH THE
 DUCK & THE TAGA TO GO OUT.

MARKING LONG (24m) SERIAL CABLE
9pin - 9pin

PIN	1	RED
	2	BLK
	3	SHIELD/RED
	4	WHIT
	5	BLK
	6	SHIELD/YELLOW
	7	GRN
	8	BLK
	9	SHIELD/GREEN

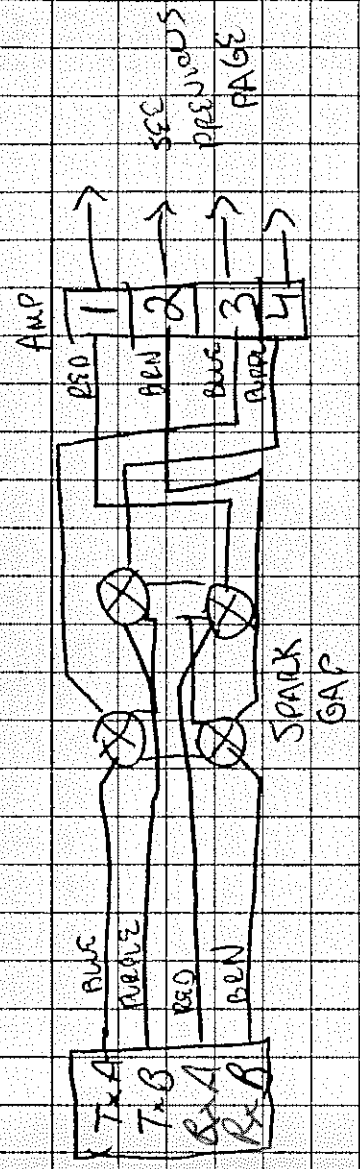
SHORT HAUL MODEM WIRING

DUCK	1	TXA (RED)	→	RED
	2	TXB (BRN)	→	BRN
	3	RxA (BLU)	→	BLU
	4	RxB (PURPLE)	→	PURPLE

(DCE)

~~TXA~~
~~RxB~~
~~RxA~~
~~TXB~~

→ NEXT
 PAGE



WA/98 - DUCK OUT AGAIN - BUT IS ALIVE
 RESTORING DATA FROM BOULDER - BUT CO₂ SYSTEM
 IS NOT RUNNING -
 6262 DOES NOT TURN BACK ON WHEN POWER
 OUTAGE OCCURS - MUST USE SWITCH ON THE
 INSTRUMENT. IS THERE A WAY TO WIRE AROUND
 THIS? OR DO WE NEED A UPS?

→ LEARNED SOME SUN COMMANDS FROM DAVE

ON URQUELL + FOR TUSTER

TO GET FOOT STATUS:

SUDO MAKEFILE NAME

(MAKE DIRECTORY W/
 FOOT PROPERTY)
 TOWNSHIP

SCP => SECURE FILE COPY

TO GET TUSTER TO DISPLAY ON URQUELL:

ON TUSTER

SETENV DISPLAY URQUELL:0

ON URQUELL

XHOST TUSTER

/usr/local/share/projects/
 NEW PROJECTS/CONV/
 FILE

TO CREATE ACCOUNTS

SUDO ADMINTOOLS => FOLLOW DIRECTIONS

SUDO CHOWN => CHANGE OWNERS

AS OF 10/28
 NOT STARTING
 UP COUNTS

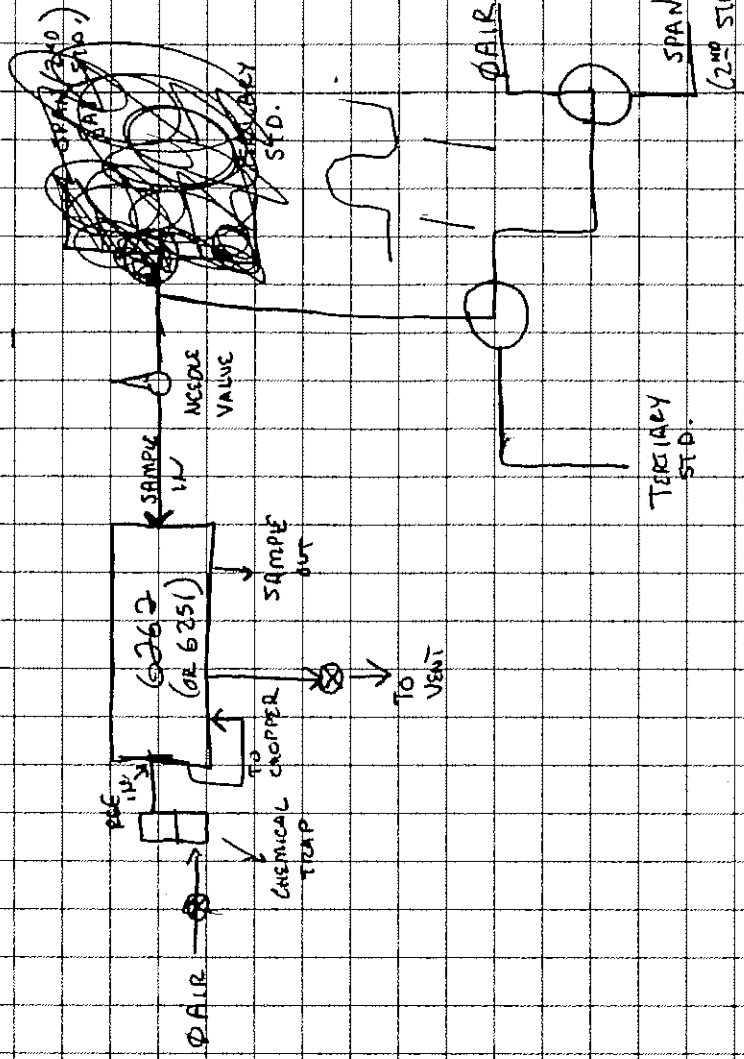
NOTE: DATA FILES OWNED BY ASTER USER

PASSWORD "yakin99"

SP = SET PROJECT
 (TO LOCK AT OLD PROJECTS)

11/9/98 BASIC IDEA OF CO₂ CALIBRATION—

- ① TO START W/ — USE ABSOLUTE MODE
PUT ϕ AIR OR N₂ IN REFERENCE CELL W/ SHUTDOGS



- ② DIFFERENTIAL MODE MIGHT BE BETTER BUT NEED TO
FIGURE OUT HOW TO DEAL W/ PRESSURE IN THE REFERENCE
CELL.
- ③ SOME KIND OF STAND FOR THE VALUES..??

11/12/98 — PUT ON LARGE SECT-MAN & AIR TANK
ON Edg. Cap. SYSTEM
LAST SMALL TANK WAS NEARLY EMPTY —
NEW TANK — JUST UNDER 1000 psi

TO COPY FILES FROM RUSSTER TO URGWELL

NOTE - PERMISSIONS MUST BE RIGHT - FILES OWNED BY "ASTER"

FROM THE RAW_DATA DIRECTORY ON URGWELL AS USER "ASTER"

scp -pv aster@russter:/usr/local/aster/projects/NIWOT/

raw_data/all/wave

FILE

SPACE

sudo chmod -R aster NIWOT90

CHANGES OWNER OF ALL FILES/DIRECTORIES UNDER NIWOT90

df -h \Rightarrow get disk space for the system

④ RAW_DATA IS IN /home disk/directory ON URGWELL
(NOT ON RUSSTER)

11/13/98 CALIBRATING US WELDING TANK -
USING SCOTT TANK C =

ROW	ϕ	SPAN	SAMPLE
1	0.1 ppm	345.45	345.45 452.4
2	0.5 ppm	345.5	345.5 452.30
3	0.1 ppm	345.3	452.27
4		345.4	452.19
5		345.4	452.32
			452.30 \pm 0.15 ppm

SCOTT TANK - A - 345.7 \pm 0.1 ppm
B - 341.9 \pm 0.2 ppm
C - 345.4 \pm 0.1 ppm

3:35 PM - ZEROED & SPANNED EC IRGA

11/11/98 Making ATI SONIC CABLE -

NEED 6 WIRES

DUPLEX CONNECTIONS

FEMALE
AMP 9-PIN

1	RS232 OUT
2	RS232 IN
3	CHASSIS
4	RS232 GND
5	
6	
7	+12V GND
8	+12VDC
9	

FEMALE
AMP 9-PIN

1	RED
2	BLK
3	GRN
4	GRN
5	
6	BLK
7	BLK
8	UNIT
9	

RED
BLK
GRN

SONIC CONN

8	RS232 IN
9	RS232 OUT
1	CHASSIS
7	RS232 GND
13	Vcc GND
12	Vcc INDC

SHIELDS? - CAN TIE TOGETHER & ATTACH TO CHASSIS GND

TO HOOK UP LAPTOP

3	TRANSMIT
2	RECEIVE
1	CHASSIS GND (?)
1	RS232 GND
4	
6	

1	RED
2	BLK
3	GRN
4	GRN
5	
6	BLK
7	BLK
8	UNIT
9	

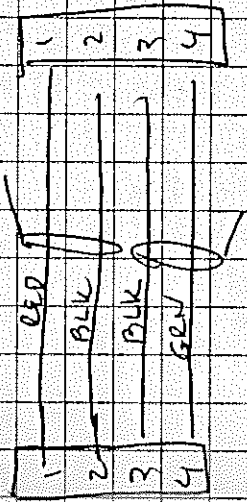
RS232 IN
RS232 OUT
CHASSIS
RS232 GND
Vcc GND
Vcc (12VDC)

COMPUTER
SERIAL 9-PIN
CONNECTOR

FEMALE
9-PIN

11/20/08

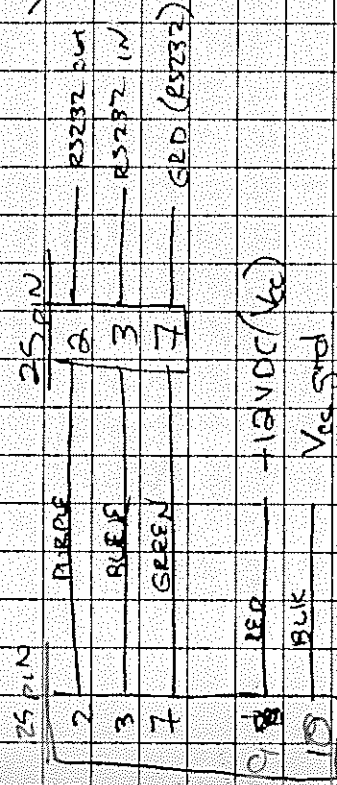
SHORT HALL CABLES



⊗⊗ IMPORTANT NOTE ⊗⊗
 + SHORT HALLS ON BOTH ENDS
 SET TO DCE (NOT DTE)

W/ PETER'S ACCE LAPTOP - DOES NOT HAVE 12V DC AVAILABLE
 ON SERIAL CBT - SO SHORT HALL MODEM DON'T HAVE POWER!

NEW SHORT HALL CABLE FOR LAPTOP



DOESN'T
 WORK

STILL DOESN'T WORK - NO COMMUNICATION
 NOW I DON'T UNDERSTAND!

11/24/08

11:15 AM - GOT

PROFILER 23X DATA LOGGER RUNNING (LEVEL 7)
 PROFILER IS NOT HOOKED UP - BUT VAISALA TEMP. SENSORS
 ARE -> LOGGING TEMPERATURE DATA NOW

AT 3 HEIGHTS

⊗⊗ NOTE ON TEMP. = 7 MULTIPLIERS IN CAMPBELL
 CODE IS SET TO 1.000.

TEMP #3 - 18M

I NEED TO REDUCE THE LENGTH OF THE CABLES,
 ONE - 134 - GMS TO 80 FT = 2 USE PRECISION
 RESISTOR ~~BEING~~ BEING SENT BY REAR

DOESN'T APPEAR
TO BE WORKING!

CHECK RESISTORS

⊗⊗ STILL OVER 500 PSI ON 0 ARE (LARGE

SHORT - MARRAN EX-114018

	<u>SW</u>	<u>NW</u>	<u>NE</u>	<u>SE</u>
Top	1	500	✓	550
↑	2	500	✓	✓
	3	✓	650	✓
Bottom	4	✓	700	✓

12/3/98 - Working on the profiler pump -

MEASURING λ_{COM} DIRECTLY AT THE EXIT (SPRINGING AND GUNNEL)
 $\lambda_{\text{COM}} = 0.6 \text{ cm}$

Added bus (n 304) - 3105590 1745

MEASURED AT FILTER (TAKING FILTER OFF)

LEUGL	ℓ	E_{corr}	ℓ_{corr}
1	(1m)	2.41	ℓ_{corr}
2	(2m)	2.46	ℓ_{corr}
3	(4m)	2.31	ℓ_{corr}
4	(8m)	2.39	ℓ_{corr}
5	(16m)		
6	(24m)		

⑧ EACH TUBING LENGTH IS $\approx 72'$ LONG

PROB. PROBLEM - WHEN YOU PUT IN MAG PERMEATE TRAP -
PRESSURE DROP IS TOO MUCH - PRESSURE SENSOR IN
LIGOR GOES NEGATIVE
RAISED UP THE FLOWS

USING 0-500 SCCM MFC

RUN	MFC RAW VOLT	→ FLOW (SCCM)	FLOW (OH SET (POT.))	READOUT	P (IRGA) - mV
1	2.94	254	700	1426	-641
2	2.00	200	400	852	-166
3	1.00	100	200	426	+382
4	1.50	150	300	640	-139
5	2.00	200	400	848	-171

⊗ TIME TO FLUSH TRAP (W/ PHAR)

RUN	
1	30 SEC
2	45 SEC
3	1 MIN 48 SEC
4	1 MIN 5 SEC
5	< 50 SEC

⊗ FLOW ARRANGEMENT - GOES THRU 2 $\frac{3}{4}$ " x 6" MAG PERME. TRAPS
THEN THRU A $\frac{1}{8}$ " x 6" GLASS TRAP

IF USE SMALLER TRAP - DESSICANT BURNS OUT TOO QUICKLY.
(THIS ARRANGEMENT MAY NOT BE GOOD ENOUGH.)

12/14/98 NOTICED VARIATA TEMP. SENSOR AT 18" IS GIVING ONLY 0.005
CHECKED THE RESISTANCES ⇒ THEY SEEM OK

⊗ CHECK TO SEE IF EXCITE CHANNEL IS WORKING

⊗ SWITCH W/ ONE OF OTHER TEMP. SENSORS
WIRING

12/3/38 - ANOTHER PROFILER PROBLEM

WHEN CONTROL LINE IS HOOKED UP - DATA LOGGER
DOESN'T MEASURE ANY SIGNALS??

SIGNALS GOOD OK IF YOU DISCONNECT THE CONTROL LINE

12/4/98 - PREVIEW W/ PROFILER COULD BE A GROUND MISMATCH
RELAYS A DEMUX CHIP GET 5VDC FROM POWER SUPPLY
AT PROFILER - BUT OV IS SET BY THE DATA LOGGER,
THEREFORE WHEN A VALUE IS ACTIVATED - CURRENT
MUST flow FROM PROF. POWER TO DATA LOGGER.
→ COULD BE THAT THERE IS TOO MUCH CURRENT FOR
LOGGER TO HANDLE!

⑦ CAMARILL PROGRAMMING NOTE - TO CHANGE JUST 1 PORT ON

THE CR23X - USE "DO" COMMAND <P86>

Followed by

45	=>	SEC	POST	75	1164	/	W01C 10
----	----	-----	------	----	------	---	---------

55 => sec port 5 done ✓

→ CAN USE IN FAST 23x.csi

BOFFER

SKOLIN SS ABLE TO USE ~~DETECT~~ CHD + DATABASE POWER

TO ~~DO~~ COMPLETELY RUN THE PROFILER (DO NOT USE MFC POWER SUPPLY)

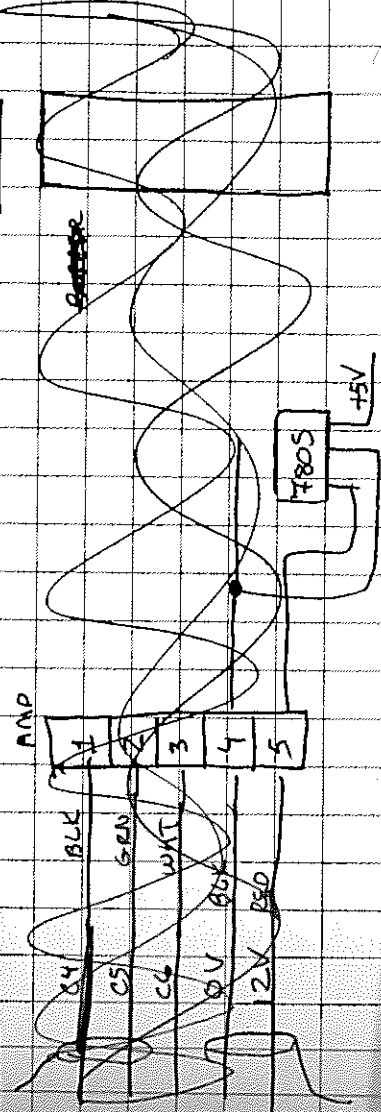
TAKE CONTROL BACK out of profiler ✓ WISE UP

USE 12V FROM LOGGED & TRY IT - OTHERWISE PUT IN A

From 10552

2398

BUCKET CHIP



12/14/78 PUTTING MKS BARATREN ON EL CO2

FC OFFLINE AT 2:20 PM

MKS AT EXPT OF L/COR

TIME	IRGA P (AV)	IRGA P (REL)	Flow	MKS RAW	MKS READ
2:29	759.9	70.521	0.00	5.43	2.180
2:32			4.84	4.84	1.864
2:34	127.00	60.907	4.84	4.63	1.864(0)
2:36	127.00	62.904	4.06	4.79	1.924
2:39	419.25	65.381	3.02	4.99	2.002
2:41	605.6	68.18	1.60	5.22	2.093
2:43	530.37	67.035	2.23	5.12	2.055
2:45:30	33.5	59.713	5.32(0)	4.50	1.813(07)
2:47:30	-69.2	57.92	5.81	4.37	1.759
2:50	-74.4	47.66	7.87	3.52	1.419

P/C IN BIG NEEDLE VALUE CN CALIBRATION LINE -
 $P = 1.414 \text{ V (MKS)}$
 $F = 7.87$

WT SPAN - $P = 1.399$
 $F = 7.80$

$\phi =$ off by 1.5 ppm
 SPAN = off by 6 ppm !!

$$\frac{1_{\text{Total}}}{760 \text{ Torr}} = \frac{0.13329 \text{ kPa}}{101.3 \text{ kPa}} \frac{\text{RA}}{\text{Torr}}$$

$$\text{VAISALA READOUT} = 1136 \text{ mV}$$

$$P = 71.367 \text{ kPa}$$

(*) CHECK TO SEE
 WHAT THE VAISALA
 PRESSURE WAS

APP

$$m = 0.90223 \pm 0.0039$$

$$\delta = 5.93 \pm 0.25$$

$$0.9045 \pm 0.009$$

$$5.212 \pm 0.59$$

~~11/6/98~~ 11/6/98 DUCK DIED AT 8:05 AM ON JAN. 5TH
 → HAD POPPED A CIRCUIT BREAKER → DUCK LOOKS OK

- (*) NOTE - FUSSTER MONITOR ACTING FUNNY - WARN'S WORKING FOR A WHILE - THEN CAME BACK ?
 NOTED SOME H₂O HAD COME THRU CABLE PORT
 & GOTTEN ON MONITOR - SEALED UP CABLE PORT
 & DRIED OFF MONITOR

OTHER PROBLEMS

- RAN OUT OF O₂ AIR FOR IRGA
- RAN OUT OF SPAN GAS FOR IRGA

- (*) NOTE - SHOULD NOT HAVE RUN OUT OF ZERO AIR SO QUICKLY - MUST BE A LEAK IN THE CALIBRATION SYSTEM
 (THESE ARE THE ONLY FITTINGS THAT I HAVE TAMPARED WITH)

(DHP) PUT SMALL N₂ (1000psi) CYLINDER ON IRGA REFERENCE CELLS - DISCONNECTED THE CALIBRATION BURNING & CONTROL LINES; BEFORE DISCONNECTING, I RE-ZEROED & SPANNED MANUAL
 [O₂ - DEC ABOUT 2.5ppm
 [SPAN - DEC ABOUT 1ppm

- (*) SO UNTIL FURTHER NOTICE ⇒ NO AUTOMATIC CALIBRATIONS!!

1/7/98

RESTARTED DATA COLLECTION!

ALSO HOOKED UP DIGITAL OUTPUT FROM EC IRGA TO FAST 23X ANALOG CHANNELS

CHANNEL 10 - CO₂

CHANNEL 11 - H₂O

EXTRA SPECIES OUTPUT PORT

CHANNEL	SPECIES	VOLT. RANGE	MIN	MAX
23A				
10	CO ₂	0-5V	300 ppm	450 ppm
4	H ₂ O	0-5V	0 mm/1000	20 mm/1000

⑧ CHANGED PREP. CONFIG LABELS

FAST 234; a9 → CO₂ dig

CH. 202 a10 → H₂O dig

Flow. CO₂ → MKS-P

1/8/99

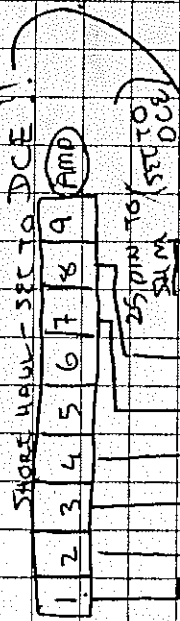
SURGE PROTECTOR BOX FOR NEW ATI

ELECTRICAL WIRING

9-PIN
AMP ~~ATTN~~



ATI AMP (CONN)



BLK
RED

250 OHM



SPARK GAP

12V

0V

12V

0V

12V

0V

12V

0V

12V

0V

12V

0V

12V

0V

12V

0V

12V

0V

12V

11/2/58 - CALIBRATING A NEW O_2 STA.

SCOTT TANK

USING SPAN = 345.4 ppm

RUN	ZERO	SPAN	SAMPLE
1	0.2 ppm	345.4 ppm	350.9 ppm
2	-0.3 ppm	345.36 ppm	350.75
3	0.11 ppm	345.5 ppm	351.30
4	0.13 ppm	345.58 ppm	351.10
5	0.02 ppm	345.3 ppm	350.80
6	-0.000	345.46 ppm	351.05

 $350.98 \pm 0.41 \text{ ppm (2\sigma)}$

RECALIBRATING OLD STA

1	0.02 ppm	345.40 ppm	453.97
2	0.5 ppm	345.37 ppm	454.22
3	0.13 ppm	345.22 ppm	453.85
4	0.00	345.42	454.17 ppm
5			

 $454.05 \pm 0.35 (2\sigma)$

PREVIOUS MEASUREMENT

 $452.3 \pm 0.2 \text{ ppm}$

DIFF = 1.75 ppm

ABOUT ~~10~~ \rightarrow MANUALLY RE-ZEROED + SPANNED USING THE NEW STD. TANK

11/13/59

MANUALLY

RE-ZEROED + SPANNED EC IRGA; STARTED AUTO-CALS! ABOUT 2:00 PM!!

⊗ TEMP. SENSOR AT ~~10~~ 18 IN SEEMS TO BE WORKING FINE WHEN TIM CONNECTED TO THE LAPTOP; HOWEVER DUCK IS GETTING NOTHING BUT ZEROS. MUST BE A COOE PROBLEM, BUT I DON'T KNOW WHERE. OBVIOUSLY THIS TEMP. IS NOT GETTING SENT PROPERLY TO FINAL STORAGE.

⊗ ALSO - MY REVISED "FAST23x" COOE STILL SCREWS UP THE SONIC WHEN IT TRIES TO SWITCH ON VALUES - DON'T KNOW WHY. 71

1/14/98 Replaced pump in profiler (2nd one was dead)

Too windy to test profiler but I put it together + left it running on level 4 (8 meters) to get an avg. CO₂ within the canopy.

Will test on the next calm day.

① NEED TO CHECK PROFILER CONTROL CABLE - WHAT ARE THE AN-OUTS??

RED	—	+5V	—	5
BLK	—	G	—	4
GRN	—	C5	—	2
BLK	—	C6 C4	—	1
WHT	—	C6	—	3
BLK	—			

1/28/99

① DUCK QUIT SENDING DATA AT 2:12 AM
RESTARTED EVERYTHING SEEMED FINE

② Turned profiler on - started running in the afternoon

③ GOT - REL. HUM. SENSOR AT 18m RUNNING AGAIN
- TEMP. AT 2m RUNNING AGAIN (W/ REBS RESISTORS)

④ Problem - To hook up Rel. Hum. sensor - had to turn off 21x & then reload program, this starts up EC calibration sequence - bug in Campbell code turns on span per 1st 4 hours. By the time I discovered this - almost got our span gas!

⑤ Turned off calibrations

1/29/99 -

(*) DISCOVERED THAT AFTER QUIT ARCHIVING YESTERDAY
DIDN'T KNOW WHY? !?
COREKIT WAS STILL RUNNING LONG AFTER THE ARCHIVER
QUIT GOING

ARCHIVER QUIT AT 9:42AM (ABOUT THE TIME
I RESTARTED THE DUXF)
COREKIT WAS RUNNING AT 3:00PM (1500)

~~(*) WHEN I RESTART~~

(*) STOPPED & RESTARTED DUXFER AT ~10:30PM
JAN. 29TH

NOTE - WHEN I STOPPED IT - THERE WERE PROCESSES
RUNNING THAT IT HAD TO KILL!!

(*) DISCOVERED WHY TEMP - I WAS NOT RESPONDED

(1) IN CHANNEL - CONFIG

LOOK AT : SIO_MSG - FORMATS/SIO_CONVERTERS

FOR CAMPBELL LOGGERS:

CAMP_21K IN BIN - (# OF DATA CHANNELS)
THAT YOU EXPECT

~~---~~

(2) THEN GO TO : COL_DEST/LOCAL/ASTER/CONFIG/SIO_MSG_FORMATS
& CREATE THE CAMPBELL FORMAT

GIVE NAME: (camp_---in_bin #)
ABOVE

AND NUMBER OF BYTES = (# CHANNELS) x 2
(dials)

(*) NEED TO CHECK THIS FOR AT1 SENS !!

23/09

71.3m SEEMS TO HAVE GONE BAD
AROUND MIDNIGHT (RECALLY ABOUT 12:30 AM)

Went way off

CALS. EC \Rightarrow BRIGHT AT 1:30 \Rightarrow BAD NEWS!

④ NEEDED TO CHANGE THIS \downarrow SEC IT OFF THE HALF HOUR!!

④

REVIEWER CALIBRATIONS CORRUPT

AT 2:15 AM I SUBSEQUENTLY SWAP 4 PPS.

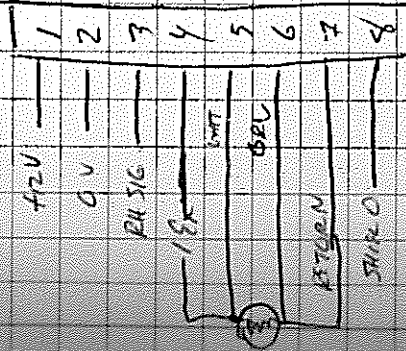
24/09

CALIBRATING A NEW SPAN GAS TANK

USING SEWITT C CYLINDER AS STD: 395.4 ppm

ROW	ZERO	SPAN	SAMPLE
1	0.16 ppm	345.5	363.80
2	0.050	345.3	363.70
3	-0.02	345.3	363.87
4	0.04 0.04	345.35	364.08
5	-0.02	345.5	363.92
6	0.00	345.3	363.80

AMP CONN. - VARS RT/T
SENSOR



ON VARS #1 \Rightarrow NO CONN. BETWEEN 6 & 7
 \downarrow SHOULD BE - BAD CABLE.

AT 3:30 \Rightarrow TOOK THIS SENSOR DOWN -

~V.37 PM MANUAL ZERO ✓ SPAN OF 5V IRGA
 ~ 4 ppm → 55T

1:40 → BACK ON-LINE → STARTING AUTO-CALS.

~~1:41~~
~~1:42~~
~~1:43~~
~~1:44~~

PRODUCER

DESSUCES

L1 = 616

L2 = 612 mV

L3 = 614 mV

L4 = 614 mV

L5 = 617

L6 = 616 mV

68.35 kPa

C₁₀₀ = 363.9 ppm

T = 17.92°C (291.1 K)

$$\frac{T_0}{T} = 1.0615$$

$$V \frac{T_0}{T} = F^{-1} \left(V \frac{T_0}{T} \right)$$

$$V \frac{T_0}{T} = 386.27$$

$$V \text{ TABLE} = 26.72 \text{ mV}$$

1:50 → MANUAL MODE

ZERO - 1.54 ✓

SPAN

D = 0.37

68.722 kPa

$$\frac{V}{P_0} = 0.6784$$

$$V_{\text{CALC}} = 1378.5$$

$$V_{\text{REF}} = 190.7$$

BACK ON-LINE AT 2:00 PM

* NOTE - ON PRODUCER - RE MANUAL CONTROL - NEEDED TO
 UNPLUG CONTROL CABLE ON OUTSIDE OF BOX

3/3/89

NEW (2) 2.0 1.20 1.00

Manual Calc

EC SYSTEM 1.28 → 1.28 (1.33)
(TAKEN AVERAGE)

— PROFILES —

$$\frac{1}{T} = 11.42 \text{ (C)} \Rightarrow \frac{1}{T_0} = 0.0211$$

$$\left(\frac{1}{T}\right) = 3.75 \text{ (C)} \Rightarrow \sqrt{\frac{1}{T}} = 1.93674$$

$$\rho \sim \frac{0.16}{450 \text{ mV}} = 0.000355$$

$$\frac{1}{T_0} = 0.0211$$

$$V_{0.16} = 14.21 \text{ (14.15)}$$

$$D_{0.16} = 1.44$$

Soil Log

Cont. 1, 2, 3	1, 2 → AM416-R
Exc 1, 2, 3, 4 (?)	3 → AM416-b
	4 Tc
	5 Tc
	6 —
	7 AM25T
	8 —

3/3/89 — MANUAL CAL. OF EC SYSTEM 12.00 mV

MANUAL CALC OF ~~THE~~ SYSTEM
 $\text{CO}_2 \text{ SPAN} = 363.9 \text{ ppm}$
 $T = 16.3^\circ\text{C}$
 $T_0 = 0.93688$
 $C \frac{T_0}{T} = 388.4 \Rightarrow \underline{\underline{2091 \text{ mV}}}$
 $P \sim 597 \text{ mV} \Rightarrow \text{IN SAMPLE MODE}$

13:10 0.013 \Rightarrow SET TO 0.000
 $P_{\text{SPAN}} = 596$ 68.079 kPa
 $P_{T_0} = 0.67205$
 $V_{\text{CALC}} = 1371.7$ (1368)

3/6/99

NEW CO₂ CAL TANK

SEED TANK C = 345.4 ppm

Run	Zero	Span	Sample
1	0.100	345.35	351.97
2	0.1	345.40	352.40
3	0.02	345.50	352.28
4	0.06	345.40	351.57 (low?)
5	0.04	345.55	352.40
6	0.00	345.55	352.40
7	0.06	345.52	350.10

352.16 \pm 0.62 ppm
 (20)

(352.26 \pm 0.37 ppm WHEN ON IT
 (20) RUN #4

POT NEW CO₂ STO. V AIR AT TOWER!

3/17/99

HOTTEN UP ATV SONIC

AT 8 METERS (JUST TO SEE IF IT RUNS)

AT 9:45 =>

CHANGED THE CONFIG FILES ON MUSTER/DUCK

⑦

ALSO STARTING CALCULATING COARS DATA
FOR THE PROOFER

⑧ =>

SONIC APPEARS TO BE SPIKING A GREAT DEAL!!

1) A FEW LONG OF A SERIAL CABLE (?)

↳ SOLUTION - TRY THAT SHALL MIGHT

2) ELEVATION - CALL STEVE OSBORNE

LET IT RUN FOR A FEW HOURS & THEN LOOK AT THINGS

P

- 3/18/99

- DATA GONE

9:30 -> 12:00

REPLACING BATTERIES

A) CLEANED K. HVC - STILL NOT WORKING

B) CHANGED MUSTER FILTER FOR CO2

③ MOVED STATUS.DC -> TO FAST-23,
CHANNEL 13

3/22/99

CHANGED PEP.CONFIG

TO REFLECT CHANGE IN STATUS.DC!

④

NOTE - DOESN'T SEEM TO BE WORKING RIGHT
NOT GIVING THE PROPER VOLTAGES

(MAKE AN AVERAGE -> GOING FROM 10HE TO 1500)

⑦ ALSO

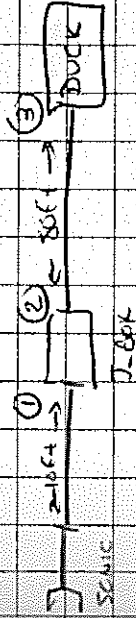
ERROR IN COARS.CONFIG

100 COARS DATA FROM

3/17 -> 3/22/99

* MANUAL CHK. OF EC SYSTEM (ZERO VOLTAGE)

ATI SONIC



(2) DISCONNECTED FROM DUCK + POWERED TO LAPTOP + 12V POWER SUPPLY AT (3)

- STIK SEE SPIKES IN DATA
(SOME 0-15 → GROUND SPIKE)

(b) PUT LAPTOP/POWER SUPPLY AT (1)

- STIK SEE SOME SPIKES - MAYBS NOT AS MANY (?)
SPIKES SEEM TO COME DURING BIG WIND GUSTS !!

WHAT WE KNOW -

NO PROBLEMS W/ JUCK POWER SUPPLY OR DATA-WIRE

POSSIBILITIES -

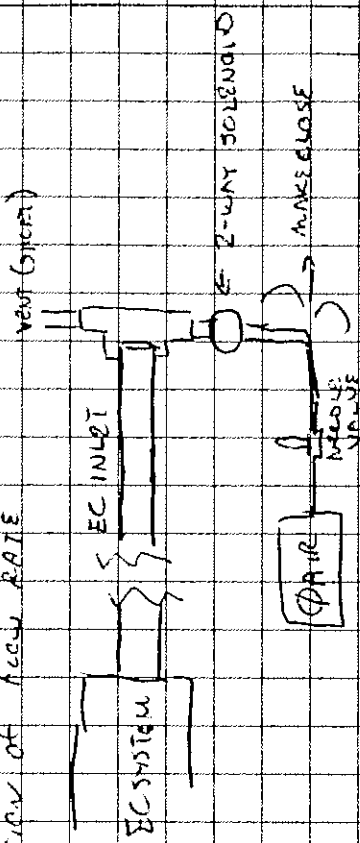
(1) IRRAW CABLE IS TOO LONG → HOOK UP SHORTER CABLES

(2) GROUND LOOP BETWEEN J-BOX + DUCK

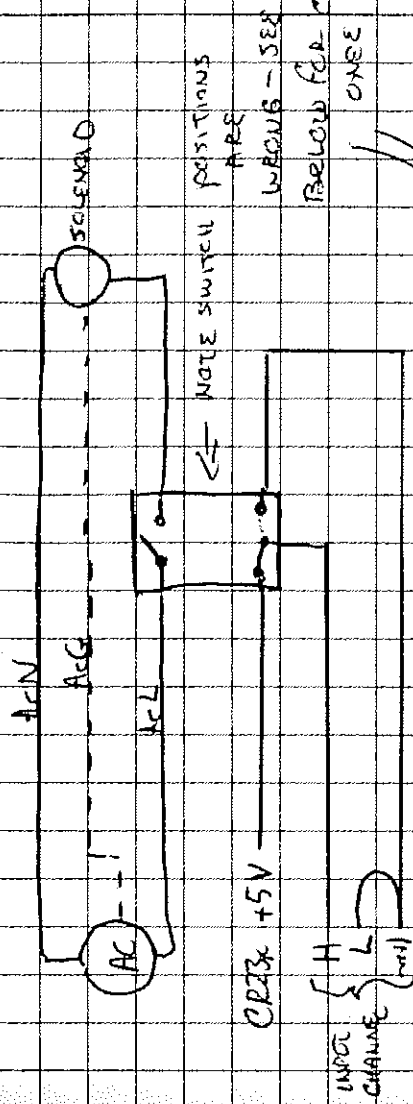
(3) DON'T THINK J-BOX IS GROUNDING MIGHT NOW

(3) SONIC IS ACTING BAD
→ CALL STEVE OSBORNE

3125- Ideal for calculating delay time in EC CO₂ AS
A function of flow rate



WIRING:



"OFF"

Switch goes ON
get signal at 23m
+ PAIR AT INLET

Δt BETWEEN SWITCH
SIGNAL + CO₂ DROP

IS DELAY TIME

⇒ VARY THE PUMPING SPEED

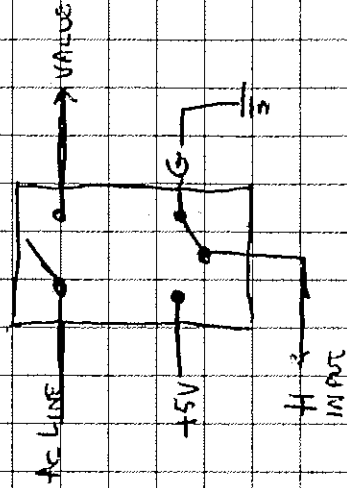
+ get

DELAY = $f_{EC}(\text{flow})$

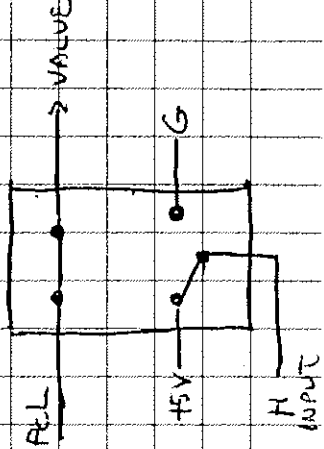
$f_{EC}(\text{PRESSURE})$

⇒ DON'T NEED HUGE AIR
PULSE - JUST ENOUGH
TO DROP CO₂ BY 20-50ppm
(will work for H₂O too)

NEED
TO
PUMP



"ON"



3/31/99 - Redrawing last picture

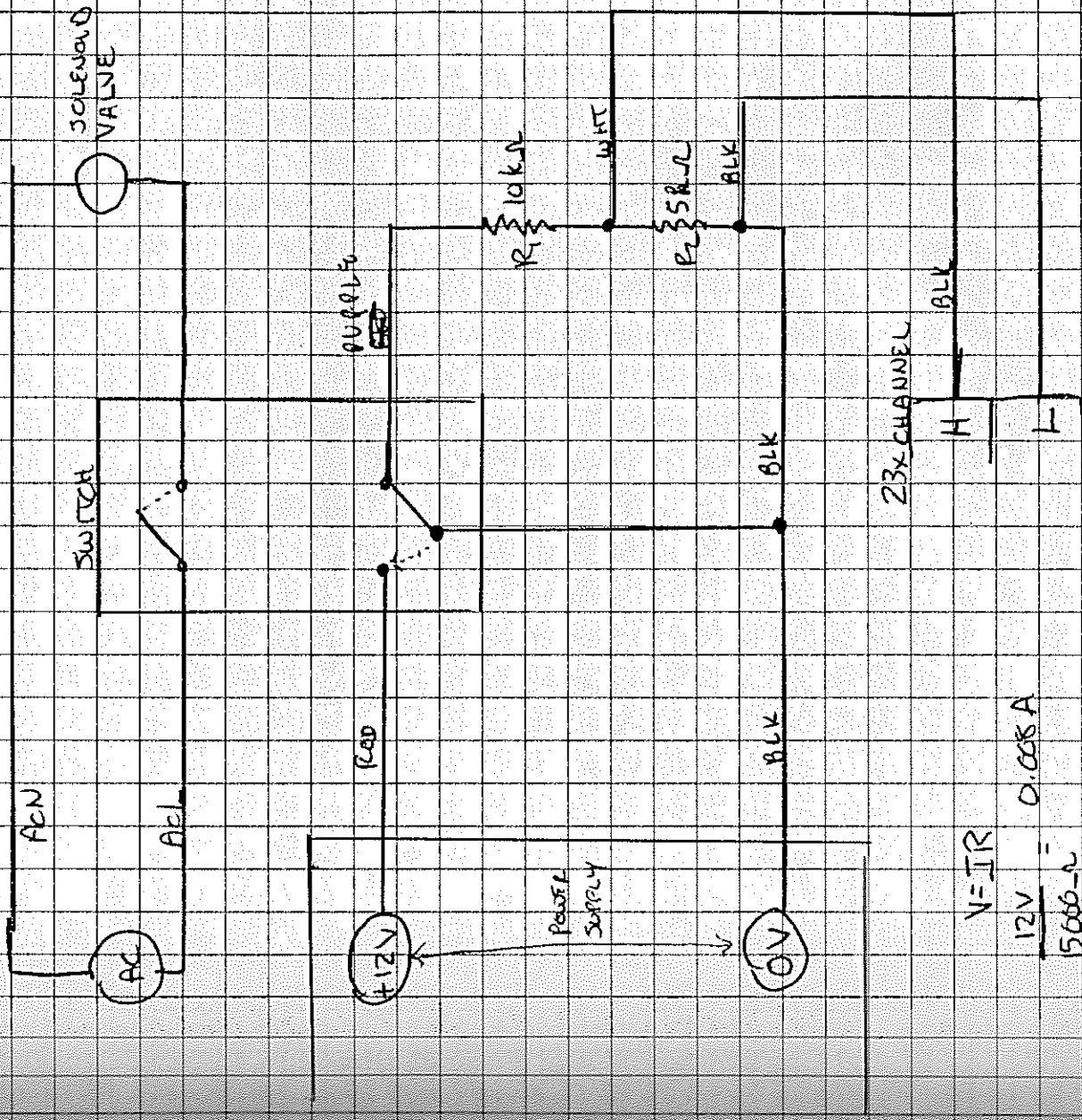
- SAME PLUMBING DIAGRAM

- ELECTRICAL - DON'T USE 23x POWER SUPPLY TO GET A

SIGNAL AT DATA LOGGER

USE A 12V POWER SUPPLY

PORT 12VDC - SWITCHED
STATUS BACK TO 21x



$$V = IR$$

$$\frac{12V}{5000\Omega} = 0.0024A$$

$$I_{TOT} = 0.0024A$$

$$V_{TOT} = I_{TOT} R_1 + I_{TOT} R_2$$

$$V_{TOT} = V_1 + V_2 = I_{TOT} R_1 + I_{TOT} R_2$$

$$V_1 = I R_1 = 8V$$

$$V_2 = I R_2 = 4V$$

→ what we will measure

4/5/89 Looking at LAG TIME
 @ AT SOME DIFFERENT TIMES -

FILES:

(RESULTS FROM FUN DELAY)
 / home / stat / startup / results / delay. # (# = 1-10)

FILE	TIMES	MEAN LAG	MEAN PRESS. (kPa)	MEAN FLOW (L/V)
1	DEC 2 10-11hrs	-2.9 ± 0.1	60.4 ± 0.1	471
2	DEC 6 10-11hrs	-2.75	59.9	530
3	DEC 8 10-11hrs	-6.3	60.7	600
4	DEC 10 10-11hrs	-3.0	61.1	491
5	DEC 15 10-11hrs	-1.6	48.3	785
6	DEC 21 10-11hrs	-1.9	47.5	1051
7	MAR 13 10-11hrs	-1.63	47.85	794
8	MAR 5 10-11hrs	-2.21	47.4	876
9	MAR 27 9-10hrs	-2.23	47.2	799
10	MAR 27 1330-18hrs	-2.6	47.4	808

DEC 1-31

④ WHAT INITIATED THIS - Looking at COWARS DATA; see LARGE VARIATIONS IN THE EC. FLOW. THIS IS NOT (UP TO 30%). THIS IS NOT ACCOMPANIED BY CORRESPONDING CHANGES IN P-EC (PRESSURE) AS WOULD BE EXPECTED. IS THE DELAY CHANGING?

ALSO NOTE - LATENT HEAT FLUX FROM K₂ H₂O IS ALMOST ALWAYS LARGER THAN FROM THE TRGA ⇒ IS THERE A DELAY PROBLEM IN THE TRGA?

DIFFICULTIES - NOT MUCH FLUX - NONE AT ALL FOR CO₂!!
 NONE FOR H₂O AT NIGHT WHICH IS WHEN MOST OF THE FLUX PERTURBATIONS OCCUR.

⇒ FROM ABOVE - ONLY MAJOR CHANGE IN DELAY IS ON DEC 9TH. DON'T KNOW WHY? BUT THIS TIME PERIOD IS WHEN LIGGGZ REALLY MISSES THE LE FLUX!!

4/6/99

FROM DOING TESTS W/ CALIBRACES, I REALIZED THAT
NOW I HAVE BEEN APPLYING LOGS IS INCORRECT!!

→ HAVE NOW CHANGED THE CODE ^{FLUXES} SO THAT
THE LOGS ARE NOW APPLIED PROPERLY!!

NEW FLUX DATA NEEDS TO BE RECALCULATED!!

7/19/98 - TRIED RE-CALIBRATING AT/ SONIC

BUT - SONIC DIED INSTEAD

Ⓢ PUT ON NEW ϕ AIR (~12:00 PM)

ϕ AIR HAD RUN OUT OVER WEEK-END - DATA MAY
BE BAD

4/20/99 - FROM 11:50 → 1:00 H₂O CO₂ INLET
DOWN & TRIED MEASURING DELAY AS A
FUNCTION OF FLOW RATE

FEED SOLENOID VALVE SIGNAL INTO
23₂, FAN DATA, CHANNEL #8 (Re-inflow)
3, INITIAL ON/OFF'S AS A TEST

Flow	Time	# of on/off's	ϕ (V)	Ⓢ PROBLEM
8.19	58.13	2	~ -700	w/ CO ₂ pulses
7.28	52.08	5	-451	from my
6.57	54.9	5	-267	BREATHER!!
5.62	57.99	5	-64	
4.62	60.78	5	132	
3.39	64.09	5	337	
7.89	49.29	5	-638	

USING SCOTT TANK C
345.4 ppm

4/27/99
New CO₂ STD. - from US.W #1

#1	<u>RUN</u>	<u>ZERO</u>	<u>SPAN</u>	<u>SAMPLE</u>
	<u>0</u>	0.00		
1	0.08	0.08	345.5	506.6
2	0.02	0.02	345.45	505.45
3	0.15	0.15	345.44	505.9
4	0.01	0.01	345.34	505.26
5	0.08	0.08	345.4	505.64
6	0.06	0.06	345.48	505.88
7				

505.9 ± 0.8 ppm
(202)

PUT NEW CO₂ STD CN - OLD ONE
WAS EMPTY

— MANUAL CALIBRATION OF EC SYSTEM

- PROFILER - FLOW METER PORTION OF CONTROLLER
SEEMS HOSID - BUT PRESSURE IS CONSTANT
⑤ IT IS CONTROLLING FLOW
⑥ FROM PUMP → MFC, H₂O IS CONDENSING
IN HIGH PRESSURE REGION!!

MANUAL CALIBRATION

$$T = 15.80^{\circ}\text{C}$$

$$P = 680 \text{ mV} \Rightarrow 69.38 \text{ kPa}$$

$$C_0 = 505.9 \text{ ppm}$$

$$\frac{C_0 T_0}{T} = 540.9 \text{ ppm}$$

$$V \frac{P_0}{P} = 2603.8$$

ZERO = 0.016 = 0.000

P = 685 → 69.38 kPa

V_{std} = 1785.3 mV

READ

- NO FLOW CONTROLLER IS LOOKING DEAD
- RE: A RESTRICTION VALUE CN - CHECK EACH LINE SEPARATELY

	<u>P (MM)</u>
L1	602
L2	594
L3	598
L4	596/7
L5	613
L6	601

THESE LOOK OK - NOW TRY TO 0 & SPAN !!

ZERO:

$$\text{SET } 0 \Rightarrow 0.000$$

$$\frac{P}{P} = 18.67^\circ$$

$$\frac{P}{SP} = 605$$

$$535.6 \Rightarrow$$

$$\frac{V P_0}{P} = 2585.5$$

$$V_{\text{CALC}} = 1741.5$$

$$V_{\text{MEAS}} = 1780$$

MOVE IT BACK

$$\frac{535}{10} = 1742$$

PROCESS OPERATIONAL AT ~~14:30~~ 14:30

5/3/99 \Rightarrow QUACKER DOWN ON 4/30 \rightarrow 20:00
(POWER OUTAGE)

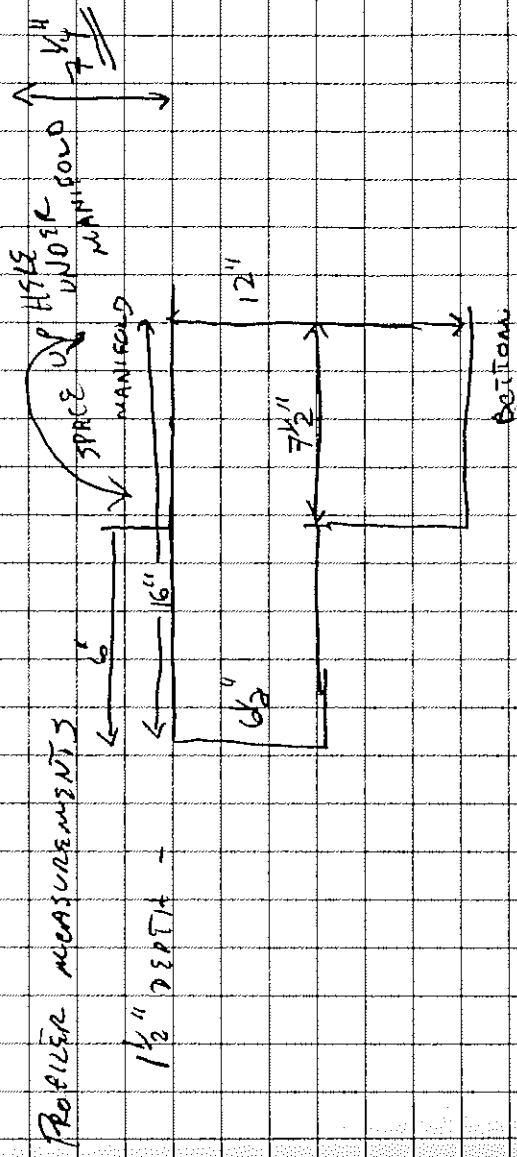
BACK ON AT 22:30,

ALSO \Rightarrow K- HYDROMETER BACK UP & RUNNING !!

VOLTAGE IS VERY HIGH !!

\rightarrow NO VENTILATOR RUNNING ON REBS @ 7.1

5/7/99 New ZERO TANK
 COSING UHP N_2 - 1000 psi
 ~ 11:45



5/11/99

MANUAL ϕ & SPAN OF EC SYSTEM
 1:03 PM - 1:08 PM

ZERO \Rightarrow OCE BY 4:40 PM

SPAN \Rightarrow OCE BY 2:00 PM

(TANK WAS READING 3810 PM AT START
 371 AFTER)

ϕ & SPAN THE PROFILER

MANUAL
 SPAN SWITCH
 WAS ON

563 mV
 $\phi = P(1)$

$\phi = -0.003$ (OK)

SPAN = $P = 553$ 67.434

$P/P_0 = 0.66569$

$T = 13.38$
 $T/T_0 = 0.92743$
 $C(T_0) = 545.49$

$V/P = 26.195$

$V_{ECC} = 1743.8$

$V_{meas} = 1741$
 SET TO 1743

DONE: 1:18

DOESNT
 MATTER
 CANNOT
 SWITCH
 15 MIN
 "AUTO"

AT 2:15 ATI SONIC ~~AT~~ REMAINING AT 21m (NEXT TO THE CAMPBELL)

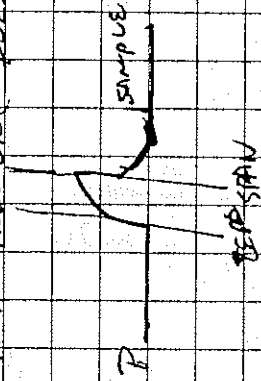
5/16 - First - GFC AT 11:45 AM
 BACK ON AT 3:10 PM, 2ND RUNNIN' AT
 SAME HEIGHT!!
 → DL; CHANNEL 2

5/16/89 - Looking At O_2 FLOW DATA + CO_2 MIXING RATIO
 IT APPEARS SOMETHING IS WRONG JUST AFTER THE CALIBRATION
 OCCURS. SIGNAL DROPS ABOUT 2-3 ppm THEN RECOVERS
 ABOUT 10 MINUTES LATER!!
 IS THERE A LEAK THRU THE VALVES??

I DON'T THINK IT'S A PROGRAMMING OR PROBLEM (CHANGING
 CAL - COEFFICIENTS)

↳ THESE DON'T CHANGE SLOWLY

ALSO - PRESSURE DOESN'T STABILIZE WHEN DRAINING ZERO SPAN



Run #1 ⇒ Run 22m → 096333
 Run #2 ⇒ Run 2 ⇒ 0

5/25/99 MARR ATU SERVICE 18.5 m (12:30pm)
CLEAN K+ H2O2 WATER OPTICS

5/26/99 CNR-1 RUNNING (4:00pm)
CHANGED VALVE 11 EC SYSTEM (MOVED CLOSE TO 3-WAY
SAMPLE/CALIBRATE VALVE)

* ALSO NEW "LIGRECS" \Rightarrow OUTPUT STATUS DIRECTLY

5/27/99 - CHANGED PREP. CONFG & CHANNEL CONFIG
TO LOOK FOR EXTRA DATA CHANNEL coming from
"LIGHT.CS"

6-7/98 BACK from VACATION

\rightarrow PUT ON NEW VAP N₂ ON REC CELLS
(DURING LAST WEEK TOO PUT ON THE EMERGENCY
N₂ CYLINDER)

NEW CO₂ STD

RUN	READ
1	0.05
2	0.02
3	0.04
4	0.10
5	0.03
6	-0.07
7	0.00

SPAN
345.46
345.49
345.32
345.30
345.5
345.5
345.5

SCOT TANK C
345.4 ppm

TANK
~~345.4~~ 350.28
350.58
350.21
351.21
351.03
351.26
350.7 / 351.6

NEW BAL TANK - 2:30

MAN CAL. OF EC SYSTEM

PREPARED OFF AT 2:45 PM

350.95 ppm
 \pm 0.44 (1 σ)

AUG - GROUNDING BOXES + TOWER UP TO LEVEL W/ CAMPBELL
SONIC.

NEED A PAINT SCRAPER !!

6/9/99

FINISHED GROUNDING BOXES ALONG TOWER

REPLACING PROXIER IRGA W/ HCAR 6202

FIRST - $P_{cell} = 648 \text{ mV} - 650$

SHUT OFF AT 11:15

(X) NO PRESSURE SENSOR

(B) CHANGE MKS SENSOR FROM EC TO PROXIER
(T) P. PROF = H2O. PROF

(H2O CHANNEL IS NOW WHERE
PRESSURE USED TO BE)

CO₂ COEFFICIENTS

$$T_0 = 35.79$$

$$K = 19312$$

$$A = 0.1525$$

$$B = 1.0285 \times 10^{-5}$$

$$C = 6.9009 \times 10^{-9}$$

$$D = -9.8797 \times 10^{-13}$$

$$E = 6.4768 \times 10^{-17}$$

H2O COEFF

$$T_0 = 41.21$$

$$K = 16479$$

$$A = 0.006481$$

$$B = 3.0842 \times 10^{-6}$$

$$C = -1.264 \times 10^{-11}$$

6/11/99

DID SOME REPLUMBING ON PROFLER

- (1) PLUGGED PUMP INTO DIFFERENT CIRCUIT (at BOTTOM OF TOWER)
- (2) PUT NEEDLE VALVE BETWEEN THE IRGA & THE PUMP (IT WAS DOWNSTREAM OF THE PUMP)
- (3) SET THE FLOWS

SAMPLE FLOW = 150 ml/min

TOTAL FLOW = SAMPLE + PROC. REC + EC REC = ~~3~~ 310 ml/min

WILL WATCH - CIRCUIT BREAKER HAS BEEN POPPING ALST DID (1) & (2) TO TRY & RELIEVE STRESS ON THE PUMP & ALSO SO IRGAS ARE ON SEPARATE CIRCUIT FROM THE PROFLER PUMP.

⇒ MOVED SONIC FROM 18.5 METERS TO 14.5 METERS
(PROBABLY AS LOW AS IT WILL GO)

EVERYTHING RUNNING AGAIN AT 11:00 AM

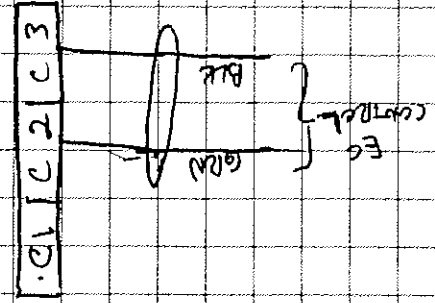
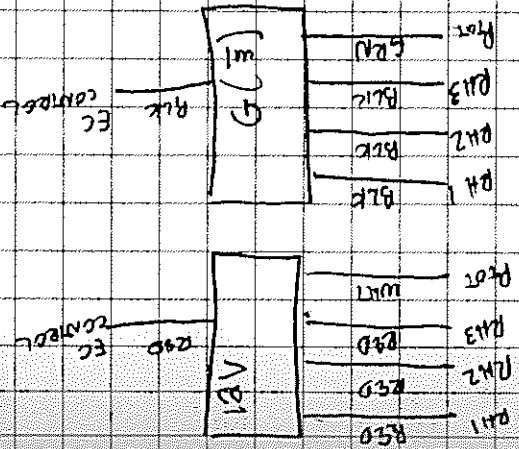
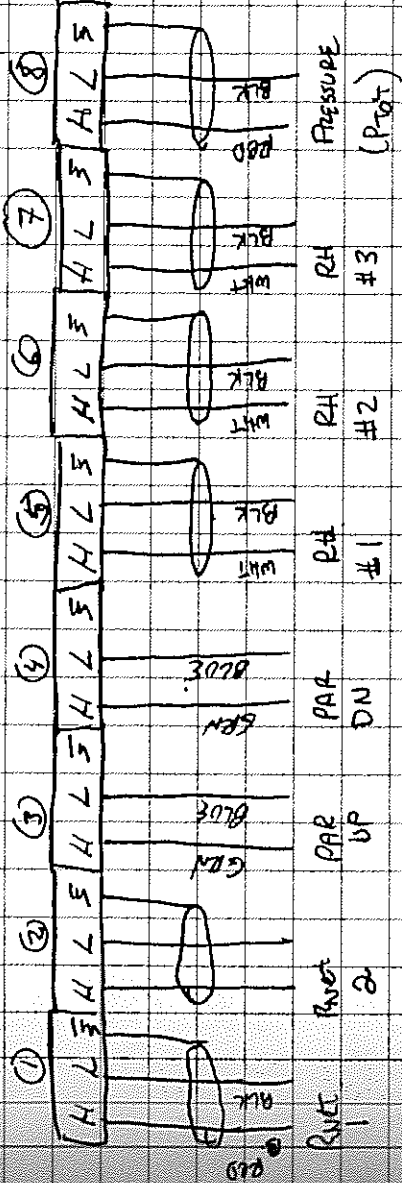
6/15/99 CHANGED DESSICANT ON PROFLER
CHECKING TENSION ON GUYS.

	NE	SE	SW	NW
1	600 (OK)	580 (600)	550 (600)	600 (OK)
2	600 ✓	600 (OK)	540 (600)	600 ✓
3	600 ✓	525 (600)	500 (600)	600 ✓
4	600 ✓	450 (600)	530 (600)	600 ✓

6/16/99 New LIGHT4.CSI

WIRING DIAGRAM

DISCONNECT
25105



6/21/99 - MOVED NET RN TO OTHER SIDE OF TOWER

(IS OVER SENSITIVE - COULD BE A PROBLEM?)

REWIRED LIGHT 21x -> ALSO CHANGED DEEP.COUNT.C

ACCORDING - CHANNELS ~~WAS~~ ARE

WIRED AS ABOVE.

STATUS. EC IS NOW OUTPUT DIRECTLY - NOT MEASURED

AS A DRE CHANNEL

PROGRAM NAME = LIGHT2.CSI

UNPLUGGED AUTOCALIBRATIONS.!!
ON EC SYSTEM

6/22/99

(7)

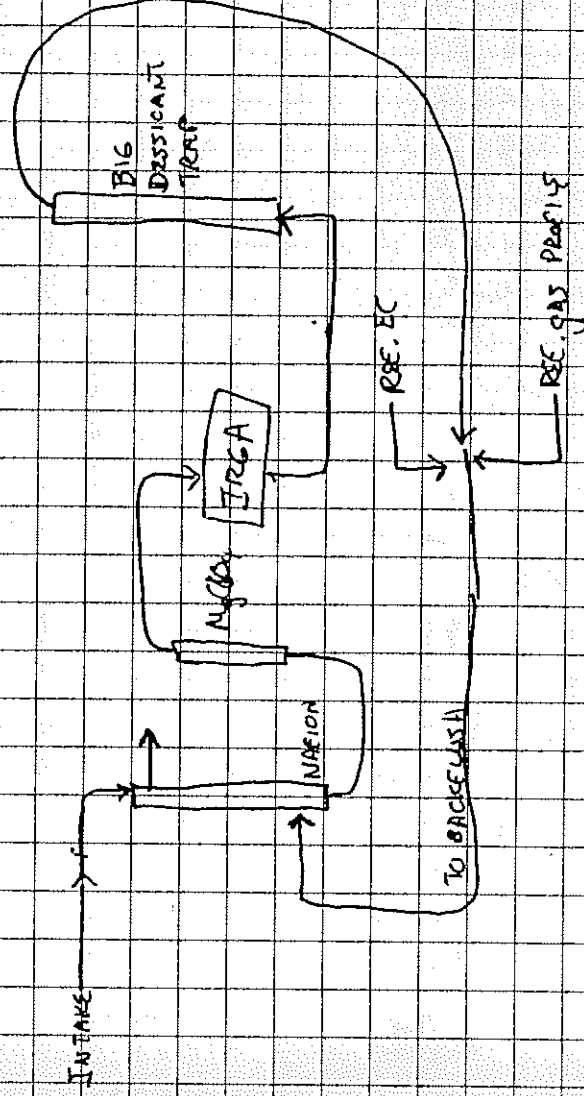
UPDATES PROF23X TO OUTPUT STATUS DIRECTLY & NOT
USE A DIFF. CHANNEL

6/23/99

- (1) 3:00 PM - MOVED AT1 SENS TO 16m
- (2) MOVED 18m RH/T SENS TO 21.5m (NEAR TO SONIC)

(*) GOT EXACT
HEIGHT

- 6/24/99
- (1) GOT PAR SENSORS RUNNING; NOT REALLY RUNNING UNTIL ~3:45PM
 - (2) Repumper Repair;



(*) NOTE ON PAR SENSORS

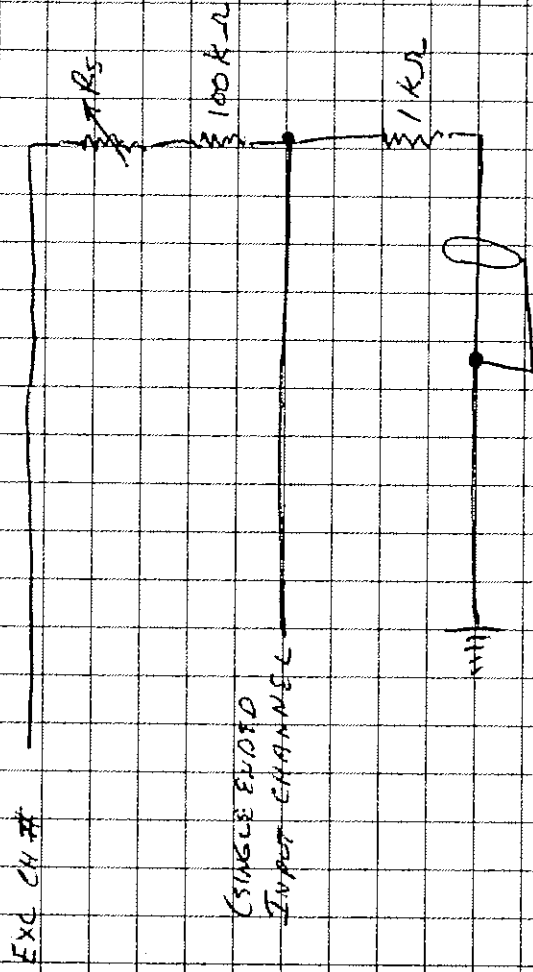
WRITE DOWN CALIBRATIONS - WHICH ONE IS UP/DOWN

(*) STARTED EC AUTO CALIBRATIONS AGAIN

6/24/99 at ~ 8:00

928512000

6/28/89: TO HOOK UP LEAF WEENESS SENSOR?



6/29/89

- HOOKED UP O₃ (TEND) RUNNING ON PREPARED CHANNEL ALSO
(AT 9:50 ON 6/30 → CHANGED PREP. CONFIG & CHANGED CONFIG
TO REFLECT O₃ MEASUREMENT)
- ALSO SWITCHED OUT 6868 IN PREPARED NOW BACK
TO OUR 6251 (IIGA #388, I THINK). IT IS THE
SAME ONE AS BEFORE
- ALSO DUG UP HEAT FLUX PLATES & REBURIED NEAR
CANOPY ACCESS TOWERS (JENNIFER - SEE NEXT PAGE!)
- (*) SWITCH OUT GAIR, DO I HAVE A LEAK - SHOULD NOT HAVE
RUN OUT SO QUICKLY

HEAT FLOW PLACES

Serial #	CF Top	Runs	Direction	TDR#
H973073	46.9	1	<u>SOUTH</u>	<u>56</u>
H973074	44.7	2		
H973076	45.7	3	<u>EAST</u>	42
H963432	40.6	4		
H963436	40.3	5	<u>North</u>	48
H973078	45.3	6		
H963430	44.6	7	<u>North West</u>	47
H973075	59.3 (?)	8		
H973079	46.4	9	<u>West</u>	43
H973077	46.1	10		
STP96020		11	<u>SOUTH</u>	
STP96018		12	<u>EAST</u>	
STP96019		13	<u>North</u>	
STP96052		14	<u>NW</u>	
		15	<u>West</u>	
			IN CLEARINGS	

TROPIC FLOWS

SAMPLE FLOW = 150 ml/min

PRESSURE REG = 108 ml/min

EC REG = 65 ml/min

COULD NOT FIND ANY LEAKS IN PERIMETER OF EC SYSTEM - KEEP AN EYE ON TANK PRESSURE

LOOK FOR FLOW
DRAIN PROBLEM
1 IN
APR 25 1974
APR 26 1974
APR 27 1974
APR 28 1974
APR 29 1974
APR 30 1974
MAY 1 1974
MAY 2 1974
MAY 3 1974
MAY 4 1974
MAY 5 1974
MAY 6 1974
MAY 7 1974
MAY 8 1974
MAY 9 1974
MAY 10 1974
MAY 11 1974
MAY 12 1974
MAY 13 1974
MAY 14 1974
MAY 15 1974
MAY 16 1974
MAY 17 1974
MAY 18 1974
MAY 19 1974
MAY 20 1974
MAY 21 1974
MAY 22 1974
MAY 23 1974
MAY 24 1974
MAY 25 1974
MAY 26 1974
MAY 27 1974
MAY 28 1974
MAY 29 1974
MAY 30 1974
MAY 31 1974
JUN 1 1974
JUN 2 1974
JUN 3 1974
JUN 4 1974
JUN 5 1974
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JUL 1 1974
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JUL 18 1974
JUL 19 1974
JUL 20 1974
JUL 21 1974
JUL 22 1974
JUL 23 1974
JUL 24 1974
JUL 25 1974
JUL 26 1974
JUL 27 1974
JUL 28 1974
JUL 29 1974
JUL 30 1974
JUL 31 1974
AUG 1 1974
AUG 2 1974
AUG 3 1974
AUG 4 1974
AUG 5 1974
AUG 6 1974
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AUG 8 1974
AUG 9 1974
AUG 10 1974
AUG 11 1974
AUG 12 1974
AUG 13 1974
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AUG 15 1974
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AUG 17 1974
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AUG 19 1974
AUG 20 1974
AUG 21 1974
AUG 22 1974
AUG 23 1974
AUG 24 1974
AUG 25 1974
AUG 26 1974
AUG 27 1974
AUG 28 1974
AUG 29 1974
AUG 30 1974
AUG 31 1974
SEP 1 1974
SEP 2 1974
SEP 3 1974
SEP 4 1974
SEP 5 1974
SEP 6 1974
SEP 7 1974
SEP 8 1974
SEP 9 1974
SEP 10 1974
SEP 11 1974
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DEC 20 1974
DEC 21 1974
DEC 22 1974
DEC 23 1974
DEC 24 1974
DEC 25 1974
DEC 26 1974
DEC 27 1974
DEC 28 1974
DEC 29 1974
DEC 30 1974
DEC 31 1974

6/30/99

New PO_2 STD.

SCOTT TANK 345.4 ppm

RUN	Δ
1	-0.016
2	0.100
3	0.03
4	-0.130
5	-0.025
6	-0.05

SPAN
345.5 ppm
345.4 ppm
345.4
345.3
345.3
345.5

SAMPLE
359.95
360.37
360.24
360.17
360.33
360.3

$$360.2 \pm 0.15 (1\sigma)$$

PUT ON AT ~ 12:00 PM

MANUAL CAL. OF ~~PROCESS~~ SYSTEM // 12:15

$$\text{SAMPLE } P = 0.627 \text{ V} \Rightarrow 68.569 \text{ kPa}$$

$$\text{SET SPAN PRESSURE} \Rightarrow 0.627$$

$$C_{\text{CAL}} = 360.2 \text{ ppm}$$

$$T = 31.26^\circ\text{C}$$

$$T/T_0 = 0.98511$$

$$C \frac{T_0}{T} = 365.64$$

$$V \frac{P_0}{P} = 1949$$

$$V_{\text{CALC}} = 1319 \text{ mL}$$

$$V_{\text{SPAN}} \Rightarrow 0.0035 \Rightarrow \text{SET TO } 0.001$$

$$V_{\text{SPAN}} \Rightarrow 1318 \Rightarrow \text{OK} \checkmark$$

BACK ON-LINE AT 12:25 PM

PIC UP LEAF WETNESS SENSOR ON LEVEL 8

hooked to PROBEUSER DATA LOGGTR, USING A SINGLE ENDED CHANNEL

NEW PROGRAM IN PROBEUSER - CALLED PROB23K8.CS

MEASURES: 5 ANALOG DIFF. VOLTAGES

LEAF WETNESS SENSOR

3 TEMP. (PETS, VARIOLA)

7/2/99

EL 6262 SCREWED UP AROUND 12:00 Noon
VOLTAGES ALL DROPPED BY ~ 200mV or more

- WHEN I GOT OUT TO TOWER - VOLTAGES WERE OK BUT
KEYPAD WAS LOCKED. (LOOKED LIKE STARTUP SCREEN!)

CYCLE POWER OFF/ON - GAVE NOTHING BUT ZEROS
(VOLTAGES LOCKED OK - BUT KEYPAD WAS
LOCKED!)

REPLACED UP 6251 => IREGA #308

(*) NOTE - STILL BAD ON CT HOME LATER THAT NIGHT!

7/6/99 (AFTER LONG WEEK-END)

Now hook up IREGA IN OFFICE & EVERYTHING SEEMS
FINE

(22112?)

DON'T UNDERSTAND WHY!!

7/7/89 ① DOWNLOADED CNR DATA

— PROGRAM ERROR — NO DATES OR TIMES ??

② TRIED HOOKING UP TO THE DUCK

③ TOOK DOWN ROV #2
MOVED ROV #1 ~~TO~~ TO THE LEVEL OF
THE SONIC.④ CHANGED SCALE ON O₂ SENSOR
FULL SCALE = 400 ppmCO₂ ~~ROV~~ ROV 0.15 9
BLK SIG. GND 8TEMP ~~ROV~~ TEMP 50 13
BLK SIG. GND 14PRESS. ~~ROV~~ AUX 15
BLK SIG. GND 14H₂O ~~ROV~~ H₂O 0.15 11
BLK SIG. GND 8

① SWITCH BACK TO 6262 (IRGA #638) =>

OK! ~ 2:30 - ON ~ 3:15

② CHANGED O₂ SENSOR RANGE

0-500 ppm => 0-10 V

③ STARTED LOGGING DATA FROM 2ND BLANKETS DATA LOGGER !!
(~ 2:30 PM) (~ 3:00 PM)④ MOVED RP TWO CO₂ INLET LINES TO

#5 => 12 METERS

#6 => 21.5 METERS (~ 3:00 PM)

7/9/99

PAP CAL #5

UP: MULTI: -178.3
 FCOFF = 0.0036
 SERIAL # 023139 \Rightarrow CAL CONSTANT = 5.61
 DNT: MULTI: -177.0
 FCOFF = 0.0036
 SERIAL # 022793 \Rightarrow CAL CONSTANT = 5.65

UNITS
mmol 5^{-1} m^{-2} MANUAL CAL. OF PROVIDED

TEMP OFF:

P_{SPAN} = 711 uVC_{SPAN} = 360.2

T = 24.8°C

T_{T0} = 0.9644
$$C \frac{T_0}{T} = 373.5 \text{ ppm}$$

$$\rightarrow V \frac{T_0}{P} = 1981 \text{ (1980.8)}$$

ZERO: OK

SPAN P = 713 uV 69.887 kPa

P/P₀ = 0.6889
$$V_{CALC} = 1367$$

[VASAKA TEMP PRT = CALIBRATION = EACH PUT ICE/WATER

R_S-R₀₁ = 1.0007 \Rightarrow MULTI = R_S-R₀₁R_S-R₀₂ = ~~1.0003~~ 1.0013 \Rightarrow " "R_S-R₀₃ = ~~1.0003~~ 1.0033 \Rightarrow " "

Russ Morrison

M-CARD

5405 - 0138 - 0502 - 1717

SXP 11/00

ON FOREST DATA LOGGERSTOWER B (246)

1-74 → Root Tc
 5-77 → SARPWOOD
 8-710 → HEARTWOOD

TOWER A (3110)

1-75 → Root
 6-710 → SARPWOOD
 11-715 → HEARTWOOD

HEAT FLUX DATA

HFT 1-710
 RTD 1-75
 STD-HFT 1-710

wires

CD2 Red 1
 Black 2
 Temp R 7
 B 8
 R P 13
 B per 14

upper left - black from white powder
 lower left - clear from IT
 lower right - clear black cross
 upper right - clear to small

7/20 → THUNDERSTORM KNOCKED 6262 (EC SYSTEM) ON PREVIOUS DAY.

AFTERNOON - SWITCHED OUT THE 6262 FOR IRGA 368, 6251 (PROBILER IRGA)

AS ALSO - AT ABOUT 4:30 - FIGURED OUT WHY TRAIN GAGE WASN'T WORKING - SCREWED UP WHEN I CHANGED PREP. CONFIG, CHANNEL-CONFIG. → CORRECTED THIS & IT SEEMS TO BE WORKING.

7/21 WILL NEED TO SEND 6262 TO LICEE WITH PUT IN 6251, IRGA 308 IN PROBILER FOR THE TIME BEING.

(TALK TO PETER ABOUT USING 6262 w/ P-SENSOR IN IT.)

7/22/97 PUTTING IRGA #308 IN PROBILER

BACKFLUSH FLOWS - FROM EC SYSTEM = 56 ml/min
FROM PROB. RES. = 1030 ml/min
SAMPLE FLOW = 149 ml/min

HOOKED UP F_{TOT} = 245 ml/min (FOR CON.)
TURNED UP SAMPLE FLOW TIL F_{TOT} = 285

THEN PROB. RES. FLOW TIL F_{TOT} = 304 ml/min

TURNED ON AT 11:38 AM

ⓧ MANUAL ZERO / SPAN OF EC SYSTEM?

SAMPLING:

$$T = 28.18^{\circ}\text{C}$$

$$P = -700 \text{ mV} \Rightarrow 48.226$$

ZERO IS OK

-792

$$\Rightarrow 46.693$$

$$C_{O_2} = 360.2 \text{ ppm}$$

$$T_{10} = 0.97534$$

$$C_{T_0} = 369.31$$

$$1960 + 4.1 \Rightarrow 1964$$

$$V_{\text{calc}} = \frac{P_{O_2}}{P} = 1964$$

$$U_{\text{calc}} = 935 \text{ mV}$$

$$U_{\text{calc}} = 905$$

$$P = -775 \quad 47.076$$

$$U_{\text{calc}} = 913 \text{ mV}$$

BACK ON AT 12:30 PM

ⓧ MANUAL ϕ A SPAN OF ANALYZER

$$T = 27.32$$

$$P_{\text{HAPPE}} = 688 \text{ mV} \Rightarrow$$

$$C = 360.2 \text{ ppm}$$

$$C_{T_0} = 369.47$$

ZERO = 0.063 (WHAT IT WAS IN THE LAB...)

$$2020 + 5.3 = 2025 \text{ mV}$$

$$P_{\text{SPAN}} = 696 \text{ mV} \Rightarrow 69.47$$

$$P/P_{O_2} = 0.68578$$

$$U_{\text{calc}} = 1389 \text{ mV} \quad (\text{READS } 1448)$$

$$1389 + 60 = 1451$$

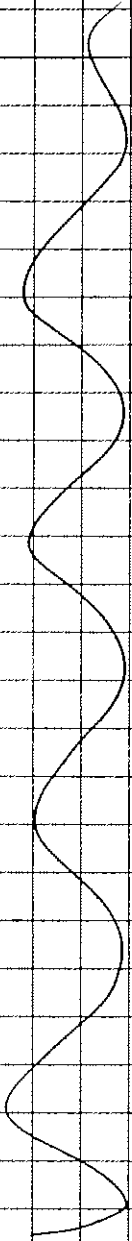
SET TO 1451

ON AGAIN AT 1240

(*) ALSO MOVED 4m PROBE INLET TO OTHER
SIDE OF TOWER. IT WAS TOO CLOSE TO SOME
TREE BRANCHES - BELIEVE I AM GETTING TOO HIGH
CO₂ VALUES. BECAUSE OF THIS.

7/28/99 -

MOVED RESS Q^{7.1} TO TOP; IS RUNNING AS WELL!!



8/1/99

NEW CAL TANK

C_{span} = 345.4 ppm

RUN	DEMO	SPAN	SAMPLE
1	.331 ANALOG	345.48	337.76
2	.372	345.45	337.76
3	.396	345.37	337.80
4	.392	345.37	337.40 337.40 337.50
5	.400 .420	345.50	337.80
6	.320	345.44	337.80
7	.392	346.22	337.82
8	.392		

#5 - 6094/YELLOW - CG UP (LW) LW.1
#6 - 8041/GAN - CG DOWN (LW) LW.2

Heater

HEATER UP NR LITE NET RADIOMETER - POINTING SE
ON SECOND HIGHEST LEVEL (COULD GET SHADOWED BY
OTHERS LATE IN DAY!!)

8/3/99 - New ϕ AIR

(*) Rk AT 2m was not working yesterday
 \rightarrow looks like it got H_2O inside the
 connector. Dried it out - put new RTV
 on it & it seems to be working now.

(*) CHANGED NO_2 IN profiler.

(*) CLEANED K_2 HYDROMETER.

8/10/99 \Rightarrow RAN OUT OF ϕ AIR SINCE YESTERDAY

(*) SWITCHED BACK TO IRGA 638 (6262)
 IN EC SYSTEM
 NOTE = NEW CALIBRATION!!

ON \sim 11:00 AM

ALSO - Jen's CO_2 STD. CALIBRATION IS WRONG!!
MUST REDO!!

New ϕ AIR \Rightarrow profiler flow was too high (TURNED DOWN)
 (*) need to RECYCLE FLOW ON profiler IRGA

(*) AUTOCALIBRATIONS HAVEN'T BEEN WORKING SINCE
 8/6/99 (AT LEAST)

MANAGE SINCE 8/3/99

DECARBATING

TUNNELER'S TANK

SCOTIA
CON = 345.4 ppm

K		SPAN	SAMPLE
1	0.334	345.73	359.73 360.16
2	0.285	345.37	359.50
3	0.088	345.48	359.56
4	0.015	345.46	359.70
5	-0.032	345.30	359.68
6	0.065	345.38	359.75

359.7 ppm
± 0.23 ppm (1σ)

- AUTOCAL RUNNING AT 12:10 PM W/ OLD TANK (360.2 ppm)
- PUT NEW TANK ON AT ~4:15 PM
- TURNED ON PROFILER & TECO

(*) I KNOW WHY AIR WAS TOO HIGH IN PROFILER
FITTING ON EC SYSTEM WAS TAPPED OFF → NO FLOW (N₂)
FROM THIS SYSTEM + IT GAVE AN OUTLET OTHER THAN
THE ~~MAIN~~ JUNE/KOMANETER; DRYER APPARENTLY HADN'T
BEEN WORKING TOO WELL!!

8/12/99

AUTO CALIBRATIONS STILL SCREWED UP -
NOT ENOUGH PRESSURE ON REGULATOR
W/ NEW TANK

PROFILER HAS BEEN OFF FOR ~24 HRS - SWITCHED
+ PUT IRGA #388 BACK INTO PROFILER
RUNNING AGAIN AT ~10:00 AM

SA - CHANGED MOLSIEVE ON PROFILER (OFF-LINE - 10:22)
 " " FILTER ON PROFILER

- MANUAL ϕ & SPAN
 $P_{\text{span}} = 710 \text{ mV}$

$C_{\text{span}} = 359.7 \text{ ppm}$
 $T = 27.1^\circ\text{C}$
 $T_{\text{FA}} = 0.97799$
 $C_{\text{FA}} = 367.167$
 $P_{\text{FA}} = 1955$

PROFILER UNISTEUT -

13' : 62" LONG
 NEED 50" LONG

RAN GAUGE
 TS : 308"

PROF DATA LOGGER
 TS : 54"
 NEEDS : 40"

$T = 27.1$
 $T_{\text{FA}} = 0.9778$

~~TEST FOR PROFILES~~

MANUAL ϕ & SPAN OF PROFILER

$T = 24.6^\circ\text{C}$

$T_{\text{FA}} = 0.96375$

$C_{\text{FA}} = 3732$

$T_{\text{FAO}} = 0.004$

$C_{\text{SET}} = 0.001$

$V \frac{P_0}{P} = 1980$

$P_0 = 101.3$

$P = 770 \text{ mV}$ 69995 kPa

$V_{\text{CALC}} = 1388$

$V_{\text{meas}} = 1326$

$V_{\text{SET}} = 1367$

H:14 - BACK CN-LINE

11:33 - CHANGED FILTER ON EC SYSTEM / SWITCHED OUT THERM TUBING
 FOR DEKADON (NO CHANGE IN FLOW RATE)

12:00 CHANGED PREP-COMING + OVAL-COMING
 FOR LAST O₃ SENSORS!

IN CHANNEL	CAMPBELL COOL RUNNING		WHAT IT SHOULD BE	
	CAL #	SERIAL	CAL #	SERIAL
1	46.3	4963431	46.9	973073
2	45.3	923078	44.7	" 074
3	44.6	963430	45.7	" 076
4	59.3	973075	46.6	963432
5	46.4	973079	46.3	" 431
6	46.1	973077	45.3	973078
7	45.7	973076	44.6	963430
8	46.6	963432	59.03	973075
9	46.9	973073	46.4	" 079
10	44.7	973073	46.1	" 072

~2:30 TOOK DOWN REBS #2
 (LET STICK UP)

8/22 Working on O₃ today! OFFLINE from 11:15AM - 4:00 PM

FAST HOOKED UP AT TECO - CHECKING OUR INLET TUBING

- I) STRAIGHT INTO TECO
- II) THRU 1/2 OF OUR INLET
- III) THRU ALL OF OUR TUBING
 (+ 55 UNION)
- IV) BACK DIRECTLY TO TECO
- V) THRU NUPRO FILTER

137-141 ppb (Fence ~5500/24)
 OK 136-141
 134-138 ppb OK

135-137
 118-123 ppb
 ~655 ~ 20 ppb IN
 FILTER

I WAS PREPARING TO TEST OTHER PUMPS - BUT
H₂ AND POWER SUPPLY BURNED OUT.

CRASO MEE - LAST THURS. IN RAIN - CIRCUIT BREAKER
AT THE TOP BLEW - I THINK THAT THE FAST G
PUMP MUST HAVE SUCKED IN SOME H₂O - CAUSED
THE PUMP TO HAVE A BIG CURRENT SURGE.

* THIS MAY BE WHAT'S HAPPENING ON THE BOTTOM BREAKER!

AT ~4:00PM - SWITCHED CO₂ INLET FILTER UP AT THE FANIC

8/25/99

READ REMAINS ON SECLOD

- ONLY USING FAST 1.03 (DISCONNECTED PUMP TO OTHER)
- ALSO PUT A SMALL (MAYBE TOO SMALL) OF A BALLAST
BETWEEN SECLOD & PUMP

CALCULATING NEW CO₂ STD. (NOT NEGOTIATED YET)

RUN	D	SPAN	SAMPLE
1	0.080	345.6	345.4 360.95
2	0.04	345.4	360.56
3	-0.16	345.4	360.48
4	0.01	345.48	360.45
5	0.02	345.37	360.39
6	-0.07	345.5	360.67
7	-0.04	345.6	360.60
			<hr/>
			360-610.2 ppm

CO₂ STD
360.95

8/30/99

TOP OUTLETS

1	2
3	4

5	6
7	8

1	2
3	4

- (1) VAS RHT FAN
- (2) NIC
- (3) NIC
- (4) BLANKEN 23x
- (5) NIC
- (6) Horn/ROCK
- (7) (3) CASSER
- (8) DC POWER SUPPLY

- (1) (?)
- (2) FAST 23x
- (3) (?)
- (4) - JONIC BOX (NCR)

TOP LEVEL 23x

- (1) H RED
- (2) L BLUE
- (3) H WHT
- (4) L BLK
- (5) H BLUE
- (6) L GRN - GRN 1/3
- (7) H YELLOW
- (8) L GRN
- (9) H GRAY
- (10) L YELLOW
- (11) H BRN
- (12) L GRN

DIFF. CABLE

12V - RED
- BLK

(7) L GRN
L BLK
F

WHT
JPD

(8) H WHT
L BLK
F

WHT
D.R.

(9) H - WHT
L - GRN
F

NR
L.T.E

RED - Exc. 1
RED

- (1) SWITCHED OUT BLANKING O₂ for BAWLING O₂
 AT TOP OF TOWER - EVERYTHING SEEMS TO BE WORKING OK
 RELEASED RADIOMETER

- (2) CNA-1
 (2) Q*Z,1 => THIS WAS OK
 (3) PAR SENSORS
 (4) NP-LITE => ALSO MOVED - POINTED TOWARD
 SOUTH / LEVEL BEACON
 CNA-1, Q*Z,1

8/31 LAURA MOVED OUR 1m CO₂ INLET TO 11cm (0.11m)
 (ALSO MOVED IT OUT INTO THE WOODS.)

RA

9/3/99 Start of ANGELUX INTERCOMPARISON w/ BOB EVANS

VASAILA RH/T connector

- | | |
|---|---------|
| 1 | RED (2) |
| 2 | BLK (2) |
| 3 | WHS (2) |
| 4 | RED (1) |
| 5 | WHT (1) |
| 6 | BLK (1) |
| 7 | BLK (1) |
| 8 | SHIELD |
| 9 | |

- (*) TURNED OFF FAST O₂ pump
 (*) NOTED - my SPAN GAS HAD GOTTEN ~ 200 psi, 2 POSSIBILITIES
 (1) LEAK IN MY NEW VALVE I PUT IN-LINE
 (2) LAURA TURNED UP SPAN GAS FLOW
 For (1) => TOOK OUT VALVE
 (2) => TURNED DOWN GAS - RESET THE PRESSURE.

(*) TURNED OFF RHT SENSOR AT (NOTE
THAT GETTING H_2O IN THE CONNECTOR)

9/4 → DATA RUNNING FINE AT 7:00 AM

9/5

11:00-11:15 120550 AROUND 127 EC MANUAL
CALIBRATION / SERVED UP AT FIRST.
THEN MANUALLY CALIBRATED

11:15-11:20 SWITCHED DESSICANT ON PRECISER.

12:15 - RHT AT 2m RUNNING AGAIN

1:25 O₂ OFF-LINE

1:44 MANUAL CAL OF EC SYSTEM w/ SCOTT MARIN
STANDARD!!

AT 20FT 11:00 AM 1:45 NOTICED
1305 = 6262 - 360-382 ppm } 3-4 ppm
OUR 6262 - 356-359 ppm } DIFFERENCE

EVEN THOUGH SPANNED W/ SAME STANDARD!!

GUY5

	NE	SE	SW	NW
1	600 38 ✓	520-760 ✓	570-600 ✓	600 ✓
2	600 ✓	520-600 ✓	600 ✓	600 (600) ✓
3	600	600 - ✓	600-760 ✓	500 - 600
4	600	600 ✓	? - 600	500 - 600

9/8/99

END OF AMERLUX INTERCOMPARISON

- 2:00-3:00 - PUT NEW 55 INLET ON CO₂ LINES / CLEAN K. RYG-OPTICS
- NEW FILTERS ON FIRST CO₂ LINES
- TURNED ON FLOW LOG (NOT BETA)
- ↳ ON AT 4:00 PM

4:00-5:00 -

MEASURED ATI SENSIC TO 13m, - RUNNING BY 5:00pm

9/10/99

10:30-11:18

EC SYSTEM DOWN

TESTING 0-10 gpm MFC; PAN ONLY

FLOW ~ 3.5 gpm THROUGH IT

(X) POSSIBLE LEAK AT ENTRANCE OF TRGA.!!

(I CERTAINLY CREATED ONE!!)

↳ BUT FIXED!

MANUAL RECAL.

Q ~ OFF BY ~ 5 gpm??

SPAN - RIGHT ON!!

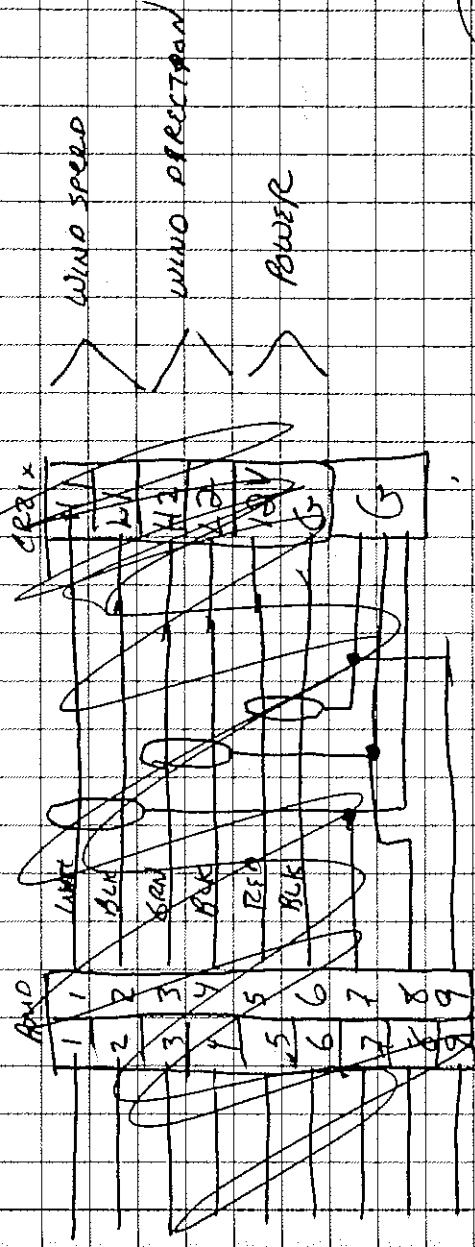
9/15/99 - ~~3:34~~ - 3:00 - CHANGED O₃ TARGET IN FAST 1.03
 3:18 - PROPER DOWN TIL 3:30 or so.

9/16/99 New CO₂ STD.

C_{STD} = 345.4 ppm

RUN	ϕ	SPAN	SAMPLE
1	-0.03	345.55	360.86
2	-0.02	345.50	361.23
3	0.03	345.40	360.38
4	-0.01	345.35	360.43
5	-0.011 (-0.11)	345.45	360.68
6	-0.03	345.45	360.48
7			360.68
			± 0.32

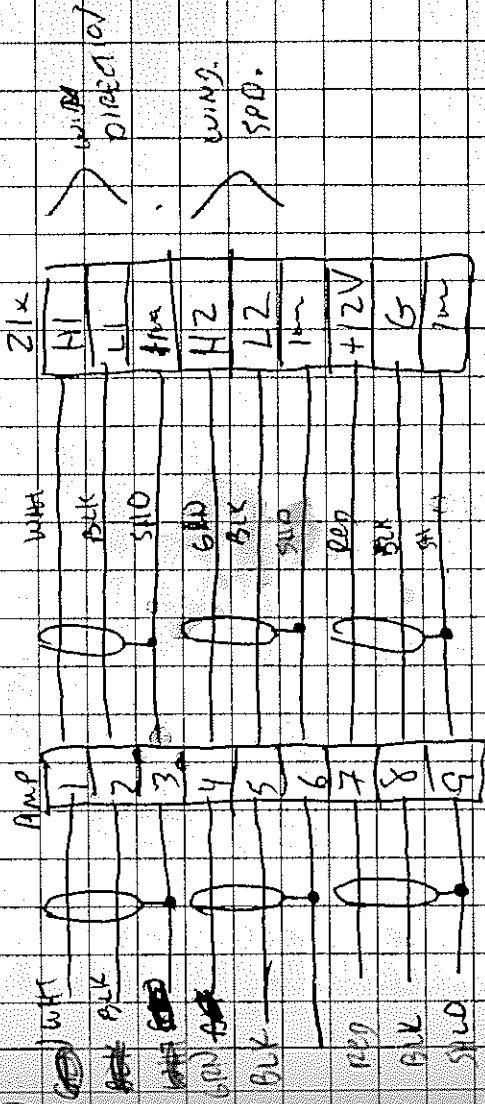
RM Young PROPANE - EXTENSION CABLE



2nd ALL SAKES
 HERM TIMES
 for
 SPARKS

NOV 1
 PAGE

10:30
 10:00



9/21/99

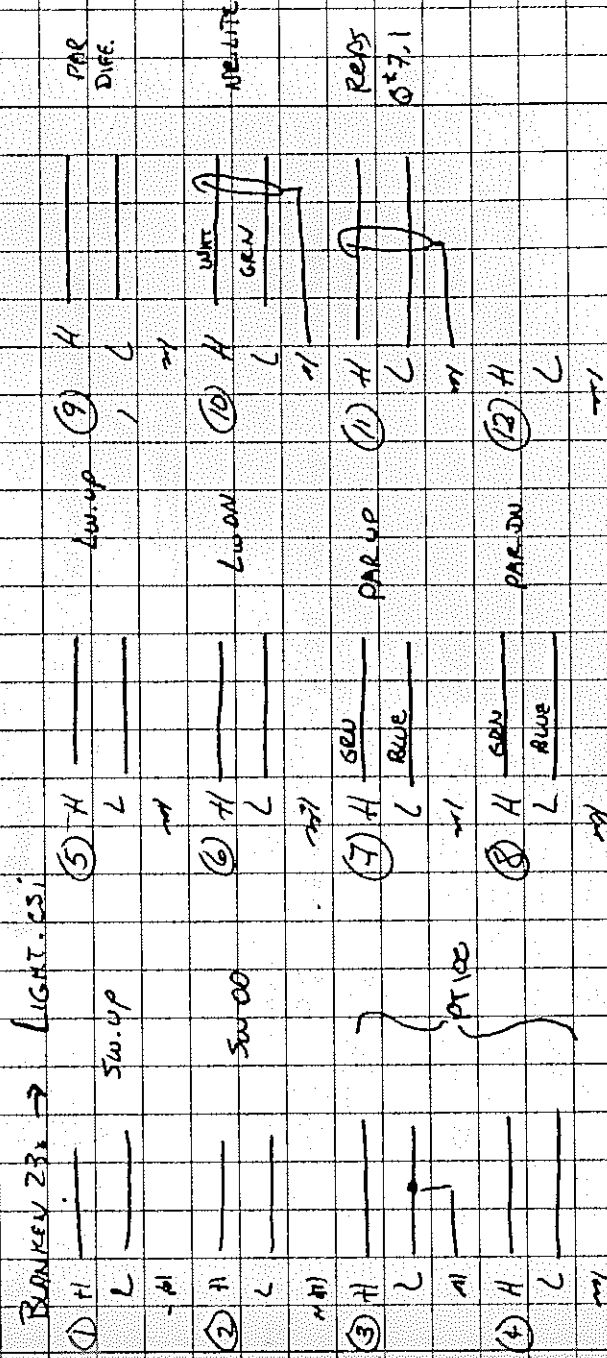
Rearranged RADIATION SERVICES -
1- DATAWAGER CONNECTIONS

PAR	REISS OFF FROM	n 10:00 AM → 4:00 PM /	PLACED PAR AT 25 METERS
			PARS AT 16 METERS

DROPSANE off from 2 → 3 AM

CAR ON CONTINUOUSLY

Autocals off AT ~ 3:30 PM



LIGHT 214 → net 214.51

① H — WHT WIND DIR.
L — BLK 25m
—1

② H — GRW WIND
L — BLK SPD.
—1

③ H — } ANOTHER
L — } PROPANE
—1

④ H
L
—1

⑤ H — WHT RH#1
L — BLK (2m)
—1

⑥ H — WHT RH#2
L — BLK 8m
—1

⑦ H — WHT RH#3
L — BLK 2m
—1

VAS. Pressure

CHANGED prep. config
w/4.00

9/22/99 — NO DEANS data
from 9/21, 16:00 → 9/22, 10:00

BLT RUNN'G NAD

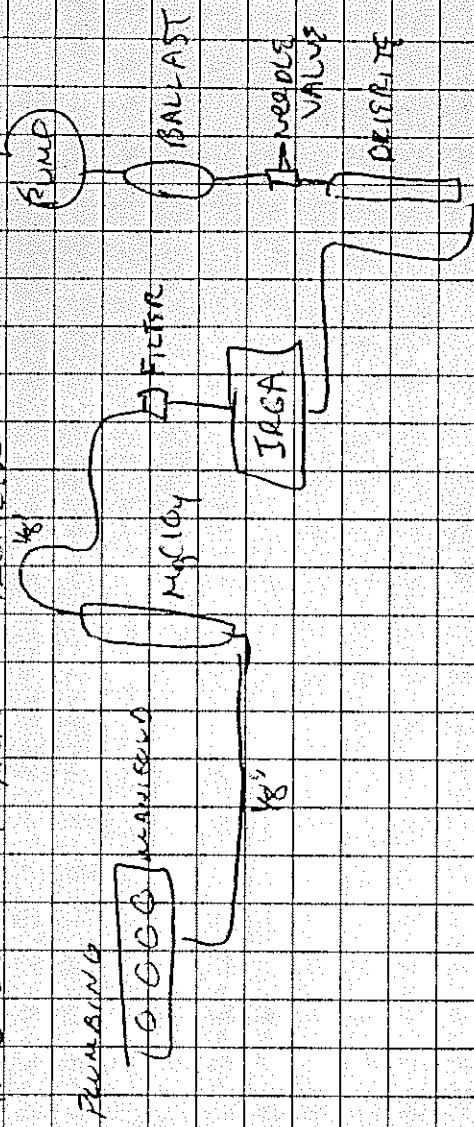
— 11:00 FAST 1.03 OFF

11:30 FAST 2.03 ON

11:30 PROFILER OFF

SPARE IN
COURSE
CONFIG
(REMAINING TIME
PERIOD
(COURSE - needs))

PUTTING DESSICANT TRAP IN PROFILE -



- ① ZEROED IRGA w/ Ref gas
- ② Turned on GUESS $\Rightarrow P \sim 606 \text{ mV}$
 $F \sim 350 \text{ ml/min}$

- ③ TRIED TO ϕ - ACCUMING AS SHOWN ABOVE
 $V = 0.011$ (NET PLATE)
 $P = 603 \text{ mV}$

- ④ BYPASS TRAP - STILL ϕ -ING
 $V = 0.005$ $P = 607 \text{ mV}$
ZEROED!! \rightarrow w/ pot.

- ⑤ BACK TO TRAP $V = 0.007$ // STILL NOT ϕ (DOWN TO 0.007)
 $P = 601 \text{ mV}$ $F = 336$

- ⑥ SPAN SET $P = 606 \text{ mV}$ \rightarrow SETTING NEEDLE VALUES
Excess flow = 350 ml/min \rightarrow SAMPLE FLOW = 320
 $C = 360.7 \text{ ppm}$ $T = 23.43$
 $T_{10} = 0.85796$
 $C_{10} = 375.74$ $1980 + 9.896$
 $V_{10} = 1990$ $P_{10} = 0.6734$ $V_{\text{new}} = 1340$
 V $V_{\text{heads}} = 1340 \checkmark$

- ⑦ SW. TO ON TO ϕ & TIME
 $F = 320$ TA AT $1.22 \Rightarrow 0.015 = V$
faster Allow $1.46 \Rightarrow 0.011 = V$

— INCREASED F TO 420
NOCL $P_{\text{sample}} = 534$

(*) TURNED ON ϕ $t = 52$ $U = 0.013$
60 0.009 \checkmark Flow rate is OK!!
GOES TO 0.006 EVENTUALLY
 $F = 415$

— SWITCH TO SPAN $F_{\text{sample}} = 447$
 $F_{\text{process}} = 278$ (OK)

$T = 23.22$ $P = 542$
 $\frac{Q_E}{T} = 376.01$ $V \frac{P_0}{P} = 1991$

$V_{\text{ALC}} = 1302 \Rightarrow \checkmark \checkmark$

ONE MORE FLOW TURNING
START ON 25 $P = 543$

$\frac{t}{30}$	$\frac{V}{25}$
45	0.019
60	0.011

LET IT RUN OVERNIGHT
& THEN CHECK IT!!

FLOW REF = 48.5 ml/min \rightarrow BACK ON-LINE 2:09

Flow EC REF = 54.5 ml/min

ALON ϕ & SPAN THE EC SYSTEM

(*) ϕ FOR $CO_2 \sim$ SPAN
& FOR H_2O WAS WAY OFF!!

(*) CHANGE DESICCANT ON N_2 BCK LINE \rightarrow TRY AGAIN
MOL. SIEVE TRAP NEXT PAGE

(X) THOUGHT THAT DESSICANT TRAP ON POC GAS MAY BE BAD

SWITCHED FOR A MEL. SIEVE TRAP (GC H₂O TRAP)

AT ABOUT 4:00 PM (16:00)

→ NOTICED AT 4:30 - CO₂ SIGNAL DROPPED LOW???

(X) PROBABLY HAVE CO₂ IN NEW TRAP & IT IS OUTGASSING!

⇒ NEED A NEW DESSICANT / SODA LIME TRAP.

9/24/99

~~10:00~~

10:00 - SWITCHED DESSICANT TRAP ON REFERENCE

UHP N₂

10-1:00 ⇒ MOVED PROBE INLETS

INLET HEIGHTS

<u>L</u>	<u>H</u>
1	0.5m
2	1m
3	2m
4	5m
5	10.5m
6	21.5m

CHANGED INLET FILTERS ON L1-264

STILL NEED TO DO TOP 3 INLETS

9/30/99

CHANGED DESSICANT ON PROBE; 11:30-11:45

(CHECKED ZERO, ETC.)

→ OLD DESSICANT STILL LOOKED OK EVEN THOUGH

WE HAD SEVERAL DAYS OF SIGNAL 100% RH

(LOOKED LIKE ONLY ~ 1/3-1/2 WAS WET.)

10/8 1:30 - EC OGA
TESTED 0+20 Lpm MFC (New mks)
→ WHEN WIDE OPEN
GET FLOW OF 6.8 SLpm
(R) DOES CONTROL FINE

— NOTE - BIG Pressure DROP -
NEED TO PUT BELOW IRGA!!
↓
DOWNSTREAM OF

SPAN. CAL. OF EC SYSTEM

- 10/5
- CHANGE FILTERS ON PROFIER INLETS 5 & 6
EXTENDED ON BOOMS
 - MOVED RAIN GAGE TO SOUTH SIDE OF TOWER
 - HOOKED UP HEATER IN P.M.
 - 2:42 - 3:01

CHANGED DOWNS ON REBS #7-1

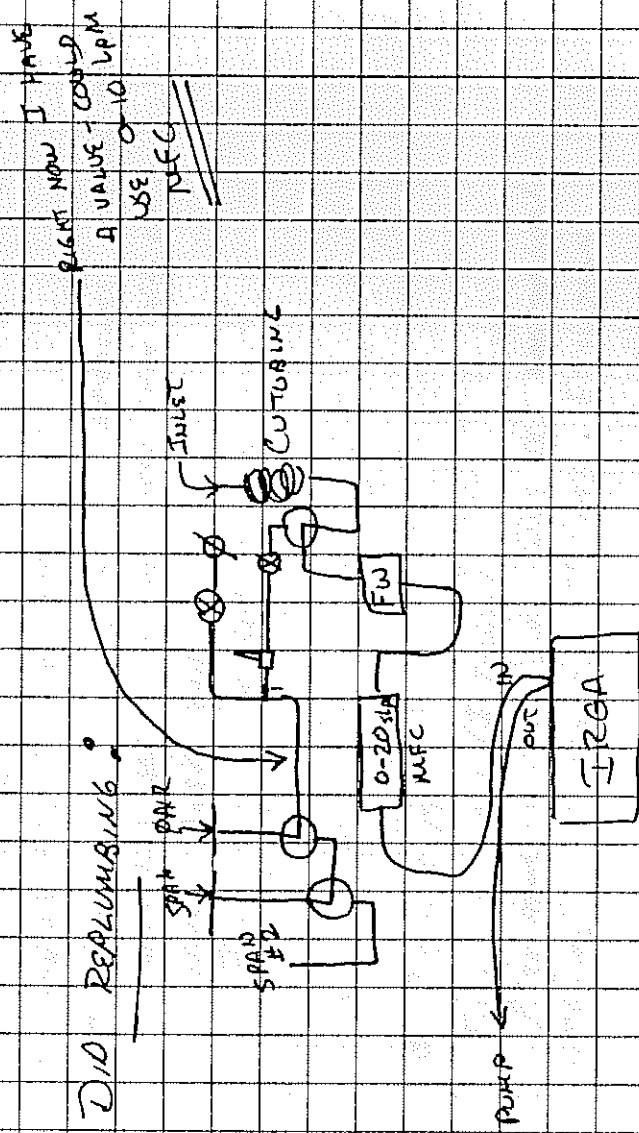
NEW CO₂ STD

CO₂ STD 345.4 ppm

Run	ϕ	SPAN	SAMPLE
1	0.030	345.47	375.98
2	0.008	345.40	375.99
3	0.03	345.47	375.83
4	0.05	345.46	375.78
5	0.015	345.53	376.07
6	0.071	345.56	375.81
7	0.100	345.50	375.98

(16)
375.96 ± 0.12 ppm

10/11 GIVING THE EC SYSTEM A MAKE-OVER
 — TURNED OFF AT 10:30 AM — BACK ON-LINE
 AT 5:00 AM



IT IS ESSENTIALLY THE SAME EXCEPT THAT I HAVE

- ① REPLACED FLOW METER W/ FLOW CONTROLLER
- ② SWITCHED THE 3-WAY SAMPLE/CALIBRATE VALVE
- ③ PUT IN EXTRA 3-WAY VALVE TO ALLOW A
 2ND SPAN GAS TO BE PUT IN
 (THIS IS NOT HOOKED UP YET)

④ TRIED PUT FLOW CONTROLLER DOWNSTREAM OF IRGA
 GOOD THINGS - HIGHER PRESSURES IN IRGA
 (P-DROP IS BELOW IRGA)

F ~ 7.05 SLPM, P = 57.5 KPA

BAD THINGS - CAN'T GET CALIBRATIONS TO WORK
 YOU END UP FIGHTING THE FLOW CONTROLLER!!

W/ MFC DOWNSTREAM

GOOD - REGULATES FLOW/PRESSURE DURING SAMPLING &
 CALIBRATIONS => CALIBRATIONS LOOK OK!!

BAD - BIG PRESS. DROP BEFORE IRGA (F = 6.75 SLPM)
 F = 6.49 SLPM, P = 43.3 KPA

At 4-45- Put new O_2 standard on!

10/12/99 - Look at autocals
 → something has screwed up
 it pumps down to very low pressure during span!
 looks like regulator got left shut off or
 tank leaked out, "
 (X) looks like another site visit, "

10/13/99

— 9:50-10:15 —

Fixed autocals (I think)

Regulator on span gas was set too low
 manually zeroed & spanned EC system

(X) Note - keep an eye on ϕ offset - it was
 about 8 ppm today. \Rightarrow I had reset it ~~and~~
 two days before - its hard to believe it
 would drift that much? "
 Maybe there's junk in the new flow controller?

- checked rain gauge - can't tell if heater is working or
 not, "

10/20/99

Switched UHP N_2 on IRGAs (~2:25-2:30)

- looked like span autocals may still be screwing up

hooked up 0-10 span MFC in ϕ span line
 & reset everything, \Rightarrow 3-3:30, mon ϕ &
 span

- Probera desiccant - $\frac{1}{2}$ gone
 (Q ~ 6 ppm)

- Rain gauge is definitely not heating. "

(X) It is getting power. "
 - No connection over heater (open circuit)
 call Campbell & left unadjusted. "

10/28/99 \Rightarrow LOOK AT PRESSURE (CIVARS) IN EC SYSTEM
~~PROBLEM~~ AFTER 4 BEARS PUTTING IN THE FLOW
 CONTROLLER

- LOOKS MUCH MORE UNSTABLE W/ THE FLOW CONTROLLER
 IN THERE?? I DON'T KNOW WHY?
 \Rightarrow CHANGES $\rightarrow 100mV$ ($\sim 2.2 kPa$)
 W/ ONLY THE FLOW METER \Rightarrow CHANGE $\sim 20-30mV$
 ($0.5 kPa$)

- NEED TO PUT FLOW METER BACK IN!!

(*) MAYBE USE FLOW CONTROLLER FOR O₂ SPAN GASES!!
 (MAKE TYLAN EXTENSION)

(*) FURTHER

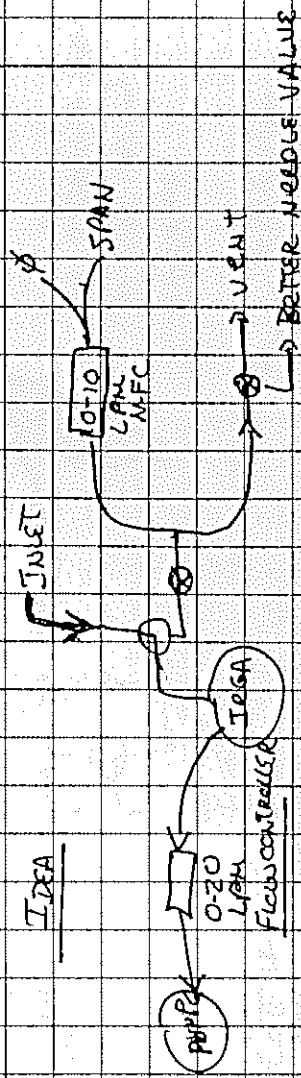
Flow is more stable w/ controller!

MUST BE DUE TO THE CONTROLLER BEING UPSTREAM
 OF THE IRGA!! IRGA SEES MORE STRESS
 FROM THE PUMP.

\Rightarrow NEED TO PUMP CONTROLLER DOWNSTREAM OF IRGA
 TRY CALIBRATING W/ MFC AS WELL

\Rightarrow USE TYLAN 0 \rightarrow 10 flow
 NEED TO MAKE EXTENSION CABLE FROM TYLAN!!

IDEA



$C = 376$ ppm

$$T = 17.6$$

11411

$$\phi = 0.003 \quad \checkmark$$

$$C_{T^0} = 399.54$$

$$P_3 = 484 = 66 \cdot 377$$

$$V_{\frac{1}{2}} = 2084.9$$

0.65525

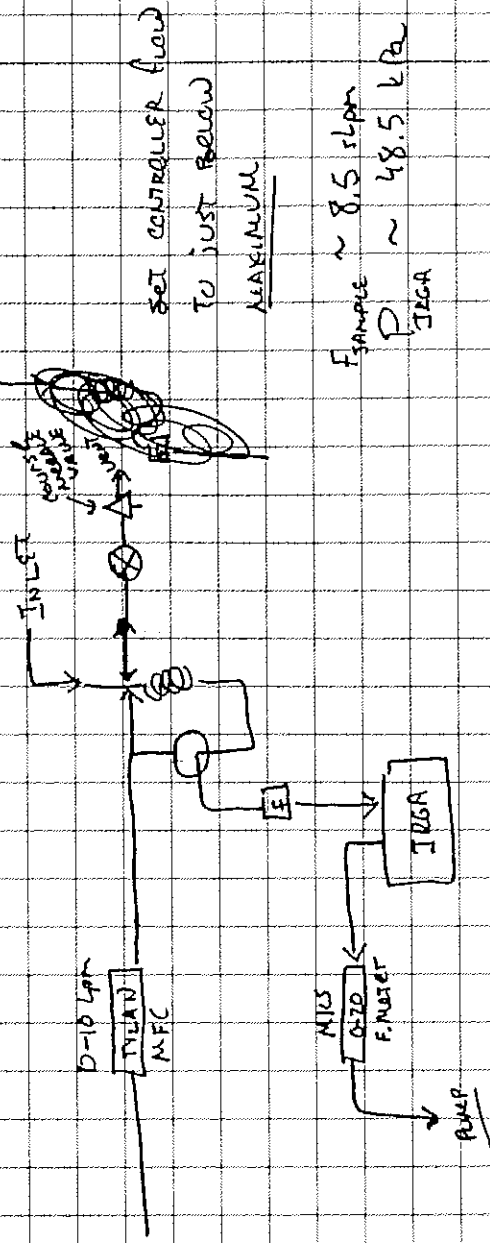
$$V_{ALE} = 1366 - V_{AES}$$

bs/e/11

- CLEANED KR-Hg. OPTICS ~ 10:30-11:00 AM

- Reprogram EC system again

DOWN - 12:30 - 1:30 PM



(x) NEED TO WATCH - SPEAKS TO TAKE TOO LONG TO STABILIZE WHEN DOING CALIBRATIONS!
(WILL PROBABLY BE OK FOR SHORT TERM)

(12)
2:30 \Rightarrow MANUAL CALIBRATION OF P-CFIVER (SEE LAST PAGE)

(*) NOTE EC ZERO KEEPS SHIFTING ~~TO~~ - NEARLY TO
END OF ~~FOR~~ TURN-POI !!
(TRY BLOWING AIR IN REVERSE !!)

- CHANGED FILTER ON TECO O₂ INLET

- New ϕ AIR (~2:45 PM)

- DOWNKEAPER 23.2A (3:30)

11/8/99:

PUT UP NEW CO₂/H₂O INLET LINE (NEW FILTERS)
EC SYSTEM DOWN FROM ~ 11:20 AM - 12:05 PM

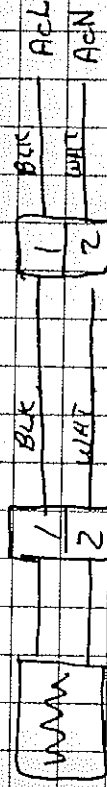
NEW CO₂ STD.

CO₂ STD. = 345.4 ppm

Run	ϕ	SPAN	SAMPLE
1	-0.05	345.34	391.18
2	0.08	345.47	391.38
3	0.07	345.39	391.28
4	-0.03	345.41	391.46
5	-0.07	345.43	391.25
6	-0.06	345.42	391.62
7	0.025	345.35	391.46

(6-)
391.36 \pm 0.14 ppm

- PUT HEATER ON EC SYSTEM -



Took 14°C out of calibration line (Flow & pressure
 equilibrate too slowly)
 Put needle valve back in
 (Manual ϕ & span \approx 330-4.00 PM)

11/11/99 \Rightarrow Turned temp controller on EC system
 Variac set to 50 (wasn't getting too hot)

\Rightarrow Temp in BRX was nearly 20°C anyway - so
 it's hard to tell if heater is helping or
 not - let it run overnight \Rightarrow that should
 be the best test.
 \odot Fan back on

NOTE = Plugged duck into same circuit as
 the IRGA (major)

- Plugged heater into the extra two
 plugs at the bottom of the tower
 (nothing else is plugged in there right
 now.)

11/16/99 ~10:30. Moved rain/snow gage back up
 11:15 - New CO₂ STD
391.4 ppm

CHECKING OUT SCOTT STANDARDS RELATIVE TO CHOL STD
 C_{ANOL} = 365.0 ppm

RUN	ϕ	SCOTT TANK C	
		SPAN	
1	0.04	365.0	344.7
2	(-0.9)	365.04	344.78
3	-0.01	365.0	344.78
4	-0.02	365.06	344.81
5			

previously 385.4 ppm (± 0.1)

DISCREP BY

SCOTT TANK A

Run	ϕ	SPAN	SCOTT A
1	0.025	365.00	345.41
2	0.000	365.02	345.32
3	-0.04	365.01	345.40
4	-0.03	365.08	345.47

PREVIOUSLY ± 345.7 ppm ± 0.1 ppm
 $\Rightarrow 345.4 \pm 0.12$ (2w) \rightarrow DIFFERENT BY 0.3 ppm

(*) COULD DIFFERENCES BE DUE TO NOT HAVING EXACT
PRESSURE MEASUREMENT!!

11/30/99

(*) NOTE - REGULATOR ON SPAN GAS WAS SHUT !!
 NO SPANS FROM

11/16 - 11/15 \rightarrow 11/30 - 1:15 PM

(3) TURNED OFF FAN IN EC BOX (TO KEEP IT WARMER)
 TURNED HEATER UP A BIT.

(3) Out of ϕ gas; SEANT FOR SOON !! FOUND
 SEVERAL LEAKS (LEAKY TANK) IN EC SYSTEM
 A FIRE GIVE BIG LEAK IN DESSICANT TRAP -
 FIXED THAT AS WELL.

(4) GOT SAIL DATA FOR NOVEMBER

(5) MANUAL ϕ /SPAN OF EC SYSTEM

12/2 \Rightarrow AUTO CALS. ARE SLOWED UP !!
2 SPANS ONLY!!

12/6/99 looked at CORSPAN regulator; ~ 11:30 AM
 when it is off \Rightarrow Pressure looks good - BUT DROPS
 near 0 when running.

⊗ WHILE SPANNING I/C SYSTEM - SET REGULATOR PRESSURE
 - WHEN OFF - PRESS. BUILT UP TO ~ 70 ps.
 THIS MAY SCREW UP THE PROPOSED CALIBRATION
 \Rightarrow NEED TO GET A NEW REGULATOR!!

12/7 \Rightarrow 12/10/99 MAKING UP TARGETS FOR FAST O₂ DETECTOR

SOLUTIONS: DYE WEIGHT + BOTTLE = 9.9779 g
 BOTTLE ONLY = 8.9743 g
 DYE = 1.0036 g

$$\text{SOLUTION I: } \frac{1.0036 \text{ g}}{50 \text{ mL}} \left(\frac{1000}{1 \text{ L}} \right) = \boxed{20.072 \text{ g/L}}$$

$$\text{SOLUTION II: } \frac{0.010 \text{ L}}{\cancel{1000 \text{ mL}}} \left(\frac{20.072 \text{ g}}{1 \text{ L}} \right) \frac{1000 \text{ mL}}{25 \text{ mL L}} = \boxed{8.029 \frac{\text{g}}{\text{L}}}$$

$$\text{SOLUTION III: } 0.005 \text{ L} \left(\frac{20.072 \text{ g}}{1 \text{ L}} \right) \frac{1}{50 \text{ mL}} \frac{1000 \text{ mL}}{1 \text{ L}} = \boxed{2.007 \text{ g/L}}$$

$$\text{SOLUTION IV: } (0.010 \text{ L}) \left(\frac{2.007 \text{ g}}{1 \text{ L}} \right) \frac{1}{25 \text{ mL}} \frac{1000 \text{ mL}}{1 \text{ L}} = \boxed{0.803 \text{ g/L}}$$

$$\text{SOLUTION V: } 0.005 \text{ L} \left(\frac{2.007 \text{ g}}{1 \text{ L}} \right) \frac{1}{50 \text{ mL}} \frac{1000 \text{ mL}}{1 \text{ L}} = \boxed{0.2007 \text{ g/L}}$$

SOLUTIONS: I → IV (see last page)

FIRST ROUND of TARGETS

SUBSTRATE: SG = SILICA GEL
CE = CELLULOSE

VIAL	SUBST.	SOLN.	date	MADE ON	SUBST	SOLN	class (o.d.)
1	SG	I	/	33	SG	IV	I
2	SG	I	/	34		IV	
3	SG	I	/	35		IV	
4	SG	I	/	36		IV	
5	SG	I	/	37		IV	
6	SG	I	/	38		IV	
7	SG	I	/	39		IV	
8	SG	I	/	40	SG	IV	
9	CE	I	/	41	CE	IV	
10	CE	I	/	42		IV	
11	CE	I	/	43		IV	
12	CE	I	/	44		IV	
13	CE	I	/	45		IV	
14	CE	I	/	46		IV	
15	CE	I	/	47		IV	
16	CE	I	/	48	CE	IV	
17	SG	III	/	49		IV	
18	SG	III	/	50		IV	
19	SG	III	/	51		IV	
20	SG	III	/	52		IV	
21	SG	III	/	53		IV	
22	SG	III	/	54		IV	
23	SG	III	/	55		IV	
24	SG	III	/	56		IV	
25	CE	III	/	57		IV	
26	CE	III	/	58		IV	
27	CE	III	/	59		IV	
28	CE	III	/	60		IV	
29	CE	III	/	61		IV	
30	CE	III	/	62		IV	
31	CE	III	/	63		IV	
32	CE	III	/	64		IV	

quaternary bubbles

55/3/75

DUCK DISO (see DUCK MANUAL/LOGBOOK)

new AIR - 1:45 PM

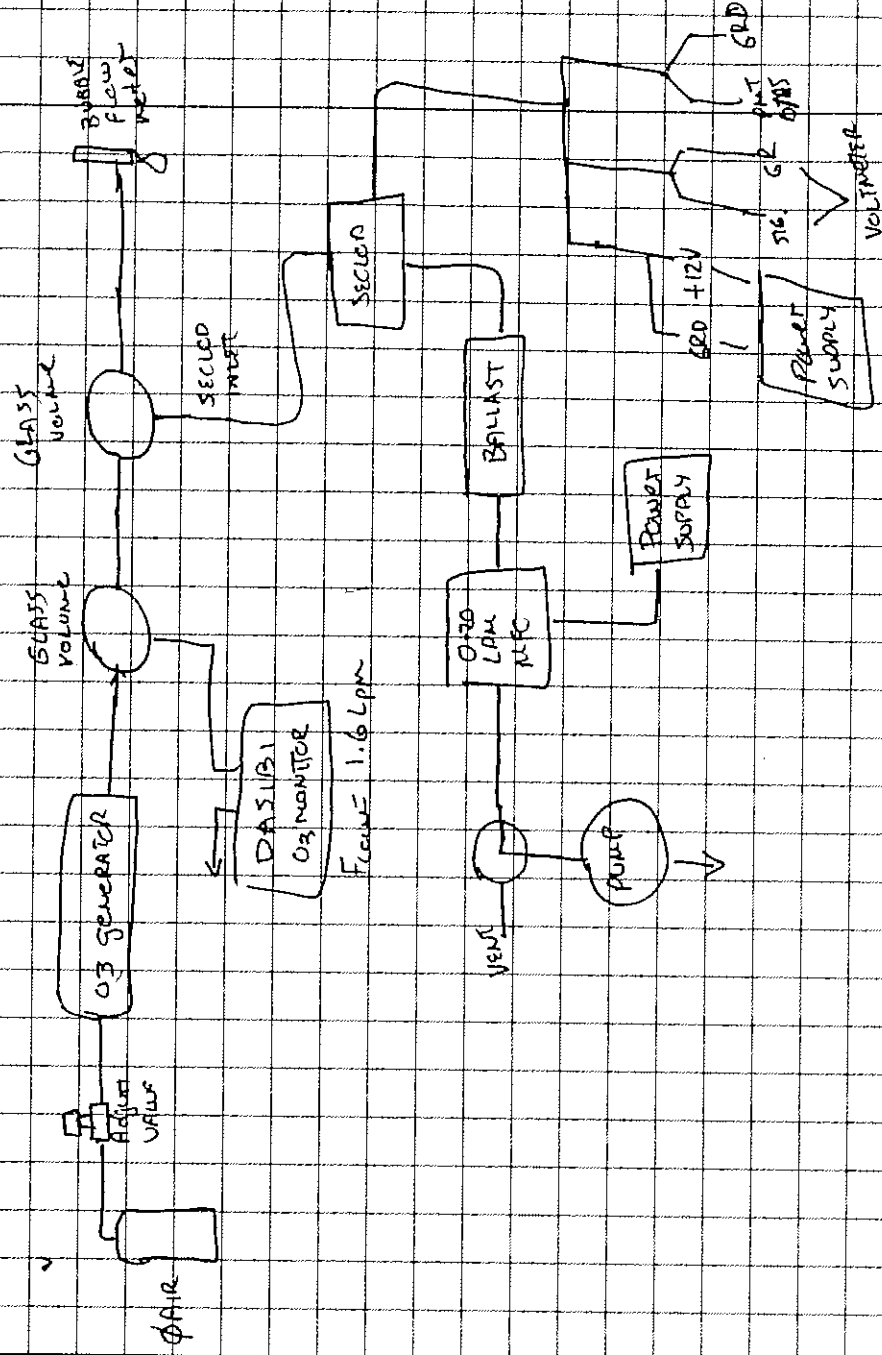
new regulator on CO2 span -

reset flows on EC system - 2:00 PM

2/7/59

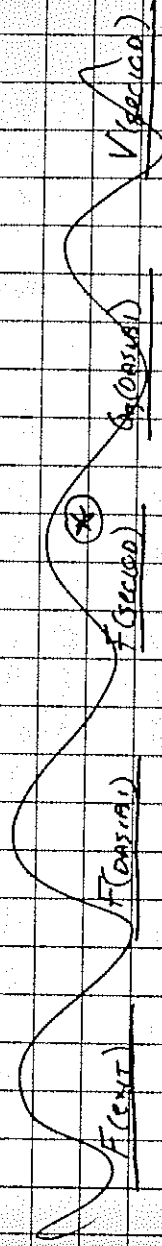
STARTING FLOW RATE TEST ON SACCO

DIET



TARGET #1

PWT BIAS =



First playing WD O₃ generator
 per 020 Lat MFC on O₃ line, closed off second

Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	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NO SIGN
 AT 9:40

12/20/88 CABLE & MODIFICATION TO BRACED POWER SUPPLY

FOR MESSIDDA HEAD \Rightarrow PUT IN CONTROL VOLTAGE SO I CAN USE IT FOR FLOW CONTROL

AMP RUNS	
NC	1
SG. CON.	2
5G.	3
+15	4
0V	5
-15V	6
INTER. 0-5V	7
CONTROL 0-5V	8
SPD	9

CABLE FOR TULAN

BLK	1
RED	2
GRN	3
WHI	4
GRY	5
BLU	6
GRN	7
BLU	8
GRN	9

12/27-12/28 - RAN OUT OF AIR ON DEC. 26 TH
REPLACED: ~11:00AM DEC. 28 TH

ⓧ FOUND LEAK ON EC SYSTEM - HOPEFULLY THIS IS
WHY GAS RAN OUT SO QUICK!

ⓧ SNOWPACK - DEPTH = 0.3m (12")

MANUAL @/SPAN OF EC SYSTEM

NEW COR STANDARD -

RUN	ϕ
1	-0.04
2	0.01
3	-0.02
4	-0.14
5	-0.08
6	0.06
7	-0.02

SPAN	STD.
345.9	397.8
345.35	397.7
345.4	397.7
345.45	397.79
345.46	397.7(8)
345.49	397.96
345.33	397.73

SCOTT TANK C = 345.4 ppm

POT ON AT
~11:00 PM

397.8 \pm 0.09 ppm

- 1:30 - CLEANED KF OPTICS
 - 1:30:21:15 - ALONG ATEI SENS TO 5 m

⊗ NOTE - W - IS ACTING UP - STILL WORKING
 BUT NEED TO CALL AT 11

2:15-2:20 -

NEW DESSICANT IN PROFILER

12-16"

SNOW 00111
 ~86.99"

⊗ 5/31/00
 * 5/31/00

ATTI BACK ON AT 20 Hz, 5 m
 ~ 12:00 PM

NEW CAL TANK

Start Tank C 395.4 ppm

RUN	ZERO	SPAN	SAMPLE (mV)	T
1	0.018	1388 mV	1557	18.92
2	0.017	1403	1563	18.92
3	0.019	1404	1566	18.92
4	0.005	1401	1564	18.92
5	0.0113	1397	1557	18.92
6	0.006	1388	1548	18.92
7	0.009	1390	1551	18.92

⊗ USING IRGA #308

CAL CO2 ON MUSTER ⇒ CALCULATE SPAN VOLTAGE

DON'T TRY TO WAGGLE

B ~ 728 mV

T ~ 17-18. °C

RUN

CO2 (ppm)

1 394.1

2 399.02

3 399.86

4 400.84

5 399.68

6 399.56

7 399.97

CHANGED AIR - ONLY 200-300psi ⇒ NEED TO RETURN

NEW STANDARD - 3:30 PM

NEW DESSICANT ON PROFILER - 3:50 PM

399.8 ± 0.6

ppm

SECOND FLOW TESTING
 TARGET #1; LAT RUN UP 60 ppb G3 R-A WHITE
 47.6 LPM
 F_{tot} = 446 (16.8% slant)

Sec. 1	Sec. 2	Sec. 3	0.3 (ppb)
6.83	426	306	47
4.83	395	308	48
2.40	353	307	47
1.06	323	318	48
4.60	389	307	48
7.06	426	307	48
8.36	445	306	47
10.13	464	306	48
11.45	470	306	46
11.75	473	307	45
12.25	477		
15.86	515	321	44
16.00	510	316	
15.86			
14.9	514	320	44
13.85	505	317	"
12.92	495	315	47
11.94	484		46
9.50	462	307	47
12.25	483	307	50
12.30	319	200	30/27/31

LAMP OFF

12.27 0 !!

13/11

→ PICKING UP NOISE
 from LAMP !!

→ NO. → STILL HAVE
 FLOW

Reflex 1.00

11/10/00 = Realized that I was not getting zero flow through second when I thought it was. Therefore our "zero" measurement is not real - still feeding or in cells (should subtract off)

Do Again:

$$\text{zero } C_2 = 11 \text{ ppb}$$

$$F_{\text{net}} = 9/16 \Rightarrow 16.64 \text{ slpm}$$

Let pump ~~off~~ at same flow w/ O₂ for a while - (135 ppb)

F_{second}	$\frac{\text{zero} - (\text{disconnected})}{\text{signal (mV)}}$	$C_2 \text{ ppb}$
2.05	0.001	45 ppb
1.808	0.001 0.001	45
3.30	0.001	44
5.82	0.001	47
7.98	0.001	46
9.38	0.001	46
10.27	0.001	47
11.00	0.001	48
13.50	0.001	46
22.14	0.001	46
zero	0.001	46
15.00	0.001	46
11.93	0.001	46
10.38	0.001	47
9.48	0.001	47
9.68	0.001	47
9.10	0.001	47
3.60	0.001	47
1.36	0.001	47
0.73	0.001	47
pump off	0.001	47
lamp off	0.001	47

2.5
2.5
0.25

2/3/00 AT SITE

- New ϕ AIR
- FILLED UP A BUNCH OF CYLINDERS
- DOWNLOADED 23xA
- + TRIED PUTTING IN NEW PROFILER CODE - BUT IT DIDN'T WORK??
- DUG PROFILER LINGS OUT OF THE SNOW & HUNG THEM IN TREES

2/18/00 AT SITE

- Ⓢ NEW ϕ AIR (OLD ONE STILL HAD 700 PSI. OR SO IN IT)
- PUT NEW CAMPBELL PROGRAM IN PROFILER. ~12:30 PM
IT WORKS!!
- KEY = USE FINAL STORAGE #1 \Rightarrow GOES TO DUCK (LIKE IT ALWAYS USED TO)
- FINAL STORAGE #2 \Rightarrow 30 MIN. AVG.
- Ⓢ NEXT TIME UP \Rightarrow SHOULD DOWNLOAD & LOOK AT AVG'S.

2:00-2:35 \Rightarrow MOVED AT1 SONIC TO 21.5 m (NEXT TO CAMPBELL BUT RUNNING AT 20 Hz)

3/1/00

→ COULDN'T CONTACT MUSTER

TURNS OUT MUSTER WAS DOWN
(MUSTER OK IN AFTERNOON)

MUSTER/QUACKER WAS FINE

10-10-45 → REPLACED CO₂ INLET FILTER (NEW INLET ARRANGEMENT)
NO STAINLESS STEEL

TOOK FILTER OFF SEC LOO

NEW PAL TANK

SECTOR TANK C

395.4 ppm

RUN

Φ

SPAN

1	0.021	1433	1584 mV	395.86
2	0.0223	1429 ✓	1582	396.84
3	0.022	1423	1576	396.88
4	0.022	1421	1567	395.09
5	0.019	1413	1564	396.11
6	0.019	1411	1564	397.41
7	0.021	1410	1562	396.93

396.45

± 0.80 ppm
(avg)

3/2/00 A FEW QUICK SIGNAL TESTS 27 SECOND #1

TARGET #	SUB.	SOUN	[0.3] ppb	SIGNAL (mV)
1	SG	I	52	443
4	SG	I	51	415 mV
17	SG	III	52	372-389
9	CE	I	53	160
25	CE	III	52	68-72
5	SG	I	51	167-365 → 365 - FAIRLY LOW
8	SG	III	52	→ 324 → 446 / "INVERTED" PERIOD SIGNAL DOUBLED
18	SG	III	52	318 → 400
1	CE	I	50	264 → 150 → 330 keeps degrading
25	CE	III	52	69-70
16	CE	I	52	→ 110 → 182 63 → 108 → 126
23	SG	III	52	392 430 → 405 → 360 * THIS ONE ONLY DECREASED 1M BACKUP? 382 → 405 FIRST FEW MINUTES?? → 432 → 446 STABILIZED 440 AFTER ~ 1/2 MIN

W/ Ø AIR FLOWING THRU → SECOND SIG ~ 56 mV

RESULTS ARE A BIT WIERD BECAUSE OF INDUCTION PERIOD

BOTTOM LINE: CELLULOSE TARGETS GIVE $< 1/2$ SIGNAL OF ANY 10-5G TARGETS BARK 20g/L & 2g/L
5G TARGETS GIVE ~ SAME SIGNAL, DON'T KNOW ABOUT LONGEVITY → HIGH CONC MAY LAST LONGER!!

NEED DATA LAGER TO TEST THIS!!

SEE ON 1ST RUN
+ DION CHANGE
BIAS 7.5V
GAIN?
FILTER?

3/10/00 - Rada Securo Flow Test (Leaky Ballast)

TARGET # 23: SUGEN (KG \Rightarrow Sec. III)

NO PAIR RUNNING

TECO = 10ppb

SECURD = 54 mV

FIR = 416 (cal meter)

~ 16.6 36ppb

set up flow = 9.7 gpm in Securo - 1.39 let run for 20 min

TO DENOTION TARGET
& STABILIZE CAMP

Securo Flow	SUGEN	On ppb
9.45	581	42
3.66	283	45
2.45	250	44
1.34	217	45
0.330	187	44
3.39	260	45
5.50	330	44
6.74	387	43
8.02	459	42
9.28	528	43
9.86	553	44
10.40	579	43
10.70	588	43
(small value open) 11.15	604	42
15.25	809	43
14.8	798	42
14.04	789	42
13.19	699	43
12.46	658	43

33
330
33

TECO = 51 mV

now using CE target #25 HG (S.W.I)

<u>SECOND FUEL</u>	<u>SIGNAL</u>	<u>0300A</u>
11.2	98	44
10.35	90.3	44
6.6	97-100	42
1.14	100	43
2.56	118	45
3.44	123	45
4.87	124	44
5.92	119	44
7.33	109	44
8.26	109	44
9.13	110	45
9.94	109	45
(all over) 11.13	113	43
12.45	117	43
13.7	120	44
15.5	126	44
11.1		
TURN OFF CAMP	52	11
TURN ON		
11.1	115	
DISCONNECT SECOND WEST LINE		
11.1	56	
TURN OFF CAMP		
11.1	56	

0300A

Adding H_2O , same DE TARGET 57

Sec 000 Flow	Flow	Finale	Signal	Q3	Temp Bin I
0 off	11.14	364 (normal)	110	42	+15°C
ON	11.14	364			
	11.14	364	114	46	-16.1
	11.16	364	108	45	+2.8°C
	11.17	312 (12.48)	1	45 47	

(Total = 15.88)

11.17	312 (12.48)	3.4	120	46	-1.66°C
11.13	271 (10.84)	5.06	117	47	4.0°C 3.8°C
11.17	208 (8.32)	7.81	108	44	8.8°C

POT H_2O IN prior to O_3 gen. (ans changing 1037 because flow rates changing)

- O_3 generator OFF / H_2O off (Flow = 16.0 slpm)					
11.14	214 (8.56)	7.95	103 46	10	-16°C
- O_3 gen. ON // H_2O off \Rightarrow let run for 10 min.					
11.17	214	7.75	103 46	46	-16
O_3 ON // H_2O on (see pulse of $O_3 \rightarrow 57$ ppb)					
11.26	214	7.75	131	46	7.3°C
11.28	153	9.82	130	45	10.40°C
11.30	271	5.14	124	45	1.8°C
11.28	312	3.78	123	46	-3.1°C
H_2O OFF \rightarrow 11.28	400	—	98	42	-16°C (any)

0.3425

PLC K6 TARGET #23 BACK IN

H2O OFF

SEC 0.0 FLOW	FLOW	SPAN	OSI	TEMP
11.3	400	6.35	46	-16

H2O ON \Rightarrow 0.3 PRESSURE!!

11.2	345	720	46	-9.1
	278	716	46	0.9°C
	226	650 645	48	5.1°C
	155	567	44	9.3°C
H2O OFF	155	480 (?)	44	-16
	"	540	44	8.4°C
CAMP OFF	400	460	44	-16°C

CAMP OFF

47

3/13/08

- TOOK DOWN FLOW #2 AT 10 AM (11:11:30 AM)

- DOWNLOADED PLOT 30 (~12:00)
NEED TO DO CNR 30

NEW OR MIX \Rightarrow NOT NEEDED AT TOWER YET!!
C₂ = 345.4 ppm

RUN	ϕ (mV)	SPAN	SPAN (mV)	TEMP
1	32	1425 (1433)	1581	? [345.4]
2	21	1418	1580	400.14 (?)
3	21 18	1409 (1411)	1573	400.00
4	9	1395	1557	400.31
5	9	1391	1552	400.4
6	9	1388 ✓	1550	400.28
7	10	1387 ✓	1549	400.24
8	10	1385 (1386)	1548	400.50
				400.28 ppm

⊗ UPped the ϕ FLOW (REGULATOR PRESSURE - (CAL PRESSURE \pm 0.18)
DIDN'T CHANGE

3/16/00 ← Moved FTI some down 1 level
(3:00-3:30)
← cleaned Kr hga optics (3:33-3:45)

3/23/00 De some more fuel tests w/ H₂O present!
turned on fcuws (+H₂O); LAMP OFF + let stabilize for 10 mins.

F₄₀₁₈ = 3.77 slpm
F₄ = ~~3.77~~ 2.78 slpm
338 ⇒ 13.52 slpm
15.95 slpm
TOTAL
17.054 slpm

① TARGET #23

Flow Sec'd	SEC'D SIGNAL	G3 TECD	DEW PT.	Comments
19.538	0.05	10	-2.7	LAMP OFF
10.228	717	41	-3.68	LAMP ON + 10min
9.12	643	42	-3.76	
7.95	609	43	-3.80	
0.75	392	42	-4 (0.40V)	
1.59	440	42	-4.04	
2.55	492	42	-4.09	
3.90	548	43	-4.15	
5.15	588	43	-4.15	
6.95	591	43	-4.24	
8.11	608	43	-4.27	
9.12	643.635	43	-4.30	
9.91	680	43	-4.32	
- 10.3 (wire open)	700	43 43	-4.35	
11.4	743	43	-4.4	
13.3	791	44	-4.42	
14.45	845	43	-4.4	
10.28	8686	44	-4.5 ⇒ let run for 10min	
	664 (After 10min)			



Now Target #4 KG = SOLN I

Assume ~ 2 sec OKG.

Flow Set.	Setl. Signal	G3	Dev Pr	Comment
10.38	277	44	-4.8	Cap signal?
9.18	2603	45	-4.8	
2.87	212	46	-4.9	
1.04	170	"	"	
5.63	245	44	"	
7.27	250	45	"	
8.77	273	"	"	
9.80	299	43	"	
10.3	314	42	"	
12.5	370	42	-4.93	
14.1	408	44	"	
10.3	333	44	"	

fixing!

TEST VARIABILITY IN TARGETS:

TARGET #	Sec 100 Flow	Sec 100 V	O3	Dev Pr
KG, III, 33	10.35	500	43	-5
	8.57	484	44	"
	6.13	482	43	-5
	1.61	369	44	"
	3.72	480	"	"
	9.27	530	43	"
	10.30	537	"	"
	12.05	632	41	"
	10.30	550	40	"
#35		570		

#35

⊗ need

to rethink

PLUMBING

CHANGED TO AT SAMPLE INLET - LESS AP, NOW NO

Sec 100 Flow GROSS PUMP IS ON

10.49	12.44	532	688	42	742	-3.6	77-5.86
9.64	11.72	483	660	41	41	-3.6	
8.95	10.28	437	579(7)	"	41	-3.7	
5.77		338	43	43	"	"	
3.55		322	41	41	"	"	
1.27		205	41	41	"	"	
6.94		374	41	41	-3.8		
10.31		539	42	42	-3.8		
13.98		732	42	42	-3.8		

OBTAINED ALL VALUES

$$\begin{array}{r}
 \text{EC100 FLOW} \\
 \hline
 17.8 \\
 \hline
 \end{array}
 \quad
 \begin{array}{r}
 \text{SKNHL} \\
 \hline
 976 \\
 \hline
 \end{array}
 \quad
 \begin{array}{r}
 \text{C} \rightarrow 1000 \\
 \hline
 632 - 5612 \\
 \hline
 1080 \\
 \hline
 627 \\
 \hline
 \end{array}
 \quad
 \begin{array}{r}
 \text{C3} \\
 \hline
 42 \\
 \hline
 \end{array}
 \quad
 \begin{array}{r}
 T_0 \\
 \hline
 -3.9 \\
 \hline
 \end{array}$$

16.4
17.8
10.3

3/24/00 AT SITE

- (*) NEW CAL. STANDARD ~ 11:00AM
- DOWNLOADED CNR DATA LOGS ~ 1:30PM
 - REPROGRAMMED SECUO; COULDN'T TURN IT ON BECAUSE TAPE WAS SCRAMMED UP \Rightarrow COULD GET TARGET TO STICK ALSO VOLT METER DIED \Rightarrow USED 9V BATTERY

4/5/00 ϕ , SPAN EC SYSTEM 11:51
new ϕ Air (N₂)

ϕ , SPAN PROFILER

13mm = 40V
65.15 kPa

$\phi_2 = 400.3$ $T = 18.6$

$$C_2 \frac{T_0}{T} = 423.9$$

$$V \frac{P_0}{P} = 2179.7 \quad P = 0.23 \text{ mV}$$

$$P \phi = 466 \text{ mV}$$

$$\phi = -0.010 \text{ mV}$$

set to ϕ

$$V_c = 1408.1$$

$$ZC405 \quad 1409 \text{ mV}$$

(12:00 - 12:06) ✓

433-534-600

4/14/00 New Secico - Flow Controller Box -
0-20.5Lpm MFC

USING TARGET #35

ⓐ WILL ATTEMPT A CALIBRATION PLCT (MAY NOT BE ABLE
TO VARY O₂ VERY MUCH)

F_{Secico} = 6.5

(can feel excess flow at vent!)

F_{tot} = 8.0

NO WATER - Dew Pt ~ -18°C

O₂ ppb

same off ⇒ 7 (reduced)

36

31

19/20

10 (0.3)

62

let run for a few minutes

68

53

69

64/65

57

47

41

37

33

29

21

19

67

70

71

TURNED
H₂O

Secico Signal (mV)

~~10~~ 10 mV

358

267

113

1

800

let run for a few minutes

886

720

973

918

805/807

620

547

467

380

288

171

130

← AFTER 20 minutes

710 → 723 mV

778

800

500 → 490

Dew Pt = 22.27

11:21 AM

11:31

11:39

→ SIGNAL WENT UP

over ~ 5 min.

THEN LEVELLED OFF

CCF RUNNING

11:48, ~~DATA~~

D3

SOLAR

Time	On (apb)	Dew Pt (°C)	SIGNAL (mV)
11:48	51	20.4 °C	488
1:07	56	15.1 °C	475
	59	15.0	526
	44-46	15.0	369
	39	15.0	288
	31	15	230
	26/27	15	160
	19/20	15	99
	15	15.1	24
	10	15.1	1
	44/45	15.1	350
	64-65	15	530

CHANGED PUMPING \Rightarrow 4.0 AUGUST IN TEMP 8476/11

1253

Dew Pt VARIATION

2:21	65	14.8	563
3:02	64	11.1	606
3:34	65	5.7 7.7	615
3:53	67	18.6	499

1420 ccf

3:55 71 -14 548 (??)

1420 on 65 19.2

CAMP ccf 11

527 ~~1420 on~~

9/11

4/17/00 - New Reagent in prefilter - 1.38-1.32

- SECOND #1 RUNNING AT 9:45 PM
F = 5.5 J/LPM

$$5.5 \left(\frac{101.3 \text{ kPa}}{71 \text{ kPa}} \right) \left(\frac{285}{273} \right) = 8.26 \text{ LPM}$$

Looks very noisy - BUT SIGNAL IS
UP AROUND

4/18/00 TILT METER ON
ATI SONIC

$$\pm x \Rightarrow 0.115 \text{ V} \quad 1.202^\circ$$

$$\pm x \Rightarrow -0.226 \text{ V} \quad -2.364$$

11:25 AM

$$\pm x = 0.581 \text{ V} \quad \text{OK}$$

$$\pm y = -0.184$$

5/24/00 New CO₂ CAL. TANK

STD. CO₂ = 345.4 ppm

Run	(mV) S	SPAN			SAMPLE		
		T	P	510 mV	T	P	510 mV
1	16	28.45	765	1377	28.6	764	1538
2	17	28.78	765	1377	28.88	765	1540
3	18	29.00	765	1378	29.05	765	1540
4	18	29.23	765	1377	29.28	766	1539
5	18	29.25	767	1377	29.25	766	1540
6	18	28.88	766	1378	28.82	766	1542
7	18	28.82	767	1379	28.85	767	1542

400.79 ±

0.25 ppm

SNOW CORES

1:45 → 4:20 PM

1	2	3	4	5	DISTANCE
80cm	76cm (combined)	82cm	65cm		400m W
55cm	57cm	74cm	86cm		400m W
55cm	83cm		86cm		300m W
69cm				84cm	300m W
67cm	73cm	98cm	42cm		200m W
78cm	64cm (71 combined)	72cm		combined (95cm)	100m W
50cm	64cm (68cm combined)	64cm			100m W
55cm	65cm	58			0m
			58cm		200 E
			63cm		100 E
					200 E
					100 E

10:15 ⇒ K₁ hyg. off // send back to Campbell
 11:00 ⇒ new O₃ target (#5) section running
 (moved pump down 1 level)
 11:30 ⇒ REBS radiation off

~~11:30~~

1:30 New CO₂ standard

5/3 DIAMETER OF SNOW CORES = 2.68 cm \pm 1/2
 2.74 cm \pm 1/2

$$\text{Avg } d = 2.71 \text{ cm } (6.0271 \text{ m})$$

$$A_{\text{red}} = 0.0005768 \text{ m}^2$$

11:30 1:45 off ⇒ RESET logger clock
 to MDT

FROM 4/27/00 SNOW SAMPLES

#COPS	DISTANCE	BOTTLE NUMBER	TOTAL WEIGHT	DRY WEIGHT	WET WEIGHT
4	400m West	1	3604.035	66.7	297.6
		2	326.0	66.5	259.5
5	300m West	3	326.0 336.9	67.2	249.7
		14	318.9	66.1	252.8
4	200m West	5	347.6	66.5	281.1
		6	343.3	66.8	276.5
5	100m West	7	410.0	67.3	342.7
		8	403.7	66.8	336.9
5	Tower (0m)	9	375.4	66.4	309.0
		10	261.4	66.9	194.5
5	100m East	12 12	367.0 367.0	66.8	300.1
		4	262.3	66.8	195.5
5	200m East	11	334.6	67.5	267.1
		13	323.6	67.7	255.9

14 \Rightarrow 2 cores in each (~~300m~~) \Rightarrow 28 SAMPLESAT ABOVE \Rightarrow NEED 35 (AT LEAST 7 more SAMPLES) \Rightarrow 4 BOTTLES
To get every 50 \Rightarrow NEED 35 more SAMPLES \Rightarrow 18 more BOTTLES
(BIGGER BOTTLES)

5/3/00 - SPIDER WEAS ON ATC W-axis

SPARKING!!

OFF AT 10:45 AM

ON AT 10:59 AM

NEW TILT:

$$\pm x =$$

$$\pm y =$$

$$V_c = 0.00$$

$$V = -0.108$$

- But Hooked up at 1:00 \Rightarrow MAYBE NOT WORKING?

DOWNLOADED PROF 30 CNR 30

12:00 1:40

SWITCH ASPIRATED SHIELDS \Rightarrow 2 \Rightarrow 13:30

DOWNLOADED STILL LOGGING

0223x

[illegible]

<u>DATE</u>	<u>LOGGER</u>	<u>RT. # (FS NOTE)</u>
5/3/00	ZPKA (SOIL)	894041
5/3/00	CNR 30	51237
5/3/00	PRCC 30	24085

PT. 4 (5 note)

Shaw Cores (5/6/00)		(1)	(2)	(3)	(4)	(5)
Location	DEPTH					
50cm W	16	36	48	52	80	43
30cm W	19	39	58	57	57	
	14					18
20cm W	20	36	43	73	42	52
	13					
100cm W	15	42	30	60	70	
	11					48
Tower (6m)	18	54	75	43	32	60
100cm E	17	43	33	26	56	39
200cm E	1	31	38	28		
	4				46	29

SNOW CORE / WEIGHTS

# Cores	DISTANCE	BOTTLE #	TOTAL WEIGHT	DRY WEIGHT	H ₂ O WEIGHT
5	400mW	16	534.7	117.5	437.2
5	300mW	19	504.3	114.8	409.2 > 511.4
5	200mW	20	177.8	75.6	102.8
5	100mW	13	535.0	109.7	425.3 > 550.0
5	100mW	15	191.6	47.5 66.9	124.7
5	0m	11	528.1	105.7	422.4 > 531.5
5	100mE	16	175.7	66.6	109.1
5	200mE	17	(*) 479.5	100.50	524.1
5	300mE	1	256.2	84.5	374.5
5	400mE	4	217.2	69.2	171.7 > 39.7

weight/area - from 4/27

$$\frac{(400)g}{Area(m^2) (\#cores)} \quad \frac{1}{1000g} = \frac{1kg}{1000g}$$

#cores	LOCATION	(1) kg/m ²	(2)	(400)g	1	1kg
4	400mW	244.46	151.60	$\frac{89.86}{-3.08}$	$\Rightarrow (1) - (2)$	
5	300mW	174.24	177.32			
5	200mW	193.34	184.29 190.7	2.64	51.35	
5	100mW	235.64	184.29		-7.13	
5	0m	174.58	186.73		41.99	
5	100mE	171.84	129.85		70.5	
5	200mE	181.35	110.85			

② 18 \Rightarrow Total Heavy \Rightarrow DIVIDED IN TWO

#	TOTAL	DRY WEIGHT
18	492.1	109.0
SPACE	170.6	29.5
		383.0
		141.1

5/11/00 Snow cones

Location	Bottle	(1)	(2)	(3)	(4)	(5)	Total weight	Dry weight	kg
new	17	28	33	42	37	45	447.4	114.9	332.5
new	15	29	40	54	30	47	496.5	105.1	391.4
new	16	30	39	64	44	26	496.8	107.8	389.0
new	18	31	10	48	66	43	486.5	105.8	380.7
on	20	28	44	19	27	28	391.9	106.4	285.5
new	19	32	26	0	49	32	374.8	105.3	269.5
new	8	11	27	17	38	0	231.9	67.3	164.6

weight/tree	(3) 5/11/00
LOCATION	5/m
100mW	145.3
300mW	135.71
200mW	134.88
100mW	132.00
0	98.99
100mE	93.45
200mE	57.07

/2.884

(3) - (5)	5/11 - 5/6
362.30	
41.61	DOWNWARD
55.82	
52.29	
82.74	UPWARD
36.40	
53.78	

5/19/00

O₂ CALIBRATIONC_{SPAN} = 345.7 ppm

Run	ϕ	SPAN	SAVED
1	0.006	1389.4	✓
2	0.008	1388.6	✓
3	0.009	1387.2	✓
4	0.010	1386.3	✓
5	0.011	1385.8	✓
6	0.012	1385.2	✓
7	0.013	1384	✓
8	0.014	1383.4	✓
9	0.015	1383.4	✓

SAVED

395.43

397.78

398.67

398.72

398.67

398.57

399.10

398.85

398.52

398.73 ± 0.20 (1σ)

Snow Caves

LOCATION	BATH	Sample Depth	(1)	(2)	(3)	(4)	(5)	Total weight	Dry weight	Moist weight
SPRINT	15		20	34	37	26	56	433.4	105.1	328.3
SPRINT	20		10	38	40	32	32	279.7	119.7	160.0
SPRINT	17		30	46	48	12	22	383.5	117.5	266.0
SPRINT	16		21	6	48	38	20	404.9	117.5	287.4
SPRINT	13		40	48	35	8	37	234.9	68.4	166.5
SPRINT	19		37	9	8	42	31	319.0	104.5	214.5
SPRINT	18		11	22	22	10	37	237.5	105.0	132.5

5/24/00

12:51 \Rightarrow RE-TULSED ATISONICwas: $\pm x = 0.060 V = 0.63^\circ$

NOW

 $\pm x = 0.834 \Rightarrow 8.72^\circ$ $\pm y = -0.270 \Rightarrow 2.82^\circ$

3:15-2:30 SWITCHED FILTERS ON profiler INLETS
 1 \rightarrow 4 (STILL NEED TO DO TOP TWO INLETS)

2:25 \Rightarrow NEW CO₂ STANDARD \Rightarrow 398.7 ppm

4:15

3:30 - ~~4:15~~ SWITCHED DESSICANT TRAP ON
 PROFILER \downarrow TOP 2 INLET

JUNK CORRS

LOCATION	BOTTLE	①	②	③	④	⑤	dry weight	Wt. weight
400 ml	2	0	0	54	42	0	240.8	166.9
300 ml	11	22	32	0	34	0	219.7	151.8
200 ml	8	0	0	88	16	0	179.5	110.0
100 ml	7	0	0	16	37	0	199.5	132.1
0	14	18	0	0	22	16	188.3	118.3
60 ml	12	0	0	20	20	0	134.5	67.0
20 ml	9	0	0	0	30	0	187.6	59.8

JUNK CORRS ON 5/31/00 (134 km)
 only 1 sample AT 500 ml

DEPTH = 18 cm

Total weight = 92.3 g

DRY weight = 66.6 g

H₂O weight = 25.7 g

5/25/00 NEW PROGRAM RUNNING

AT 14.5m \Rightarrow 11:54 AM

Put up new dual radiometer mount at 16m

REBS #1 RUNNING AT ~ 4:30 PM

NO VENTILATOR

⊗ Looks like #2 is NOT RUNNING \Rightarrow THOUGHT IT
 STOPPED - NEED TO TRACE LINE!!!

6/8/00 From Excel Spreadsheet

Period	DAILY Energy From Snow Melt	# DAYS	TARGET Snow DAY
Apr 27 - May 6 129 - 118	15.1 W _{W-2}	9	8
May 6 - May 11	39.6 W _{W-2} (↑)	5	4
May 11 - May 19	15.7 W _{W-2}	8	5
May 19 - May 28	27.2 W _{W-2}	5	5
May 28 - May 31	21.2 W _{W-2}	7	6

6/9/00

New Ø AIR

Is running - 10:30 AM

SECURED - WAS RUNNING TARGET #7

NET BIAS

7.5

2.0

SIGNAL

.9

.9

SECURED ON AT 11:00 AM; TARGET #37

✓ Datalogger Download Status 974396

23x9

CMR

PROFILER

Downloaded AT 1:30 PM

6/14 10:10 → Sec'd off
new target #39

Have run at
PMT bias of 7.5V
8 7.0V

~~2:55~~ 1.

Time
10:28

12:10

12:38

✓ 1:43

✓ 2:15

0 2:47

3:33

3:57

PMT BIAS
6.0

7.0

7.0

7.0

7.0

7.0

7.0

7.0

GAIN
7

7.0

7.0

7.0

7.0

7.0

7.0

7.0

FC
7

40 turns left

40 turns right (120°)

(Voltage down to 4.5) 40 more turns right (120°)

(Voltage down to 4.5) 40 more turns right (120°)

(Voltage down to 4.5) 40 turns left (120°)

(Voltage down to 4.5) 40 turns right (120°)

(Voltage down to 4.5) 40 turns right (120°)

10~ Hg.

10:40

12:10

~ 1:30

2:40

⇒ one vent. stop off

⇒ other vent off

⇒ prep. off

⇒ prep. back on

1:30-2:30 Moved lower prep. up 1 m

(noticed at 4:00 PM - doesn't seem to be working)

NEED TO CHECK THIS OUT!!!

6/21/00

REMOVED QUACKER & HUSSTER
 12:30 - 12:50 PM

15m propane - power had been disconnected
 BACK ON AT 1:30 PM

1:30 \Rightarrow DC POWER RUNNING
 KR HIGH & PROPRANE
 BOTH REBS VENTURERS OFF !!
 SECOND PUMP OFF !!

(*) NOTE WATCH 25k propane wind speed
 LOOKS LIKE IT MAY BE BAD !!
 WIND DIRECTION IS OK !!

1:45 - CR21X OFF

CENTRAL

(1) H	WHT	RAY	RED	#12	C2-GRN
(2) L	BLK	25	BLK	G	C3-BLK
(3) H	GRN				Red +12V
(4) L	BLK				BLK-G
(5) H	WHT	RAY	\Rightarrow Red +12V		
(6) L	BLK	15W	\Rightarrow BLK-G		
(7) H	WHT	Vas-#	\Rightarrow Red - +12V		
(8) L	BLK		BLK-G		
(9) H	WHT	Vas-#	\Rightarrow 77W		
(10) L	BLK				
(11) H	WHT	Vas-#			
(12) L	BLK				
(13) H	RED	PTB107			
(14) L	BLK				

Now 23k

RUNNING AT

12:30 PM

DATA

WHT - +12V
 GRN - G

OK !!

(8) Note at 3:00-3:30 → spike in PSD of K₂ h₂g
was gone. Either REBS ventilator or Secuod

pump was problem.

(Guessing REBS ventilator - since remaining 1 ventilator
shifted that spike to higher freq.)

6/23/00 Power Outage
1800, 6/20 → ~11:30 6/23
Start in main unit

Secuod Pump on - ~1:30 PM

~~Secuod~~ SWITCHED OUT Secuods

(#2 new installed)
100) ~~new~~ CAPACITOR PLACED IN
GAIN CIRCUIT.

6/26/00 -

new p AIR

new calib. STANDARD

RUN	ZERO	SPAN		JANACE		P	S/G	ppm
		T	A	T	A			
1	10	28.16	812	28.16	811	1548	1548	398.9
2	11	28.19	812	28.19	811	1548	1548	399.62
3	12	"	812	"	"	1550	1550	399.96
4	11	"	812	"	"	1548	1548	399.62
5	10	"	"	"	"	1547	1547	399.58
6	11	"	"	28.16	"	1548	1548	398.72
7	10	27.65	814	27.69	813	1547	1547	398.72
8	10	27.97	813	28.03	813	1547	1547	399.29
								399.41 ppm
								±0.4
								new std. air => 300 ppm

6/27/00 Looking AT Power Spectra -

- ① K- hygrometer - SPIKE AT 3.4 Hz appears to be coming from the Sealed pump (or possibly one of Heron's pumps \Rightarrow need to check this - find out times when Heron is running)

- ② Sealed's - put 1 μ F capacitor in GAIN feed back loop \Rightarrow appears to be "over-filtering" \Rightarrow now we can cut back the resistances.

③ DO 300 CORRELATIONS IN THE TIME SERIES

mat -
prof 6x30
ENR 6x30

7/5/00 Sealed pump off AT 1:30
(Heron's pumps still on)
Profiler OFF - 1:30
ON - 1:38 \Rightarrow new desiccant

23XA \Rightarrow JURY STILL
FS MPTR = 1,066,290

21:57 \Rightarrow DOWNLOADED \Rightarrow net 30s
FS MPTR =

~~Put in~~ new program - ~~BOEC~~ BOEC calls off
AT 1:30 PM

Profiler - DOWNLOADED 3:07 PM

\Rightarrow looks like it collected ALL THE DATA!
FS MPTR =

✓ New Fest 23 program = 3:25-3:28

(160)

7/19/00 ATI sonic mounted AT 5m on
 little tower
 - Running AT ~ 12:00 PM
 - New TECO filter - 12:00 PM
 - Manual ϕ , span of Profiler

$$P_{STP} = 399.4$$

~~2700~~ MANUAL AT 1:30 PM

SAMPLING

	Pressure	Flow
21	0.432	~630
22	0.428	623 ml/min
23	0.431	647
24	0.430	600-625
25	0.436	600-630
26	0.429	620-650

~~SAMPLE P~~
 27
 28
 29

Reset needle valve & sonar flow
 Flow 21 ~ 460 ml/min

b	Pressure	
21	0.638	
22	0.638	
23	0.639	
24	0.637	
25	0.639	
26	0.634	

$$ZERO = 0.024$$

set to 0.000

too slow

Reset AGAIN

$$P = 0.972 \text{ kg} \quad \text{still too slow}$$

BACK TO BEGINNING

$$P(46) = 0.936$$

$$F = 640 \text{ ml/min}$$

$$65.7 \text{ kPa}$$

CLOSE TO ZERO AFTER 1 min!!

(OK) ✓

Already tested

New set speed

T_F ~~33.6~~ 33.6

~~7:40~~ ~~2:39:38.5~~ $T_H/T_F = 1.00717$

$^{17}O_2 \frac{I_0}{I_1} = \frac{408.3}{402.3} \Rightarrow 209.51 \text{ mV}$
TABLE

$P_{open} = 436 \text{ mV}$ 65.64 kPa
 $P/P_0 = 0.64799$

$V_{acc} = 1357.6 \text{ mV}$

$V_{meas} = 1359$, set to 1357

BACK ON AT 2:41 PM

7/14/20

2:00 PM - PROCLUT ACC \Rightarrow LEAK TESTED

NO LEAKS FOUND

PUMPING ON LEVEL 6 ONLY
NO PROFILES

PUMP SOUNDS LIKE ITS ABOUT TO GO

ON AT 2:30

2:30 \rightarrow 2:42 CHANGED FILTER ON CO₂ INLET

PLACED ABOUT 7" FROM SONIC PATH

1st OFF AT 2:45

1st BACK ON AT 3:35

1:7500 ON A1 4:10 \Rightarrow INTO $^{17}O_2$ dig. + $^{16}O_2$ dig.
(CHANNEL 10 + 11)

AP

7/18/00 5:14 Spring H₂(CO₂) on Level 6

AT NIGHT → NOT A VALVE SWITCHING PROBLEM!

⇒ SWITCHES INLET LINES FOR LEVEL 5 & LEVEL 6
(10m) (21.5m)

RUNNING ON AUTO AT ~4:00PM

— CAMPBELL SONIC AT 1.5m ⇒ RUNNING ~3:00AM

— EC pump - RS 3:10 - 3:25PM (FAN REPAIR)

7/20/00 RAINING W/ profiler

Profiler off = ~~10:20~~ ~10:30 AM

	Pressure Voltage	T	SIGNAL (mV)
21	0.570	33.66	1314
22	6.569	33.5	1312
23	0.571	33.3	1310
24	0.572	33.2	1304
25	0.573	33.0	1318
26	6.567	33.68	1308

Pressure ⇒ WAY LOW ON SPANED P = 480mV (Reset to ~580mV)
CHECK READ - "0.0067 (Adjusted to 0.000)

BACK ON LEVEL 5 (TOP)

ONP No IN 2/

25 581

21 576

SWITCHED TO L2 ⇒ (21 & 22 are reversed ???)

ONLY GOES DOWN TO 1155

⇒ DOWN TO 0.667 W70

[DESSICANT TEMP. !!]

Something seems very WRONG!!

500
500

PULSED VP
70 1345

1333

3203

31.8

* REALIZED MAIN PUMP WAS DEAD!!

SWITCH OUT & PUT SEEDED PUMP (SAME KIND OF PUMP) \Rightarrow ALSO SWITCHED OUT THE SMALL SAMPLING PUMP.

BACK ON AT 2:15 \Rightarrow TESTED W/ UHP N₂ TEE-ED ACROSS LEVEL 2 \Rightarrow WORKED PERFECTLY
 Ⓢ LEVELS 1 & 2 ARE NOT SWITCHED

Ⓢ SHOULD LOOK FOR CHEAP ROTAMETER TO MEASURE
 (MAIN FLOW RATE!! (UP TO 6-20 LPM))

\rightarrow MAYBE ONE FOR SAMPLE FLOW TOO!

Ⓢ BACK ON AT 2:30 PM

LEVELS 5 & 6 ARE STILL SWITCHED!!

Flow rate $\sim 350 \text{ cm}^3 \text{ min}^{-1}$

FLUSHED DESSICANT TRAP IN $\sim 45 \text{ sec}$ (UP N₂ AT INLET #2)

Pressure $\sim 496 \text{ mV}$

Ⓢ Adjusted span pressure as well!!

7/26 BACK FROM VACATION

2 THINGS

- ① EC CO₂ reading TOO HIGH OF A VOLTAGE
- ② PROFILER LOOKS LIKE IT GOT WORKING THE NIGHT OF 2/5

7/27/00 Source of BOTH problems

Power went out TO BOTTOM circuit from
15:43 ON 7/21 TO
~12:00 ON 7/24

WHEN CAME BACK ON \Rightarrow something must have
gotten into reference cell of EC CO₂

ZERO ~ 70 ppm \Rightarrow CAL ON; ZERO on the pot
1:30 \Rightarrow EC OFF TILL 2:00

BLASTED VAPOR N₂ BACK THRU REFERENCE CELL
+ CHOPPER

\Rightarrow SIGNAL CAME BACK TO NORMAL!!

PRODUCED CUT OFF AT 11:30

BACK ON AT 2:00; MIGHT BE OK

- STILL HAVE weird problem w/ TOP inlet

SWITCHED L5 + L6 BACK TO ORIGINAL POSITIONS!
⊗ MOVE L6 DOWN TO L5 AND THEN

NEW CO₂ STANDARD

CO₂ STD = 345.4 ppm

Run	ZERO Value (mV)	SPAN		Signal	PRESS		Temp	COND.	
		Temp	Press		Press	Temp		Cond.	Temp
1	8	24.863	832	1392	826	1549	27.58	400.5	27.58
2	11	24.9	827	1393	826	1555	28.16	400.19	28.16
3	12	28.3	"	1392	827	1556	28.40	400.50	28.40
4	12	28.56	827	1392	"	1557	28.72	400.47	28.72
5	13	28.876	827	1397	"	1557	28.87	401.01	28.87
6	14	28.9	826	1392	828	1556	28.94	400.41	28.94
7	14	29.21	828	1391.4	828	1554	29.22	400.89	29.22
8	14	29.23	828	1391	828	1555	29.27	400.50	29.27
									400.45 \pm 0.3
									ppm

⊗ [New desiccant in desiccant - 3:15-3:30
New filter on top inlet \Rightarrow moved closer to tower!

7/28/00 \Rightarrow Level 2 ON prefilter screenings up
(MAN. SWITCH ON \Rightarrow TURNED OFF \approx 11:00)

\Rightarrow New O₂ gas \Rightarrow 3:35 PM

8/11/00

Li7500 DAC setup

2V
O
O

H₂O
CO₂

5V
500 $\mu\text{mol}/\text{m}^3$ // 800 $\mu\text{mol}/\text{m}^3$
20 $\mu\text{mol}/\text{m}^3$

CHANGE TO

~~433~~ = 2.86 $\mu\text{mol}/\text{m}^3$ // CO₂ (336 ppm)
100 $\mu\text{mol}/\text{m}^3$
280 = ~~5.05~~ 5.05 $\mu\text{mol}/\text{m}^3$ // H₂O
100 $\mu\text{mol}/\text{m}^3$

9.8 $\mu\text{mol}/\text{m}^3$
2.450

DOWNLOADED 23A \Rightarrow FSMOTR = 1196499

TEAS RADIOMETERS \Rightarrow OFF at 1:35

8/14/00

TEAS #1 ON AT 11:00 AT 26 m
TEAS #2 ON AT 12:00 AT 17 m (16 m?)

Took NR LITE Down AT 12:00 PM

2:00-3:00 PM \Rightarrow K. Lyy \downarrow 1:750 OFF
CALIBRATED 1:7500: TEAS OFF BY \approx 7:50 PM

BACK ON AT 3:00 (may be 2:30)
SPAN OFF $<$ 1.5 ppm

8/22/00 New EC meter line & filter

EC system off 12-12-30

Man. zero & span

(F_{out} = 7.30 sand at low!)
P = 35 kPa

(Refer to After new meter line!)

SHOULD I REPLACE Heat EXCHANGER?

- Grounded not data logger

- CHECKED 16m propane cable & extension looked OK
EARTH GROUND IS OK TOO!!

- 1:30-1:45 → new designation in profiler

New cal. gas

O₂ = 345.4 ppm

SPAN

SAMPLE

ROW	BARO	T	P	mV	T	P	SLAB	CONF. (ppm)
1	202	33.6	828 828	1387	33.56	828	1553	402.31
2	24	33.12	"	1387 ✓	33.42	"	1555	402.49
3	24	33.34	"	1387 ✓	33.31	"	1656	402.58
4	24	33.24	828	1388	33.21	829	1657	402.79
5	25	33.14	830	1389	33.12	829	1558	402.68
6	25	33.07	829	1389	33.04	829	1558	402.58
7	24	32.92	830	1389	32.88	"	1557	402.72

402.54 ± 0.17
(1σ)

8/24/00 New AIR

New cal. TANK - 10:30 - 11:00

Also - Profiler pressure sensor HARD BARO CONNECTION

Fixed: 1:18 PM

During down time: P_{env} ~ 0.376 mV

8/25/00

- Replaced Copper Heat Exchanger in EC SYSTEM
12:10 - 12:20

- CHECKED GROUNDS ON loggers

653
 SWITCHED TO
 DATA LOGGING
 CO. d. g. CHANNEL
 LAST CHANNEL

Hooked up Airt 70 ZSD < > reads between
 357-364 ppm (wet but - but could be better)
 \Rightarrow Noted CO_2 zero coefficient (Z_{CO_2}) = 0.85
 SHOULD BE BETWEEN 0.9-1.1
 \Rightarrow Need to RE-ZERO carefully!!

12:30 - 1:15 \Rightarrow move AT1 to 5.75 m
~~1:15-1:30~~ = ON small tower

1:15 - 1:45 \Rightarrow SWITCHED RHT AT 8m TO point
 ON other side of tower.

THERMOCOUPLES = 3 full
 1 cut

23x IS RUNNING 2 AM416
 (1) 8 Tcs AT SOUTH TOWER
 (2) 15 Tcs AT Middle tower

BOTH JUST USING 1 CHANNEL ON 23x!!

(*) mostly need more thermocouples!!

8/29/08 \Rightarrow 10:30 \Rightarrow REVERSED & SPANNED EC SYSTEM
 -HAD BIG ZERO SHIFT (~30ppm!) - New Cu tubing?
 ALSO NOTED CELL PRESSURE IS MUCH LOWER THAN
 usual (40 kPa) \Rightarrow IS MY NEW FILTER TOO
 MUCH OF RESTRICTION? (PEROSPAN WERE 46 kPa
 WHICH IS NOT UNUSUAL LOW!)

11:45-12:15 \Rightarrow K₂ tag off WHILE ZEROING
 12:50 // put 500g lime TRAP JUST PRIOR TO CELL
 zero for CO_2 NOT far off (~4ppm)
 $Z_{CO_2} = 0.85$ (still!)
 $Z_{H_2O} = 1.08$ (was 1.08)
 WATER WAS QUITE A BIT off (2500)
 DID NOT CHECK SPAN

1:30-2:00 @, span test on EC system

③

Time	Gas	Flow	Pressure
< 1:30	SAMPLE	6.21	40 kPa
1:32	Ø	7.84	46.9 kPa
→ 1:42	SPAN	7.82	46.9 kPa
1:47	SAMPLE	?	?

④ BT my watch -- wrong ahead of data

need to check filters + pump (is pump going bad)

2/1/00 Pressure still low decreasing
in EC system - as it
pump on BAD filter

$F_{tot} = 5.89$ $P = 38.9$ kPa

↳ suggests BAD filter on obstruction,
pump is still pulling down pressure.

1:16 - EC off

hooked up old inlet w/7 filter

old inlet + filter $F = 5.79$, $P = 38.4$ kPa
take filter off \Rightarrow NO CHANGE!

no inlet tubing $\Rightarrow F = 6.91$, $P = 43.4 \Rightarrow$ still low!!

bypass heat exchanger + solvent

$F = 5.96$ $P = 39.667$

now it starts to leak like pump

new 2nd stage filter \Rightarrow

$F = 8.71$

$P = 51.38$

BACK ON AT 1:29

$F = 8.51$ $P = 50.3$ kPa

BAD

FILTER

2nd stage

THATS

THAT

9/20 HAD LOST ITS MIND - RESTARTED & everything seemed OK

DOWNLOADED SOIL DATA

FSMPTF = 1271006

PUT IN NEW PROGRAM - TAKE OUT 15 MIN MEASUREMENTS
(was sep flow)

2100

~~1-4-80~~ → 4:20 Moved profile INLETS
TO SMALL TOWER - HAD TO INCREASE
TUBING LENGTH SAME.

SAME HEIGHTS EXCEPT L4 ~ 5.5m
(NOT 5.0m)

OTHERWISE L1 = 0.5 m

L2 = 1 m

L3 = 2 m

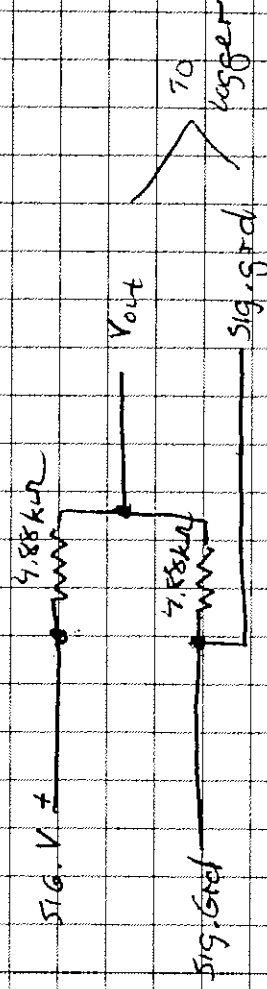
L4 = 5.5 m

L5 = 10 m

L6 = 21.5

PRESSURE CHECKED OK

9/5/00 - Voltage Divider for DOUBLE profile!



TESTING

	V _{IN}	V _{OUT}	V _{OUT}
1002)	11.45	5608	2.0158
T	26.43	1310	2.0176
P	75.587	375	2.0157
	170.30	857	2.0187

RANGE
755-4432mV

n = 8 V

2.0236

132.5

656

2.0200

7.980

3.95

2.0200

4.43032

2.20

2.015

2.018 ± 0.003

9/7/00 Profiler has been on "MANUAL"
 since ~ Aug. 22!!
 F ~ 320 μm
 (New!!)

Pressure seems low

level	P	Altitude
1	90 mV	Altitude cut
2	90 mV	NO change
3	91 mV	
4	89 mV	
5	98 mV	
6	92 mV	

(*) Pumped around Dessicant Trap

PA ~ 644 mV \Rightarrow THAT'S THE PROBLEM
 NEED NEW DESSICANT TRAP

Left running AT 10:48 \Rightarrow NEED TO GET
 MORE DESSICANT

10:53 - 10:55 \Rightarrow Put more balls into EC line
 F before = 8.50 slpm
 F after = 8.40 slpm \Rightarrow NO big change!

Turnmeter
 (*) $2^\circ \Rightarrow 0.191$
 $6^\circ \Rightarrow 0.574$

11/15 Profiler dessicant switch

9/8/00 - 11:04 \Rightarrow Profiler dessicant switch
 11:20 \Rightarrow Underexposed CSAT off \Rightarrow ADDING
 4m CSAT-3

Output \Rightarrow 10 THINGS!!
 Wind speed \Rightarrow final storage 552

11:49 \Rightarrow CHANGED prep. config cover - config, etc
 REPAIRING BOTH CSAT SWs, CS

Powls check

Duck 2.1A
Bottom 5A
M.D. 2.5A
Top 1.1A

④ NO Horn pumps

Thru = CNR = pulled in at 2:30

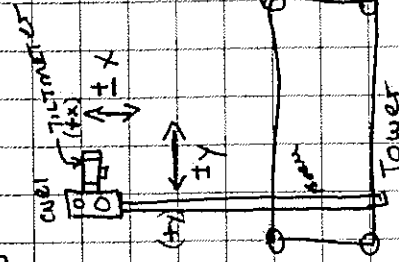
Back cyl at 3:00

TILT = $\pm x = 0.073$ (WANT near ZERO)
 $\pm y = 0.177$ ($\sim 20^\circ$)

$\pm x$ TILT = 0.76°

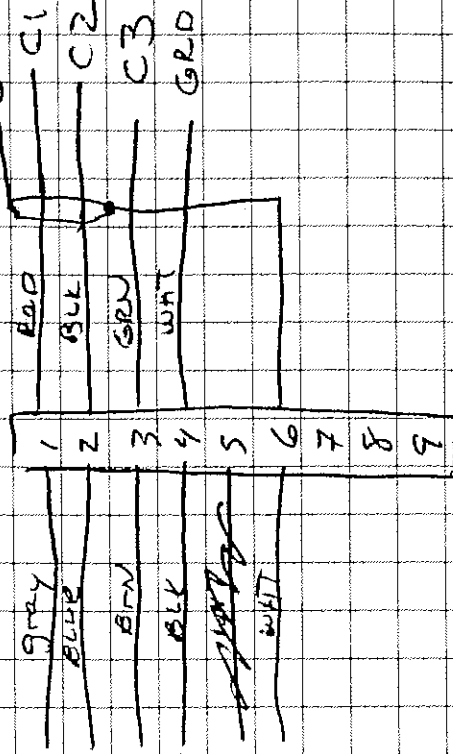
$\pm y$ TILT = 1.872°

DIAGRAM



9/15/00

— 117500 sqm cable —



Sept. 14
Tered outputting
H. res. Campbell
DATA in mod. P.M.
Screwed every thing up!!

VOLTAGE DIVIDER FOR EC SYSTEM
(SAME AS ON 8/5/00 for pre-filter except
 $R = 4.96 \text{ k}\Omega$)

V_{IN}	V_{OUT}	V_{OUT}/V_{IN}
1677.6	836	2.0306
1557.7	472	2.0290
961.3	473	2.0323
780	382	2.0381 2.0419
2892	1419	2.0381
2898	1420	2.0408

$$\text{Avg} = 2.0354 \pm 0.0055$$

$$(0.27\%)$$

1:00 PM began logging
Digital CO_2 output from EC 6262

[0 V \Rightarrow 300 ppm
5 V \Rightarrow 500 ppm]

ATTEMPT TO REKAT SENSITIVITY RELATIVE TO
MEASURING ANALOG VOLTAGE

- 2:30 cleaned K optics

< 3:00 moved Li7500 close to tower \rightarrow hooked up
50m, BUT doesn't seem to be working
properly

- OLD DIGITAL DATA
STARTED ON 1/7/99 0-5V; 300-850 ppm
Robably until 7/9/97 WHEN SWITCHED IRGAS

2.0354
0.27%
2.0354
0.27%
2.0354
0.27%

9/18/00

11:00 \Rightarrow Disconnected DAC output on EC 6262

① Power Spectra looks very bizarre

② \Rightarrow Reset Li7500 \Rightarrow spikes on DACsWent away - SDM still not working
(Recheck!!)11:45-12:00 Put Voltage Divider in EC CO₂ VOLTAGE
Drops from 1000 \Rightarrow 800 mV③ Oshoan shows that we are now getting
THAT 0.1 mV THAT WE WANT!!NEW CAR STANDARD
using Refers 6262

Run	ϕ	SPAN
1	0.16	345.3
2	0.27	345.5
3		
4		
5		
6		

SAMPLE	ppm
401.60	
403.20	

C_{SP} = 345.4 ppmtoo bad!!
unstable up!
SHOULD BACK
6251

7/21

Run	ϕ (mV)	SPAN	P (mV)	T (mV)	S _g (mV)	Sample	T	S _g	ppm
1	3	727	20.15	1383	727	20.6	1555	403.32	
2	2	"	21.1	1378	726	21.4	1548	403.43	
3	0	727	21.907 21.907	1373	727	22.3	1542	403.14(1)	
4	2	728	22.68	1373	728	22.86	1544	403.74	
5	2	727	23.20	1371	726	23.40	1542	403.82	
6	4	727	23.81	1371	727	24.00	1541	403.70	
7	3	727	24.35	1368	727	24.47	1537	403.28	
8	3	727	24.73	1367	727	24.83	1537	403.74	

403.56 \pm 6.28

54221.2

$$366.04 \pm 0.25$$

Deans other (small tank)

445.89

2

20

9/26- 1:7500 IN TRAILER

Ready light keep blinking
every 20-30 sec

Hooked up SDM \Rightarrow BANDWIDTH set wrong
Also \Rightarrow conversion does funny things!!

\Rightarrow ZERO \Rightarrow BOTH CO₂ + H₂O look OK
SPAN CO₂ (OFF BY ~0.2 ppm)

\hookrightarrow used Scott 345.1 ppm
THEN ADDED DUANE WIND STANDARD
measured 368.3 \Rightarrow right on

BACK TO ZERO \Rightarrow OKAY!!
TARGET

#70 WAS DAC

842 \Rightarrow SECUR

10 \Rightarrow empty

11, 12 \Rightarrow DAC channels

getting back to
looks OK, THEN

NO \Rightarrow -1.878

H₂O \Rightarrow -18

164 \Rightarrow -1.65

\Rightarrow 7.8176

(x) or (-)

10:15-10:31 \Rightarrow DOWNLOADED net logger

10:31-11:00 \Rightarrow SWITCHED 6262 for 6251 (Serial 1308)

(S) Note \Rightarrow remember THIS IRGA STILL

HAS SAFETY SWITCH HOOKED UP!!

IF power goes out, have to go flip

switch

11:16-11:44 \Rightarrow DOWNLOADED prof logger

11:50-12:00 \Rightarrow New test 234 program // no 50M

for 1:7500, changed voltage ranges.

1300-13:30 \Rightarrow DOWNLOADED CNR

\rightarrow over

At the same time - changed TIME TILT

$$\frac{I_x}{I_y} \Rightarrow \frac{0.081 \checkmark}{0.316 \checkmark} = \frac{0.85^\circ}{3.31^\circ}$$

1:30 \Rightarrow DISCONNECTED L:7500, TOOK BACK TO TRAILER

10/2/00 DOWNLOADED SOIL LOGGER
FSMPR = 64,908

- TOOK OUT GROUND LUGS ON 3 LEGS OF BASE SECTION

10/4 \rightarrow PUT BRACE ON TOWER LEG. NEW ϕ AIR

10/9 PUT L:7500 BACK UP \Rightarrow RUNNING AT 3:30PM
Running on both SDM & DACs

FAST 232 output now:

u v w tc, diag. 03 STAT. 11 coded. tee, p. cc
h20. ec, h20. k- EC flow, h20. dig, co2. dig
CO2. mmol h20. mmol

SDM outputs
ANALOG outputs

\Rightarrow AT 3:30 \Rightarrow NOTICEO L:6251 IN EC SYSTEM SOUNDED
BAD \Rightarrow CHOPPER MOTOR PERHAPS,

DIED AT \sim 3:45PM

SWITCHED OUT IRGA'S \Rightarrow ~~put~~ put 6262 (IRGA 638)
BACK IN \Rightarrow has NEW calibration
(*) H2O channel back on

(*) DROPPED 6251 (IRGA 308) OFF TOWERS (oops!)
well-time to send in BACK ANYWAY.

\Rightarrow 6262 \Rightarrow RUNNING AT 5:00 (ϕ & SPAN)

10/16 Afternoon2:39 - EC system off for pressure
CALIBRATION

T.	RESTRICTION	Downstream	MPs RAW	MPs water
F	Licor Voltage	Pres	UPST.	LP
7.06	-191	56.20	4.52	178.4
6.50	- 207.0	58.08	4.54	183.0
	-62.17		4.84	171.3
4.80	242.8	62.81	4.84	195.2
3.49	450.9	65.97	5.05	—
1.79	652.6	69.63	5.25	—

II - RESTRICTION UPSTATION -

6.95	-996	43.98	3.53	3.26	142.4	131.6
5.50	-1406	37.75	3.02	2.81	122.0	113.6
4.46	-1732	32.86	2.62	2.45	106.7	99.1

ATM Pressure

0.55	757.5	70.64	5.36	5.36	—	—
------	-------	-------	------	------	---	---

O.P. CONDITIONS

8.40	-568.5	50.54	4.06	3.73	163.9	150.6
7.41	-277.2	54.92	4.33	4.09	174.9	165.2
6.77	-136.6	57.04	4.46	4.27	180.3	172.3
7.27	-385.6	53.25	4.23	3.95	176.7	159.3
5.88	53.9	59.94	4.65	4.50	187.8	181.8

BACK ON-LINE AT 3:30
Pressure off

conversion to kPa
 1 Torr = $\frac{101.3 \text{ kPa}}{760 \text{ Torr}}$ = 0.1333 Torr

Rotameter 1.1 Volt
 (Amp.) 0.977
 17.5 394
 10 569
 23 270
 32-33 -335

AKS UP DN
~~0.977~~ 5.30
 5.97 4.96
 5.16 5.15
 4.80 4.81
 4.11 4.10

BACK CN - 3.54
 Rotameter = 17

MORNING

11-11:20 \Rightarrow New net code, moved Prep AND
 wind speeds to different channels

Now \Rightarrow channel 9
 16m \Rightarrow channel 10
 11:20 Reset 6.7500 \Rightarrow still spiking

11:30 New Tilt on CNR Radiometer
 It was
 $\pm x = 0.088^\circ \Rightarrow 0.92^\circ$
 $\pm y = 0.253^\circ \Rightarrow 3.06^\circ$
 changed to
 $\pm x = 0.085^\circ \Rightarrow 0.89^\circ$
 $\pm y = 0.519^\circ \Rightarrow 5.43^\circ$

11:30-11:50 Profiler OK
 - new dessicant
 - Also put on Rotameter in place of
 Needle valve

Rotameter
 18 Flow (per hour)
 \rightarrow 513 ml/min

11:15-1:50 Replumbed Ref. $N_2 \Rightarrow$ now goes thru
 profiler to EC system

10/18/00 New CAL STANDARD
(using Peters 6262)

340 = 345.4 ppm

RUN	IRG (ppm)	SPAN (ppm)
1	0.0	345.4
2		
3		
4		
5		
6		
7		

⊗ Peter's IRGA is screwed! Very UNSTABLE
WILL NEED TO RE-CALIBRATE THIS STANDARD
LATER!

New 510. 11:00 AM
10:55-10:58 manual & V SPAN OF
EC SYSTEM, Meas. NEW TANK
TO BE 405.0 ppm (1)

⊗ 11/3/00 10:30⁵¹ - New TILT ON Radiometer

OLD

$$\begin{aligned} \pm X &= 0.518 = 5.413^\circ \\ \pm Y &= 0.085 = 0.89^\circ \end{aligned}$$

NEW

$$\begin{aligned} \pm X &= 0.660 / 0.650 \\ \pm Y &= 0.085 = 0.89^\circ \end{aligned}$$

6.897 - 6.793

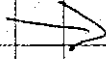
11:10-11:20 ⇒ New filter on EC system
11:00-12:00 ⇒ New filters on Profile INLETS

~ 8-2 - Reconnected 16 m prop ⇒ seemed to be working
DIED SHORTLY AFTER
- Put on new connector ⇒ seemed to be working when
I LEFT.

① 1:30

DOWNLOADED SOIL LOGGETT CHANGED TIME TO STANDARD TIME!

11/6 ⇒ Apparently 16m wind speed died again few hours after 5:10 PM (?)



SEAMED TO START WORKING AGAIN

12/1/00 New STANDARD

Span = 375.4

// newly calibrated 6251 (308)

REV	SPAN		P	COR		SAMPLE		P	COR	CORR (ppm)
	±	±		±	±	T	T			
1	0	11.40	787		1414 (504)	11.88	786	1607	1607	411.18
2	0	12.58	786		1410	12.66	786	1609	1609	411.24
3	0	12.9	786		1399 (409)	13.00	786	1604	1604	411.73
4	0	13.27	786		1408	13.35	786	1595	1595	409.06
5	0	13.7	786		1406	13.6	786	1600	1600	411.47

410.94

± 1.1 ppm

SPAN HIGH

② BIG offset AFTER SPANNING

New std. - 1.30

1585 new CUR FIT

$$\begin{aligned} \bar{x} &= \frac{\text{new}}{\text{old}} = \frac{0.818}{0.920} = 0.888 \\ \bar{x} &= 0.888 \end{aligned}$$

$$\begin{aligned} \bar{x} &= \frac{\text{new}}{\text{old}} = \frac{0.637}{0.920} = 0.692 \\ \bar{x} &= 0.692 \end{aligned}$$

$$\begin{aligned} \bar{x} &= \frac{0.0}{0.0} = 0.0 \\ \bar{x} &= 0.0 \end{aligned}$$

EC MANUAL SPAN

1:40

new profiler pump
ON AT 2:00

③ TSC

O₃ LINE HAD CURVE DISCONNECTED

AT ~ 8-9 m.!!

12/17/02 - NEW AIR
- NEW DESSICANT IN POUCH (~10 KG AIR)

12/28/03
New standard air
Scott Tank
~ 500-600 psi

CHECKING LIG 251 => #308
CHECKING SCOTT TANK A vs LUMO

RUN	ZERO	SPAN	P	T	V _{CO2}	SCOTT TANK A		CO ₂ (U)	CO ₂ (ppm)
						A	I		
1	0.000	0.783	15.96		1465				
2					1465				
3	0.000	784	16.40		1464	786	16.51	1396	345.98
4	"	"	16.75		1463	✓ 785	16.90	1400	348.36
5	"	784	17.20		1464				
6			17.20		1461	✓ 785	17.35	1394	345.92
7	0.00	784	17.53		1460	✓ 785	17.68	1393	345.98

⊕ - Blank found

new AIR ~ 12:45 PM
(~ 300 psi left in EXTRA TANK AT TOWER)

RUN	ZERO	SPAN	P	T	V _{CO2}	SCOTT TANK A = 345.4 ppm		CO ₂ (ppm)
						Sample	T	
1	0	781	20.19		1381	780	20.27	400.03
2	"	"	20.42		1380	780	20.50	399.99
3	0	781	20.77		1379	780	20.85	399.41
4	0	782	21.08		1378	"	21.17	399.52
5	0	782	21.49		1377	781	21.55	399.94
6	0	782	21.84		1376	780	21.90	400.04
7								

399.82 ± 0.28
(100)

New Sealed solutions: $0.7523g - 5.05g/L \times 0.500g$
 $\frac{56ml}{56ml} = 10.085/L$

NEW BATCH OF SEALED TARGETS

using 5g/L solution // 1 ml each 5 mg in solution

1 → 9 ⇒ Kieselguhr silica-gel
 10 → 16 ⇒ Whatman GF/C

TARGETS DIDNT LOOK TOO GOOD (very white)
 even the kieselguhr

Maybe Drying too fast

101 → 109 : kieselguhr; 5g/L
 110 → 116 : Whatman GF/C

where does dye go?
 for 5 g/L ⇒ 1 ml ⇒ 5 mg/ml

TRY weighing some of THE next target before AFTER

NEW BATCH - ALL Whatman GF/C		before		after	
Well	VIAL#				SOLN
1	117	—	—	—	DYE
2	118	—	—	—	DYE
3	119	—	—	—	DYE
4	120	0.0084	0.0104	0.0084	DYE
5	121	0.0060	0.0170	0.0060	DYE
6	122	0.0036	0.0160	0.0036	DYE
7	123	0.0084	0.0082	0.0084	DYE
8	124	0.0055	0.0058	0.0055	MECH
9	125	0.0063	0.0060	0.0063	MECH
10	126	0.0063	0.0063	0.0063	MECH
11	127	0.0064	0.0063	0.0064	MECH

8) ALSO TURNED N₂ flow DOWN (longer DRYING TIME)

DYE APPEARS TO DEFINITELY BE IN THE TARGETS - EVEN THOUGH yellow color is NOT real apparent. ALSO - weights were drifting some - MIGHT MAY EVAPORATE SOME DYE IN IT.

SHOULD REDO SOME CELLULOSE TARGETS IN THIS FASHION

1/4/00

Rechecking wind direction calculations

(*) Not calculating mean wind direction properly!!
(will be right most of time)

W/ Time series of wind directions ($\frac{1}{2}$ hr)

(A) OLD WAY \Rightarrow TAKE MEAN (doesn't work near 0°)

(B) NEW WAY \Rightarrow get x & y components

$$U_x = \text{mean}(\sin(\theta))$$

$$U_y = \text{mean}(\cos(\theta))$$

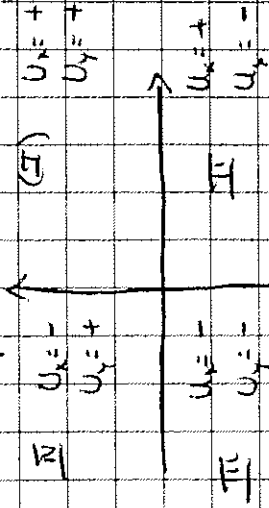
$\theta \in$ WIND DIRECTION
IN RADIANS
(Not degrees!!)

$$\theta = \arctan\left(\frac{U_x}{U_y}\right)$$

$\theta =$ IN RADIANS

$\left(\frac{180}{\pi}\right) = \text{degrees}$

THEN get proper quadrant



If $U_y < 0 \Rightarrow \theta = \theta + 180$ (Quads. II & III)

$U_y > 0 \Rightarrow$ IF USE $(\theta < 0, 360 + \theta)$

\rightarrow Quad I

Vector Wind Speed =

$$U_e = \text{mean}(\text{wspeed} * \sin(\theta))$$

$$U_m = \text{mean}(\text{wspeed} * (\cos(\theta)))$$

$$U = \sqrt{U_e^2 + U_m^2}$$

\rightarrow Quad IV

⇒ ALSO - New way of calculating std. deviation of wind direction
see Campbell 23x MANUAL pp 11-2

1/11/01

03 DEC AT 11:00 AM (Back Down 10.147)
TREC TO THE LAB

11:30 - New TILT ON CNA

OLD

NEW

$$\pm X = 0.097 \Rightarrow 1.019^\circ \quad \pm X = 0.099 \Rightarrow 1.035^\circ$$

$$\pm Y = 0.878 \Rightarrow 9.189^\circ \quad \pm Y = 1.200 \Rightarrow 12.65^\circ$$

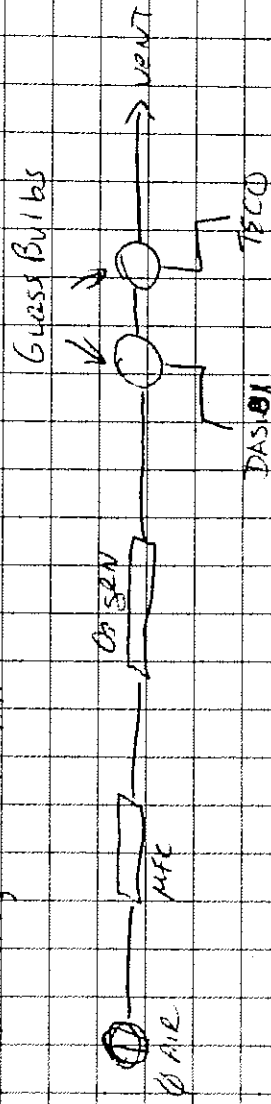
New Cal std. on $\bar{\sigma}$ 1:30 PM

399.8 ppm

Downloaded Soil 23ra

11/22/01 Checking TEO O₂ CALIBRATION -

Running ZERO AIR



FLOW TOTA = 4.103 gpm

TEO = Bench Temp = 33.4°C

Pressure = 625.9 Torr

TEMP = 56.6°C

Flow A = 0.726 gpm

Flow B = 0.720 gpm

DAS/B1 Flow = 2.25(?)

(Cells A+B)

~~DAS/B1~~ O₂ setting

DAS/B1

TECO

off
on

1.8 (-0.2-1.5)

92/93

91.5 - 96.3

~~76/75~~

73.2 - 71.6

103/102

109.1 - 107.7

112 = 103-114

121.3 - 120.9 - 123.5

47/48

46.7 - 48.1

30/31

24.5 - 25.6 - 26.1

SWITCHED INLET LINES AT UV detectors

~~32/33~~

~~24.5~~

32/33

24.5 - 23.8 - 25.4

45/46

41.5 - 43.0

68

62.2 - 63.9

94/95

88.1 - 89.5 - 90.4

114/115

110.2 - 112.0

131/132

129.5 - 128.1

SWITCHED INLET LINES -

~~128~~

X 118/119/120

126.5 - 121.8 (2)

120/121

121.8 - 122.0

✓

119 - 120

120.1 - 121.6

off

10 - 12

20.1 - 1.3

TESTING INLET LINES & FILTERS

Setup

DASIAL

TECO

Normal

92-93-94

~~88.9~~ 88.9-90.1

Last Filter inline

96

86.7-85.8

OLD FILTER (from summer)

92/93/95

87.5-85.6

Lower 1/2 of inlet

96

66.6-67.7

Upper 1/2 of inlet

~~92/93/95~~ 97/95

65.9-64.9-66.2

Upper 1/2 of inlet

97-97

58.8-57.4

(+ empty filter

CASE - now)

Empty filter case

93-92

89.2-86.7-85.4

Normal

93-94-95

91.1-92.9-94.3

92.8-94.3

Full inlet line -

98

49.87-48.3

 $P = 557.6 \text{ mthg}$ $F_g = 0.706 \text{ hr}, F_g = 0.701 \text{ hr}$

TURN DOWN 03



67-70

32.9-33.6-34.4

51-50

25.1-23.9

35-34

16.4-17.0

33-34

28.8-27.0

Normal

82

77.0-75.8

Sealed inlet

84-83-85

76.8-75.4-77.1

Rest of BIRCH

85

75.9-75.2-

TEACON

86

87-88

67.8-67.1-66.5

TEE #1 (piece of)

86

87-88

67.8-67.1-66.5

TEACON

86

87-88

67.8-67.1-66.5

TEE #2

86-89

63.7-62.4

Normal

84-88

80.3-78.1-78.5

85-87

82.8-83.8-84.1

EC inlet (Decabon)

88-89

85.1-85.9

1/24/01

Peaks w/ respect to towers
Center clockwise from N

		Miles
1	-25° from mag. N	
2	-44° " " "	
3	-85° " " "	S. Draper house
4	-94°	
5	-104°	
6	-140° - Deans Tower	

NEW DATA

12:08 MAN. SPAN + Q ON EC SYSTEM
12:15-12:30 - Cleared R. by ground

~ 2:45 - Hooked up Blackens' data logger

=> underestimating Fox Tower

Channel 706

=> getting some data - but it is intermittent
& looks crazy

Don't understand what's going on.

Turned this channel off after ~ 20 min

THINGS TO CHECK -

① IS DATA BEING OUTPUT IN HIGH RESOLUTION

② IS THERE DATA LOGGET PROGRAM SET-UP

(MISSING SAMPLES, ETC. - WRITING OTHER DATA TO FS #1)

③ NEED TO CHECK IS MIN. COORDINATES.

④ TRY PUTTING IN PROGRAM ~~just~~ just spew out data!

sample

$$y_{BGR} = 0$$

て	ち
り	っ
の	に

五十二

$$(-1) = -1$$

204-0

①	②
11	11
11	11

十	十
二	二
一	一

22

22