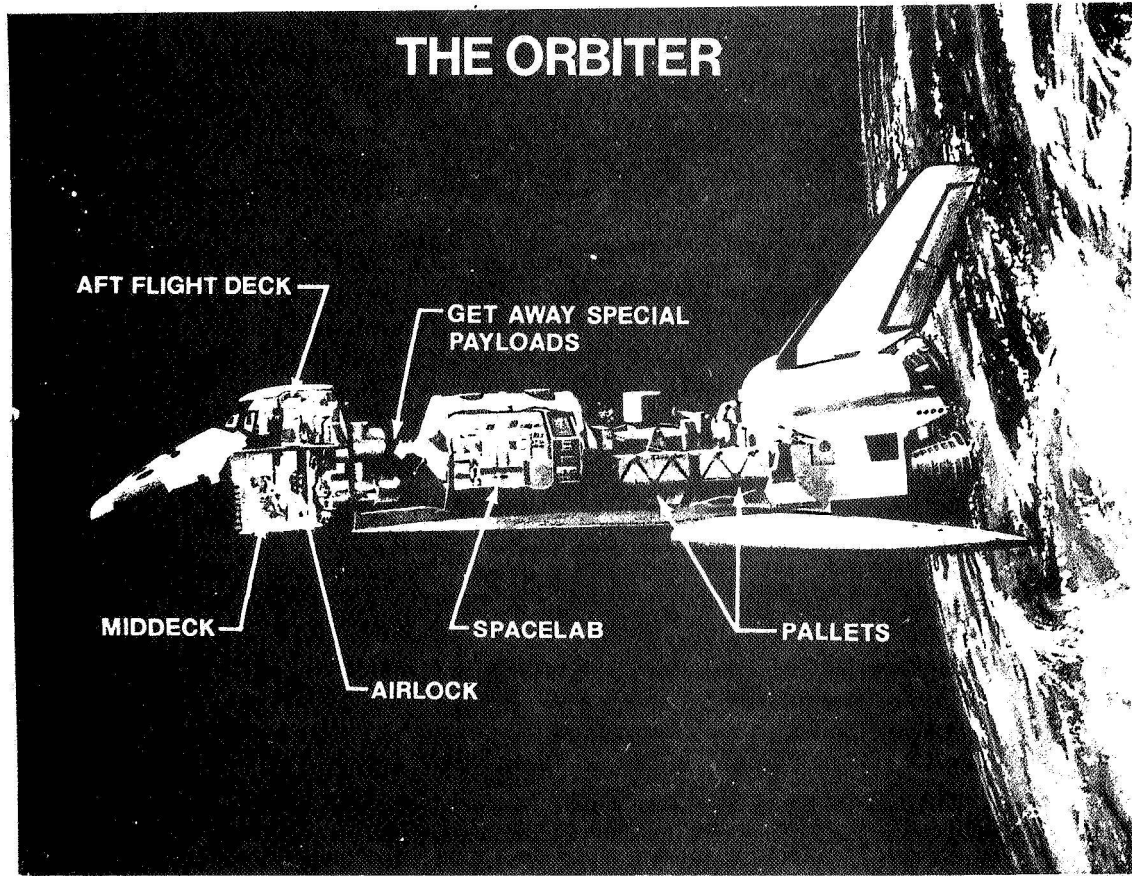


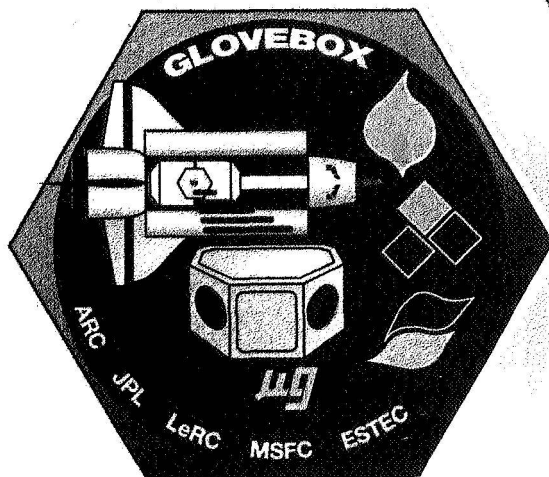
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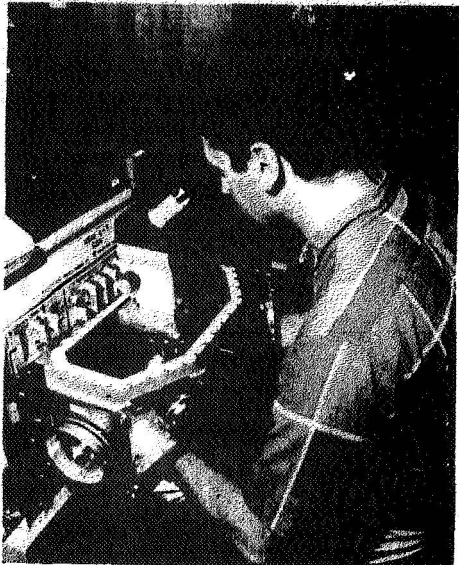
**FLUIDS FLIGHT HARDWARE**

**DR. NANCY SHAW**  
**CHIEF, FLUIDS EXPERIMENT DEFINITION BRANCH**  
**(216) 433-3285**

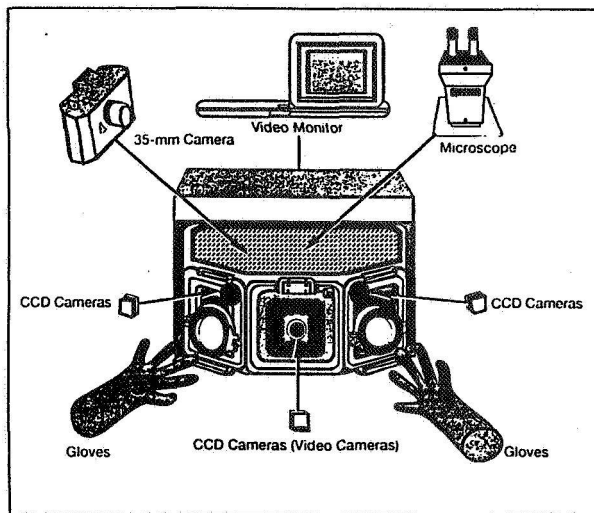




# GLOVEBOX



## Glovebox-2 Investigations



### Fluids

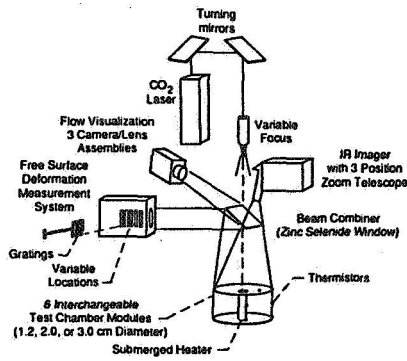
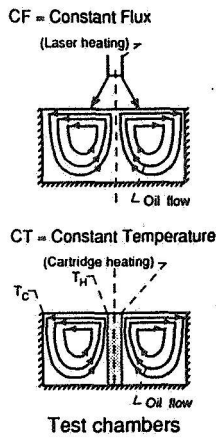
- Colloidal Disorder-Order Transitions
- Interface Configuration Experiment
- Oscillatory Thermocapillary Flow

### Combustion

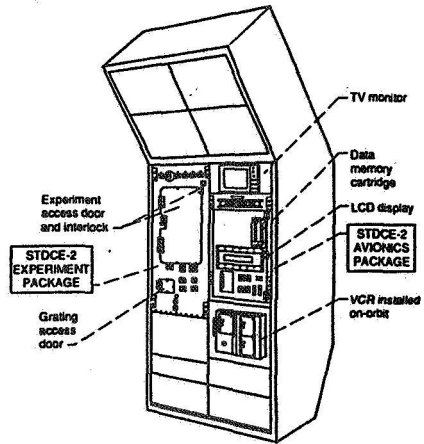
- Comparative Soot Diagnostics
- Fiber Supported Droplet Combustion
- Forced Flow Flamespreading Test
- Radiative Ignition and Transition to Spread Investigation

### LeRC Contacts:

PS: Howard D. Ross  
 PM: Brian F. Quigley



Optical Systems for STDCE-2



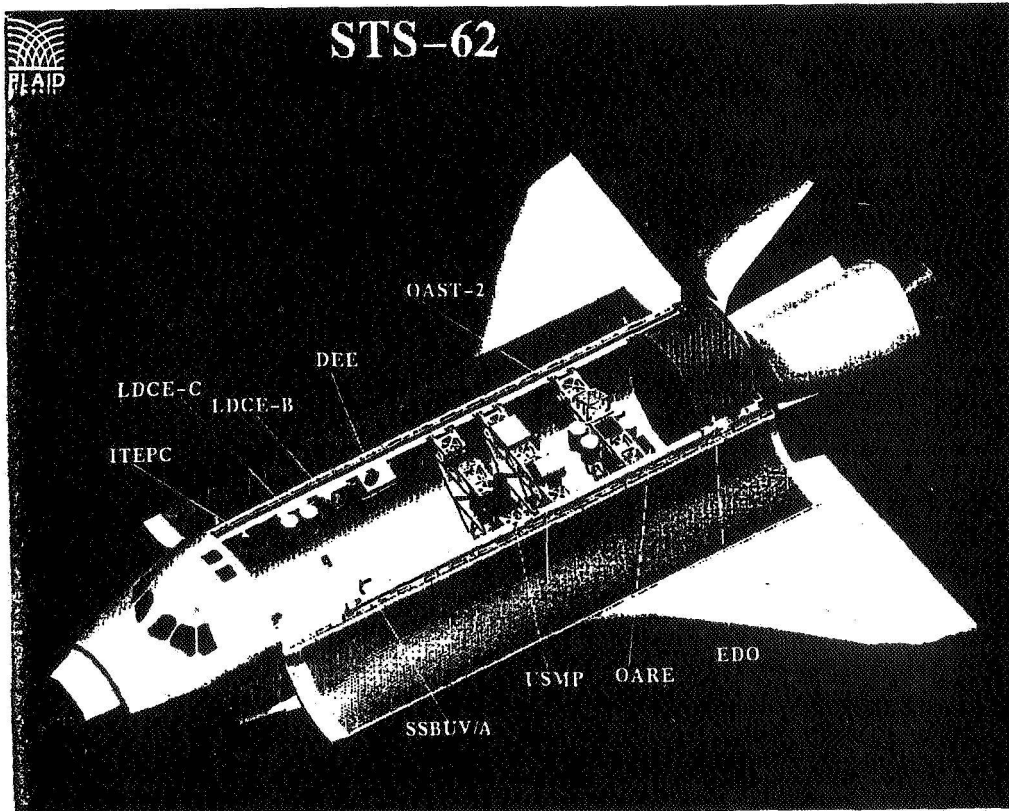
STDCE-2 in Spacelab Rack

Study Oscillatory Thermocapillary Flows and Validate Physical Models on the Second U.S. Microgravity Laboratory Mission (USML-2)

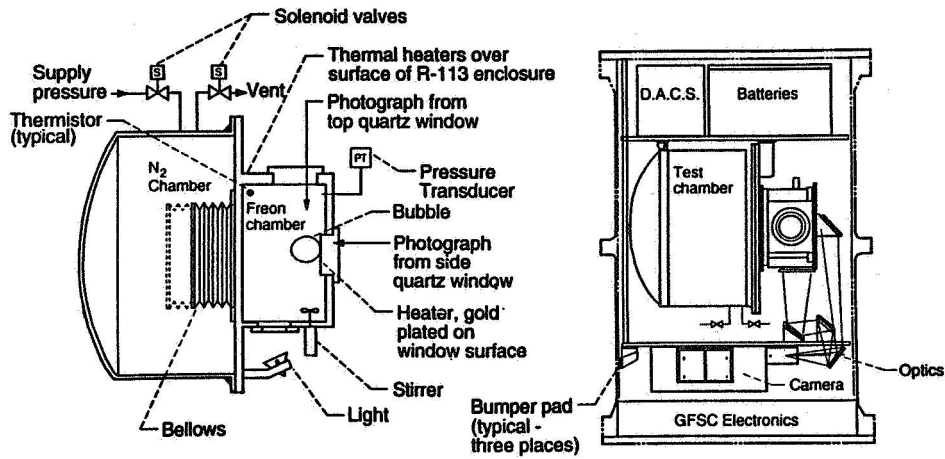
PI: Prof. Simon Ostrach  
Prof. Yasuhiro Kamotani  
Case Western Reserve University

CD-93-63753

LeRC Contacts:  
PS: Alexander D. Pline  
PM: Thomas F. Jacobson  
DPM: Robert L. Zurawski



## Pool Boiling Experiment Get Away Special Payload STS-47, STS-57, and STS-60



Test chamber schematic

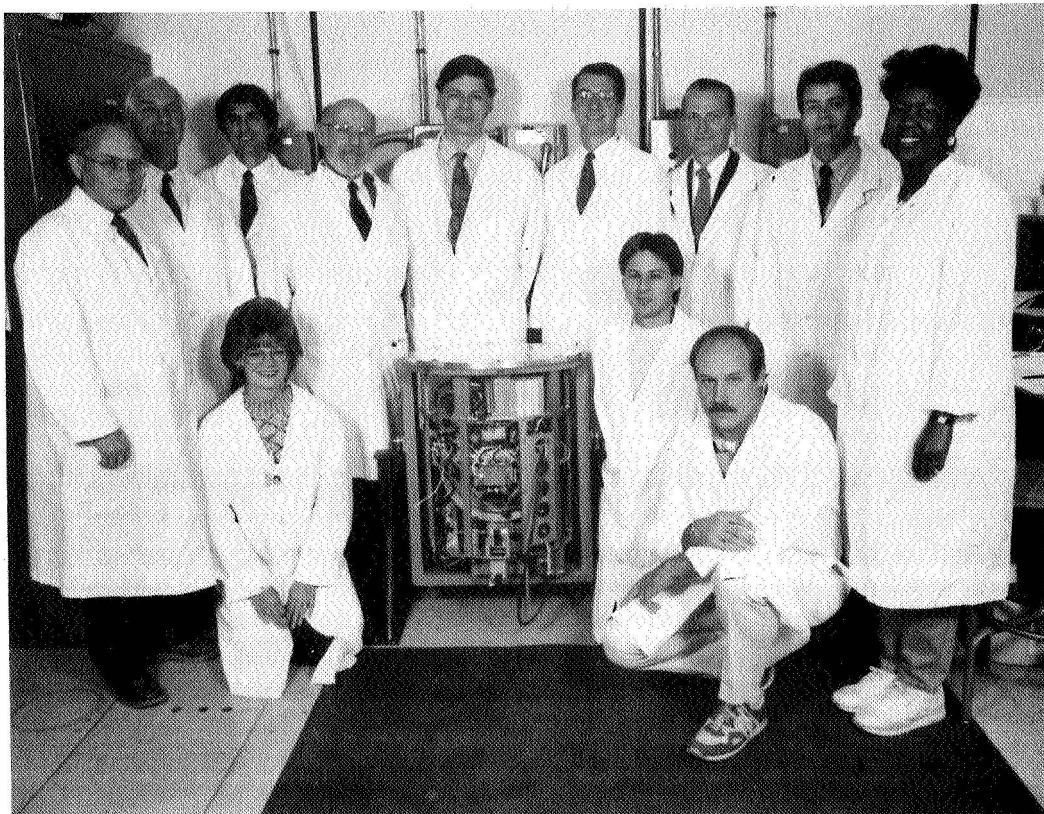
Set-up of experiment in container

Study of heat flux and liquid subcooling effects on the onset  
of nucleate pool boiling in reduced gravity.

PI.: Prof. Herman Merte, Jr.  
University of Michigan

LeRC Contacts:  
PS: Francis P. Chiaramonte  
PM: Angel M. Otero

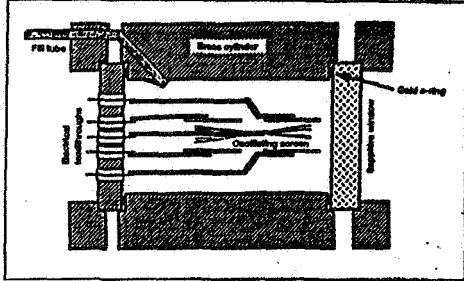
CD-93-64459





# Critical Fluid Viscosity Measurement Experiment

## Protoflight CFVME Viscometer



### Objectives & Description:

The purpose of the experiment is to produce data on xenon closer to its liquid-vapor critical point than is possible in 1-g due to the singular compressibility of the fluid near the critical point. The data will provide complementary results with Critical Fluid Scattering Experiment to test the mode-coupling theory of critical phenomena and will provide guidance to re-normalization group theory development on dynamic critical fluid behavior.

The test requires the use of a low-frequency, low-shear rate viscometer and a thermostat with approximately 20  $\mu$ K temperature control precision near room temperature. Viscosity measurements with an accuracy of 0.2% will be taken between 60 mK and 600  $\mu$ K of  $T_c$ . Sample loading to within 0.3% of critical density and temperature gradients of less than 0.22  $\mu$ K/cm are also required to take full advantage of the low-g environment.

Discipline:	Fundamental Science
Phase:	Definition
Principal Investigator:	Dr. M. Moldover/NIST
Co-Investigator:	Dr. R. Berg/NIST
LeRC Project Manager:	Dr. R. Lauver
LeRC Project Scientist:	Dr. A. Wilkinson

## Hitchhiker-G Typical Structural Configuration

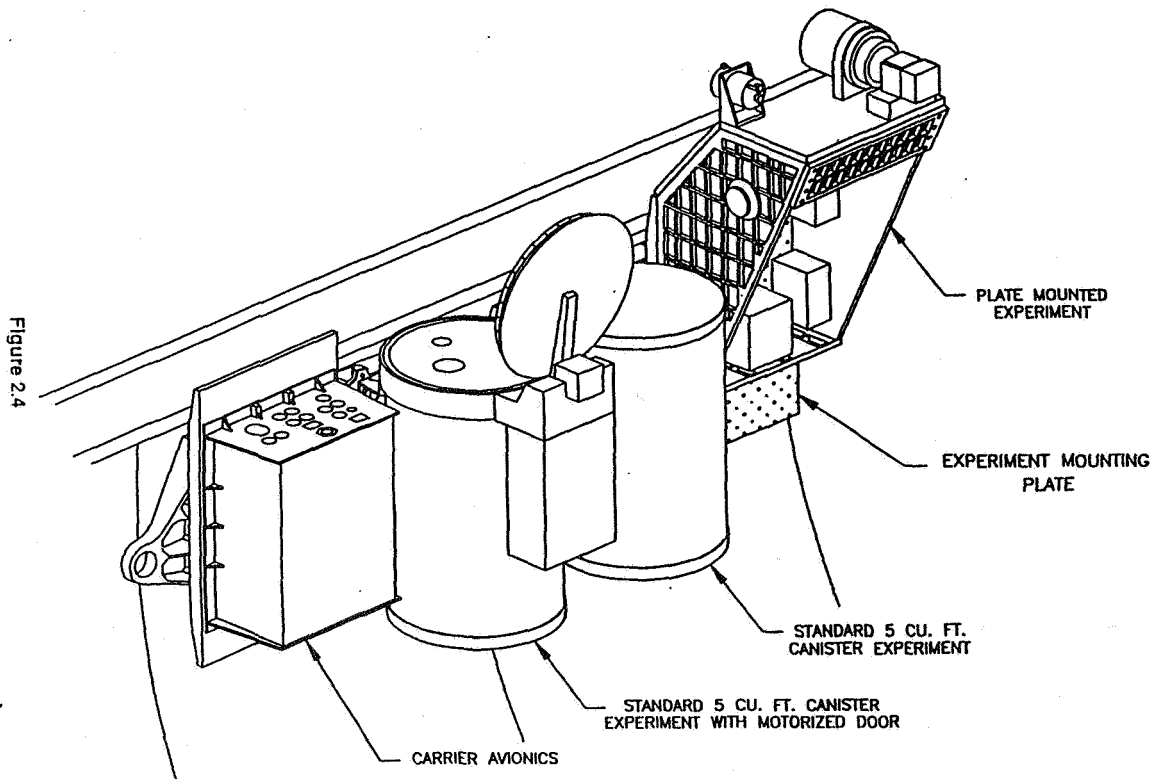
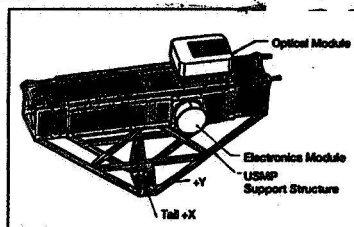


Figure 2.4

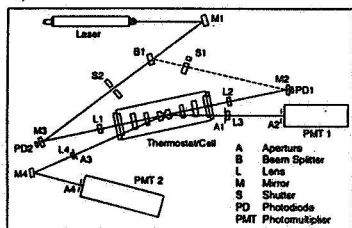
## Zeno-Critical Fluid Light Scattering Experiment Shuttle-USMP



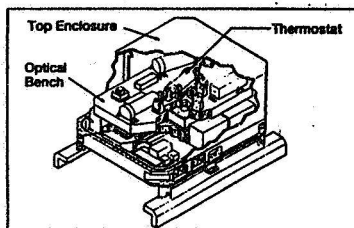
ZENO thermostat



Flight configuration



Optical layout



Optical module

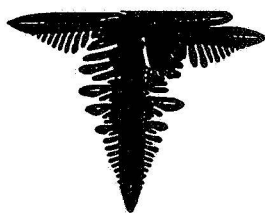
Extend light scattering measurements of xenon to temperatures closer to the critical point by reducing density stratification in the sample

PI: Prof. Robert W. Gammon  
University of Maryland

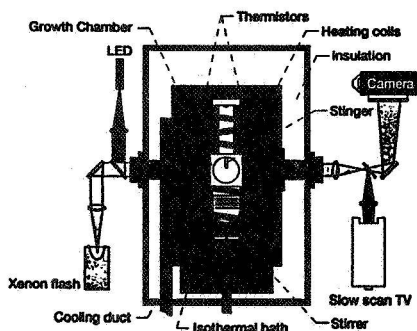
CD-93-64129

LeRC Contacts: PM: Richard W. Lauver  
PS: R. Allen Wilkinson

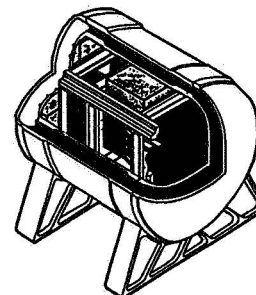
## Isothermal Dendritic Growth Experiment Space Shuttle-USMP



Dendrite



Thermostat



Flight Apparatus

Development and verification of a mathematical model relating dendrite growth rates and tip radii to tip undercooling

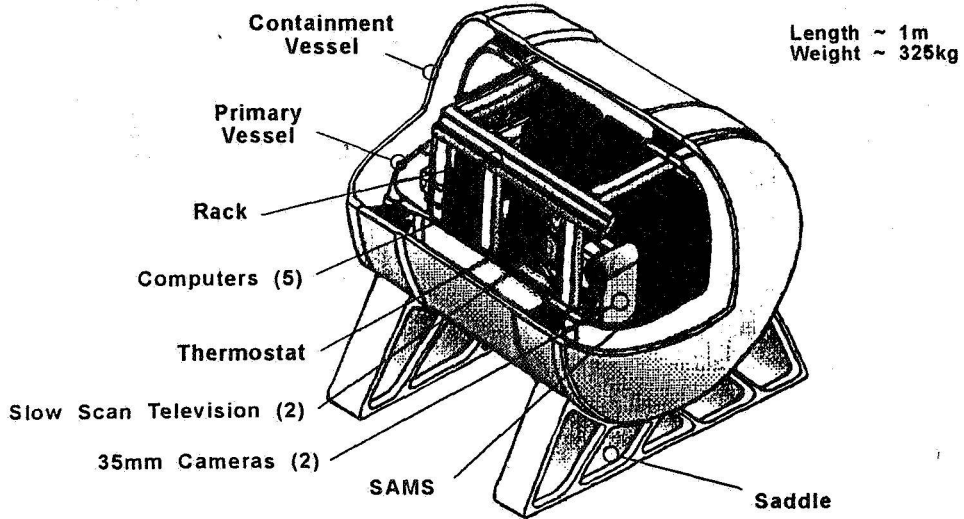
PI: Prof. Martin E. Glicksman  
Rensselaer Polytechnic Institute

CD-93-64460

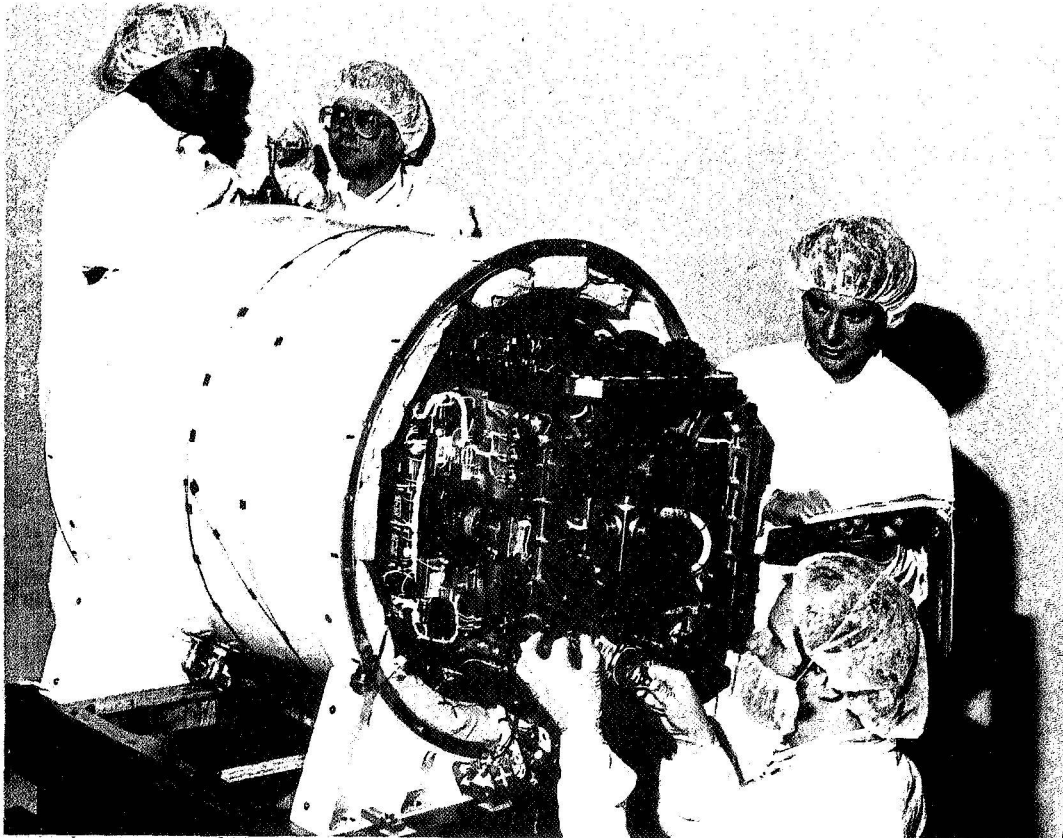
LeRC Contacts: PM: Edward A. Winsa  
PS: Diane C. Malarik

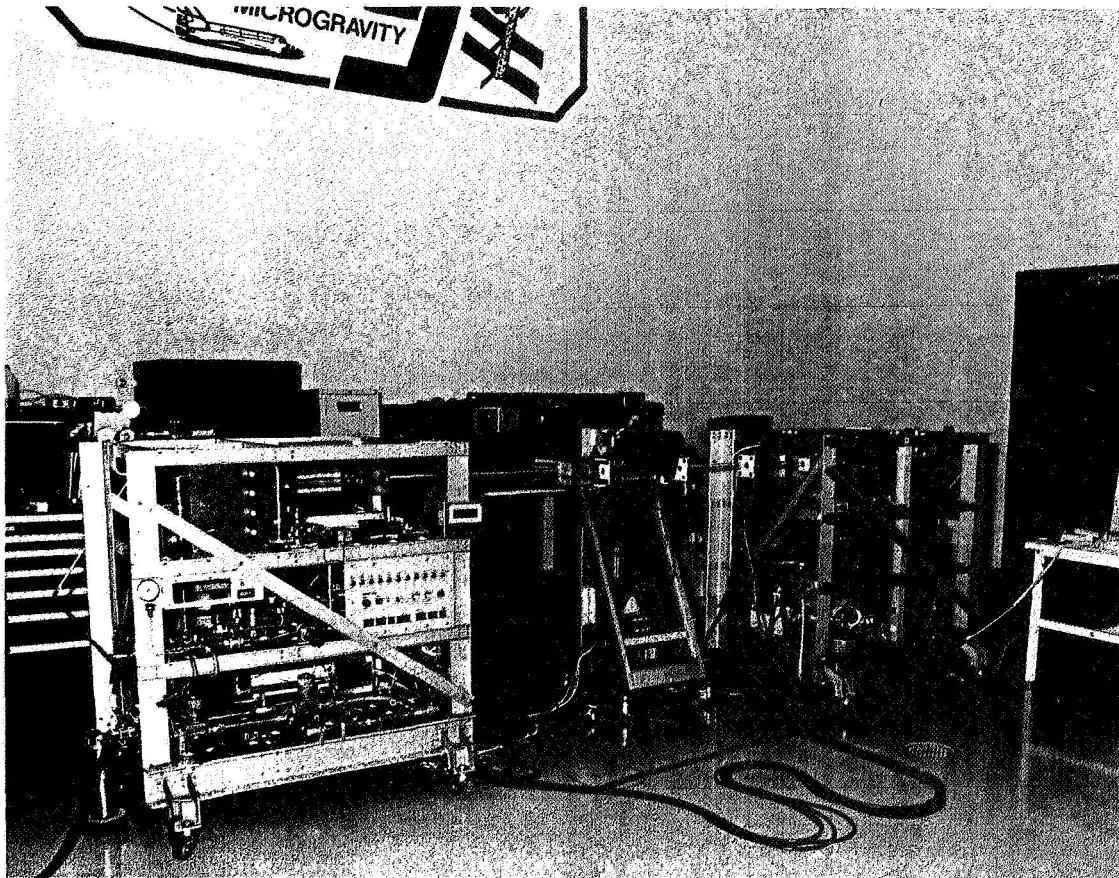
*Isothermal Dendritic Growth Experiment  
IDGE*

*Flight Apparatus Both Autonomous and Teleoperable*



NASA  
C-93-01594





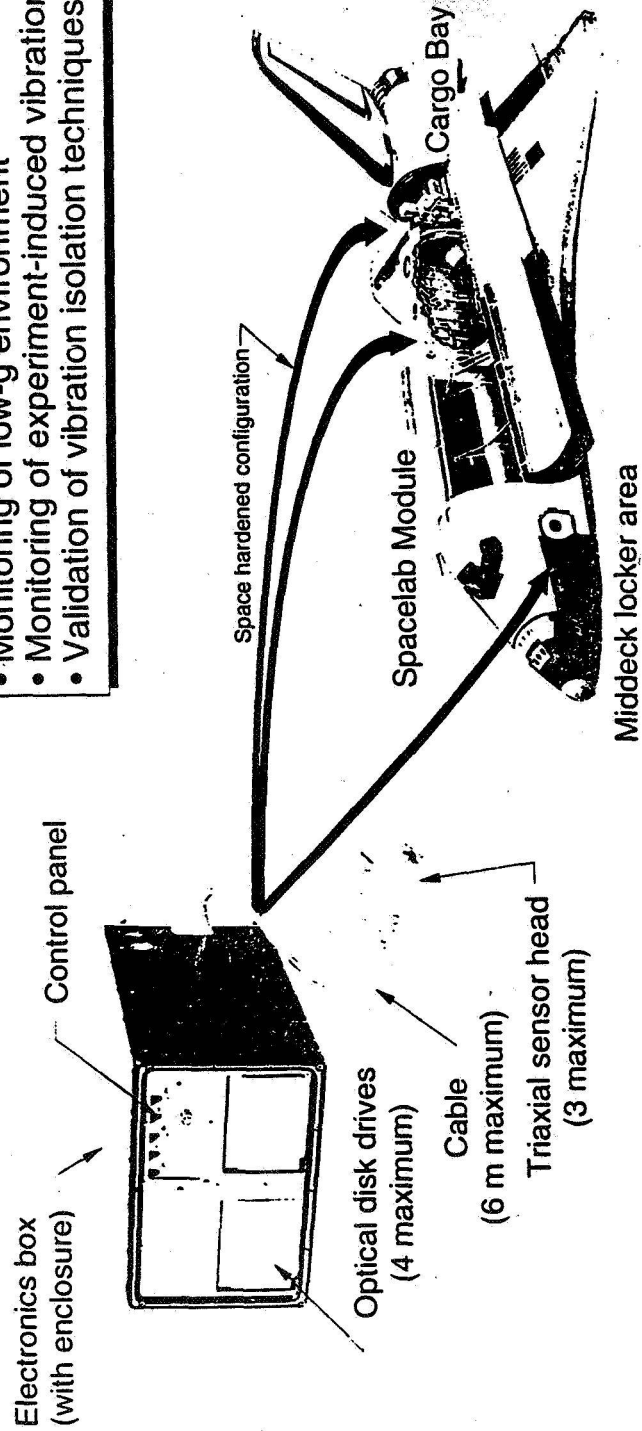
## **MICROGRAVITY ACCELERATION ENVIRONMENT SUPPORT**

- **SCIENCE REQUIREMENTS DEFINITION ASSISTANCE**
- **MICROGRAVITY ENVIRONMENT ADVICE**
  - **EFFECT OF LOCATION, ORIENTATION, EXCITATION**
- **MISSION OPERATION SUPPORT**
- **POST-MISSION PI SUPPORT**
  - **PROCESSED ACCELERATION DATA**
  - **SUMMARY ANALYSIS OF ENVIRONMENT**

**LeRC CONTACT:  
RICHARD DeLOMBARD  
(216) 433-5285**

# Space Acceleration Measurement System (SAMS)

- Applications of the SAMS
- Measurement of low-g accelerations
  - Monitoring of low-g environment
  - Monitoring of experiment-induced vibrations
  - Validation of vibration isolation techniques



Typical locations for the SAMS

LeRC Contact:  
PM: Ronald Sicker

CD-94 64569