



Dryden Flight Research Center  
Edwards, California 93523-0273

DOP-O-300  
Revision: G

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# Dryden Organizational Procedure

## CODE O

# AIRCREW FLIGHT OPERATIONS MANUAL

Electronically approved by  
Director, Flight Operations Directorate

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### DOCUMENT HISTORY PAGE

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

DATE APPROVED	ISSUE	PAGE	AMENDMENT DETAILS
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5/20/99	Rev A	All 4 6 17 27 31 36	Corrected formatting and spelling -Add to Chapter 3: 3. ER-2 Pilot Qualifications and renumber 4. Pilot Training and Checkout -Change in Chapter 11: FLIGHT to AVIATION -Change in paragraph 4c: 3a and 3b to 4a and 4b -Change in paragraph 3a, line 4: five to three -Change in Chapter 9: PERSONNEL to PERSONAL -Change in paragraph 8: Form -XOF to NASA-DFRC Aviation Hazard/Incident Report (DFRC 165)
5/18/00	Rev B	All	Global changes to clarify process, make inclusions for Airborne Science operations, and general editorial comments.
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See IDMS Document Master List	Rev D	All	Modified page numbering on index to match current page listings. Incorporated links inside of Word document.
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6/6/03	Rev G	All	Document reorganized to make information more easily accessible and to include clarification of processes and general editorial comments.

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## PREFACE

DOP-O-300 DRYDEN FLIGHT RESEARCH CENTER CODE O FLIGHT OPERATIONS MANUAL is in accordance with NASA Policy Directive (NPR 7900.3A) NASA Aircraft Operations Management. It is issued pursuant to the authority of the Director, Dryden Flight Research Center, and prescribes standard operating procedures and instructions pertaining to the operation of aircraft assigned to Dryden and to related aircraft operations involving Dryden. This manual will be used in conjunction with other governing instructions, regulations, and procedures. When the need arises, special instructions or waivers will be issued by the Director for Flight Operations. Such special instructions will be incorporated in the manual as the situation dictates.

## SUPPLEMENTS

Between revisions, supplements will clarify, change, or add to this Operations Manual. Supplements will be identified as OS-1, OS-2, etc. A log sheet for pilots to initial indicating acknowledgement of supplement will also be utilized. As supplements are cancelled, the log will so note. Supplements will only be maintained with the reference copy of the Operations Manual, on file in the Pilots Office.

Comments and recommendations concerning this manual are encouraged and should be submitted to the DFRC Director for Flight Operations.

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## CHAPTER 1 FLIGHT AND AIRCREW AUTHORIZATION

### 1. AIRCREW DEFINITIONS

- a. Primary Aircrew: Pilots, Flight Test Engineers, Flight Engineers, Navigators, and Loadmasters, both civil service and contractor, that are authorized by position descriptions, MOU, MOA or contracts to perform flights in DFRC aircraft and are assigned to the Flight Crew Branch in the Dryden Flight Operations Directorate. DFRC Pilots not assigned to the Flight Operations Directorate who are authorized by position descriptions to perform flights in DFRC aircraft are considered primary aircrew while performing those duties. Training is documented in the aircrew flight record file and kept at the operations desk (ER-2 training records are maintained in ER-2 Operations). Other NASA center pilots, contractor pilots, U. S. military pilots, and other pilots covered by MOU, MOA, or other agreements are considered primary aircrew for purposes of approval and are required to complete any training directly related to their assigned research projects. Rated flight surgeons on military flight orders are considered primary aircrew.
- b. Secondary Aircrew: Other flight crew positions needed to accomplish the Dryden mission that occupy a seat with flight controls or have emergency procedure responsibilities aboard an aircraft, such as: Flight Test Engineers, Photographers, non-military Flight Surgeons, Loadmasters, B52 Launch Panel Operators and Crew Chiefs, DC-8 Mission Managers, Technicians, and Engineers. Training records are kept in life support.

### 2. APPROVAL TO FLY IN DRYDEN AIRCRAFT

- a. The Chief, Flight Crew Branch, makes Dryden primary aircrew aircraft assignments. They must meet the qualification, training, checkout, and currency requirements of this document. Records are kept in a flight record file kept at the operations desk.
- b. Non-Dryden primary aircrew, Dryden and non-Dryden secondary aircrew, and all observers (typically one time flights for orientation or familiarization), must be approved for flight by the Chief, Flight Crew Branch, the Director for Flight Operations, or the Center Director in accordance with the Appendix A. Approval is documented on DFRC Form 176, and maintained in the life support office. This approval will be granted for a specified period not to exceed one year.
- c. Non-Dryden personnel required to support DC-8 Airborne Science operations will obtain approval of the Director for Airborne Science on the Flight Participant Form (FPF). An electronic list of current approved FPF personnel is maintained on a server, accessible to Code Y and Code O locally and when deployed. When

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deployed, FPF approval authority for add-on airborne science personnel is delegated to the designated on-scene supervisor or to the lead mission manager and the pilot-in-command.

- d. Approval for NASA Dryden employees to fly in non-Dryden controlled aircraft in the performance of their duties is covered in Chapter 12, Joint Flight Programs.
- e. Persons on passenger status aboard NASA Dryden aircraft are approved for flight using the passenger manifest filed at the Flight Operations Desk, in accordance with Chapter 10.

### 3. APPROVAL OF FLIGHTS AND AIRCRAFT

- a. Individual research flights must be requested formally through a flight request DFRC Form 129 (Flight Request) approved by the Director of the originating organization. These flights must then be approved by the Director for Flight Operations, who is responsible for ensuring assigned aircrew meet the qualifications established by Dryden policies and procedures. Flight outside of the normal flight envelope (as defined by the aircraft flight manual), involving maneuvers prohibited by the aircraft flight manual, or involving departures, spins, or other out-of-control maneuvers (except T-34 spins) will be treated as a research flight and requires a DFRC Form 129.
- b. Local area research support, maintenance, test training, and proficiency flights by Dryden aircrew must be approved by the Chief, Flight Crew Branch, or the Operations Supervisor (see Chapter 6). The flight profile will be documented with the NASA Flight Plan (OF Form 21) or the ER-2 Flight Authorization Form Y-001.
  - (1). A Flight Monitor reviews the flight profile and provides emergency and other technical support to the flight aircrew for the duration of that flight. It is the responsibility of the Flight Monitor to be readily available to the Flight Operations radio for the duration of the flight. If the Flight Monitor changes during the conduct of the flight, the new Flight Monitor will be annotated on the bottom of the OF Form 21.
  - (2). Research and research support flights conducted with Dryden control room support that have a designated senior Flight Operations representative or mission controller with access to the appropriate flight manuals do not require the designation of a flight monitor. The Director for Flight Operations will designate personnel who can function as senior Flight Operations representatives and mission controllers.
  - (3). Round-robin proficiency flights conducted using a DD-175 flight plan, or equivalent, and do not require a flight monitor.

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- c. Either the Director for Flight Operations or the Director for Airborne Science has the authority to schedule and approve individual DC-8 or ER-2 flights. Approval will be documented on the DFRC DC-8 Flight Manifest or DFRC ER-2 Flight Authorization form. DC-8 flights conducted within the R2508 complex require a flight monitor. A qualified ER-2 pilot will be in the ER-2 operations room for communications with the ER-2 while airborne.
- d. All flights of Dryden aircraft piloted by other than Dryden pilots require the approval of the Director for Flight Operations. Requests and approval will be documented with DFRC Form 176. This approval may be for more than one flight and cover a period of up to one year.
- e. All flights that terminate at an airfield other than Edwards AFB require the concurrence of the Chief, Flight Crew Branch, and the Director for Flight Operations. Requests and approval will be documented with Flight Operations OF Form 20, Flight Authorization. Cross-country flights conducted using a flight plan do not require a flight monitor. Missions conducted to, at, or from deployment sites in support of research or airborne science activities and approved through the AFSRB or ORR process do not require an OF Form 20 if the aircrew possess travel orders.
- f. The Director for Flight Operations will make exceptions to the above documentation requirements on a case-by-case basis. However, all flights will be documented appropriately within the intent of the above requirements.

#### 4. AIRCREW DESIGNATIONS

Aircrew designations are made by the Chief, Flight Crew Branch, and will be documented for each aircrew by specific aircraft type. The Chief, Flight Crew Branch, will insure each aircrew possesses an adequate level of training and experience to perform the duties of the designated position. Overall qualifications for the designations below are made based on aircrew overall flight experience, experience in similar types of aircraft, experience in the actual aircraft type, experience in the specific crew position or duty designation, other training, and demonstrated performance.

- a. **Instructor Pilot (IP):** The Chief, Flight Crew Branch will designate pilots with appropriate qualifications and experience as Instructor Pilot for each aircraft type, research, and support. In addition to normal aircraft instruction, an IP will be required for any flight conducted in dual controlled aircraft when a pilot unqualified in that type occupies the front seat (tandem seat cockpit aircraft), the left seat of a side-by-side seat aircraft certified for single pilot operation, or either seat in an aircraft requiring two pilot operation. Instructor pilots will fly chase on single seat aircraft when a pilot not checked out in that aircraft is flying the aircraft. Instructor pilots will evaluate initial qualification and annual proficiency check flights in research and support aircraft for which they are instructor qualified. Instructor pilots may perform functional check flights on aircraft in which they are IP qualified.

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- b. Pilot (FP): The designation of Pilot signifies full qualification in that aircraft, including acting as aircraft commander of multiple piloted aircraft. Pilots may perform functional check flights if designated as FCF qualified by the Chief, Flight Crew Branch.
- c. Co-Pilot (CP): The designation of Co-Pilot signifies qualified in a multi-pilot aircraft but precludes acting as aircraft commander of that aircraft.
- d. Flight Test Engineer (FTE): Engineers are designated and approved by the Director for Flight Operations to perform flight test engineer duties in flight on research test missions in specified aircraft.
- e. Flight Engineer (FE): Aircrew are designated to perform flight engineer duties in the DC-8 aircraft. The Chief, Flight Crew Branch will designate those FEs with appropriate qualifications and experience as Instructor Flight Engineer (IFE). In addition to normal aircraft instruction an IFE will evaluate initial NASA FE qualification and annual proficiency check rides in the DC-8 or simulator. A qualified FE is required at the engineer console during all critical flight regimes (takeoff and landing) unless an IFE is present and giving instruction.
- f. Navigator (N): Aircrew are designated to perform navigator duties in the DC-8 aircraft. The Chief, Flight Crew Branch will designate those navigators with appropriate qualifications and experience as Instructor Navigator, IN. An IN will conduct the initial training and qualification of all aircrew requiring the designation N.
- g. Loadmaster (LM): Aircrew are designated to perform Loadmaster duties in the C-17 aircraft.
- h. Other secondary aircrew personnel: Other secondary aircrew, such as aerial photographers (AP), flight surgeons (FS), launch panel operators (LPO), or other unique positions aboard Dryden research aircraft are approved by the Director for Flight Operations using DFRC Form 176.

## 5. AIRCRAFT MONITORS

A highly qualified Instructor Pilot, Flight Engineer (if applicable), Navigator (if applicable), or Loadmaster (if applicable) will be identified by the Chief, Flight Crew Branch as the aircraft monitor (AM) for each aircraft type and crew position (research or support aircraft).

- a. Aircraft monitors serve as the primary point of contact with outside agencies for obtaining technical and operational information and insure distribution of relevant information to all assigned aircrew.
- b. Aircraft monitors will define, update, and administer the aircrew training syllabus

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for each aircraft.

- c. Aircraft monitors will conduct systems and emergency procedure reviews during training sessions and safety meetings.

## 6. PROJECT PILOTS

For each research flight project conducted by Dryden Flight Research Center, a lead project pilot will be assigned. Military pilots assigned to Dryden programs are required to be fully qualified for the program, as determined by the Chief, Flight Crew Branch, and the Director for Flight Operations. Each Airborne Science deployment will have an assigned lead project pilot for each type aircraft to work flight operations issues relative to that deployment. The Chief, Flight Crew Branch, will make the assignments which will be documented at the Flight Operations Desk.

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## CHAPTER 2 AIRCREW QUALIFICATIONS

### 1. POLICY

- a. Research test pilots and other aircrew at the Dryden Flight Research Center are engaged in aeronautical research flight programs that may involve the application of advanced and unconventional flying techniques. It is Dryden policy to ensure that each of these flying personnel is thoroughly qualified to operate aircraft and experimental aerospace vehicles within limitations imposed on them individually, and that a systematic program of pilot checkout, training, certification, and currency is maintained at all times.
- b. Airborne Science aircrews based at Dryden accomplish airborne science data collection by conducting worldwide flight operations. It is Dryden policy that each aircrew member is fully qualified to perform their duties safely and effectively in the conduct of above mentioned flights, and that a systematic program of checkout, certification, training, and currency is maintained at all times.
- c. The Chief, Flight Crew Branch, and the Director for Flight Operations shall approve a program of training and checkout for non-Dryden pilots that operate Dryden research or support aircraft.
- d. The Director for Flight Operations insures that all personnel assigned to aircrew duties are fully qualified for their assigned aircrew positions. The qualifications listed below provide guidance on the minimum qualifications required for being hired as aircrew members to perform the assigned position tasks. Once hired as an aircrew member, assigned aircrew may be trained to perform duties associated with other aircrew positions as required to meet Dryden aircraft and mission requirements, as noted below.

### 2. RESEARCH TEST PILOT QUALIFICATIONS

The basic education requirement is successful completion of a standard professional curriculum in an accredited college or university and have been awarded a bachelor's degree, or higher, with major study in an appropriate field of engineering, physical science, life science, or mathematics. In addition, candidates must have a current FAA commercial pilot license with instrument, multi-engine, and single engine land ratings or a pilot and instrument rating from the armed services. Also required is a minimum of 1,750 hours of total time, of which 1,500 hours must be pilot in command flight time, including at least 500 hours in jet aircraft having at least 3000 pounds of thrust per engine. Also required is completion of a flight test course, such as a military test pilot school or equivalent, or at least one year of test piloting experience. Selected candidates must meet the security requirements of the position.

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### 3. DC-8 RESEARCH PILOT QUALIFICATIONS

The basic education requirement is successful completion of a standard professional curriculum in an accredited college or university and have been awarded a bachelor's degree or higher. In addition, candidates must possess an FAA commercial pilot license with instrument, multi-engine and single engine land ratings or possess a pilot and instrument rating from the armed services. Also required is a minimum of 1,500 hours of pilot in command flight time which include at least 500 hours as the pilot in command in a transport or bomber class aircraft with a gross weight of at least 100,000 pounds. Selected candidates must also meet the security requirements of the position.

At the discretion of the Chief, Flight Crew Branch, and Director for Flight Operations, Dryden research pilots may checkout in the DC-8 to perform co-pilot duties without prior transport or bomber experience. They may be upgraded to pilot in command after 200 hours.

### 4. ER-2 RESEARCH PILOT QUALIFICATIONS

The basic education requirement is successful completion of a standard professional curriculum in an accredited college or university and have been awarded a bachelor's degree or higher. In addition, candidates must possess an FAA commercial pilot license with instrument, multi-engine and single engine land ratings or possess a pilot and instrument rating from the armed services. Also required is a minimum of 1,500 hours of pilot in command flight time. As a general policy, pilots should have at least 1000 hours in the U-2 and have been a current U-2 pilot within the past year to be qualified to begin duty as a NASA ER-2 pilot. Selected candidates must also meet the security requirements of the position.

At the discretion of the Chief, Flight Crew Branch, and Director for Flight Operations, Dryden research test pilots may checkout in the ER-2 without prior U-2 experience.

### 5. MISSION SUPPORT AIRCRAFT PILOT QUALIFICATIONS

Assigned pilots who do not meet the qualifications for a research pilot position, who are in training for a research pilot position, or who are assigned to management positions may be authorized to fly support aircraft with the approval of the Director for Flight Operations. The pilot must be designated as a pilot as part of the position description. The basic education requirement is successful completion of a standard professional curriculum in an accredited college or university and have been awarded a bachelor's degree or higher. In addition, candidates must possess a FAA commercial pilot license with instrument, multi-engine, and single engine land ratings or possess a pilot and instrument rating from the armed services. Also required is a minimum of 1,500 hours of total flight time (pilot in command and co-pilot), including 250 hours of pilot in command flight time (1/4 of the total flight time requirement may be waived in accordance with OPM guidelines for GS-2181 individual occupational requirements). To fly as a pilot in command or co-pilot in aircraft with a gross weight greater than 12,500 pounds, the pilot must have at least 500 hours of flight time in that weight category of

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aircraft. Selected candidates must also meet the security requirements of the position.

#### 6. FLIGHT TEST ENGINEER QUALIFICATIONS

The basic education requirements is successful completion of a standard professional curriculum in an accredited college or university and have been awarded a bachelor's degree or higher with major study in an appropriate field of engineering, physical science, life science, or mathematics. Also required is a minimum of 250 hours of total flight time, of which 100 hours must be of relevant flight test engineer experience in jet fighter, transport, or bomber class aircraft. Selected candidates must meet the security requirements of the position.

Dryden assigned pilots may be designated as flight test engineers and receive required training for this position from project pilots. Research engineers, project managers, operations engineers, or other technically qualified persons may be designated as secondary aircrew flight test engineers and receive required training for this position from project pilots.

#### 7. DC-8 FLIGHT ENGINEER QUALIFICATIONS

Candidates must possess a FAA turbojet flight engineer certificate, possess an equivalent rating from the armed services, or be a rated pilot. Also required is a minimum of 1,500 hours of total flight time, of which at least 500 hours are in a transport class aircraft with a gross weight of at least 100,000 pounds. Selected candidates must meet the security requirements of the position.

Dryden research pilots, flight test engineers (primary aircrew only), and navigators may checkout in the DC-8 to perform flight engineer duties without prior flight engineer experience.

#### 8. DC-8 NAVIGATOR QUALIFICATIONS

Candidates must possess a navigator rating from the armed services or be a rated pilot. Also required is a minimum of 1,500 hours of total flight time, of which at least 500 hours are in a transport or bomber class aircraft with a gross weight of at least 100,000 pounds, and international flight planning experience. Selected candidates must meet the security requirements of the position.

Dryden research pilots, flight test engineers (primary aircrew only), and flight engineers may checkout in the DC-8 to perform navigator duties without prior navigator experience.

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9. C-17 LOADMASTER QUALIFICATIONS

Candidates must possess a loadmaster rating from the armed services or equivalent civil experience. Also required is a minimum of 500 hours of total flight time, of which at least 250 hours are in a transport class aircraft with a gross weight of at least 100,000 pounds. Selected candidates must meet the security requirements of the position.

Dryden assigned aircrew may be designated as loadmasters and receive required training for this position from qualified C-17 instructor loadmasters or project pilots for limited loadmaster duties (not involving the loading and unloading of cargo). Technically qualified persons may be designated as secondary aircrew loadmasters and receive required training for this position from qualified C-17 instructor loadmasters or project pilots for limited loadmaster duties. To be considered fully qualified (allowing the loading and unloading of cargo), a loadmaster must attend a formal C-17 loadmaster course of instruction.

10. INSTRUCTOR AIRCREW QUALIFICATIONS

- a. Generally, an aircrew must have a minimum of 500 hours of total flight instructor experience (pilots only) and 50 hours of flight experience in the particular type of aircraft and position (pilot, flight engineer, or navigator) for which an instructor designation is made prior to being designated as an instructor. The 50 hour in-type requirement may be reduced at the discretion of the Chief, Flight Crew Branch, for research test pilots flying prototype or one-of-a-kind experimental aircraft based on the pilot's overall experience, experience in similar aircraft, and familiarization with the particular research aircraft.
- b. Existing staff may be upgraded to instructor status with less than 500 hours of instructor experience at the discretion of the Chief, Flight Crew Branch. In this case, an aircrew must have: pilot, 200 hours as aircraft commander in the specific type of aircraft; flight engineer, or navigator, 100 hours.

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## CHAPTER 3 AIRCREW TRAINING AND CHECKOUT

### 1. PRIMARY AIRCREW TRAINING AND CHECKOUT

- a. Research test pilots normally fly several test aircraft and experimental aerospace vehicles as well as various support aircraft. A research test pilot assigned to a flight project must retain proficiency in the aircraft type or a vehicle of a similar nature. Research pilots who support DC-8 and ER-2 airborne science programs normally fly several mission support aircraft and may support test programs carried on these aircraft. In the event the pilot is not qualified in an aircraft, that pilot will receive qualification training under direction of a current instructor pilot. Other NASA Center, military or civilian instructor resources should be used in the event a current DFRC instructor pilot is not available. Qualification training will vary with the aircraft involved, but will normally include:
  - (1). Ground training (including aircraft and cockpit checkout), handbook study, attendance at formal aircraft training programs, simulator emergency procedure training, and the performance of an aircraft written examination (open book).
  - (2). Checkout flights, which may include dual flights with an instructor pilot or solo flights monitored by an instructor pilot either in a chase aircraft or via radio.
  - (3). For support aircraft, a check ride in a dual controlled aircraft, if available, prior to being cleared for solo flights.
  - (4). For research aircraft, a check ride. The check ride may be dual or chased and may be accomplished during a research flight.
  - (5). Solo flights in which a prescribed number of flights in a given time are performed to complete initial checkout or gain proficiency, followed by support flights and test flights of a limited nature.
  - (6). Additional sorties, as required, to complete training items not completed during the checkout program due to a lack of required resources (such as air refueling).
  
- b. DC-8 flight engineer and navigator and C-17 loadmaster training generally mirrors the training syllabus for pilots, but is tailored towards the specific duties of that crew position. Ground and flight training requirements and completion documentation for DC-8 flight engineer and navigator and C-17 loadmaster checkout, including initial, re-qualification, and instructor checkout, are maintained in training folders in the Flight Crew Branch.

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- c. An initial aircrew checkout training program will be developed by either the lead project pilot (research aircraft), the aircraft monitor (support aircraft), lead DC-8 flight engineer, lead DC-8 navigator, or the C-17 project pilot for loadmasters. The training program will be documented in writing, approved by the Chief, Flight Crew Branch, and filed in the aircrew flight record file. The checkout training program will be tailored to consider previous experience in the general category of aircraft, currency in similar types of aircraft, previous training background, and availability of other resources to insure an adequate level of training. The training program must include exposure to all aircraft handling qualities the aircrew might reasonably encounter during routine or emergency operations without violating flight manual restrictions or limitations. Checkout training should occur within a short enough period of time to assure good continuity, and should not exceed three months as a guide.
- (1). Each flight accomplished during the checkout-training program will be documented, noting completion, maneuvers performed, and proficiency level achieved (dual or chased sorties), using the specific training forms for each aircraft type and the OF Form 14 (Completion of Aircraft Qualification and Recurrency Training). These training syllabi are maintained in each aircraft training folder in the Flight Crew Branch.
  - (2). Pilots who have not completed all specified ground training for a particular aircraft, including attendance at formal schools and simulator training, may fly with a qualified instructor pilot for familiarization. These flights may not be counted as checkout flights for the purpose of obtaining qualification in the aircraft.
  - (3). Local aircraft checkouts are allowed if deemed necessary by the Chief, Flight Crew Branch due to scheduling constraints or other mission considerations. They will be documented in the checkout training program developed for the aircrew.
  - (4). When available, military or civilian training schools will be used to provide primary aircrew with ground school, simulator, and flight training for aircraft checkout and familiarization.
- d. Qualification training is applicable to prototype aircraft that have been operated by other organizations prior to the Dryden pilot's checkout. In the case of new and experimental or research aircraft for which no formal schools are available, the services of the designers and the manufacturer's best qualified personnel will be utilized to brief and familiarize the Dryden pilots with the aircraft and aircraft systems. In addition, existing simulators and aircraft of a similar nature will be used to give the pilot as much preparation as possible for first flight in a research vehicle.

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- e. Other required or special training, such as air refueling, functional check flight qualification, and spin or departure training, is documented and maintained in the aircrew flight record file.
- f. Flight test engineer training is tailored by the project pilot for each research project to meet the specific project requirements, but generally includes ground and simulator training to include required systems operations to be performed by the flight test engineer during routine and emergency operations. Ground and flight training for flight test engineer checkout is project specific, although a training folder is maintained in the Flight Crew Branch to cover overall training events.
- g. Training for all multi-place aircraft will include crew resource management training for normal and emergency operations.
- h. All activities accomplished in support of initial, re-qualification, and instructor checkout in an aircraft will be documented on the Aircrew Qualification Record, Form OF-14, and kept on file in the aircrew flight record file. Additional forms used to document individual training event accomplishments will be attached, as required.
- i. Aircrew will not perform flight duties in a position for which a documented training program has not been completed unless approved by the Chief, Flight Crew Branch and under the supervision of an instructor pilot or instructor aircrew qualified in that position.
- j. Training is not approved until an individual aircrew training plan is documented, reviewed and approved by the Chief, Flight Crew Branch. Training is not complete until the aircraft specific Form OF-14 is reviewed and signed by the Chief, Flight Crew Branch.
- k. Non-essential aircrew will not be carried on flights when initial pilot checkout or upgrade pilot training is to be accomplished.

## 2. PHOTO AND SAFETY CHASE CHECKOUT

- a. Pilots who are graduates of a recognized test pilot school have received training and practical experience during their test career in photo and safety chase procedures. Generally, no additional training will be required. However, to meet special requirements or for breadth of experience the Chief, Flight Crew Branch, may require a pilot to receive additional training prior to being cleared to chase NASA Dryden research test missions.
- b. Research pilots who are not graduates of a recognized test pilot school and who have not received training or practical experience in photo and safety chase procedures require a formal checkout prior to being cleared for chase duties. The Chief, Flight Crew Branch, will approve individuals for such training. The checkout ground

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briefings and flight maneuvers are documented in a special qualifications training folder maintained in the Flight Crew Branch. A syllabus of instruction is documented in writing and placed in the pilot's flight record file. Flight training is documented using the specific training forms for each aircraft type and the OF Form 14 and kept in the flight record file.

### 3. INSTRUCTOR AIRCREW CHECKOUT

Pilots, flight engineers, and navigators are designated to instructor status by the Chief, Flight Crew Branch, based on overall experience, experience in the particular type of aircraft, experience in similar types of aircraft, extensive training with contractor engineers or in contractor simulators, previous instructor experience, extensive knowledge of the aircraft mission, and demonstrated performance.

- a. Dryden qualified instructors will normally conduct the training required for a new instructor. In the absence of Dryden qualified instructor aircrew, contractor, or military instructor aircrew may be used to checkout Dryden aircrew.
- b. A syllabus of instruction is documented in writing and placed in the aircrew flight record file. Individual flight training is documented using training forms for each aircraft type and kept in the aircrew flight record file. Completed training is documented on the Aircrew Initial Qualification form and kept on file in the aircrew flight record file. A nominal syllabus of instruction is available in the specific aircraft training folder.
- c. For aircrew without previous instructor experience, an instructor upgrade plan is documented, reviewed, and approved by the Chief, Flight Crew Branch, and should include training in instructional techniques and exposure to typical situations that an instructor may encounter while performing instructional duties. Use simulators to enhance the instructor upgrade training when available.

### 4. SECONDARY AIRCREW TRAINING AND CHECKOUT

Secondary aircrew will be assigned a training category by the Chief, Flight Crew Branch using the DFRC Form 176. Completed training records are maintained in the Life Support Section. The categories and training are:

- a. Long Term (Not to exceed one year) (Ejection seat aircraft F18/F15/B52 and Non Ejection Seat aircraft T34/DC8/G3/B200/C-17) will include:
  - (1). Annual Physical
  - (2). Egress in assigned aircraft
  - (3). Altitude Chamber (optional if mission profiles do not exceed 10,000 feet)

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- (4). Equipment Issue
  - (5). Water Survival (optional if no over water operations performed)
  - (6). Land Survival
- b. Short term or one time familiarization/orientation flights in all DFRC aircraft:
- (1). Medical clearance by the Flight Surgeon
  - (2). Temporary equipment issue through Life support
  - (3). Egress
  - (4). Other training as directed by the Chief, Flight Crew Branch
- c. Persons on a Passenger-type aircraft when in a passenger status:
- (1). Egress (may be documented using the flight manifest)
  - (2). Other training as directed by the Chief, Flight Crew Branch, on a Form 176

## 5. PRIMARY AIRCREW TRAINING RECORDS

To ensure that all Dryden aircrew maintain the high level of qualifications and currency standards required by the Dryden Flight Research Center, the Director for Flight Operations will maintain a system of records, notices, and reports covering each individual aircrew in the organization. A computerized system will be used to track accomplishment and due dates for all training. The Chief, Flight Crew Branch, will designate who enters data into the computerized system. This system will include:

- a. A daily log showing the flights flown by individual pilots, flight time, type of flight, and type of aircraft or research vehicle involved.
- b. A monthly flight report for each primary aircrew showing status with respect to training and currency requirements.
- c. A training file (flight jacket) for each primary aircrew to include:
  - (1). Emergency notification data.
  - (2). Copies of FAA and FCC licenses and rating forms.
  - (3). Initial qualification records, including attendance at formal ground and flight schools, checkout grade sheets, initial proficiency check rides, written examination record, and simulation and emergency procedure training. These records are maintained for two years or until the aircrew achieves 100 hours of flight experience, whichever occurs later.
  - (4). Upgrade (to other crew duty positions) or re-qualification training records, including attendance at formal ground and flight schools, checkout grade sheets, and check rides. These records are maintained for two years.
  - (5). Recurrency certifications including copies of FAA, civilian, or military training certificates, formal flight schooling, proficiency check rides, written examination record, and recurring simulation and emergency procedure training. These records are maintained for two years.

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- (6). Specialized training records, such as attendance at aviation safety officer school, accident investigation courses, or other related training.
  - (7). Other training records, as determined by the Chief, Flight Crew Branch.
- d. The Life Support Section will keep current records for primary and secondary aircrew to include:
- (1) Ejection/egress training.
  - (2) Physiological training.
  - (3) Medical clearance.
  - (4) Water survival training.
  - (5) Land survival training (with emphasis on desert survival).
  - (6) Specialized training to support individual project requirements.
- e. ER-2 Physiological, Ejection Seat, and survival training records and copies of ER-2 Pilot Medical Clearances will be maintained by the ER-2 aircraft monitor.
- f. A member of the Flight Crew Branch will be designated as the training officer and be responsible to monitor flight jackets and life support training to insure training is current for all assigned aircrew.

## 6. AIRCRAFT TRAINING FOLDERS

Aircraft training folders are maintained in the Flight Crew Branch for each aircraft type flown at the Dryden Flight Research Center. These training folders contain the primary aircrew ground and flight training syllabus for initial aircraft checkout, re-qualification training, and instructor checkout. Additionally, training for flight test engineer checkout is documented in aircraft training folders where applicable. A general flight test engineer checkout training folder is maintained to cover those training items common to all research test aircraft. A photo and safety chase checkout training folder is also maintained.

## 7. NEW AIRCREW CHECKLIST

Prior to the first flight newly assigned pilots shall complete at a minimum the following list of items.

- a. Accomplish, or provide documentation of a current, flight physical.
- b. Accomplish, or provide documentation of current, physiological training.
- c. Provide documentation of or schedule required water and land survival training with Life Support Section, to be accomplished at next available opportunity.
- d. Conduct DFRC egress training for the applicable aircraft.
- e. Ensure the training officer assembles aircrew flight record file.
- f. Complete emergency data form.
- g. Complete applicable aircraft open book exam.
- h. Complete an aircraft emergency procedure review.
- i. Complete required reading.

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- (1). DOP-O-300 and NPR 7900.3A, Chapter 3 (if applicable).
- (2). AFFTC Instruction 11-1
- (3). Aircraft Flight Manual/NATOPS
- (4). FCIF
- (5). Safety Read File
- j. Receive safety briefing from the Aviation Safety Officer.
- k. Insure that an appropriate training syllabus is developed by the aircraft monitor, approved by the Chief, Flight Crew Branch, and documented in the flight record file.
- l. Schedule and accomplish in accord with the training syllabus applicable aircraft ground and simulator training.
- m. Insure that the Chief, Flight Crew Branch signs the Aircrew Qualification Record authorizing the training in the appropriate block.

Once the necessary items are completed the Chief, Flight Crew Branch will provide authorization to the newly assigned pilot to begin flight operations.

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## CHAPTER 4 AIRCREW CURRENCY AND PROFICIENCY

### 1. AUTHORITY TO ESTABLISH CURRENCY REQUIREMENTS

The Director for Flight Operations, has the authority to establish and approve all flight currency requirements for all aircrew assigned to Dryden. This includes general and long term flight currency requirements and specific requirements established for particular flight research programs and aircraft.

### 2. WAIVER OF REQUIREMENTS

A waiver of currency requirements may be granted by the Director for Flight Operations, in connection with a Dryden Flight Research Center flight operation. Such waivers will be based on the recommendation of the Chief, Flight Crew Branch and in consideration of the nature of flight operations, the particular vehicle involved, and the overall qualifications of the individual aircrew concerned. Waivers will be requested and approved in writing and filed in the aircrew flight jacket.

### 3. LOGGING OF FLIGHT TIME

Aircrew qualifications for all Dryden assigned aircraft are maintained by the Chief, Flight Crew Branch. Designated aircrew log flight time as indicated in the paragraphs below. Aircrew designated as FTE, FE, or N as their primary duty in a particular aircraft may not log flight time in other crew capacities in that aircraft. Flight time is recorded in the Dryden Monthly Flight Time Report.

- a. First Pilot (FP) time is logged by pilots when actually piloting any aircraft in which they are qualified, when piloting any single seat aircraft, and when piloting any other aircraft while under the supervision of an instructor pilot.
- b. Co-pilot (CP) time is logged by a pilot when performing duties other than actual control of the aircraft. Pilots can log CP time in any aircraft while they are in a pilot (or co-pilot) seat with access to flight controls but not actually flying the aircraft.
- c. When two FP qualified pilots fly together only one pilot at a time can log FP time, the other must log CP time. Both pilots can log FP time during a single flight but the sum total cannot exceed the aircraft total flight time.
- d. Instructor Pilot (IP) time may be logged by a pilot when performing instructor pilot duties while in an aircraft for which he is designated as an instructor. IP time may be logged in single-seat or dual controlled aircraft. When logged in single-seat aircraft, a pilot may log IP time only while chasing a pilot under instruction and actually performing the duties of an instructor. In dual controlled

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aircraft, a pilot may log IP time when flying with a pilot under instruction who is logging FP or CP time.

- e. Flight Test Engineer (FT) time is logged by non-pilot crewmembers on test missions when performing the duties of a flight test engineer.
- f. Flight Engineer (FE) time is logged by a crewmember performing the duties of a flight engineer for the duration those duties are performed.
- g. Instructor Flight Engineer (IF) time is logged while supervising a FE under instruction.
- h. Navigator (NN) time is logged by a crewmember performing the duties of a navigator for the duration those duties are performed.
- i. Instructor Navigator (IN) time is logged while supervising a navigator under instruction.
- j. Loadmaster (LM) time is logged by a crewmember performing the duties of a loadmaster for the duration those duties are performed.
- k. FE, LM, and NN time for a flight may be split between two dual qualified crewmembers.
- l. Observer (OV) is logged by any crewmember when aboard an aircraft in flight and not occupying an aircrew position. This time is not used to meet minimum annual or semiannual flight requirements.

#### 4. GENERAL AIRCREW CURRENCY REQUIREMENTS

Once checked out in an aircraft, a primary aircrew member must maintain currency by a designated minimum number of flights and training events in a given period of time. The Chief, Flight Crew Branch, or a designated representative, will monitor each aircrew currency. General currency requirements for aircrew are as follows:

- a. For a pilot to be current in an aircraft, one landing in that aircraft type must have been made in the previous 45 days.
- b. After 45 days, the pilot must regain currency by reviewing normal and emergency procedures and aircraft limitations with an IP. The flight plan will be annotated with evidence of the accomplishment of this requirement and initialed by the instructor pilot and the Operations Supervisor. In the absence of a flight plan, a letter documenting the required review above will be posted in the pilots flight jacket. The pilot then must make a landing with a current IP in the aircraft. If the aircraft is single seat, the IP will monitor the flight from a chase aircraft (preferred) or by radio.

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- c. If all pilots are non-current, the senior IP available for that aircraft will review normal and emergency procedures and aircraft limitations with another instructor pilot or a pilot designated by the Chief, Flight Crew Branch. The flight plan will be annotated with evidence of the accomplishment of this requirement and initialed by the instructor pilot and the Operations Supervisor. In the absence of a flight plan, a letter documenting the required review above will be posted in the pilots flight jacket. The senior instructor pilot then regains landing currency while being monitored by the designated IP occupying a pilot position, or by chase aircraft or radio in the case of a single seat aircraft.
- d. The Chief, Flight Crew Branch, with the concurrence of the Director for Flight Operations, may designate surrogate aircraft of similar performance and handling qualities to meet the landing currency requirement for specific research aircraft. For example, a high performance fighter or trainer proficiency aircraft may be used to meet the landing currency requirement for a high performance fighter research aircraft. In this case, the landing currency requirement for the research aircraft may be extended to 180 days instead of 45 days if the pilot is current in the designated surrogate aircraft. However, a normal and emergency procedures review is required and documented in accordance with paragraph 4b above.
- e. Over 1 year, the pilot must accomplish a recurrency checkout program documented in writing and approved by the Chief, Flight Crew Branch.
- f. Accomplishment of a FAA approved or military training program, including a NASA or FAA check ride in a simulator, can be used to meet the above currency requirements with the approval of the Chief, Flight Crew Branch.
- g. The B747 SCA aircraft is operated by DFRC aircrew in accordance with Johnson Space Center currency requirements.
- h. Additional DC-8 pilot currency requirement: Prior to a DC-8 deployment, each pilot will fly a sortie such that they will not exceed the 45 day currency in the DC-8 prior to assuming pilot responsibilities during the deployment. If the pilot has not made a DC-8 landing within 45 days he is still considered current for research missions if the pilot complies with the FAA rule of three (3) landings within the previous 90 days.
- i. Additional ER-2 pilot currency requirements.
  - (1). Minimum of one Simulated Flameout (SFO) approach and one no-flap landing each 90 days.
  - (2). One sortie within two weeks prior to any deployment with a hazard identified as an accepted risk in the deployment Operational Readiness Review.
  - (3). If non-current for SFOs or no-flap landings, the pilot will review flight

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manual procedures for the non-current maneuver and accomplish the maneuver on the next flight.

- (4). The ER-2 aircraft monitor may authorize additional ER-2 proficiency flights, if required, to maintain pilot proficiency or to accommodate proficiency requirements for unique ER-2 operations.
  
- j. Passengers or non-essential aircrew will not be carried in NASA Dryden aircraft unless the pilot-in-command is current in the aircraft being flown. Waiver of this requirement must be approved in writing by the Director for Flight Operations. Other pilots (multi-place aircraft) who are not current in landings may not perform landings while carrying passengers or non-essential aircrew aboard the aircraft.
  
- k. For DC-8 flight engineers, the basic currency requirement is one flight each 90 days in the aircraft. DC-8 FE may regain proficiency as follows:
  - (1) Perform DC-8 FE duties under the supervision of a designated Instructor Flight Engineer (IFE) who is current in the aircraft.
  - (2) Perform FE duties in a FAA approved DC-8 flight simulator under the supervision of a DFRC designated IFE or a FAA approved instructor.
  - (3) In the event that all FEs are non-current and a DC-8 flight simulator is not available, the senior IFE will review normal and emergency procedures and aircraft limitations with another FE designated by the Chief, Flight Crew Branch. The senior IFE will fly in the aircraft with an instructor pilot to regain currency. The senior IFE will then supervise flights for the remaining FEs in accordance with paragraph 6i(1) above.
  - (4) Waivers to the above procedures may be granted in writing by the Director for Flight Operations.

DC-8 flights that carry passengers or non-essential aircrew must be crewed with a current DC-8 flight engineer. Waiver of this requirement must be approved by the Director for Flight Operations.

- l. For Loadmasters, the basic currency requirement is one flight each 90 days in the aircraft. A loadmaster may regain proficiency by performing loadmaster duties under the supervision of an Instructor Loadmaster who is current in the aircraft. Waivers may be granted in writing by the Director for Flight Operations.
  
- m. There is no flight currency requirement for DC-8 navigators.
  
- n. There is no aircraft-specific flight currency requirement for flight test engineers.
  
- 5. PILOT ANNUAL FLIGHT PROFICIENCY REQUIREMENTS

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- a. Overall annual requirements for Dryden research pilots are as follows:
- (1) Annual proficiency level is a minimum of 120 sorties or 200 hours per year (either criterion may be used).
  - (2) Semiannual proficiency level is a minimum number of 60 sorties or 80 hours per six months (either criterion may be used). Pilots qualified in single-seat type high performance aircraft should obtain at least 30 sorties per six months in high performance aircraft.
  - (3) Minimum night flying time per year is 5 hours (2 hours per six months). Pilots qualified in single seat type high performance aircraft should obtain at least one night sortie per half in high performance aircraft.
  - (4) Minimum instrument flight time per year is 20 hours per year (10 hours per six months) of which 10 hours (half of the total requirement) may be obtained by simulator operations.
  - (5) Minimum number of precision approaches per six months – 3
  - (6) Minimum number of non-precision approaches per six months – 3
  - (7) Annual proficiency level for ER-2 pilots is 24 sorties or 100 hours in the ER-2. The minimum requirement per six months is 12 sorties or 40 hours.
  - (8) There is no established minimum number of sorties or hours in any particular aircraft type, except as noted above.
- b. Dryden research pilots in management positions, Dryden research pilots so designated in writing by the Chief, Flight Crew Branch, other Dryden mission support aircrew assigned to piloting duties on a part-time basis, and NASA pilots not assigned to Dryden but who are authorized by the Chief, Flight Crew Branch to fly Dryden aircraft must meet the requirements of paragraph 4 above. For these pilots, the requirements of paragraph 5 are modified as follows:
- (1) Minimum number of sorties is 60 sorties per year or the minimum flight time per year is 100 hours (either criterion may be used).
  - (2) The minimum number of sorties is 30 per six months or the minimum semiannual flight time is 40 hours (either criterion may be used). Pilots qualified in single seat type high performance aircraft should obtain at least 30 sorties per half in a high performance aircraft
  - (3) All other requirements of paragraph 5a above remain the same.
- c. The Director for Flight Operations may designate certain pilots as “Day, VFR

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only” or “Day only”. These pilots will meet the requirements of paragraph 4 and 5 above, except for the night and instrument time requirements are waived, as appropriate. These designations will be documented on the aircrew initial checkout form for the aircraft and maintained in the flight record file. Unless otherwise documented, the pilot is considered fully qualified in the aircraft.

- d. Failure to meet the above minimum requirements, due to illness, extended or frequent travel, special assignments not involving flying, or other reasons, is documented by the Chief, Flight Crew Branch, in the individual aircrew training folder.

## 6. RECURRENT TRAINING REQUIREMENTS FOR PILOTS

- a. Each pilot will complete an annual instrument review and refresher class (USAF or USN instrument refresher training) every 12 months to review the latest information for IFR operations. A locally prepared instrument examination may be taken in lieu of attendance at a formal instrument refresher course.
- b. Every 12 months each pilot will complete recurrent training for each type test, support or airborne science aircraft in which they are qualified. The recurrency training date is based on the last day of the month in which the proficiency check ride is accomplished. A period of up to three months prior to the month in which the proficiency check flight is due may be used to accomplish the emergency procedure review, aircraft written examination, and aircraft specific training that are linked to the annual proficiency check flight requirement. Recurrent training requirements will be specified by each aircraft monitor or lead project pilot to include an aircraft proficiency check ride to demonstrate proficiency in normal, instrument, and emergency procedures as defined and documented on the specific aircraft Form OF-14.

A proficiency check ride requires the following maneuvers, as a minimum: Flight planning, mission briefing, ground procedures, takeoff, normal and emergency landing patterns normally practiced in flight, post landing procedures, mission debriefing, and other maneuvers deemed appropriate by the aircraft monitor. If instrument maneuvers are required, the following additional maneuvers will be flown as a minimum: precision (if the aircraft is ILS equipped) and non-precision instrument approaches, and missed approaches.

Proficiency check rides may be accomplished in either the aircraft or the simulator, or a combination of both, as determined by the aircraft monitor and approved by the Chief, Flight Crew Branch.

The annual emergency procedure review will be accomplished in a simulator suitable for emergency procedures training under the supervision of a fully qualified pilot or simulator instructor in the specific type of aircraft. If a suitable simulator is not available, a table-top emergency procedure review may be used, conducted by the aircraft monitor or lead project pilot. For multi-place aircraft,

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the emergency procedure review simulation should be accomplished with a full NASA crew to facilitate crew resource management training.

Any refresher training accomplished at an approved commercial training establishment or through the military may be utilized to fulfill the above requirements. Check rides completed under the supervision of a qualified military or civil check pilot may be used to fulfill the proficiency check ride requirement for a particular aircraft if properly documented.

- c. Each pilot will complete a review of egress procedures every 12 months for each ejection seat aircraft flown under the guidance of the qualified Life Support Section (OFL) personnel. For non-ejection seat aircraft, a review of egress procedures will be accomplished in conjunction with the annual proficiency check ride. The Life Support Section will keep the records of the ejection/egress training. The ER-2 aircraft monitor will maintain ER-2 records. Equivalent military egress training, conducted by a military trainer, may be used to meet this requirement.
- d. If a life support technician is not available in a timely manner to provide egress training for any aircraft, a qualified pilot for that aircraft may provide egress training and is responsible to insure the training is properly documented in the Life Support Section.

#### 7. RECURRENT TRAINING REQUIREMENTS FOR DC-8 FLIGHT ENGINEERS AND NAVIGATORS

- a. Every 12 months each flight engineer will complete recurrent training for the DC-8 aircraft. Recurrent training will be specified by the DC-8 flight engineer monitor and is defined and documented on the DC-8 Form OF-14.

An emergency procedures review will be accomplished in a simulator suitable for emergency procedures training under the supervision of an IFE, an IP, or a fully qualified instructor. If a suitable simulator is not available, a table-top emergency procedure review may be used, conducted by the DC-8 FE monitor.

These activities will be recorded in the flight engineer's flight jacket. Any refresher training accomplished at an approved commercial training establishment may be utilized to fulfill the above requirements.

- b. Each flight engineer and navigator will complete a review of DC-8 egress procedures every 12 months under the guidance of the qualified Life Support Section (OFL) personnel. The Life Support Section will keep training records.

#### 8. RECURRENT TRAINING REQUIREMENTS FOR LOADMASTERS

- a. Every 12 months each loadmaster will complete recurrent training for the C-17 aircraft. Recurrent training will be specified by the C-17 aircraft monitor as

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defined and documented on the C-17 Form OF-14.

These activities will be recorded in the loadmaster's flight jacket. Any refresher training accomplished at an approved military training establishment may be utilized to fulfill the above requirements.

- b. Each loadmaster will complete a review of C-17 egress procedures every 12 months under the guidance of qualified Life Support Section (OFL) personnel or USAF loadmaster. The Life Support Section will keep training records.

9. **FLIGHT REQUIREMENTS FOR FLIGHT TEST ENGINEERS AND SECONDARY AIRCREW**

- a. Persons assigned as a flight test engineer in the pilot's office (Code OF) or long term flight status as either flight test engineers (FTE) or aerial photographers (either still or video) in high performance aircraft should fly at least once per 60 days in a high performance project aircraft, a support F-18, or the T-34.
- b. Persons assigned to long term flight status to support projects in other than high performance aircraft (transport or bomber class aircraft, business class aircraft, light aircraft, etc.) do not have a flight currency requirement. Aircraft monitors or project pilots will insure that individuals assigned to these aircraft are properly trained prior to flight to accomplish the assigned mission.
- c. The Pilot in Command is responsible to ensure that crewmembers and passengers meet the applicable training requirements. The Director for Flight Operations may grant a waiver of requirements. Such waivers will be based on the recommendation of the Chief, Flight Crew Branch and in consideration of the nature of flight operations and the particular vehicle involved.

10. **SPECIFIC FLIGHT PROJECT REQUIREMENTS**

- a. Pilot readiness and currency requirements for specific flight research projects and experimental aircraft are established by the Director for Flight Operations, the Chief of the Flight Crew Branch, or the project pilot, on an individual basis.
- b. If the complexity of the research aircraft does not require a special operations plan, the general flying requirements for proficiency will prevail.
- c. For the DC-8 and ER-2, specialized training required to support deployment operational requirements are identified by the deployment project pilot and accomplished by affected aircrew prior to the deployment.

11. **GROUNDING OF AIRCREW**

- a. Mandatory temporary grounding of aircrew will occur for the following reasons until the specified corrective action is completed:

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- (1). Flight physical overdue. Aircrew must complete a flight physical to resume flight duties.
  - (2). Physiological training overdue. Aircrew must complete physiological training to resume flight duties, if physiological training is required.
  - (3). Egress and ejection seat training overdue. Aircrew must complete egress and ejection seat training to resume flight duties in the aircraft for which training is required.
  - (4). Check ride overdue. Pilot is restricted from solo operations (only pilot aboard the aircraft) in the aircraft type until the check ride is completed. In multi-place aircraft, the pilot is restricted from performing pilot-in-command duties until the check ride is completed. In single place only aircraft the pilot must receive a check ride at the next opportunity. The Chief of the Flight Crew Branch may use discretion and waive this requirement, in writing, if an aircraft is unavailable or for other unforeseen circumstances, but the check ride must be completed expeditiously.
  - (5). No other overdue training requires a mandatory grounding, but must be waived in writing by the Chief of the Flight Crew Branch and completed expeditiously.
  - (6). Flight physicals and training are not considered overdue until the first day of the month following the month in which the physical or training expires.
- b. The Chief of the Flight Crew Branch or the Director for Flight Operations have the authority and responsibility to temporarily ground aircrew, in writing, for a period of up to 30 days for flight discipline or flight safety violations, or for other reasons as deemed appropriate. He/she also has the authority and responsibility to recommend permanent grounding of aircrew.
- c. Upon concurrence of the next level supervisor on the recommended permanent grounding, the Center Director shall be notified immediately so that he/she may appoint a Flight Status Review Board. The functions of this board are covered in Chapter 4, Section 11 of this manual.

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- d. In all cases of a permanent grounding of flight crew, the cognizant supervisor shall, within 30 calendar days of the action:
  - (1). Conduct a performance appraisal review with the grounded flight crew that shall include a discussion of reasons for the grounding action and annotate the performance appraisal to reflect the situation, and
  - (2). Coordinate with management and the Dryden Human Resources Branch to effect the timely and appropriate reassignment of position duties of the affected flight crew.

## 12. FLIGHT STATUS REVIEW BOARD

- a. Whenever a Flight Crew is removed from flight status by the authority vested in relevant supervisors, that situation will be reviewed by a third party board (which may include aircrew members from other NASA Centers). This board will be appointed by the Center Director and shall be disbanded after presenting their Findings and Recommendations to the appropriate members of management. The grounded flight crew may waive his/her right to this review in writing, at any time during the process, and in such cases, the Board will terminate at that time.
- b. The Board's scope includes all elements pertinent to the grounding that are necessary to arrive at their conclusions and recommendations. However, their scope does not include personnel assignment options beyond the flight status issue. The Board should feel free to call upon any Center resources required in the course of their review.
- c. All testimony, deliberations, findings, and recommendations occurring in the course of the review shall be deemed confidential and distributed only on a need-to-know basis.
- d. Relevant supervisors may also request of the Center Director that a Flight Status Review Board be appointed "before the fact" to aid that supervisor in his/her decision making process regarding a contemplated removal from flight status. In this case, the candidate for grounding may not waive his/her right to the review.

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## CHAPTER 5 FLIGHT SCHEDULING AND PLANNING

### 1. SCHEDULING OF FLIGHTS

- a. An aircrew member will be assigned the collateral duty of Scheduling Officer. The Scheduling Officer will:
  - (1). Schedule all flights, considering research priority and aircrew availability.
  - (2). Monitor flight time and inspection requirements on proficiency and support aircraft, and adjust flight schedules to integrate flight and maintenance requirements.
  - (3). Notify aircraft maintenance operations concerning aircraft requests, including time of flight, fuel service required, and type of mission.
  - (4). Keep the Chief, Flight Crew Branch briefed and current on daily schedules of research support, maintenance, and proficiency flights.
  - (5). Assist the Chief, Flight Crew Branch, in insuring that all assigned aircrew meet the minimum landing currency and proficiency flight requirements.
  - (6). Work with and assist the Flight Scheduling Office to assure that all airspace, range, and frequency requirements are scheduled with AFFTC.
  
- b. Dryden Flight Operations will maintain logs and other appropriate documentation to record pilot and aircraft flight times. Aircraft flight time will be coded by mission type:
  - X-1 Research test flights
  - X-2 Research support flights, such as:
    - a. Safety or Photo chase support
    - b. Research mission training
    - c. Instrumentation or data system checkout
    - d. Range operations support
  - X-3 Maintenance functional check flights
  - X-4 General proficiency or program support flights
  - X-5 Mission Management flights
  - X-6 Airborne Science research flights

### 2. PRIMARY AIRCREW DUTY TIME

Maximum primary aircrew (pilot, flight engineer, navigator, and loadmaster) duty times are shown below. Crew duty time is the total time a crew is on duty before the final termination of a flight. Crew duty time accrues consecutively and begins when a

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crewmember reports to his/her designated place of duty and ends when the aircraft is parked and shutdown. Each crewmember must have at least twelve hours off duty after completing all post-flight activities prior to being required for a subsequent flight (either ground or flight duties). These requirements can be waived by the Director for Flight Operations or a designated representative on an individual basis.

- a. Single piloted aircraft or dual piloted aircraft with one pilot - 12 hours
- b. Dual piloted aircraft with two qualified pilots on board - 14 hours
- c. Dual piloted aircraft with three qualified pilots on board - 16 hours
- d. DC-8 – An additional flight engineer is required onboard to extend duty time beyond 14 hours. An additional navigator is required onboard to extend the duty time beyond 14 hours if the navigator is required for mission accomplishment.
- e. C-17 – An additional loadmaster is required onboard to extend duty time beyond 14 hours.
- f. Constraints for ER-2 Flights:
  - (1). 6.5 hour normal flight duration. Flight duration can be extended with concurrence of the Chief, Flight Crew Branch, or the Director for Flight Operations.
  - (2). ER-2 pilots will not fly longer than 6.5 hour flights on consecutive days.
  - (3). Pilots flying ER-2 missions of 9.0 hours or more will be given the following physiological recovery time:
    - (a). First day after the flight (24 hour period) - no duties.
    - (b). Second day after the flight (48 hour period) - ground duties only.
  - (4). The pilots will make a judgment in the field if any other constraints are applicable. These constraints would be based on factors such as:
    - (a). Adequacy of crew rest facilities
    - (b). Duties between flights
    - (c). Length, complexity and timing of flights
    - (d). Previous levels of flight activity

### 3. MINIMUM REQUIRED AIRCRAFT CREW COMPLEMENT

- a. All aircraft will be operated with all required crew positions staffed by fully qualified and current aircrew, or staffed by aircrew in training and under the supervision of a current instructor fully qualified for the duties of the position. Typically, instructor pilots will occupy a position where aircraft control can be

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assumed when the other seat is occupied by an aircrew in training (single seat aircraft excepted).

- b. For single seat aircraft, the required crew is one pilot fully qualified in the aircraft or a pilot in training and under the supervision of an instructor pilot.
- c. For tandem two-seat aircraft that can be fully operated from a single seat, the required crew is one pilot occupying the primary pilot position (typically the front seat).
- d. For side-by-side seat aircraft that are certified for single pilot operation, the required crew is one pilot. However, for operational considerations, it is desired to operate these aircraft with both seats occupied to facilitate air traffic avoidance. In this case, the second (co-pilot) seat may be occupied by any assigned pilot or by any primary aircrew with a military aeronautical rating (navigator or flight surgeon). The Chief, Flight Crew Branch may designate other primary or secondary aircrew qualified to occupy the co-pilot seat during non-passenger carrying flights.
- e. For side-by-side seat aircraft that require two pilots at the controls, the required crew is two qualified pilots (including co-pilots), or one instructor pilot and one pilot in training.
- f. During non-critical and benign flight phases, such as cruise flight, pilot or co-pilot positions may be occupied by non-qualified persons for brief periods of time for orientation purposes at the discretion of the aircraft commander as long as the other seat is occupied by a fully qualified pilot. However, for critical flight phases, including takeoffs and landings, all required aircrew positions will be occupied by persons fully qualified for those positions or in training to obtain qualification and under the supervision of an instructor fully qualified in the position.

#### 4. RESEARCH FLIGHT CREW REQUIREMENTS

The specific aircrew qualifications for the accomplishment of research flights are:

- a. Research test flights involving the following require a research test pilot to fly the aircraft or test points. The minimum essential aircrew required to accomplish the test objectives will be scheduled.
  - (1). Flight of experimental or highly modified aircraft.
  - (2). Accomplishment of specific test maneuvers involving envelope expansion, flight outside of the normal aircraft operating envelope, flying qualities, unusual flight profiles, test maneuvers prohibited by the aircraft flight manual (such as spins), carriage of uncertified external loads,

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internal or external load separation or drop tests, or precision control of aircraft flight conditions.

- (3). Accomplishment of tests that involve the evaluation of experimental or modified flight displays or the use of specialized equipment, such as night vision goggles.
  - (4). Other flights, as directed by the Chief, Flight Crew Branch, or the Director for Flight Operations.
- b. The first series of flights of the DC-8 aircraft with experiment loads that substantially alter the external configuration of the aircraft from previously flown configurations or involve separation or drop tests require a research test pilot as the pilot in command. This series of DC-8 research flights is flown with the minimum essential aircrew required to accomplish the test objectives, as determined by the lead project pilot. Once flown by a research test pilot and all operating restrictions for the aircraft configuration are noted in the aircraft fact sheet, any DC-8 research pilot may fly subsequent flights.
  - c. ER-2 flights that involve experiment loads that involve external load separation or drop tests require a research test pilot to review the aircraft configuration and planned flight profiles prior to flight. The research test pilot then will brief the ER-2 research pilots on any concerns or procedures required for safe operations.
  - d. Other research flights which are of a carry-along nature involving the collection of systems data, such as range telemetry system performance data or electronic system data, that involve benign flight conditions or maneuvers may be accomplished by any research or mission support pilot qualified in the aircraft at the discretion of the Chief, Flight Crew Branch.
  - e. Chase missions in support of research flights are generally flown by research test pilots trained in chase procedures. Non-test research or mission support pilots may be qualified to perform chase duties if the pilot: 1). Is designated by the Chief, Flight Crew Branch to perform chase missions, 2). Completes a prescribed chase checkout program, and 3). The mission is deemed benign in nature by the Chief, Flight Crew Branch.

## 5. FLIGHT PLANNING FACILITIES

To meet the responsibility for the flight operations at Dryden, the Flight Operations Directorate directs and coordinates a flight planning operation with facilities and information sufficient to provide for complete self-briefing and preflight planning by all Dryden and visiting pilots. This includes:

- a. A flight planning room with storage for information files, maps, and charts required by pilots, and wall space for the display of aeronautical information.

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- b. Pilot information files containing applicable NASA and Dryden flying policies, procedures, instructions, and regulations; applicable Department of Defense and other federal agency regulations on operations, flying and flight safety; flight manuals; local Edwards Air Force Base flight operations regulations and other pertinent data relating to Dryden flight programs, projects and mission.
- c. A Flight Crew Information File (FCIF) for ensuring that all Dryden primary aircrew are familiar with the latest information applicable to their assigned responsibilities. A crewmember's initials and date on the FCIF card and publication distribution card(s) indicates that he/she has received/reviewed the new information. Current FCIF cards are required for flight (both general FCIF card and the applicable aircraft specific FCIF card). The pilot-in-command is responsible for insuring that all crewmembers are current. FCIF cards will be maintained on all primary aircrew assigned to support Dryden flight research projects. FCIF cards are maintained for the following information:
  - (1). Information of a temporary nature relevant to flight operations within the R2508 complex (typically issued by AFFTC), safety meeting minutes, or other information deemed appropriate for NASA DFRC operations. An FCIF card is maintained for this purpose for each assigned aircrew.
  - (2). Flight publications for specific aircraft, such as flight manuals, checklists, fact sheets, mission rules, etc., deemed necessary for safe operation. A separate FCIF card is maintained for each aircraft type for each aircrew qualified in that aircraft.

Due to the physical separation of the ER-2 operation from Bldg. 4800, a separate Flight Crew Information File applicable to the ER-2 will be maintained at ER-2 Operations in Hangar 1623.

- d. Displays of flight information maps and local flight planning maps, showing standard routes, control zones, and airways, and giving details of local danger areas and flying areas. Also, a display of the Edwards Air Force Base airfield plan map showing runways, taxiways, runway and taxiway dimensions, runway gradient, field elevation, overruns, adjacent terrain features, and airfield hazards.
  - e. Access to a computer for the display of NOTAM and national weather data.
6. FLIGHT CLEARANCES
- a. The pilot in command of a Dryden aircraft will ensure that a flight plan is prepared prior to every flight. The form used will be one of the following:
    - (1). Local research and research support flights – the Research Flight Request (DFRC Form 129).

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- (2). Local flights in VFR conditions - DFRC Local VFR Flight Plan (OF Form 21)
- (3). Local flights in IFR conditions - Military Flight Plan (DD Form 175)
- (4). Departure from military airfields - Military Flight Plan (DD Form 175) or DOD International Flight Plan (DD Form 1801)
- (5). Departure from civil airfields - Flight Plan (FAA 7233-1) or DOD International Flight Plan (DD Form 1801)
- (6). ER-2 local flights in VFR conditions - ER-2 Flight Authorization (DFRC Form Y-001).
- (7). All research, test support, and proficiency flights conducted within the R-2508 complex or originating and terminating at Edwards AFB and flight planned on a DFRC Local VFR Flight Plan (OF Form 21) require an operations number from the Air Force Flight Test Center scheduling office. Cross country and round-robin proficiency flights conducted using a DD Form 175, DD Form 1801, or FAA 7233-1 and originating at Edwards AFB do not require an operations number. Missions which involve deployment to other fields for an extended time do not require an operations number.

## 7. FLIGHT PUBLICATIONS FOR RESEARCH AIRCRAFT

- a. Research aircraft are frequently highly modified to accomplish test objectives. It is critical to document those modifications that affect the operation of the aircraft, including normal and emergency procedures, instrumentation system operating procedures, and flight limitations. This may be accomplished through fact sheets posted in the flight manual (for minor or temporary changes), flight manual supplements (for more extensive changes), or a complete re-write of the flight manual (for major modifications). Normal and emergency procedure checklists should be modified or re-written so that pilot procedures, as applied to the particular test aircraft, are clear to the pilot and supporting test team in the control room. It is generally undesirable to require reference to multiple flight manuals during an emergency. Therefore, whenever practical, a consolidated single document should be created for each test aircraft. Mission rules or guidelines may be written by research projects that further define how research aircraft are operated during research test missions. Project pilots should review and sign fact sheets, locally generated flight manuals and supplements, modified checklists and mission rules/guidelines to indicate they have been reviewed and approved for use. Fact sheets, flight manuals/supplements, modified checklists, and mission rules/guidelines should be posted in the pilots' office with the master flight manual for the aircraft.

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- b. The manufacturer or military user no longer updates certain research aircraft flight manuals because the aircraft is no longer used in the active inventory. In these cases, flight manuals for newer models of the aircraft should be maintained and referenced to determine if procedures for the research aircraft should be revised.

## 8. AIRCRAFT MAINTENANCE RECORDS

Each aircraft will have a Dryden Aircraft Maintenance Record noting the readiness of the aircraft, including status and fuel service. The form will be completed and signed by the aircraft crew chief and readied for presentation to the aircraft operations engineer (for research test aircraft and the DC-8) and the pilot (aircraft commander) scheduled to fly the mission, in turn. The pilot will accept the aircraft as ready by inspecting the form and signing in the appropriate place. The pilot may sign off an open non-grounding maintenance item. An open grounding maintenance item may be downgraded to an open non-grounding item by approval of the Director for Flight Operations, or his/her representative, before flight.

## 9. WEIGHT AND BALANCE FORMS

A copy of current aircraft weight and balance forms (USAF Form F or equivalent) for all aircraft operated at the Dryden Flight Research Center will be maintained in the pilot's office in the flight planning room or in Code Y for the DC-8 and ER-2 aircraft. Additionally, a copy of the weight and balance form for each normal (non-test) configuration likely to be flown will be maintained for each fighter aircraft that can be configured with external stores. A copy of current weight and balance forms for each support and proficiency aircraft is maintained with the aircraft flight manuals for easy reference. Weight and Balance data will be computed for each B-52, DC-8 and ER-2 flight, signed by the pilot-in-command, and a copy kept on the ground until the flight is complete.

## 10. CREW BRIEFINGS

- a. Flight planning is an essential part of the process for conducting flights in a safe and efficient manner. All flights conducted in DFRC aircraft will be planned and briefed appropriately to insure thorough preparation. Flights involving more than one aircraft operating in coordination with each other (formation flight, air combat maneuvering, etc.) require a briefing between the pilots to insure that all maneuvers to be flown are coordinated and all contingencies considered. Flights involving aerial refueling require coordination with the tanker aircraft and a review of air refueling procedures.

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- b. The Crew Briefing is an essential part of the process for conducting research flights in a safe and efficient manner. The briefing is conducted no more than one day prior to flight. The crew briefing is normally the last formal briefing and presentation prior to the actual research flight. This briefing is normally conducted by the Pilot in Command flying the mission. If the flight slips more than 24 hours, a new crew briefing will be scheduled. The intent is to cover all operational aspects of the mission and to promote full understanding among the participants. Absentees must be briefed separately prior to the actual flight.
- c. The following personnel shall attend research flight crew briefings, as appropriate for the mission requirements:
- (1). Aircrew members including chase support pilots
  - (2). Senior Flight Operations representative
  - (3). Mission Controller
  - (4). Operations engineer
  - (5). Control room subsystem monitors
  - (6). Appropriate systems engineers
  - (7). Project scientists
  - (8). Other personnel deemed necessary for proper mission planning and execution.
- d. Combined Systems Tests and other ground tests in support of research programs will be crew briefed. Some or all of the personnel listed for attendance at research flight crew briefings will attend ground test crew briefs, as determined by the test requirements and objectives. The project pilot, operations engineer, or project chief engineer will determine who is required prior to the crew briefing.
- e. Briefing formats for different project flights may vary but should cover the following areas:
- (1). Technical briefing follow up and open items
  - (2). Weather
  - (3). Test plan/flight profile
  - (4). Test cards/chase requirements
  - (5). Mission rules/limitations/Go and No-Go Criteria
  - (6). Aircraft status
  - (7). Crew coordination items
  - (8). Emergency procedures
  - (9). Bingo and landing fuel

A flight briefing guide, maintained and updated in the Flight Crew Branch, is distributed to projects for use in mission briefings. The briefing guide provides a general briefing guide, applicable to all non-test flights. Additionally, the briefing guide provides specific briefing guides for test missions, formation flights, and air combat flights, as well as for non-qualified crew members.

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- f. Post flight debriefings will be conducted to discuss general flight conduct, mission accomplishments, areas for improvement or requiring further action, aircraft maintenance issues, and aircrew, control room, or experiment coordination.

## 11. FUNCTIONAL CHECK FLIGHTS

- a. Functional check flights are accomplished when significant maintenance or modifications have been performed to an aircraft involving flight critical systems such as engines, electrical systems, hydraulics, flight controls, pitot static systems, environmental systems (including pressurization), and other essential systems for safe operation, or to check aircraft characteristics in critical flight regimes, such as stalls. Functional check flights are normally not required for instrumentation or experiment system checkout if the integrity of flight critical systems are not affected. Flights dedicated to instrumentation or experiment system checkout are accomplished as mission support flights.
- b. Maintenance functional check flights on support aircraft will normally be conducted in accordance with applicable NATOPS, USAF Technical Orders, or a Production Flight Procedures Manual (PFPM). The Director for Flight Operations, or designated representative, may approve exceptions to this general guidance.
- c. The following considerations will be used to determine if a functional check flight is required for research aircraft (including airborne science aircraft):
  - (1). Applicable NATOPS, USAF Technical Order, or Production Flight Procedures Manual requirements.
  - (2). Length of time since the aircraft last flew.
  - (3). Types of modifications made to the aircraft since it last flew.
  - (4). Amount and type of maintenance performed on the aircraft since it last flew.
- d. Functional check flights on research aircraft will be conducted at the discretion of the project manager, operations engineer, and project pilot. The Director for Flight Operations, or designated representative, may also direct functional check flights.
- e. Functional check flights on research aircraft may be full or partial profiles.
  - (1). Full profiles will normally be flown if the aircraft has not flown for an extended period of time or if extensive modification or maintenance has been accomplished since it last flew.
  - (2). Partial profiles may be flown to check specific aircraft systems affected by maintenance or modifications.

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- f. Functional check flight procedures for each research aircraft will be reviewed in light of aircraft limitations and modifications. Where appropriate, modified functional check flight procedures will be written. These modified procedures will be documented in the aircraft flight manual, in a dedicated functional check flight checklist, or in the aircraft fact sheet.
- g. Specific functional check flight procedures to be followed for a research aircraft will be briefed at the appropriate technical briefing (Tech Brief or Mini-Tech) prior to flight to inform management of specific maneuvers to be flown.
- h. Functional check flight maneuvers will be documented either in a dedicated functional check flight checklist or on mission test cards.
- i. When a partial functional check flight profile is flown on a research test aircraft, it may be combined with a test mission. The mission may integrate test maneuvers and functional check requirements in any manner to facilitate mission accomplishment with the proviso that test maneuvers must not be accomplished until all applicable functional checks are completed. Generally, this will require that functional maneuvers must be flown at the beginning of the flight.
- j. For functional check flights for all aircraft, only essential crew will be utilized. The crew size and positions to be occupied during a functional check flight will be determined by the pilot-in-command based on the requirements of the flight. Research test missions may include crewmembers required to accomplish test requirements. All crewmembers will be fully qualified for the position occupied. Normal functional check flight crew complement, unless otherwise authorized by the Chief, Flight Crew Branch or the Director for Flight Operations, or their designated representatives, will generally be:
- (1). Fighter: 1 pilot
  - (2). T-34: 1 pilot
  - (3). B-52: 4 (2 pilots, 1 crew chief, 1 launch panel operator)
  - (4). King Air: 1 pilot (2 preferred)
  - (5). DC-8: 3 (2 pilots, 1 flight engineer)
  - (6). ER-2: 1 pilot
  - (7). G-3: 2 pilots
- k. All FCF tests will be accomplished in day VMC. Additionally, the airfield weather must be VFR (1500 foot ceiling and 3 miles visibility) and suitable for all planned FCF maneuvers for the aircraft. This does not preclude flying through IMC to an area where VMC exists.

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1. Pilots are designated by the chief, flight crew branch, as FCF qualified in specific aircraft. Generally, instructor pilots are FCF qualified in aircraft in which they are instructor qualified. Additionally, research test pilots are FCF qualified in specific project research test aircraft. FCF qualifications are documented in the aircrew flight record file.

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## CHAPTER 6 FLIGHT EXECUTION AND SUPERVISION

### 1. MINIMUM ESSENTIAL SYSTEMS FOR AIRCRAFT OPERATIONS

- a. The DC-8 aircraft will be operated in accordance with the NASA DC-8 MEL (minimum equipment list). Exceptions require prior approval from the Director for Flight Operations.
- b. The King Air B200 and G-3 aircraft operated at DFRC will be operated in accordance with the aircraft MEL. No exceptions are allowed when performing Mission Management flights. When the aircraft is in a DFRC mission support or test configuration, the MEL does not apply. However, the guidance in paragraph c below will be followed. Exceptions require prior approval from the Director for Flight Operations.
- c. Other aircraft operations require all critical systems be functional. No aircraft may be operated with warning lights or non-advisory caution lights illuminated, with degraded life support systems, with degraded or inoperative fire extinguishing systems, or with degraded flight control systems (including hydraulic systems). Aircraft may be operated with degraded radar, communication or navigation systems if sufficient capability remains to accomplish the mission. Pilots should determine, prior to flight, which systems are essential to aircraft safety and mission accomplishment and adhere to those standards when deciding whether to continue or abort a mission. Test projects usually establish mission rules to address aircraft malfunction scenarios.

### 2. FLIGHTS WITHIN EDWARDS AFB AIRSPACE

Dryden Flight Research Center pilots will use UHF radios to the maximum extent possible when communicating with the Edwards AFB tower, SPORT, or Joshua control within the R2508 complexes. Pilots will also comply with AFFTCI 11-1 and AFFTCI 11-2 procedures. Deviations from AFFTCI 11-1 and AFFTCI 11-2 procedures will be coordinated with the 412<sup>th</sup> Operations Group commander and communicated to other agencies using the 412<sup>th</sup> Operations Group FCIF process.

### 3. FORMATION FLIGHTS

Formation flights of Dryden Flight Research Center aircraft must take place only by prior arrangements between the pilots of the aircraft involved. Normally, such arrangements must be made prior to takeoff of the aircraft involved; however, arrangements may be made in flight by radio when the individual pilots involved determine that a formation flight is appropriate for official flight test or training purposes. Formation takeoffs and landings are authorized for sections of not more than two aircraft. When an emergency or special circumstance exists or for the protection of lives, a deviation from the prior

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arrangement is permitted with the following precaution: the decision to operate near another aircraft in flight must be carefully weighed, considering the capabilities of the aircraft and understanding the intentions of the crews involved. In no case should the action increase the overall hazard.

#### 4. PROTECTION AGAINST ADVERSE PHYSIOLOGICAL CONDITIONS

DFRC aircraft will be operated in such a way that aircrew and passengers are properly protected against adverse physiological conditions. Aircraft will not operate above 50,000 feet pressure altitude unless specifically equipped to do so. Refer to Appendix B for specific oxygen and pressure suit requirements.

#### 5. BASIC FIGHTER MANEUVER (BFM) FLIGHTS

All BFM flights will include appropriate briefings using the flight briefing guide and rules of engagement located in the Aircrew Training Room. Whenever possible these briefings should be conducted face-to-face.

#### 6. T-34 SPIN TRAINING

Normal erect spins will be flown only with two pilot crewmembers in the aircraft. Control release and progressive spins may be demonstrated or practiced if one crewmember is designated as a T-34 instructor pilot. Normal erect spins may be demonstrated to a non-pilot crewmember by an instructor pilot. No other spin modes will be flown. Spin entry will be at or above 9000 ft. AGL. If the aircraft is out of control passing 5000 ft. AGL, bailout will be initiated. All spin maneuvers to be flown will be briefed, indicated on the local flight plan form, and initialed by the Chief, Flight Crew Branch, or the Operations Supervisor prior to the flight.

#### 7. F/A-18 DEPARTURE AND OUT-OF-CONTROL TRAINING

F/A-18 departure training will be conducted using the USNTPS syllabus as approved by the Director for Flight Operations. All departure training will be conducted in a spin area and will utilize safety chase for backup altitude calls. Safety chase altitude calls of approximately 12,000 feet and 9,000 feet AGL will be made. Safety chase will call for ejection at 6,000 feet AGL if the departure aircraft is still out of control. Departure flights require approval from the Director for Flight Operations and approval is documented using a DFRC Form 129 in accordance with Chapter 1, paragraph 3a. All departure maneuvers to be flown will be briefed, indicated on the local flight plan form, and initialed by the Chief, Flight Crew Branch, or the Operations Supervisor prior to the flight.

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## 8. TOUCH AND GO LANDINGS

Touch and go landings will not be performed when carrying passengers or airborne science research scientists/engineers. Normal configuration touch and go landings are permitted when carrying secondary aircrew cleared for flight using the DFRC Form 176.

## 9. LOCAL FLYING WIND LIMITATIONS

- a. For ejection seat equipped fighter-type aircraft and the T-34, the maximum wind limits for flight are 25 knots steady state or 35 knot gusts. The Chief, Flight Crew Branch, may waive these limits for cross-country flight departures.
- b. Maximum wind limits for B-52 aircraft are 35 knots steady state or gust.
- c. There are no maximum wind limits established for other non-ejection seat or non-parachute equipped aircraft except the flight manual crosswind landing limits.
- d. Touch and go landings are not to be performed when the crosswinds exceed two-thirds of the maximum flight manual crosswind landing limits.

## 10. WEATHER REQUIREMENTS

- a. Weather requirements for planning IFR departures and determining IFR alternate requirements are specified in tables 1 and 2, respectively. Weather requirements for executing IFR departures and approaches are specified in table 3.
- b. If there is no published approach at the destination capable of being flown with the navigation equipment aboard the aircraft, pilots may file IFR to a point enroute (where forecast weather is VMC at the time of arrival) or to a point served by a published approach procedure (where the pilot can make a descent to VMC conditions) and then continue under VFR to the destination.
- c. Regardless of weather, pilots must designate an alternate airport on all IFR flight plans when the destination does not have weather reporting capability or when filing to a destination requiring any of the following to fly the planned approach.
  - (1). Radar
  - (2). GPS is the only available navigation aid
  - (3). An unmonitored navigation aid
- d. When designating an airfield that has no compatible instrument approach procedure as an alternate, the forecast weather, including intermittent conditions, for the ETA ( $\pm 1$  hour) must permit a VFR descent from the IFR en route altitude to a VFR approach and landing.

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- e. Do not designate an airfield as an alternate unless it meets the requirements of the previous paragraph if the approach required to be flown is based on an unmonitored navigation aid or the only available approach requires GPS.

<b>Table 1. WEATHER CRITERIA FOR DEPARTURE ALTERNATE</b>	
Airport weather, including intermittent conditions, at or above minimums for any compatible approach	Not required
<p>With visibility below minimums, visual references must be adequate<sup>1</sup> for takeoff, but not less than 1,600 feet RVR for the runway in use (1/4 SM prevailing visibility in the absence of RVR).</p> <p>No ceiling requirement.</p> <p><sup>1</sup>Adequate visibility is defined as runway markings or runway lighting that provides the pilot with sufficient visual reference to continuously identify the takeoff surface and maintain directional control throughout the takeoff run.</p>	<p><b>Alternate Weather, including intermittent conditions, for ETA ± 1 hour</b>            Greater of:            Ceiling: 1000 feet or MDA/DH+500 feet and            Visibility: 2 SM or 1 SM above lowest compatible approach minimums</p> <p><b>Aircraft having 1 engine:</b>            Alternate must be within 25NM of departure airport.</p> <p><b>Aircraft having 2 engines:</b>            Alternate must be within 30 minutes of departure airport at normal cruising speed in still air with one engine inoperative.</p> <p><b>Aircraft having 3 or more engines:</b>            Alternate must be within 1 hour of departure airport at normal cruising speed in still air with one engine inoperative.</p>

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<b>Table 2. WEATHER CRITERIA FOR DESTINATION ALTERNATE</b>	
<b>Destination</b>	<b>Alternate Requirements</b>
<b>Weather, including intermittent conditions, for ETA ± 1 hour at or better than:</b> Ceiling: 3000 feet and Visibility: Greater of 3 SM or 1 SM above lowest compatible approach	Not required
Below above criteria but above approach minimums for the lowest compatible approach.	<b>Alternate Weather, including intermittent conditions, for ETA ± 1 hour</b> Greater of: Ceiling: 1000 feet or MDA/DH+500 feet and Visibility: 2 SM or 1 SM above lowest compatible approach minimums  For isolated airports, two hours holding fuel in lieu of an alternate airport is permitted

<b>Table 3. EXISTING WEATHER REQUIRED</b>		
	<b>FOR DEPARTURE</b>	<b>TO COMMENCE APPROACH (Practice approaches not authorized when weather is below minimums)</b>
ER-2	Approach Minimums at Takeoff Airport, not less than ½ mile	Approach minimums, not less than ½ mile visibility
T-34	Approach Minimums at Takeoff Airport, not less than 1 mile	Approach minimums, not less than 1 mile visibility
DC-8 C-17 B-200 (2 pilots) G-3 B-52H	Minimums for Compatible Approach at Takeoff Airport or not less than 1/4 mile (1600 RVR) and Takeoff Alternate	Approach minimums, not less than ½ mile visibility
F-18 B-200 (1 pilot)	Minimums for Compatible Approach at Takeoff Airport or not less than 1/4 mile (1600 RVR) and Takeoff Alternate	Approach minimums, not less than 3/4 mile visibility
Research aircraft	As specified in fact sheet or VMC if not specified	As specified in fact sheet or VMC if not specified

## 11. FUEL MINIMUMS

- a. Pilots will plan and execute each mission to allow completion above the fuel remaining shown in the minimum fuel column in the table 4 below. Pilots will declare minimum fuel when it becomes apparent that traffic sequencing will result in landing at or below the minimum fuel. Pilots will declare emergency fuel

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when it becomes apparent that a landing will occur at or below the emergency fuel unless traffic priority is obtained.

<b>Table 4. AIRCRAFT FUEL REQUIREMENTS</b>		
<b>AIRCRAFT</b>	<b>MINIMUM FUEL (pounds)</b>	<b>EMERGENCY FUEL (pounds)</b>
F/A-18	2000	1500
F-15	2000	1500
ER-2	200 GAL	125 GAL
B-200	500	400
T-34	200	150
B-52B/H	25,000	20,000
DC-8	10,000	8000
B-747	25,000	20,000
C-17	16,000	12,000
G-3	4000	2500

- b. Bingo and landing fuels should be planned to allow landing in normal traffic sequence prior to reaching the minimum fuels noted above. When lakebed runways are not available at Edwards AFB, bingo and landing fuels will be adjusted to allow for runway 22-04 closures that would require landing at an alternate landing site prior to reaching the minimum fuels noted above.
- c. Cross country flights are planned with sufficient fuel to reach the destination initial approach fix, proceed to an alternate, if required by weather conditions, and complete an approach and landing, plus 10% or 20 minutes low altitude loiter, whichever is greater (no requirement to exceed 45 minutes of loiter time). Compute fuel consumption for loiter based on maximum endurance operation at 10,000 feet. If an approach is flown at the original destination using visibility only weather criterion, fuel must be sufficient to complete a missed approach, proceed to an alternate, and complete an approach and landing with the above fuel reserve.
- d. Other research, airborne science, and support aircraft: as determined and briefed by the project pilot (research) or aircraft monitor (support).

## 12. ABNORMAL AIRCRAFT OPERATIONS

- a. The practice of inflight emergency procedures, such as simulated single engine landings, actual engine shutdowns and restarts, etc., may be accomplished for training or evaluation flights with prior preflight planning. In dual control aircraft (F-18B, F-15B, King Air, T-34, or G-3), practice emergency procedures may be performed if operating the aircraft solo, if dual and one of the pilots is instructor qualified, or, with the concurrence of the Chief, Flight Crew Branch, if both pilots are fully qualified with a minimum of 50 hours in type each. Practice emergency procedures in heavy transport or bomber category aircraft (C-17, DC-8 or B-52)

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require an instructor pilot with immediate access to the controls. Practice emergency procedures are prohibited when carrying secondary aircrew (except FTEs or other aircrew approved for the planned operations), observers, passengers, research engineers/scientists, or other non-essential aircrew. Qualified primary aircrew may occupy a passenger seat if aboard for the purpose of accomplishing training. Waivers to this policy must be approved in writing by the Director for Flight Operations.

- b. Practice emergencies should not be initiated below a safe altitude when considering aircraft performance, degraded flying qualities, and aircrew proficiency level. In no case should practice emergencies be initiated below 200 feet AGL unless performed as part of an approved syllabus.
- c. Aircraft operations without all normal flight critical systems fully functional, as defined by the aircraft flight manual or minimum equipment list, such as three-engine ferry of a four engine aircraft, are prohibited without approval of the Director for Flight Operations. If approved, these abnormal operations will be conducted with minimal required crew for the intended operation, as described in the Functional Check Flight section. Abnormal flight operations will not be conducted while carrying passengers, nonqualified primary aircrew, secondary aircrew, research engineers/scientists, or non-essential aircrew. Qualified aircrew may occupy a passenger seat if extra pilots are aboard for mission accomplishment.

### 13. SUPERVISION OF DAILY FLIGHT OPERATIONS

Supervision and oversight of daily flight operations is accomplished by two aircrew (typically pilots): the Operations Supervisor and the Flight Monitor.

- a. The Chief, Flight Crew Branch will designate, based on their experience and familiarity with Dryden procedures, aircrew to be Operations Supervisors. The Operations Supervisor for the day is posted on the daily flying schedule. The tour of duty is typically from the beginning of flying to the end of flying for the day. The Operations Supervisor is responsible to insure that aircrew scheduled for all missions are current (landings, egress, physiological and survival training, FCIF, and flight physical), qualified (able to perform the required flight maneuvers), comply with all the requirements of this document, and that all secondary aircrew are approved for the planned flight operations. Prior to the first flight of the day, the Operations Supervisor initials the scheduling board to indicate his approval of each individual mission. All flights added to the schedule and any changes to aircrew for previously approved flights require Operations Supervisor approval prior to flight. Flights will not commence without Operations Supervisor approval. For flights scheduled to takeoff during non-duty hours, when an Operations Supervisor is not on duty, the aircraft commander is responsible to insure that all the above requirements are met for all aircrew on the flight.

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- b. A flight monitor is required for all local Edwards AFB flights performed using the DFRC Local VFR Flight Plan (OF Form 21) or ER-2 Flight Authorization Form Y-001, unless waived by the Chief, Flight Crew Branch, to meet specific mission requirements. The flight monitor provides emergency procedure and other support to airborne pilots. Any pilot in the Flight Crew Branch may serve as a flight monitor. When a pilot files the DFRC Local VFR Flight Plan, another pilot must review and sign the flight plan. The pilot who reviewed the flight plan is then designated as the flight monitor for that flight. The flight monitor is required to be readily available (less than 5 minutes) to support the airborne pilot via the radio at the Flight Operations duty desk when required. A single flight monitor may support multiple flights. The flight monitor also supports the operations supervisor, as required. An operations supervisor may simultaneously perform the flight monitor function. If the flight monitor changes during the course of a flight, the new flight monitor is noted on the bottom of the flight plan.

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## CHAPTER 7 MEDICAL REQUIREMENTS

### 1. ANNUAL PHYSICALS

- a. Dryden Flight Research Center aircrew must pass an annual aviation medical examination. Pilots must undergo the equivalent of a Class I FAA Medical examination. The results of the examination need not be forwarded to the FAA unless a FAA Medical Certificate is desired by the pilot. If the pilot performs Mission Management Aircraft operations, a Class I Medical Certificate issued in the last twelve months is required. Other flight crewmembers must pass the equivalent of a Class II FAA medical examination as specified on the DFRC Form 176.
- b. Normally, the examination will be conducted at the Dryden Health Unit. If conditions prevent a pilot from reporting to the contractor-operated clinic within the normal 12-month period, he/she will obtain a physical examination from a qualified FAA examiner, another NASA Center flight medicine clinic, or from a military flight surgeon. In this case, the pilot must ensure that adequate documentation covering the examination is forwarded to the Director for Flight Operations, and to the Dryden contractor-operated clinic. Pilots who participate in long-term medical tracking programs, such as long-term astronaut physical tracking, may obtain flight physicals at other NASA Centers so long as a copy of documentation is provide to the Dryden flight surgeon. Pilots who are members of the military reserve or guard may receive flight physicals at the respective reserve unit so long as a copy of documentation is provide to the Dryden flight surgeon.
- c. Commencing in the month that a NASA pilot reaches 55 years of age, the pilot will be required to pass a flight physical every six months, meeting the physical requirements above.

### 2. MEDICAL RECORDS

- a. The Dryden medical representative will receive the records of each individual aircrew physical examination, maintain these records in current status, and notify the Chief, Flight Crew Branch, and the individual aircrew of the results of the annual physical examinations.
- b. It is the responsibility of the individual aircrew to schedule his/her annual physical examination prior to the expiration of his/her present qualification. The Chief, Flight Crew Branch will maintain a record of the individual's flight physical in the Life Support Office.

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### 3. PREGNANCY TESTING

- a. Female aircrew will not be permitted to fly with known or suspected pregnancy. The only exception shall be, following the female aircrew's voluntary request and the approval of a flight surgeon and the Director for Flight Operations, she shall be permitted to fly in pressurized multi-crew, multi-engine, non-ejection seat aircraft from the 13<sup>th</sup> through the 24<sup>th</sup> week of gestation. Physiology training shall be waived during pregnancy.
- b. Female aircrew performing high altitude flights, requiring a pressure suit, will take a urine pregnancy test every 14 days at the Dryden Health Unit. Aircrew who are sterile are exempt from this requirement.
  - 1) If the pregnancy test is positive, the female aircrew will be removed from flight status and the test repeated in 48 hours. If the repeat test is positive, the female aircrew will be considered pregnant and restricted from all high altitude flights for the duration of the pregnancy. If the repeat test is negative, the test will be considered a false positive and the crewwoman returned to full flight status.
  - 2) During periods of time when high altitude flights, requiring a pressure suit, are not anticipated for female aircrew, pregnancy tests may be suspended until 14 days prior to the next anticipated flight.

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## CHAPTER 8 PHYSIOLOGICAL AND SURVIVAL TRAINING

### 1. POLICY

It is the policy of the Dryden Flight Research Center that all Center aircrew comply with physiological and survival training requirements in keeping with Air Force regulations pertaining to the Air Force Physiological Training Program and applicable survival training programs deemed appropriate for the Edwards AFB local flying area. Additional survival training may be required to support specific test or airborne science project deployments.

### 2. PHYSIOLOGICAL TRAINING PROCEDURES

- a. In keeping with agreements with Edwards Air Force Base authorities, the U. S. Air Force Physiological Training Program is available to all Dryden aircrew. Records on each aircrew for this training will be maintained by the Dryden Life Support Office who will maintain currency status and notify aircrew of required periodic physiological training. In addition, physiological training will be scheduled through the Life Support Office. Refresher training is required every five years.
- b. Aircrew requiring pressure suit refresher training will assure themselves that their training is broad enough that both pressure suit and routine refresher training are accomplished concurrently. In addition, prior to each flight utilizing a pressure suit, pilots will accomplish a suit functional run on the test console. ER-2 pilots will accomplish pressure suit refresher training in an altitude chamber, along with general physiological training every three years. Records of this training will be maintained by the ER-2 Operations.
- c. Physiological Training for High Altitude - Counter Pressure Garments (Jerkin or CHAGS System). Aircrew operating aircraft while using the Jerkin, CHAGS, or equivalent system shall complete the required original physiological training requirements and a ground level functional check every five years as a refresher-training requirement. In addition, prior to each flight using the Jerkin Suit, aircrew shall accomplish a suit function cockpit/console test and checkout.

### 3. SURVIVAL TRAINING REQUIREMENTS

- a. Primary and secondary aircrew who participate regularly in flight operations will accomplish refresher water survival and land survival training every five years. This training is similar in nature to that provided to AFFTC flight crew personnel at Edwards AFB, but will also include training to cover unique or special equipment carried aboard NASA aircraft or in NASA survival kits. The training will normally be conducted in conjunction with normally offered courses at Edwards AFB. However, the Dryden Life Support Section will maintain the

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capability to conduct the above training, as required.

- b. Specialized survival training will be scheduled for special operations outside the Edwards AFB local flying area, if deemed appropriate by the test project or directed by the Chief, Flight Crew Branch, Director for Flight Operations, the Air Worthiness and Flight Safety Review Board, or the Center Director. The project management or the Life Support Branch will arrange this specialized training. Identified personnel will either attend regularly scheduled military survival training courses at military facilities, specially scheduled courses at Dryden conducted by certified survival training specialists, or other courses which are deemed appropriate to meet the project requirements in a timely manner.
  
- c. The Life Support Section will maintain all records (except for ER-2 pilots) pertaining to survival training, and will notify personnel of training due at least three months prior to the due date. Survival training conducted locally at Edwards AFB will be scheduled through the Life Support Section. ER-2 survival training records will be maintained by the ER-2 aircraft monitor who will schedule ER-2 survival training as required.

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## CHAPTER 9 PERSONAL EQUIPMENT

### 1. INSPECTION REQUIREMENTS

In direct support of the Dryden policy to ensure maximum safety and protection, a program of continuing and periodic inspections of aircrew equipment will be carried out under the direction of the Director for Flight Operations. This includes inspections of personal protective equipment, such as pressure suits, flight clothing, oxygen masks, helmets, parachutes, and life vests. It also includes inspections of personal protective equipment installed in aircraft, such as ejection seats, survival kits, and oxygen systems.

### 2. QUALIFIED TECHNICIANS PERFORM INSPECTIONS

Qualified aerospace personal equipment technicians perform all periodic inspections of standard equipment as required by appropriate military technical orders or as required by NASA directives where additional and special equipment or modifications to equipment are involved in connection with support or research flight operations. Records of all inspections are made to indicate equipment serviceability, use, and modifications. In addition, continuing preflight and post-flight inspections are made to ensure maximum safety and effectiveness of equipment.

### 3. CHIEF, FLIGHT CREW BRANCH RESPONSIBILITY

The Chief, Flight Crew Branch is responsible for conducting periodic inspections of the aerospace personal equipment area and records to ensure technical adequacy and currency in equipment maintenance and inspection.

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## **CHAPTER 10 PASSENGER FLIGHTS**

### 1. POLICY

All aircraft assigned to the Dryden Flight Research Center are used as research vehicles in flight research operations and airborne science research, or as program support aircraft in the accomplishment of research programs. Use of Dryden controlled aircraft for transportation of program support personnel will be accomplished on a non-interference exception basis, subject to the approval of the Director for Flight Operations.

### 2. AUTHORIZATION OF PASSENGERS

- a. In keeping with Dryden policy, personnel authorized for passenger travel in Dryden aircraft will only be carried using Mission Management Aircraft procedures and must be one of the following.
  - (1). U. S. Government employees (civilian or military).
  - (2). NASA contractor personnel.
  - (3). Official advisors or consultants to the U. S. Government.
- b. Any local flight that plans to carry passengers will be requested by completion of Request for Air Transportation Services, DFRC Form 115.

### 3. PERSONS FLYING IN PASSENGER STATUS

Persons not obtaining flight approval using a DFRC Form 176 who are in a passenger status on King Air B200, DC-8, C-17, or G-3 aircraft obtain aircraft egress training from a qualified aircrew as documented on the passenger manifest.

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## CHAPTER 11 CHARTER AND MISSION MANAGEMENT OPERATIONS

### 1. CONTRACTING POLICY

Charter aircraft operations will be covered by a special contract for each operation.

### 2. CHARTER PASSENGER OPERATIONS

In the case of charter passenger operations for the Dryden Flight Research Center, the following guidelines are established:

- a. All operations must be conducted in accordance with "14 CFR Part 135".
- b. Multi-engine aircraft will be used with a two-pilot operation.

### 3. COORDINATION WITH AIRCRAFT OPERATIONS DIRECTORATE

Any charter operation must be coordinated as early as possible with the Dryden Aircraft Operations Directorate.

### 4. MISSION MANAGEMENT OPERATIONS

In the case of mission management operations for the Dryden Flight Research Center, the following guidelines are established:

- a. The mission management contract technical monitor pilot will insure that contractor aircrew scheduled for mission management passenger and training flights are current (flight and ground training, egress, physiological and survival training, FCIF, and flight physical), qualified (able to perform the required flight maneuvers), and comply with all the requirements of NPR 7900.3A, chapter 3. The Operations Supervisor, in accordance with DOP-O-300, reviews the qualifications and currency of all pilots scheduled for mission management flights.
- b. All operations must be conducted in accordance with "14 CFR Part 91".
- c. Multi-engine aircraft will be used with a two-pilot operation.
- d. Dryden research pilots performing pilot duties on Mission Management aircraft will meet the requirements of NPR 7900.3A, Chapter 3 (Mission Management Aircraft Operations) or DOP-O-300, whichever is more restrictive. Dryden research pilot status to fly as a Mission Management pilot is designated in writing in each pilot's flight record file.

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- e. Contractor mission manager aircraft pilots will receive an annual line-check in accordance with NPR 7900.3A, chapter 3, under the supervision of a designated government pilot assigned to the Flight Operations Directorate. Line-checks are performed during an actual mission management aircraft flight with or without passengers aboard unless waived by the Chief, Flight Crew Branch, or the Director for Flight Operations.
- f. The MMA contract technical monitor pilot maintains the training records for all contractor MMA pilots in accordance with NPR 7900.3A, chapter 3. The Chief, Flight Crew Branch will periodically review contractor mission management pilot training folders to insure that all information is current and complies with the requirements of NPR 7900.3A, chapter 3. This review is accomplished at least annually.

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## CHAPTER 12 JOINT FLIGHT PROGRAMS

### 1. INTER-AGENCY INTERESTS

The Dryden Flight Research Center as a field installation of NASA may have an interest in research and test programs of Department of Defense agencies and other Government agencies associated with aeronautical and aerospace research programs. Upon request, Dryden also conducts research on specific problems for the benefit of these other agencies. Consequently, occasions will arise when it is in the interest of NASA and the Dryden Flight Research Center mission to participate in joint flight programs with these agencies or in flight operations conducted by them.

### 2. AGREEMENTS AND PROGRAM APPROVAL

Decisions to participate in joint programs to support a research flight operation of another federal agency will be based on official agreements established and approved between NASA and other agencies.

### 3. APPROVAL TO FLY IN NON-DRYDEN CONTROLLED AIRCRAFT

a. Approval and waivers for aircrew flying on aircraft operated by other government agencies.

- 1) The Director for Flight Operations will grant approval of NASA aircrew to participate in a flight operation of another agency, in keeping with officially established agreements as set forth in Paragraph 2 above. Such approval will require compliance with all aircrew qualification requirements established by Dryden Flight Research Center policies and the specific flight programs involved. A waiver of any established qualification requirement for a Dryden Flight Research Center NASA aircrew will require approval of the Director for Flight Operations.
- 2) For flights on aircraft operated by other government agencies without official agreements, NASA Dryden aircrew must secure the approval of the Chief, Flight Crew Branch, and the Director for Flight Operations, to fly as a crewmember or test observer in a government aircraft as a NASA employee on official duty status. Written approval using the DFRC Form 176 is required.
- 3) Aircraft flown while a member of the Reserve or National Guard are exempt from the requirements of this paragraph.

b. Approval and waivers for aircrew flying on non-government aircraft.

- 1) NASA Dryden aircrew must secure the approval of the Chief, Flight Crew Branch and the Director for Flight Operations, to fly as a crewmember or test

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observer in a non-government aircraft as a NASA employee on official duty status. Written approval using the DFRC Form 176 is required.

- 2) The Director for Flight Operations shall assure that reasonable flight safety standards will be in effect and issue a memo to the individual and to their Directorate Chief so stating.
- c. Exceptions:
- 1) Aircraft certified for, and being operated as, a revenue (cargo or passenger) Aircraft
  - 2) Aircraft identified in a formal Center-level MOU/MOA that allows NASA aircrew participation.
4. INSPECTION PROCEDURES FOR EXTERNAL AIRCRAFT OPERATIONS

The following procedures are suggested for announced inspections, surveys, and reviews of external companies and their aircraft operations and maintenance departments.

- a. Select and coordinate date with the company to be visited.
- b. Carefully select inspection team members based on specific expertise required or desired for the inspection. Normally, one person for operations and one person for maintenance is sufficient.
- c. Formally notify the company of the inspection, its scope, and any specific items or areas to be examined.
- d. Prepare for the inspection. Research previous inspections, recent mishap history, hazard reports, and any actions directed by safety committees that may be pertinent to the aircraft or mission of the company.
- e. Begin the inspection with a briefing to the company key personnel, outlining the scope of the inspection and the team member assignments. Company management should determine attendance at the in-brief.
- f. Meet with the team members to distribute inspection checklists and to discuss purpose, scope, and conduct.
- g. Conduct the inspection. Minimize interference with work in progress.
- h. Provide a debriefing to the company on the overall summary of the inspection and the major findings. Encourage questions and discussions. Do not restrict debriefing attendance.

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- i. Prepare the inspection report. The report should include requirements for response, suspense, and follow-up procedures.

5. SAFETY CHECKLIST FOR INSPECTING EXTERNAL AIRCRAFT OPERATIONS

- a. What is the contractor's safety record?
- b. Does the contractor have an aviation safety program?
- c. What are the qualifications of the people running the aviation safety program?
- d. What are the qualifications and experience of the contractor's pilots?
- e. Does the contractor have an operations manual?
- f. Is the operations manual adequate?
- g. How does the contractor manifest passengers and cargo and control weight and balance?
- h. Is the contractor operating the aircraft within their limitations?
- i. What maintenance standard is the contractor meeting?
- j. What is the contractor's maintenance training program?
- k. What are the qualifications of the contractor's maintenance personnel?
- l. Is the contractor providing adequate passenger briefings?
- m. Are the contractor's hangar and maintenance facilities adequate?
- n. Does the contractor have adequate emergency equipment?
- o. Does the contractor have adequate maintenance manuals and technical documents?
- p. If notified of a hazardous situation, what action would the contractor take?
- q. Does the contractor have a pre-mishap plan?
- r. What is the overall condition of the contractor's aircraft and equipment?

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## CHAPTER 13 AVIATION SAFETY PROGRAM

### 1. POLICY

- a. The nature of the DFRC mission requires the interaction of people and equipment in a hazardous environment. Each individual must be safety aware and alert to unsafe working, living, and flying conditions on a continual basis.
- b. The objective of the DFRC Aviation Safety Program is to identify and minimize or eliminate hazards. The success of the program is dependent on:
  - (1). Compliance with established directives.
  - (2). Implementation of good safety practices.
  - (3). Sustained safety awareness.

### 2. ORGANIZATION

- a. The Aviation Safety Officer (ASO) Position will be a collateral duty of a flight crew member from the Flight Crew Branch, typically a pilot. The ASO will liaison with the DFRC Aviation Safety Manager and will have direct lines of communication to the Director of Flight Operations and the Center Director when, in his/her judgment, the situation dictates direct communication.
- b. A Life Support Safety Officer (LSSO) will be a collateral duty of a life support technician assigned to the Flight Crew Branch Life Support Section. The LSSO will work in conjunction with the Life Support Section Lead, the ASO, and the Chief, Flight Crew Branch to address safety hazards and conditions unique to the Life Support Section mission.

### 3. TRAINING FOR THE AVIATION SAFETY OFFICER

The Aviation Safety Officer will attend or have attended a formal Aviation Safety Officer training program. This training may be completed at an approved military or civilian school. Training accomplishment is documented in the aircrew training folder.

### 4. CONCEPT OF OPERATIONS

The Safety Program is established to plan, coordinate, implement, and enforce those programs that will help maximize DFRC productivity through the conservation of material and protection of personnel assets. A comprehensive Safety Program shall be planned and implemented by the Center Safety and Mission Assurance Office in close coordination with Flight Operations Directorate, the Flight Crew Branch, the Aircraft Maintenance Division, the Aviation Safety Officer and the Flight Line Ground Safety Officer. The goal of the program is to ensure that hazards to personnel and equipment

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are identified and minimized or eliminated to the maximum possible extent. Mishap prevention is greatly enhanced by a climate of positive safety attitudes.

## 5. AVIATION SAFETY OFFICER DUTIES AND RESPONSIBILITIES

### a. Basic Function

The Aviation Safety Officer shall act as the principal advisor to the Center Aviation Safety Manager, the Director for Flight Operations, and the Chief, Flight Crew Branch on matters involving flight safety. He is responsible for fostering a safety attitude within the Flight Crew Branch, for monitoring safety related occurrences and identifying potentially risky practices and procedures.

### b. Duties and Responsibilities

- (1). Act as a focal point for all aviation safety matters within the Flight Crew Branch and the Flight Operations Directorate.
- (2). Provide flight safety training for new aircrew personnel.
- (3). Observe flight and ground operations of aircraft in order to detect and correct unsafe practices and hazards.
- (4). Ensure thorough safety training of all flight crew prior to flight.
- (5). Apply Operational Risk Management (ORM) to impending center flight operations in order to identify and eliminate or manage hazards and determine required training.
- (6). Maintain close liaison with NASA Headquarters, the Edwards AFB Safety Office, the Air Force Safety Center, and the Navy Safety Center in order to take advantage of lessons learned and stay abreast of recent developments and innovations in aviation safety that could benefit the unit. Obtain aircraft mishap information for aircraft flown by those units which are common to the NASA Dryden aircraft fleet for dissemination to Dryden aircrew. Also, obtain aircraft mishap information for other aircraft which provide valuable lessons that are worth disseminating to DFRC aircrew.
- (7). Work in cooperation with the Director, Office of Flight Safety and Mission Assurance, the Range and Systems Safety Office and the Center Director as necessary to promote flight safety.
- (8). Chair the Cockpit Safety Review Committee.
- (9). Organize and conduct monthly meetings for all assigned aircrew. This meeting is normally in conjunction with a weekly meeting of all DFRC primary aircrew. Lecture notes and attendance and subject matter records

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will be kept for all meetings and posted on the Aviation Safety Board. FCIF entries will be made, for absent aircrew, and will require meeting note review prior to sign off.

- (10). Assist the Center Aviation Safety Manager in the organization and presentation of the Quarterly Safety meetings.
- (11). Provide reports, as requested, to the Director for Flight Operations, on the flight branch safety posture.
- (12). Supports the Chief, Flight Crew Branch, Director for Flight Operations, the Center Aviation Safety Manager, and the Office of Flight Safety and Mission Assurance to conduct periodic reviews of all aviation related activities for compliance with established safety standards and practices.
- (13). Provides input and recommendations for safety awards to the Chief, Flight Crew Branch, Director for Flight Operations, the Center Aviation Safety Manager, and the Office of Flight Safety and Mission Assurance.

c. Individual Project Safety Officers.

Each lead project pilot will act as the project safety officer and will assist the ASO in promoting a positive safety attitude within the project, for monitoring safety related occurrences, and identifying and reporting potentially risky practices and procedures to the ASO or ASM. The lead project pilot will also assist project managers and chief engineers in identifying project unique hazards and implementing minimizing procedures to reduce hazards to acceptable levels of risk.

d. Life Support Safety Officer.

A life support technician is designated by the Chief, Flight Crew Branch, to assist the ASO in matters pertaining to life support systems and ejection seats. The life support safety officer (LSSO) is the focal point for gathering safety information and conducting monthly safety meetings within the life support section on subjects pertinent to the safe maintenance of aircraft life support systems, explosives, and ground test equipment. Suitable records of meetings are maintained to insure that absent personnel are thoroughly briefed on information disseminated.

## 6. AVIATION INCIDENT REPORTING SYSTEM

a. Purpose of Incident Reports

A hazard is anything possessed of the potential to cause damage or injury. The four purposes for incident reporting are:

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- (1). To report a hazard and the remedial action taken, so others may take similar action.
- (2). To report a hazard and recommend corrective action to others.
- (3). To document a continuing hazard so that a corrective action may be taken prior to the hazard leading to a mishap.
- (4). To inform personnel of hazards that are encountered in the performance of their duties so that extra vigilance and caution will be used so as to avoid a mishap.

b. General Submission Criteria

Submit Incident Reports whenever a hazard is detected or observed or whenever an event occurs that should have been a mishap but for circumstance, quick reaction, procedure, or similar reason, no loss occurred. At a minimum a report is required anytime a flight is terminated early because of an airborne anomaly. Over reporting incidents is preferred to not reporting incidents of significant concern.

- (1). Aircraft mishap/incidents requiring a report include but are not limited to:
  - (a). Situations which require declaring an emergency
  - (b). Near misses
  - (c). Foreign Object Damage (FOD)
  - (d). Bird Strikes
  - (e). Physiological incidents
  - (f). Inadvertent loss of control
  - (g). Incident due to weather factors
  - (h). Hazardous air traffic control incidents
  - (i). Things falling off aircraft (TFOA)
- (2). Aircraft malfunctions which require a report include, but are not limited to:
  - (a). Engine related problems
    - i. Loss of oil pressure
    - ii. Flameouts
    - iii. Stalls/surges
    - iv. Situations requiring shutdown
  - (b). Flight control failures
    - i. Single failures that fail to reset
    - ii. Multiple like failures
    - iii. Failures that cause degraded control
  - (c). Significant electrical failures
  - (d). Significant hydraulic failures
  - (e). Landing gear or flap problems

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- (f). Brake problems
  - (g). Nosewheel steering problems
- c. Reporting of Incidents. DFRC Form 165 (Aviation Hazard/Incident Report) will be used for reporting any airborne or ground anomalies. Forms will be completed by the PIC and submitted to the ASO. The PIC is responsible for making recommendations related to the incident when possible. The ASO shall investigate the incident and summarize his finding and recommendations. Significant incidents shall be forwarded to the Center Safety Office, Chief Pilot and/or Chief of Flight Operations for review and/or corrective actions. When deemed necessary a separate investigation by the Center Safety Office will be requested to further and more fully investigate incidents of significant safety concern.
- d. Dissemination of Safety Related Information
- Information pertinent to outside organizations will be disseminated through the appropriate channels. Information that could assist other organizations in identifying aircraft system deficiencies, high failure items, human factor errors, cockpit resource management errors or other valuable lessons learned will be publicized to the maximum extent possible consistent with NASA, DOD, and FAA policies or directives. Generally, the ASO will assist the ASM in determining what safety related information is worth outside dissemination and to which organizations the information should be provided. The ASM will then disseminate the information through appropriate channels.

## 7. SAFETY TRAINING

### a. Monthly Training

Monthly training will be conducted by the ASO. This meeting will typically coincide with the weekly pilots meeting and will focus on recent events that have occurred within DFRC flight operations or applicable military or civilian aviation events. All primary DFRC aircrew will be required to attend the monthly safety meetings. All meetings will be documented with notes and attendance list filed on the Aviation Safety Information Board (ASIB). FCIF entries will be made for all non-attendees, and note review will be required prior to next flight.

### b. Quarterly Training.

Quarterly safety training will be conducted by the ASM. This meeting will focus on safety related concerns and challenges for the upcoming quarter. It will include any training deemed necessary by the ASM and attendance will include all center assigned aircrew. Notes and attendance lists will be posted on the ASIB. Non-attending primary aircrew review will be required prior to next flight and all other non-attendees will be encouraged to review the notes.

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## 8. COCKPIT SAFETY REVIEW COMMITTEE

- a. The purpose of this standing committee is to review cockpit modifications which could impact aircrew egress and safe operation of the aircraft. A more in-depth discussion of roles and responsibilities is listed in the DOP-O-007.
- b. The committee shall meet as required to review initial cockpit design and installation prior to flight. The committee will decide whether the proposed modifications require further cockpit safety review or pose no hazard and do not require further committee action.
- c. The committee shall be comprised of following members or their designated representative:
  - (1). The Aviation Safety Officer, Chairman
  - (2). Chief of Life Support Section, Member
  - (3). Operation Engineering Branch Chief, Member
- d. Each member must sign off the appropriate work order following the modifications before the aircraft will be released as safe for flight. A record of loose equipment, such as cameras or temporarily installed test equipment, approved for flight in fighter and ejection seat equipped trainer aircraft will be maintained in the Life Support Section.

## 9. MISHAP INVESTIGATION AND TRAINING

- a. In the event of a mishap as defined in NPD 8621.1G, the Center Director will convene a mishap investigation team. The ASO will act as a team member or advisor when requested to do so by the Center Director.
- b. The ASO shall assist the Center Safety Office on the annual review of the DCP-S-001 Aircraft Mishap Response Procedures manual.
- c. The ASO shall brief the DCP-S-001 to the Flight Crew Branch annually and to new aircrew as part of the flight safety training for new personnel.
- d. The ASO will conduct mishap response training annually for all mission controllers, primary and secondary aircrew, and flight scheduling officers.

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**APPENDIX A**  
**APPROVAL SIGNATURE REQUIREMENTS TO FLY IN DRYDEN AIRCRAFT**

1. DFRC FORM 176

The DFRC form 176 is used to document flight approval by DFRC management, emergency notification data for next of kin, flight surgeon physical examination approval, and aircraft specific equipment issue and egress training for all persons who fly in DFRC aircraft with three exceptions: a). DFRC assigned primary aircrew who occupy flight crew positions and are specifically authorized to perform flight crew duties by position descriptions, agreements, or contracts; b). Persons who fly in B200, DC-8, C-17, and G-3 aircraft in a passenger status who have no aircrew duties and do not occupy an aircrew position are documented using the DFRC flight manifest (USAF passenger manifest is acceptable); and c). DC-8 experimenters and scientists who support Airborne Science data missions are documented using the Flight Participation Form. Flight physicals and training that are obtained at other flight activities and are current can be used to meet the training requirements of the Form 176.

2. DRYDEN FLIGHT CREW BRANCH ASSIGNED PRIMARY AIRCREW

The Chief, Flight Crew Branch, makes Dryden primary aircrew aircraft assignments, including primary aircrew in other Directorates who are attached to the Flight Crew Branch for flight duty. Flight training records are kept at the operations desk. Government employee aircrew members of the Dryden Flight Crew Branch, including attached primary aircrew, are approved to fly in any Dryden-controlled aircraft. Aircrew that fly in other than assigned aircraft will obtain Chief Pilot or Operations Supervisor approval, which is annotated on the flight plan. Aircraft specific training, such as egress, must be accomplished and current, and documented at the Operations Desk.

3. DFRC ASSIGNED MILITARY, CIVIL SERVICE, AND CONTRACTOR SECONDARY AIRCREW

Aircrew members not assigned to the Dryden Flight Crew Branch and needed to accomplish the Dryden mission that occupy a seat with flight controls or have emergency procedure responsibilities aboard an aircraft will be put on long term flight status using a DFRC Form 176. Aircrew positions include: flight test engineers, aerial photographers, non-military flight surgeons, launch panel operators, crew chiefs, mission directors, technicians and engineers. Personnel must obtain authorization using the Form 176 prior to flight in a Dryden-controlled aircraft.

- a. For military and civil service aircrew, approval to fly in Dryden-controlled aircraft is only granted upon obtaining the concurring signatures of his/her supervisor, the Chief, Flight Crew Branch, and the Director for Flight Operations on the Form 176.

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b. For contractor aircrew, the Form 176 must also be signed by the contractor employee's supervisor and the DFRC COTR.

3. OTHER NASA CENTER PRIMARY AND SECONDARY AIRCREW

Aircrew members from other NASA Centers must be approved by the Chief, Flight Crew Branch, for flights in Dryden-controlled aircraft. In addition, approval of his/her own Center supervisor is required. This approval may be obtained verbally and will be documented in the justification block of the Form 176.

4. MILITARY AND CONTRACTOR PRIMARY AIRCREW COVERED BY MOA'S MOU'S OR OTHER CONTRACTS OR AGREEMENTS

Primary aircrew personnel from other organizations with which NASA Dryden has established formal agreements, (such as MOAs, MOUs, or other contracts) must be approved by the Chief, Flight Crew Branch, and the Director for Flight Operations using a Form 176 to document approval prior to performing those duties in Dryden-controlled aircraft.

5. DC-8/C-17/B200/G-3 EXPERIMENTERS, MISSION ESSENTIAL PERSONNEL, AND NON-AIRCREW

All DC-8 experimenters and mission essential personnel, including maintenance and supervisory persons, who are designated to fly on the DC-8 are identified prior to the first flight associated with that deployment. A list of approved personnel for each campaign, signed by the Director of Airborne Science, must be provided to the Director for Flight Operations. Additions to this list must be approved by the Director for Airborne Science with a revised copy provided to the Director for Flight Operations. A copy of the Flight Participation Form must be sent to the Director for Flight Operations for filing. Next of kin information must be obtained and retained by the Director for Flight Operations for all of these personnel prior to flight.

Additional experimenters and mission essential personnel, including maintenance and supervisory persons, who are identified during a deployment, must be approved by the designated on-scene supervisor or the lead mission director and the pilot-in-command. These personnel must be manifested for all flights in which they are to take part. A copy of the flight participation form must be sent to the Director for Flight Operations for filing. Next of kin information will be obtained and retained by the Director for Flight Operations for all of these personnel.

All personnel who fly on the DC-8 will be manifested for each flight. The Director for Airborne Science will maintain the original file copy of all manifests and will ensure that the Director for Flight Operations is also provided a copy of the manifest for all DC-8 flights prior to flight.

All experimenters and mission essential personnel, including maintenance and supervisory persons, who fly on the C-17, B200, or G-3 will be approved using the Form

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176 and manifested for each flight. The Director for Flight Operations will be provided a copy of the manifest prior to flight.

6. ALL OTHER PERSONNEL

Personnel must first obtain a Form 176 signed by the following persons prior to flight in a Dryden-controlled aircraft.

- a. Approval to fly in Dryden-controlled aircraft is only granted upon obtaining the concurring signatures of his/her supervisor, Chief of the Flight Crew Branch and the Director for Flight Operations on the Form 176.
- b. For contractor employees, the Form 176 must also be signed by the contractor employee's own supervisor and the DFRC COTR or sponsor if no COTR.
- c. Center Director will approve the Form 176 for non-Dryden, non-project personnel.

7. NON-DRYDEN CONTROLLED AIRCRAFT

Approval for NASA Dryden employees to fly in non-Dryden controlled aircraft in the performance of their duties is covered in Chapter 12, Joint Flight Programs.

8. DC-8/C-17/B200/G-3 PASSENGERS

Persons who fly aboard NASA Dryden controlled aircraft for the purpose of transportation, and who have no aircraft or experiment duties, are documented using the NASA Dryden passenger manifest (DOD passenger manifest is acceptable for C17 missions) in accordance with Chapter 10, Passenger Flights.

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## APPENDIX B OXYGEN AND PRESSURE SUIT REQUIREMENTS

### 1. SUPPLEMENTAL OXYGEN REQUIREMENT FOR ALL AIRCRAFT

Each aircrew member and passenger shall use supplemental oxygen when the aircraft cabin altitude exceeds 10,000 feet.

The Chief, Flight Crew Branch, may approve specific unpressurized aircraft operations above 10,000 feet MSL without supplemental oxygen subject to the following restrictions:

- a. Maximum of 1 hour between 10,000 feet and 12,500 feet MSL.
- b. Maximum of 30 minutes between 12,500 feet and 14,000 feet MSL.
- c. Total flight time above 10,000 feet MSL shall not exceed 1 hour.
- d. Supplemental oxygen must be used above 14,000 feet MSL.

If the aircraft loses cabin pressure, the pilot must initiate an immediate descent to the lowest practical altitude, preferably below 18,000 feet cabin altitude, but in no case above 25,000 feet cabin altitude unless occupants are wearing functional pressure suits. If any occupant does not have access to functioning oxygen equipment, the unpressurized aircraft altitude restrictions above apply.

Should anyone aboard the aircraft experience hypoxia, other physiological symptoms, or decompression sickness, a crewmember will administer 100% oxygen to that individual. The pilot must descend to the lowest practical altitude and land at the nearest suitable installation where medical assistance can be obtained. The affected person will not continue the flight unless authorized by a flight surgeon or designated aviation medical examiner.

### 2. PRESSURIZED AIRCRAFT

- a. The following restrictions apply to aircraft maintaining a cabin altitude of 10,000 feet or less.
  - (1). The pilot of a single piloted aircraft must have an oxygen mask on if flying at an altitude above FL 350.

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(2). The following table applies to multi-piloted aircraft.

<b>Table 6-1. Oxygen Requirements for Multi-piloted Aircraft</b>					
Altitude	Pilot	Flight Engineer	Other Flight Deck Crew	Cabin/Cargo Area Crew	Passengers
<b>10,000 feet through FL 350</b>	R	R	A	D	D
<b>Above FL 350 through FL 410 (both pilots in seats)</b>	R	R	A	A	D
<b>Above FL 350 through FL 410 (only one pilot in seat)</b>	O	R	A	A	D
<b>Above FL 410 through FL 500</b>	O	O	A	A	D

- Legend:
- D Aircraft drop-down oxygen required only.
  - A Have oxygen available (carry portable oxygen or have oxygen outlet with mask)
  - R Have oxygen readily available (quick donning mask within arms reach, regulator ON and 100%)
  - O Oxygen mask ON. Regulator ON and NORMAL

- b. Sustained operations (more than approximately 1 minute) above a cabin altitude of 25,000 feet are prohibited unless wearing a full pressure suit. If transient cabin altitudes above 25,000 feet of 1 minute or less are anticipated, the aircrew will pre-breathe 100% oxygen for 30 minutes prior to takeoff and remain on 100% oxygen until all operations where the possibility of exceeding 25,000 feet cabin altitude are completed.
- c. For pressurized aircraft with a cabin altitude of 25,000 feet or less operating between FL 500 and FL 600 for periods not exceeding 30 minutes, the aircrew must wear a full pressure suit or a partial pressure suit providing 70mm Hg of assisted positive pressure breathing for altitude. Additionally, the aircrew will pre-breathe 100% oxygen for 30 minutes prior to takeoff and utilize 100% oxygen until all operations above FL 500 are completed.
- d. For any aircraft conducting operations more than 30 minutes in duration above FL 500, for all operations above FL 600, or for any aircraft intentionally operating with a cabin altitude above 25,000 feet, the aircrew must wear a full pressure suit.
- e. Exceptions to the above requirements may be granted through the NASA Dryden Air Worthiness and Flight Safety Review process.

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