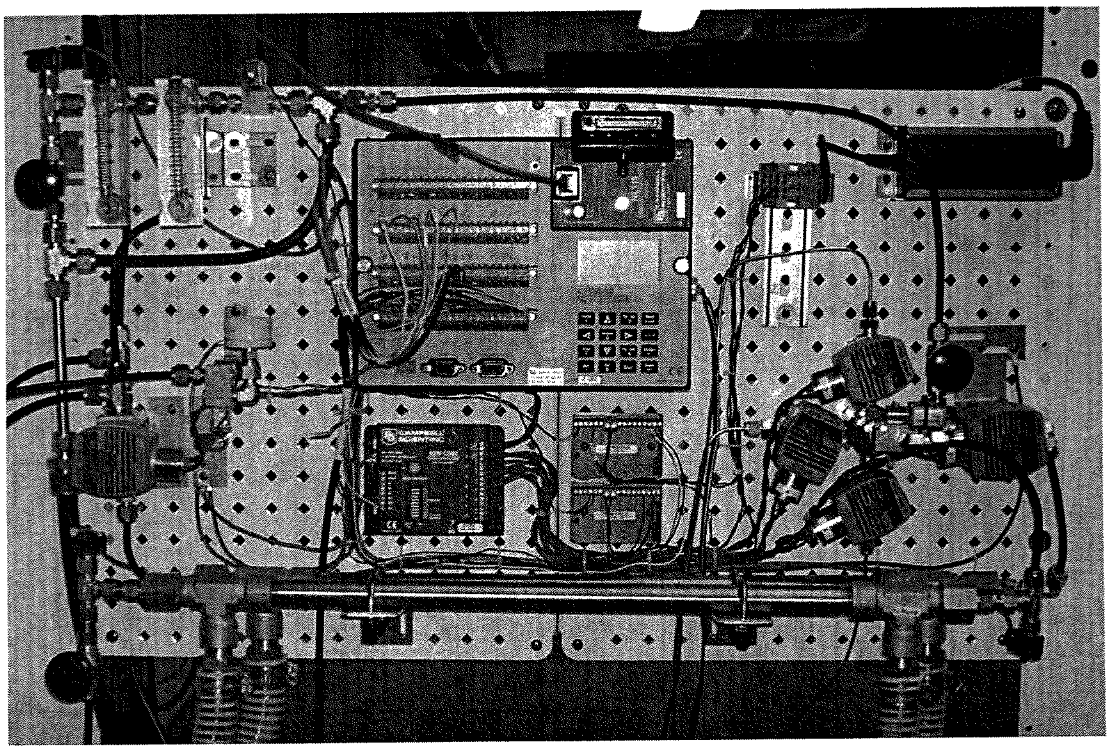
Sampling System for Eddy Covariance / Profile with Calibration



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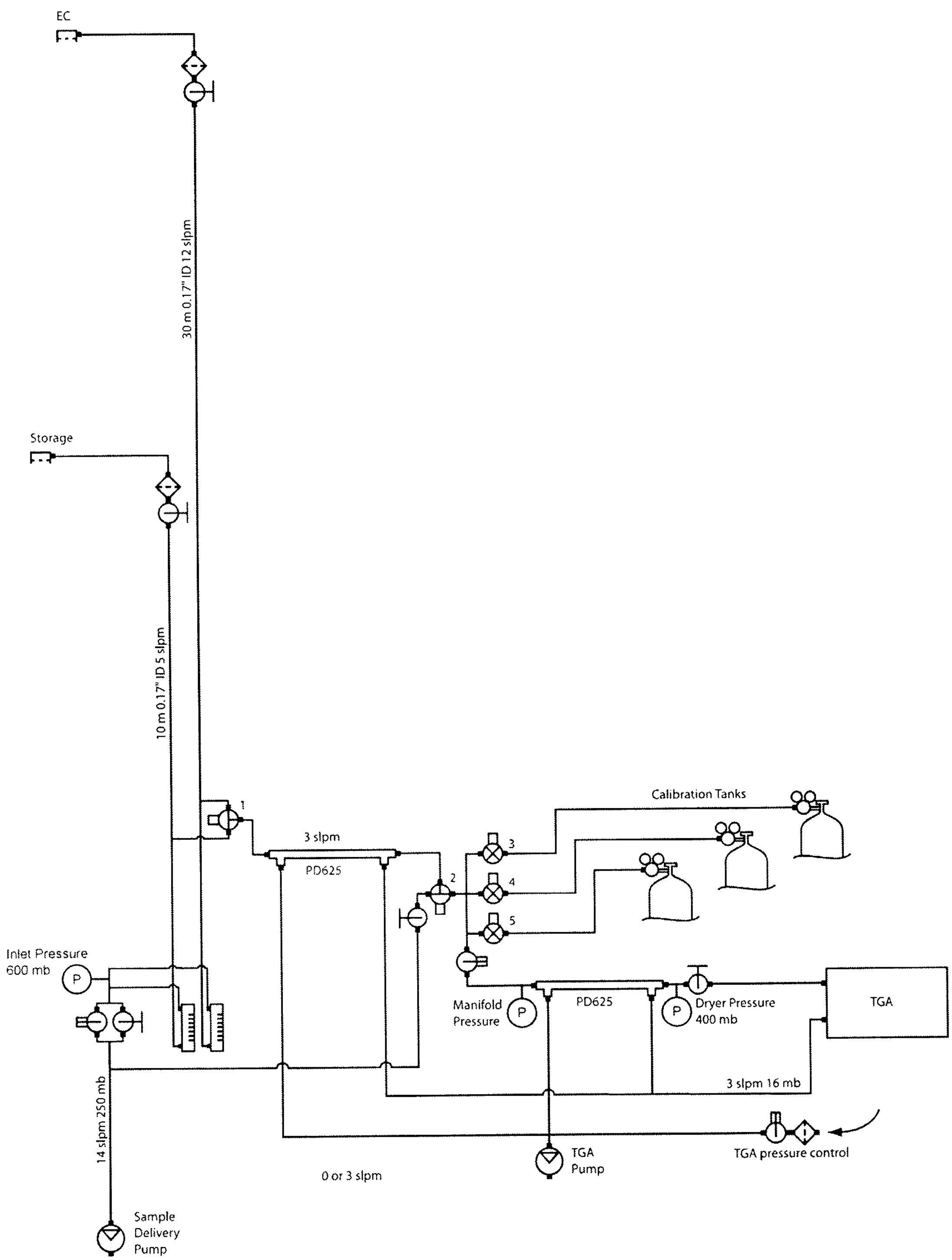
Plumbing Diagram



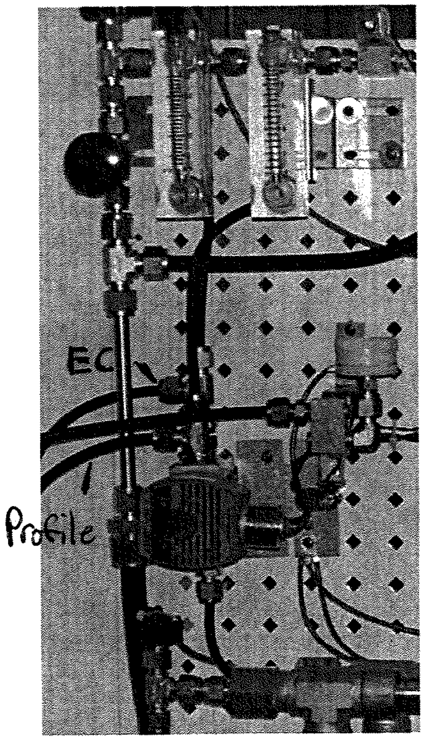
General Description

The EC/Profile sampling system has one EC inlet, one profile (storage term) inlet, and three calibration inlets. It is designed for high base flow rates and a subsample flow up to 3 slpm. The calibration inlets use 2-way valves that allow flow only when they are selected. The EC and profile inlets are selected by a 3-way valve that pulls a subsample from the selected EC or profile inlet all the time. If a calibration inlet is selected, the subsampled flow bypasses the TGA, flowing to the sample delivery pump.

The system is designed for two pumps: a sample delivery pump and an analyzer pump. The sample delivery pump pulls a high flow down the EC and profile sample tubes to the sampling system. It will operate at approximately 14 slpm and 250 mb. The analyzer pump is a Busch model RB0021, modified to allow continuous operation. The analyzer pump pulls a subsample through the TGA. This pump will operate at approximately 3 slpm and 16 mb.

The EC/profile sampling system uses two dryers. A PD625 dryer between the EC/profile selection valve and the calibration manifold does most of the drying. A second PD625 between the calibration manifold and the TGA ensures the calibration samples have the same humidity as the air samples. These dryers are purged in reflux mode, using the output of the TGA.

Sampling System Connections



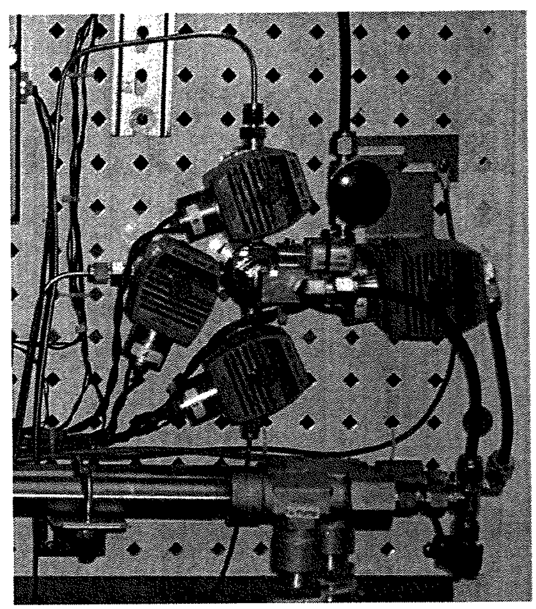
EC / Profile Inlets

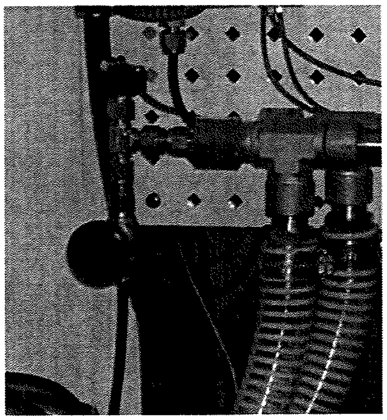
The EC and profile inlets are the tees on the left side of the sampling system. These tees are mounted on the ASCO valve that selects either the EC or profile inlet. The tee that is behind and slightly above is the EC inlet. The top outlet of this tee carries the excess flow to the 0-25 LPM rotometer to monitor the EC base flow. The other tee is for the profile inlet, and it connects to the 0-10 LPM rotometer.

The outlet of the EC/profile selection valve connects to the PD625 dryer to provide the subsample for the TGA. If this valve is energized, the EC inlet will be selected. If it is not selected the profile inlet will be selected.

Calibration Inlets

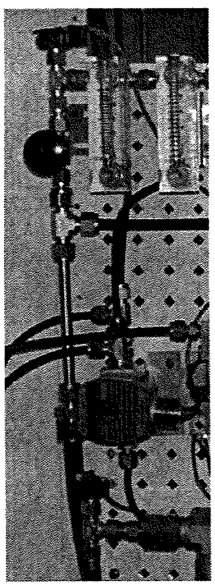
The calibration tank inlets are the 1/8" Swagelok fittings on the calibration valves (top, bottom, and left) at the right side of the sampling system. The fourth valve (right side) selects the EC/profile inlet.





Sample Outlet

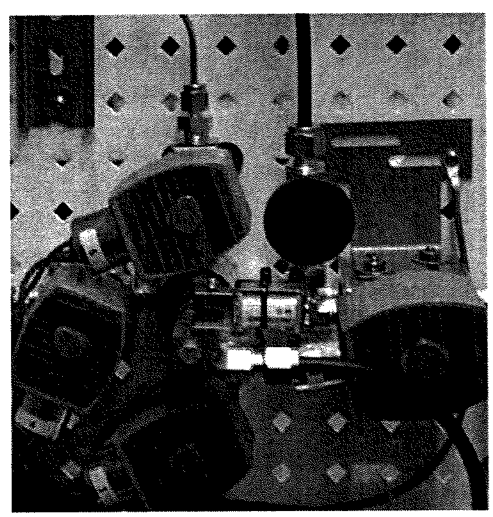
The sample outlet connection is at the lower left corner of the sampling system. A needle valve and pressure sensor are attached to a tee at the outlet of the second dryer (left side of the dryer in front). This pressure sensor measures the dryer pressure. The needle valve controls the flow subsampled to the TGA. Connect the outlet of the needle valve to the TGA sample inlet.

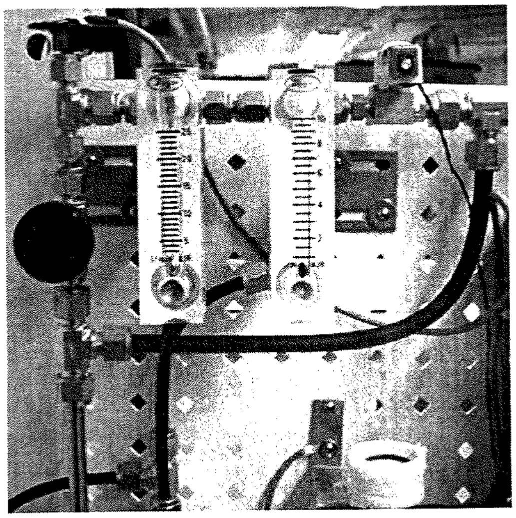


Bypass Outlet

The bypass outlet is the outlet of the 3/8" Swagelok tee at the upper left corner of the sampling system. A 5" section of 3/8" OD stainless steel tubing extends this outlet down below the EC and profile inlet connections. A reducing union allows the connection to the 5/8" OD black polyethylene tubing that leads to the sample delivery pump (Gast double-head pump).

The bypass needle valve is connected to an elbow on one outlet of the 3-way solenoid valve on the right side of the sampling system. This needle valve controls the flow subsampled from the EC/profile inlet when a calibration tank is selected. It should be adjusted to keep this flow constant, whether it is selected to go to the TGA or bypassed to the sample delivery pump.





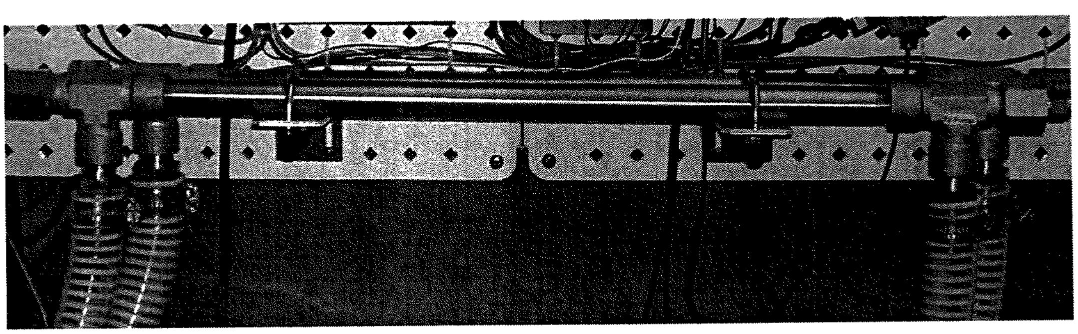
The excess flow from the EC and profile inlets goes through the rotometers mounted at the upper left corner of the sampling system. The 0 – 25 LPM rotometer on the left carries the EC flow and the 0 – 10 LPM rotometer on the right carries the profile flow. Note that these rotometers will be at low pressure, so the flow will read higher than the standard flow. At 600 mb they will read approximately 1.3 times the standard flow.

The inlet pressure is measured by the pressure sensor at the tee to the left of these rotometers. This pressure is controlled by the electronic proportional control valve to the right of the rotometers. This control valve is too small to carry the full flow from the intakes, so a manual needle valve below the pressure sensor carries part of the flow in parallel with the electronic valve.

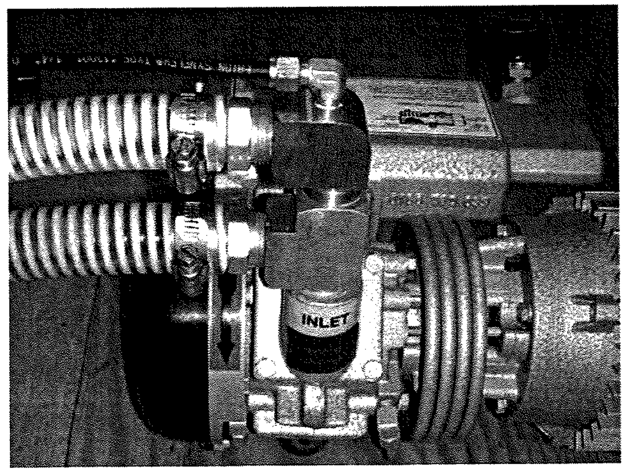
Dryer Purge Connections ✓

The dryers are purged with the exhaust from the TGA. Connect the TGA pump outlet to the dryer purge inlets using the ½" Swagelok tee, adapters, and 1" hose as shown below.

Connect the other end of these 1" hoses to the dryer purge inlets as shown below. ✓

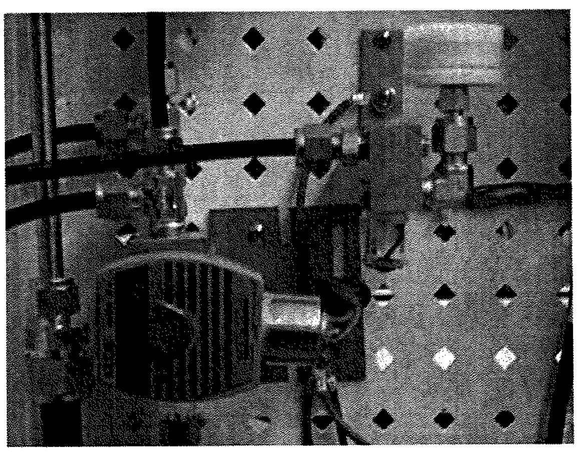


Two more sections of 1" hose connect the dryer purge outlets (labeled "To Pump") to the Busch pump, shown at right.



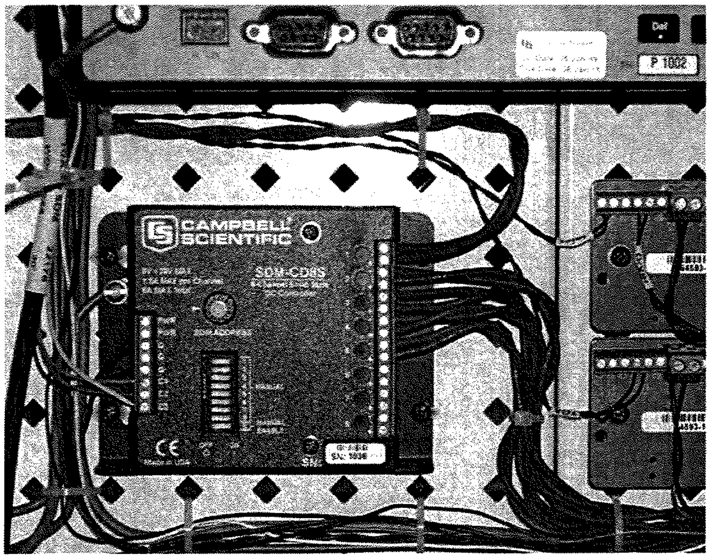
TGA Pressure Control Connection

The sampling system has a filter and electronic proportional control valve to admit air to the Busch pump as needed to maintain the TGA pressure at a setpoint. The filter and valve are shown below. Connect the outlet of this assembly to the ¼" Swagelok elbow on the Busch pump inlet (shown above).



Valve Drive Electronics

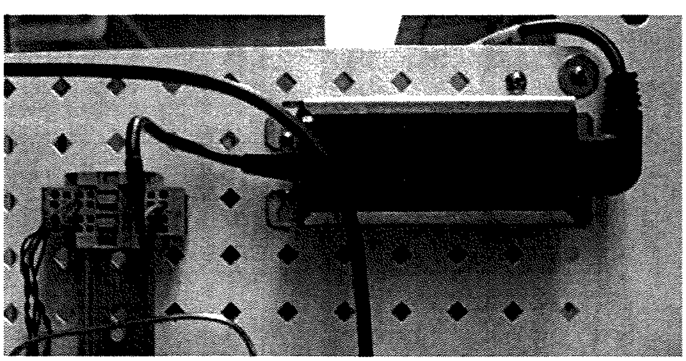
The valves are controlled with an SDM-CD8S DC control module.



Valves may be controlled by the datalogger via the SDM cable, or manually using the switches on the SDM-CD8S module. The table below indicates which SDM-CD8S channels should be turned on for each sampling system inlet.

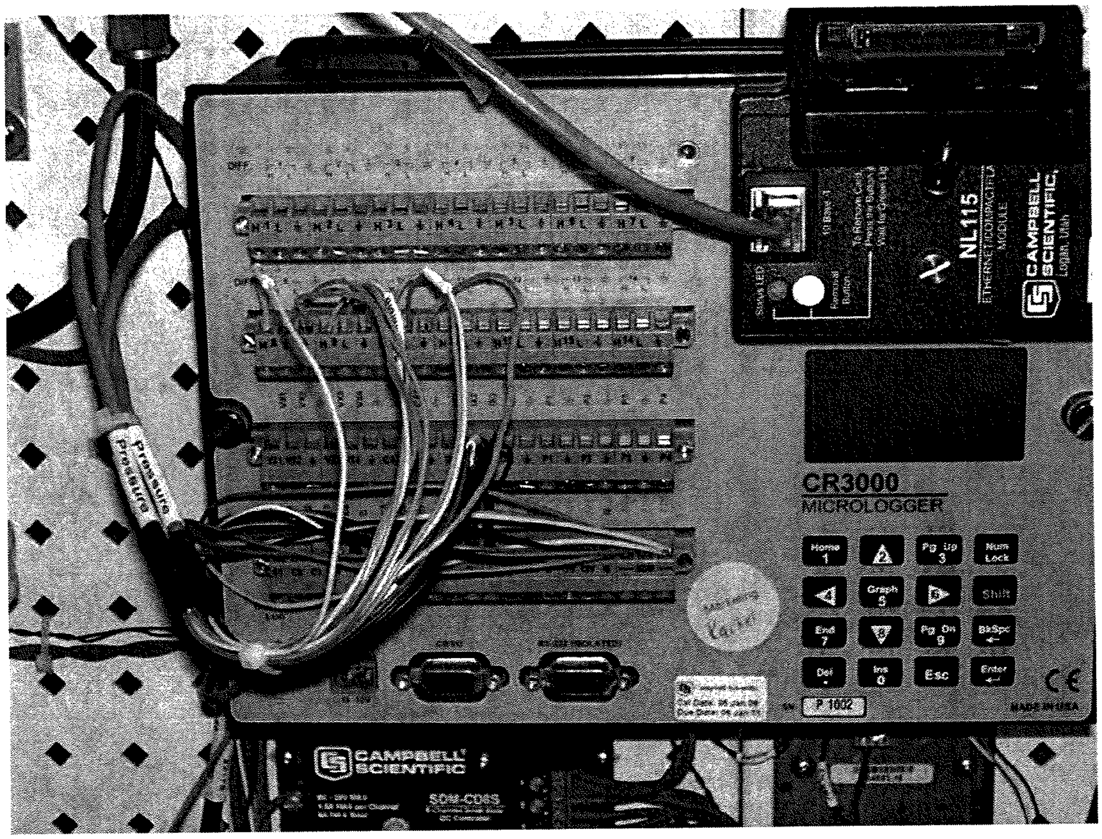
Inlet	SDM-CD8S Channels
EC	1 and 2
Profile	2
Cal 1	3
Cal 2	4
Cal 3	5

A 12V power supply in the upper right corner of the sampling system powers the valves. Connect this power supply to AC mains power, 110/220 Vac, 50/60 Hz.



Datalogger Connections

The sampling system requires a CR3000 datalogger (user supplied) to measure the three pressure sensors in the sampling system as well collecting TGA data via SDM. These cable connections are shown below. The datalogger also requires a power supply (user supplied) to charge its battery.



Sampling System Adjustment Procedure

Connect all plumbing as shown in the plumbing diagram. Turn on both pumps.

Inlet Flow

The flow in the EC and profile (storage term) inlets is determined by the needle valve at the inlet. Temporarily attach a rotometer to the inlet to measure the flow, and adjust the needle valve as needed.

Inlet Pressure

The inlet pressure (pressure in the sample tubes where they connect to the manifold) is measured by the transducer mounted on the sampling system, and controlled by an electronic control valve. Initial testing showed this pressure must be at least 550 mb to obtain 3 slpm through the sampling system, so a pressure of 600 mb is recommended to provide adequate flow with some margin.

Note that rotometers do not measure standard flow rates unless they are at standard temperature and pressure. The pressure in the rotometers on the sampling system will be approximately 600 mb, so they will read approximately 1.3 times the standard flow.

Inlet Needle Valve

The inlet needle valve (to the left of the rotometers) is a "helper" for the electronic control valve. Adjust this needle valve to put the electronic control valve near the middle of its adjustment range (*InletP_DutyCycle* ~ 0.65).

Dryer Pressure

The pressure in the second dryer (outlet) is controlled by the datalogger to the setpoint. A setpoint of 400 mb is recommended.

Sample Flow

The flow subsampled to the TGA is determined by the needle valve at the outlet of the second dryer (and the dryer pressure). Make sure the dryer pressure is at the setpoint and adjust this needle valve as needed. A sample flow of 3 slpm is suggested.

Calibration Inlets

- Select a calibration tank
- Set the regulator delivery pressure for ambient pressure (~0 psig)
- Make sure the dryer pressure is at the setpoint and the sample flow is at the desired value
- If the dryer pressure and the sample flow are low it may be necessary to increase the regulator delivery pressure to a few psi above ambient
- Repeat for each calibration tank

Bypass Needle Valve

The bypass needle valve (on the calibration manifold) controls the flow through the first dryer when a calibration tank is selected. The goal for setting this needle valve is to keep a constant flow through the dryer whether this flow is selected to go to the TGA or bypassed. This flow is not measured, but a constant flow can be inferred by keeping the value of the *InletP_DutyCycle* variable constant.

- Select the EC or profile inlet
- Make sure the *SampleFlow* is at the desired value
- Note the value of the *InletP_DutyCycle* variable
- Select a calibration tank. This will divert the flow subsampled from the EC or profile inlet through the bypass needle valve instead of the TGA.
- Adjust the bypass needle valve to make the *InletP_DutyCycle* variable read the same as noted above

TGA100A Product Assembly Record

TGA200 Serial Number_____1110______________
Work Order______________74828_____________
IH Order________________236994____________
Assembled by_____________Paul Fluckiger______
Completion Date__________November 2, 2009_______
Customer________________Andreas Christen, U of British Columbia

Electronics

Sub Assembly_____1029__________
Mother Board_____72360-01______
Power Supply_____1030__________
CPU____________1360__________
Analog__________1030__________
Input____________1033__________
Output___________1030__________
Heater PWM_____64593-10________

Absorption Cell Lengths

Sample_______146.6____________
Reference_____146.6____________

Pressure Transducer

Zero Output (V)_________0.2231______
Full-range Output (V)_____4.643_______
Full-range Output (mbar)__1013________

Detectors

	Reference	Sample
Manufacturer	Infrared Associates	Infrared Associates
Model	MCT-5-TE3-1.0	MCT-5-TE3-1.0
Serial Number	8775	8777

TGA OS

Version_______TGAWindows 2.2_____
Firmware______TGA_2.2_____________

Position 1 Laser

Serial Number__360-HV-1-253______

	Ramp A	Ramp B	Ramp C
Gas	CO_2	^{13}C	^{18}O
Wave number (cm^{-1})	2311.756	2311.399	2311.972
Operating Temp (K)	101	101	101
DC Current (mA)	374.5	362.9	381.5

Position 2 Laser

Serial Number______________

	Ramp A	Ramp B	Ramp C
Gas			
Wavenumber (cm^{-1})			
Operating Temp (K)			
DC Current (mA)			

LN2DEWAR

Serial Number_______08-4936________

Cold Strap (K/W)______21.5____

CRYODEWAR

Serial Number_________NA____________

Compressor SN________NA____________

Cold Head SN_________NA____________

Specials

Polyethylene Liner in Long Cell___NA___

Other Notes

Dewar Evacuation Assembly____099406353_____

InfraRed ASSOCIATES, INC.

CUSTOMER: CAMPBELL SCIENTIFIC   P.O.: 86967   DATE: 7/20/2009

DETECTOR TEST REPORT

TEST CONDITIONS

Operating Temperature (K)	215
Background Temperature (K)	298
Blackbody Temperature (K)	500
G Factor	5.8
Flux Density	4.315 x 10 E –5 w/cm^2
Chopping Frequency (hz)	1000
Diode	

DETECTOR/ DEWAR DESCRIPTION

Cap Number	8777	
Serial Number	M-28903	
Model Number	14002	
Detector Number	39165	
Element Length	1.0	mm
Element Width	1.0	mm
Active Area	1.0E-2	cm^2
Field of View		
Dewar Model	TO-66	
Window	SAPPHIRE	

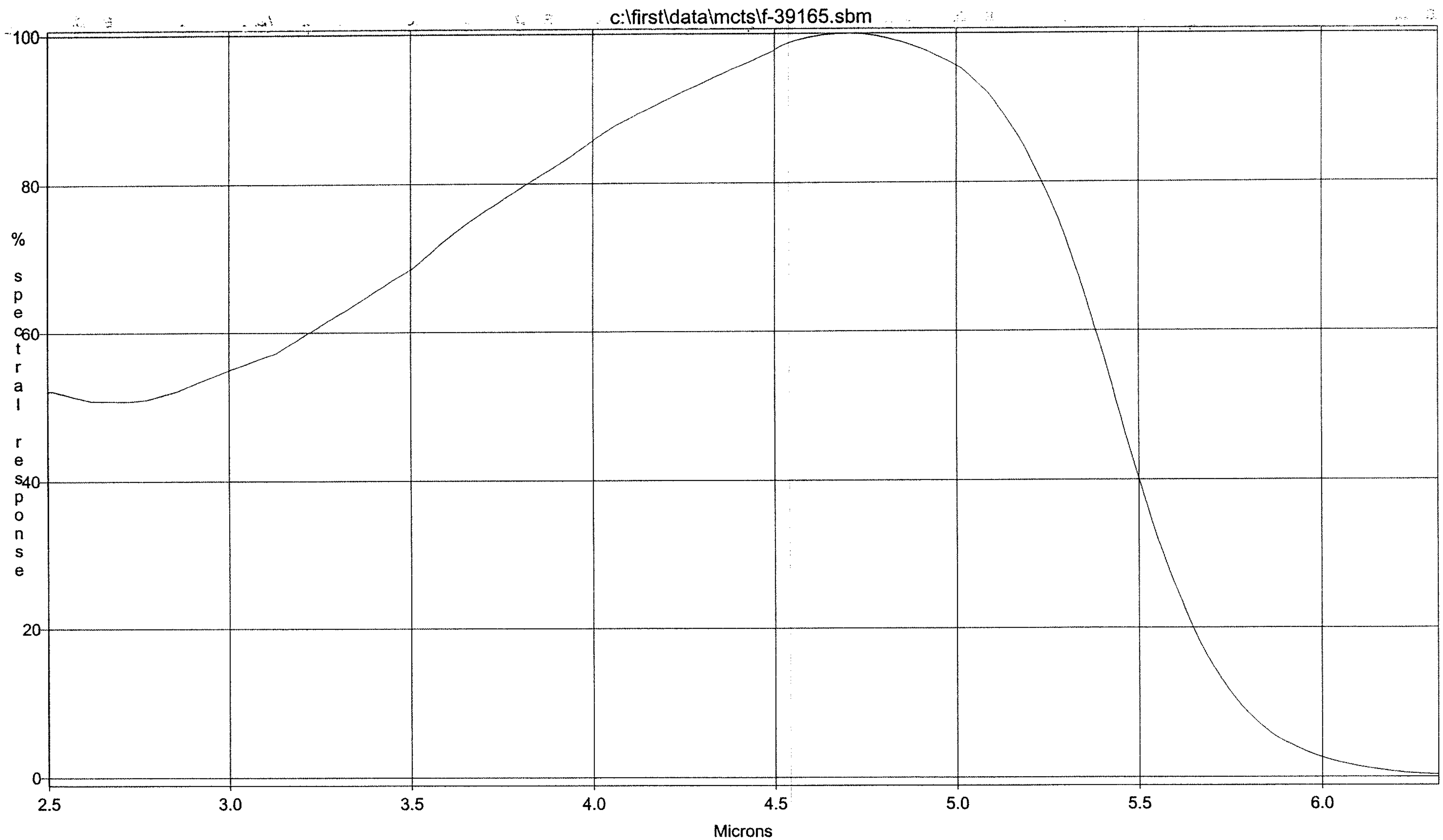
Detector Test Data

DETECTOR RESISTANCE AT 298K: 419 ohms

Current (mA)	Voltage (mV)	Resistance (ohms)	Responsivity (Peak V/W)	Noise (nV RMS/Hz^1/2) 1 khz	10 khz	D* (Pk, f,1) E9 1 khz	10 khz
1.66	2000	1204	10150	25.42	23.22	40.02	43.79
1.23	1500	1219	7714	19.77	17.86	39.15	43.32
0.82	1000	1219	5162	14.12	12.50	36.59	41.29

Tested by: RE   **Date:** 7/20/09

Approved by: RE   **Date:** 7/20/09



WinFIRST Report

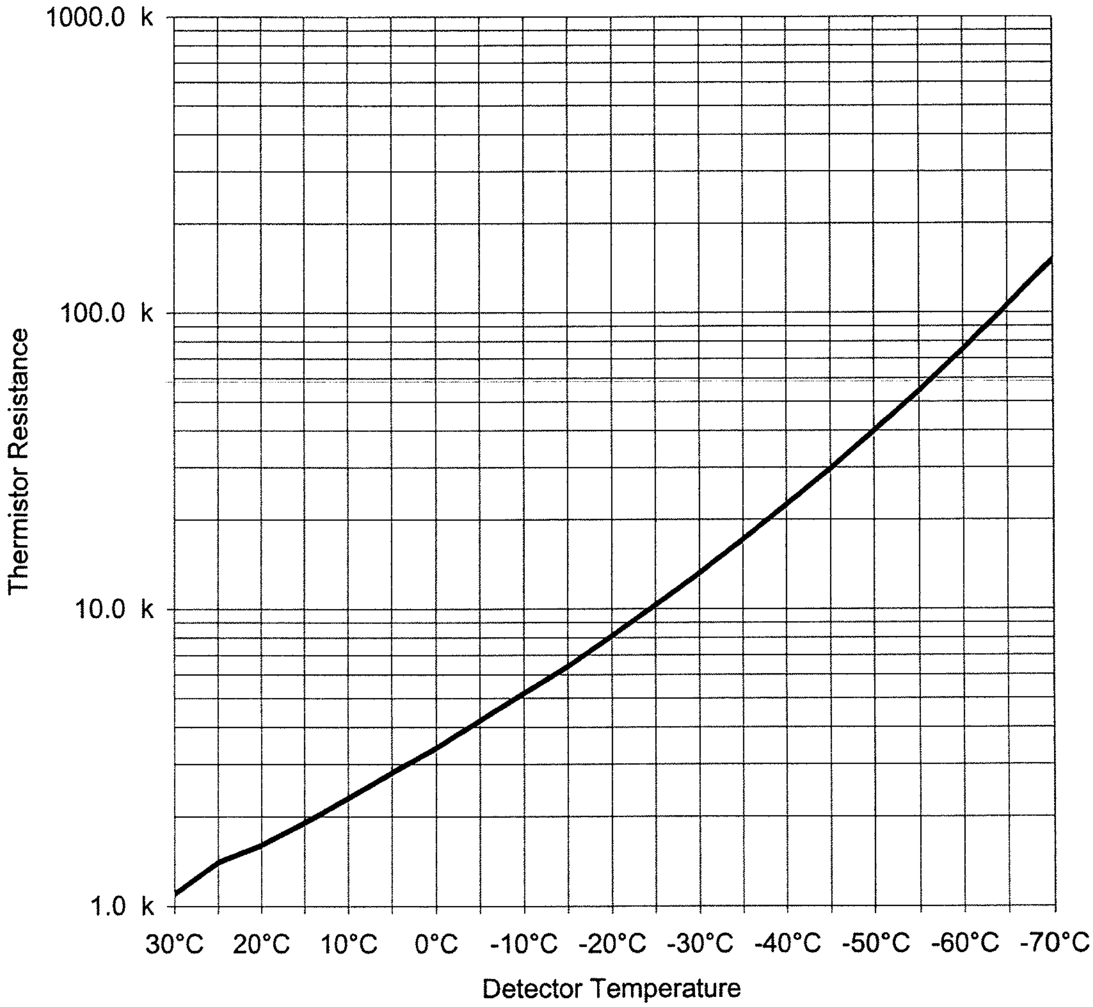
Name:
Date:
Sample:
Comments:

Thermistor Calibration Curve
Part Number:

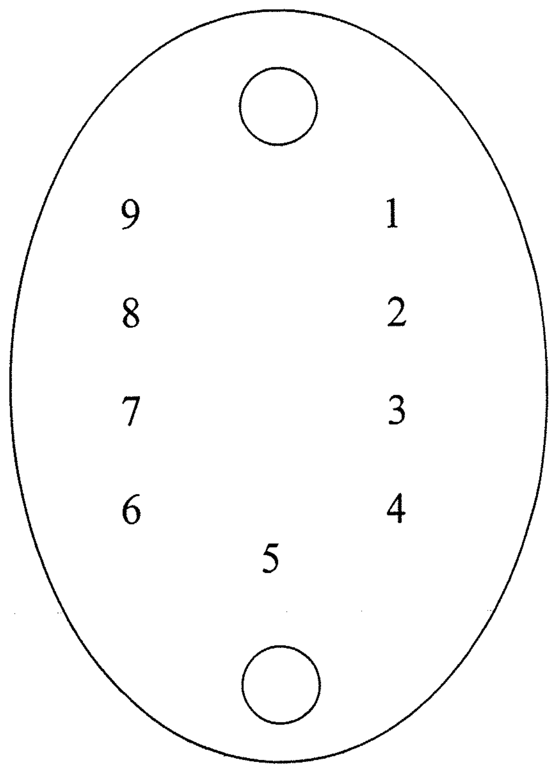
Detector No : 39165
T. E. Cooler Voltage 1.900V
T. E. Cooler Current 0.99A

Thermistor 0° Calibration Resistance : 3.399 k
Thermistor Value at Test Temperature : 73kΩ
Detector Test Temperature : -58°C

**** Note: Do Not Exceed 1.2 Amps TEC Current**



TO-66



PIN 1 COOLER POSITIVE
PIN 2 n/c
PIN 3 n/c
PIN 4 n/c
PIN 5 THERMISTOR
PIN 6 THERMISTOR
PIN 7 MCT DETECTOR
PIN 8 MCT DETECTOR
PIN 9 COOLER NEGATIVE

InfraRed ASSOCIATES, INC.

CUSTOMER: CAMPBELL SCIENTIFIC   P.O.: 86967   DATE: 7/20/2009

DETECTOR TEST REPORT

TEST CONDITIONS

Operating Temperature (K)	215
Background Temperature (K)	298
Blackbody Temperature (K)	500
G Factor	5.8
Flux Density	4.315 x 10 E –5 w/cm^2
Chopping Frequency (hz)	1000
Diode	

DETECTOR/ DEWAR DESCRIPTION

Cap Number	8775	
Serial Number	M-28904	
Model Number	14002	
Detector Number	44514	
Element Length	1.0	mm
Element Width	1.0	mm
Active Area	1.0E-2	cm^2
Field of View		
Dewar Model	TO-66	
Window	SAPPHIRE	

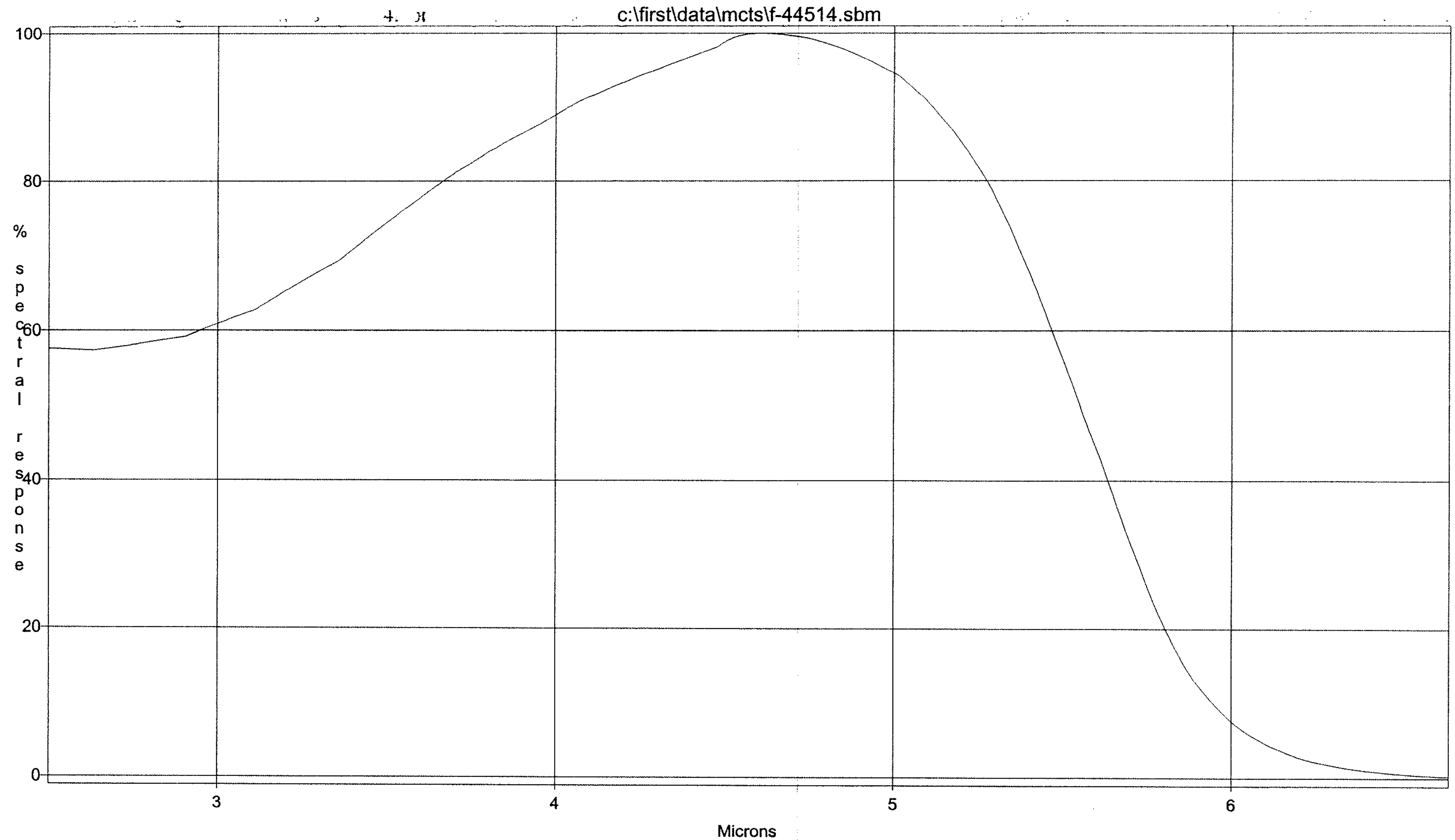
Detector Test Data

DETECTOR RESISTANCE AT 298K: 445 ohms

Current (mA)	Voltage (mV)	Resistance (ohms)	Responsivity (Peak V/W)	Noise (nV RMS/Hz^1/2) 1 khz	Noise (nV RMS/Hz^1/2) 10 khz	D* (Pk, f,1) E9 1 khz	D* (Pk, f,1) E9 10 khz
2.08	2000	961	9419	33.89	21.88	27.78	43.03
1.56	1500	961	7215	26.83	16.97	26.85	42.51
1.04	1000	961	4860	19.77	12.50	24.59	38.86

Tested by: RS   **Date:** 7/20/09

Approved by: RS   **Date:** 7/20/09



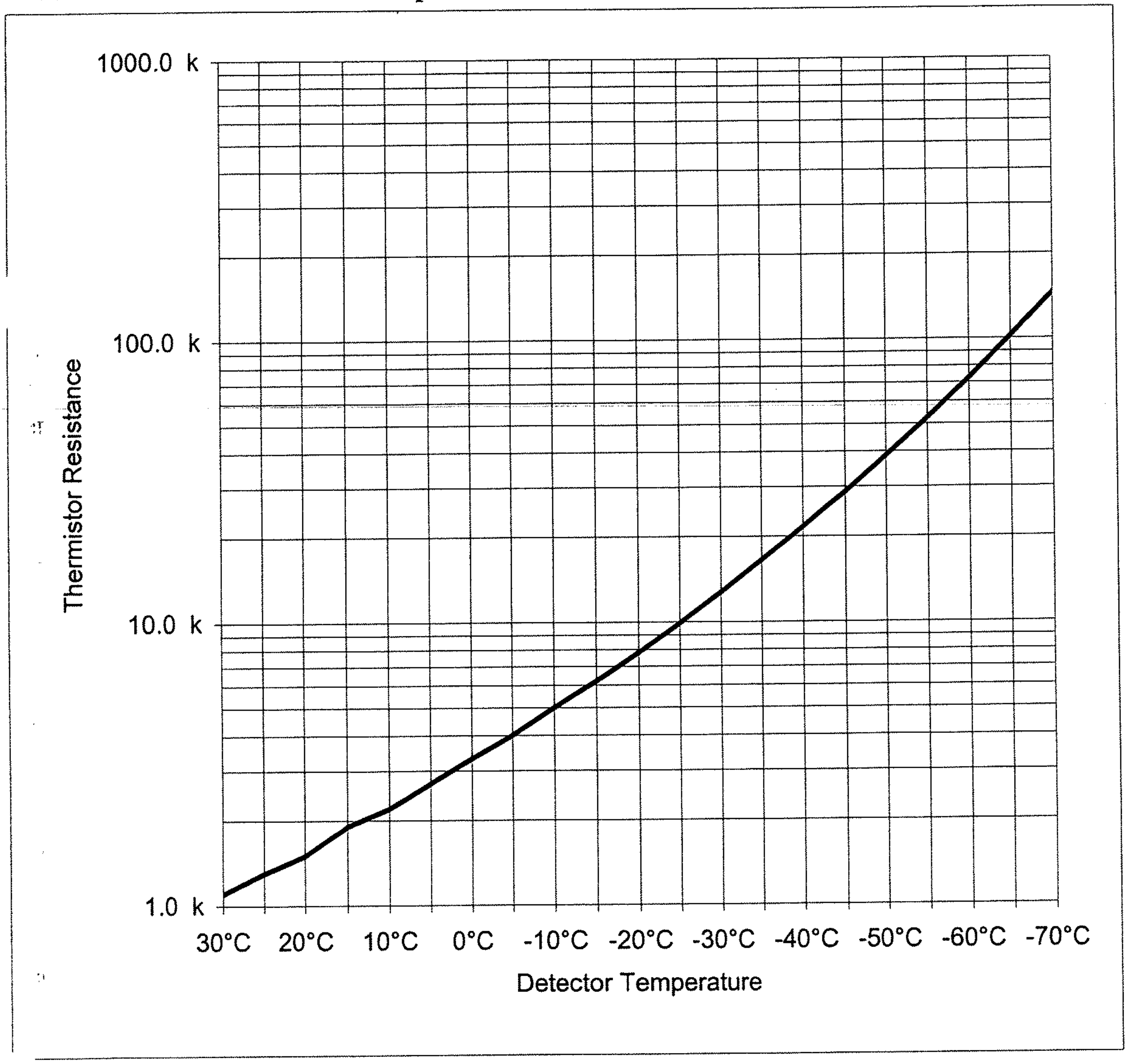
WinFIRST Report

Name:
Date:
Sample:
Comments:

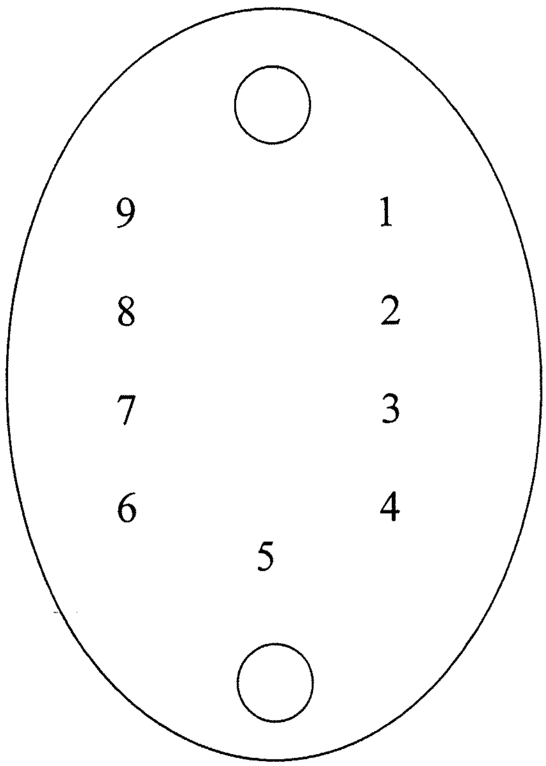
Thermistor Calibration Curve
Part Number:

Detector No	: 44514	Thermistor 0° Calibration Resistance	: 3.281 k
T. E. Cooler Voltage	2.001 V	Thermistor Value at Test Temperature	: 70 kΩ
T. E. Cooler Current	1.04 A	Detector Test Temperature	: -58°C

** Note: Do Not Exceed 1.2 Amps TEC Current**



TO-66



PIN 1 COOLER POSITIVE
PIN 2 n/c
PIN 3 n/c
PIN 4 n/c
PIN 5 THERMISTOR
PIN 6 THERMISTOR
PIN 7 MCT DETECTOR
PIN 8 MCT DETECTOR
PIN 9 COOLER NEGATIVE

LASER COMPONENTS

Datasheet for Laser Components Leadchalkogenide - Diodelaser

Order Number : 62759-1.......
LC Order Number : 599088........
Part Number : 03231003.......
Customer Name : LCIG/Campbell.

Lasertype : IR-CO2-MC.
Wavenumber Region : 2312...... cm-1......

Special Conditions : IR-CO2-MC-(E)....... Laser Diode......... CSI17469............

Polarity : +
Housing (groun) : -

Operator : Kapfhammer
Serial Number : 360-HV-1-253...
Date : 17/Aug/2009

Max Operationtemp / K : 110.00.
Max Diode Current cw / mA : 600.00.

Alterung durchgef. 20x Temp.zyklus (Preaging) 77K ⇔ 300K

300K-Burn-in durchgeführt Etalontest bestanden
Etalon passed

Record of Laser No. 360-HV-1-253

Date : 17/Aug/2009
Operator: Kapfhammer

freigegeben released
Michael Kapfhammer
19. Aug. 2009
Dr. Lars Mechold

T / K	threshold current Ith/mA	wavenumber at threshold cm-1	maximum current Im/mA	maximum total power Pm/mWatt
92	239	2264	465	0.45
92	242	2264	467	0.46
94	255	2272	491	0.47
96	270	2285	456	0.44
98	287	2292	459	0.34

Definition :

maximum total power : the power which the laser diode radiates at maximum current.

LASER COMPONENTS GmbH · Werner-von-Siemens-Str. 15 · 82140 Olching /Germany · Fon: +49 8142 2864 0 · Fax: +49 8142 2864 11 · info@lasercomponents.com

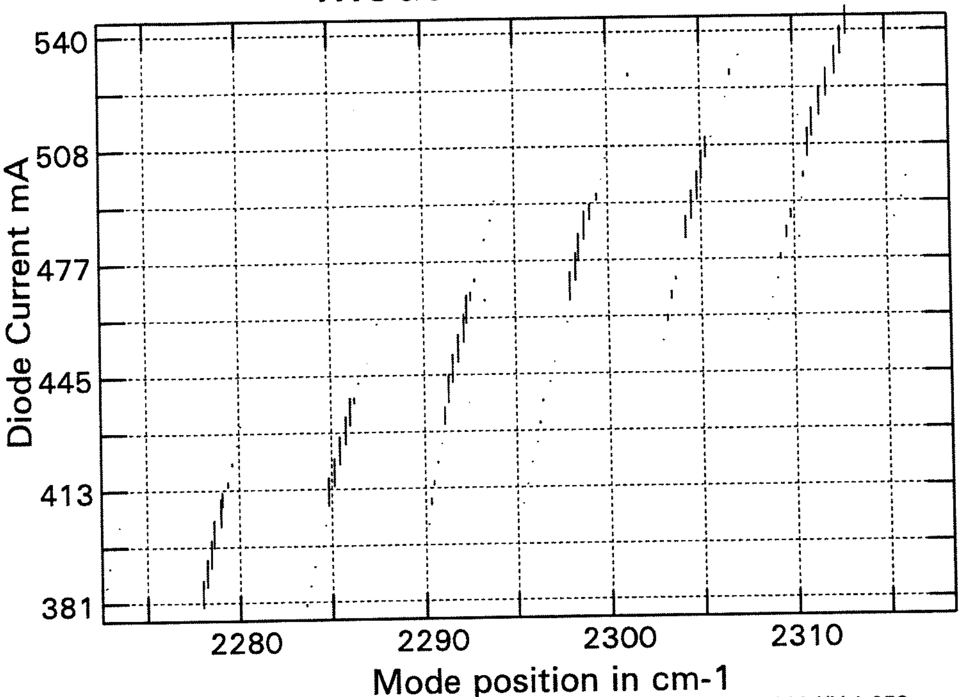
Etalontest bestanden
Etalon passed

freigegeben
released

Michael Kapfhammer
19. Aug. 2009

LASER COMPONENTS

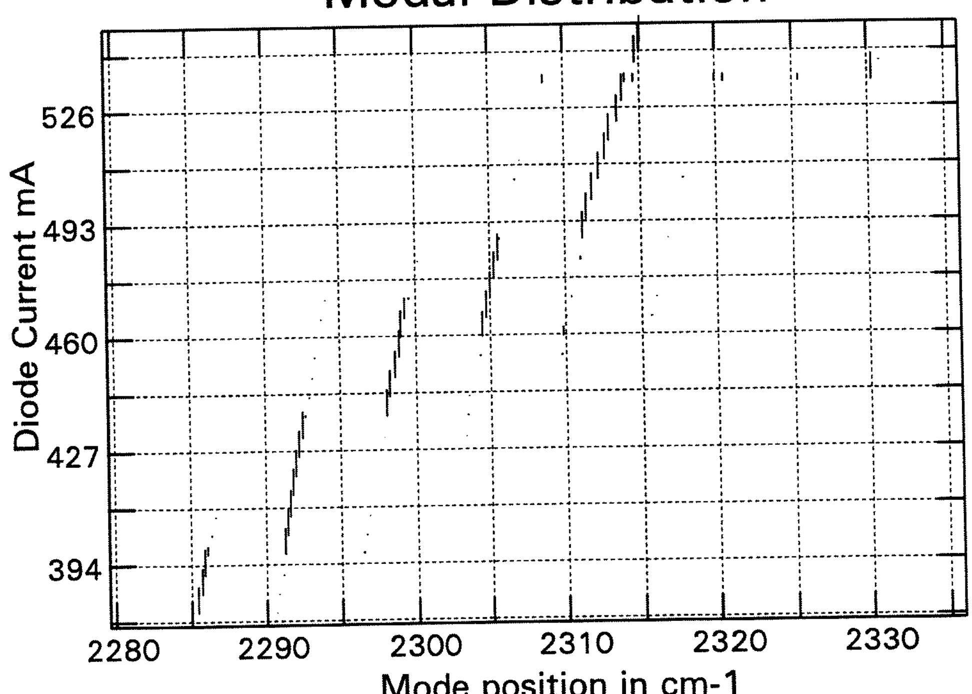
Modal Distribution



max modal Power %	total Power mWatt
100.00 -	0.3498
97.35 -	0.2534
67.94 -	0.0929- L
99.37 -	0.3957
99.32 -	0.3010- L
97.64 -	0.3832
57.58 -	0.3475
81.75 -	0.3591
76.19 -	0.2874
52.33 -	0.4157
42.82 -	0.3498- L
78.27 -	0.3806
79.25 -	0.4122
59.68 -	0.4282- L
79.50 -	0.3809
99.33 -	0.4375
98.69 -	0.4465
94.89 -	0.4282
75.38 -	0.4055- L
56.70 -	0.3701
96.52 -	0.4006
85.17 -	0.3986
73.38 -	0.4244
57.26 -	0.4290
95.72 -	0.3954
98.32 -	0.3977
97.76 -	0.3646
95.01 -	0.3701
74.58 -	0.3254

08/17/09 Operator:Kapfhammer Laser: 360-HV-1-253
Temperature: 95.00 K

Modal Distribution



max modal Power %	total Power mWatt
100.00 -	0.3271
99.18 -	0.3036
32.83 -	0.0244- L
100.00 -	0.3126
100.00 -	0.2456
100.00 -	0.3875
99.35 -	0.2473
90.98 -	0.1080
100.00 -	0.3646
100.00 -	0.3237
93.01 -	0.4244
88.46 -	0.3498
96.21 -	0.4592
88.48 -	0.3794
53.63 -	0.3594
43.97 -	0.4502
91.45 -	0.3399
99.01 -	0.4401
97.90 -	0.4404
87.17 -	0.4491
97.22 -	0.4084
100.00 -	0.3338
100.00 -	0.4174
100.00 -	0.3832
98.30 -	0.3681
93.22 -	0.3666
72.32 -	0.3472
98.17 -	0.3463
98.61 -	0.3242
98.14 -	0.3141

08/17/09 Operator:Kapfhammer Laser: 360-HV-1-253
Temperature: 97.00 K

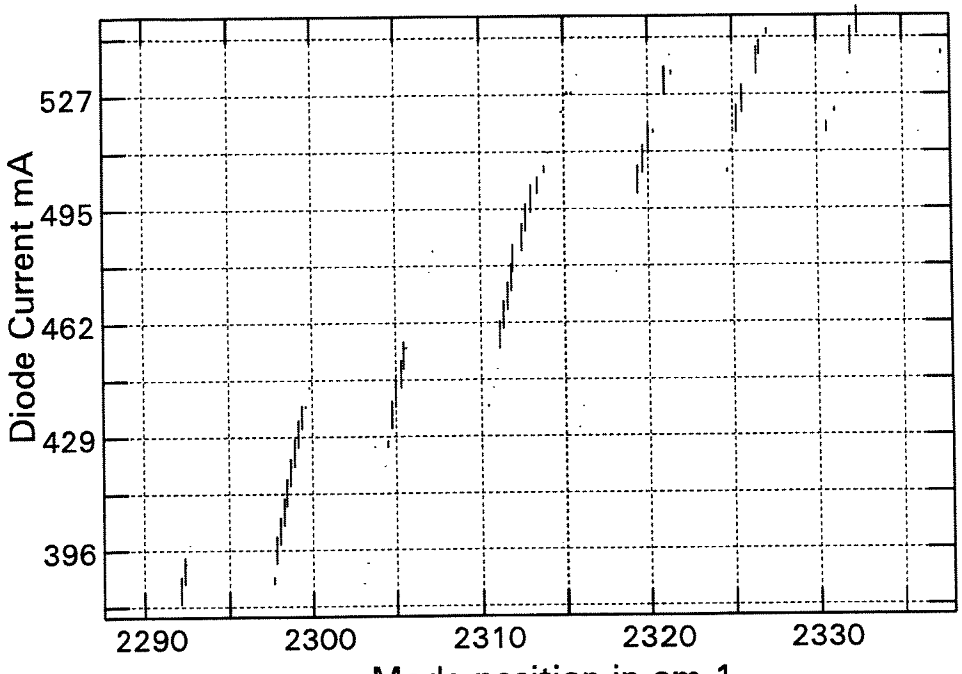
Etalontest bestanden
Etalon passed

freigegeben
released

Michael Kapfhammer
19. Aug. 2009

LASER COMPONENTS

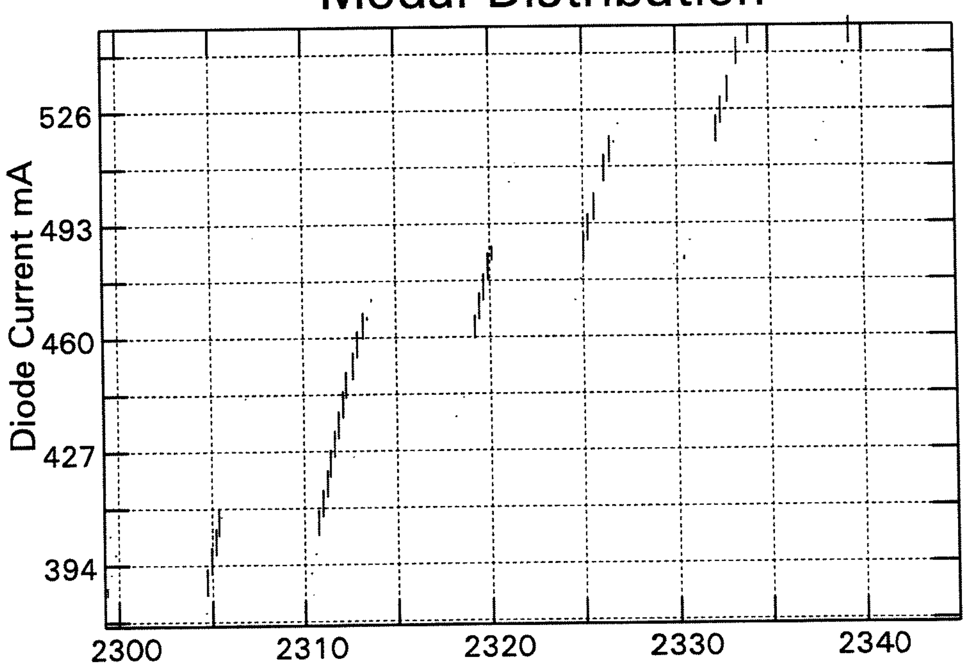
Modal Distribution



08/17/09 Operator:Kapfhammer Laser: 360-HV-1-253
Temperature: 99.00 K

max modal Power %	total Power mWatt
79.85 -	0.2402
59.68 -	0.2347- L
81.68 -	0.2479
85.96 -	0.0284- L
82.17 -	0.1503
64.48 -	0.2235
82.86 -	0.3446
71.73 -	0.3486
62.11 -	0.1974
100.00 -	0.4383
100.00 -	0.3986
97.84 -	0.1692- L
97.96 -	0.1483- L
100.00 -	0.3750
100.00 -	0.3344
100.00 -	0.3849
93.62 -	0.3570
98.09 -	0.3138
93.43 -	0.3794
86.59 -	0.3181
53.75 -	0.2763
75.48 -	0.3254- L
99.36 -	0.2981
100.00 -	0.3042
100.00 -	0.3434
100.00 -	0.3158
99.26 -	0.3086
97.35 -	0.2941
76.82 -	0.2366
100.00 -	0.2502

Modal Distribution



08/17/09 Operator:Kapfhammer Laser: 360-HV-1-253
Temperature: 101.00 K

max modal Power %	total Power mWatt
58.95 -	0.2270
92.79 -	0.0722
100.00 -	0.2125
96.90 -	0.2588
90.31 -	0.2610
98.69 -	0.2509
98.36 -	0.1327- L
100.00 -	0.1596
98.71 -	0.2608
59.07 -	0.2126
96.42 -	0.3356
90.02 -	0.2819
89.51 -	0.2070
53.79 -	0.2267
100.00 -	0.3213
100.00 -	0.2801
95.53 -	0.1060- L
98.29 -	0.0981
100.00 -	0.3010
98.15 -	0.2511- L
100.00 -	0.2456
100.00 -	0.2964
98.36 -	0.2810
50.72 -	0.2395
91.88 -	0.2418
93.85 -	0.2166
75.78 -	0.1779
92.74 -	0.2122

LASER COMPONENTS

Diode lasers are sensitive components which require careful handling, storage and operation. LASER COMPONENTS has introduced a series of innovative quality control procedures to optimize performance and reliability.
For best results please read and apply the following instructions and precautions:

GENERAL SAFETY PRECAUTIONS:

Open heat sink laser diodes may be damaged by mechanical contact of the laser chip or by contamination of the facet. Handle the device with tweezers to avoid skin oil contamination of the lasers. **Do not** use thermal grease when mounting these lasers to a heatsink, as grease tends to creep and will eventually contaminate the laser. Thermal grease is acceptable with sealed package models. Store the laser diode in its shipping container when not in use to prevent damage. Use extreme caution if attempting to couple an optical fiber to the laser as contact of the fiber against the facet may cause damage. **Damage of the above types is not covered by the warranty.**

The window of hermetically sealed packages is quite thin to minimize the optical path length. Do not push on the window when inserting the laser diode into a socket. Push the device into place by pressing on the base of the package.

ELECTRICAL DAMAGES:

A: Electric Static Discharge (ESD):
Laser diodes are very reliable under normal operating conditions. However like most semiconductor devices, they can be easily damaged or destroyed by inadvertent electrical or static discharges. A static free environment is mandatory. Grounded tweezers and a grounded wrist strap on the user, a grounded work surface, anti-static floors and case ground for the laser diode all reduce the risk of a damaging static discharge through the diode.
Laser diodes are very sensitive to an electrostatic discharge (ESD) and may suffer latent catastrophic damage unless they are handled according to proper ESD procedures. Latent damage is usually due to breakdown of the P-N junction in an area of the device outside the optical cavity. Defects in the active region of the junction from ESD or electrical over-voltage may propagate with time into the laser cavity. The resulting decreased performance of the laser may appear immediately or long after the damage occurs.
Reduce static charge accumulation by wearing a grounded wrist strap when handling laser diodes.

B: Excessive Forward Current:
Excessive forward current can cause operation at optical power levels which may damage the output facet in less than 1µsec. Data sheets include maximal operation currents. Laser action may continue after this damage at lower efficiency and lower power, or only spontaneous emission may remain. Allowable current depends on pulse width in pulsed or quasi-cw operation, and peak optical power must be reduced as pulse width increases.

1. Eliminate transient power supply spikes by using a power supply specifically designed for operation of laser diodes, or other "slow start" power supply.
2. If, in an emergency, a general laboratory supply is used, connect the laser diode with a shorted switch across the diode. With the diode shorted, turn the laboratory power supply current control to minimum. Turn the supply on, increase the current through the series resistor slightly, open the shorted switch, then increase the current to the required value. Reverse this procedure for turn-off.

C: Reverse Currents:
Reverse currents may destroy the diode or damage it, sometimes with no change in the reverse current vs. voltage characteristic. Forward or reverse transients may be caused by energy reflections in pulsed systems, capacitance in fixtures or cables, or output capacitors in constant current supplies operated with no load connected. Drive levels on drivers for moderate power cw laser diodes may be tested by using a dummy load.
Use a grounded work area, and store the laser diodes in their original shipping packages when not in use.

Polarity
The polarity of all LASER COMPONENTS lead salt diode lasers is positive. The use of incorrect polarity will damage the laser and invalidate the warranty.

Germany and other countries: LASER COMPONENTS GmbH, Phone: +49 8142 2864 0, Fax: +49 8142 2864 11, info@lasercomponents.com
USA: LASER COMPONENTS IG, Inc., Phone: +1 603 821 7040, Fax: +1 603 821 7041, info@laser-components.com
Great Britain: LASER COMPONENTS (UK) Ltd., Phone: +44 1245 491 499, Fax: +44 1245 491 801, info@lasercomponents.co.uk
France: LASER COMPONENTS S.A.S., Phone: +33 1 3959 5225, Fax: +33 1 3959 5350, info@lasercomponents.fr

MECHANICAL DAMAGE:

Open heat sink laser diodes are exposed and subject to mechanical damage or contamination. When not in use, the laser should ideally be stored in vacuum, or under an inert (argon or nitrogen) atmosphere and not exposed to sources of heat. This should minimise long-term changes in laser parameters which are in part caused by contact between the lasers crystal and air.
LASER COMPONENTS vacuum packs all lead salt lasers prior to delivery.
Protect diode lasers from hard shocks and do not touch the chip during installation.

Mounting

LASER COMPONENTS lead salt lasers are fitted with a short current lead terminated with a pin. This pin is compatible with the mounting socket fitted to LCIG and similar laser cryostats. Several old cryostats (e.g. most Laser Photonics / Laser Analytics models) require that the laser be soldered to the cryostat. Improper soldering techniques can lead to undesirable thermal strain on the laser chip which can cause damage or deterioration in laser performance. We recommend the use of a matching connector for the laser pin. This female connector should be soldered to the laser head to the electrical stand off. Then the laser pin plugged into the connector, thus avoiding any thermal load to the laser. Suitable matching connectors are included in the delivery from LASER COMPONENTS.
Please note that pin removal and/or soldering of the laser lead may damage the laser and invalidate the warranty.
The technical solution of laser installation may have changed since several years, e.g. by using female connectors instead of soldering ports. Please also contact your next service point for more information.

After installing the female connector, mount the laser in the cryostat using two screws. Install both screws loosely and align the laser before tightening completely. After mechanically installing the laser, plug the male laser pin into the female connector. Be careful not to place any strain on either wire. At all times when handling the laser, avoid touching the laser crystal or electrode.

HIGH TEMPERATURE:

Do not operate diode lasers at higher temperatures than those given in the data sheet. Temperatures higher than specified may lead to lower output power or even destroy the p-n junction.

Lead salt diode lasers working at cryogenic temperatures (<120K) should be mounted in proper LN2 dewars or closed-cycle coldheads. Although these lasers have been designed and tested for use at cryogenic temperatures, as with any metal part, excessive thermal cycling from cryogenic conditions to room temperature can lead to fatigue. Therefore, we recommend that the user minimizes temperature cycling.

Using lead-salt lasers inside different systems from various producers please be aware, that the temperature values recorded in the test data do represent the temperature measured in the concrete test system. Since all cryogenic diode laser systems do feature temperature gradients, the temperature depends on concrete tempsensor position. Therefore, spectral positions will in most cases occur in customer systems at temperature readings that differ from the values in the test data sheet. A difference of up to 4 Kelvin is rather typical. In addition, this difference tends to rise the harder the heating element works (i.e. the further away from 77 K the actual reading is). At temperatures of appr. 125 K differences of up to 8 Kelvin have been observed. A useful procedure is to set the current to the value given by test data and vary the temperature reading until the requested mode has been found.

08/08 / V8 / HW / irs/infrared/ handling-instructions.doc

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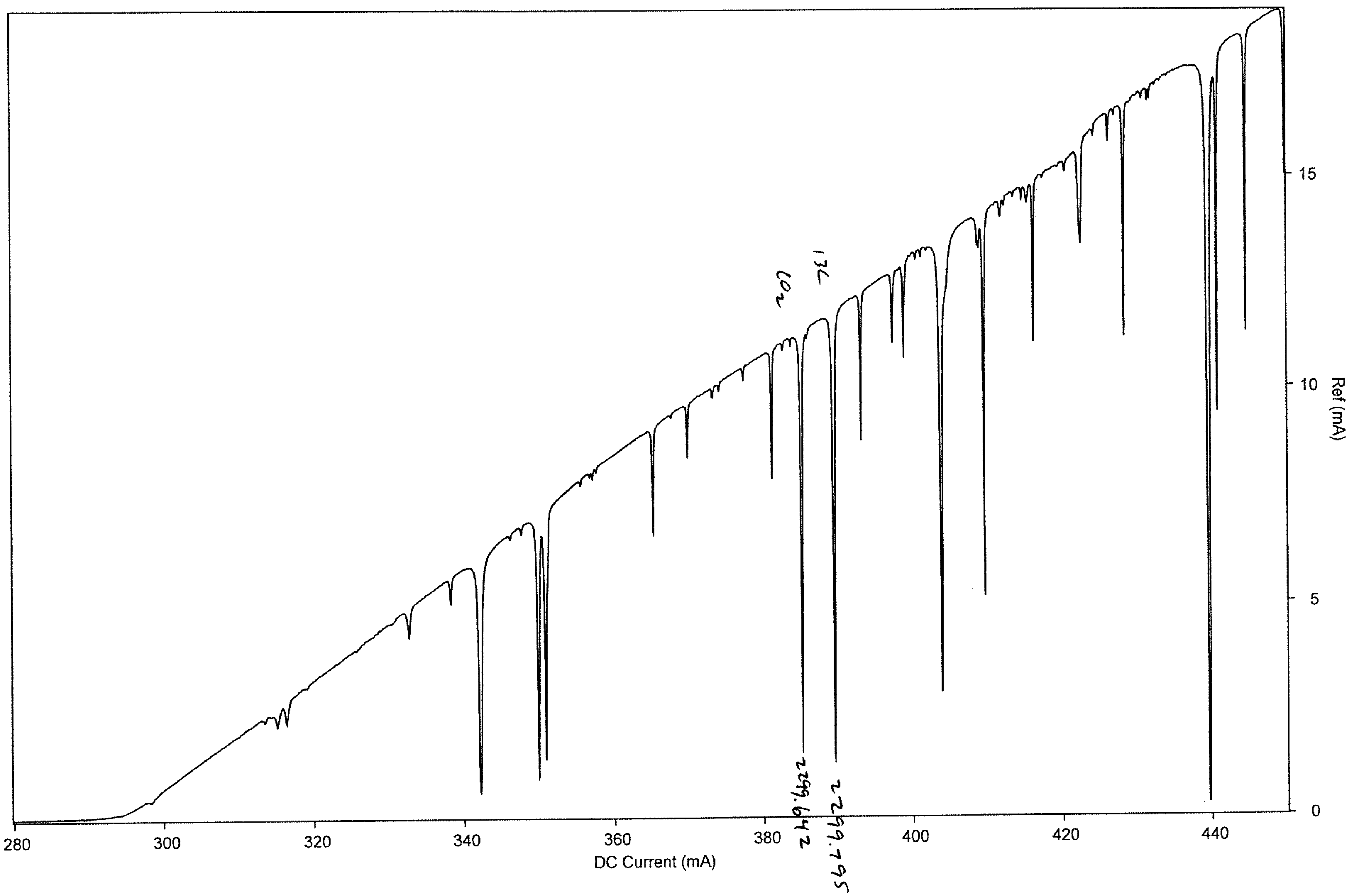
W1: File 11-03-2009-1235.map.000 at 99.0 K



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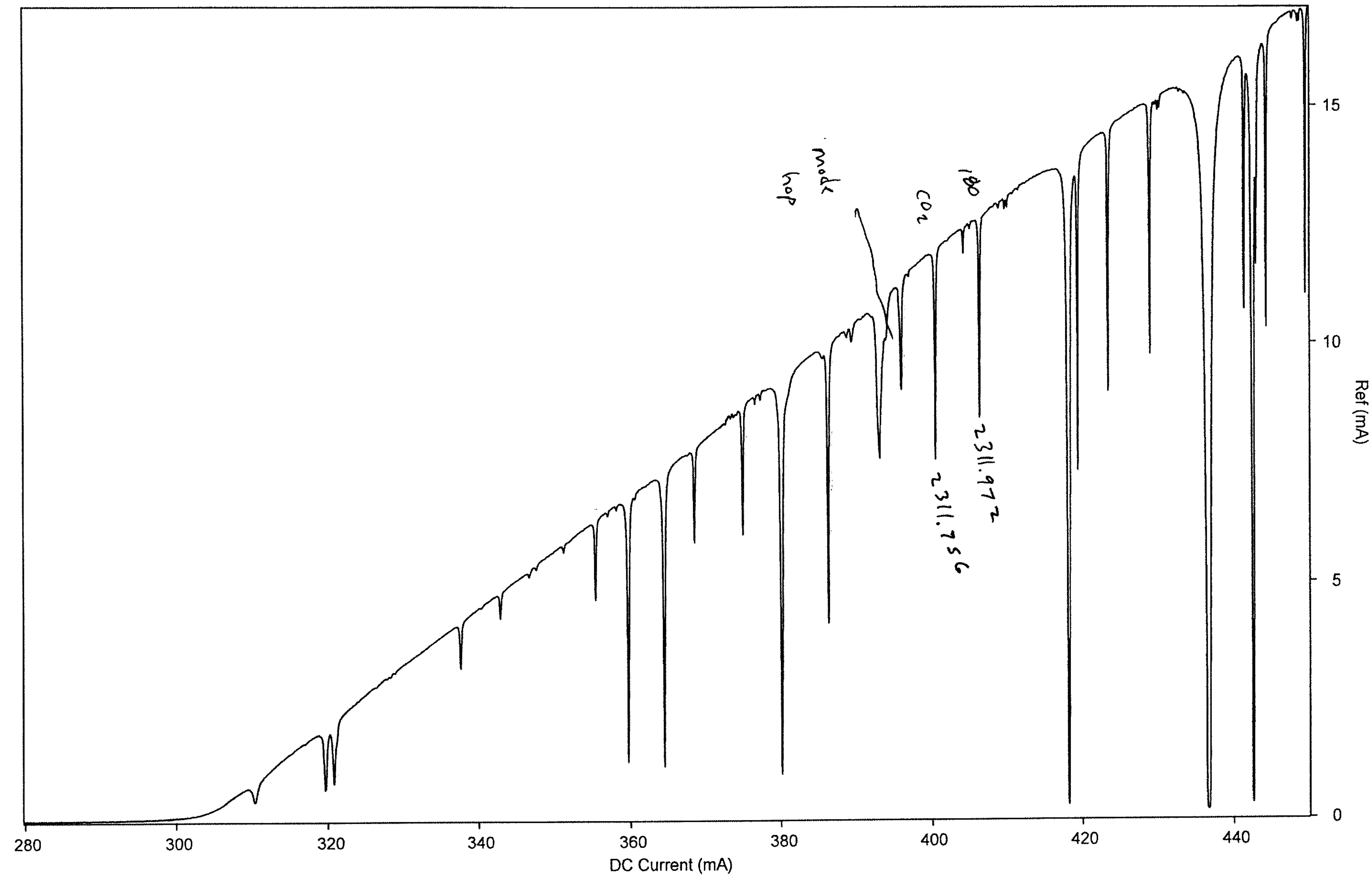
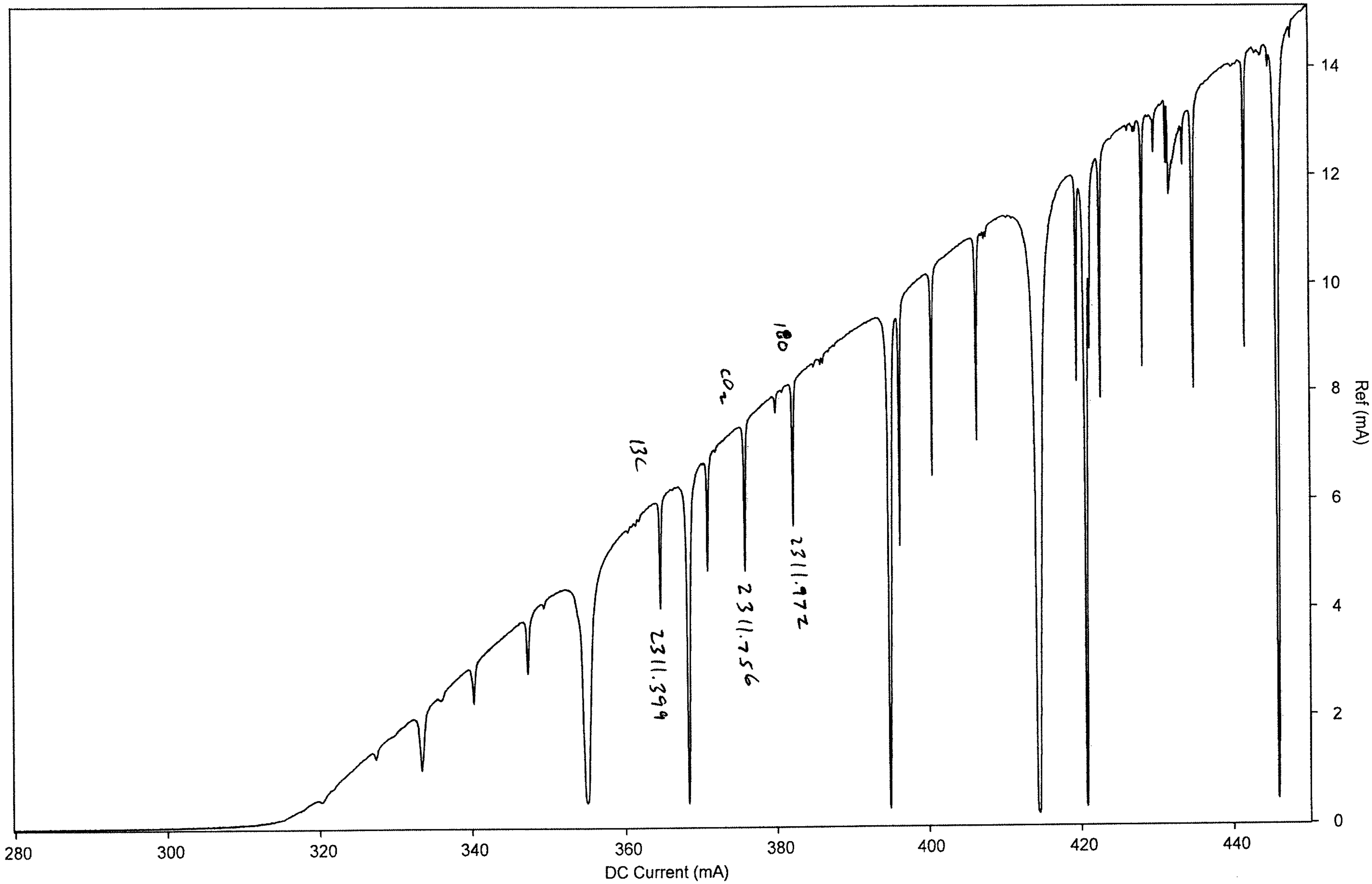
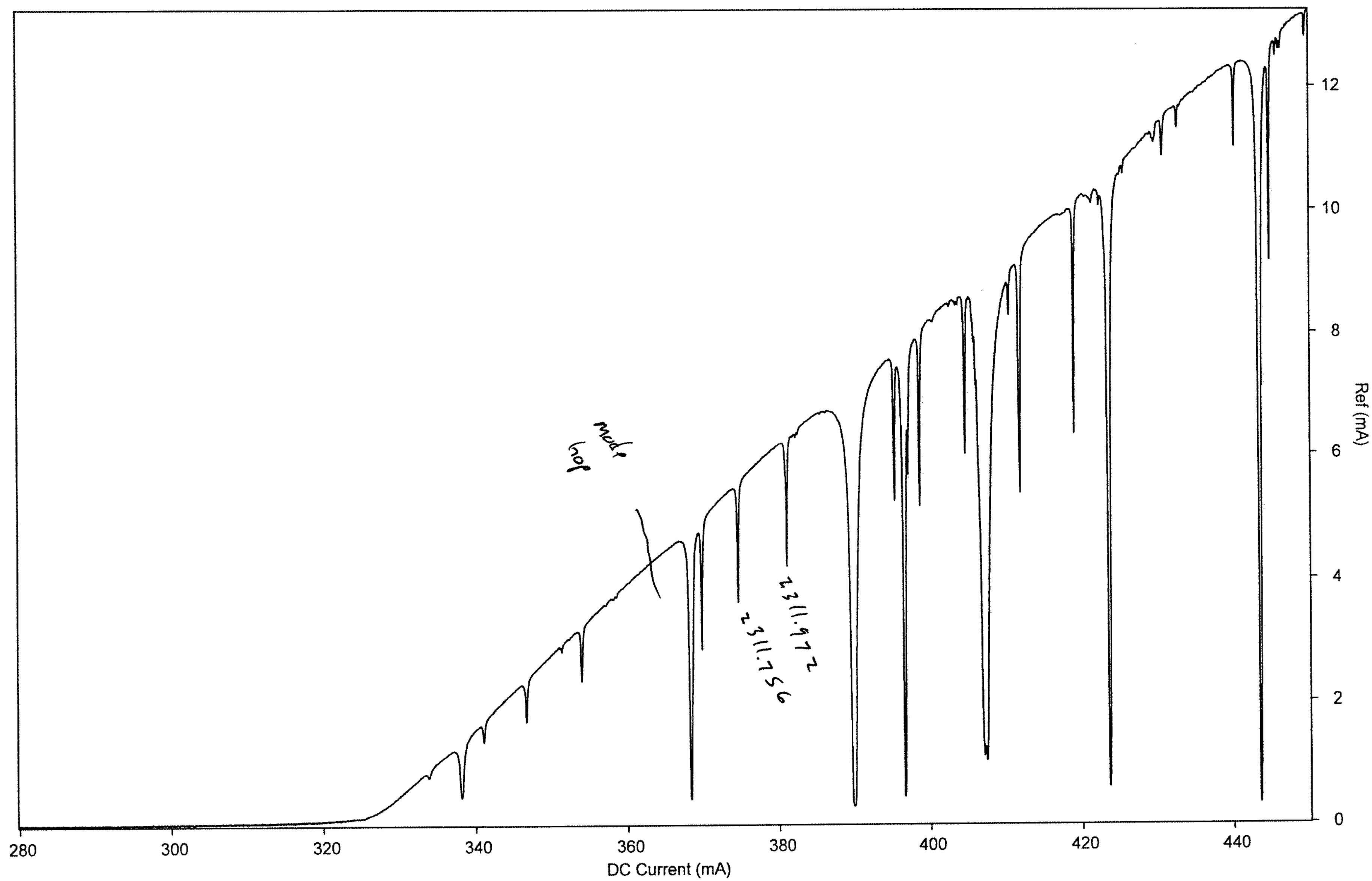
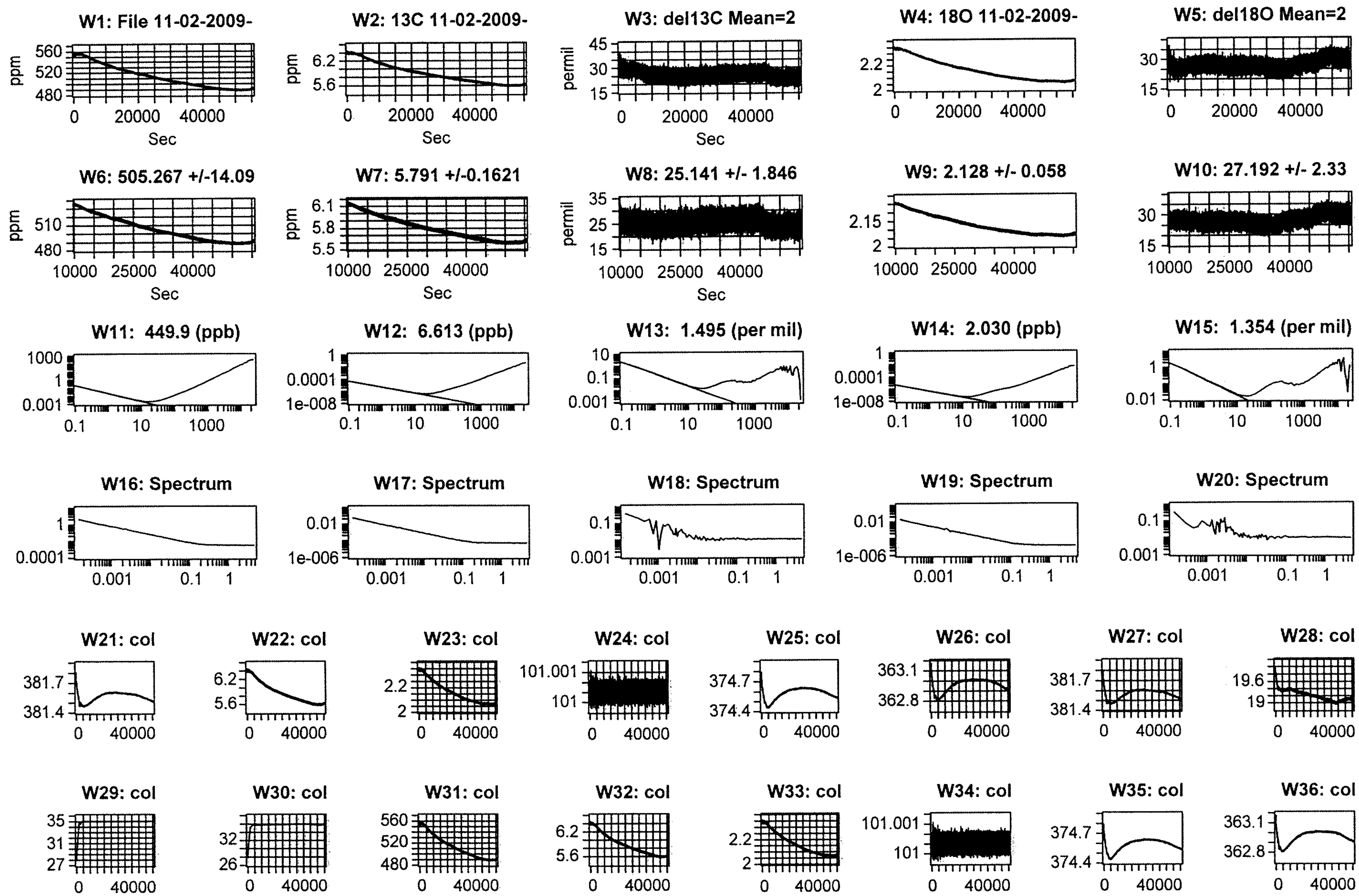


W1: File 11-03-2009-1235.map.002 at 101.0 K



W1: File 11-03-2009-1235.map.003 at 102.0 K




W1: File 11-02-2009-
W2: 13C 11-02-2009-
W3: del13C Mean=2
W4: 18O 11-02-2009-
W5: del18O Mean=2
W6: 505.267 +/-14.09
W7: 5.791 +/-0.1621
W8: 25.141 +/- 1.846
W9: 2.128 +/- 0.058
W10: 27.192 +/- 2.33
W11: 449.9 (ppb)
W12: 6.613 (ppb)
W13: 1.495 (per mil)
W14: 2.030 (ppb)
W15: 1.354 (per mil)
W16: Spectrum
W17: Spectrum
W18: Spectrum
W19: Spectrum
W20: Spectrum
W21: col
W22: col
W23: col
W24: col
W25: col
W26: col
W27: col
W28: col
W29: col
W30: col
W31: col
W32: col
W33: col
W34: col
W35: col
W36: col
ppm
permil
Sec