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TITLE: International Space Station, Past, Present, and Future

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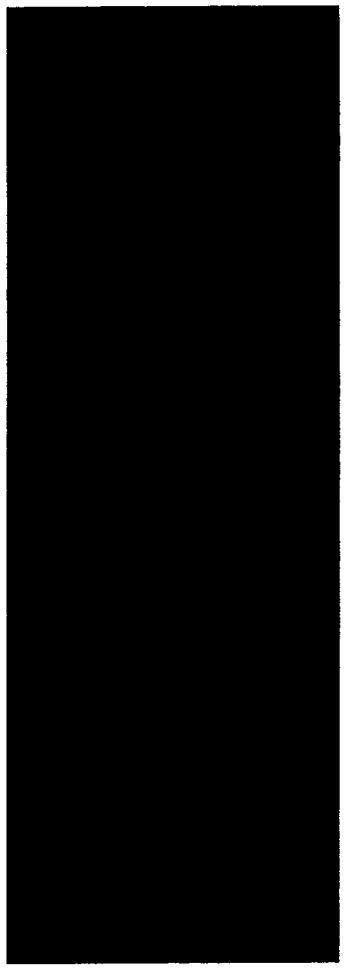
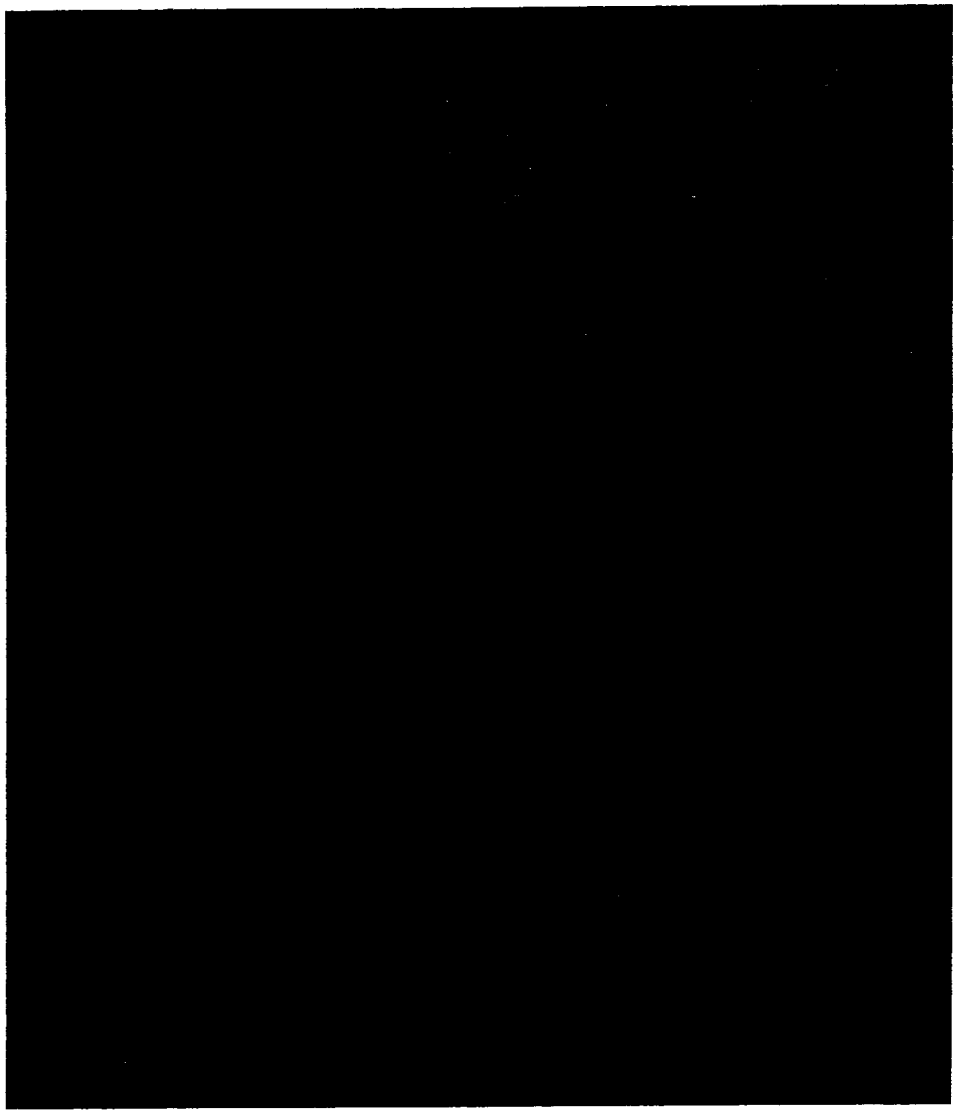
Huntsville, AL, United States

ABSTRACT: My presentation for Mexico is entitled "International Space Station, Past, Present, and Future". It is intended to provide a broad overview of what the International Space Station (ISS) is and how it is being developed, who the International Partners are, and the vision for the Space Station. The presentation is predominantly pictorial with top-level station information included such as the size and weight, the amount of pressurized volume, amount of power, etc. that will be available when the station is completed. The presentation also acknowledges the countries participating in the ISS Program, the contributions of the International Partners in terms of both hardware elements and launches, the Crews that have helped assemble, outfit, and/or occupy the Station, and the research that is already underway onboard. The major hardware elements to be delivered over the next several years are shown and the presentation ends with slides giving the overall functionality and capabilities the International Space Station will provide when complete.

International Space Station: Past, Present, and Future

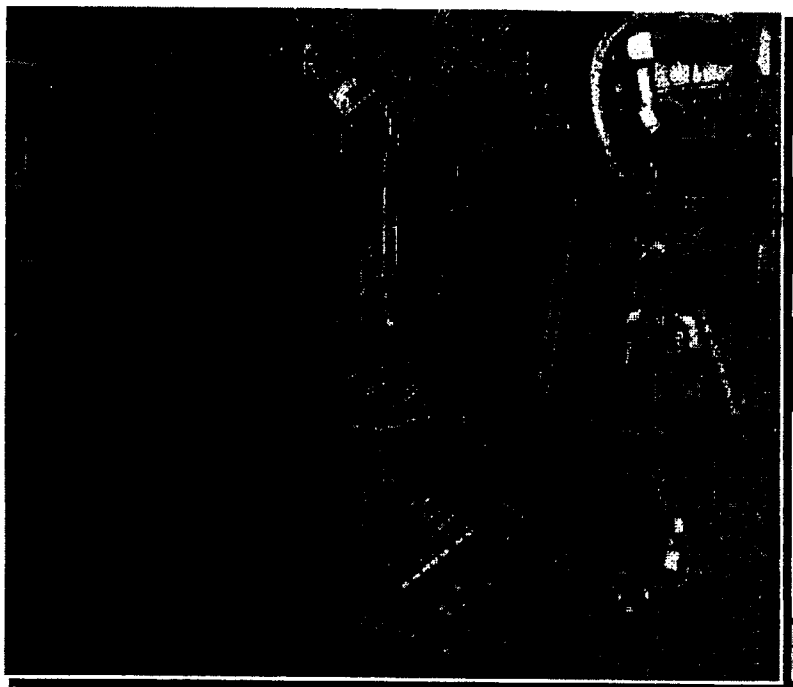


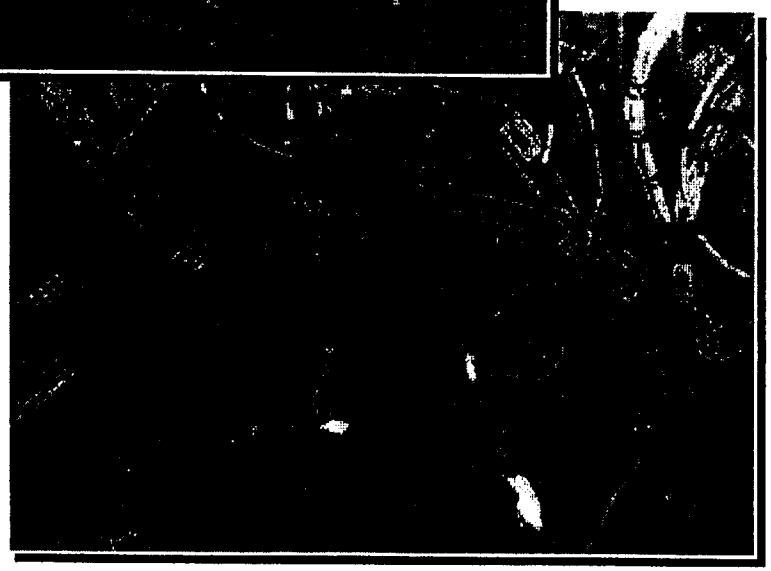


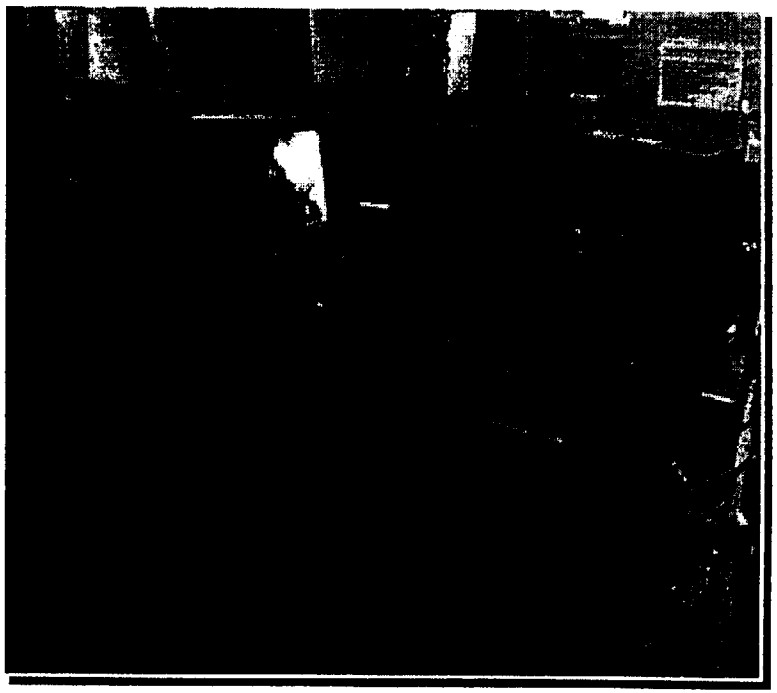
Size and Weight at Completion

Size and Weight at Completion

ISS Systems & Software

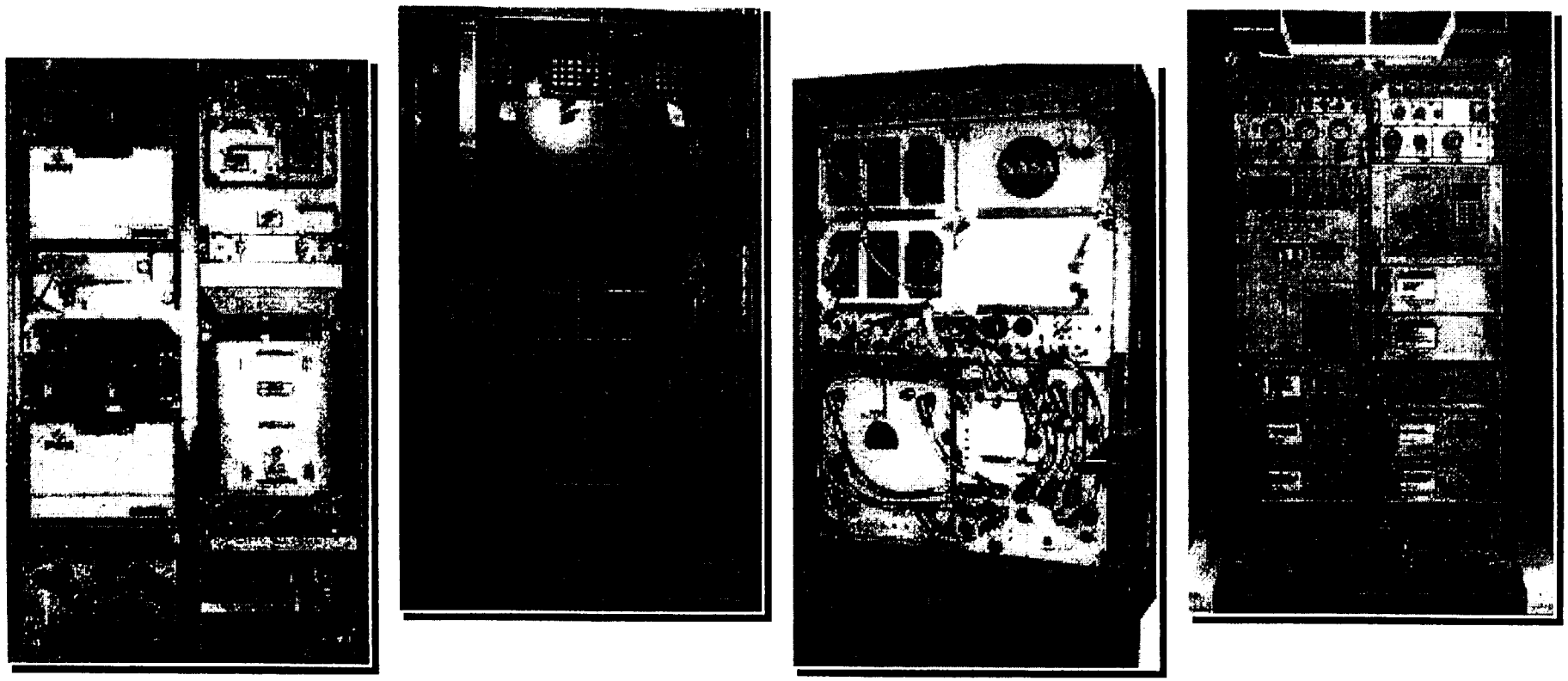






ISS Systems & Software

- *122 standard racks will outfit the Station with systems, experiments and stowage*



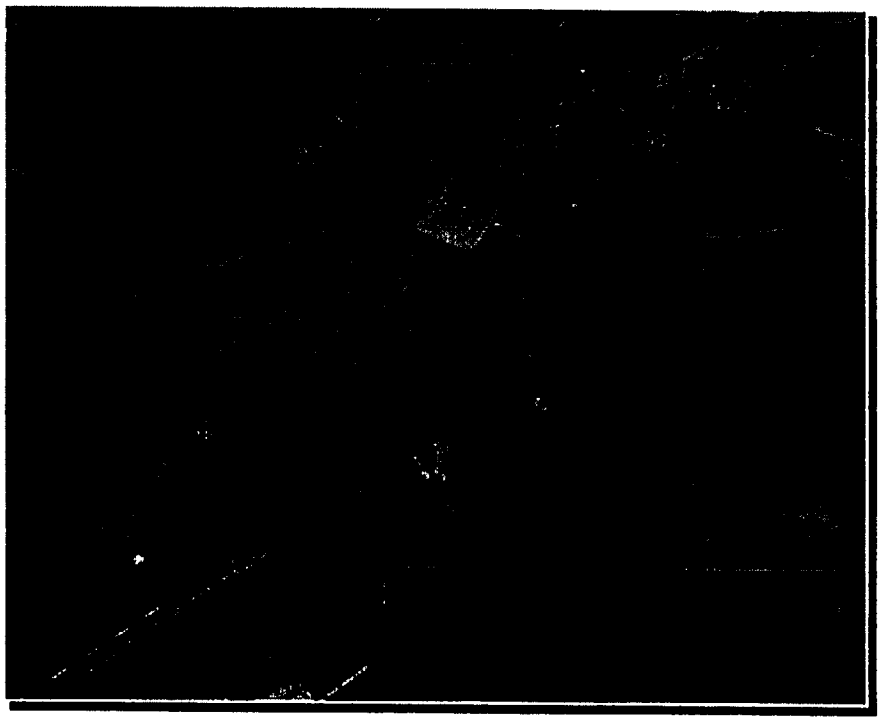
Power

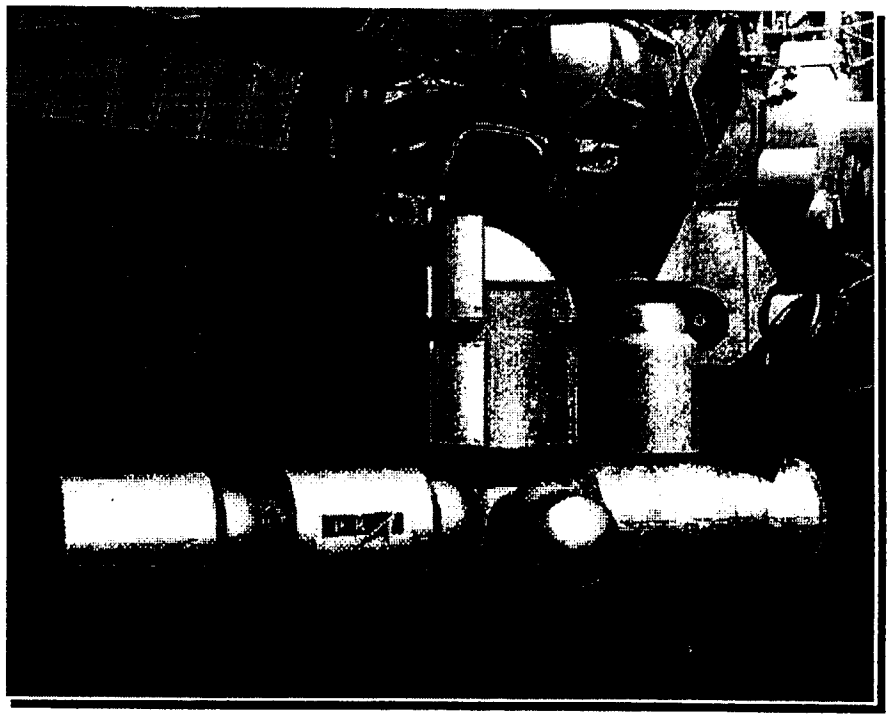
More power for research than any space station before

- 78 kW useable power available with all four US solar arrays
- Enough power for 50 homes at assembly complete

Research Facilities

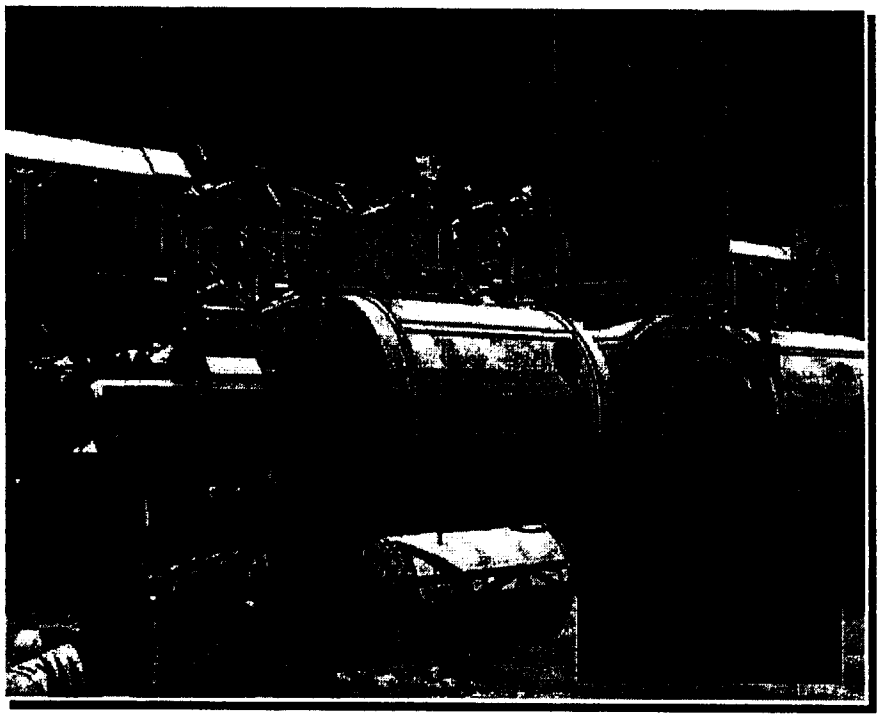
6 International Laboratories and multiple external experiment attach sites

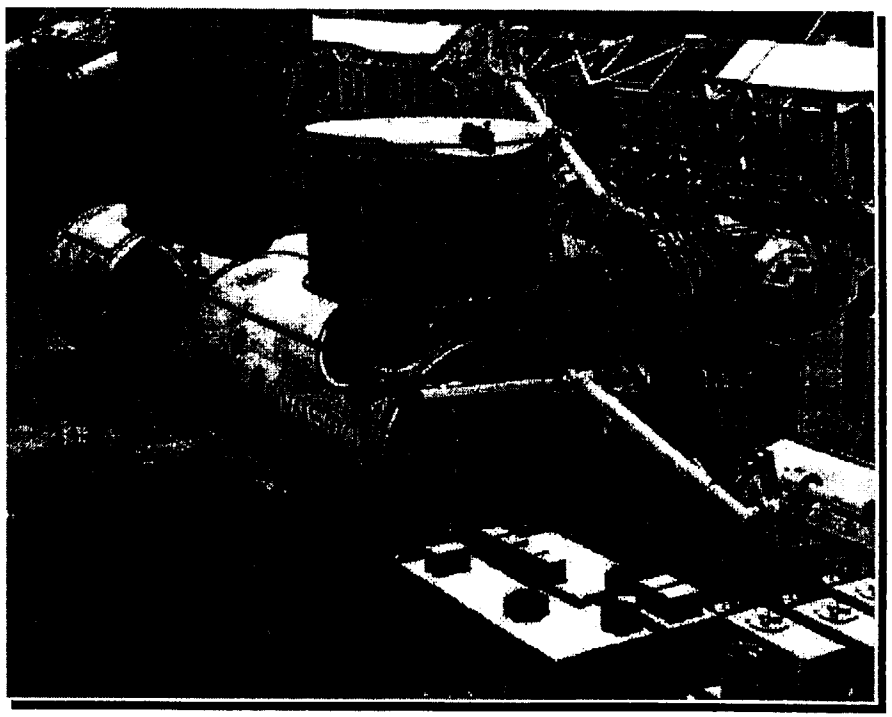




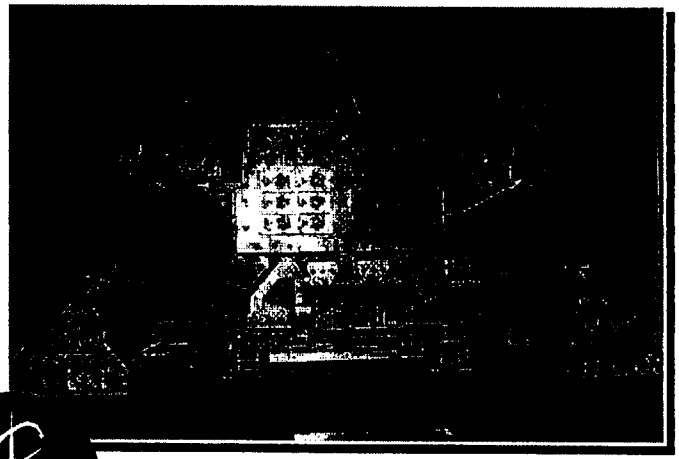
Research Facilities

6 International Laboratories and multiple external experiment attach sites





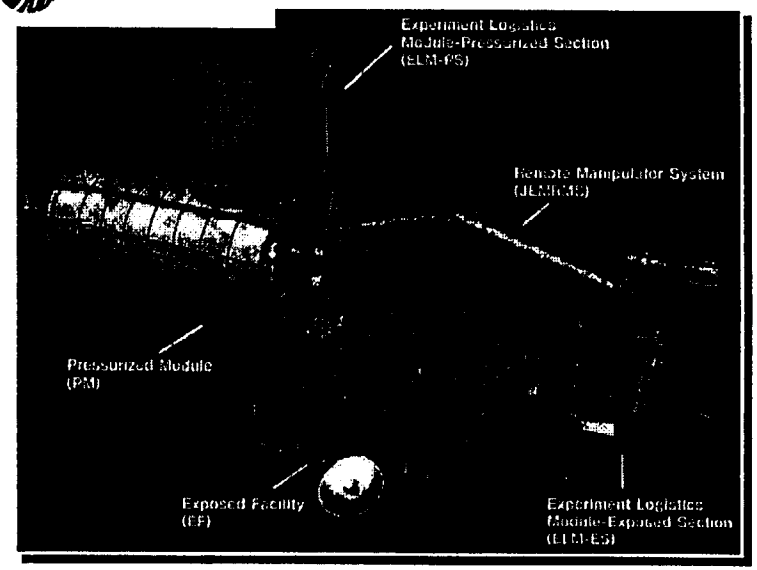
ISS Robotic Systems



CSA ASC

esa

NASDA



To Build and Operate

- *90 launches*
- *12-14 flights per year*
- *5 launch vehicles from 4 space agencies*

ISS International Partnership

United States

Russia

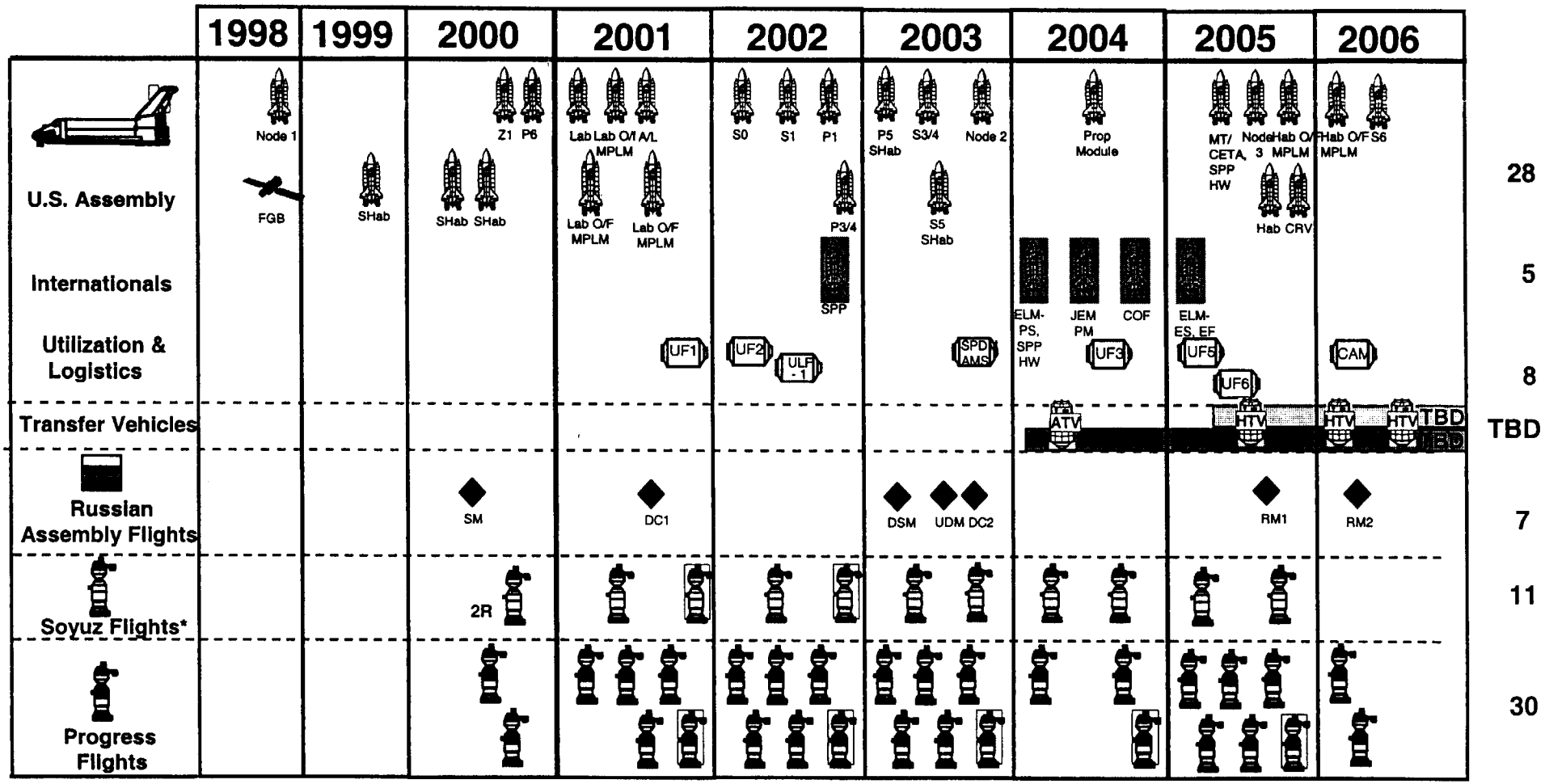
Canada

Japan

Europe

Overview of Space Station Flights

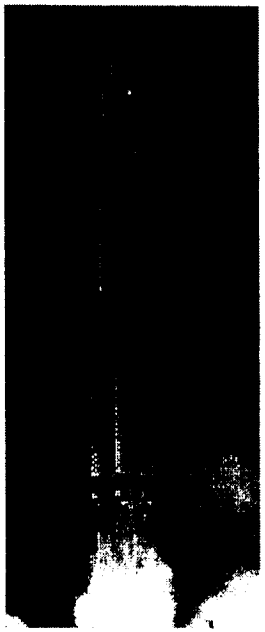
Rev-F Assembly Sequence, DCN – 03 (in review)



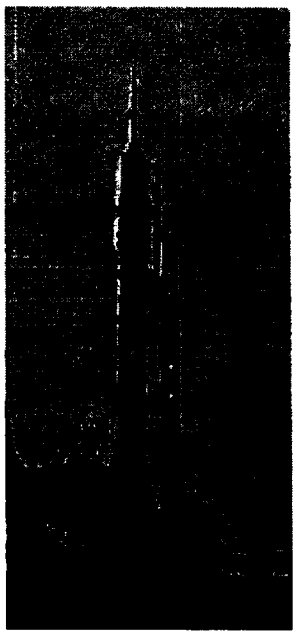
Total 89+

ISS Launch Vehicles

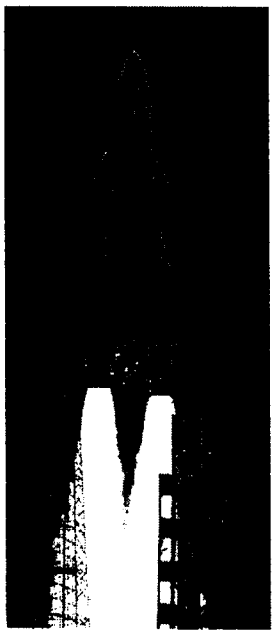
Shuttle



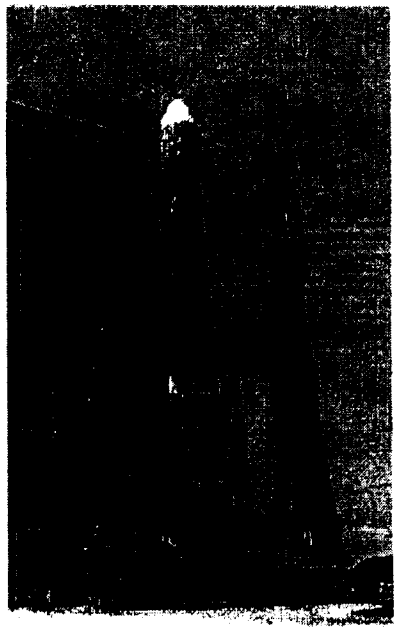
Proton



Soyuz



Ariane & ATV



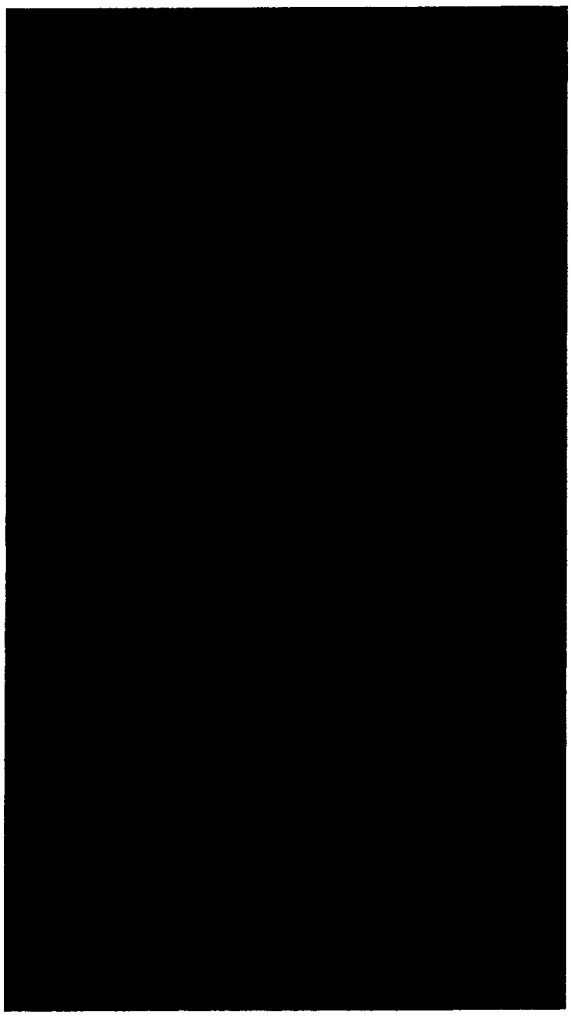
HIIA & HTV

Shuttle will launch 38 of the 47 Major elements

On-Orbit Construction

- *More than 1000 hours of space walking for on orbit assembly*

Accomplishments



ISS Assembly So Far

ISS Assembly So Far

26 flights to ISS accomplished as of Apr. 2002

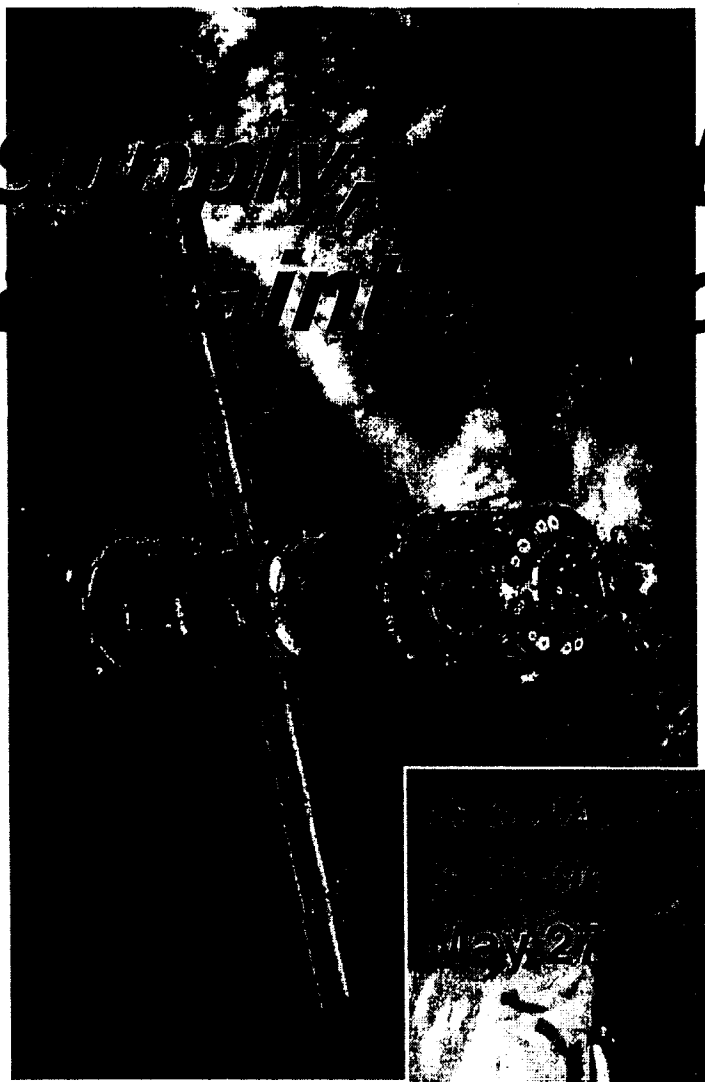
13 Shuttle Flights

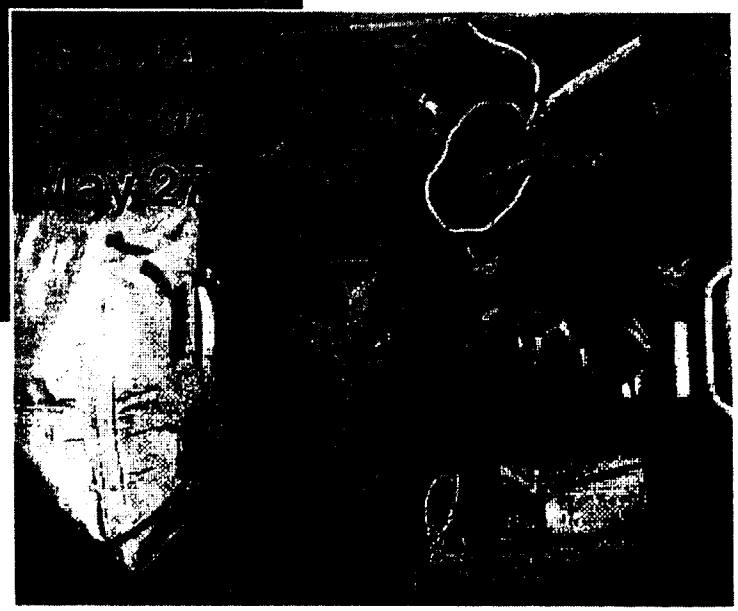
- 8 Major elements (Node,Z1,P6,S0,Lab,MPLMs, Arm, Airlock)
- 5 Logistic flights

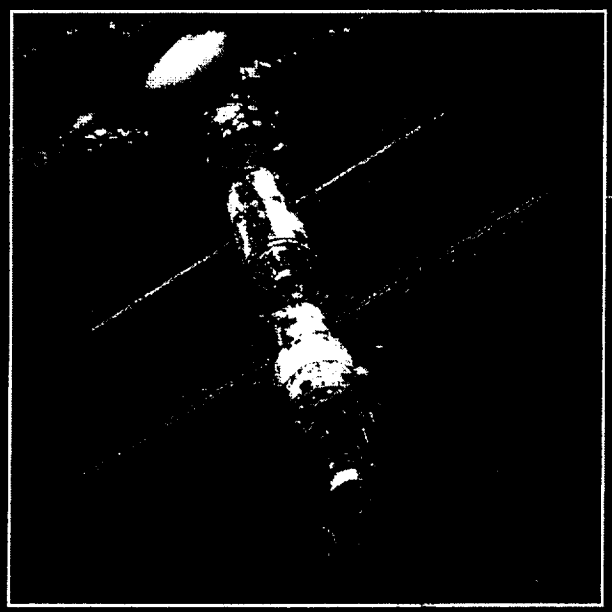
2 Proton Launches (Zarya and Zvezda)

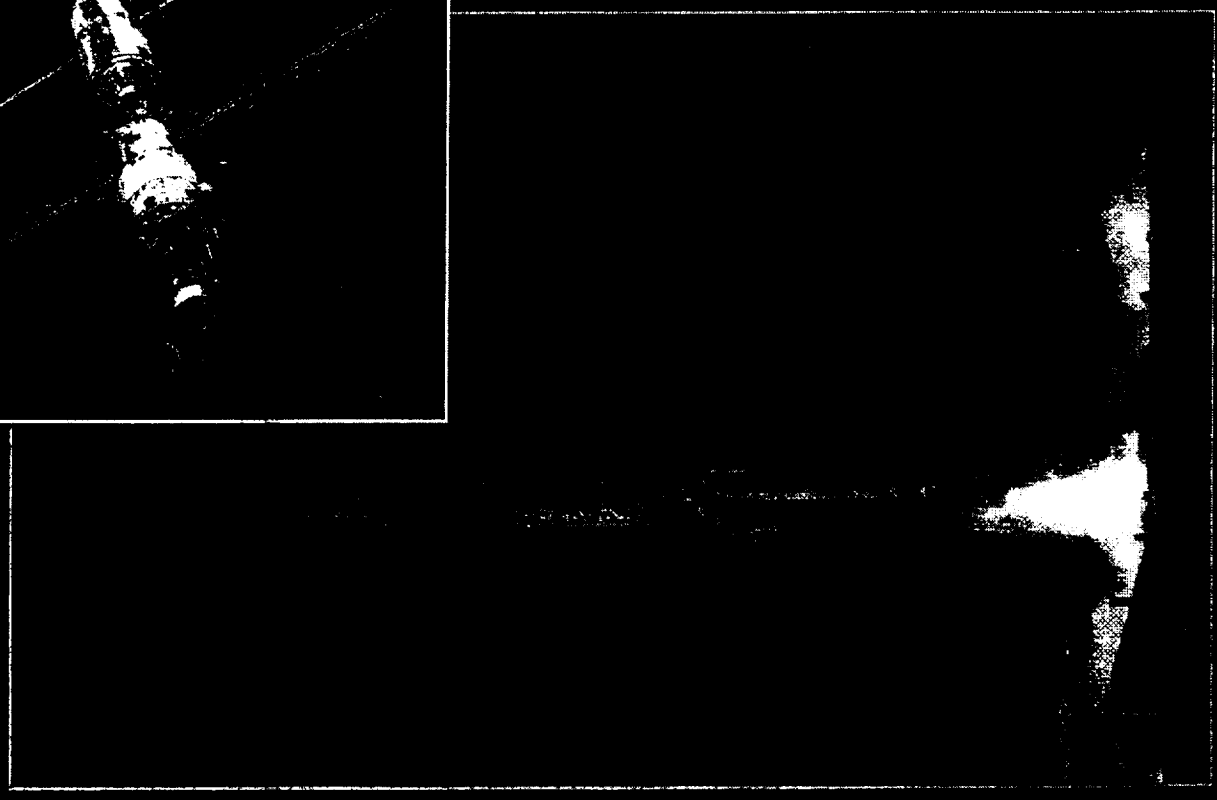
4 Soyuz (3 piloted and 1 unpiloted)

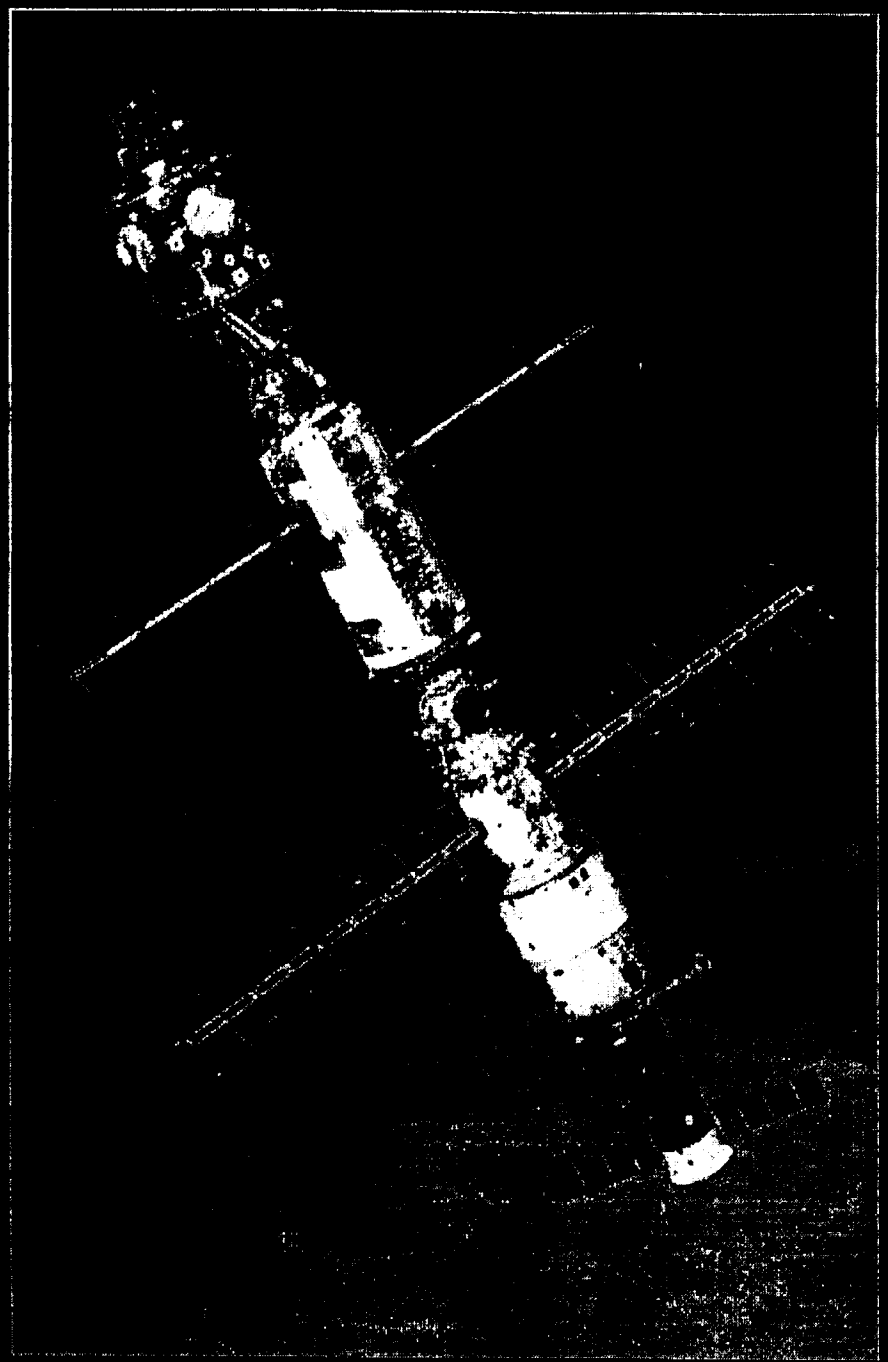
7 Progress Vehicles

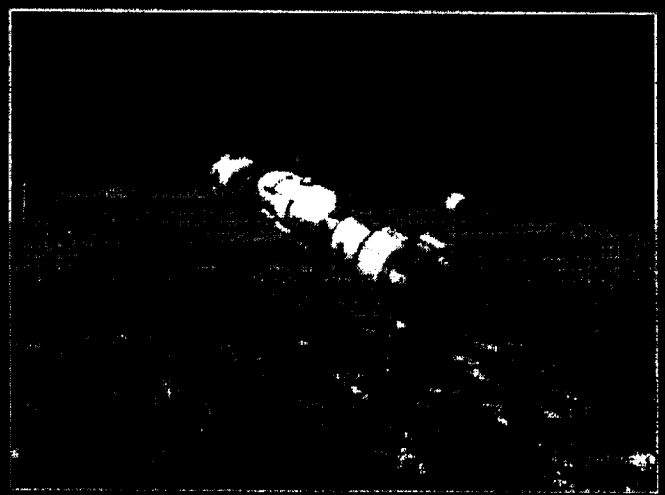






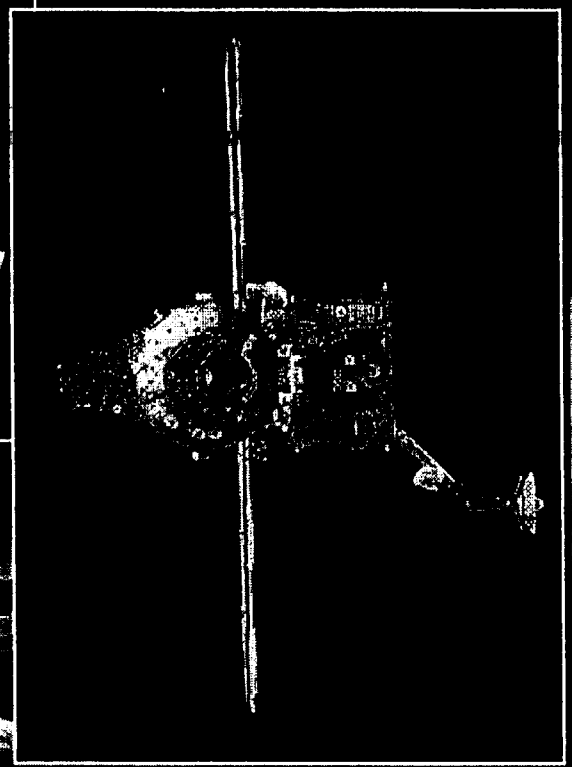


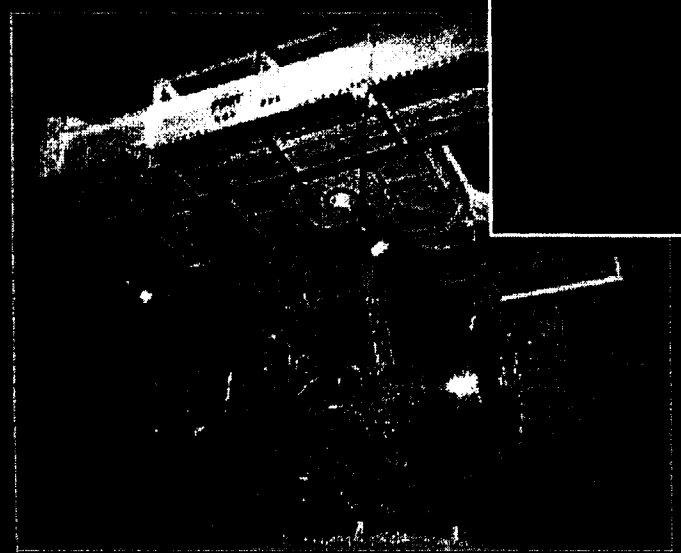




7 Progress Launches

- August 2000
- November 2000
- February 2001
- May 2001
- August 2001
- November 2001
- March 2002

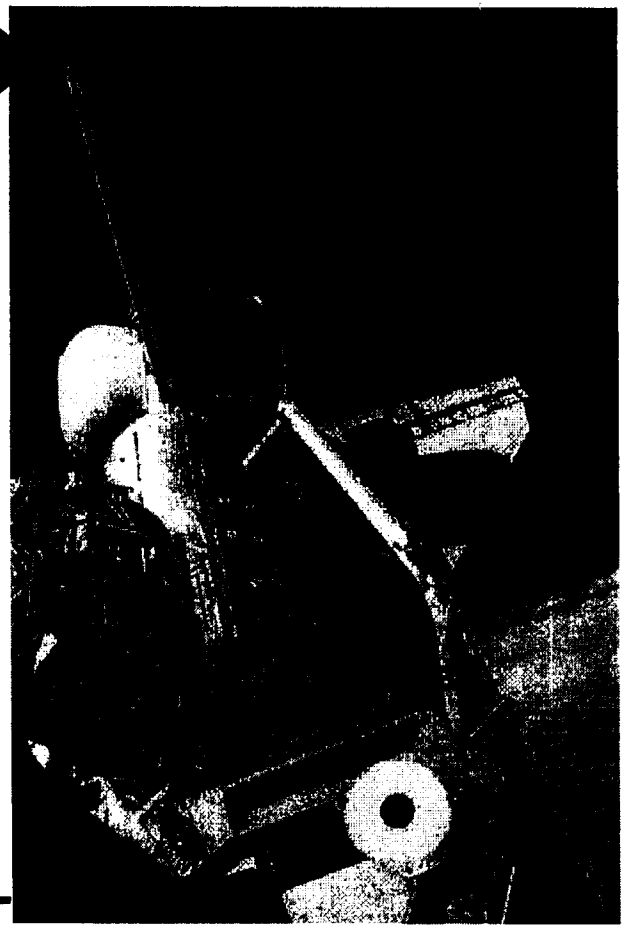


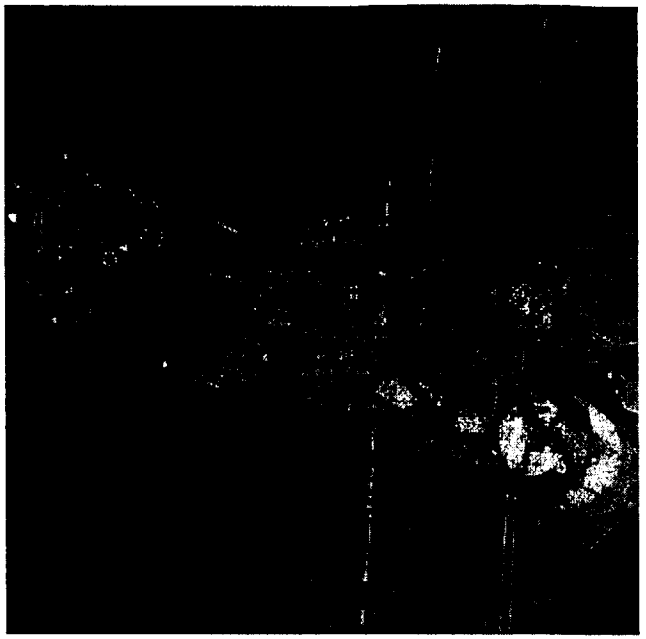


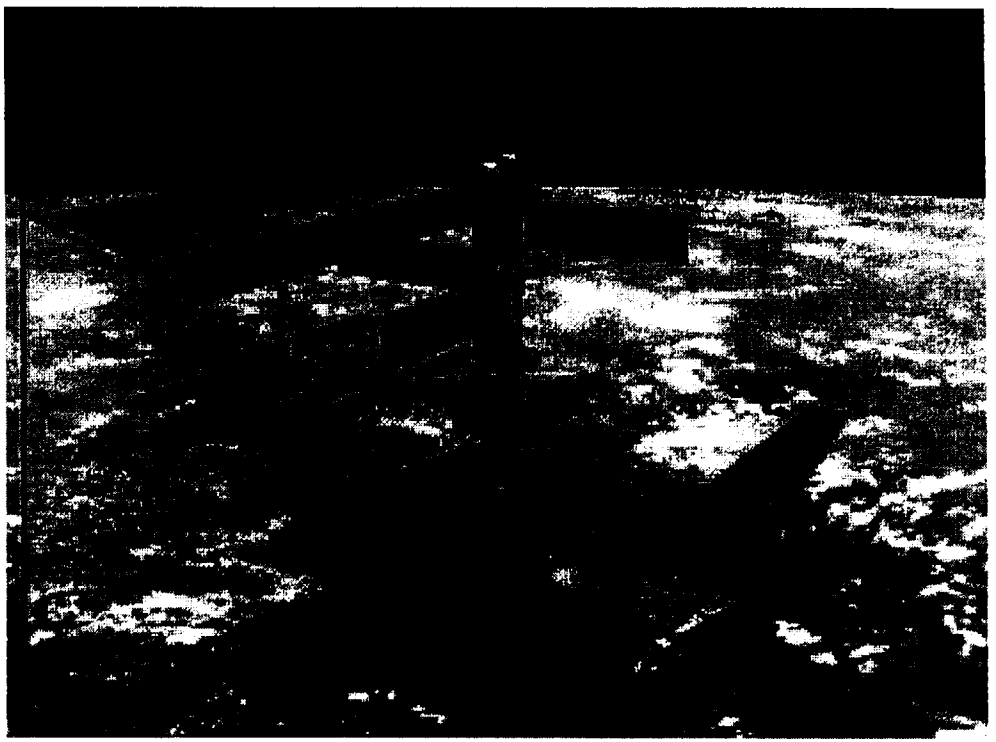
ISS-5A

U.S. Lab

"D

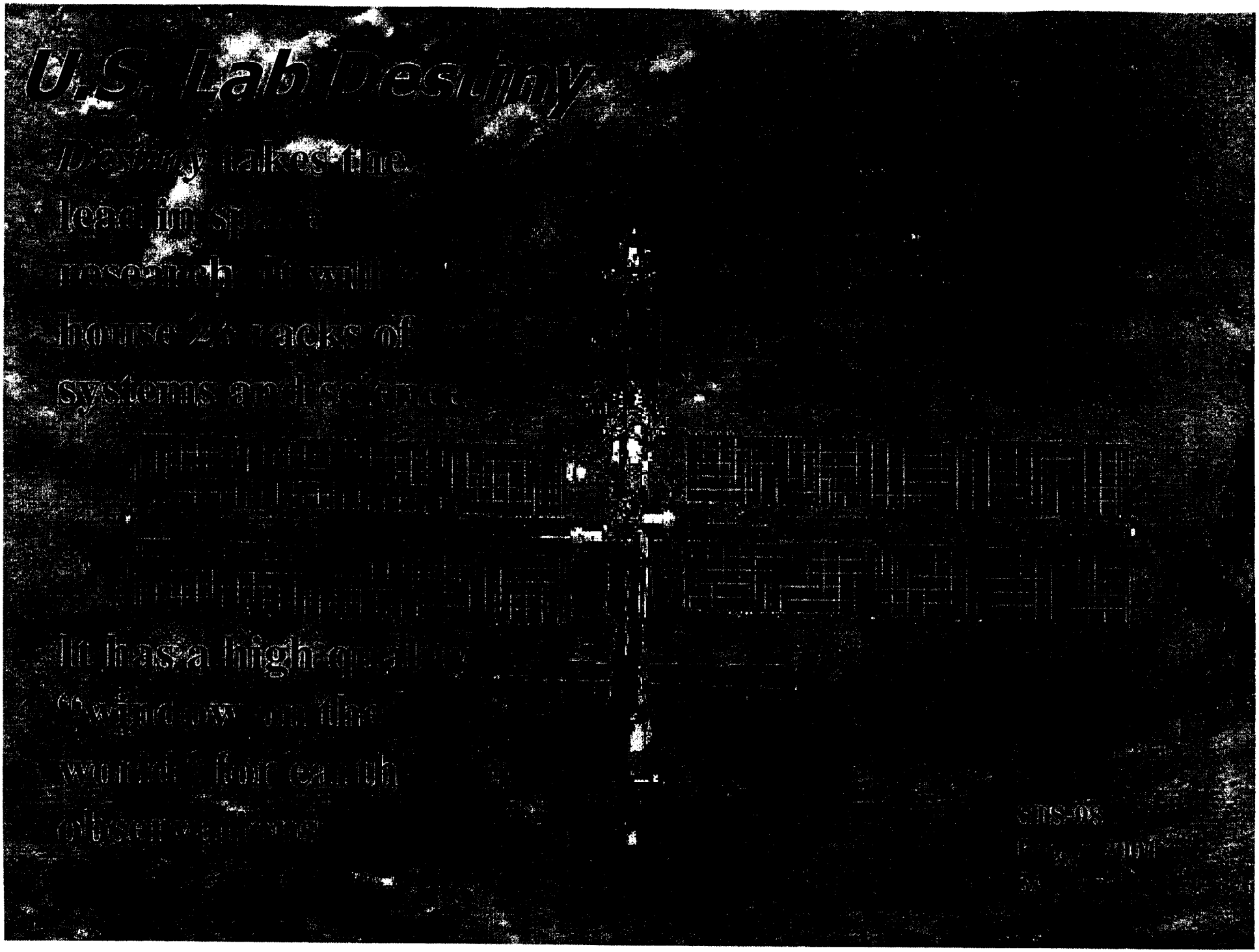




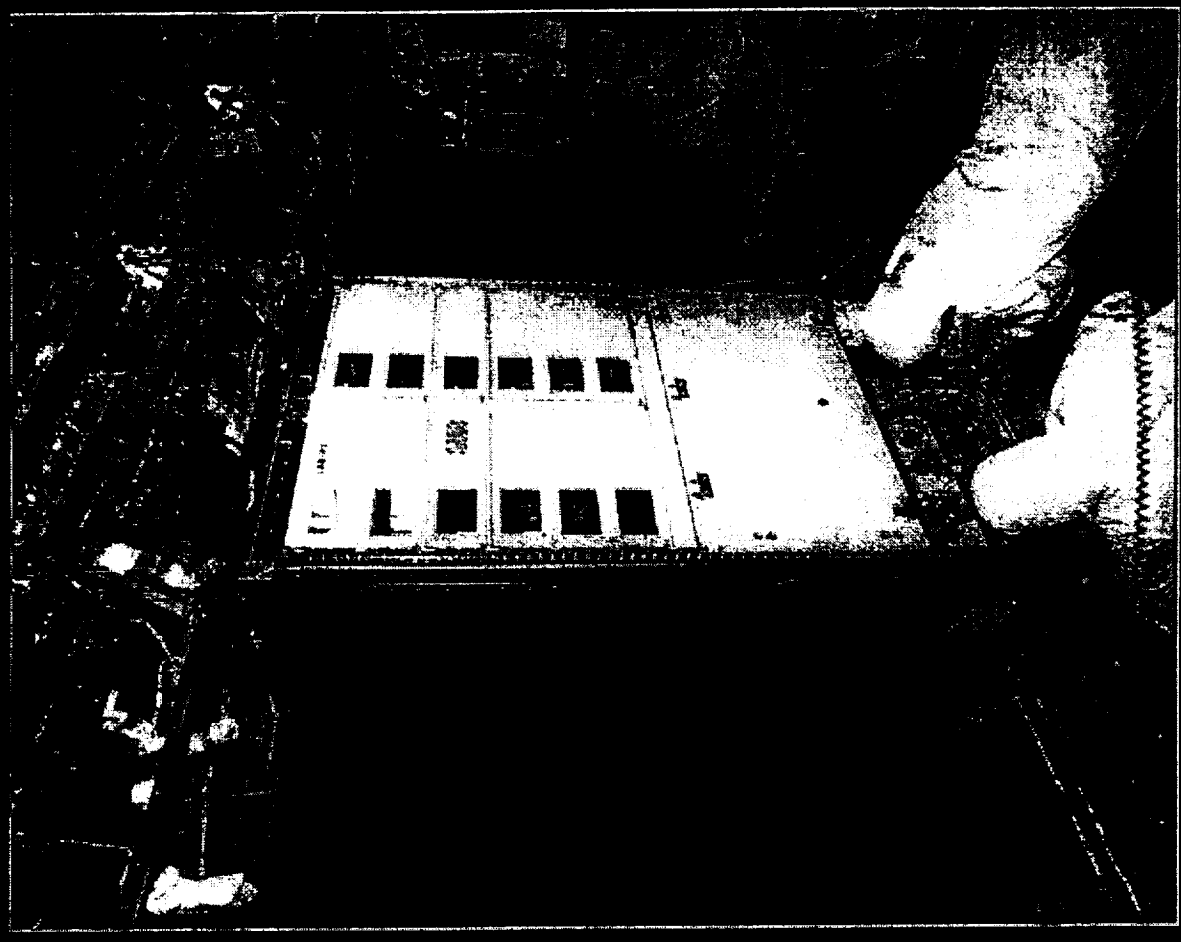


STS-

February 7, 2001


U.S. Lab Destiny
Destiny takes the
leading space
research
house 24 racks of
systems and science
In a high
window on the
world for earth
observations
STS-08


STS-98
Feb. 7, 2001
5A

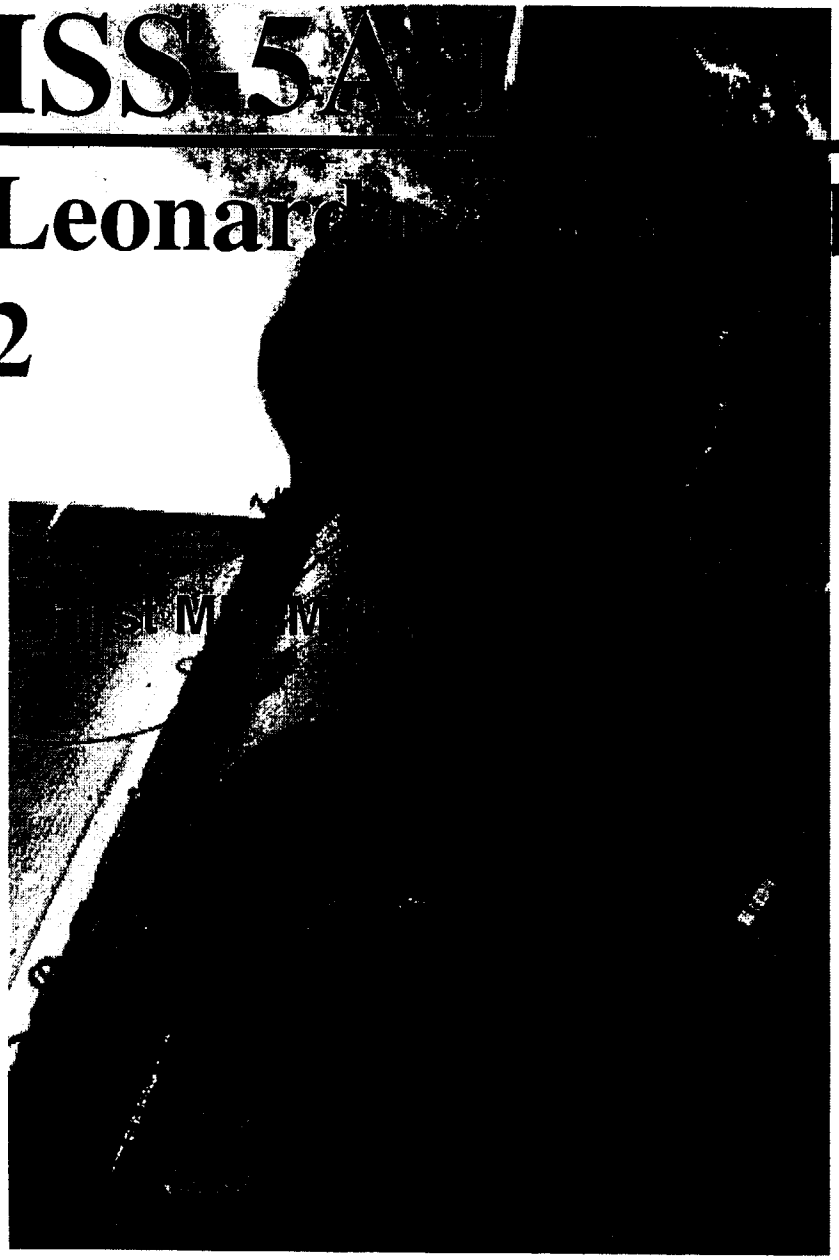


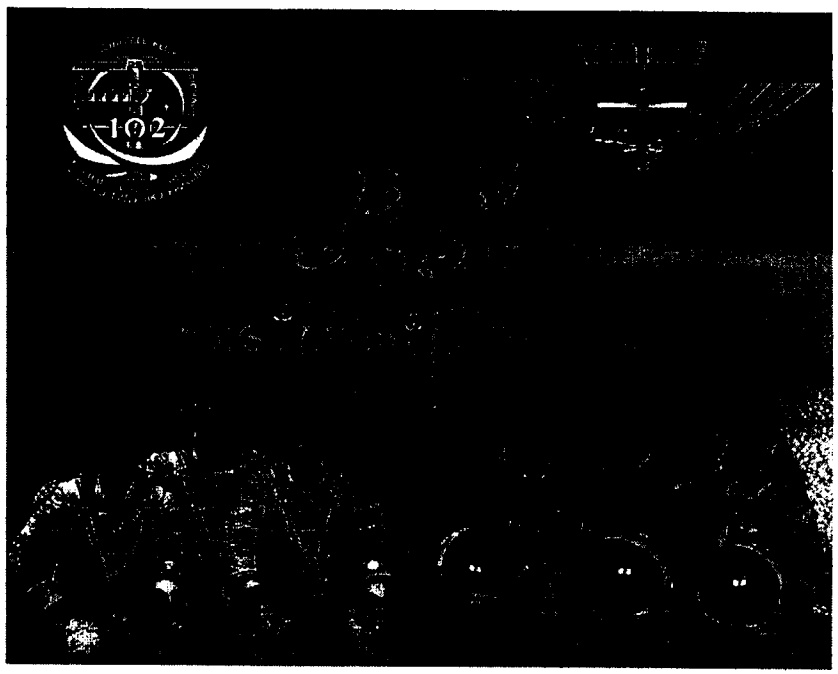
ISS 5A

Leonar dition

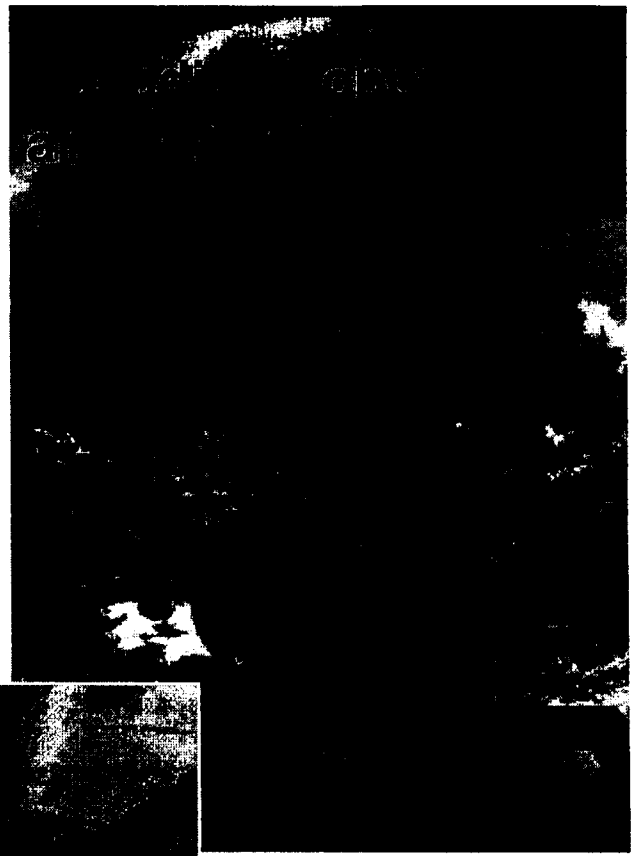
2

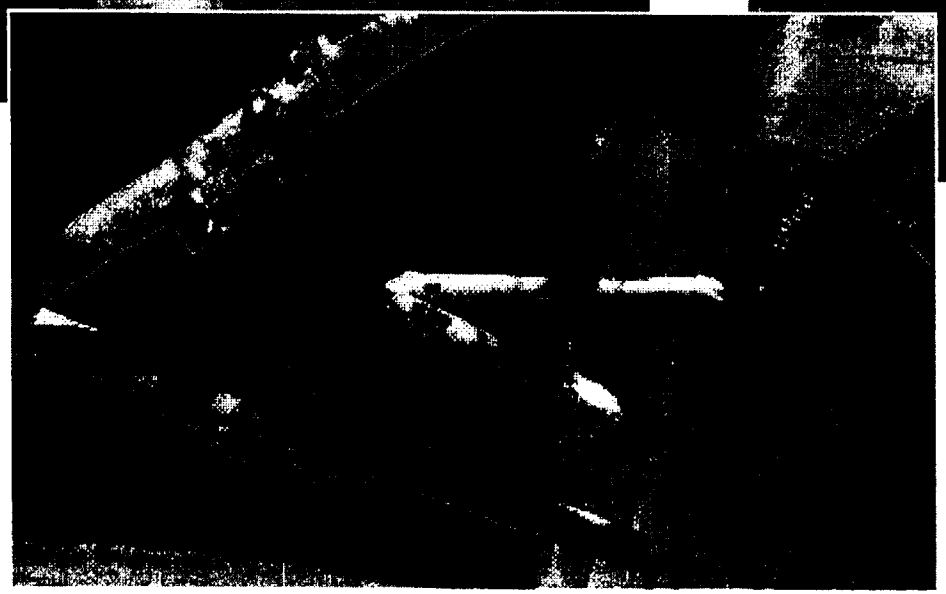
First Resear





ISS-6A



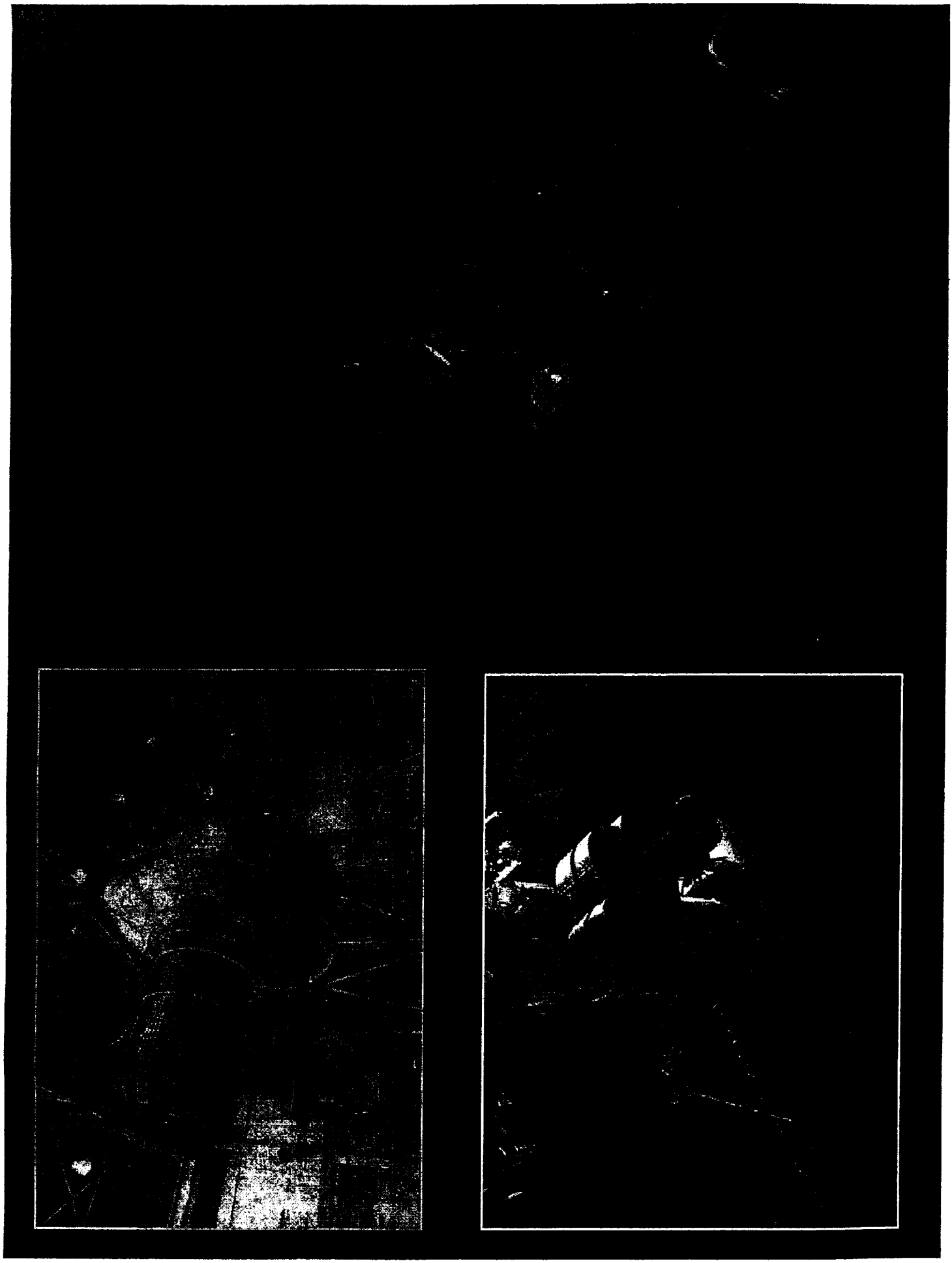


Canadarm

CanadaArm 2 deployment

This was the toughest mission to the ISS so far. We lost main line control computers which caused scrambling on the ground and in-orbit to regain capability.

STS-100
April 19, 2001
6A

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ISS-7A.1

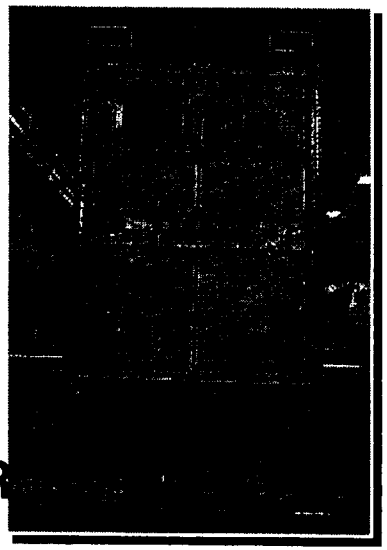
STS-105

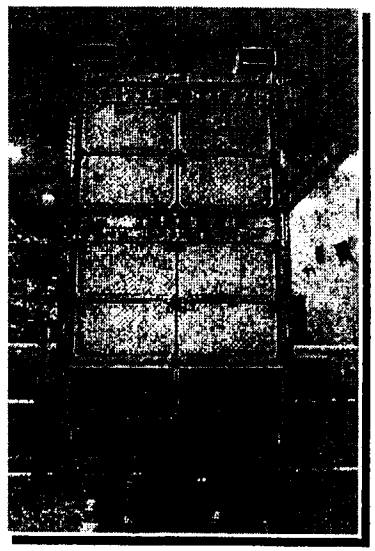
August 10, 2001

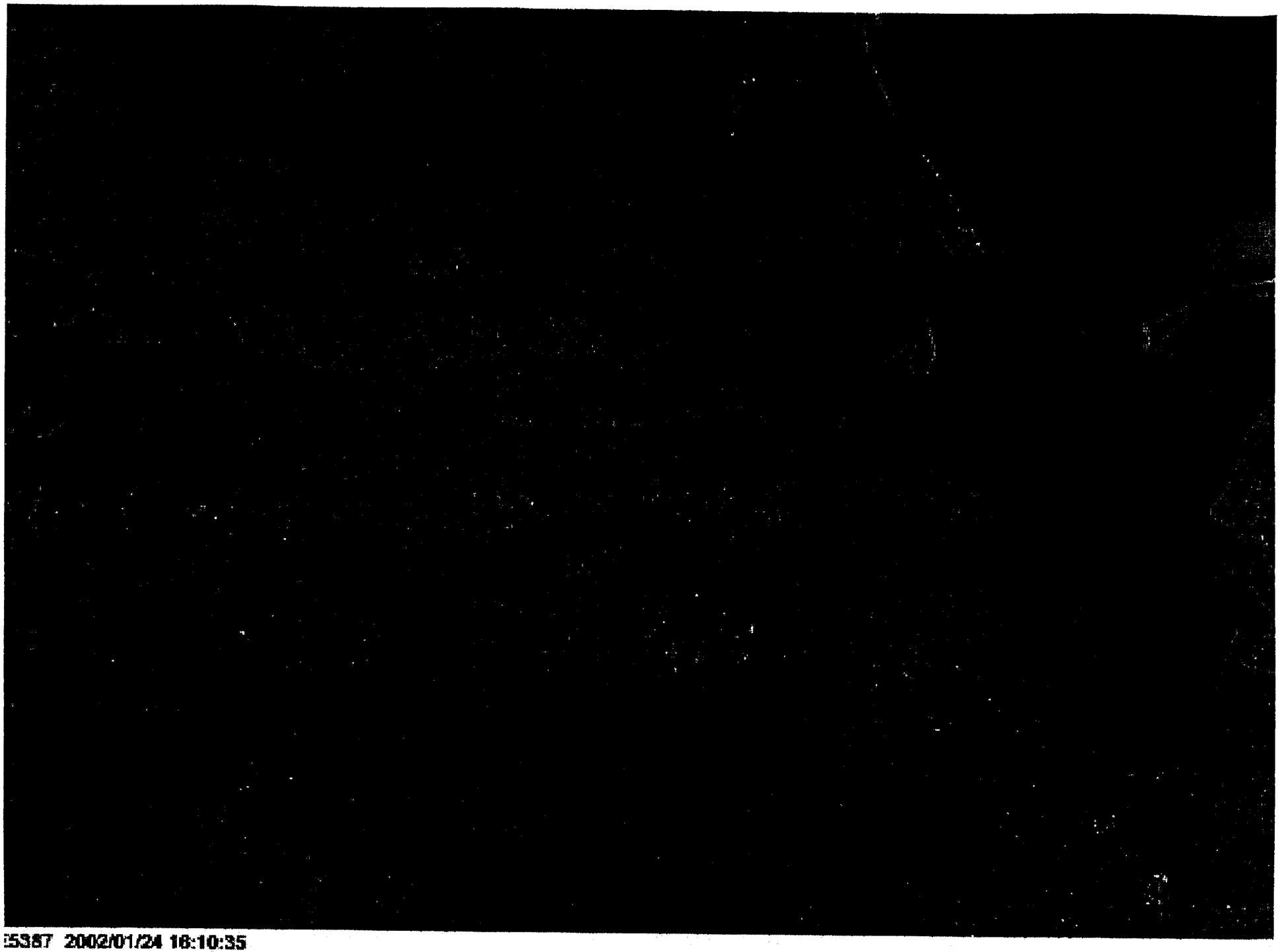
Leonardo on-orbit

Expedition 3

EXPRESS R

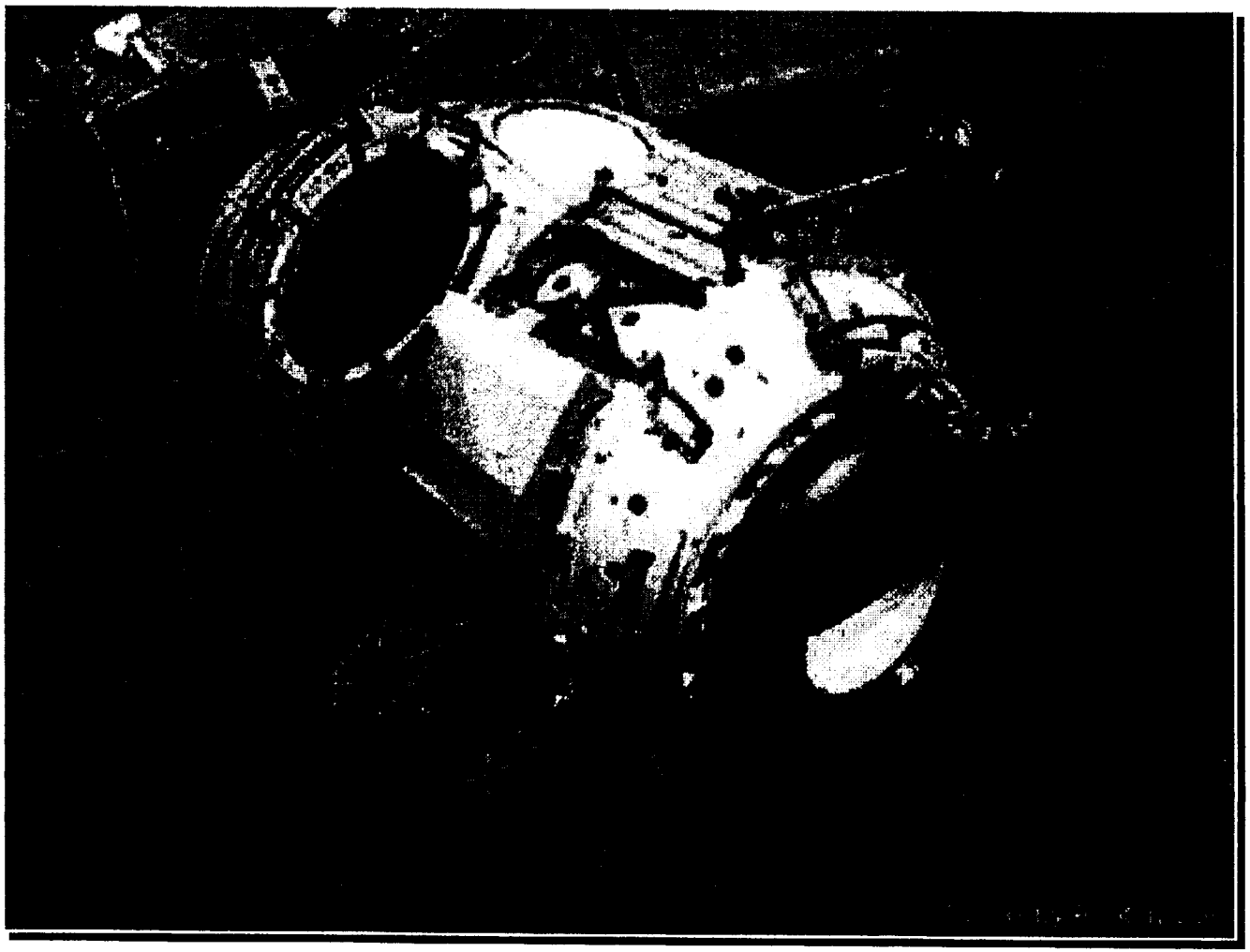





E5387 2002/01/24 16:10:35

August 2001

Russian Docking Compartment – ISS4R

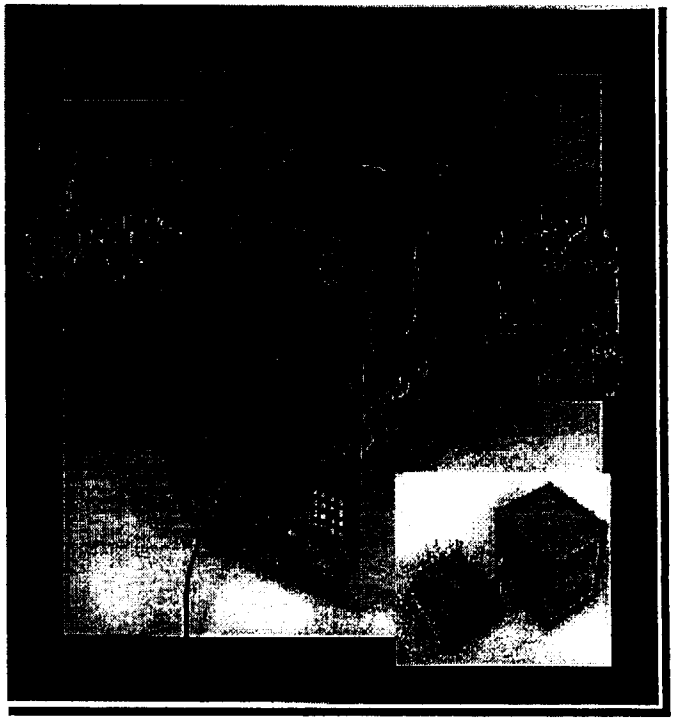


ISS-UF-1

STS-108

December 5, 2001

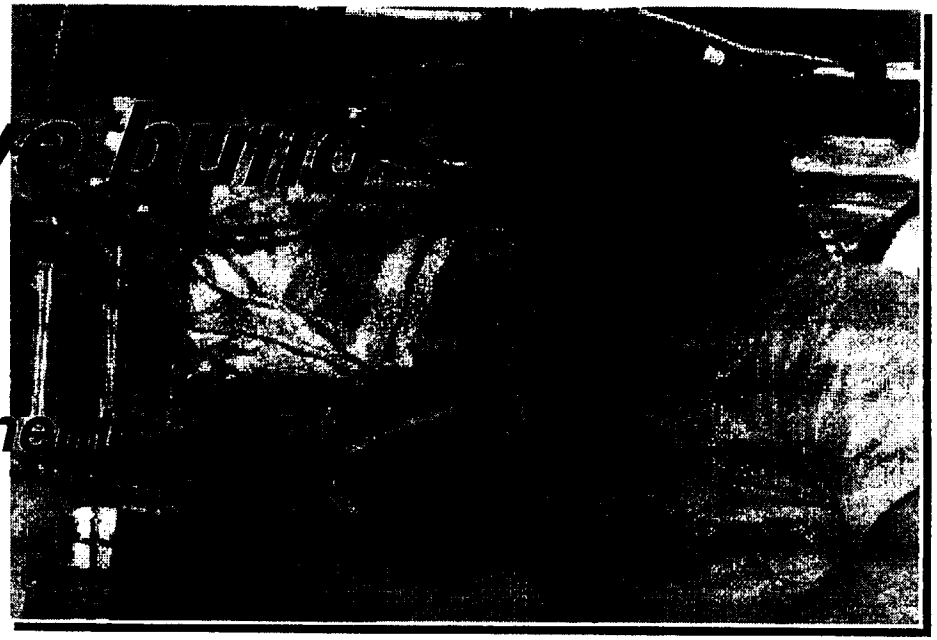
Expedition 4

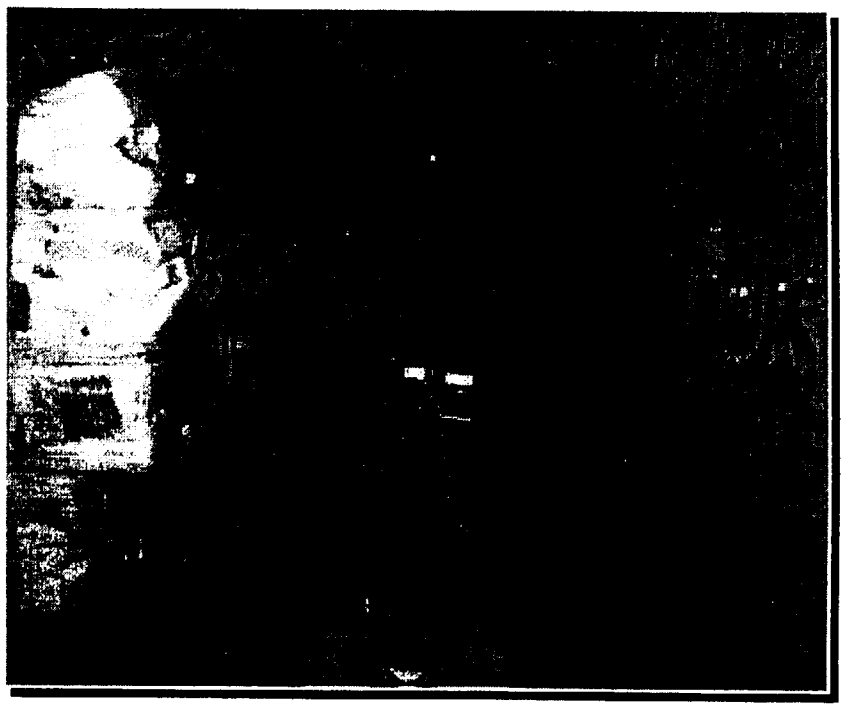


Expedition 4 conducting 28 experiments, including fundamental biology

Research while we build

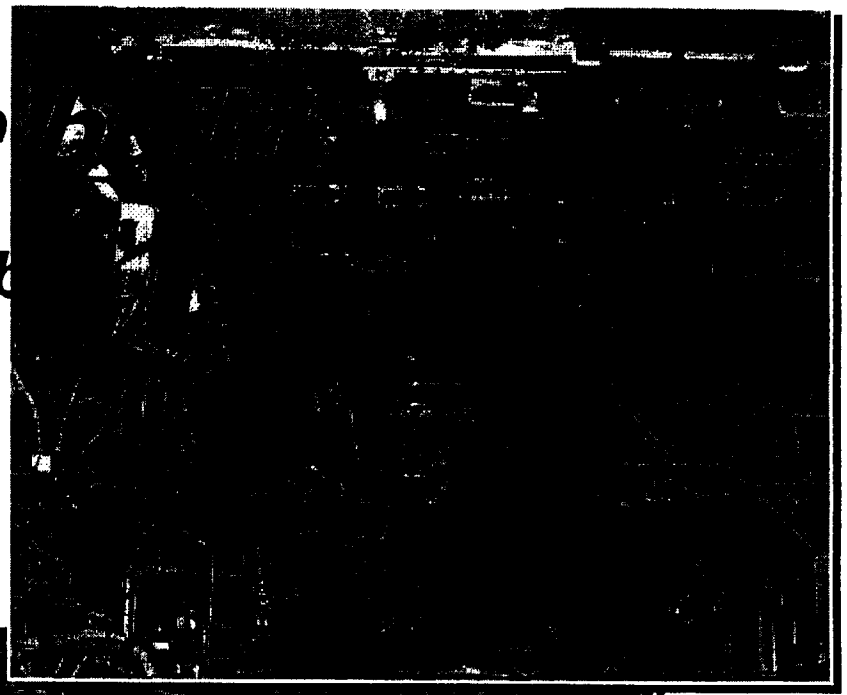
- *Early research is mostly in life sciences, microgravity, and space product develop*
- *Experiments started before Destiny arrived*

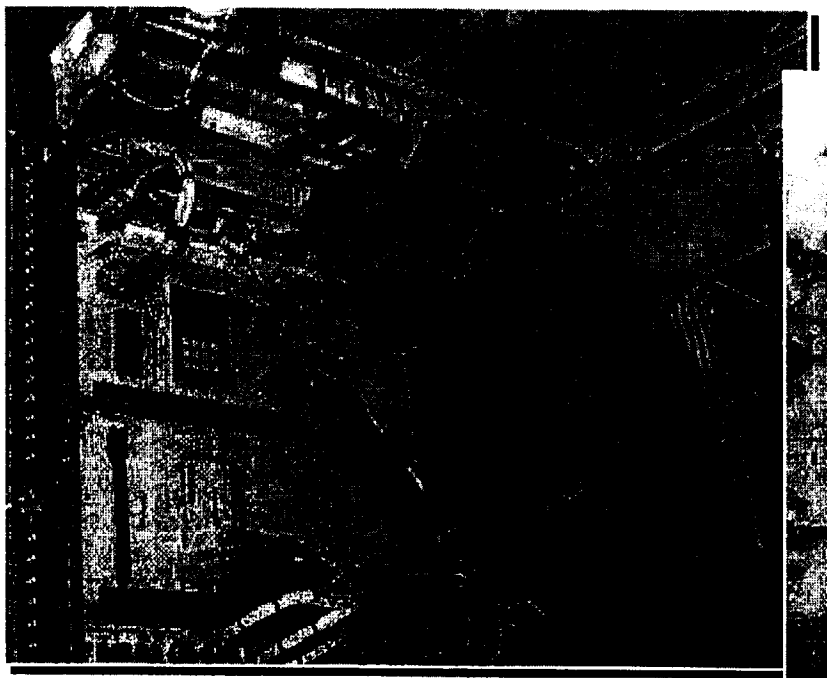


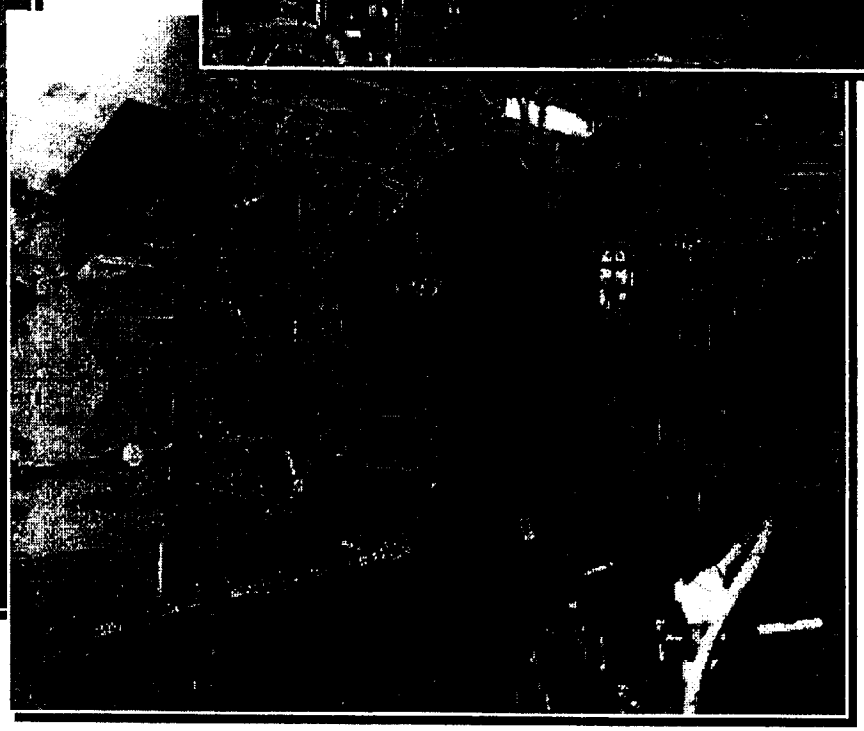


Research while we

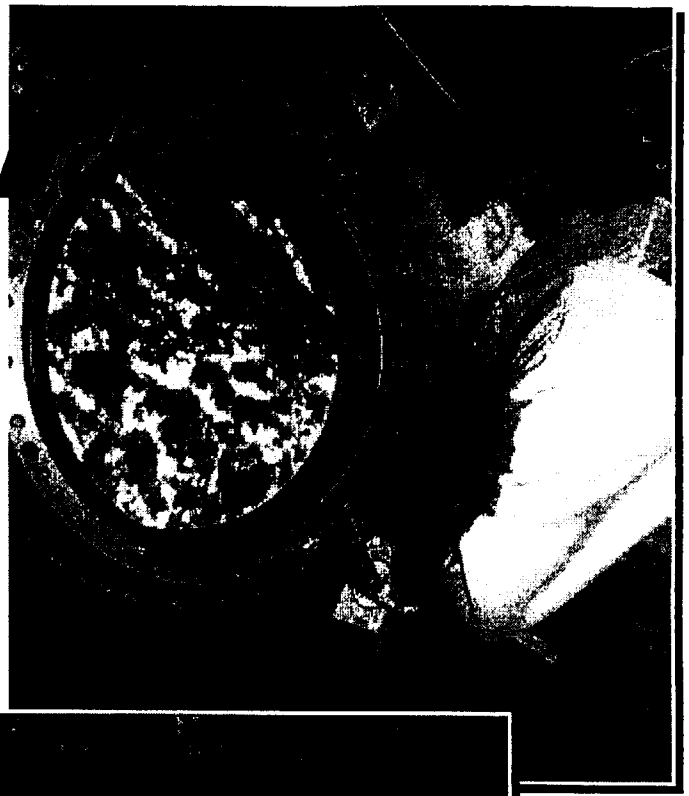
- *5 research racks already on orb*
- *Human Research Facility EXPRESS racks 1 , 2, 4 & 5*

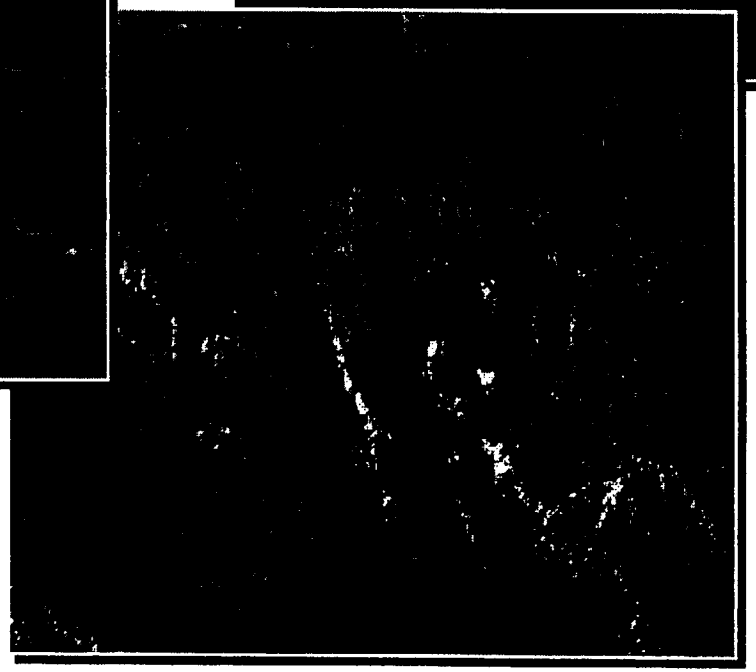






Research while we bu





- *High quality optical lab window for Earth Science*

ISS Payloads Ops Integration Center

From laptop to ISS to the World

Continuous ground support to the orbiting Space Station

MCC-H - Primary responsibility for flight support

Mission Control Center - Houston

Mission Control Center - Moscow

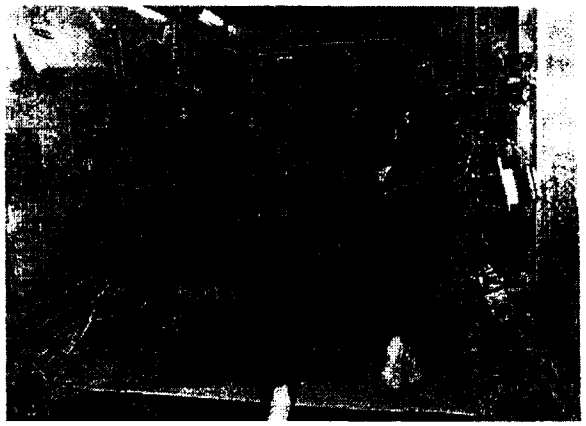
Payload Operations & Integration Center

MCC-M - Primary responsibility for command & control until ISS 5A

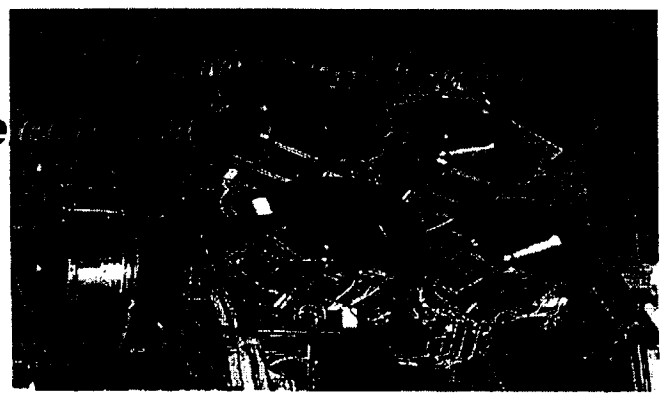
Marshall Space Flight Center manages execution of on orbit payloads and payload support systems in coordination with MCC-H

Functionality and Capabilities

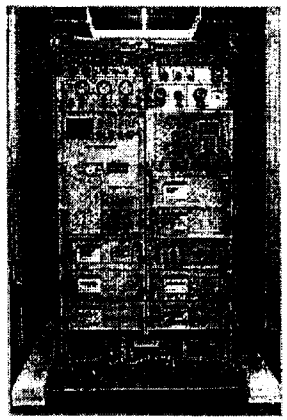
- *P6 solar array provides 19KW*
- *Lab "Destiny" research and 41% more volume*



- *Thermal control*
- *Robotics*



- *Research experiments begin*
- *MPLMs the ISS moving vans*



The Future

What's Ahead 2002

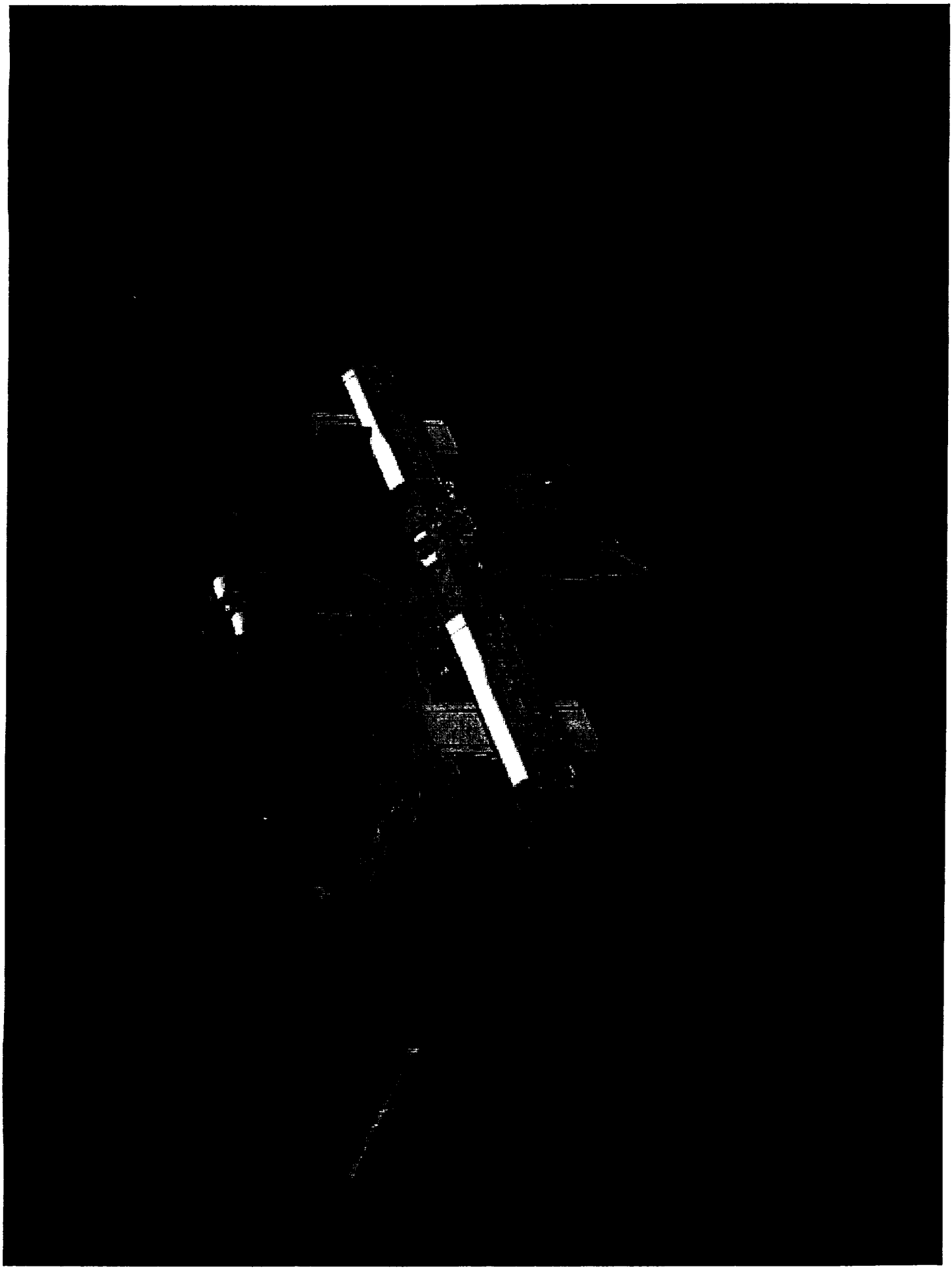
8A (SO) Apr 02

9A (S1) Aug 02

11A (P1) Sept 02

Truss segments

Plus crew rotation/utilization flights



What's Ahead 2003-2004

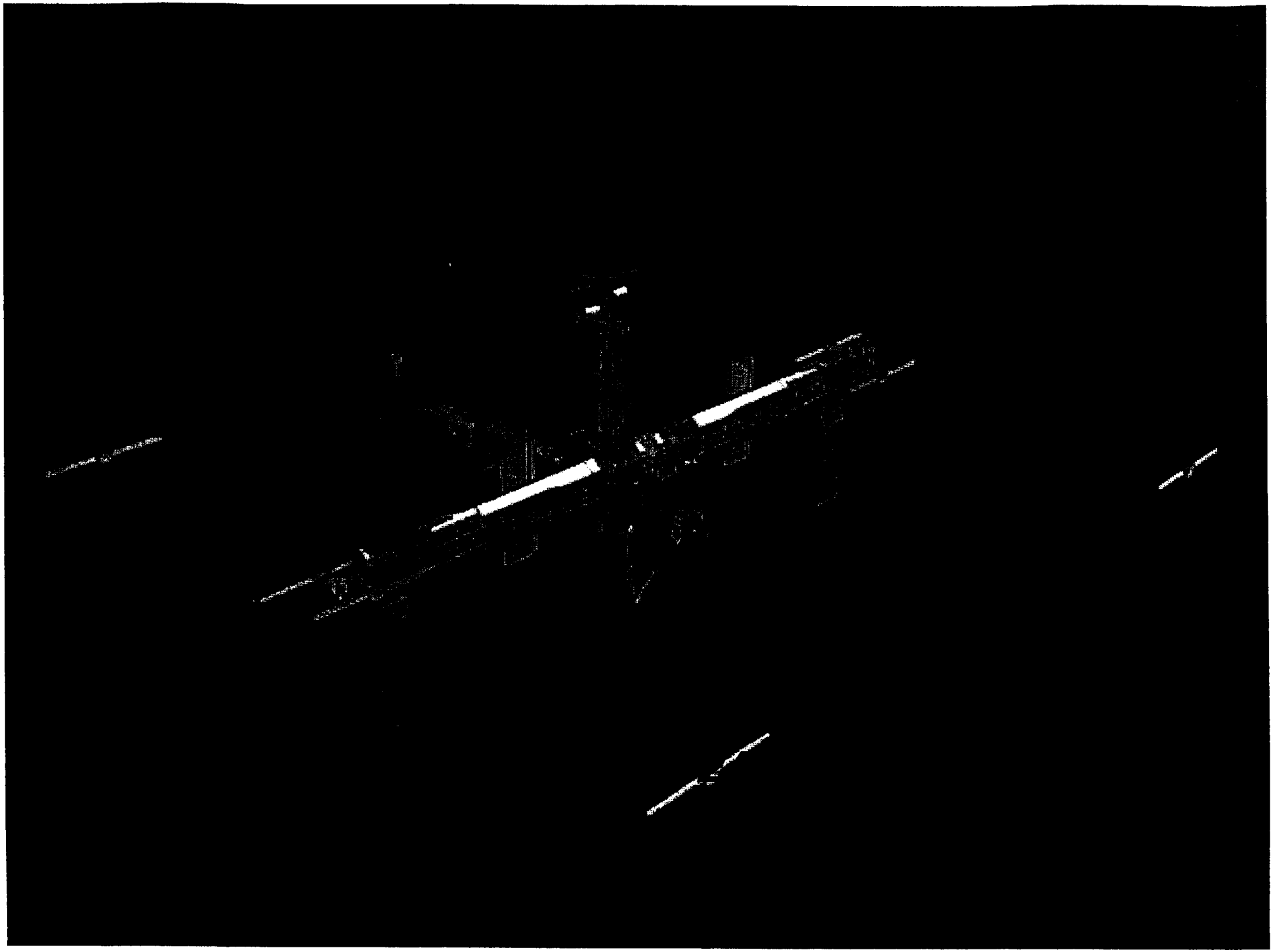
12A (P3/P4) Apr 03

13A (S3/S4) Aug 03

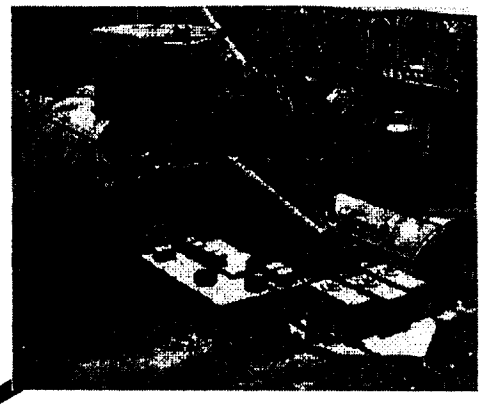
15A (S6) Jan 04

Solar Arrays

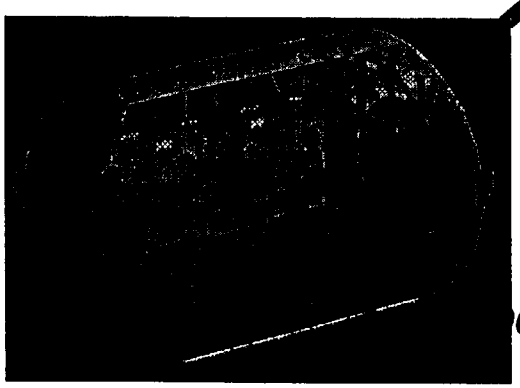
Plus crew rotation/utilization flights



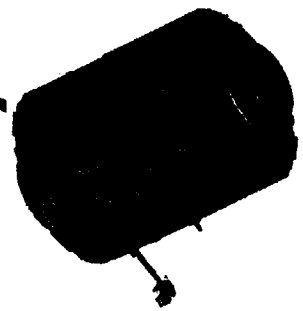
What's Ahead 2004 -2005



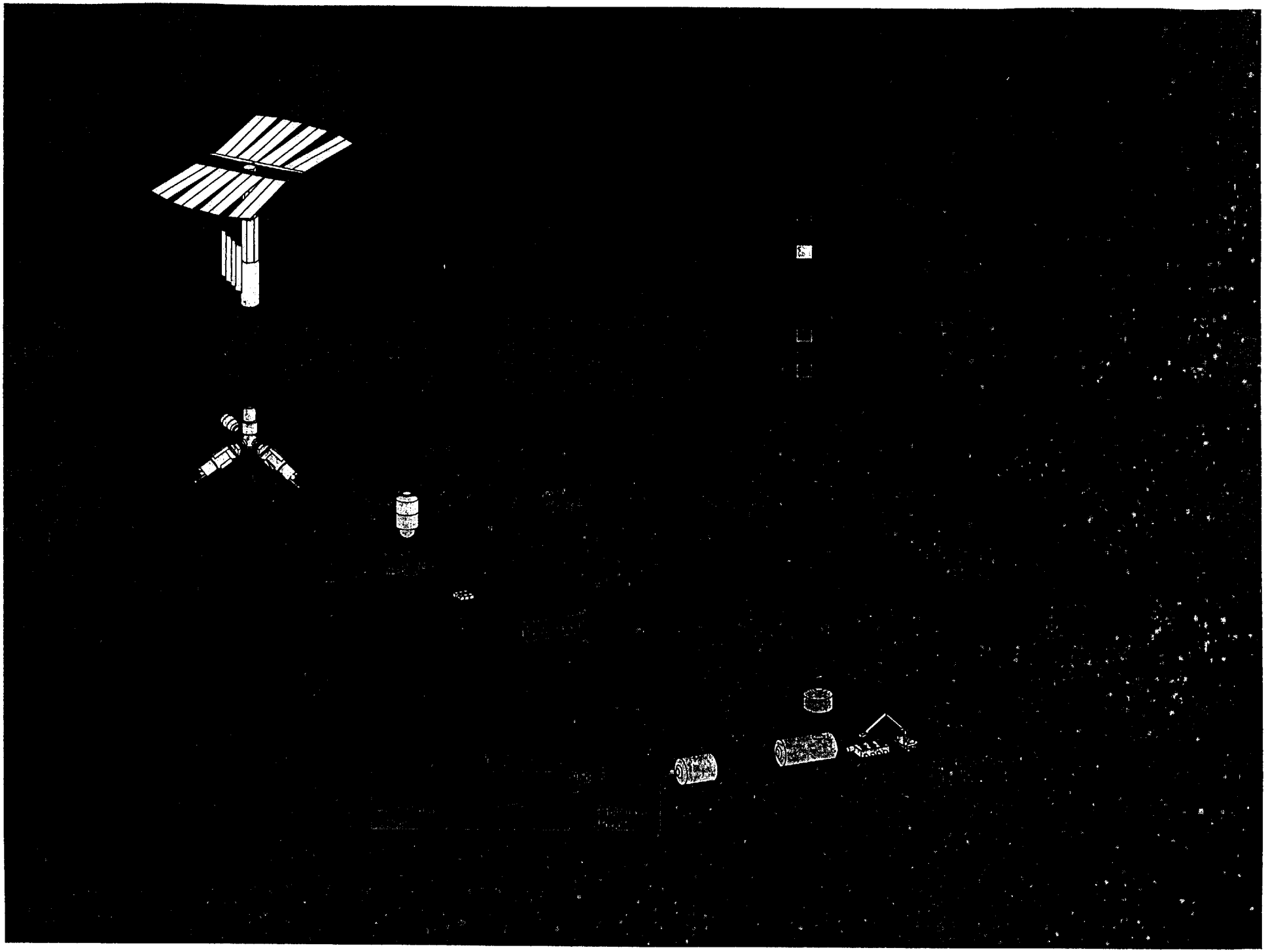
Japanese lab "Kibo"



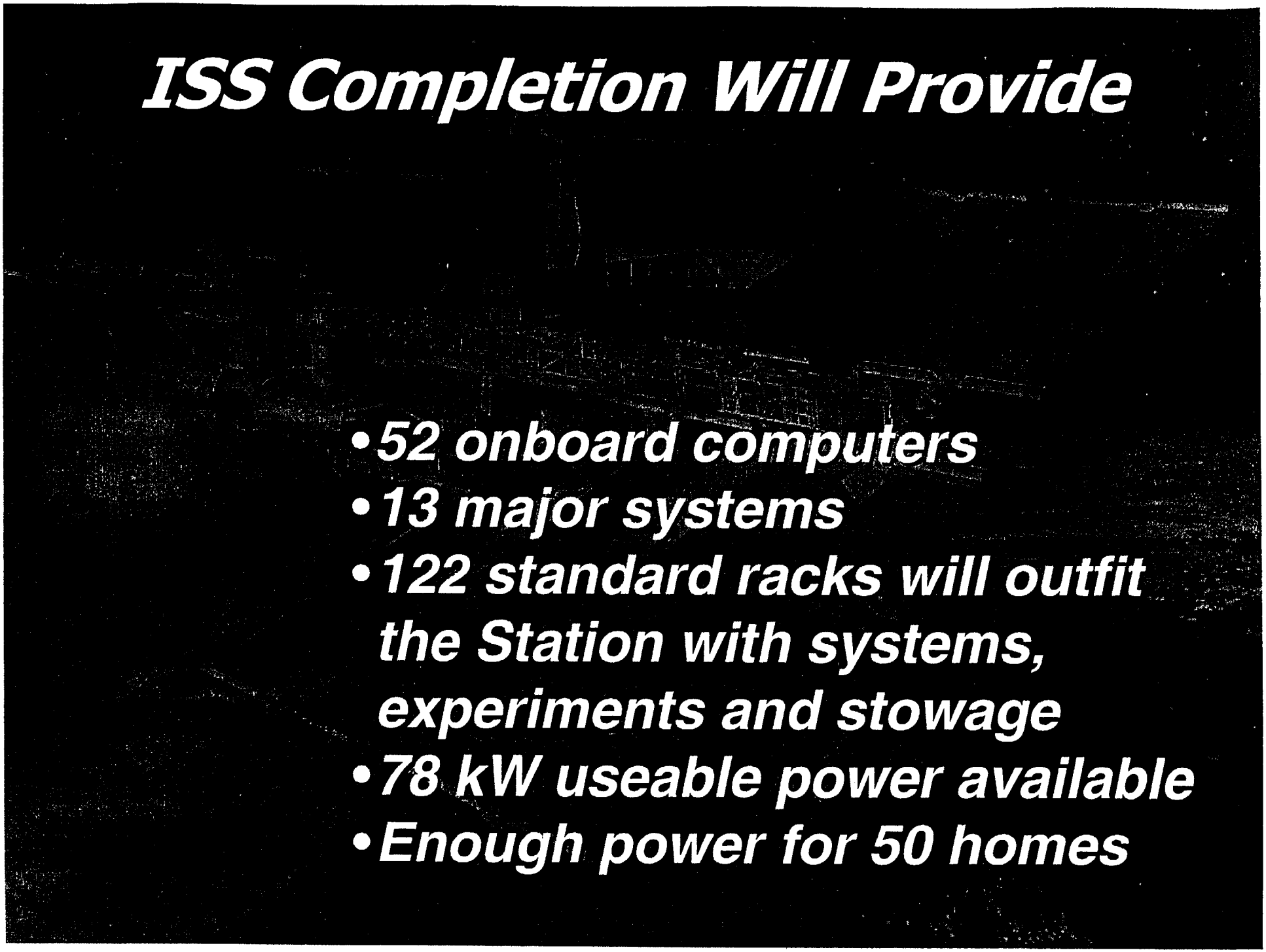
ean "Columbus"



Node 2
connecting
module



ISS Completion Will Provide



- 52 onboard computers
- 13 major systems
- 122 standard racks will outfit the Station with systems, experiments and stowage
- 78 kW useable power available
- Enough power for 50 homes

THE INTERNATIONAL SPACE STATION:

A new star on the horizon.

It's About Life on Earth ... and Beyond