



Dryden Flight Research Center
Edwards, California 93523-0273

DHB-Y-001
Baseline

AIRBORNE SCIENCE HANDBOOK VOL. I

Code Y

Electronically Approved By:
Director, Airborne Science Directorate

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Dryden Flight Research Center Handbook		
Arborne Science Handbook Vol. 1	DHB-Y-001	Revision: Baseline
		Page Page 2 of 33

DOCUMENT HISTORY PAGE

This page is for informational purposes and does not need to be retained with the documents.

DATE APPROVED	ISSUE	PAGE	AMENDMENT DETAILS
See IDMS Document Master List	Baseline		

Dryden Flight Research Center Handbook		
Arborne Science Handbook Vol. 1	DHB-Y-001	Revision: Baseline
		Page Page 3 of 33

1.0 SCOPE

- 1.1 Scope
- 1.2 Purpose
- 1.3 Applicability

2.0 INSTRUCTIONS: HOW TO USE

- 2.1 For use of the handbook

3.0 ACRONYMS/DEFINITIONS

4.0 DRYDEN ORGANIZATIONAL CHAPTER

5.0 AIRBORNE SCIENCE DIRECTORATE POLICIES

- 5.1 Airborne Science Quality Policy
- 5.2 Responsibility
- 5.3 Responsibility During Deployment
- 5.4 Time, Attendance and Overtime Pay Policy

6.0 PROCEDURES

- 6.1 Dryden Centerwide Procedures (DCP) Index
- 6.2 Select DCPs
 - DCP-J-001, Foreign National Visit Request
 - DCP-J-004, Security Access Request
 - DCP-J-006, Permanent Badge Request
 - DCP-J-007, Temporary Badge Request
 - DCP-O-002, Work Order System
 - DCP-S-001, Aircraft Mishap Response Procedure
 - DCP-S-002, Hazard Management
 - DCP-X-008, Tech Brief (T/B) and Mini-Tech Brief (Mini T/B)
 - DCP-X-009, AFSRB
 - DCP-X-020, Operation Review Board & ORR
- 6.3 Airborne Science Documents
 - DOP-Y-001, Airborne Science Flight Request (Contract) Review
 - DOP-Y-002, Airborne Science Capability Improvement
 - DOP-Y-003, Mission Development & Implementation
 - DOP-Y-004, Laboratory Management
 - DOP-Y-006, Airborne Science Configuration Control
 - DOP-Y-007, Airborne Science Configuration Control Board Process
 - DEI-Y-001, Airborne Science Laboratory Operations Guide (not included)
 - DEI-Y-002, ER-2 Experimenter's Integration Manual (not included)
 - DEI-Y-008, DC-8 Experimenter's Integration Manual (not included)

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<http://www.dfr.nasa.gov/DMS/dms.html>
ARE FOR REFERENCE ONLY
THIS SITE IS UPDATED EVERY 30 DAYS

Dryden Flight Research Center Handbook		
Arborne Science Handbook Vol. 1	DHB-Y-001	Revision: Baseline
		Page Page 4 of 33

6.4 Airborne Science Administrative Information

- 6.4.1 Meeting Scheduling
- 6.4.2 Conference Room Management
- 6.4.3 Training Requirements
- 6.4.4 Local Area Flights

7.0 INFORMATION

- 7.1 Customer Contact Checklist
- 7.2 Mission Manager's Checklist
- 7.3 DC-8 Passenger Safety Brief
- 7.4 Survival Tips

Dryden Flight Research Center Handbook		
Arborne Science Handbook Vol. 1	DHB-Y-001	Revision: Baseline
		Page Page 5 of 33

1.0 SCOPE

1.1. SCOPE

This Airborne Science handbook contains “for reference only” information on responsibilities, procedures, and guidelines for the conduct of the Airborne Science Mission.

1.2. PURPOSE

This handbook provides guidance for the conduct of the Airborne Science Mission from experiment selection through flight. The purpose of this handbook is to compile into one document information, policies and procedures used by Airborne Science personnel at Dryden to accomplish the Airborne Science mission. It is broken up into parts that may overlap. One section contains such things as mission statements and objectives. Another section contains policies and guidelines used in the Airborne Science decision making processes. Other sections contain procedures and information. As with any document, not all situations can be foreseen and it is incumbent upon each individual to use sound judgment in applying policies and procedures to meet mission objectives safely and effectively. Recommendations to improve this handbook should be directed to the Program Manager.

1.3. APPLICABILITY

This handbook is “for reference only” for all civil servants assigned to the Airborne Science Directorate and to those matrixed civil servants conducting airborne science work.

Dryden Flight Research Center Handbook		
Arborne Science Handbook Vol. 1	DHB-Y-001	Revision: Baseline
		Page Page 6 of 33

2.0 INSTRUCTIONS

2.1 INSTRUCTIONS FOR USE OF THIS HANDBOOK

This handbook is designed to provide reference information to the reader about how business is conducted to accomplish the airborne science mission. It is intended to give an overview of the content of the work effort in the Airborne Science Directorate. The content ranges from a description of the Enterprise (Agency area of endeavor) purpose, to current procedures, to information literature about the Directorate.

HOW TO USE THE MANUAL:

Refer to the Table of Contents and look for the desired subject. For example, when looking for “duty hours” information may be under both “Policy” and “Procedures”.

This manual will be in a constant state of revision (a “living” document) to allow for inclusion of new subjects or to revise a section to reflect the latest experience. See the Program Manager for the latest version.

Dryden Flight Research Center Handbook		
Arborne Science Handbook Vol. 1	DHB-Y-001	Revision: Baseline
		Page Page 7 of 33

3.0 ACRONYMS

AIRBORNE SCIENCE ACRONYMS

ACLAIM	Airborne Coherent Lidar Advanced In-flight Measur.
ACE	Arctic Cloud Experiment
AEAP	Atmospheric Effects of Aviation
AERI	ground based Michelson Interferometer
AES	Airborne Emission Spectrometer
AGR	Anderson Group Radiometer
AIR	Atmospheric Ionizing Radiation
AIRSAR	Airborne Synthetic Aperture Radar
AMPR	Advanced Microwave Precipitation Radiometer
<i>AMMR</i>	<i>Airborne Multichannel Microwave Radiometer</i>
ARMAR	Airborne Rain mapping Radar
AVIRIS	Airborne Visible Infrared Imaging Spectrometer
CAMEX	Convection and Moisture Experiment
<i>CAPAC</i>	<i>Cloud/Aerosol Particle and Condensate Mass</i>
CIR	Cloud Ice Radiometer
CIREX	Cirrus, Radiation, and Exchange experiment
CW Lidar	Continuous Wave lidar
CWVCS	Clouds, Water vapor, Climate System
DASI	Digital Array Scanning Interferometer
EDOP	ER-2 Doppler Radar
FIRE	First Int, Sat. Cloud Cli ProjRegional Experiment
GTE	Global Tropospheric Experiment
HAUCSS	High Altitude Underflights Calibrate Satellite Sensors
<i>HIS</i>	<i>Scanning High Resolution Interferometer Sounder</i>
ISCCP	International Satellite Cloud Climatology Project
LASE	Lidar Atmospheric Sensing Experiment
LBA	Large scale Atmosphere-Biosphere Experiment
LIP-C	Lightning Instrument Package-Continuous
LIP-T	Lightning Instrument Package-Transient
MAC	Multi-Instrument Aircraft Campaign

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 ARE FOR REFERENCE ONLY
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Dryden Flight Research Center Handbook		
Arborne Science Handbook Vol. 1	DHB-Y-001	Revision: Baseline
		Page Page 8 of 33

MACAWS	Multi-center Airborne Coherent Atmosph. Wind Sensor
MAMS	Multispectral Atmospheric Mapping Sensor
MIR	Millimeter-wave Imaging Radiometer
MISR	Multi-Angle Imaging SpectroRadiometer
MMS	Meteorological Measuring System
MNPS	Minimum Navigation Performance Specification
MTS	Microwave Temperature Sensor (Sounder)
NAST-I	N-pose Aircraft Sounder Test Bed
NPOESS	National Polar Orbiting Operational Environ. Satellite
PACRIM	Pacific Rim
PEM B	Pacific Exploratory Mission (second)
POLARIS	Photochemistry of Ozone Loss in Arctic Regions in Summer
POP	Program Objective Plan
PSR	Polarimetric Scanning Radiometer
PRT	Precision Radiation Thermometer
RADS	Radiation Shielding Instrument
RC-10	ER-2 Large-Format Aerial Camera
RVSM	Reduced Vertical Separation Minima
SAGE	Stratospheric Aerosol and Gas Experiment
SASS	Subsonic Aircraft Assessment
SAW	<i>Surface Acoustic Wave Microhygrometer</i>
Scan HIS	Scanning High Resolution Interferometer Sounder
SEU	Single Event Upset
SLS	Stratospheric Limb Sounder
SOLVE	Ozone Loss
SONEX	SASS Ozone and Nox Experiment (subsonic aircraft/assessment program)
SSF	Solar Spectral Flux
STARLINK	ER-2 Satellite Communications System
STRAT	Stratospheric Traces of Atmospheric Transport
TEFLUN	Texas Florida Underflights
TIMS	Thermal Infrared Multispectral Scanner
TOPSAR	Topographic Synthetic Aperture Radar
TRMM	Tropical Rainforest Moisture Measurement
WINCE	Winter Cloud Experiment
WINTEX	Winter Experiment

Dryden Flight Research Center Handbook		
Arborne Science Handbook Vol. 1	DHB-Y-001	Revision: Baseline
		Page Page 9 of 33

5.0 AIRBORNE SCIENCE DIRECTORATE POLICIES

POLICIES

The policies that constitute this section are in addition to Agency and Center policies that govern the Center's operation. The policies herein apply to the conduct of the airborne science mission. They are applicable to all DFRC Code Y civil service employees.

5.1 AIRBORNE SCIENCE QUALITY POLICY

The Airborne Science quality policy is to:

1. Provide accurate estimates to NASA Headquarters for estimated charges to the experimenter.
2. Successfully integrate the experiment into an airborne science platform.
3. Get the airborne platform to the desired conditions to acquire data.
4. Return the experiment to the experimenter.

5.2 RESPONSIBILITY

The Mission Manager has first (primary) responsibility to identify any deficiency detected in the design, construction, installation, and/or operation of an experiment. All other personnel have the authority and responsibility to question or stop undesirable practices.

The Mission Manager must ensure that work affecting quality and safety is performed in accordance with approved procedures.

5.3 RESPONSIBILITY DURING DEPLOYMENTS

1. The Lead Mission Manager has primary responsibility for the content and conduct of the mission.
2. Any member of the deployment team can call a halt to an operation for safety reasons. The reason must be brought to the attention of the Lead Mission Manager and the Pilot-in-Command.
3. The Lead Mission Manager can make deviations from the briefed campaign missions at his/her discretion based on the totality of the circumstances at the time. Major deviations must be approved by an Airborne Science Manager (Program Manager or above). Major deviations are

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Dryden Flight Research Center Handbook		
Arborne Science Handbook Vol. 1	DHB-Y-001	Revision: Baseline
		Page Page 10 of 33

defined as increases in schedule or cost greater than 10% or any degradation in the briefed safety margin.

Dryden Flight Research Center Handbook		
Arborne Science Handbook Vol. 1	DHB-Y-001	Revision: Baseline
		Page Page 11 of 33

5.4 TIME, ATTENDANCE AND OVERTIME PAY POLICY

Airborne Science personnel will follow their DFRC Time, Attendance, and Overtime Pay guidance as stated in the March 16, 1999 memo from Human Resources (copy supplied).

ON DEPLOYMENT

Airborne Science personnel on deployment will be on “first forty” status and will request “comptime” for time worked over 40 hours in one week. Overtime pay is normally not authorized and must be approved by the Airborne Science Director or a designee.

Dryden Flight Research Center Handbook		
Arborne Science Handbook Vol. 1	DHB-Y-001	Revision: Baseline
		Page Page 12 of 33

6.0 PROCEDURES

This section contains the procedures to be used by Airborne Science Directorate employees in the conduct of the airborne science mission. The procedures are provided to ensure consistency of results, thereby providing high quality and predictability of action. High quality is defined here as a safe operation that satisfies the customer's requirements.

6.1 INDEX

6.2 SELECT DCPs

- DCP-J-001, Foreign National Visit Request
- DCP-J-004, Security Access Request
- DCP-J-006, Permanent Badge Request
- DCP-J-007, Temporary Badge Request
- DCP-O-002, Work Order System
- DCP-S-001, Aircraft Mishap Response Procedure
- DCP-S-002, Hazard Management
- DCP-X-008, Tech Brief (T/B) and Mini-Tech Brief (Mini T/B)
- DCP-X-009, AFSRB
- DCP-X-020, Operation Review Board & ORR

6.3 AIRBORNE SCIENCE DOPs

- DOP-Y-001, Airborne Science Flight Request (Contract) Review
- DOP-Y-002, Airborne Science Capability Improvement
- DOP-Y-003, Mission Development and Implementation
- DOP-Y-004, Laboratory Management
- DOP-Y-006, Airborne Science Configuration Control
- DOP-Y-007, Airborne Science Configuration Control Board Process

6.4 AIRBORNE SCIENCE ADMINISTRATIVE PROCEDURES

- Meeting Scheduling
- Conference Room Management
- Training Requests
- Local Area Flights

Dryden Flight Research Center Handbook		
Arborne Science Handbook Vol. 1	DHB-Y-001	Revision: Baseline
		Page Page 13 of 33

6.4 AIRBORNE SCIENCE ADMINISTRATIVE PROCEDURES

6.4.1 MEETING SCHEDULING

1. The Directorate Secretary is responsible for scheduling meetings that represent the Directorate, involve other DFRC Codes at the Branch Chief/Program Manager or higher, or as directed by the Director.
2. Technical Documentation Specialists may schedule working meetings for the program. Working meetings normally involve Code Y personnel and participants below the Branch Chief/Program Manager level.
3. The Directorate Secretary is responsible for the Schedule Board in the Directorate Office.

6.4.2 CONFERENCE ROOM MANAGEMENT

1. The Directorate Secretary is responsible for maintaining the Code Y conference rooms (CR) schedules and overseeing the CR and support equipment.
2. Technical Documentation Specialists may have direct access to the schedule and may reserve the CRs for direct program support functions. All others will go through the Directorate Secretary to reserve the CRs.
3. The Directorate Secretary will resolve CR scheduling conflicts. The CR schedules are maintained in Meeting Maker as CR 205 Bldg 1623 and CR 219 Bldg 1623.

6.4.3 TRAINING REQUIREMENTS

This procedure covers training requirements for:

- Airborne Science Program Manager
 - Airborne Science Mission Manager
 - Director for Airborne Science
 - Deputy Director for Airborne Science
 - Technical Management Specialist
1. **Procedures for Identifying Tasks That Require Training**
The Director, Airborne Science will identify tasks that require training. The Director will set the level of training required, provide the resources for the training, and certify that the training was completed or waived. A waiver may be granted based on ability to do the task described.
 2. **Specific Training Requirements**
 - a) **Director for Airborne Science**
 - Formal education and experience as published in the position description

Dryden Flight Research Center Handbook		
Arborne Science Handbook Vol. 1	DHB-Y-001	Revision: Baseline
		Page Page 14 of 33

- Management Education Program attendance (or equivalent program) desired, not mandatory
- b) Deputy Director for Airborne Science
- Same as the Director for Airborne Science
- c) Program Manager for Airborne Science
- Formal education and experience as published in the position description
 - Experience as a Mission Manager
 - Management Education Program (or equivalent) attendance within two years of appointment
- d) Mission Manager
- Training required to be certified as a journeyman Mission Manager at DFRC.
1. Not less than six months on-the-job training serving as an assistant Mission Manager on an Airborne Science Platform Aircraft.
 2. Participate as an assistant Mission Manager on at least two United States Deployments.
 3. Participate as an assistant Mission Manager or perform Mission Manager duties on one foreign country deployment or on a deployment where diplomatic clearances are required.
- The Airborne Science Program Manager or higher authority will certify the employee as a Journeyman Mission Manager.
- e) Technical Management Specialist
- Formal education and experience as published in the position description
 - On-the-job training by a person performing the task at the journeyman level

6.4.4 LOCAL AREA FLIGHTS

1.0 Approvals

Airborne Science aircraft flights that originate from Edwards AFB and return to Edwards AFB (local area flights) will be approved by the Airborne Science Program Manager. This authority may be delegated within the Airborne Science Directorate.

2.0 Mission Justification

The relevant Mission Manager will present the requirement for the mission to the Program Manager (PM). The PM will be satisfied that the flight is justified and that the payload is optimized.

Dryden Flight Research Center Handbook		
Arborne Science Handbook Vol. 1	DHB-Y-001	Revision: Baseline
		Page Page 15 of 33

3.0 Technical Briefing

The PM will insure that there has been an adequate technical briefing that covers the requirement for the flight and the technical approach for satisfying the requirement. The PM has the authority to delay or cancel any local area flight of an Airborne Science aircraft.

4.0 Proficiency Flights

Flights for aircrew proficiency do not require a technical briefing and may conduct a crew briefing as sufficient information exchange and justification.

Dryden Flight Research Center Handbook		
Arborne Science Handbook Vol. 1	DHB-Y-001	Revision: Baseline
		Page Page 16 of 33

7.0 INFORMATION

INFORMATION

The Information section contains miscellaneous information about the Airborne Science Directorate and its operation. The purpose is to provide information and not direction. See the Table of Contents for specific items.

TABLE OF CONTENTS

- 7.1 Customer Contact Checklist
- 7.2 Mission Manager's Checklist
- 7.3 DC-8 Passenger Safety Brief
- 7.4 Survival Tips

Dryden Flight Research Center Handbook		
Arborne Science Handbook Vol. 1	DHB-Y-001	Revision: Baseline
		Page Page 17 of 33

7.1 CUSTOMER CONTACT CHECKLIST

I. First Contact

- A) Send caller an Airborne Laboratory Experimenters' Handbook," a brochure, and an "Integration Questionnaire" for the appropriate aircraft
 - 1) Explain that proposed science must have relevance to NASA mission

- B) Add name to Call Letter mailing list
 - 1) Explain about the "Announcement of Opportunity"

- C) Tell caller about Dryden Flight Research Center (DFRC) Airborne Science home page on internet
 - 1) Home page address is:
<http://www.dfrc.nasa.gov/Projects/airsci/general/>
 - 2) Flight Request page is:
<http://www.dfrc.nasa.gov/Projects/airsci/general/SciProg/home.html>

- D) Explain flight request approval basics
 - 1) Describe Flight Request Approval process
 - a) Letter is sent out in April/May soliciting flight requests for the DC-8 and ER-2
 - b) Flight requests are due at DFRC by the end of June for the following fiscal year
 - c) DFRC logs and forwards the originals to NASA Headquarters
 - d) HQ eliminates some flight requests
 - e) DFRC estimates flight hours for and broadly schedules the remaining flight requests
 - f) HQ makes final approval of flight hours for each flight request
 - g) The customer is contacted by a Mission Manager and detail planning begins
 - 2) Describe sponsorship
 - a) Explain fiscal and priority advantage of NASA Office of Earth Science (OES) sponsorship
 - i) Experimenter enjoys full Government sponsorship
 - ii) Experimenter enjoys top priority
 - b) Describe NASA Non-OES sponsorship
 - i) Experimenter enjoys Government sponsorship
 - ii) Experimenter enjoys second priority
 - c) Describe Non-NASA sponsorship
 - i) Experimenter sponsor pays flight costs and mission peculiar costs to the Government
 - ii) Experimenter receives third priority
 - d) Describe Piggy-back status
 - i) Experimenter sponsor pays mission peculiar costs only

Dryden Flight Research Center Handbook		
Arborne Science Handbook Vol. 1	DHB-Y-001	Revision: Baseline
		Page Page 18 of 33

- ii) Experimenter is accommodated on a non-interference basis
- e) Provide referrals to customer for sponsorship advice.
 - i) Refer to prior experiments with similar equipment or science
 - ii) Refer to headquarters discipline manager

II. Pre-Approval Experimenter Support

- A) Describe extent of pre-approval support
 - 1) Without an approved flight request, support can be provided with the limitation that no detail design or fabrication costs can be incurred by the Government
 - a) The Government can provide a rough funding estimate for customer's flight hours and mission peculiar costs
 - b) Also, preliminary layouts and schematic designs can be prepared, and design and fabrication estimates can be made
 - 2) If the customer's program is "registered" with the NASA OES as a probable out-year program, Government costs can be incurred in advance of an approved flight request
 - a) In addition to the support listed above, planning meetings and site surveys can be held, and some detail design can begin

- B) Provide Pre-approval Support
 - 1) Feasibility Studies
 - a) Prepare Aircraft Work Orders for contractor design and fabrication cost estimates
 - b) Contractor Costs are charged to "Engineering Program Support - General"
 - 2) Additional OES Support
 - a) Create Sales Order Numbers for Programs that will require contractor support beyond feasibility studies.
 - b) Attend planning meetings
 - c) Prepare Aircraft Work Order for site survey
 - d) Prepare Aircraft Work Order for detail design

Dryden Flight Research Center Handbook		
Arborne Science Handbook Vol. 1	DHB-Y-001	Revision: Baseline
		Page Page 19 of 33

7.2 MISSION MANAGER'S CHECKLIST

I. Program Preparations

- A) Gather flight requests
 - 1) Read about instruments/program
 - 2) Understand PI goals
 - 3) Make a list of P.I.'s, their addresses, and phone numbers.
 - 4) Take note of special conditions
 - a) Time of year
 - b) Time of day
 - c) Weather constraints
 - 5) Take note of any ground truthing, interagency, or aircraft coordination required
 - 6) Take note of any special clearances required
 - a) Foreign airspace
 - b) Congested airspace
 - c) Restricted airspace

- B) Obtain or prepare a program calendar
 - 1) Include necessary lead times -Consider:
 - a) Fabrication lead times
 - b) Window test lead times
 - c) Integration period
 - d) International clearance lead times
 - 2) Include necessary reviews and checks -Consider:
 - a) Laser safety review
 - b) Operational Readiness Review (ORR)/Airworthiness & Flight Safety Review Board (AFSRB)
 - c) Preflight checks
 - i) Weight and balance
 - ii) Power-up check
 - iii) Engineering test flight.
 - 3) Consider 30 in 7 restrictions
 - 4) Coordinate anticipated flight days and flight hours between all Mission Managers
 - 5) Consult with pilots on tentative plan

- C) Contact Principal Investigators (P.I.'s)
 - 1) Verify contact points
 - a) Check affiliation and relation to project
 - b) Check addresses for both office and shipping
 - c) Get phone, fax, and E-mail numbers for both office and laboratory
 - d) Get name of technician and others that may fly or otherwise participate in project
 - e) Check discipline manager name

Dryden Flight Research Center Handbook		
Arborne Science Handbook Vol. 1	DHB-Y-001	Revision: Baseline
		Page Page 20 of 33

- 2) Verify payload requirements
 - a) Verify instrument characteristics, such as:
 - i) Sensors
 - ii) Probes
 - iii) Antennas
 - iv) Lasers
 - b) Ask about rack requirements, such as:
 - i) Rack type and number
 - ii) Rack shelves
 - iii) Storage boxes
 - iv) Standard brackets and holders
 - v) Sheet metal fabrication
 - vi) Fasteners
 - c) Check power requirements, such as:
 - i) 60Hz loads
 - ii) 400Hz loads
 - iii) Check capacity for right and left sides
 - iv) Check for power surge problems such as with large motors
 - d) Consider window requirements, such as:
 - i) Existing window inventory
 - ii) Window test lead-time
 - iii) Window adaptor fabrication
 - iv) Window blank modifications
 - v) Interior window shield
 - vi) Exterior window cover
 - e) Check for hazards, such as:
 - i) Compressed gasses
 - ii) Cryogenics
 - iii) Flammable or corrosive materials
 - iv) Toxic gasses or liquids
 - v) Lasers and ionizing radiation
 - vi) MSDS's (Material Safety Data Sheets)
 - vii) High electrical loads, batteries
 - f) Check for accessories, such as:
 - i) Monitor and bracket
 - ii) Power strip
- 3) Verify tentative schedule
 - a) Verify flight days
 - b) Verify constraints
 - c) Verify coordination needs
 - d) Schedule P. I. visits
- 4) Verify data requirements
 - a) Check DADS requirements, such as:

Dryden Flight Research Center Handbook		
Arborne Science Handbook Vol. 1	DHB-Y-001	Revision: Baseline
		Page Page 21 of 33

- i) Deliverables format: diskette, tape, or CD
 - ii) List of required parameters to capture
 - iii) DADS display customization
 - iv) Equipment tie-ins
 - v) Check post flight needs
 - b) Check time code requirements
 - c) Check photo requirements, such as:
 - i) Cameras
 - ii) Media type
 - iii) Subject
 - iv) Post flight needs
 - d) Check video requirements, such as:
 - i) Format
 - ii) Required annotations
 - iii) Number of copies needed
- D) Prepare and issue an Experimenter's Bulletin
 - 1) Typical sections in the bulletin are:
 - a) "Mission" or "Program Objectives"
 - b) "Area of Operations"
 - c) "Payload"
 - d) "DC-8 Support Systems"
 - i) DADS
 - ii) IR Surface Temperature Radiometer
 - iii) Video cameras
 - iv) GPS/INS Navigational Management System
 - v) APT Satellite Weather Receiver
 - vi) Weather Radar
 - vii) 2 and 3 Stage Hygrometers
 - e) "Schedule"
 - f) "Coordinators"

II. Program Integration

- A) Prepare Service Requests and Aircraft Work Orders for:
 - 1) Photographic support
 - a) Order equipment installation documentation photography
 - b) Order at least one proof sheet of all photos taken of the mission
 - 2) Personnel and equipment in support of deployment
 - a) Include support for mission logistics, navigation, flight planning, meteorological services, ground crew, and technicians
 - b) Say that overtime may be required and shall be approved / disapproved in the field

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<http://www.dfr.nasa.gov/DMS/dms.html>
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Dryden Flight Research Center Handbook		
Arborne Science Handbook Vol. 1	DHB-Y-001	Revision: Baseline
		Page Page 22 of 33

- c) Request that deployment costs be tracked on a separate sales order number
 - 3) DADS support
 - a) Request support for both local and deployment flights
 - 4) Mechanical and electrical design work.
 - a) Be prepared for design review and drawing iterations
 - 5) Machine and sheet metal shop work associated with equipment fabrication
 - a) Include requirement for inspections and certifications in the request, especially if the job will be sent out (off center) for fabrication
 - 6) Sheet Metal support for equipment and rack installation (integration)
 - a) Request support for incidental sheet metal fabrication associated with completion for experimenter rack build-up and installation
 - b) Provide a floor plan and written description of items to be installed, with station number
 - 7) Window tests
 - 8) Sheet Metal support for equipment and rack de-installation (integration)
 - a) Coordinate this with new program integration. Provide a written description of items to be removed, with station number
- B) Consider coordination of events during the Integration period, such as:
- 1) Experimenter visit requests
 - a) Extra lead time is required for foreign nationals
 - 2) Equipment shipping
 - a) Coordinate with Lab Manager & P.I.s
 - 3) DC-8 lab usage. Outline rules for such things as:
 - a) Tool borrowing
 - b) Equipment tests
 - c) Internet hook-ups
 - d) Support from DC-8 technicians
 - e) Support from sheet metal shop
 - f) Storage
 - g) Inspections and weighing
 - h) Work hours
 - 4) Integration with aircraft. Issues to consider include:
 - a) All racks should be inspected and weighed before installation on aircraft
 - b) Final location and bolt-down of racks
 - c) Connections to DADS and aircraft power
 - d) Need for inspection of all equipment before power-up
 - e) Equipment tests should be coordinated with the Mission Manager and Techs
 - f) Safe practices for servicing of gasses aboard aircraft. Experimenter should demonstrate proficiency
 - g) Schedule required hangar roll-in and roll-out times with flight operations
 - h) Check with aircraft maintenance about any required maintenance or inspection that is imminent, such as aircraft washing or VHF antenna inspection

Dryden Flight Research Center Handbook		
Arborne Science Handbook Vol. 1	DHB-Y-001	Revision: Baseline
		Page Page 23 of 33

- 5) Pre data flight preparations. Plan for:
 - a) Airworthiness Flight Safety Review Board (if required)
 - b) Operational Readiness Review
 - c) Power-up check
 - d) Engineering test flight
 - e) Functional Science check flight

- C) Chair daily 1:00PM meetings in the DC-8 Lab
 - 1) Meeting attendees include:
 - a) A representative from each P. I. being integrated
 - b) The Aircraft Crew Chief or designee
 - c) An Aircraft Inspection representative
 - d) An Aircraft Airworthiness representative, if required
 - e) An engineering support representative
 - f) An aircraft technician
 - g) A DADS representative
 - h) A shop support representative
 - i) The Mission Manager
 - 2) Meeting agenda includes:
 - a) Update on schedule of events from Mission Manager
 - b) Progress reports from the Crew Chief, shop support, aircraft inspection, the integration engineer, and logistics support
 - c) Progress reports from each of the P. I.'s.
 - d) General comments from anyone

III. Deployment Preparation

- A) Arrange Clearances
 - 1) International clearances must be arranged for simple overflight, with or without data, as well as landing at and operations from a foreign base
 - 2) Military base clearance must be arranged for security or logistics reasons
 - a) At Thule A. F. B., Greenland, a "Theater Clearance" is required. All flight participant social security numbers were submitted, along with a letter stating deployment purpose and dates
 - b) All participants should carry Government travel orders if being billeted on base. These orders allow access to all base privileges including mess hall, clubs, and exchange
 - 3) Flights into congested or restricted airspace require at least 24 hours lead-time for ATC clearances
 - 4) All flight participants should make sure their passport is current
 - a) Those individuals with Government passports may want to obtain and use a personal passport instead if they will be flying into "unfriendly" regions of the world

Dryden Flight Research Center Handbook		
Arborne Science Handbook Vol. 1	DHB-Y-001	Revision: Baseline
		Page Page 24 of 33

- b) Some countries may require visa's for entry in addition to a passport
- 5) Visiting experimenters will need proper badging to enter DFRC & Hangar 1623
 - a) Individuals without adequate existing badges must be badged at the DFRC Security office
 - i) Names should be submitted at least 24 hours in advance. Always double check with the badging office that names submitted are on the visitor list the day before
 - ii) Non U. S. citizens will require valid alien registration documentation. Those with only a visa will require processing through NASA Headquarters and their Embassy

B) Arrange Logistics.

- 1) Airfield operations and ground support (these items should be checked at the alternate airfield also) includes:
 - a) Fuel
 - i) "Contract," U. S. Government fuel is preferred, unless there's an emergency. Commercial fuel is substantially more expensive. The P. I. pays the difference.
 - b) Power carts
 - i) Fuel for power carts can be an issue if the aircraft must be kept occupied at length.
 - ii) Reliability is often an issue. Redundant power carts are a good safeguard.
 - c) Hangar space
 - i) Usually the aircraft doesn't need to be hangared. However, not hangaring in a hot or cold environment may mean that heaters or coolers are required.
 - ii) In some locations, aircraft security will be impacted by the hangaring or no hangaring of the aircraft.
 - d) Heaters or coolers
 - e) Sewage disposal
 - i) Proper equipment for sewage disposal is nice, but in a pinch the crew can empty the toilets with a bucket.
 - f) Transient alert ("Follow Me") truck
 - g) Flight operations
 - i) Check tower operating hours. Arrange for overtime if required. Tower operating hours and airfield operating hours are sometimes different. Check on fire protection hours.
 - ii) Check operating hours for weather services and flight planning.
- 2) Personnel logistics include:
 - a) Hotel
 - i) The flight crew will require single accommodations to assure proper crew rest.
 - b) Transportation

Dryden Flight Research Center Handbook		
Arborne Science Handbook Vol. 1	DHB-Y-001	Revision: Baseline
		Page Page 25 of 33

- i) Rental cars are needed if staying for more than one night.
 - ii) Bus, van, or limo service should be arranged to the hotel if rental cars are not arranged.
 - iii) Transportation to the rental car agency may need to be arranged.
 - c) Flight meals and bottled water
 - i) Flight lunches are not provided for local flights of any length. If on deployment, flight lunches should be arranged if flights are 6.5 hours or more and there is no opportunity for persons to pack a bag lunch beforehand.
 - ii) Flight meals should be inexpensive, easy to eat in flight, and should include non-caffeinated drinks such as fruit juices.
- 2) Experiment logistics include:
 - a) Compressed gasses
 - i) Most compressed gasses can be carried aboard the aircraft. However, large quantities, or gasses that cannot be flown, may need to be pre-shipped.
 - ii) Availability of gasses should be checked for the remote site.
 - b) Cryogenes
 - i) Check for availability of Dry Ice at remote site.
 - ii) Check for availability of Liquid Nitrogen at remote site.

Experimenters are responsible for any cryogenes other than the above.
 - c) Express mail service (in case data has to be sent home)
- 3) Mission Manager logistics include:
 - a) Prepare flight bag. Take:
 - i) Copy of Flight Requests and P. I. correspondence
 - ii) Copy of Emergency Procedures, including incident reporting procedures and a list of office and home phone numbers for all pertinent NASA contacts
 - iii) Copy of checklists, including: flight checklist, preflight briefing checklist, and safety briefing checklist
 - iv) Hotel and transportation information
 - b) Check Mission Manager supplies
 - i) Mission Manager storage bins should contain adequate office supplies, including printer paper, 3-hole punch, and stapler.
 - ii) A "Forms Binder" should be brought containing multiple copies of all necessary forms, including:
 - Fax cover sheets
 - Flight Authorization Letter
 - ER-2 or DC-8 Flight Announcement
 - ER-2 or DC-8 Daily Schedule of Events
 - Aircraft Flight Data Report
 - Flight Participant Form
 - Flight Itinerary and Passenger Manifest
 - Flight Request
 - iii) Bring a supply of aircraft brochures, decals, and photos.

Dryden Flight Research Center Handbook		
Arborne Science Handbook Vol. 1	DHB-Y-001	Revision: Baseline
		Page Page 26 of 33

- c) Check Mission Manager Medical bag
 - i) Update inventory, Check expiration dates

- C) Prepare Aircraft
 - 1) Load for deployment
 - a) Load Experiment spares including:
 - i) “Blue boxes” loaded with spare hardware and tools for in-field repairs.
150lbs. Max. load for each box.
 - ii) Gas bottles, Prefer aluminum bottles over steel.
 - b) Load Aircraft spares including:
 - i) Spare tires
 - ii) Spare engine parts
 - iii) Spare windows, window blanks, and window hardware
 - iv) Tools, tow bars, yoke, etc.
 - c) Obtain a copy of the manifest (list of contents) for each spares box. Make sure that the aircraft crew chief keeps another copy. Each box should have a copy of its manifest taped to its exterior.
 - 2) Check Weight and Balance
 - a) Once complete, any rack or aircraft mounted equipment brought aboard or taken off must be recorded for weight and balance control. Generally, items over ten pounds should be recorded.

- D) Special provisions may be required when flying into remote or hostile environments, such as:
 - 1) Arctic regions
 - a) If the deployment includes flights over ice, the arctic survival sleds will be required. Prior to loading the sleds should be inventoried and updated.
 - i) Flight participants should have an arctic survival briefing. This primarily involves the viewing of a videotape on arctic survival techniques.
 - b) Arrange for arctic survival clothing to be issued to flight crew and experimenters. Items include:
 - i) Parka with fur hood
 - ii) Snow pants
 - iii) Boots
 - iv) Mittens
 - c) Remind flight participants to bring personal arctic gear, such as:
 - i) Wool socks, gloves, and scarves
 - ii) Thermal underwear
 - iii) Lip balm
 - iv) Skin moisturizer
 - v) Sun glasses, if going in the daylight period
 - 2) Remote tropical or third world regions
 - a) Make sure flight participants are vaccinated for the regions on the itinerary, including the secondary landing areas.

Dryden Flight Research Center Handbook		
Arborne Science Handbook Vol. 1	DHB-Y-001	Revision: Baseline
		Page Page 27 of 33

- b) Flight participants should bring”
 - i) Bug repellent
 - ii) Sunscreen
 - iii) Foot powder

IV. Program Flight

- A) Define flight lines.
 - 1) AIRSAR flight lines are determined by the AIRSAR Science Coordinator at JPL.
 - a) Make contact regarding flight days and approximate flight hours.
 - b) Obtain calculated flight lines from JPL and plot flight plan to obtain flight hours and to determine take-off and landing times.
 - i) The flight plan is typically determined by the navigator
 - c) Consult with AIRSAR Science Coordinator about final plans for flight day.
 - i) Arrange safety briefings
 - ii) Arrange pre-flight briefings
 - iii) Confirm arrival times for P.I.’s

- B) Prepare for flight.
 - 1) File flight forms, including:
 - a) Flight Request.
 - i) File this on or before the Thursday preceding the flight.
 - b) Deployment Schedule (for deployments only).
 - i) Circulate this for signatures then recover and keep the signed original to take on the flight.
 - ii) Flights of unknown duration should be assigned 7.5 hour duration until a better estimate is known.
 - c) Flight Authorization Letters.
 - i) Program Manager or Mission Manager should sign letter (anywhere) prior to filing. On deployment, fax this back to DFRC prior to flight or leave with someone on the ground until faxing is convenient
 - ii) Line through unused rows on letter
 - d) Flight Participant Forms
 - i) File these forms for new participants with the branch office. On deployment, fax this back to the branch office prior to flight or leave with someone on the ground until faxing is convenient.
 - ii) Recent flight participants should be reminded to keep their previously filed forms up-to-date.
 - e) Flight Itinerary and Passenger Manifest
 - i) File just prior to take-off. On deployment, leave this at the airfield operations office or, if returning, with someone on the aircraft ground crew.
 - ii) Mission Manager and assistant should keep a copy on the manifest in their flight suit during flight in case of emergency egress.

Dryden Flight Research Center Handbook		
Arborne Science Handbook Vol. 1	DHB-Y-001	Revision: Baseline
		Page Page 28 of 33

- f) Flight Announcement
 - i) Date and time stamped flight announcements should be posted on the aircraft, in the DC-8 lab, and on the bulletin board outside the branch office. On deployment, arrange to have a place at the hotel where flight announcements will be posted.
 - 2) Chair Pre-deployment Brief (deployments only)
 - a) Briefing is conducted during the week before the deployment
 - b) Attendance is not mandatory; however, a representative from the ground crew should attend
 - c) Agenda includes:
 - i) Distribution of fact sheet about lodging, transportation, itinerary, flight days and times, and special conditions or rules.
 - ii) Announcement of immediate schedule for pre-flight brief, take-off and landing.
 - iii) Tips about the deployment location such as: weather conditions, places to eat or visit, things to avoid, local customs.
 - iv) Reminders about passports and flight meals.
 - 3) Chair Pre-flight Brief
 - a) Briefing is conducted approximately 1 1/2 hours before the flight, unless otherwise arranged. On deployment, the briefing is conducted 1 hour before the flight, on the aircraft, unless otherwise arranged.
 - b) Attendance is mandatory unless excused by Mission Manager
 - c) Agenda is listed on prepared checklist but generally includes:
 - i) Reading of the passenger manifest and introduction of flight crew, P. I.'s, Mission Managers, and technicians.
 - ii) Discussion of flight plan and schedule, weather, special operating conditions or restrictions, and a summary of the science objectives.
 - iii) Summary of safety issues
 - 4) Arrange for preflight power
 - a) Preflight power requirements can be related to the following: calibration, cryogen loading and testing, GPS system warm-up, post-flight processing from a previous flight.
 - b) SAR usually requires 2 hours of power prior to take-off
 - 5) Fuel for flight
 - a) Fuel loads will be determined by the aircraft commander
 - b) The aircraft is powered down during fueling
 - c) Persons may or may not be allowed aboard the aircraft during fueling depending on airfield regulations
 - 6) Prepare a "press release" about the deployment
- C) Fly
- 1) Take-off
 - a) Follow checklist
 - i) Door closes at T-30 minutes
 - ii) Power down at T-20 minutes

Dryden Flight Research Center Handbook		
Arborne Science Handbook Vol. 1	DHB-Y-001	Revision: Baseline
		Page Page 29 of 33

- iii) Engine start T-20 to T-10
 - iv) Experimenter power-up prior to taxi
 - v) Taxi
 - vi) Take-off
 - b) Mission Manager Console Operations
 - i) Check power distribution
 - ii) Check intercom
 - iii) Check altimeters
 - iv) Turn on hygrometers
 - v) Open shutters
 - c) Operate GRID computer
 - i) Boot-up and log-in computer
 - ii) Enter take-off time and flight crew information
 - iii) Check flight plan waypoints with NMS
 - iv) Log passage of waypoints
 - v) Set up any macros required for data lines
- 2) Fly data lines
 - a) Log waypoints and conditions before start
 - b) Announce estimated time to beginning of data lines
 - c) Call out line start
 - d) Mark closest point of approach (CPA)
 - e) Call out line end
- 3) Land
 - a) Follow checklist
 - i) Turn-off hygrometers
 - ii) Log-off GRID
 - iii) Close shutters
 - iv) Power-down P.I.'s before landing or while taxiing to parking
 - b) Conduct debrief
 - i) Solicit reports on success of experiments from P.I.'s
 - ii) Determine post flight power needs
 - iii) If on deployment, discuss schedule for down time and next flight
- 4) Do post flight administration
 - a) Submit Aircraft Flight Data Report
 - i) Report gets faxed to Directorate Office ext.3719
 - ii) Copy of report is posted on the bulletin board outside the Directorate office
 - b) Distribute DADS printout
 - i) Receive from DADS operator
 - ii) Keep a copy and give the original to the primary payload P. I.
 - c) Distribute video tapes
 - d) Take care of P.I.'s photographic needs
 - i) Take delivery of photo proofs from mission
 - ii) Fax proofs to P.I.

Dryden Flight Research Center Handbook		
Arborne Science Handbook Vol. 1	DHB-Y-001	Revision: Baseline
		Page Page 30 of 33

iii) Order copies of photos for P. I.

V. Post Flight

- A) Issue an Experimenter's Bulletin summarizing the mission.
- B) Conduct a Lessons Learned Briefing
- C) Collect and Archive Mission Documentation.
- D) Compile final MPC report. Issue to Mission Scientist of Sponsor.

Dryden Flight Research Center Handbook		
Arborne Science Handbook Vol. 1	DHB-Y-001	Revision: Baseline
		Page Page 31 of 33

7.3 DC-8 PASSENGER SAFETY BRIEFING

I. EXITS

- a. Location
- b. Operation
- c. Emergency Lighting
 1. Check for fuel, fire, wreckage
- d. Slides - forward & aft exits
 1. Inflation procedures
 2. Evacuating
 3. Move away from the aircraft (100yds Up Wind)
- e. Escape lines - overwing exits and cockpit windows
- f. No escape access through cargo pits

II. OXYGEN SYSTEM

- a. Location
- b. Operation - rapid decompression or triggered by FE
- c. Oil-based lip ointments
- d. Medicinal O2 (Green)
- e. Walk around for fire fighters (Yellow)

III. IN-FLIGHT EMERGENCIES

- a. Notify MM's of anything unusual - see, hear, smell
- b. In case of fire/smoke
 1. Notify MMs
 2. Get on headset
 3. Power down equipment
 4. Clear aisles
 5. Allow trained personnel to fight fire
- c. Fire fighting equipment (fire boards)
 1. Halon, portable oxygen with smoke mask, insulated gloves, crash ax, seatbelt cutter (yellow handle)
- d. Rapid cabin decompression
 1. Don oxygen masks
 2. Fasten seat belts
 3. Get on headset for further instructions

IV. GROUND EVACUATION

- a. Emergency escape breathing device (EEBD)
 1. Location
 2. Operation (Not for fire fighting)
- b. Confirm safe side of aircraft to exit
- c. Assemble away from aircraft

Dryden Flight Research Center Handbook		
Arborne Science Handbook Vol. 1	DHB-Y-001	Revision: Baseline
		Page Page 32 of 33

V. DITCHING (SEE MM EMERGENCY CHECKLIST)

- a. Life vest (Do not inflate until outside of aircraft)
- b. Life rafts
 1. Location
 2. Operation
- c. Ditching Position (If not in shoulder harness)

VI. LOOSE EQUIPMENT

- a. Secure prior to take-off and landing (rope provided)
 1. Tool boxes, brief cases, camera bags, etc...

VII. FIRST AID KITS AND FLASH LIGHTS

- a. Emergency/evacuation use only!
- b. Medical flight bag - see MMs
- c. Flashlights - emergency/evacuation use only

VIII. GENERAL

- a. Clothing requirements - no shorts, dresses, sandals, high heel shoes
- b. Observe “No Smoking - Fasten Seat Belt” signs
- c. Wait until MMs “Clear” the cabin before getting up
- d. Caution: colds, sinus problems, ear blocks
- e. Hearing protecting required/provided during flight
- f. Clear flash photos with MMs
- g. Ask MMs for access to cockpit before entering
- h. Ask MMs for access to cargo pits before entering
 1. Notify MMs after exiting cargo areas
- i. Type of materials (gasses) and experiments on board
- j. Housekeeping
 1. Coffee, water, cold storage, lavatories
 2. Overhead storage - 40lb max
 3. Trash bags provided
 4. No glass beverage containers on aircraft
 5. Do not place drinks on racks
 6. No liquids in overheads
 7. Keep galley, lavatories and work areas clean

Dryden Flight Research Center Handbook		
Arborne Science Handbook Vol. 1	DHB-Y-001	Revision: Baseline
		Page Page 33 of 33

7.4 SURVIVAL TIPS

Safest Seat - over the wing is the strongest, an aisle seat is easiest for egress

Seat Belts - keep on at all times, keep tight for take-off and landing (prevent “g” force decel slip)

Egress Briefings - Pay attention! You may be in charge

Baggage and Personal Items - Leave behind during an evacuation

Dress Accordingly - close knit cotton & wool is best, covering as much of the body as possible, none of the following: high heels, loafers, hair spray or lotion

Carry a small flashlight

Sharp Objects - such as glasses or pens, remove for take-off and landing