NLC - The Next Linear Collider Project

Fabrication of X-Band Structure

Workshop on RF Breakdown in Copper Structures

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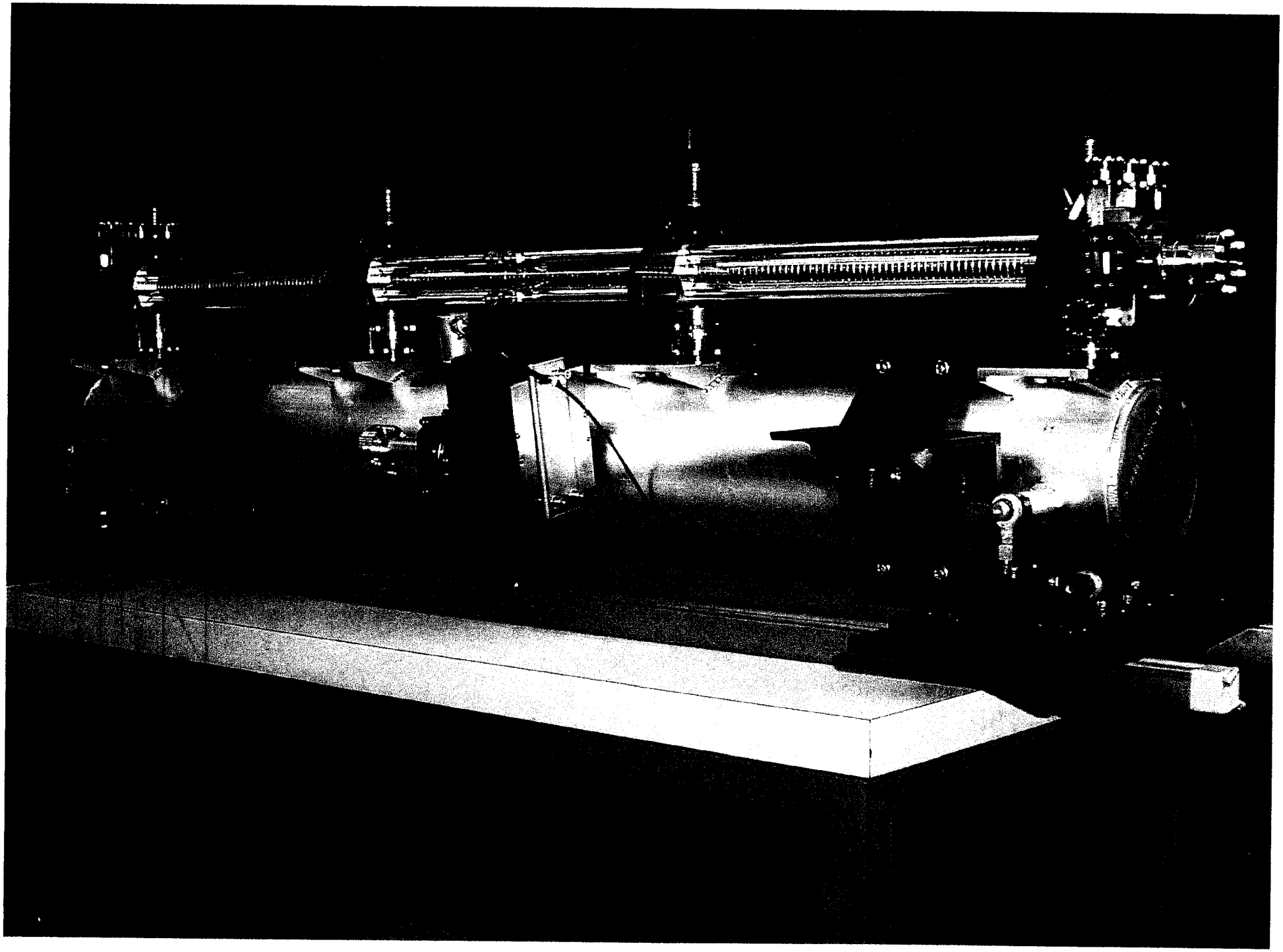
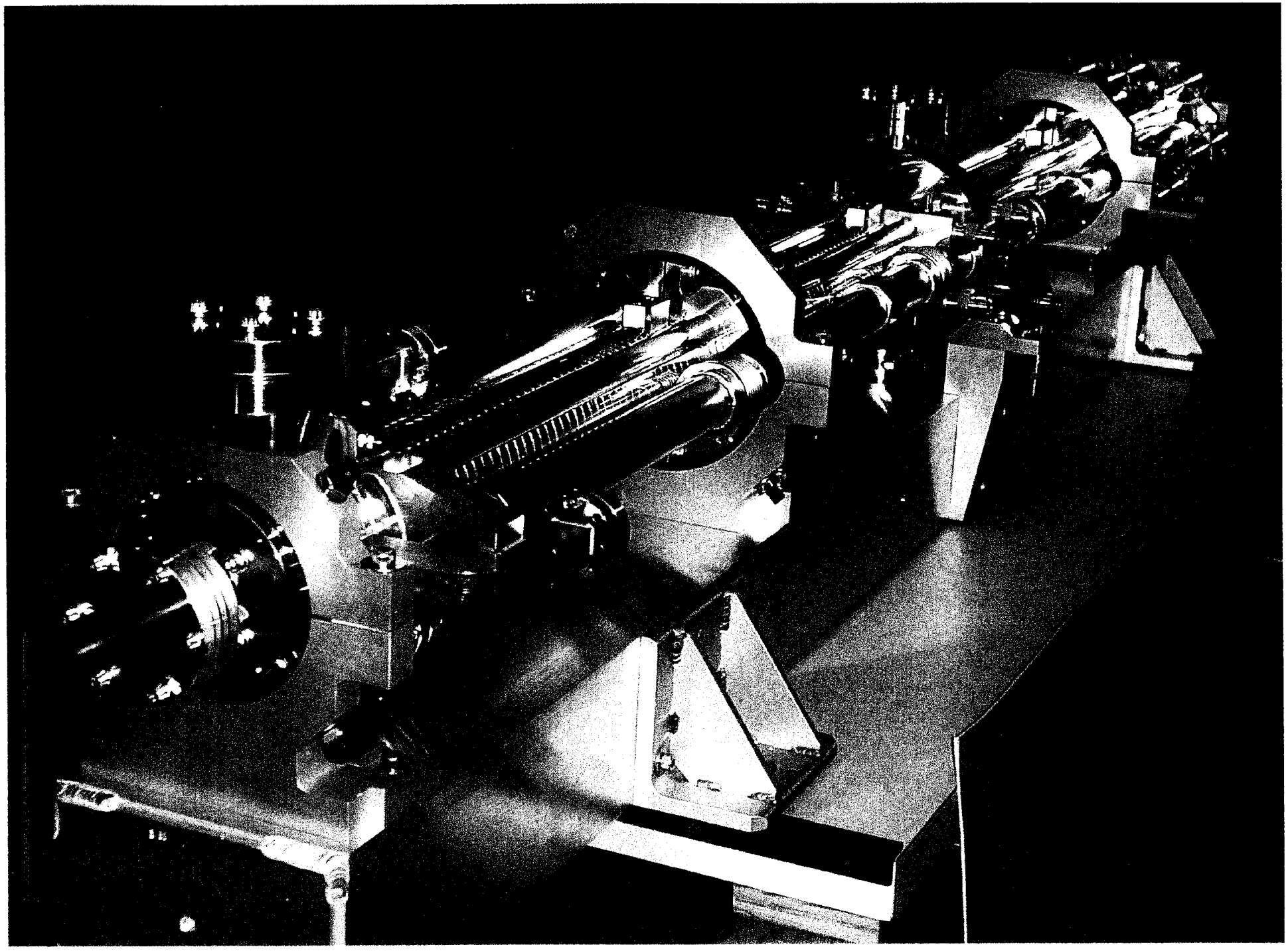
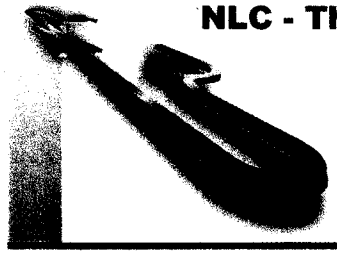
August 2000







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Clean Room Specification

Federal Standard 209D

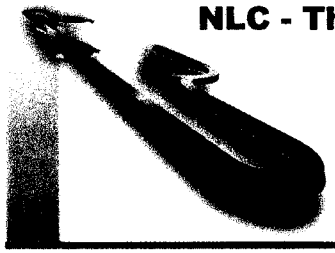
Six Designated levels of Cleanroom Cleanliness:

Class 100,000
Class 10,000
Class 1,000
Class 100
Class 10
Class 1

The class number refers to the maximum number of particles bigger than 0.5 μm/cubic foot

Horizontal Laminar Air Flow or Vertical Laminar Air Flow

Using High Efficiency Particulate Air (HEPA) Filter



Fabrication Procedure

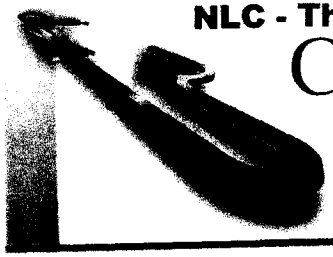
- Rough Machining
- Single Diamond Turning
- Ozonized Water Rinsing
- Cell Stacking
- Pre-Bonding at 150^0 C
- Diffusion Bonding at 850^0 C
- Chemical Cleaning for Input/Output/HOM Parts
- Final Brazing
- Leak Check and N2 Purge, Filling
- Alignment Measurement and Straightening
- Microwave Characterization
- ASSET Experiment
- Vacuum Baking
- High Power Processing

Particle Count for the Location Related with Our Structure Fabrication

Location	Room 150 Under Hood	CMM Inside Tent	Kly. Clean Room	Room 150 High Ceiling	Room 150 Main Room	Kly. QC Room	Bake Station	Furnace Station
0.3μm	0 to 100,000	30,000	350,000	500,000	600,000	850,000	900,000	1,200,000
0.5μm	0 to 100,000	10,000	60,000	100,000	110,000	170,000	200,000	300,000
Operation	M.W. QC	Mech. QC	**Assembly &Storage**	Bead Pulling	M.W. QC	**Assembly &Storage**	Baking	Brazing& Assembly
Duration (Days)	10	14*	20*	5*	7*	5*	4+7	6

Vacuum Baking for Our Structure

Structure	Date	Bake ID	Temp. C	Days	Hot	Cold
75cm	6/4/93	TS293	400	6	3E-8	3E-10
DS1	2/7/94	Manual	400	2.5	5E-8	4E-9
0.9m-1	5/30/96	TS419	450	4	5E-9	5E-10
0.9m-2	5/16/96	TS416	450	4	5E-9	5E-10
DS1	3/7/97	TS450	550	6	3E-8	1E-9
DS2	1/27/97	TS445	550	5	3E-8	1E-9
CERN	9/43	Heat Tape	150	24		
DDS1	10/2/96	TS438	450	5	2E-8	9E-10
DDS2	4/23/97	TS453	550	3.5	6E-9	1E-9



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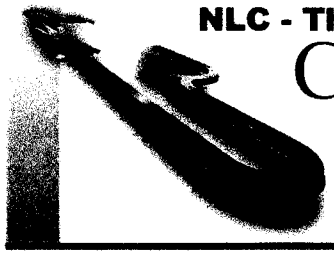
Chemical Cleaning for Oxygen Free Electronic Grade (OFE) Copper Structure Parts I

For Disks and Parts with Diamond Turning Finish

- Vapor degreasing in perchloroethylene for 5 minites (solvent degreasing)
- Alkaline soak clean using Enbond Q527 for 5 minutes (detergent to clean dirt)
- Water rinsing
- 50% hydrochloric acid for 1 minute (oxide removing)
- Water rinsing
- Mixed Acid (Phosphoric, Nitric, Acetic, Hydrochloric) for 5 seconds
- Water rinsing
- Cold and hot Deionized water rinsing
- Isopropyl alcohol rinsing
- Blow dry



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Chemical Cleaning for Oxygen Free Electronic Grade (OFE) Copper Structure Parts II

For Disks and Parts with Regular Machining Finish

- Vapor degreasing in perchloroethylene for 5 minites (solvent degreasing)
- Alkaline soa clean using Enbond Q527 for 5 minutes (detergent to clean dirt)
- Water rinsing
- 50% hydrochloric acid for 1 minute (oxide removing)
- Water rinsing
- Mixed Acid (Phosphoric, Nitric, Acetic, Hydrochloric) for 1 minute
- Water rinsing
- Mixed Acid (Sulfuric, Nitric, Hydrochloric) for 5 seconds (75% itching here)
- Water rinsing
- Solution of Oxyban 60 (1% by volume) for 2-5 minutes (anti-tarnish, CH,CO...)
- Water rinsing
- Cold and hot Deionized water rinsing
- Isopropyl alcohol rinsing
- Blow dry