KSC ISS Research
Spaceflight Hardware and Implementation

Presented by

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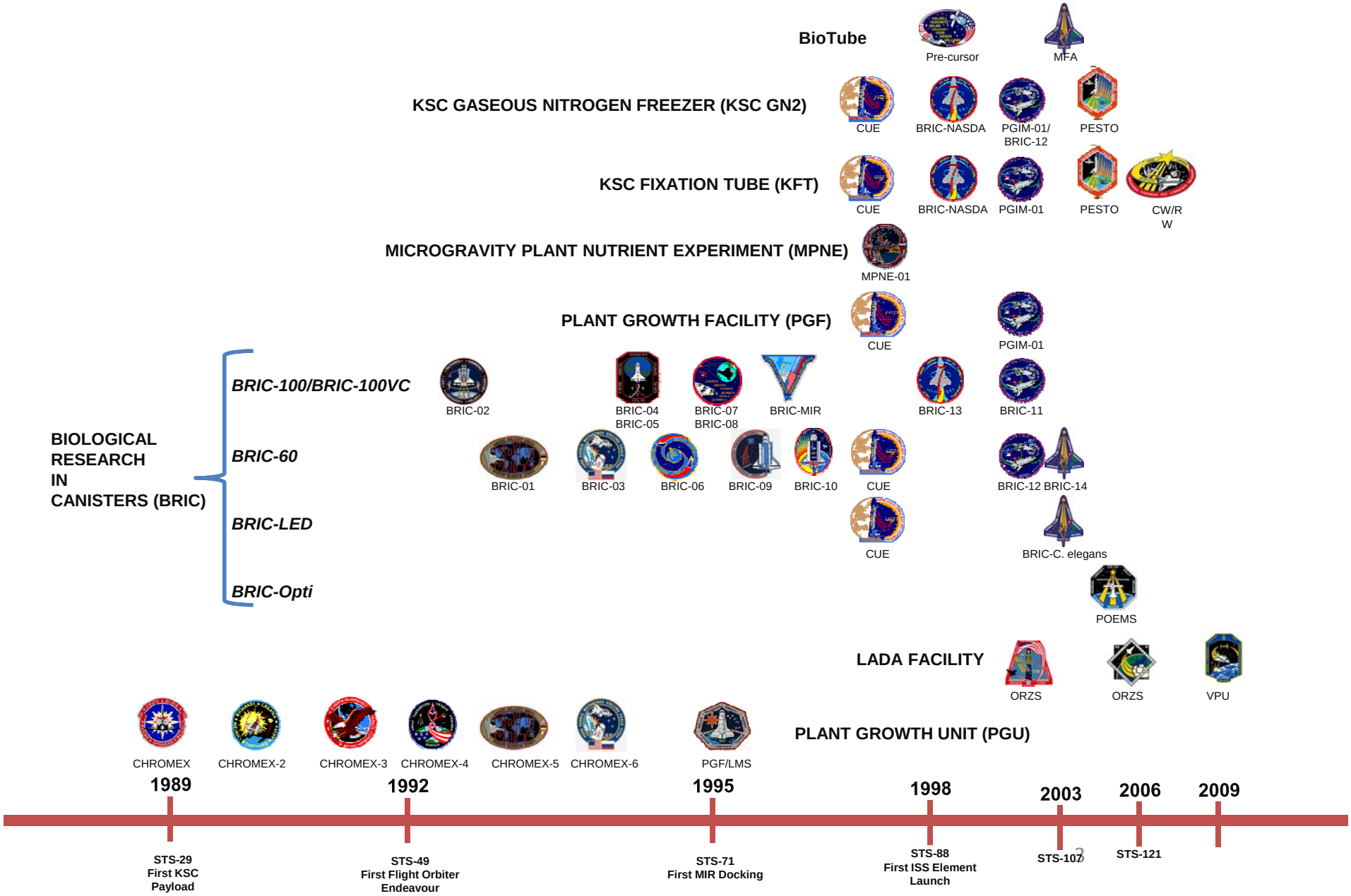
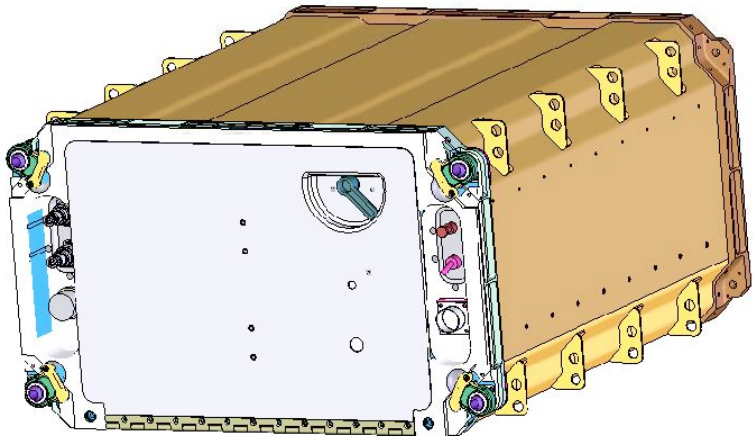
Life Sciences at KSC

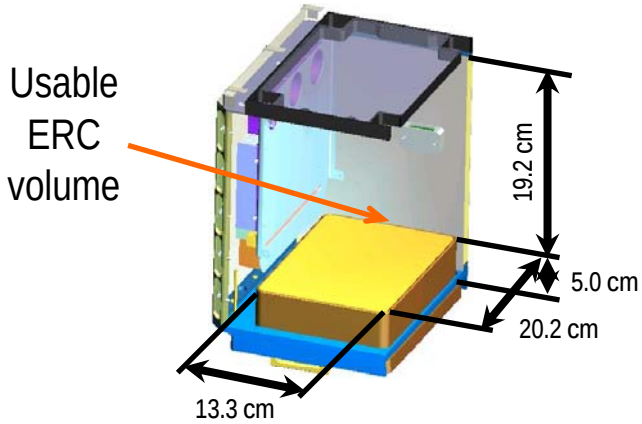
- Launch site preflight processing laboratories
- Spaceflight hardware development and certification
- Payload integration engineering

KSC Flight Payload History



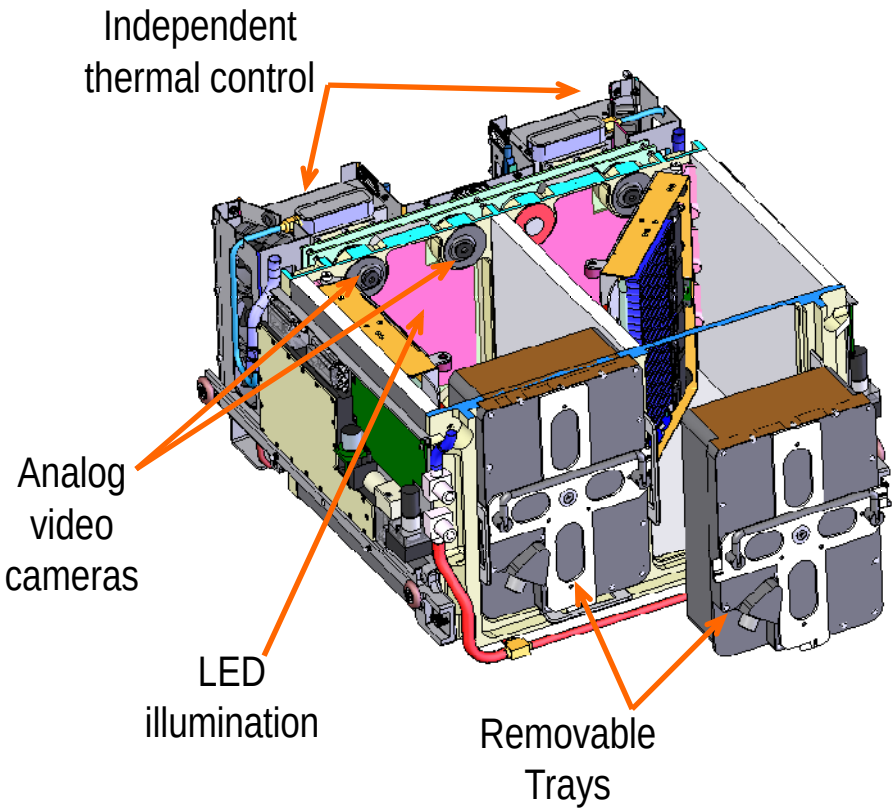
ABRS

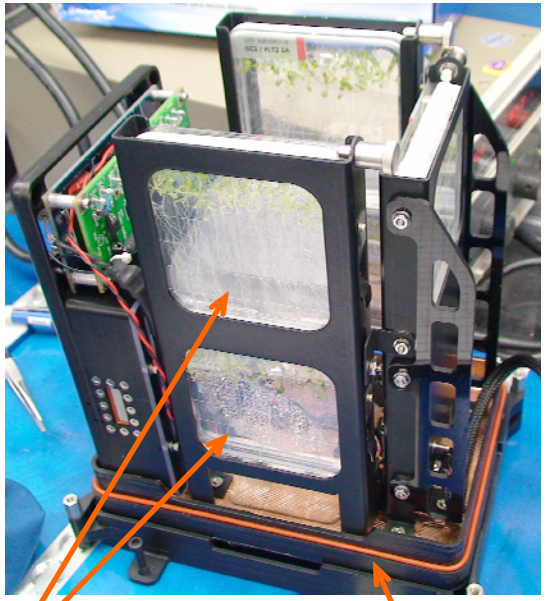




- Single middeck locker replacement facility plus stowage (filters, kits, etc.)
- Shuttle and EXPRESS compatible
- Can be used as a primary growth facility or up/down specimen transportation
- Two large, independent Environmental Research Chambers (ERCs) provide specimen access and manipulation
- Control temperature, RH, CO_2, illumination, video observation, scrubs volatile organics
- Condensate recovery and automated water reintroduction
- Rear breather (shuttle & EXPRESS)
- Currently on ISS

ABRS





Provides GFP Imaging Capability for Biological Investigations

Biotube

- Cylindrical Generic Containment Unit (GCU) can support a broad range of investigations
- Sealed, 3 levels of containment
- Power and video services inside GCU
- Video frame capture

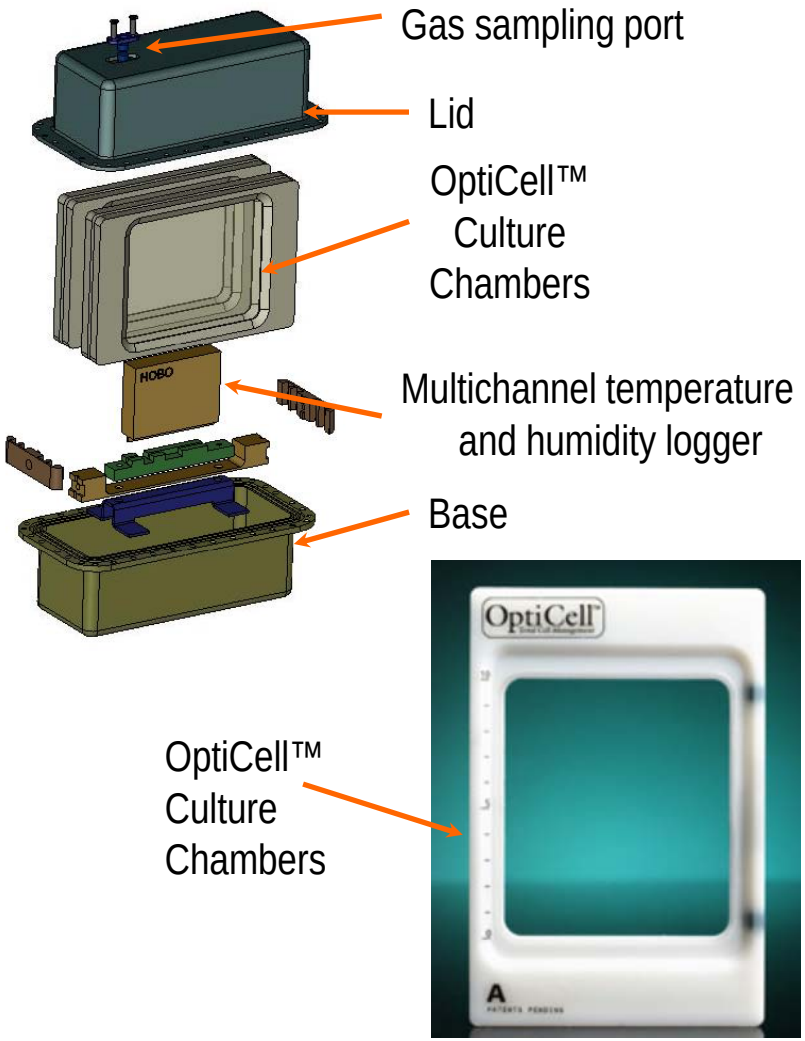
Carrier for Experiment Unique Equipment (+/- Fixatives)

BRIC-LED

- Up to six 60mm x 15mm Petri Dishes per BRIC canister
- Eight canisters per half locker tray
- 3 sealed levels of containment
- Unidirectional LED illumination
- Single or dual stage manual liquid (fixatives, growth inhibitors, etc.) introduction
- Autonomous environmental data logging

Enables Liquid Treatments (e.g. Cytochalasin) Followed by In-flight Fixation

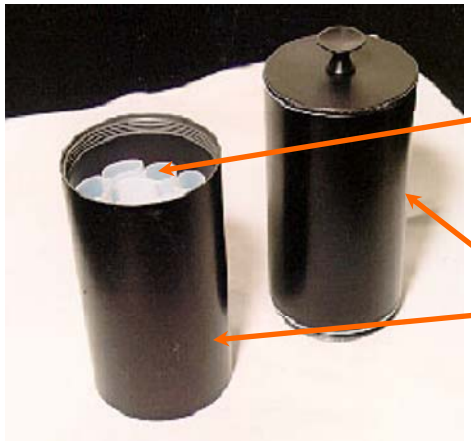
BRIC-Opti

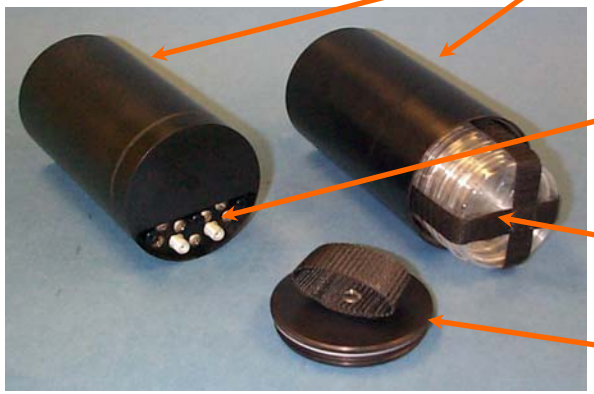


- 2 sealed levels of containment
- Gas sampling capable
- Passive
- Can be frozen (-100 °C)
- Contains up to 4 OptiCell™ culture chambers
- Autonomous environmental data logging

For Passive Tissue Culture/Microbial Growth in COTS Opticells

BRIC-60 series

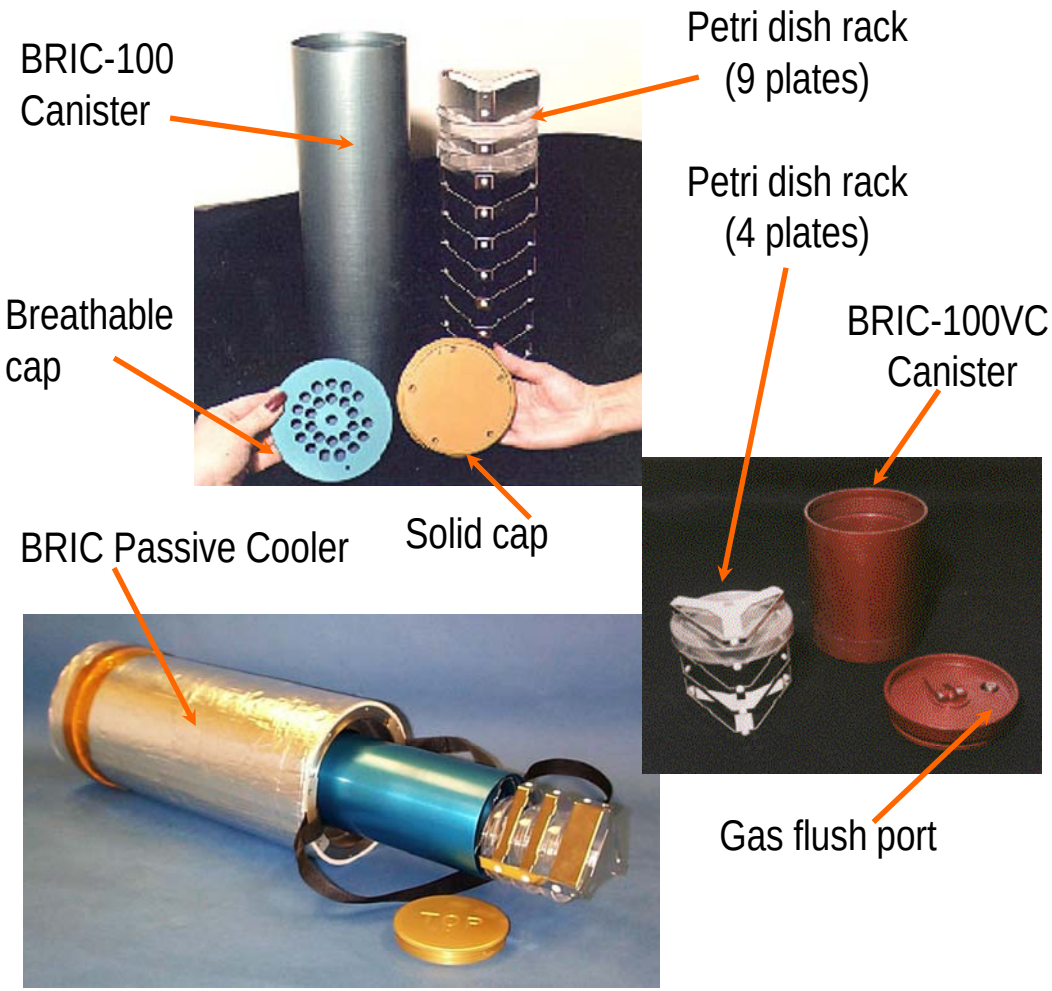




- One Vented Chamber
- Light-tight
- Holds up to eleven 60mm x 15mm Petri Dishes, Teflon® tubes, etc.
- One or two gas Sampling Positions
- Passive volatile organics and CO_2 removal
- May be frozen
- Autonomous environmental data logging

For Petri Dish (or Other) Studies +/- In-flight Freezing

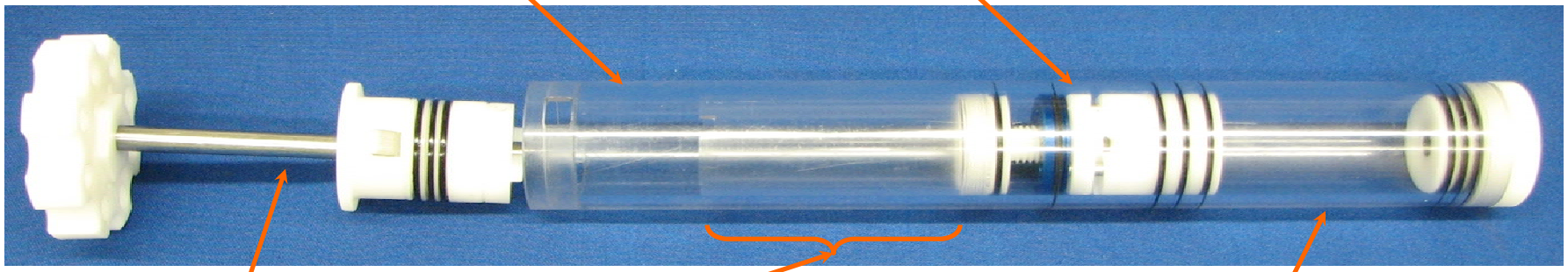
BRIC-100 series



- Sealed or vented passive containers
- BRIC-100 holds 9 100mm Petri Dishes
- Can be used in conjunction with BRIC passive cooler (+4 °C)
- BRIC-100 VC is sealed
- BRIC-100VC holds four 100mm Petri Dishes & two data loggers
- Gas flushing capability

For Petri Dish (or Other) Studies +/- Pre-flight Gas Flushing Capability (e.g. 5% CO_2)

KFT



- Provides three levels of containment during all phases
- No glovebox required
- Samples may be transferred from other growth facilities
- Maintains robust containment down to -100 °C

Integration & Operations

- LSSC has managed and integrated 49 payloads
- Platforms: shuttle, ISS, SPACEHAB, Progress, MPLM, Spacelab, *Mir*
- Joint collaborations with CSA, DLR, ESA, JAXA, NSAU
- Capabilities for hardware engineering, integration, operations support, and project science coordination
- EMA operations control center at KSC for real time support
- OES chambers provide simulated spaceflight environment for ground controls

Points of Contact

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For additional information go to:
http://www.lssc.nasa.gov/fs/lsda/
http://www.nasa.gov/mission_pages/station/science/experiments/ABRS.html

Acronyms

ABRS	Advanced Biological Research System
BRIC	Biological Research in Canisters
BRIC-LED	Biological Research in Canisters – Light Emitting Diode
COTS	Commercial Off-the-Shelf
CSA	Canadian Space Agency
DLR	Deutsches Zentrum für Luft- und Raumfahrt
DMSO	Dimethyl sulfoxide
ECP	Environmental Control Panel
EMA	Experiment Monitoring Area
ERC	Environmental Research Chamber
ESA	European Space Agency
EXPRESS	Expediting the Processing of Experiments to the Space Station
GCU	Generic Containment Unit
GFP	Green Fluorescent Protein
JAXA	Japan Aerospace Exploration Agency
KFT	Kennedy Space Center Fixation Tube
KSC	Kennedy Space Center
LSSC	Life Science Services Contract
MPLM	Mult-purpose Logistics Module
NSAU	National Space Agency of Ukraine
OES	Orbital Environmental Simulator