GSFC/Wallops Flight Facility Aircraft Operations Manual

Effective: October 15, 2010

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CHANGE HISTORY LOG
Record of Revisions

Revision	Effective Date	Entered by	Description of Changes
Baseline	2/9/2001		Initial Release
A	10/27/06	RRogers	Overall format update Section 4.2 Add the following italicized words describing documentation required by the PIC within 24 hours of flight. "Also, the PIC is required to update the CAMP computer system flight data to include: a) flight time and associated data such as approaches, landings, etc, b) fuel purchase costs, and c) handling fees and other associated flight costs within 24 hours after a flight." Section 5.0.2 Replace existing words about mission management aircraft to the following: "Mission management flights conducted on the GSFC/WFF King air program support aircraft will be in accordance with NPR 7900.3 and are scheduled through the GSFC/WFF aircraft scheduling office." Section 5.2.4b Add the words "in CAMP." to the last line. The last line should now read, "The master manifest for missions is retained as a quality record in CAMP."
B	3/16/07	RRogers	Section 2.2.4 Added new section with an organization chart Section 3.3 Removed the words, “Copies of all documents are maintained in secure flight operations office files”. Section 2.2.3 Update section with the following new words, “ This Board is responsible for reviewing program support and research/development missions prior to flight. The Board is appointed by the mission manager or the Code 800 Director, if desired, for large high profile missions. The assigned Mission Manager, as well as other appropriate personnel presents to the Board. The FRR/MRR Board is responsible for determining and approving mission readiness. The minimum attendance criteria for readiness reviews shall include the appropriate disciplines needed to cover all aspects of aircraft modification or mission requirements. The minutes of this board are a Code 800 quality record.

C	10/15/10	G. Postell	Safety Management System (SMS) inclusions

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Section One: Introduction

1.0 Purpose and Scope

This Manual prescribes aircraft operations management policy, requirements and standards applicable to the operation of aircraft assigned to the NASA Goddard Space Flight Center's Wallops Flight Facility (GSFC's WFF). Mission Management aircraft are subject to procedures and rules contained in the NPR 7900 series of directives.

1.1 References

a. Federal Air Regulations (FAR), Part 91
b. GPR 8715.2, Aviation Safety Program
c. GPR 5100.2, Supplier Performance Records
d. NPR 8715.3, NASA Safety Manual
e. NPD 1280.1, NASA Management System Policy
f. NPD 7900.4, NASA Aircraft Operations Management
g. NPR 8621.1, NASA Procedural Requirements for Mishap and Close Call Reporting, Investigating, and Recordkeeping
h. NPR 7900.3A, Aircraft Operations Management

1.2 Related Directives

The following related sources of information are supplemental to this Manual:

a. GSFC Aircraft General Maintenance Manual (GMM) - This document describes the maintenance and inspection policy, requirements and standards for GSFC aircraft and related support equipment. It includes information on the technical library, tool control program, aviation life support equipment, logistics, quality control/assurance, and aircraft line services.

b. Aircraft Flight Manuals - Each aircraft flight manual contains specific operating information, procedures, instructions, and limitations for a particular aircraft model. Supplements to flight manuals are issued by the Aircraft Office to provide information on update changes to aircraft equipment and procedures.

c. Federal Air Regulations - Federal Aviation Regulation (FAR) Part 91 applies to operations of GSFC aircraft unless NASA regulations contain more stringent requirements or specifically exempt FAR Part 91 provisions, as applicable.

d. International Regulations - When operating in international or foreign national airspace, the rules and procedures established for that airspace shall apply.

e. WFF Airport Operations Manual - The Airport Operations Manual contains course rules and procedures applicable to aircraft operating at the WFF Airport and the Wallops Range.

f. GSFC Aviation Safety Program (ASP) – The GSFC Aviation Safety Program provides procedures and guidance relative to mishap prevention, planning, reporting, and investigations.

1.3 Definitions and Abbreviations

a. **Aircraft Maintenance** – The scheduled or unscheduled work on an aircraft that is required to attain and to sustain a state of airworthiness, and work that meets all required standards, practices, and guidelines for airworthiness.

b. **Aircraft Modification** – Any alteration, addition, or removal of aircraft structure, components, equipment, computer software, or primary instrumentation. Routine maintenance is excepted from this definition.

c. **Aircraft Operations** – A general term used to describe the operational phase of an aircraft's activity that normally commences with an aircraft's release for flight and terminates with its return to maintenance status. Aircrew training, functional check flights, and mission operations are considered subsets of aircraft operations. "Aircraft maintenance operations" is a general term used to describe non-flight maintenance activity.

d. **Aircraft Services Contractor** – The support services contractor providing aircraft services for the Wallops Flight Facility.

e. **Airworthiness** – The capability of an aircraft to be operated within a prescribed flight envelope in a safe manner.

f. **Civil Aircraft** – Aircraft other than public or military aircraft. Includes aircraft engaged in carrying persons or property for commercial purposes.

g. **Collaborative or Cooperative Partner -** provide functions to include aircraft services as specified under a Memoranda of Agreement or Cooperative Agreement.

h. **Configuration Control** – A process that ensures that changes in an aircraft configuration are controlled and in conformance with design drawings and specifications. Configuration changes to aircraft with an FAA airworthiness certificate must be in conformance with the FARs. Configuration changes to NASA research or program support aircraft must be in conformance with NASA specific directives of the NASA entity operating the aircraft.

i. **Contracting Officer's Technical Representative (COTR)** – An individual who serves as the primary technical representative for the contracting officer relative to a Government contract.

j. **Engineering Flight Check (ECF)** – A flight authorized by a NASA operations and safety directive for the purpose of validating engineering modifications to a NASA research or program support aircraft. The ECF is usually required following installation of project

equipment for a particular mission. Since the ECF validates predicted aircraft performance throughout the aircraft's operating envelope, as applicable, only essential aircraft operating and engineering personnel are permitted to be on board an ECF.

k. **Facility Operations Manager (FOM)** – This is a term used by NASA to designate an individual who is responsible for the safety and operation of a particular facility or building.

l. **Flight Mechanic (FM)** – A FM is a flight engineer who performs aircraft maintenance in addition to those duties normally associated with a flight engineer.

m. **Foreign Object Damage (FOD)** – FOD describes objects such as stones, debris, or birds that are foreign to normal operating conditions and that can cause damage to personnel and equipment in an aircraft environment. FOD control is a vital part of an aircraft maintenance safety program.

n. **Functional Check Flight (FCF)** – An FCF is synonymous with a post-maintenance check flight and has the expressed purpose of flight checking aircraft power plants and systems as required by the GSFC AMPM or another applicable maintenance manual.

o. **Goddard Procedural Requirements (GPR)** – A GPR is a GSFC-approved publication that provides procedures and guidelines on a particular subject. A GPR is issued in conformance with the Center's quality management system.

p. **Intercenter Aircraft Operations Panel (IAOP)** – The IAOP is composed of members from NASA centers that operate aircraft, representatives from the Aircraft Management Team (AMT), advisors from appropriate NASA centers, advisors from the Office of Safety and Mission Quality, and points of contact from the NASA Headquarters program offices. The IAOP provides NASA with aircraft advisory information and a standardized, functional peer review process for aircraft operations and maintenance.

q. **Material Safety Data Sheets (MSDS)** – MSDS describe material that has hazardous characteristics or that requires special or restricted handling.

r. **Mission Management Aircraft (MMA)** – MMA are those aircraft owned and operated by NASA to transport personnel for official business. These aircraft are sometimes referred to as administrative aircraft and are authorized by Congress for NASA to conduct mission management support. MMA are operated and maintained in accordance with the FAR.

s. **NASA-Controlled Aircraft** – Aircraft that are bought, borrowed, leased, bailed or otherwise procured or acquired, regardless of cost, from any source for the purpose of conducting NASA science, research, and/or other missions, and which are operated by NASA and/or whose operation is managed by NASA. Aircraft loaned by NASA to another agency/organization are not considered as NASA-controlled aircraft unless so stated by agreement.

t. **Nonconformance Report (NCR)** – A NCR is a structured reporting process within the Center's quality management system (QMS) that indicates a nonconformance with the QMS. A corrective action (CA) is required to eliminate a nonconformance.

u. **Operations and Safety Directive (OSD)** – An OSD is a GSFC/WFF document that describes and approves a research or program support operation or mission. An OSD is required for all aircraft missions except mission management aircraft missions and training or maintenance-related flights.

v. **Project Check Flight (PCF)** – A PCF is an initial project-related flight in a program support aircraft that is flown to check the functionality of project equipment. This flight is authorized in an OSD and is staffed with project personnel who operate and check project equipment.

w. **Public Aircraft** – An aircraft used only in the service of a government or political subdivision.

x. **Quality Assurance Evaluator (QAE)** – A QAE is a Government official who works for the COTR and CO in evaluating a contractor's quality performance.

1.4 Acronym List

A/C or ACFT	Aircraft
ACM	Additional Crewmember
AGSE	Aircraft Ground Support Equipment
ALSE	Aircraft Life Support Equipment
AMPM	Aircraft Maintenance Program Manual
AOM	Aircraft Operations Manual
ARB	Airworthiness Review Board
ASC	Aircraft Services Contractor
AT	Avionics Technician
CDR	Critical Design Review
CO	Contracting Officer
COB	Close of Business
COP	Copilot
COTR	Contracting Officer's Technical Representative
CTO	Control Tower Operator
ECF	Engineering Check Flight
ETA	Estimated Time of Arrival
ETR	Estimated Time of Return
FAA	Federal Aviation Administration
FAR	Federal Air Regulation
FCF	Functional Check Flight
FM	Flight Mechanic
FOD	Foreign Object Damage
FOM	Facility Operations Manager

GOV	Government Owned Vehicle
GPR	Goddard Procedural Requirements
GSFC	Goddard Space Flight Center
HAZMAT	Hazardous Materials
HQ	Headquarters
IAOP	Intercenter Aircraft Operations Panel
IAW	In accordance with
IMTE	Inspection, Measuring, Test Equipment
ISO	International Standards Organization
MC	Mission Capable
Mech	Aircraft Mechanic
MMA	Mission Management Aircraft
MS	Management System
MSDS	Material Safety Data Sheet
NA	Not Applicable
NASA	National Aeronautics and Space Administration
NCR	Nonconformance Report
NCW	Not complied with
NMC	Not Mission Capable
OJT	On-Job Training
OPCK	Operational Check
OPS	Operations
OSD	Operations and Safety Directive
OSHA	Occupational Safety and Health Act
PCF	Project Check Flight
PDR	Preliminary Design Review
PG	Procedures and Guidance
PIC	Pilot in Command
PSA	Program Support Aircraft
PWS	Performance Work Statement
QA	Quality Assurance
QAE	Quality Assurance Evaluator
QAP	Quality Assurance Plan
QASP	Quality Assurance Surveillance Plan
SIC	Second in Command
TDY	Temporary Duty
TIC	Third in Command
WFF	Wallops Flight Facility

Section Two: Policy, Authority, and Responsibilities

2.0 Policy

The operation of NASA aircraft is based on the concept that safety has the highest priority. Operations involving unwarranted risks will not be tolerated. The GSFC Aviation Safety Program and quality management systems practices are integral parts of GSFC aircraft operations.

2.0.1 It is NASA policy to ensure that all aircraft operations meet approved programmatic needs, are duly authorized, and are accomplished in airworthy aircraft by qualified flight crews.

2.0.2 Aircraft assigned to NASA GSFC's WFF are operated as public aircraft, as defined in Federal Aviation Regulations Part 1.1. NASA aircraft are classified by the following criteria, in accordance with NPR 7900 Aircraft Operations Management Manual:

a. Research and Development - Those aircraft used primarily for research and development in aeronautics, applications, atmospheric studies, and space-oriented programs.

b. Program Support - Those aircraft used primarily for direct support of NASA programs and projects including, but not limited to, such activities as astronaut space-flight readiness training, science applications, special-purpose cargo airlift, range surveillance, microgravity research, launch security, search and rescue, chase, support of tracking and remotely located sites, and pilot proficiency, including cross-country. (GSFC's WFF normally operates aircraft in this category.)

c. Mission Management - Those aircraft used primarily for transporting NASA senior management and staff personnel.

d. Inactive - Those aircraft in a non-operational status with potential for future use or awaiting disposition; on loan from NASA; or used for spare parts.

Other uses of NASA aircraft include training, maintenance, ferry, and emergency or humanitarian flights.

Research/development and program support flights are conducted in accordance with GSFC approved operations and safety directives.

Mission management flights are scheduled through the GSFC Mission Management Aircraft Scheduling Office, and are conducted in compliance with the NASA Aircraft Operations Management Manual, NPR 7900 Chapter 3.

GSFC aircraft shall normally be commanded by a NASA designated pilot. NASA designated pilots are those who perform pilot duties as a condition of NASA employment, fulfill NASA contract requirements, or are utilized in accordance with an interagency agreement. Demonstration, evaluation, or training flights involving non-NASA pilots will be documented and approved through the Chief, Aircraft Office.

2.1 Authority

2.1.1 Management Authority. GSFC aircraft may be flown only as authorized by the Center Director or his designated representative. This authority is delegated to the Director of Suborbital Projects and Operations and also through the Director of Management Operations for mission management flights.

2.1.2 Operational Authority. The Assistant Director for Project Support, Suborbital Projects and Operations Directorate, approves research and program support aircraft operational and safety directives. The Chief, Aircraft Office, is delegated daily operating authority for GSFC assigned aircraft.

2.2 Flight Management Responsibilities

2.2.1 Aircraft Office (AO)/830. The AO provides for operations and maintenance of assigned aircraft support equipment. The AO also provides for aviation safety, project support, and advisory information on aeronautics. The AO approves assigned aircraft modifications and aircraft missions. It represents GSFC on the Intercenter Aircraft Operations Panel and provides for technical surveillance and evaluation of the Center's aircraft services contracts, collaborative and cooperative partners.

a Operations Manager/Quality Assurance Evaluator (QAE)/830. Manages and provides for flight operations quality assurance through monitoring and evaluation of flight crew training, proficiency, and mission operations. Represents the Center on intercenter aircraft operations and safety panels, as delegated; coordinates aircraft operations with other organizations, as required; Technically monitors and evaluates the performance of contracts. Technically manages government functions associated with aircraft maintenance and logistics. Provides technical expertise on maintenance, inspection, modification and overhaul of assigned aircraft; provides for line support of aircraft and unmanned aerial vehicles.

b. Aviation Safety Officer/Quality Assurance Evaluator (QAE)/830. The aviation safety officer (ASO) is responsible for duties specified in the GSFC Aviation Safety Program. The ASO provides aviation safety oversight and assistance to line management, and coordinates aviation safety matters with interfacing organizations. The ASO is a member of the Airworthiness Review Board, Mission Scheduling Review Board, and the Flight Standardization Review Board. The ASO is required to be an active pilot and serves as a QAE for aviation safety.

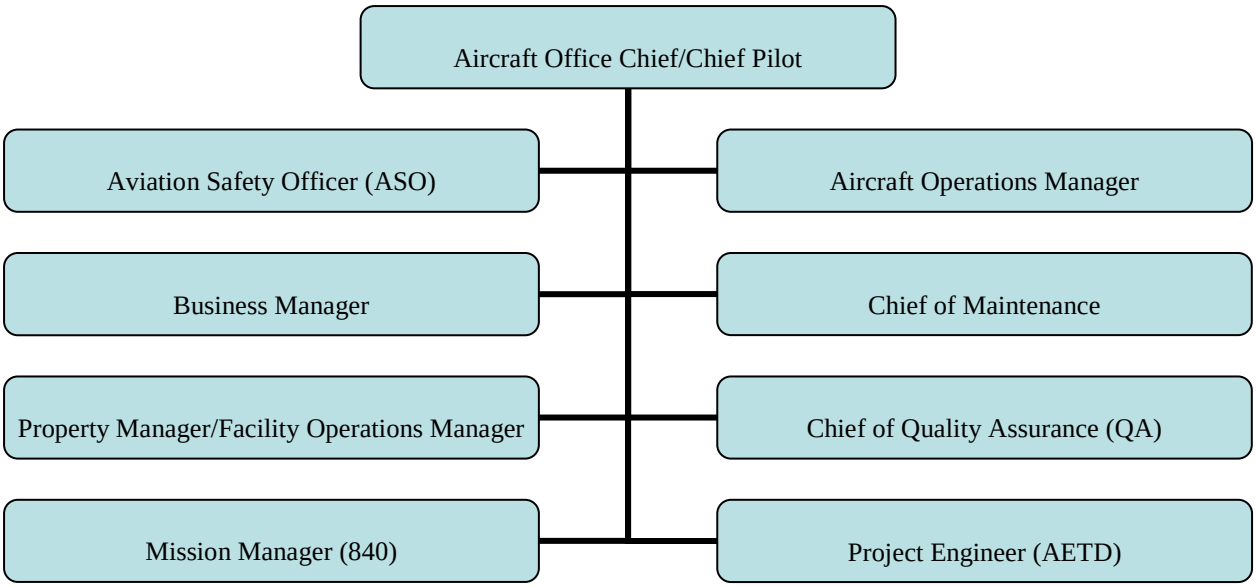
c. Business Manager (QAE/830). The Business Manager is responsible to interact with the AO Resource Analyst in ensuring all financial aspects of the flight operation are properly managed and documented, including all reporting requirements.

d. Property Manager/Facility Operations Manager (QAE/830) is responsible for compliance with all property regulations regarding AO property both on and off site. As Facility Operations Manager, he/she is responsible for all facility related activities.

2.2.2 Mission Manager/Range and Mission Management Office/840 Aircraft mission support is provided by Code 840 and the Aircraft Services Contractors (ASC). Mission managers are responsible for the coordination and management of aircraft projects. Mission managers work with project, operations, maintenance, and facilities personnel in support of aircraft missions. They are responsible for the initiation and development of operations and safety directives for their missions, as well as arranging and presenting flight readiness reviews. Mission managers normally deploy with their assigned mission when operating away from home base; however, when missions are not complex, a pilot-in-command may be assigned as the deployed mission manager with the approval of the Chief, Aircraft Office.

2.2.3 Project Engineer/Applied Engineering and Technology Directorate (AETD)/500 Project engineers are assigned to projects that involve aircraft engineering requirements. Project engineers from other organizations that provide aircraft engineering services comply with AETD processes and procedures. Project engineers are responsible for engineering assignments including the initiation and development of related operations and safety directives which detail test flight requirements. Prior to flight, project engineers arrange and present airworthiness and flight readiness reviews, when required, and they work closely with assigned functional check or project pilots prior to, and during flight test operations.

2.2.4 Organization Chart



2.3 Flight Board Responsibilities

2.3.1 Scheduling Review Board (SRB). The SRB consists of operations, maintenance, quality assurance, and safety officials from within the Aircraft Office and ASC organizations. The SRB approves or disapproves project support aircraft (PSA) scheduling based upon the capability and capacity of the Aircraft Office to accommodate scheduling requests. Aircraft project personnel from Code 840 present scheduling requests to this board. The minutes of this board are a Code 830 quality record.

2.3.2 Airworthiness Review Board (ARB). The ARB is a board appointed by the Code 800 Director and is responsible for approving aircraft modifications. The Board is composed of the GSFC Aviation Safety Officer and mechanical, electrical, and aeronautical engineers, one of which is designated Chairman. The Board is convened at the request of the sponsoring project/mission manager, and is attended by cognizant Government and contractor management, operations and maintenance officials. The assigned project manager presents airworthiness matters to the Board. Consultants and additional personnel may be assigned to Board proceedings.

2.3.3 Flight/Mission Readiness Review (FRR/MRR) Board. This Board is responsible for reviewing program support and research/development missions prior to flight. The Board is appointed by the mission manager or the Code 800 Director, if desired, for large high profile missions. The assigned Mission Manager, as well as other appropriate personnel presents to the Board. The FRR/MRR Board is responsible for determining and approving mission readiness. The minimum attendance criteria for readiness reviews shall include the appropriate disciplines needed to cover all aspects of aircraft modification or mission requirements. The minutes of this board are a Code 800 quality record.

2.3.4 Flight Standardization Review Board (FSRB). The FSRB is responsible for standardizing flight crew procedures. The Board is composed of the Chief, Aircraft

Office, the QAE Operations, Aviation Safety Officer, the ASC manager, and designated representatives. The minutes of the FSRB are a Code 830 quality record.

2.4 Flight Crew Responsibilities

2.4.1 Pilots-in-Command (PIC). A PIC, when assigned to a flight, is responsible for the safety, security, and proper operation of the aircraft. Command responsibility includes compliance with all preflight, in-flight, and post flight requirements, as set forth in this Manual, and related publications. A PIC shall ensure the safety and well-being of onboard personnel and work with mission managers and project engineers in meeting project requirements. It is the responsibility of the PIC to meet project requirements, as described within operations and safety directives, unless the PIC considers the requirements unsafe or improper based on existing conditions. Command of a flight or mission shall not be transferred prior to its completion unless approved by cognizant authority, or unless the PIC becomes incapacitated or impaired, necessitating assumption of command by the assigned senior copilot.

2.4.2 Copilots (CP). Copilots are assigned to flights as Second-in-Command or Third-in-Command on augmented crews. As such, they are responsible for carrying out normal copilot functions in addition to specific instructions issued by the PIC. Copilots are responsible for understanding the flight plan, the maintenance status of their assigned aircraft, and they shall normally operate communications and navigation equipment. Copilots who are qualified as First Pilots may control the aircraft from either the left or right seat with passengers or project personnel onboard at the discretion of the PIC. Copilots who are qualified as Second Pilots may control an aircraft during the cruise regime from the right seat on missions with passengers or project personnel onboard at the discretion of the PIC. A Second Pilot may not normally make takeoffs or landings from either seat with passengers or project personnel onboard. Copilots are responsible for assisting the PIC at all times and for serving as a backup safety pilot. As such, they shall be trained to temporarily assume the duties of a PIC should the PIC become incapacitated or seriously impaired.

2.4.3 Flight Mechanics (FM). FMs are responsible to the PIC for aircraft preflight and post flight inspections, servicing, weight and balance, systems operation, and procedures. FMs are responsible for keeping the PIC informed on the mechanical condition of the aircraft and for performing maintenance and related troubleshooting. During ground operations, FMs represent the PIC in supervising ground support and security measures. The senior FM is responsible for supervising assigned maintenance flight crewmembers in support of maintenance requirements.

2.4.4 Avionics Technicians (AT). When assigned to a flight or mission, an AT is responsible for providing avionics support during ground and flight operations. As flight crewmembers, ATs are responsible for assigned procedures as well as technical assistance in the operation and maintenance of aircraft avionics equipment. ATs advise flight and project crewmembers on aircraft-project equipment electrical interfaces and

provide assistance, as required. They report to the senior FM for aircraft systems and maintenance support.

2.4.5 Additional Crewmember (ACM). ACMs are assigned to specific flights where project personnel loading exceeds 10. ACMs function as flight attendants/safety observers, and are responsible to the PIC for aircraft cabin normal and emergency procedures and related duties. The ACM is normally an aircraft mechanic who is available to assist with maintenance when deployed. When an aircraft mechanic is not specifically required as an ACM, a third pilot, a second flight mechanic, an avionics technician, or a Mission Manager (MM) may be assigned duties as an additional crewmember with commensurate responsibility for cabin normal and emergency procedures and related duties. The additional pilot, FM, AT, or MM may be designated as under training (UT), provided ACM qualification standard is complete.

2.4.6 Instructor Flight Crewmembers (IFC). Instructors are responsible for providing ground and flight instruction for designated aircraft and flight crew positions in accordance with established procedures and policy. When assigned to a flight in an instructor capacity, the instructor pilot shall sign for the aircraft and be responsible for its safe and proper operation. Instructor Flight Mechanics/Avionics Technicians who are assigned to instruct on a particular flight are responsible for the safe and proper operations of their respective positions.

2.4.7 Proficiency Flight Examiners (PFE). PFE designees are responsible for examining, evaluating, and instructing airmen in designated aircraft and flight crew positions. A PFE is responsible for maintaining and enforcing a high state of knowledge and proficiency in assigned areas of responsibility and to uphold established flight standards. When assigned to a flight as a PFE, the PFE signs for the aircraft and is responsible for its safe and proper operation. Government contract technical officials functioning as Quality Assurance Evaluators (QAE) retain the option of signing for an aircraft acceptance.

2.4.8 Functional Check Pilots (FCP). A FCP is responsible for performing post-maintenance or post-modification flight checks. Normally, a QAE is assigned as the FCP or copilot on functional checks. Due to the potential for abnormalities during functional check flights, only the most qualified airmen are selected for this designation. Responsibilities include attainment of thorough knowledge and understanding of aircraft systems, procedures, and performance characteristics. A FCP is responsible for understanding the work performed prior to flight, for reviewing maintenance and modification documentation, for close liaison with maintenance and quality control personnel, and for a detailed preflight and post flight inspection. The FCP receives a thorough preflight briefing from maintenance and quality personnel prior to a functional check flight (FCF). An FCF checklist is to be used for the conduct of the flight.

2.4.9 Mission Manager (MM). A MM is a Project Manager trained to function as a crew member with safety of flight responsibilities; Responsibilities include attainment of thorough knowledge and understanding of aircraft systems, procedures, and emergency procedures.

Section Three: Crew Qualification, Training, and Currency

3.0 General

Prior to assigning crewmembers on NASA GSFC aircraft, the requirements of this chapter must be accomplished; the crewmember must be designated in writing for his/her crew position; and all required training must be documented in the individual's training file. All crew must be familiar with this document, which contains mandatory standard operation procedures (SOP) to be implemented on all Wallops aircraft. All crew are to be trained in the use of this manual, and tested annually. A copy of this manual must be on board the aircraft.

Flight crewmembers who are not qualified in their respective positions but who are assigned to a flight for qualification are designated "under training" (UT) and, therefore, must be accompanied by an instructor or evaluator for that position. Crewmembers "under training" must meet ground training requirements prior to flight training.

3.1 Prerequisite Qualifications

Before being designated to crew positions, personnel must satisfy the following prerequisite qualifications:

a. **All Pilots** Possess an FAA First Class Medical certificate issued within the past 12 months by a NASA or FAA approved medical examiner.

b. **Pilots-in-Command**
   (1) Possess an FAA Airline Transport Pilot (ATP) Certificate and FCC Restricted Radiotelephone Operator Permit.

   (2) Possess an FAA ATP Type Rating in assigned aircraft, as applicable. In lieu of a Type Rating, a NASA/GSFC administered flight check may be approved by the Chief, Aircraft Office.

   (3) Shall have been a designated pilot for at least 5 years, and must meet the following minimum flight experience requirements:
      (a) 2,500 pilot hours (500 multiengine)
      (b) 200 pilot hours in type
      (c) 200 instrument pilot hours (100 actual)
      (d) 100 night pilot hours

Note: In exceptional circumstances, the 2500 pilot hour requirement may be reduced to 1500 pilot hours. The 200 pilot hours in-type requirement may be reduced if the pilot is qualified in a similar type. Justification for exceptions must be submitted to the Chief, Aircraft Office for approval.

c. **Copilots**
   (1) General - Shall have a minimum of 700 total pilot hours, 100 instrument hours, 50 night hours.

(2) First Pilots
(a) Possess an FAA Commercial Pilot Certificate with appropriate category, class and instrument rating and an FCC Restricted Radio-telephone Operator Permit.
(b) Have flown at least 50 hours in type.

(3) Second Pilots
(a) Possess an FAA Commercial Pilot Certificate with appropriate category, class, and instrument rating; and an FCC Restricted Radiotelephone Operator Permit.
(b) Have flown at least 10 hours in type, 8 of which may be in approved simulator.

d. **Flight Examiners** Proficiency flight examiners will be selected from highly qualified instructors who have demonstrated the skill, maturity, and temperament to perform evaluator duties. The organizational chief pilot functions as the chief flight examiner and may designate subordinate examiners.

e. **Instructor Pilots** Instructor pilots will be selected by the chief pilot from highly qualified PICs who have demonstrated the skill, maturity, and temperament to perform instructor duties.

f. **Lead Pilots** Lead pilots are those selected by the organizational chief pilot to function as the senior pilot for a particular aircraft. The lead pilot is responsible to the chief pilot for specific duties associated with a type of aircraft. These duties may include enforcement of proficiency and standardization, as well as special liaison with maintenance and project personnel. Monitoring the condition of the aircraft and aircraft publications is normally an assigned duty.

g. **Flight Mechanic (FM)**
(1) If FM is used to sign off maintenance actions, the FM shall possess an FAA Airframe and Power plant (A&P) Certificate or an equivalent qualification from the U.S. Armed Forces, which is subject to the approval of the ASC and Government QAE personnel. In lieu of the foregoing requirements, commensurate qualifications and background may be approved by NASA and contract officials.

(2) Possess an FAA Flight Engineer Certificate with an appropriate rating for assigned aircraft or an equivalent qualification from the U. S. Armed Forces.

(3) Possess a current FAA Second Class Medical Certificate or a current equivalent qualification from the U. S. Armed Forces.

(4) Shall have a minimum of 100 FE/FM hours in type which may include simulator hours.

h. **Flight Mechanic Instructor (FMI)/Evaluator (FME)/Lead Flight Mechanic (LFM)** A FMI shall be an experienced and qualified individual who has demonstrated the skill, maturity, and temperament to perform instructor duties as determined by the chief flight mechanic. A FME is an exceptionally experienced individual who is qualified to perform evaluator duties. A LFM is assigned as the lead flight mechanic for a particular aircraft.

i. Avionics Technician (AT)
(1) Possess an FCC General Radio Telephone Operators License.

(2) Possess a current FAA Third Class Medical or an equivalent issued by a FAA med.

(3) Shall be qualified to operate and maintain aircraft electronic equipment, and be qualified in aircraft cabin normal and emergency procedures.

j. **Mission Managers (MM)/Project Coordinator (PC) and Additional Crewmember (ACM)** Mission Managers are normally designated after functioning for at least one year on field campaigns involving flight hardware such as rockets or balloons.
(1) Possess a current FAA Third Class Medical Certificate or the equivalent issued by an FAA examiner.

(2) Shall be qualified in aircraft cabin normal and emergency procedures.

k. Project Crewmembers Project personnel scheduled to fly aboard GSFC aircraft shall receive safety-related indoctrination training from the assigned pilot-in-command prior to flight. The Program Support Aircraft Project Personnel Briefing Checklist shown in Appendix A of this Manual shall be utilized as a quality record for all briefings.

3.2 Training

Aircraft training of crewmembers is intended to ensure that each crewmember is prepared to perform assigned duties safely and proficiently. To enhance the overall training effort, monthly aircrew meetings are conducted for training and standardization purposes. Minutes of these meetings are quality records.

3.3 Training Documentation

Training files will be maintained for each flight crewmember. These files will contain all documentation pertaining to crew qualification and training. Original documents are processed through the NASA and contract flight management offices and are maintained by individual crewmembers in their training files. Training files will contain the following minimum documentation:

a. Qualifications File will contain certificates of professional and medical qualification, including copies of crewmember licenses, and the letter designating the individual to a current crew position.

b. Ground Training File will contain a list of all ground training accomplishments, including simulator training, showing dates, location, and amount of training. A record of training must be maintained for the past 3 calendar years.

c. Flight Training All flight training will meet requirements as set forth in NPR 7900, This training will include: initial and annual aircraft type and systems training to include

emergency procedures, aircraft surface contamination training, and dangerous goods training for flight crew members and cabin crew members. Periodic first aid training will be conducted for crew members, and cabin crew members. Self training for schedulers will be conducted and tested annually via the AOM annual exam.

File will contain a record of all flight training and evaluations for the past 3 calendar years.

A system must be in place to record licensing, training and qualifications information for each person who is required to receive training and said systems must meet the IS-BAO requirements. Electronic records must include procedures in place to protect the system integrity and for verification of the records.

Refer to Paragraph 4.2 for additional flight time documentation requirements.

3.4 Ground Training

3.4.1 Survival, Physiology and First Aid (SPFA) Training. Each flight crewmember shall receive SPFA training before initial designation and every 5 years, thereafter. This training shall consist of basic SPFA training and be supplemented by hands-on training with specific equipment and conditions associated with assigned aircraft. Project crewmembers receive survival, physiology and other safety related training prior to mission assignments by the assigned pilot-in-command as described on the GSFC/WFF Program Support Aircraft Project Personnel Briefing Checklist.

3.4.2 Aircraft Systems Training. Each crewmember shall receive instruction on systems and procedures in assigned aircraft, as applicable, to the individual's crew position.

a. Initial Training. Prior to initial designation, each flight crewmember shall receive qualification training for their respective crew position. Completion of a systems and procedures examination is required prior to flight training for pilots and flight mechanics.

b. Refresher Training. Flight crewmembers shall receive refresher training in their respective positions on a annual basis. An annual systems and procedures examination is administered and evaluated as part of the refresher training and re-qualification package for pilots and flight mechanics. For pilots flying internationally, international training is required every three years.

3.4.3 Pilot Instrument Examination. Prior to initial designation and annually thereafter, a pilot written instrument examination shall be administered to each pilot. The examination shall be graded and made part of a pilot's qualification file.

3.4.4 Aircraft Operations Manual Examination. Prior to initial designation and annually thereafter, an examination shall be administered to pilots on the content of this Manual,

the NASA Aircraft Operations Management Manual (NPG 7900.3A), and the WFF Airport Operations Manual. This examination shall be graded and made a part of a pilot's qualification file. The instrument and aircraft operations manual examination may be combined into one test.

A training library, which contains a wide variety of training publications and audio-video tapes, is available to flight crewmembers. The library is maintained by the ASC.

3.5 Flight Training

Flight training is designed to provide the crewmember with hands-on experience under controlled conditions. Flight training shall normally be conducted under the supervision of a NASA designated flight examiner or instructor; however, military and contract training may be used, as required. Only designated flight examiners are permitted to conduct flight evaluations. Because of the safety and efficiency provided by aircraft simulators, optimum use shall be made of these facilities to satisfy training requirements. Simulated emergency or abnormal situations in flight with passengers on board are prohibited. The records associated with aircrew training and qualification are summarized in the Addendum to this Manual.

Passengers and non-essential crewmembers are not permitted aboard training and currency flights.

During training and evaluation flights, an engine failure may be simulated by setting zero thrust. One engine or propeller may be secured for training purposes with the intention of air starting the engine, providing the aircraft's altitude is above 1500 ft. AGL for four engine aircraft and above 3000 ft. AGL for twin engine aircraft. Aircraft training, which involves simulated system failures, shall be conducted under day-VFR conditions. Currency flights that do not involve training may be conducted under IFR or night conditions. Practice stalls and spins shall be performed in accordance with respective aircraft flight manuals.

3.5.1 Initial Pilot Training Prior to initial designation in an assigned aircraft, each pilot shall complete an FAA approved initial training syllabus, if available, for the prospective aircraft and position assignment. If an FAA approved course is not available, an equivalent military course is acceptable. As a minimum, an initial syllabus shall consist of: ground school (30 hrs. minimum); simulator, if available, (12 hrs. minimum); and flight training (3 hrs. minimum with simulator; 8 hrs. minimum without simulator).

3.5.2 Refresher Pilot Training Pilots train annually (either in the aircraft or flight simulator). Scheduling of training may be flexible so as to optimize proficiency with operational assignments.

Note: When aircraft are not available for flight or if crewmembers are not needed, refresher training may be delayed until required.

FAA or military approved refresher courses are preferred, when available. As a minimum, refresher training will consist of training in the aircraft or simulator. Aircraft

and simulator training will be preceded by at least 4 hours of interactive ground school to include aircraft systems, as well as normal, emergency, and egress procedures. Flight training shall consist of a dedicated training flight of at least 1.5 hours duration and shall include those events listed on the pilot training form (NASA WI-1170). Simulator training shall consist of a minimum of 4 hours simulator time preceded by 4 hours of ground school.

3.5.3 FM, AT, and ACM Training Prior to initial designation in a particular aircraft, each FM, AT, and ACM will complete a specific training syllabus. The length of the syllabus may be adjusted, depending on crewmember experience and adaptability. Refresher qualification training will be provided on an annual basis for each assigned aircraft. Training qualification standards and forms are described in this Section. Initial and recurrent Emergency Procedures training programs per SMS Standard 5.3.1 for all aircraft crew members received are required to include:

a. fire in the air and ground, use of fire extinguishers, operations/use of emergency exits, passenger preparation for landing and ditching, emergency evacuation procedures, doning/inflation of life preservers, the deployment of rafts, pilot incapacitation, unlawful interference, bomb threat, and other security procedures. All aircrew shall receive patient evacuation training during MEDEVAC and passenger health emergencies. All cabin and crew members shall receive annual Safety Procedures training.

3.5.4 Mission Manager /Project Coordinator Training Mission managers and project coordinators assigned to aircraft missions receive safety-related training in aircraft cabin normal and emergency procedures on an annual basis and prior to assigned missions. Training qualification standards are described in this Section.

3.5.5 Maintenance Training. The aircraft support services contractor shall establish and maintain a training program that ensures that the company maintenance personnel have the knowledge and skills appropriate to the level of maintenance performed. Training requirements are specified in the General Maintenance Manual. The training program shall include both initial and recurrent training appropriate to the aircraft group, type or system and the related procedures for which maintenance is conducted and a maintenance release is to be signed. Maintenance personnel, dispatchers, and others shall receive CRM/Human Factors training.

3.5.6 International Training. PIC for international flights shall complete international training annually.

3.6 Overdue Training

Refresher training will be considered overdue if not completed within 1 month following the specified due month. Crewmembers who are overdue training will not be used as required crewmembers until the training is completed.

3.7 Currency (Recent Experience) Requirements

To ensure that all flight crewmembers have the opportunity to exercise their aeronautical skills and, thereby, maintain the proficiency level to which they have been trained, the following

minimum currency requirements are established for program support aircraft. (Mission management aircraft currency requirements are delineated in NPG 7900.3)

3.7.1 Pilots - Tables 3-1, 3-2, and 3-3 set forth currency requirements:

Table 3-1 - Single Aircraft Currency Requirements (Fixed Wing)

Requirement	**PIC**	**First Pilot**	**Second Pilot**
Previous 90 days (In type)			
Pilot/Copilot Hours	40	30	20
Instrument Hours	3	3	2
Instrument Approaches	3	3	2
Landings (Total)	6	6	2
Landings (Night)	3	3	1

Table 3-2 Multiple Aircraft Currency Requirements (Fixed Wing)

Requirement	**PIC**		**First Pilot**		**Second Pilot**	
	All Types	**In Type**	**All Types**	**In Type**	**All Types**	**In Type**
Previous 90 days						
Pilot/Copilot Hours	40	1	30	1	20	1
Instrument Hours	3	1	3	1	2	-
Instrument Approaches	3	1	3	1	2	-
Landings (Total)	6	3	6	3	2	1
Landings (Night)	3	-	3	-	1	-

Notes:
(1) Requirements under "All Types"' apply to all aircraft. Total "Pilot/Copilot Hours" may include simulator hours. Instrument hours, night hours, approaches, and landings may be accomplished in an approved visual motion simulator.

(2) To maintain currency, Flight Mechanics must have flown at least 10 total hours and 2 hours in type each calendar quarter, or they will be accompanied by a current Flight Mechanic. Simulator time may be credited toward this total. A Flight Mechanic may regain currency by satisfactorily passing a refresher training re-qualification check.

3.8 Overdue Currency Requirements

The following requirements apply to pilots who are overdue the currency provisions of paragraph 3.7:

3.8.1 Total Pilot Hours Pilots-in-command and copilots who do not meet the 90 day total hour requirements, but are otherwise current, will increase all instrument approach minimums by 200 feet and 1/2 mile visibility (or the Runway Visual Range equivalent) but in no case may the minimum be less than 400 foot ceiling and 3/4 mile visibility.

3.8.2 Step-Down Qualification Pilots-in-command or First Pilots who fail to meet the requirements of paragraph 3.7 may revert to First Pilot or Second Pilot status, if current in that position, until respective currency requirements are satisfied.

3.8.3 Multiple Currency Pilots flying multiple types of aircraft who satisfy all the multiple currency requirements (all types) may satisfy the in-type currency requirement, except night requirements, by flying a training flight with a flight instructor or examiner pilot. This training flight must include a minimum of two instrument approaches, two takeoffs, and two landings in the deficient type aircraft.

3.8.4 Night and Instrument Currency Pilots not meeting the night or instrument currency requirements of paragraph 3.7 will not conduct night landings or instrument flight with project crewmembers or passengers but may otherwise be utilized under day or VFR conditions until these requirements are satisfied.

3.8.5 Disqualification Flight crewmembers delinquent in any currency requirement, except as modified above, are disqualified for flights carrying project crewmembers or passengers. Disqualification through a 90 day period requires re-qualification in items deficient or a proficiency flight check with a flight examiner. Disqualification over 3 months requires retraining, in accordance with paragraphs 3.4 and 3.5, and a formal flight evaluation by a PFE. Currency (recent experience) is reestablished by satisfactorily passing a proficiency flight check.

3.9 Evaluation

The intent of flight crew evaluations is to objectively evaluate aircrew performance and, thereby, measure the effectiveness of our training program. Designated flight examiners will administer all flight checks.

3.9.1 Proficiency Prior to being designated in their crew position, and annually thereafter, flight crewmembers must complete a proficiency evaluation flight conducted by a designated flight examiner. This proficiency evaluation normally occurs coincident with an annual training period. Pilots will train annually and designate it as a proficiency evaluation. When maintaining qualifications in more than one type aircraft, a proficiency evaluation flight in each type aircraft is required annually. When variant models exist within a particular type aircraft, "differences training" and proficiency will be conducted. Except for an initial check, pilot and flight mechanic proficiency checks may be performed in an approved simulator by a designated examiner. FAA ATP and FE practical test standards are used as proficiency standards for pilots-in-command and flight mechanics. Pilot and flight engineer standards for military aircraft are contained in the evaluation chapter of applicable flight manuals.

3.9.2 Documentation The flight training and qualification forms illustrated in this section shall be used to document the training and qualification of civil service and contract personnel. Simulator forms from training vendors, complement the enclosed forms. Forms shall be submitted within 48 hours of flight completion. Form WI-1170 is also used to document planned flight training and is filed by instructors/examiners with the aircraft operations office prior to flight. Following flight and form completion including sign-off, the original is filed in the individual's training file with copies retained in the NASA and contract files, as applicable. Proficiency examiners are required to thoroughly describe flight events in the remarks section of each form and provide recommendations, as appropriate. A Flight Crew Authorization Letter is issued before new qualifications become effective.

3.9.3 Overdue Flight Checks Flight checks will be considered overdue if not completed within 1 month of the specified due month. Flight crewmembers overdue proficiency checks will be scheduled only on training flights with a qualified examiner.

3.9.4 Multiple Aircraft Qualification Limitations Pilots assigned to GSFC, fly aircraft of various categories, classes, and types, depending on experience and qualifications. Line pilots are limited to maintaining currency in three aircraft types in the capacity of PIC. Proficiency Flight Examiners may exceed this limit.

3.10 Standardization

Standardization of procedures among aircraft and aircrews are promoted and approved by the Flight Standardization Review Board (FSRB) and are enforced by PFE, IFE, and lead personnel. Standardization of procedures is considered as particularly valuable when operating multiple types of aircraft with multiple crews. Therefore, a policy of optimizing standardization is fostered. FSRB minutes are a quality record of Board proceedings.

3.11 Crew Resource Management (CRM)

The optimum utilization of flight crewmembers and flight equipment resources by Pilots-in-Command shall be a training and qualification priority. Command effectiveness in managing resources is always important; however, it is critically important during abnormal or emergency conditions when normal positional responsibilities become more demanding. Training will focus on disciplined checklist management of normal and emergency procedures and the preclusion of disproportionate attention with any one event. CRM/Human factors training is required annually for aircrew, maintenance personnel, and dispatchers.

3.12 Avionics Technician (AT) and Additional Crewmember (ACM) Aircrew Position Training and Qualification Standards

3.12.1 **Normal Procedures**

a. Door and Hatch Operation AT and ACM personnel must have the ability to responsively operate all aircraft doors and hatches.

b. External Power/APU: ACM and AT personnel must be familiar with the operation of each and know associated normal and emergency procedures.

c. Project Power/UPS: AT personnel should be thoroughly familiar with component locations, circuit protection, operation, and troubleshooting. AT and ACM personnel should be aware of the flight station master switch and UPS locations, and should be able to recognize normal output from meter readings.

d. Preflight and Servicing Support: AT personnel must be trained in preflight communication and navigation equipment and provide troubleshooting and repair assistance, as required, with aircraft avionics including project power. ACM personnel assist the FM, as directed and in accordance with level of experience .

e. Test and Operation of Avionics Equipment: AT personnel preflight and operate COM/NAV equipment, including the programming of special navigation units, as required. Initial checks normally require a flight with a supervisory AT.

f. Engine Start Support: AT and ACM personnel provide line and cabin monitoring of engine start, as required, and when required by the FM. The FM briefs AT and ACM personnel on specific duties, as applicable. Observation for safe clearance of engines, use of ICS and hand signals, and awareness for abnormal smoke, flames, and fluid loss are typical requirements.

g. Intercommunication System (ICS) Operation: Since an ICS is the primary means of inter aircraft communications, all crewmembers must be knowledgeable of various ICS features and be able to assist project personnel in its use.

h. Passenger and Crew Brief: Be familiar with normal and emergency equipment and procedures briefs by the PIC so that questions from passengers can be properly answered.

i. In-flight Under floor Activity Policy: Such activity must be approved by the PIC and be considered "mission essential." If this activity is in the vicinity of an open or glass port, individuals will be tethered by a safety belt. Supplemental oxygen will be readily available at altitudes above 12,000 feet.

j. Taxi: Ensure that cabin equipment and personnel are secure for takeoff. Remain in communication with the flight station and report any unusually significant observations.

k. Takeoff: Remain in communication with flight station and be prepared to follow flight station directions in the event of an emergency. Report any unusual observations or occurrences that would affect flight safety. Be aware that non-secure objects may become dislodged during takeoff.

l. Cabin and Wing Check: Be able to conduct a cabin and wing check when requested by the flight station. Be aware of what to look for such as fluid leaks, smoke, or life raft dislodgment.

m. Descent: Be prepared to wake sleeping personnel due to pressure changes and oversee pre-landing preparations.

n. Before Landing: Ensure cabin is prepared for landing and report same to PIC. Report post-landing support requirements if not previously reported.

o. After Landing: Ensure that cabin personnel remain seated while aircraft is moving.

p. Security: Be sensitive to aircraft security measures. Strangers (non-crew personnel) must be identified and escorted. Only authorized individuals are permitted onboard.

Contents of packages must be verified. Work with PIC and FE to ensure aircraft is secure when left unattended.

3.12.2 **Emergency Procedures**

Evaluators are urged to use these standards as a minimum criteria and apply hands on training techniques.

a. Alternate Door Operation: Be able to open doors by alternate methods. ACM personnel should be knowledgeable of the operation of all doors and hatches.

b. Escape Rope/Slide: Be knowledgeable of escape rope locations and how to use them. Be able to attach and deploy a pneumatic slide.

c. Cabin Oxygen Systems: Be familiar with the use and limitations of aircraft oxygen systems.

d. Portable Oxygen Systems: Be able to use and instruct the use of portable oxygen systems; i.e., walk-around bottles with smoke masks, walk-around bottles with normal (first aid) mask, and oxygen hoods. Know how to unpackage and don oxygen hoods. Know applicability and limitation of each portable system.

e. Land-Water Evacuation: Be familiar with how to egress an aircraft cabin during an emergency evacuation on land, with emphasis on night operations. Be prepared to follow flight station directions on which side of aircraft to egress and assist with evacuation. Be familiar with preplanned ditching assignments. Be familiar with aircraft exits that are suitable for water ditching. Be sensitive to flight station directions and the need to remain secure until the aircraft has settled on the water. Be prepared to assist with evacuation.

f. Flotation Equipment: Be familiar with the equipment and use of flotation vests and rafts, including raft accessory kits. Know where flotation equipment is located and how to deploy rafts.

g. Anti-Exposure Suits: Be familiar with donning anti-exposure suits, and be prepared to assist others.

h. Survival Kits: Be familiar with arctic/jungle/desert survival kits when carried on specific missions. Know their appearance, location, and general contents.

i. Signal Kit/ELT: Know the location and contents of the emergency signal kit. Know the location and features of portable ELT units.

j. First Aid Kit: Be familiar with the location and contents of first aid kits. Be prepared to assist others with basic first aid.

k. Fire Fighting: Be familiar with the location of fire extinguishers, protective gloves, crash axes, and portable oxygen/smoke mask combos. Be familiar with the use of extinguishers and hazards associated with their use.

l. Fuselage Fire/Smoke Removal: Be prepared to assist passengers and the flight station during this emergency procedure which may involve donning of oxygen equipment and fighting internal fires under the direction of the PIC and FM.

m. Fire of Unknown Origin: Be prepared to assist flight station in determining origin of unknown smoke and fumes. Origin might be associated with project or aircraft electrical/air conditioning equipment. Be prepared to function without normal electrical power and ICS.

n. Hydraulic System Support: Be familiar with hydraulic system components located in the aircraft cabin, including reservoir gages. Be aware of hazards associated with high pressure leaks and be able to recognize atomized mist resulting from high pressure leak. Report any anomalies to the flight station, and be able to provide normal ops reports.

o. Depressurization: Be able to recognize an explosive and rapid decompression and, thus, be able to don oxygen, assisting others, and follow flight station instructions.

p. In-flight Door Warning: Ensure that personnel are aware of caution and warning notices in the respective aircraft in-flight manuals. Know location of under-floor restraining harness.

q. Fuel Dumping: Personnel should know how to visually confirm dumping, and be prepared to report any fuel fumes in the cabin.

r. Brake Fire: Personnel must be sensitive to flight station instructions that will emphasize method and location of egress. Remain well clear of wheels in case of explosion.

s. Attitude: Crewmembers must demonstrate a positive and constructive attitude relative to their positional duties and responsibilities.

t. Judgment: Crewmembers must exercise sound judgment relative to their positional duties and responsibilities.

u. Crew Coordination: Crewmembers must demonstrate an ability to clearly and concisely communicate and act in coordination with other crewmembers. Responsiveness to checklists will be evaluated.

3.13 Mission Manager (MM) and Project Coordinator (PC) Aircrew Safety Training and Qualification Standards

3.13.1 Normal Procedures

a. Door and Hatch Operation: Possess the ability to responsively operate all aircraft doors and hatches, .

b. External Power/APU: Be familiar with the output of each and their limitations relative to project requirements.

c. Project Power/UPS: Be aware of the flight station master switch and UPS locations and be able to recognize normal output from meter readings. Know location of applicable circuit breakers.

d. ICS/Radio Operation: Be knowledgeable of ICS and radio capabilities and be able to assist project personnel in their use. Note: FCC license may be required for radio communications.

e. Passenger and Crew Brief: Be familiar with normal and emergency equipment and procedure briefs by the PIC so that questions from passengers can be adequately answered.

f. In-flight Under-Floor Activity (P-3): Such activity must be approved by the PIC and be considered "mission essential." If this activity is in the vicinity of an open or glass port, individuals shall be tethered by a safety belt. Supplemental oxygen will be readily available at altitudes above 12,000 feet.

g. Taxi: Ensure that project equipment and personnel are secure for taxi and takeoff. Remain in communication with the flight station and report any unusually significant observations.

h. Takeoff: Remain in communication with flight station and be prepared to follow flight station directions in the event of an emergency. Report any unusual observations or occurrences that would affect flight safety. Be aware that non-secure objects may become dislodged during takeoff.

i. Cabin and Wing Check: Be familiar with cabin and wing checks and what to look for such as fluid leaks, smoke, or life raft dislodgment.

j. Descent: Direct and/or monitor project preparations for landing. Ensure that sleeping personnel are awake due to pressure changes.

k. Before Landing: Ensure cabin is ready for landing and report same to PIC. Report post-landing support requirements if not previously reported.

l. After Landing: Ensure that cabin personnel remain secure while aircraft is moving.

m. Security: Be sensitive to aircraft security measures. Strangers (non-crew personnel) must be identified and escorted. Only authorized individuals are permitted onboard. Packages with unverified contents must not be accepted. Work with PIC to ensure aircraft is secure when left unattended.

3.13.2 **Emergency Equipment**

a. Escape Rope/Slide: Be knowledgeable of escape rope locations and how to use them. Be able to attach and deploy a pneumatic slide.

b. Cabin Oxygen Systems: Be familiar with the use and limitations of aircraft oxygen systems.

c. Portable Oxygen Systems: Be able to use and instruct the use of portable oxygen systems; i.e., walk-around bottles with smoke masks, walk-around bottles with normal (first aid) mask, and oxygen hoods. Know how to unpackage and don oxygen hoods. Know applicability and limitation of each portable system.

d. Flotation Equipment: Be familiar with the equipage and use of flotation vests and rafts, including raft accessory kits. Know where flotation equipment is located and how to deploy rafts.

e. Anti-Exposure Suits: Be familiar with donning antiexposure suits, and be prepared to assist others.

f. Survival Kits: Be familiar with arctic/jungle/desert survival kits when carried on specific missions. Know their appearance, location, and general contents.

g. Signal Kit/ELT: Know the location and contents of the emergency signal kit. Know the location and features of portable ELT units.

h. First Aid Kit: Be familiar with the location and contents of first aid kits. Be prepared to assist others with basic first aid.

i. Fire Extinguishers/Gloves/Axes: Be familiar with the location of fire extinguishers, protective gloves, crash axes, and portable oxygen/smoke mask combos. Be familiar with the use of extinguishers and hazards associated with their use.

3.13.3 **Emergency Procedures**

Instructors are urged to use these standards as minimum criteria and apply hands-on training techniques.

a. Alternate Door Operation: Be able to open doors by alternate methods.

b. In-flight Door Warning: Be knowledgeable of door warning signs as well as caution and warning notices in the respective aircraft flight manuals. Know location of P-3 under-floor restraining harness.

c. Depressurization/Emergency Descent: Be able to recognize an explosive and rapid decompression and, thus, be able to don oxygen and assist others. Be aware of aircraft attitude changes associated with an emergency descent.

d. Hydraulic System Leak: Be aware of hazards associated with high pressure leaks and be able to recognize atomized mist resulting from high pressure leak. Mist is toxic and flammable and, thus, non-sealed electric switches/relays could ignite mist. Report any anomalies to the flight station.

e. Fuselage Fire/Smoke Removal: Be prepared to assist passengers and the flight station during this emergency procedure which may involve donning of oxygen equipment and fighting internal fires under the direction of the PIC and FM. Serve as communications link with flight station.

f. Fire of Unknown Origin: Be prepared to assist flight station in determining origin of unknown smoke and fumes. Origin might be associated with project or aircraft electrical/air conditioning equipment. Be prepared to function without normal electrical power and ICS. Follow PIC directions and serve as cabin coordination/communications link.

g. Land Evacuation: Be familiar with how to egress an aircraft cabin during an emergency evacuation on land, with emphasis on night operations. Be prepared to follow flight station directions on which side of aircraft to egress and assist with evacuation.

h. Ditching: Be familiar with preplanned ditching assignments and with aircraft exits that are suitable for water ditching. Be alert to flight station directions and the need to remain secure until the aircraft has settled on the water. Be prepared to assist with evacuation.

i. Fuel Dumping: Project power is to be secured prior to dumping. Fuel fumes may enter aircraft cabin. Report any fuel fumes to flight station.

j. Brake Fire: Be alert to flight station instructions that will emphasize method and location of egress. Remain well clear of wheels in case of explosion.

Section Four: Crew Complement and Scheduling

4.0 Crew Complement

4.0.1 Basic Flight Crew Aircraft shall not be operated with less than the minimum crew specified in the official aircraft operating manual.

a. Aircraft manufactured with dual controls and approved for single pilot operations will normally be assigned two qualified pilots. The Chief, Aircraft Office, may authorize single pilot operations if mission requirements and safety justify an exemption.

b. An Avionics Technician may be assigned to the basic crew if mission requirements dictate a need for avionics support.

c. An Additional Crewmember (ACM) qualified in cabin normal and emergency procedures will normally be assigned to missions carrying ten or more passengers or project personnel.

4.0.2 Augmented Flight Crew. An augmented flight crew is required if flight requirements exceed those stipulated for a basic flight crew. Flight crews may be augmented with one qualified PIC or First Pilot and one qualified Flight Mechanic, as applicable, to the basic crew.

4.0.3 Project Crew. The project crewmember complement is the number of project personnel required to operate, maintain, and provide support for aircraft equipment aboard the aircraft for a particular mission.

4.1 Crew Scheduling

4.1.1 Flight crewmember scheduling occurs in response to operational, training, currency, or maintenance requirements. Flight crew assignments are made as early as possible to afford crew preparation, and are predicated on crewmember qualifications and equitable distribution of flight time to maintain currency and proficiency.

4.2.1 The Aircraft Office schedules civil service flight crew personnel. The contract manager or his/her designee provides contract flight personnel assignments. Flight crew assignments appear on a flight schedule. The daily flight schedule is approved by the Chief, Aircraft Office. The master daily flight schedule is retained as a quality record.

4.3.1 Project crewmember scheduling is assigned and authorized by project users and approved by the Aircraft Office. Names of project crewmembers are provided to the assigned PIC for manifesting and flight briefings.

4.2 Flight Time Documentation

4.2.1 Flight time and associated data (approaches, landings, etc.) are recorded by the PIC on the Mission Data Sheets within the aircraft maintenance logbook.

Also, the PIC is required to update the CAMP computer system flight data to include: a) flight time and associated data such as approaches, landings, etc, b) fuel purchase costs, and c) handling fees and other associated flight costs within 24 hours after a flight. This information is transferred to a flight operations computer, which stores and prints the information for individual crewmembers. The CAMP computer system compares individual flight crewmember data with established training and currency requirements to ascertain any deficiencies. Monthly mission summaries are derived from individual mission data and are reported to requesting organizations as quality records by aircraft operations personnel.

4.2.2 The following flight purpose codes are assigned to flights through the flight scheduling system:

Code	Description
A	Mission management passenger/cargo flights
B	Mission management ferry (positioning) flights
C	Training/currency flights
D	Maintenance functional check flights
E	Maintenance ferry flights
F	Program support flights
G	Research and development flights
H	Other

4.2.3 The following criteria is used in accrediting flight time and associated data:

a. Flight time computation shall include the time from brake release before takeoff until the brakes are set again after landing.

b. Total Pilot/Copilot/Flight Mechanic hours may include simulator hours.

c. Training and instrument hours, approaches, landings, and night requirements may be accomplished in an approved simulator.

d. Actual instrument time may be logged by both pilots flying a dual controlled aircraft in instrument meteorological conditions; however, simulated instrument time may only be logged by the pilot manipulating the controls of an aircraft or simulator.

e. Pilots who are designated a flight instructor may log as pilot-in-command (aircraft commander) time, all flight time during which she or he acts as a flight instructor.

f. Only the pilot controlling the aircraft may log approaches and landings.

4.3 Crew Duty Time

Crew duty time is the total time between the commencement and termination of crew duties. Crew duty time accrues consecutively and begins when a crew reports to a designated place of duty to start preparation for a flight and ends when secured from post flight duties. Crew duty will normally commence at least 1 hour before scheduled departure time in order to provide adequate time for flight preparation. This does not preclude using personnel as crewmembers who commenced other duties before reporting for a flight; however, in this case, the crew duty time for the entire crew begins at the time these other duties commenced.

4.3.1 Crew Duty Time Limitations

a. Basic crew duty time will not be scheduled to exceed 14 consecutive hours, except as set forth below.

b. Basic crew duty time may be extended to 16 hours if the total time of crew duty is confined to the period between 4 a.m. and 12 midnight (local time at departure point). The aircraft must be pressurized and have a functional autopilot for this extended time. This extension must have crewmember concurrence as well as safety and management approval.

c. Augmented crew duty time will not exceed 20 consecutive hours. Augmented crew duty time is predicated on the ability of an off-duty crewmember to rest in a reclining type passenger seat. The aircraft must be pressurized and have a functional autopilot for augmented limits to be in effect.

d. For aircraft with no autopilot or a failed autopilot, basic crew duty time is limited to 12 hours. With pilot augmentation, crew duty time may be increased to 14 hours.

e. Pilots-in command shall declare crew rest when flight plan time to the next station indicates that crew duty time will be exceeded.

f. Avionics Technicians may exceed crew duty time if the exceeding portion of a mission can be conducted without their services.

g. Time spent deadheading as a passenger immediately before acting as an flight crewmember will count as crew duty time.

h. Prepositioning of relief crews shall be considered if the mission schedule can not be supported within the duty time limitations specified for a single crew.

4.3.2 Non-Crew Duty Time Limitations In consideration of personnel health and safety and in the interest of maintaining quality performance in operational activities, the following work hour limits apply to personnel not on flight crew duty:

a. Daily limit: 16 hours
b. Weekly limit (7 days): 72 hours
c. Consecutive work period: 10 days*
d. Minimum off-duty period: 8 hours
e. Minimum off-duty period for work periods exceeding 12 hours: 10 hours

*Requires a minimum of 24 hours free of duty.

Note: 4.3.2a may be extended to a maximum of 20 hours on a one-time basis. 4.3.2b may be extended to a maximum of 84 hours in a 7-day period on a one-time basis. Both extensions must be authorized by a mission manager and supervisory official.

4.4 Flight Time Limitations

4.4.1 Maximum Limitations

	Daily Hours	**Weekly (7 day) Hours**
a. Daily/Weekly		
1. Basic Crew	8	40
2. Augmented Crew	16	40
b. Monthly	100 hours	
c. Quarterly	300 hours	
d. Annually	1000 hours	

Notes: (a) A PIC may use reason in exceeding the above values to meet operational requirements while deployed if they consider it safe to do so.

(b) The basic crew daily flight time limit may be extended from 8 hours to a maximum limit of 10 hours with approval of QAE-Operations, ASO, ASC Manager, and PIC. The aircraft must be pressurized and have a functioning autopilot.

(c) Weekly requirements should be coordinated to meet flight and rest requirements.

4.4.2 Minimum Limitations Pilots who have less than 100 pilot hours, 12 pilot night hours, and 12 pilot instrument hours annually and Flight Mechanics who have less than 50 panel hours annually are considered below annual minimum limits and, thus, shall receive a flight status review. The review will address cause and effect on proficiency, as well as provide corrective action, if required. Minimum hourly requirements may include simulator hours.

4.5 Crew Rest

Crew rest is a period of time provided to flight crewmembers for necessary rest, eating, and local transportation prior to commencing flight crew duties. Crew rest will be provided prior to departure from the home station as well as at en route stops when mission schedule or crew duty limitations prevent the aircraft from returning to the home station.

4.5.1 Crew Rest Limitations

a. Twelve consecutive hours free of all official duties is considered the minimum crew rest period prior to commencing flight duties. A 10-hour crew rest period may be approved on an exceptional basis with the consent of the PIC.

b. At en route stops, crew rest will not normally commence until 1 hour after termination of the flight in order to allow for necessary post flight duties.

c. The crew rest period ends when the crew begins official duties in preparation for departure, which is at least 1 hour prior to scheduled takeoff time.

d. Time accrued by any flight crewmember traveling as passenger on an aircraft may not be credited to meet any of the crew rest requirements of this section.

4.6 Other Requirements of Flight Crewmembers

Flight crewmembers will refrain from any activity, on or off duty, which could compromise the safety, integrity, or confidence in aircraft operations.

4.6.1 Use of Drugs

a. A crewmember will not possess, use, or distribute any medication or drug which is designated an illegal or controlled dangerous substance under Federal or State law, except as may be authorized by law.

b. A flight crewmember will take no medication within 24 hours before a flight unless approved by an AME.

c. Unless prescribed or approved by a NASA or FAA designated aviation medical examiner (AME) or by an armed forces flight surgeon, use of other medication by a crewmember must be discontinued at least 24 hours before reporting for flight duty.

d. If continuing medication is necessary for a long-term disease, flight duty is prohibited unless an AME specifically approves that medication at the time of issuance of a medical certificate.

e. Drug testing shall be in accordance with the NASA Drug-Free Work Place Program and the Contractor's Drug-Free Work Place Program, respectively.

4.6.2 Illness or Incapacitation Flight crewmembers who become seriously ill, incapacitated, or hospitalized for any mental or physical disorder will advise their immediate supervisor and consult with an AME before being assigned to flight duties.

4.6.3 Hazardous Hobbies Interest pursued by flight crewmembers in their leisure time may present potential hazards to safe crewmember performance. For example, certain plastics, solvents, photographic chemicals, and insect poisons used in common hobbies may have toxic effects on persons exposed to them without the awareness of these effects by the individual involved. Flight crewmembers are urged to discuss all such possible hazards with their AME.

4.6.4 Scuba Diving. No person will serve as a flight crewmember within 24 hours after using compressed air (or other gas) in a dive.

4.6.5 Immunization and Loss of Blood

a. No person will serve as a flight crewmember within 24 hours after being vaccinated or inoculated.

b. Flight crewmembers will not serve as blood donors except under emergency conditions, and subsequently, should not perform flight duties for at least 72 hours.

c. After accidental blood loss exceeding 1/2 pint, approval from a physician indicating blood levels are normal will be required before returning to flight duties.

4.6.6 Use of Alcohol No person may act as a crewmember while under the influence of alcohol. Additionally, crewmembers will not consume any alcoholic beverage while on duty or during the 10 hour period prior to reporting for duty.

4.6.7 Extracurricular Employment

a. Work of such an extent or nature as to interfere with efficient performance of flight crew duties is prohibited. Outside employment of NASA employees is subject to administrative approval in accordance with NHB 1900.1, "Standards of Conduct for NASA Employees."

b. Flight crewmembers may not engage in any outside non-NASA flight activities if that employment, plus their regular duty, compromise any duty or flight time limitation of this chapter.

Section Five: Flight Operations

5.0 Flight Origination and Authorization

5.0.1 Program Support Aircraft (PSA) PSA assigned to GSFC/WFF are scheduled by flight requests. The request is assigned to a mission manager (MM) or project engineer (PE) who works with the requesting party in developing the flight support requirements. A contract project coordinator may be assigned to the mission for additional support. Prior to flight, an operations and safety directive (OSD) is reviewed and approved by safety and management officials. This directive contains the purpose and description of a flight or mission, personnel requirements, specific safety limitations, and cost accounting data. When the OSD is approved and a mission readiness review (MRR) completed a PSA flight may be flown. The OSD and MRR are quality records documenting a PSA mission.

5.0.2 Mission Management Aircraft (MMA) Mission management flights conducted on the GSFC/WFF King air program support aircraft will be in accordance with NPR 7900.3 and are scheduled through the GSFC/WFF aircraft scheduling office.

5.0.3 Training Flights Training, evaluation, and currency flights are scheduled by contract management or QAE personnel to meet the requirements and standards specified in Section Three of this Manual.

5.0.4 Maintenance Flights. Maintenance-related flight requirements are scheduled by contract management or QAE personnel in response to maintenance requirements.

5.1 Operating Policy

5.1.1 Aircraft Security. Pilots-in-command are responsible for the security of their aircraft at transient domestic and international locations. Aircraft shall be locked when left unattended. Identification of passengers, luggage, and packages must be complete and associated with an official manifest. If luggage or packages are not accompanied by a crew member, passenger or an official manifest/request, it shall be rejected. A security inspection of an aircraft shall be made prior to flight if the aircraft has been left unattended. In planning for an en route stop:

a. Determine if there is any hostile/dissident activity occurring at the destination that might endanger the aircraft while parked.

b. If a potential endangerment or risk exists, request the following security measures or consider another basing location.

(1) Aircraft security assistance.

(2) Lighted parking area for aircraft.

(3) Local security patrols to periodically check the aircraft.

5.1.2 Flight Attire and Appearance

a. Pilots assigned to MMA flights shall dress in a conservative manner similar to corporate executive operations. During high temperature periods, short sleeve shirts are authorized.

b. Flight crewmembers assigned to research, program support, training, and FCF missions on PSA shall wear standard protective flight attire consisting of fire retardant flight suits and jackets, flight gloves, and flight boots. Helmets are required for specific operations. Arctic attire will be issued for specific missions. Exceptions to these requirements must be approved by the Chief, Aircraft Office. Flight attire is required to provide flight crew protection and identification. It shall be worn in a professional manner and with individual and organizational identification.

c. NASA is considered a pre-eminent organization within the aerospace industry. Therefore, it is incumbent upon assigned personnel to appear and act in the highest professional manner.

d. Project crewmembers are encouraged to wear protective flight attire, and may be required to wear such attire on specific missions. As a minimum, project crewmembers will wear full length trousers and normal foot wear. Shorts and sandals, as an example, are not considered adequate attire. Arctic attire will be issued for specific missions.

e. Flight attire for project personnel is government-furnished and, therefore, shall be accounted for and subject to turn-in upon termination of duty.

5.1.3 Aircraft Life Support Equipment (ALSE) Aircraft shall be equipped with sufficient ALSE for each flight. The GSFC Aircraft General Maintenance Manual describes the minimum allocation and inspection requirements of ALSE for assigned aircraft. All aircraft shall be equipped with supplemental and protective oxygen equipment, first aid kits, emergency signal kits, emergency locator transmitters (ELT), fire extinguishers, crash axes, and flotation vests. Flotation rafts shall be carried on oceanic flights. Anti-exposure suits, survival kits, and parachutes are assigned to aircraft, depending upon specific mission requirements.

5.1.4 Flotation Vest Requirement for Low Level Over-Water Missions To improve survival readiness, project missions operating below 1000 ft. ASL requires that all occupants wear flotation vests. Over-water missions operating at or above 1000 ft. must have flotation vests readily available.

5.1.5 Use of Oxygen The following requirements shall apply to the use of oxygen:

a. When all occupants are equipped with oxygen, unpressurized aircraft may ascend to Flight Level 250. In unpressurized aircraft, flight above 10,000 feet requires oxygen to be available to all crewmembers and passengers. Flight crewmembers shall use oxygen in unpressurized aircraft above 12,500 feet. When oxygen is not available to all occupants, flight between 12,500 and 14,000 feet must not exceed 30 minutes and, flight above 14,000 feet is not authorized. At cabin altitudes above 8,000 feet at night, flight crewmembers on duty will use 100 percent oxygen for 10 of the last 20 minutes preceding an approach.

b. The quantity of oxygen aboard an aircraft before takeoff shall be sufficient to accomplish the planned mission. In aircraft carrying passengers, there shall be an adequate quantity of oxygen to protect all occupants through normal descent to 12,500 feet.

c. Smoking is not allowed.

d. The following legend describes oxygen requirements for various altitudes:

Ambient Altitude	**One Pilot**	**Second Pilot**	**Crew On Duty**	**Other Occupants**
FL 270 and below	R	R	R	N/A
Above FL 270 thru FL 350	I	R	R	R
Above FL 350 thru FL 400	I or O	I R	R	R
Above FL 400 thru FL 450	O	I	R	R
Above FL 450 thru FL 500	O			
Above FL 500	P	P	P	P

Legend:
R – Oxygen shall be readily available
O – Oxygen shall be used
P – Pressure suit shall be worn
I – Oxygen shall be immediately available. Helmets shall be worn with an oxygen mask attached to one side or an approved quick-donning mask will be adjusted and positioned for immediate use. Set oxygen regulator to 100 percent and ON.

5.1.6 Hazardous Materials The carriage and use of hazardous materials aboard GSFC aircraft is prohibited unless specifically required and approved for a particular flight or mission. NASA Management Instruction, NMI 6000.5, Transportation Management, and personnel who are experts in hazardous materials, shall be consulted in the approval process which, in turn, requires documentation in an operations and safety directive or other authorizing instructions. Pilots-in-command shall note in flight plans the class of hazardous materials that are onboard.

5.1.7 Smoking Policy Smoking is not authorized onboard GSFC aircraft or within 50 feet of parked aircraft.

5.1.8 Aircraft Checklists All aircraft are equipped with operating checklists that are in conformance with the flight-respective aircraft flight manuals and approved by the Flight Standardization Review Board. Checklists are used for normal and emergency procedures as they pertain to aircraft systems and project equipment, when applicable. The pilot flying will normally initiate a checklist and the pilot not flying will read aloud the checklist using a challenge-response method. The crewmember responsible for a checklist item will execute and verbally respond to the item. If the responsible crewmember is not ready to execute an item, the crewmember should state "standby." If the responsible crewmember does not respond, a repeated challenge shall be stated. If the pilot flying does not respond to a repetitious challenge, the pilot not flying should announce that she or he is assuming control of the aircraft.

Emergency procedure checklists contain memory (Phase I) and non-memory (Phase II) items. Phase I items are normally delineated on checklists by an enclosed box or bold print. Identification of malfunctions shall be announced verbally by the crewmember observing the malfunction before initiating emergency action. If emergency action is appropriate, the pilot flying shall announce the emergency checklist required and command the Phase I items by memory, if applicable, to the particular checklist. The pilot not flying shall confirm Phase I items complete, as applicable, and verbally read Phase II items by challenge and response. Flight crewmembers shall repeat the response with the execution of checklist items associated with their position.

5.1.9 Sterile Cockpit Policy. During all critical flight operations, cockpit activities will be limited to those involved with the direct operation of the aircraft. These activities exclude non-relevant conversation, radio calls that are non-ATC related, and administrative paper work. Critical flight operations are those associated with takeoff, landing, low altitudes, and high traffic density. The PIC shall call for "Sterile Cockpit Procedures" when deemed necessary.

5.1.10 Minimum Altitudes. Pilots-in-command shall comply with minimum altitudes specified in FAR Part 91 and with foreign national rules, as applicable. Oceanic flights are normally limited to 200 feet and 1000 ASL, respectively, for day and night; however, operations and safety directives may permit lower altitudes if safety and mission requirements justify lower limits.

5.1.12 Special Flight Operations. Formation, aerobatic, and supersonic flight operations shall not be conducted unless specifically approved in an operations and safety directive.

5.1.13 Inoperative Equipment. Depending on flight requirements and conditions, aircraft may be dispatched with inoperative equipment, providing safety and mission requirements are satisfied. Minimum equipment lists (MEL) are available to determine equipment requirements. Pilots-in-command should consult with operations and maintenance personnel if questions arise on inoperative equipment. Maintenance discrepancies that do not require aircraft grounding may be transferred to the deferred (carry-over)

maintenance log and an "inoperative" label affixed to inoperative equipment in the aircraft. This label will be removed when the discrepancy is repaired.

5.1.14 Functional Check Flight Policy. Functional check flights (FCF) shall only be flown by designated pilots and flight mechanics. The assigned Functional Check Pilot (FCP) shall always act as PIC and normally occupy the left pilot seat. These flights shall be scheduled with the minimum number of personnel necessary to satisfy the requirements of the FCF. Parachutes may be required for specific flights. The minimum altitudes for securing one engine, on a non-emergency basis, is 3000 ft AGL for twin engine aircraft and 1500 ft AGL for a four engine aircraft.

5.1.15 Downline Aircraft Maintenance Abnormalities. Pilots-in-command who experience downline aircraft maintenance abnormalities that may affect safety of flight are required to contact qualified maintenance personnel for consultation prior to continuing flight. It is important that pilots receive a maintenance opinion on potentially serious problems even though they may believe that they understand the existing condition or malfunction.

5.1.16 Aircraft Mishaps, Incidents, or Close Calls. In all cases of aircraft mishaps, incidents, or close calls occurring to assigned aircraft and crews, the assigned PIC shall ensure, to the extent possible, that all pertinent information is transmitted to the Chief, Aircraft Office and ASC manager with copies forwarded to safety officials by the most expeditious means feasible following such occurrence. The PIC retains responsibility for the safe custody of the aircraft until relieved by proper authority and all immediate reporting requirements. Direction on NASA aircraft incident and mishap reporting is located in NPG 8621.1G as described on page 1-1 of this Manual.

5.1.17 Required Publications. The Pilot in Command shall insure the following documentation or information is readily available on the flight deck.

a. Pertinent aeronautical charts
b. Pertinent enroute, terminal, and instrument approach procedure charts
c. Aircraft performance data
d. Aircraft checklists (as described in section 5.1.8)
e. The current and/or approved aircraft flight manual or NATOPS
f. GSFC/WFF Aircraft Operations Manual (830-AOM)
g. GSFC/WFF General Maintenance Manual (830-GMM)
h. NASA Procedural Requirements (NPR 7900.3)
i. The aircraft MEL
j. The aircraft certificate of airworthiness
k. The aircraft certificate of registration (when required)
l. Documentation required for the area of operation

5.1.18 Intercept of Aircraft. It is imperative that the target of interest (TOI) aircrew immediately comply with direction from either ATC or military intercept aircraft. Pilots, if capable, should maintain a listening-watch on VHF guard 121.5. The intercepting pilots should comply with prevention of inadvertent Traffic Collision Avoidance System (TCAS) initiation procedures.

5.1.19 Seats, Safety Belts, Shoulder Harnesses. A seat with a safety belt, having a metal-to-metal latching device, is required for each aircraft occupant; except for infants under the age of 2 years old. If transportation of infant passengers is required, use of an infant restraint car-seat is recommended when feasible. All seats located within the flight deck shall, and all aft-crewmember seats and sideways facing seat should be provided with and utilize a shoulder harnesses. Any forward-facing experimenter seat with an experimental equipment rack located with contactable distance shall be provided with and utilize a shoulder harness.

5.2 Predeparture Procedures

5.2.1 General Predeparture procedures vary considerably with mission requirements. Missions that deploy away from home station involve significant preparation by the assigned mission manager and flight crew. An Aircraft Mission Line/Deployment Predeparture Checklist is to be used by pilots-in-command to ensure that all predeparture requirements are complete. Mission manager and flight crew assignments shall be made as early as practical to allow for adequate predeparture preparations. Complex project missions require close interface between the mission manager, pilot-in-command, and assigned crewmembers.

5.2.2 Flight Planning Thorough flight planning is essential to the safe and efficient conduct of flight operations. A flight plan will be filed for all flights. Instrument flight rules (IFR) shall be utilized unless mission/flight requirements dictate a need for visual flight rules (VFR). When operating under VFR, radar advisory service shall be used to the maximum extent practical. A local VFR flight plan may be used for local operations (within 150 nm) at the discretion of the PIC. Oceanic operations shall comply with ICAO, warning area, and air defense procedures, as applicable.

a. Fuel Planning - Considering aircraft structural requirements, weather forecasts and known en route delays, the minimum amount of useable fuel required at takeoff will be sufficient to:
   (l) Complete the flight to the destination airport;
   (2) Fly from that airport to the alternate airport, if required;
   (3) Fly for 1 additional hour using normal cruise consumption;
   (4) For international flights involving oceanic or remote area operations, an additional hour, using normal fuel consumption, shall be planned;
   (5) When fueling at stops away from home station, the PIC, when practicable, shall utilize airports where aviation fuel is available at government contract prices. Payment for such fuel is to be made through approved credit cards or government forms which are carried aboard aircraft at all times. At commercial facilities where the above means of payment are not acceptable, fuel services should be billed on appropriate company forms. The PIC shall authenticate all fuel deliveries, and ensure that a copy of each receipt is obtained and turned into the NASA Aircraft Maintenance Office; and,

(6) During aircraft fueling or defueling operations, only fueling-essential personnel shall be aboard the aircraft.

b. Weather Planning. Prior to takeoff, the PIC will receive a thorough weather briefing concerning current weather and forecasts for the proposed route, destination, and alternates.

(l) Departure Weather Normally, weather minimums for takeoff will be not less than landing minimums appropriate for the aircraft equipment and for the airport facilities. However, a takeoff may be made when the weather is below landing minimums but not less than 1/4 mile visibility or runway visual range (RVR) 1600 feet and provided a suitable departure alternate is available within 100 nautical miles. The weather reported at the departure alternate must be at or above landing minimums and forecast to remain so for at least 2 hours after takeoff.

(2) En Route Weather The PIC will not fly into areas of reported or forecast severe weather conditions, unless approved in an aircraft operations and safety directive for scientific purposes. Operative airborne radar is required for any flight into areas where current weather reports or forecasts indicate that thunderstorms may reasonably be expected and flight under daylight visual meteorological conditions is not possible. Whenever possible, all flights will be planned to circumnavigate areas of thunderstorm activity.

(3) Destination Weather The PIC may file for a destination that forecasts prevailing visibility equal to or greater than published landing minimums appropriate to the aircraft equipment, but not less than 1/2 mile or RVR 1800 feet for the time of arrival. If the destination weather is reported and forecast to be less than 5000 foot ceiling or less than 5 miles visibility from the time of departure until 1 hour after the estimated time of arrival (ETA), an alternate airport will be listed in the flight plan. Alternate airport weather minimums will meet or exceed the requirements of FAR Part 91 (600-2 for precision approaches or 800-2 for non-precision approaches and forecast to remain so for 1 hour after ETA).

5.2.3 Preflight Inspections Before each flight, the PIC will ensure that the aircraft is in an airworthy condition. Required inspections shall be accomplished and logged as soon as practical after reporting to operations so that minor discrepancies may be corrected before a delay is incurred.

a. Aircraft Maintenance Log Prior to activating any aircraft system, the Aircraft Maintenance Log will be reviewed and evaluated. Prior to flight, the PIC will accept the aircraft by signing this log and retain the log aboard the aircraft during the duration of the mission.

b. Aircraft Inspection An aircraft external and internal preflight inspection will be accomplished in accordance with the aircraft flight manual. At intermediate stops, as a minimum, a walk-around inspection shall be conducted and logged after each

arrival and before each departure. A walk-around inspection is an external examination intended to detect those obvious discrepancies that may occur at any time to an aircraft; e.g., a bird strike, missing panels, or damage caused by ground servicing equipment. On program support flights, particular attention shall be focused on insecure project related equipment.

c. Avionics Equipment Navigation and radio equipment necessary for the flight will be given an operational check prior to departure. Current in-flight publications will be readily available and adequate for this mission.

d. Aircraft Life Support Equipment Appropriate and sufficient emergency and survival equipment will be available and inspected before the flight.

e. Cold Weather Operations Under no circumstances will takeoff be attempted with ice, snow, or frost adhering to the airfoils or other critical areas of the aircraft.

5.2.4 Passenger/Project Personnel Considerations

a. Travel Authority Only authorized personnel may be carried on aircraft. Authorization must be in writing from an approving authority. If personnel arrive for a flight and they have not been previously manifested, the PIC will ascertain their authorization from the assigned mission manager or cognizant NASA representative.

b. Manifesting All passengers and project personnel will be manifested. Prior to departure, the PIC will certify the accuracy of the manifest and file a copy with a responsible ground agency such as a military, civil, or NASA operations office. If a NASA official acting as a ground coordinator for the flight is aware of all changes to the manifest, the PIC is relieved of this requirement. In all cases, an accurate and authorized listing of onboard personnel is required to be on file with officials on the ground prior to flight. The master manifest for missions is retained as a quality record in CAMP.

c. Passenger/Project Personnel Loading During aircraft loading and off-loading, passengers/project personnel shall be escorted by an assigned flight crewmember when flight line activity presents a potential safety hazard. Normally, all engines and propellers will be completely stopped when loading and unloading personnel or cargo from aircraft. In those instances when, in the determination of the PIC, extenuating circumstance require the loading or unloading of personnel or cargo with an engine running, the following minimum precautions will be followed:

(l) Only the engines on the opposite side of the aircraft from the loading door may be operating and will be operated at as low a power setting as practical.

(2) The aircraft will be parked so that personnel approaching or leaving the aircraft will not walk in front of, nor behind, a rotating propeller nor in the vicinity of an operating turbo-jet engine.

(3) A flight crewmember will be positioned on the ground to assure personnel do not approach close to an operating engine.

d. Passenger/Project Personnel Briefings The PIC will ensure that all passengers and project personnel have been briefed on smoking, use of seat belts, location and operation of appropriate emergency and survival equipment, and operation of doors and exits. The GSFC/WFF program support aircraft project personnel briefing checklist shall be used for passenger and project personnel briefings.

5.2.5 Aircraft Loading The PIC will ensure that the aircraft does not exceed the maximum gross weight, zero fuel weight, maximum landing weight, and center of gravity limits specified in the appropriate aircraft flight manual.

a. Weight and Balance Data A copy of the current weight and balance data will be maintained aboard each aircraft. It will be used to ensure that the weight and center of gravity will remain within limits for the duration of each flight.

b. Cargo and Personnel When cargo and personnel are carried on the same flight, cargo will be stowed in baggage compartments or, if this is not practical, cargo will be stowed forward of passengers in the cabin. If cargo or luggage must be stowed aft of personnel, it must be contained within approved bins or equivalently restrained with cargo netting and straps to withstand a minimum of a 9-G force forward and a 3-G force laterally. All cargo, baggage, or other equipment will be properly secured to prevent injury to personnel or damage to the cargo or aircraft. Personal equipment, such as briefcases and luggage, may be carried by personnel in the aircraft cabin, provided the articles can be securely stored and will not interfere with emergency egress routes.

5.2.6 Operational Risk Management(ORM) Tool – All research and other non routine flights require the PIC to complete this tool prior to flight. Copies of the tool shall be submitted to the aircraft office chief and the ASO prior to flight.

NASA GSFC/WFF ORM Tool

Mission Considerations

Flight Missions

Test Flight/ECF/FCF	3
Pilot Evaluation / NATOPS	2
IPDFW	2
DFW	2
Research	2
MMA	1
Pilot Proficiency	2
Logistics	1

Full Crew Complement

Yes	0
No	2

Crew Experience w/ Flight	
Moderate Experience	1
Experienced	0
Very Experienced	1
Scheduled Flight Time	
6.0 Hours or less	1
6.0-10.0 Hours	2
10 Hours of more	3
Preflight Period	
0700-1700	0
1700-0400	3
0400-0700	2
Scheduled Crew Day	
< 9 Hours	0
9-14 Hours	1
14-18 Hours	2
Total Preflight Time	
3-5 Hours	1
>5 hours	3
Turnaround	
>12 Hours	0
8-12 Hours	1
>3 Days w/Minimum Turn	3

<u>Crew Consideration</u>	
PIC Time (within year)	
Less than 50 Hours in type	2
Greater than 50 Hours in type	0
PIC Currency (last 30 days)	
0-10 Hours	2
10-20 Hours	1
>20 Hours	0
Copilot Currency	
0-10 Hours	2
10-20 Hours	1
>20 Hours	0
Any Crew >100 hrs (last 30 days)	**2**
Pilot/FE no-fly 30 days	**3**
Weather Considerations	
Departure and/or Destination	
Forecast < 1000 ft / 1 mile	1
Forecast < mins	2
T-storms Forecast < 3 Hours	1
T-storms Present < 5 nm	3
Transit	
IMC	1

Sigmet or WW en route	3

Operation Area

Wx < 1500 ft AGL / 3 mile	2

Inoperative Equipment

Radar (Day/Night or IMC)	1/3
Radalt (Day/Night or IMC)	1/3
Autopilot (Day/Night or IMC)	1/3
FMC/FMS (Day/Night or IMC)	2/3

Heavy Weight Takeoffs

GW >120,000	2
GW>135,000	3

Additional Mission Considerations
Unfamiliar Airfield
US

Day/Night	1/2

Non-CONUS

Day/Night	2/3

Detachment Operations

First 48 Hours on site	2
Middle of Detachment	0
48 Hours to Return Home	1

Human Factors (±15 days from flight)

Death/Divorce/Baby/Mirage	3
Injury/Health/Work Problem	2
Change in Routine/Job	2
Work Stressors	5

Other: _____

Overall Total: _____

Risk Level Notification:

Risk control implementation required	15-19
Chief of Flight Operations Approval Required	20 or above

Chief of Flight Operations Approval / Date:

_____

Risk controls to be implemented:
(1)

(2)
(3)
(4)
(5)

5.3 Takeoff and Departure Procedures

5.3.1 Operation of Controls A qualified NASA designated or approved pilot, shall be at the controls of an operating aircraft.

a. Takeoffs and Landings The PIC will occupy either the left or right seat during all takeoffs and landings. At the discretion of the PIC, a copilot designated as a First Pilot in-model may perform takeoffs and landings when passengers/project personnel are carried, provided the PIC occupies the other seat.

b. Adverse Conditions Under adverse conditions, the PIC will personally control the aircraft. Adverse conditions include, but are not limited to, severe icing, severe turbulence, low ceilings and visibilities, marginal runway conditions, and aircraft emergencies.

5.3.2 Departure Briefing Before takeoff, the PIC will ensure the crew is briefed on the procedures to be used during takeoff and climb to cruising altitude as well as instructions for returning to the airport, if necessary. Other crewmembers will monitor the departure and assist the pilot flying. They will immediately report to the pilot any deviation from anticipated procedures. The pilot flying will provide verbal instructions and intentions throughout the departure.

5.3.3 Use of Navigational Aids (NAVAIDS) and Electronic Equipment All available navigational aids will be used from departure to landing. On departure, NAVAIDS will be set up to aid in an emergency return to landing as well as to aid in establishing the initial en route course.

a. Cockpit Voice Recorder (CVR) and Flight Data Recorder (FDR). If installed and operative, the CVR and FDR will be turned on during the entire flight.

b. Landing Lights Maximum use of landing lights is encouraged during all takeoffs, landings, and when operating near airports or high density traffic areas.

5.3.4 Outside Vigilance The PIC is responsible for ensuring that during visual conditions, at least one person maintains a lookout for conflicting traffic at all times. No paperwork will be accomplished by flight crewmembers during critical phases of flight.

a. Use of Autopilot To aid in outside vigilance during flight in visual conditions, maximum use of an automatic flight control system is encouraged. However, on takeoff, the autopilot will not be engaged at less than 500 feet above the terrain.

b. Outside Observer Use of additional crewmembers to aid in outside vigilance is highly encouraged, particularly while operating in heavy traffic areas during visual conditions. Flight Mechanics will normally remain at their duty station throughout the climb and descent.

5.4 En Route Procedures

In the event of an engine failure or shut down, the PIC will land at the nearest suitable airport at which a safe landing can be made. On four engine aircraft with one engine failed, the PIC may proceed to a suitable airport other than the nearest airport for better support if considered safe to do so.

5.4.1 Crewmembers at Stations Flight crewmembers shall remain at their assigned stations with seat belts fastened unless such absence is necessary for the performance of their duties or in connection with physiological needs.

5.4.2 Passenger/Project Crewmember Considerations The PIC is responsible for the safety and well being of on-board personnel, and should keep them apprised of any significant deviations from the itinerary or schedule. In-flight delays and readily discernible abnormal conditions should likewise be explained.

a. Safety Belts The PIC will ensure that all passengers and crewmembers have safety belts securely fastened for taxi, takeoff, landing, and before entering areas of in-flight turbulence.

b. Admission to the Flight Deck Passengers or project personnel may be admitted to the flight deck at the discretion of the PIC. During takeoff, landing, and periods of turbulence, personnel must occupy an approved seat.

5.4.3 In-Flight Meals Normally, crewmembers should plan their schedules so that eating meals in-flight is unnecessary. If this is not practicable, one pilot at a time may eat during normal cruise conditions. Food of the same kind from a common source should not be consumed by both pilots within 1-1/2 hours of each other during flight to prevent the possibility of disabling food poisoning.

5.4.4 Flight Progress The PIC will ensure that the aircraft's progress is continually monitored. This includes the progressive following of the aircraft's position, fuel consumption and weather conditions en route, at destination, and at alternates.

5.4.5 Non-Secure Project Equipment Due to unexpected turbulence in-flight, it is very important that loose or non-secure equipment in aircraft be absolutely minimized. Only essential repairs or adjustments to project equipment should be conducted during flight and, in doing so, tools and associated equipment must be maintained in secure kits near project equipment, if necessary. Non-secure chairs and stools are particularly risky during turbulence and shall not be permitted onboard airborne aircraft. Pilots-in

command are responsible for aircraft and personnel safety and are authorized to correct in-flight safety deficiencies, if they exist.

5.4.6 Minimum Fuel The PIC will notify ATC of the aircraft's "minimum fuel" status at any time the fuel supply has reached a quantity where, upon reaching destination, little or no delay can be accepted. A minimum fuel advisory does not imply to ATC a need for traffic priority. However, if fuel remaining indicates a need for traffic priority to ensure a safe landing, the PIC will formally declare an emergency due to low fuel and will report fuel remaining in minutes.

5.4.7 Emergency Procedures When an emergency or in-flight difficulty arises, the PIC will complete the applicable checklists and report the difficulty to the appropriate ATC facility. This report will include the nature and extent of the difficulty, intentions, type of assistance requested, and any other pertinent information.

5.5 Arrival, Approach, and Landing Procedures

5.5.1 General During instrument arrivals, all available navigation aids will be used. When available, precision approach guidance will be used for night arrivals.

5.5.2 Weather Minimums An approach will not be started unless the reported visibility is at or above approach minimums for a precision approach, but in no case may the minimum be less than 1/2 mile visibility or RVR 1800 feet. For non-precision approaches, multi-piloted aircraft may commence the approach when reported weather is below minimums, provided the aircraft is capable of proceeding to a suitable alternate in the event of a missed approach.

5.5.3 Destination Below Minimums If the destination weather is marginal or below minimums, the PIC may proceed to a suitable alternate or may proceed to destination and hold, if the destination weather is forecast to improve and fuel for alternate and reserve requirements will not be compromised. The weather at the alternate must be at or above alternate minimums and forecast to remain so until the new ETA plus 1 hour.

5.5.4 Approach Briefing Before starting an approach, the pilot flying will brief the crew on the procedures to be followed during the approach, landing, and missed approach, including key altitudes and restrictions, as well as specific crew duties.

5.5.5 Approach Progress The pilot making the approach will announce his/her progress and intentions periodically. The pilot not flying will monitor the approach and provide a continual cross-check of the NAVAIDS, instruments, air traffic control instructions, and approach procedures. Any deviations from the prescribed procedure will immediately be brought to the attention of the pilot flying. The pilot not flying will call out, "1000 feet above," and "100 feet above," the appropriate MDA or DH. When the runway is in sight,

the pilot not flying will state, "runway in sight". If the runway is not in sight when the aircraft reaches the missed approach point, the pilot not flying will state, "go around."

5.5.6 Use of Autopilot Use of the autopilot during arrivals, descents, and approaches is encouraged, particularly during visual flight conditions, as an aid in collision avoidance. In order to prevent excessive loss of altitude in the event of an autopilot failure, the pilot directing the aircraft will maintain light control contact throughout the final portion of an automatic coupler approach. Full manual control will be assumed at or above published minimum altitude.

5.6 Post flight Procedures

5.6.1 Closing Flight Plan Upon completion of a flight, the PIC will ensure that the flight plan is closed with ATC.

5.6.2 Customs, Immigration, Agriculture Inspections On international flights where arrival inspections are required, the PIC will ensure that no occupants disembark until cleared by inspectors. The aircraft shall have been sprayed with an approved insecticide, if required. General declaration forms, individual custom forms, cargo/passenger manifests, passports, visas, and immunization records shall be ready for presentation, as required.

5.6.3 Post flight Inspection. The PIC shall ensure that the aircraft post flight inspection is complete and that the aircraft is properly protected and secured. Plugs, covers, chocks, and tie downs, if necessary, shall be installed. Hangar space should be arranged or requested, if needed for aircraft security or project support.

5.6.4 Aircraft Maintenance Log. The PIC will enter in the aircraft log, each mechanical irregularity discovered during the flight. All unusual events (e.g., overweight or hard landings, lightning or bird strikes, static discharges, and flight through hail or severe turbulence) will be recorded in the aircraft log. In addition, the PIC is responsible for correct flight, cost accounting, and manifest data entry.

5.6.5 Post flight Briefing. Crewmembers and passengers, if applicable, shall be briefed on the time and location for reporting on duty following crew rest. The PIC or mission manager shall be aware of crewmember lodging and shall provide home station with layover information by telephone, message, or as prearranged.

5.6.6 Post flight Security. The PIC must take prudent measures to secure and protect the aircraft at home, when deployed, and during en route stops. The Security Plan, created in response to periodic Threat Assessments, delineates security procedures while at home. The following measures shall be implemented by the PIC to preclude unnecessary exposure to weather, such as high winds and freezing precipitation, and to provide a reasonable degree of security from such activities as vandalism, theft, or terrorism. The following arrival security checklist shall be used:

a. Remove any classified material from the aircraft.

b. Lock all lockable doors and hatches. Use security tape on all doors and hatches.

c. Provide base operations dispatcher with telephone number/location where aircraft crewmembers can be contacted in the event of a problem.

d. Upon returning to the aircraft, perform a security check of the aircraft, giving particular attention to possible tampering or unauthorized entry. This should include a survey of the tarmac area surrounding the aircraft for any threats or possible hazards.

e. Report any security incidents or violations to the installation security official as soon as practical.

f. If there is evidence of unauthorized entry, the aircraft will not be moved until a thorough search for damaging material; e.g., explosive or listening devices, has been completed by appropriately trained personnel.

Notes:
(1) A Technical Surveillance Counter Measures (TSCM) survey of an aircraft may be required when it has just returned from a foreign country. This should be conducted prior to further use of the aircraft, and will normally be coordinated with GSFC security officials.

(2) In any location designated as a "high threat area," action will be taken to ensure that all baggage, cargo, and passengers are subjected to appropriate security screening; e.g., physical, x-ray (if available), and positive identification, prior to being loaded on the aircraft.

(3) Be aware of the results of periodic security vulnerability assessments/surveys of aircraft and aircraft parking areas.

g. Mission Summaries. At the conclusion of a project mission, a mission summary is documented by the assigned Mission Manager. This summary describes the performance of the mission and serves as a quality record for the conduct of the mission. In addition, aircraft user customer satisfaction survey forms are used to evaluate the quality of aircraft services. These forms are provided to aircraft users and are available electronically on the Aircraft Office local Internet home page.

GSFC/WFF

Program Support Aircraft Project Personnel Briefing Checklist

Medical/Physiology/Survival (Advance Brief)

_____ Inquiry on physical condition/inform crew of personal distress conditions
_____ Ear/sinus block procedures
_____ Cautions on self-medication
_____ Availability of first aid booklets and CPR/choking remedy guide sheets
_____ Seat belt usage/release policy
_____ Turbulence precautions
_____ No smoking policy
_____ Flight suit policy
_____ Tool control policy
_____ Low altitude life vest policy
_____ Under floor activity policy
_____ Physiology brief (discuss hypoxia, hyperventilation, TUC.); show tape, as applicable
_____ Survival brief (use tape and book reference, as applicable)

Emergency Equipment/Procedures (on-board)

_____ Pilot to crew interface/communications (PA, ICS, signs)
_____ Seats/restraints
_____ Escape routes
_____ Operation of hatches, doors, slides, ropes, ladders
_____ In flight door warning procedure
_____ Use and location of oxygen equipment
_____ Use and location of fire extinguishers
_____ Fire of unknown origin procedures/uninterrupted power source (UPS) considerations
_____ Project power master switch
_____ Smoke elimination procedures
_____ Crash axe/protective glove locations
_____ Emergency signal kit, first aid kit, and survival kit locations
_____ Use and location of flotation devices/anti-exposure suits, as applicable
_____ Ditching procedures/assignments/instructions
_____ Specific hazards associated with project equipment, if any

Pilots-in-command are responsible for insuring that all crewmembers and project personnel are briefed on the above items prior to flight, and that signed form is returned to the GSFC WFF Aircraft Office.

_____
Name of project personnel receiving brief

_____ _____ _____
Briefer Date Aircraft No.

I am satisfied that I have been adequately briefed on the hazards and risks associated with flying on this NASA aircraft.
I certify that I have no health issues that would prevent me from flying on this NASA aircraft.
I certify that I have been briefed that there may be insurance issues with flying on a NASA aircraft with no airworthiness certificate.

_____ _____
Signature of personnel receiving brief Date Rev 10/06

TO VERIFY THAT THIS IS THE CORRECT VERSION PRIOR TO USE CONTACT THE WFF AIRCRAFT OFFICE OR CHECK THE AIRCRAFT OFFICE HOMEPAGE AT http://wacop.wff.nasa.gov/