

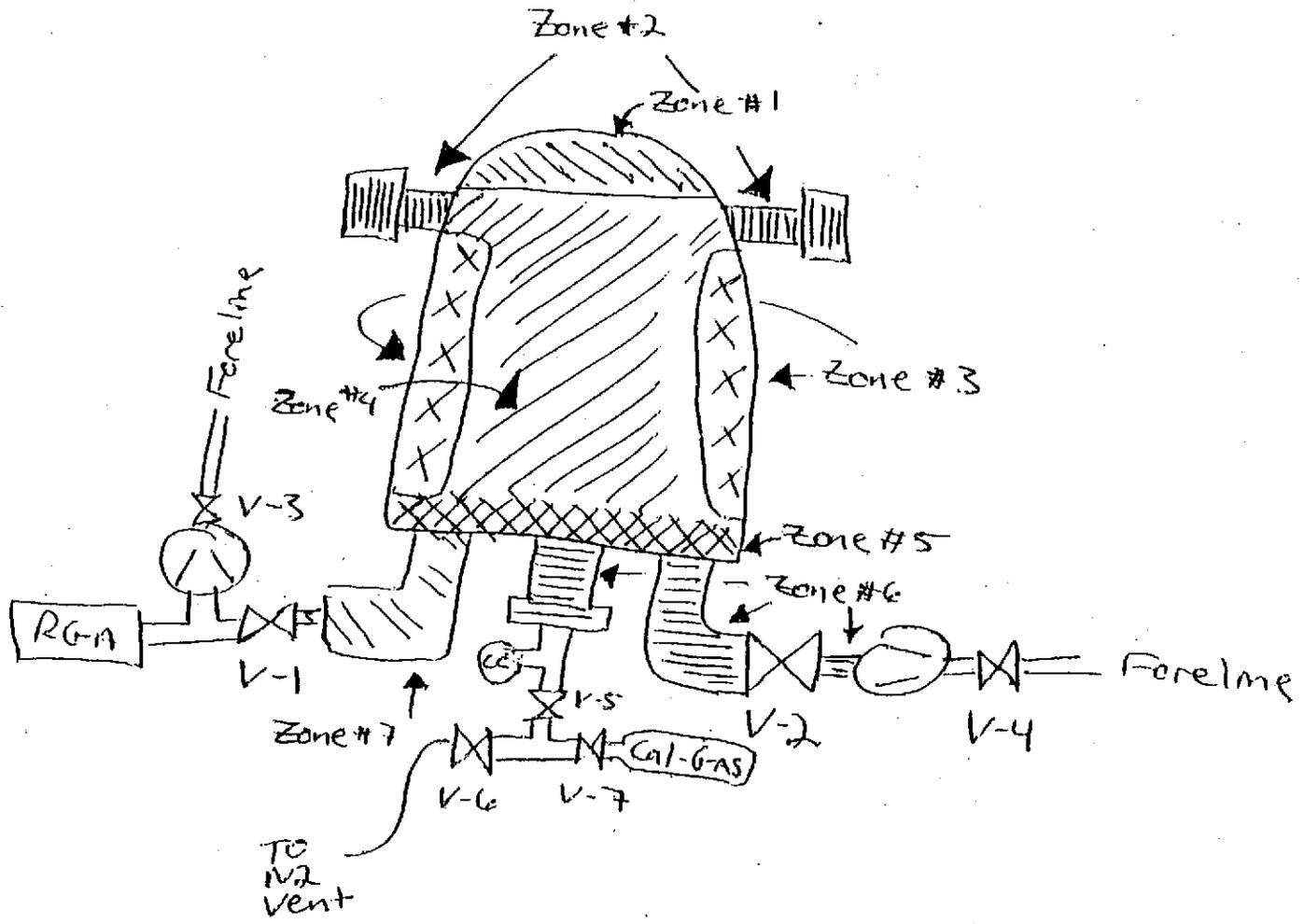
## Summary of LHO Vacuum Bake Oven A RGA Data Generation

The individual parts which comprise a "load" are cleaned as per LIGO-E960022 or as allowed by waiver(s) and loaded into the bake oven. The oven is then pumped down through the main pump "arm" (through V-2, RGA arm is valved off at this point). A heating profile is programmed and baking of the system begins. A typical "heating profile" consists of ramping up to material type soak temperature, soaking for approximately 48 hours, ramping down to approximately 70C, soaking and then ramping down to near room temperature. While soaking at 70C, an RGA background scan is taken. V-1 is then opened and V-2 closed. Enough time is allowed for the system to come into pressure equilibrium and then an elevated load temperature RGA scan is taken. V-1 is then closed and V-2 opened. Following this elevated temperature scan, the load is ramped down to near room temperature and the baking portion of the process is complete. Throughout the baking, temperature data is taken to verify the actual temperatures in the various "heat zones" of the bake oven system.

Once at near room temperature, another RGA background (V-1 closed) scan is taken. Next, V-1 and the cal-gas are opened and V-2 closed. After a 30 minute pressure equilibration time, a "calibration" scan is taken. The calculated pressure of Argon (constituent of the "mixed" calibration gas) is determined using the leak rate of Argon and the pump speed of the RGA arm port as seen by the oven chamber and compared (ratio) to the maximum amp value measured for Argon in the calibration scan. This "torr/amp" ratio becomes the Calibration Factor for the given load, converting measured current to pressure.

Finally, the cal-gas is valved out and enough time is allotted to allow all traces of it to be pumped away. A "post-bake" scan is then taken. Approval of the post-bake scan is a collective "pass/fail" determination made by either Dennis Coyne (CalTech) or Stan Whitcomb (CalTech). The data collected during the "elevated temperature scan" is entered into a spreadsheet which then calculates what the outgassing rates of AMUs 41, 43, 53, 55 and 57 ought to be at room temperature. These calculations are used to determine the room temperature outgassing rates when the signals are below the RGA's sensitivity (noise floor).

Refer to the LHO Vacuum Bake Oven A logbook for the actual ordered events of the load # of interest.



**LHO VACUUM BAKE OVEN A:  
CONTENTS LOAD #73**

**B.S.C. BELLOW SERIAL NUMBER D972122-030**

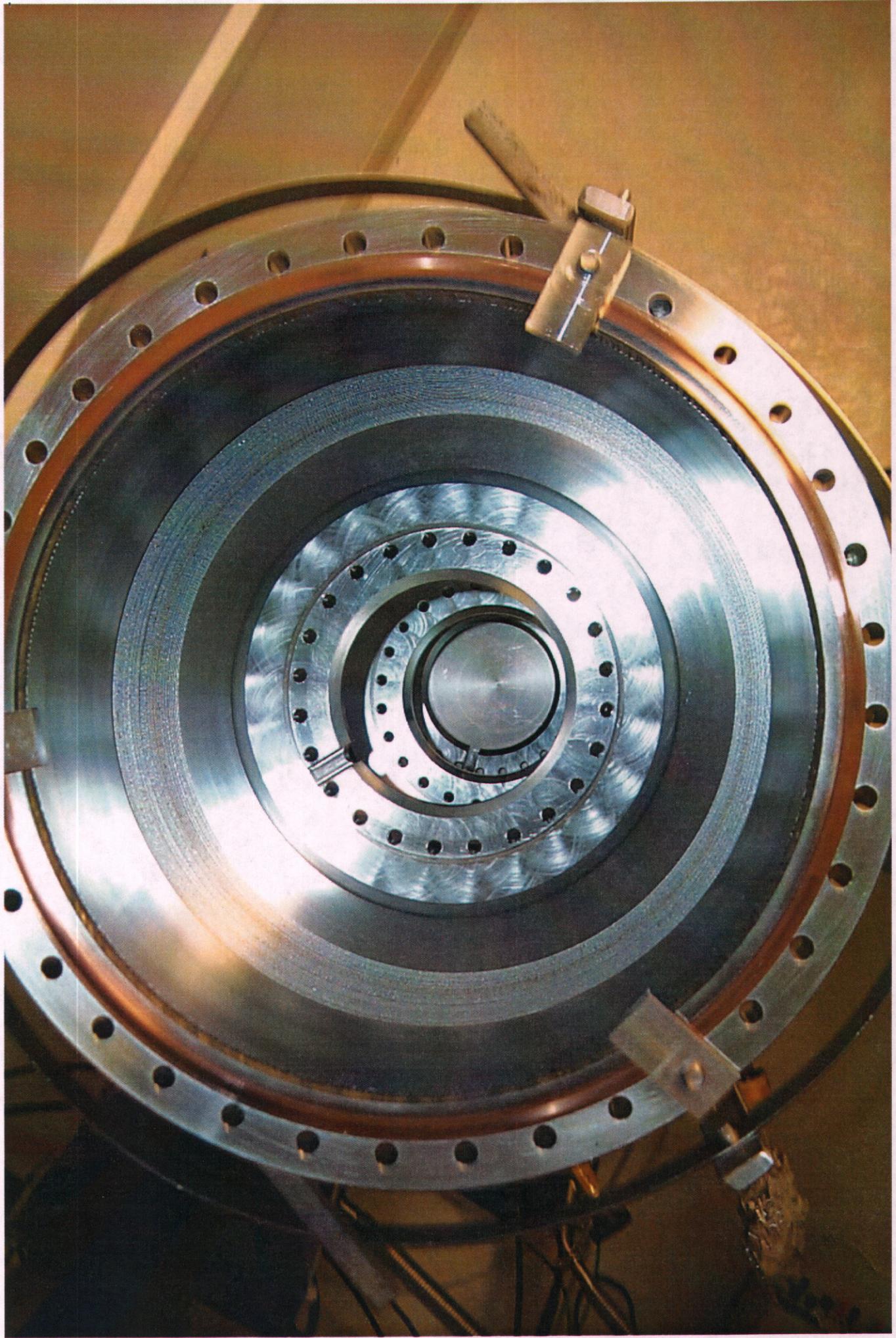
**B.S.C. BELLOW SERIAL NUMBER D972122-031**

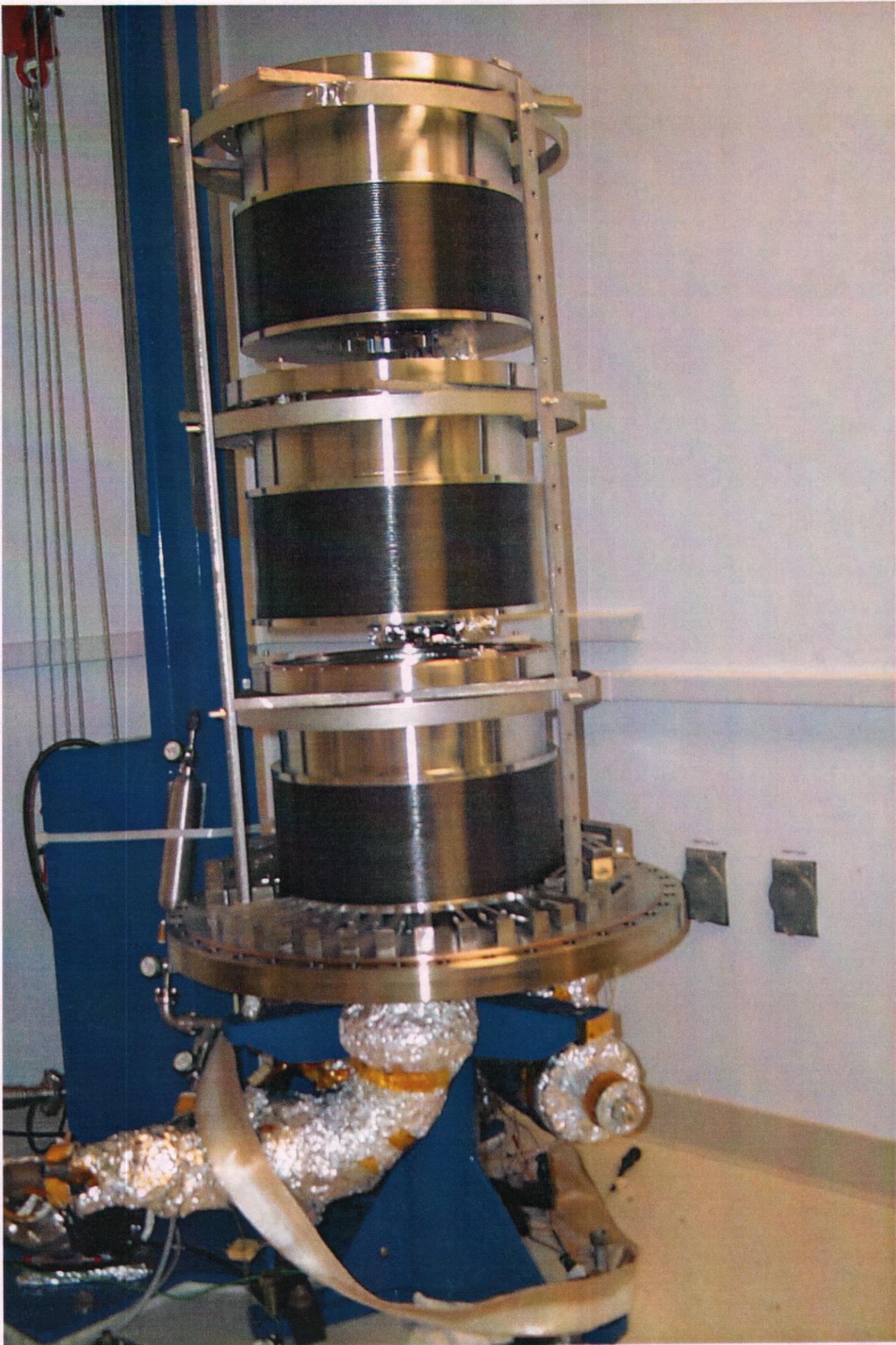
**B.S.C. BELLOW SERIAL NUMBER D972122-036**

**MISC. SS FASTNERS SERIAL NUMBER N/A**

**LOS CLAMPS, SHORT SERIAL NUMBER D980183-A-N/A (14ea)**

**LOS CLAMPS, LONG SERIAL NUMBER D980184-A-N/A (38ea)**









**LHO VACUUM BAKE OVEN A LOAD #73  
ELEVATED TEMPERATURE BACKGROUND  
SCAN**

V-1 Closed

**ELEVATED TEMPERATURE BACKGROUND  
SCAN NOT AVAILABLE**

**LHO VACUUM BAKE OVEN A LOAD #73  
ELEVATED TEMPERATURE SCAN**

V-1 Open, Cal-Gas and V-2 Closed, 0°C

**ELEVATED TEMPERATURE SCAN NOT  
AVAILABLE**

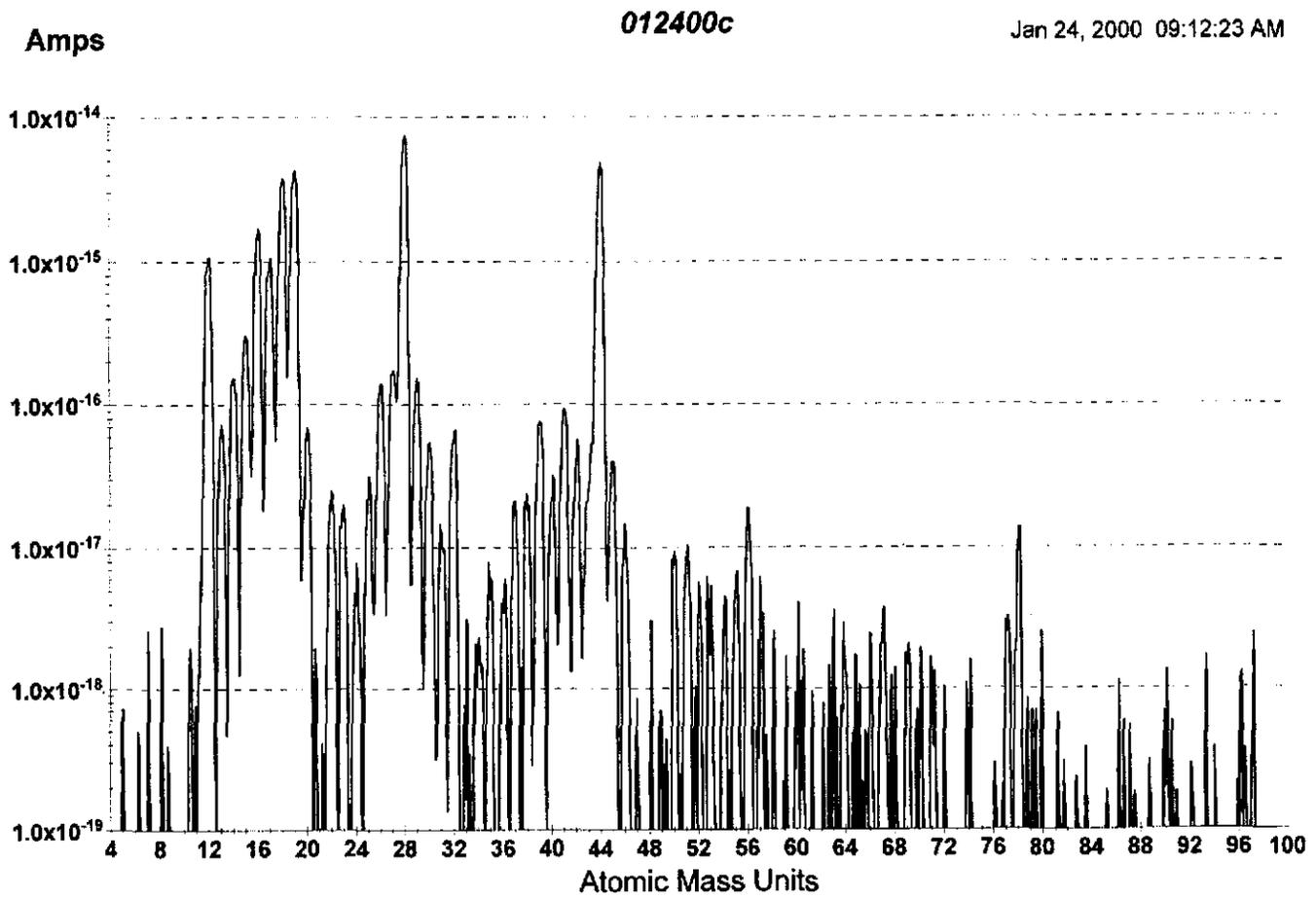
## LHO Bake Oven A Load # 73

1<sup>st</sup> Order Desorption Outgassing Rate Estimates using  $Q_{low} = SP_{low} = SP_{high} [e^{(E_s/kT_{high})}] / [e^{(E_s/kT_{low})}]$

Number of units in bake load	Pump Speed (L/sec)	AMU	RGA background current (amps)	RGA current (amps) @ High Temp	Calibration Factor CF (torr/amps)	High Temp (K)	Low Temp (K)	Es/k	Extrapolated outgassing rate (torr*L/sec) @ T <sub>low</sub>
1	5	41	no data	no data	2.30E+05	no data	2.96E+02	13000	#VALUE!
1	5	43	no data	no data	2.30E+05	no data	2.96E+02	8000	#VALUE!
1	5	53	no data	no data	2.30E+05	no data	2.96E+02	13000	#VALUE!
1	5	55	no data	no data	2.30E+05	no data	2.96E+02	15000	#VALUE!
1	5	57	no data	no data	2.30E+05	no data	2.96E+02	15000	#VALUE!

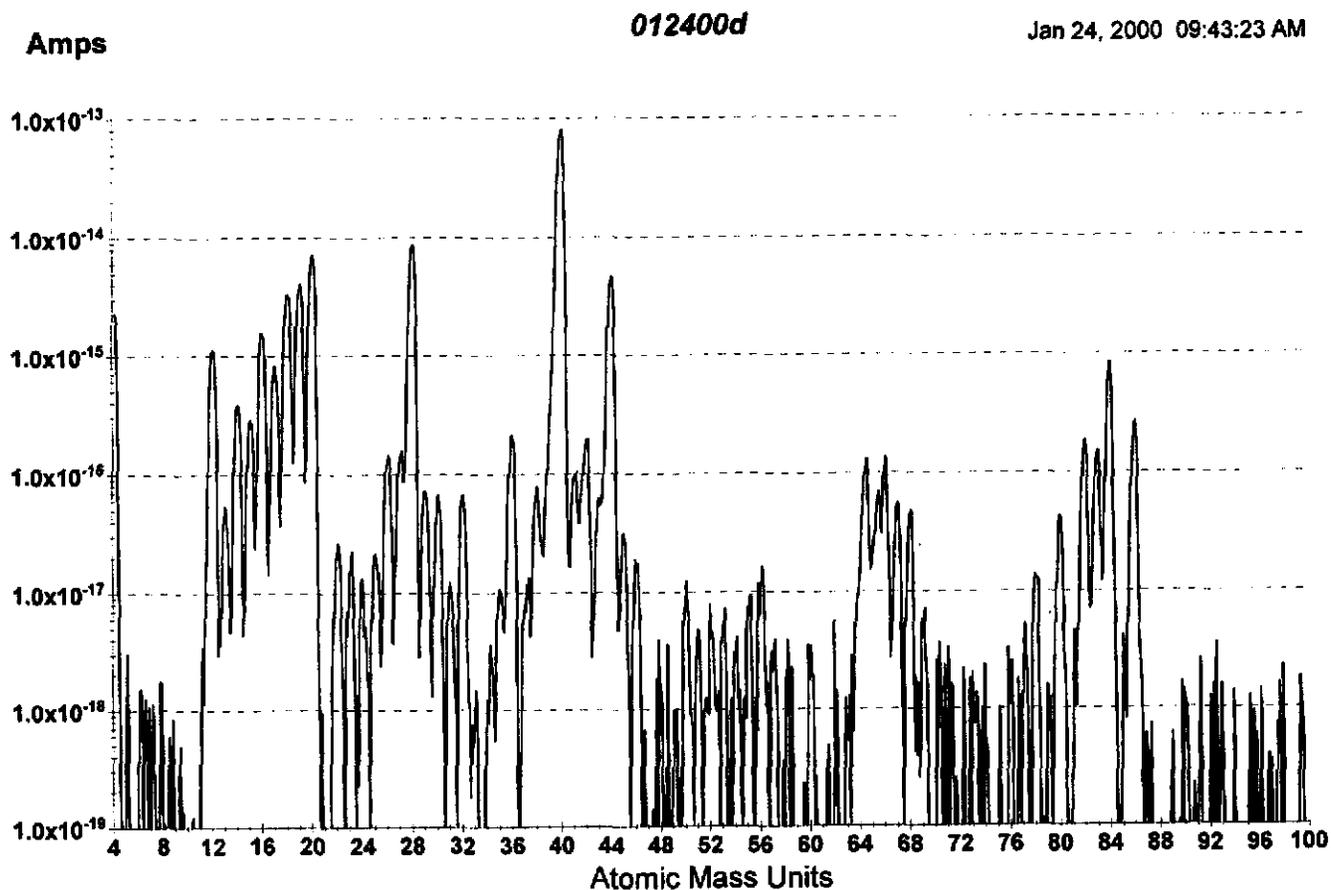
# LHO Vacuum Bake Oven A Load #73 RGA Background

V-1 closed, room temperature



# LHO Vacuum Bake Oven A Load #73 Calibration

V-1 and cal-gas open V-2 closed in pressure equilibrium at room temperature



CF defined as  $P_{(40)calc} / I_{(40)meas}$

$$P_{(40)calc} = (\text{leak rate}) / (\text{pump speed}) = (1.1\text{E-}7 \text{ torr}\cdot\text{L}/\text{sec})(0.86) / (5 \text{ L}/\text{sec}) = 1.8\text{E-}8 \text{ torr}$$

$$I_{(40)meas} = 8.0\text{E-}14 \text{ amps} \quad (\text{taken from } 012400\text{d}.asc)$$

$$CF = (1.8\text{E-}8 \text{ torr}) / (8.0\text{E-}14 \text{ amps}) = 2\text{E}5 \text{ torr}/\text{amps}$$

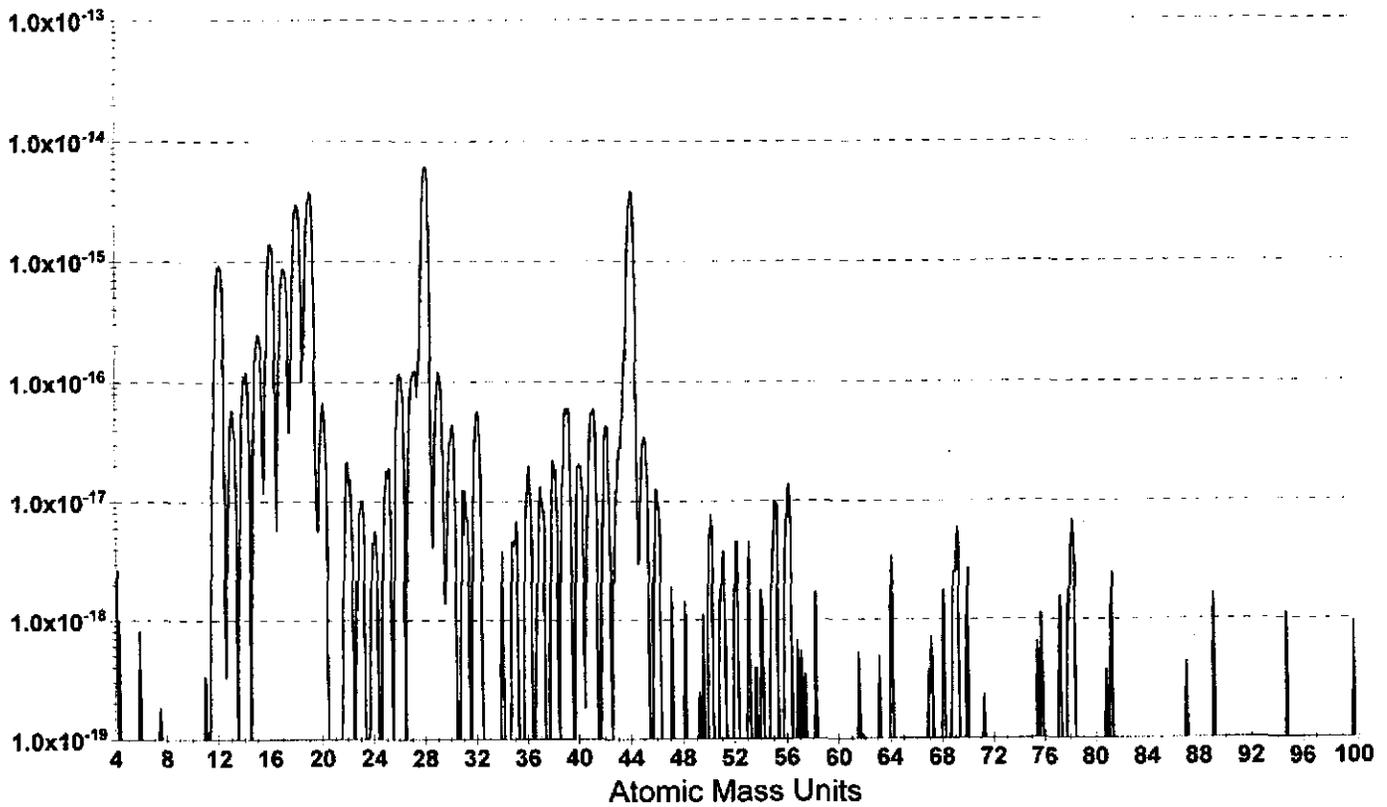
# LHO Vacuum Bake Oven A Load #73 Post-Bake Scan Room Temp.

V-1 open, Cal-Gas and V-2 Closed

Amps

012400e

Jan 24, 2000 10:39:33 AM



# LIGO PROCESS TRAVELER

DCC Number: E9600 6300-14  
E98 00 X  
 Date Prepared:                     

Originator <b>B. RIVERA</b>	Cognizant Engineer <b>B. WEAVER</b>	Ext./Phone# <b>8191</b>	Project <b>LIGO</b>	Account Number
Dwg/Part Number	Rev	Part Description <b>MISC SS FASTNERS - COS</b>	Serial Number <b>—</b>	Qty
Used In (next higher assembly):				

Vendor Name	PO/Contract Number <b>P</b>
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**Data Package, Receiving/Inspection Remarks:**

Inspection Required Y/N	Visual Damage Y/N	Comments	Name/Initials	Date Comp.
<b>N</b>	<b>N</b>		<b>B. RIVERA</b>	

**Process Flow:**

#	Operation	Start Date	Work Area	Instructions	Name/Initials	Date Comp.
1	Clean & Vacuum Bake per LIGO Vacuum Prep. Form	<b>1/8/00</b>	<b>CIT</b>	per E960022-A		
2	Control Point		<b>NA</b>	Review/approve RGA scan # <b>012400E.RGA</b>	<b>B. RIVERA</b>	<b>1/21/00</b>
3	Wrap & Tag vacuum clean parts per E960022-A		<b>CIT</b>	<b>VB0609073</b> per package	<b>BC</b>	<b>1/26/00</b>
4			<b>CIT</b>			

END: Go to Traveler associated with next higher assembly processing

**Note: Copy this traveler and give to the DCC**

*N.B.: A copy of this traveler must be submitted to the DCC each time the original is shipped with the associated part(s) and when the traveler has been completed.*

**LIGO PROCESS TRAVELER**

Special Instructions (Handling/Packaging Constraints, Remarks, etc.) or Notes:

DCC Number:

E00006300-X  
E98 -00-X

INCLUDING MISC. SS. SHCS & FEUDER WASHERS SENT BY JAVEEN FRANK
CAL-TECH END USER UNKNOWN BRNECA 11/8/00

# LIGO PROCESS TRAVELER

Original LHO

DCC Number: E990449-00-X

Date Prepared: 12/28/99

Originator	Cognizant Engineer	Ext./Phone#	Account Number
J. Romie	Janeen Romie	#8445	5F518= LIGO.5F500, 2.8, NSFLIGO.5F500

Dwg/Part Number	Rev	Part Description	Serial No.	Qty
D980183	A	<u>SUSPENSION CLAMPS</u> LOS Clamp, Short stainless	n/a	94 total: 14 to LHO, 80 to LLO 118 total: 38 to LHO, 80 to LLO
D980184	A	LOS Clamp, Long stainless	na/	
<b>Used In (next higher assembly):</b>		Used to mount the LOS suspension assemblies to the optical tables.		

Vendor Name	PO/Contract Number
Schober's Machine and Engineering, Alhambra, CA	PC 263740

**Data Package, Receiving/Inspection Remarks:**

Inspection Required Y/N	Visual Damage Y/N	Comments	Name/Initials	Date Comp.
Y	N		J. Romie/JHR	12/14/98

**Process Flow:**

#	Operation	Start Date	Work Area	Instructions	Name/Initials	Date Comp.
1	Clean per LIGO Vacuum Prep. Form		CIT	per E960022 for metal parts.	J. Romie/H. Armandula <i>JHR</i>	12-27-99
2	Vacuum Bake per LIGO Vacuum Prep. Form	1.18.00	LHO/LLO	per E960022 for stainless parts: Bake in vacuum at 200 deg. C for 48 hours.	B. RIVERA	1.21.00
3	Control Point		NA	Review/approve RGA scan # <u>012400E.RGA</u> <u>V30L09073</u>	D. Coyne <i>DC</i>	1/26/00
4	Wrap & Tag vacuum clean parts per E960022-A		LHO/LLO	Wrap (UHV foil) and bag (CP Stat or equiv.) per E960022.		
5	Copy and File Traveler		LHO/LLO	Make 1 copy of the traveler File one copy with the DCC. Original goes with parts.		

*N.B.: A copy of this traveler must be submitted to the DCC each time the original is shipped with the associated part(s) and when the traveler has been completed.*

# LIGO PROCESS TRAVELER

DCC Number: E990449-00-X

#	Operation	Start Date	Work Area	Instructions	Name/Initials	Date Comp.
6	Pack		LHO/LLO	Pack parts as appropriate to prevent contamination and damage. Move them with traveler to LOS Suspension cabinet in vacuum prep. lab. <b>Note: Pack original traveler with these parts.</b>		
END: Go to Traveler associated with next higher assembly processing						

**Special Instructions (Handling/Packaging Constraints, Remarks, etc.) or Notes:**
