Dryden Flight Research Center
Edwards, California 93523

DCP-O-001
Revision D

Dryden Centerwide Procedure

Code O

Aircraft Maintenance & Safety Manual (AM&SM)

Electronically approved by
Assistant Director for Management Systems

Before use, check the Master List to verify that this is the current version.

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1-1.0 PURPOSE OF DOCUMENT

The purpose of the Aircraft Maintenance and Safety Manual (AM&SM) is to provide guidance and direction for all persons who maintain and operate Dryden aircraft and/or who have duties in aircraft hangars and/or on flight lines.

The Aircraft Maintenance and Safety Manual implements the governing policies for the maintenance and control of aircraft operated and maintained by Dryden.

Aircraft documentation processes/requirements for hosted programs are dictated through the individual Project Offices and their MOA/MOU. However, for Dryden controlled aircraft the preferred method of aircraft documentation is through the utilization of the aircraft workbook forms or the automated NALCOMIS system outlined/referenced throughout this manual.

Within this manual are found references to policy, procedures, instructions, and guidelines for the maintenance, modification, and inspection of public aircraft under government control. The attached appendices are to be considered as part of the Aircraft Maintenance and Safety Manual.

As a basic rule an aircraft's Technical Order or other detailed maintenance, inspection and/or servicing document is meant to be its governing document. In the case of contractors, contractual requirements, or their Quality Assurance Plan (QAP) or equivalent, and processes, if more stringent than this Manual, are followed. However, for any aircraft or vehicle that does not have those documents, or those documents do not provide sufficient information, then this manual is to become the governing document.

1-2.0 SCOPE & APPLICABILITY

The contents of this AM&SM are to be adhered to by all Flight Operations civil service personnel that work on Dryden aircraft, work in the Dryden hangars or on the flight line. Additionally, contractor maintenance personnel, or host operations, will adhere to the AM&SM unless they are operating to other approved (statement of work and/or contractual) processes that comply with or are more stringent than those defined within.

Flight Operations shops do not have to comply with the AM&SM for activities that are accomplished within the confines of that particular shop. They must however comply with established good housekeeping and safety processes.

Other Center organizations that provide support and services on Dryden aircraft, in Dryden hangars, or on the flight line are required to comply with all applicable Sections of this AM&SM.

The instructions, procedures, and references contained within this manual are given to clarify the manner in which Dryden maintains, modifies, and inspects aircraft and aircraft assets controlled by Dryden. Personnel performing aircraft maintenance, modification, and inspection are responsible for being familiar with this manual as well as the associated documentation as they pertain to their assigned tasks.

This manual applies to all aircraft controlled by the Dryden Flight Operations Directorate regardless of geographical location.

1-3.0 DOCUMENT OBJECTIVES

The objective of this document is to combine in one manual all the necessary information for Flight Operations personnel, including contractors, and other organizational elements that interface with Dryden aircraft or flight facilities, to accomplish their tasks efficiently and safely.

1-4.0 RELEVANT DOCUMENTS

1-4.1 Authority Documents

It is the intent of the Flight Operations Directorate to follow NASA Agency safety and health directives in carrying out its mission. Therefore, directives/documents from the Dryden Office of Safety and Mission Assurance are the cornerstone of the safety requirements identified within the Aircraft Maintenance and Safety Manual.

1-4.2 Reference Documents

The AM&SM will identify all references within the body of the document. All subjects covered by separate Dryden Management System (DMS) documents will contain electronic links to that particular document. Any external document, whose contents or partial contents define how Dryden is to operate, will be repeated or paraphrased within the body of the AM&SM and the document title and number will be cited as a reference. During the yearly review of the AM&SM, all external cited references will be reviewed for changes and continued applicability.

Dryden’s aircraft operations are unique in that the types (and source) of aircraft operated vary greatly. There can be military, commercial, and/or one-of-a-kind research aircraft being operated and maintained at any one time. There may, or may not be operating manuals for these aircraft. Additionally each service organization (Air Force, Navy, etc.) has its own documented methods of doing business. Accordingly,

Dryden will utilize processes and procedures from a variety of sources to establish general maintenance and safety practices, in order to operate and maintain Dryden aircraft. In some cases these processes and procedures will be altered to reflect the Dryden work environment and other specific circumstances.

1-4.3 Superceded Documents

The following documents have been superceded in their entirety by incorporation into this and subsequent revision of the Aircraft Maintenance and Safety Manual:

PI-20-E	Fuel Tank Repair Criteria. See Chapter 7-15.0
PI-20-N	Operation of Motor Vehicles on the Flight Line and in Hangars. See Chapter 7-20.0

1-5.0 WAIVER AUTHORITY & PROCESS

Reference

Form DFRC 317 AM&SM Waiver

The Flight Operations Chief of Maintenance or his designee is the sole authority to waive requirements within the AM&SM, and the following is the only authorized process for deviations from this document.

NOTE: Minor changes (or additions or deletions) to the content of the AM&SM (typos, clarification, etc.) can be presented to the Flight Operations Special Assistant, Process/Facilities, for immediate processing through the Management Systems Office.

The Chief of Maintenance will ensure that any waiver that pertains to hazardous operations and personnel working within hazardous operations will be reviewed by the Safety Office, Code SH.

Typically, there are two reasons for requesting a waiver:

1. A needed deviation by a project or activity that is required to accomplish a task or
2. A proposed change of policy that applies to all Dryden and that requires a permanent change to the AM&SM.

See Section 1-7.2, Additions to the AM&SM.

Except where documented within more stringent standards, practices and procedures, any deviation(s) from this manual shall be documented through the AM&SM waiver process (See AM&SM Waiver Process below). The waiver database and process can

be accessed through the Documentation Automation Lookup & Exchange System (DALES) “Turnstile”.

1-5.1 AM&SM Waiver Process

An approved waiver (form DFRC 317, AM&SM Waiver) is the only authorized deviation from the AM&SM and Appendices. For any affected aircraft, a copy of each *accepted* waiver shall be maintained in the back of the aircraft’s workbook. Upon expiration, rescission, or cancellation of an accepted waiver, the affected waiver shall be removed from the aircraft’s workbook and destroyed. The current status of all waivers will be maintained, and can be viewed, via the Documentation Automation Lookup & Exchange System (DALES), Turnstile. This database is the formal and official waiver repository.

The database shall not have any record(s) deleted that have been created. The status and “determination” of any waiver can be changed by the proper responsible individual (the appropriate ranking Chief who *accepts* and *authorizes* a waiver by making the waiver’s initial “*Determination*”). Once changed, the Chief will notify the affected individual(s) responsible for complying with the waiver so that the new status or determination can be properly reflected within the Aircraft’s Workbook.

Any conflict between a printed copy of a waiver and the database shall default to what is reflected within the database.

1-5.2 Waiver Database Review

Electronically access the DALES Turnstile and select the “AMSM Waiver Database” button. When prompted for a password, just select “OK”; there is no password needed to review the records.

1-5.3 Waiver Initiation

Electronically access the DALES Turnstile and select the “AMSM Waiver Database” button. When prompted for a password type “*Originator*”, this will allow you to create a new waiver request within the database. Upon writing the waiver, contact your supervisor (or appropriate individual) for review.

1-5.4 Review and Concur Process (Supervisors/Branch Chiefs)

NOTE: Deviation from the following “Review and Concur Process” is allowed. Refer to the most current process that is embedded within the database through selecting the “Waiver Process” button.

Review
If there needs to be clarification or material added, notify the originator to make the necessary changes. Once satisfied electronically sign and date the "Reviewed By:" segment of the waiver and notify your superior (or appropriate individual) for their "Concurrence".

Concurrence
The person who has signed off on the "Review" will contact their superior (or appropriate individual) who will then make recommend changes, concur, or defeat the waiver request.

If changes are needed the individual who signed off on the "Review" shall be made aware of the perceived deficiencies. That individual will then notify the originator and have them update the request. Once the request has been updated the originator's supervisor (or appropriate individual) shall again be notified. That individual will again review the waiver request and once satisfied contact their superior (or appropriate individual) for concurrence.

1-5.4.1 <u>If Concurred with</u>

Sign and date the "Concurred By:" segment of the waiver and notify the appropriate upper level Chief (or appropriate individual) for a "Determination".

1-5.4.2 <u>If Concurrence is *not* achieved</u>

And that individual wishes to defeat the waiver then they shall notify the originator of their decision *and* notify the appropriate upper level Chief (or appropriate individual) for a "Determination" of "Rejected".

1-5.5 Determination Process (Appropriate Upper Level Chief or Individual)

1-5.5.1 <u>If concurrence was *not* achieved, but upper level Chief believes waiver should be granted</u>

Then they may select a determination of "Accepted". They shall electronically sign and date the "Authorized By:" segment of the waiver; notify the originator (and the individual who did not concur) of their determination. The determination of "Accepted" officially authorizes the waiver requested.

1-5.5.2 <u>If concurrence *was* achieved & upper level Chief does *not* agree</u>

A determination of rejection is reflected by selecting “Rejected”. Electronically sign and date the “Authorized By:” segment of the waiver and notify the originator, concurring and reviewing individuals of the determination. The “determination” of “Rejected” officially disallows the waiver requested.

1-5.5.3 <u>If the waiver request is deemed to be acceptable</u>

A determination of accepted is reflected by selecting “Accepted”. Electronically sign and date the “Authorized By:” segment of the waiver and notify the originator of the determination. The “determination” of “Accepted” officially authorizes the waiver requested.

1-6.0 ABBREVIATIONS, ACRONYMS, & DEFINITIONS

1-6.1 Abbreviations

None.

1-6.2 Acronyms

AFFTC	Air Force Flight Test Center
AFI	Air Force Instruction
AFM	Air Force Manual
AFOSH	Air Force Occupational Safety and Health
AFSRB	Airworthiness and Flight Safety Review Board
AFVA	Air Force Visual Aid
AGE	Aerospace Ground Equipment
AGSM	Aviation Ground Safety Manager
AGSO	Aviation Ground Safety Officer
AM&SM	Aircraft Maintenance and Safety Manual
ASAT	Accountability for Safety and Training Database
ASP	Airborne Science Program
BGSO	Branch Ground Safety Officer
CCR	Configuration Change Request
CFR	Code of Federal Regulations
DALES	Documentation Automation Lookup and Exchange

	System
DI	Designated Inspector
DMS	(Dryden's) Document Management System
DOD	Department of Defense
DOT	Department of Transportation
FAA	Federal Aviation Administration
FCF	Functional Check Flight
FOD	Foreign Object Damage
GEM	Global Electronic MotorCar, electric vehicle
GIDEP	Government – Industry Data Exchange Program
GOX	Gaseous Oxygen
I/A/W	In Accordance With
ICAO	International Civil Aviation Organization
JCN	Job Control Number
LEL	Lower Explosive Limit
LOX	Liquid Oxygen
MAF	Maintenance Action Form
MCN	Maintenance Control Number
MOA	Memorandum of Agreement
MOC	(AFFTC) Maintenance Operation Center
MOO	Maintenance Operations Office
MOU	Memorandum of Understanding
MWP	Maximum Working Pressure
NALCOMIS	NASA Aviation Logistics Command Management Information System
NATO	North Atlantic Treaty Organization
NDI	Non-Destructive Inspections
NFPA	National Fire Protection Association
OAP	Oil Analysis Program
ODT	Identifier for Dryden Workbook Forms
OFI	Opportunity for Improvement
ORR	Operations Readiness Review
PCB	Printed Circuit Board
PI	(Dryden) Process Instruction
POC	Point of Contact

PS	(Dryden) Process Specification
QAS	Quality Assurance Specialist
SMA	Safety and Mission Assurance
SOW	Statement of Work
TDs	Technical Directives
TDY	Temporary Duty
TO	Technical Order
UL	Underwriters Laboratory
W&B	Weight and Balance

1-6.3 Definitions

Reference

NPR 7900.3A, Aircraft Operations Management

Air Worthiness	The status of the aircraft as modified to accomplish particular flights, tests, or experiments. An aircraft is considered air worthy if it is flight worthy and all experimental systems required for the safe operation of the aircraft and accomplishment of all required mission elements are fully functional. Minor maintenance items may remain unresolved if safety is not impacted and the system is not required for mission accomplishment. Some test aircraft are equipped with experimental systems that cannot be separated from the basic aircraft and upon which the aircraft is fully dependent for safe flight. These test aircraft must always achieve an air worthy status. Typically, non-standard aircraft configurations, payloads, or external store configurations are involved, and specialized, non-standard, and locally developed procedures are involved in the installation or maintenance of these systems. Modified systems typically include instrumentation, video and cameras, recorders, additional sensors, and associated wiring, as well as aerodynamic, structural, hydraulic, electrical, flight control, and other modifications required to accomplish specific test or research objectives. Modifications may result in additional flight envelope restrictions on aircraft operations beyond those established by

	flight manuals. Certain minor modifications and uncertified external load configurations may be approved for routine operations by the operations engineer and considered as flight worthiness items with appropriate documentation in flight manuals or aircraft fact sheets.
Critical Lift	Critical lifts include the lifting of personnel, high dollar, and one-of-a-kind articles, aircraft, etc. whose loss would have serious programmatic impact or present a potentially unacceptable risk of personnel injury or property damage.
Experiments	Any authorized device or assembly that is incorporated into or onto a platform aircraft for the sole purpose of aiding in the obtainment of, or being the obtainer of, data.
Flight Worthiness	The maintenance status of the basic airframe. An aircraft is considered flight worthy if all normal production representative systems required for the safe operation of the aircraft and accomplishment of all required mission elements are fully functional. Minor maintenance items may remain unresolved if safety is not impacted and the system is not required for mission accomplishment. The aircraft may be safely operated without dependence on any experimental systems or modifications. Maintenance is accomplished using established procedures and checklists contained in military technical orders, manufacturer's maintenance manuals, or local DFRC procedures established by operations engineering as routine for that airframe.
Mission Management Aircraft	NASA administrative aircraft certified by the Federal Aviation Administration and used primarily for passenger transport. These include aircraft used to transport management and staff personnel on official travel for the purpose of satisfying mission requirements or other travel for the conduct of agency business. Dryden's Mission Management Aircraft are used primarily to support research and development programs. These aircraft are typically not modified and are maintained to FAA standards. Their documentation is typically maintained in their Aviation Standard Log Books.

Platform Aircraft	The term platform aircraft is used to describe the basic configuration of an aircraft's structure excluding experiments or variable aircraft configurations composed of experiment accessories, such as ER-2 Super Pods. Platform Aircraft are a subset of the Research and Development classification; however, they are used primarily to carry various experiments, much like cargo, to accomplish the goals of the Airborne Science Program (ASP). These aircraft are typically standard aircraft with a set basic configuration. Typically, their payloads (of varying experiments) change and are treated as cargo. Their documentation typically utilizes their Aircraft workbooks and ODT Forms.
Program Support Aircraft	Aircraft used to support programs and operations other than the direct production and acquisition of data. This includes, but is not limited to, astronaut training, safety chase, photo chase, cargo transport, flight training, range surveillance, launch security, and command and control. Dryden's Program Support Aircraft are used primarily to support research and development programs, including but not limited to pilot proficiency and chase. These aircraft are typically not modified and are maintained to Air Force and Navy standards. Their documentation is typically maintained in NALCOMIS.
Research and Development Aircraft	All aircraft directly related to the production or acquisition of data. This includes, but is not limited to, data acquired for aeronautics, Earth, Space, or life sciences, meteorology, and photogrammetry. Dryden's Research and Development Aircraft are used primarily for flight research and flight research experiments. These aircraft typically have their aerodynamics or flight control laws modified to achieve research data. Their documentation typically maintained through their Aircraft workbook utilizing ODT Forms with TDs being tracked through NALCOMIS and Work Orders being tracked through the electronic work order system in the Documentation Automation Lookup & Exchange

System (DALES).

1-7.0 PROCEDURES / GUIDANCE / OTHER

Procedures, guidance, and other directions are found throughout all chapters and appendices of this manual.

1-7.1 OSHA Requirements

It is Flight Operations policy to comply with applicable regulations of other Federal agencies exercising regulatory authority over NASA in specific areas (i.e., Department of Labor's Occupational Safety and Health Administration, Department of Transportation, etc.).

1-7.2 Additions to AM&SM

In the event that this manual is found to be insufficient to cover a specific topic, or it is discovered that this manual has not covered a valid topic, then the assigned Operations Engineer from the project that the discovery was made is responsible to ensure that, with the concurrence of the Chief of Maintenance, a document is created, approved and in place to correct the oversight.

Upon successful utilization of the newly created document that corrected the oversight an Opportunity for Improvement (OFI) shall be submitted through the Interactive Document Management System, located on Dryden's X-net, for incorporation into this manual.

1-7.3 Update and Review Requirements for AM&SM

The AM&SM is to be reviewed no less often than annually. The AM&SM Waiver database (discussed under "AM&SM Waiver Process") and any applicable OFIs are to be reviewed at the same time.

All waivers that have been determined to be 'Accepted' and are of a permanent nature will be incorporated into this document during its review. Those waivers, once incorporated, will then be 'Cancelled' within the AM&SM Waiver database.

The annual review will be documented and notes maintained by the Code O Special Assistant for Processes.

A document History Log can be found on the last page of this document, after all appendices. The log is for information only. In the

Description of Change column of the Document History Log, incorporation of waivers will be noted.

1-7.4 Dryden's Workplace Safety Standards

Dryden workplace safety standards promote the philosophy that "all accidents are preventable: ZERO is the GOAL": and that ANY PERSON can terminate operations that compromise safety.

Operations in the hangar, on the flight line, and aircraft maintenance, modification, and inspection shall adhere to requirements in the Aircraft Maintenance and Safety Manual and applicable aircraft documentation.

Deviations from AM&SM safety requirements shall be waived by the Chief of Maintenance per AM&SM Section 1-5.1.

GENERAL

A. Take the time to plan the task and understand the hazards.

B. Wear the appropriate protective clothing for the task.

C. Use proper equipment for the task and inspect equipment or tools prior to use.

D. Observe good house keeping practices.

E. Keep walkways clear of equipment. When hoses or power cords cross walkways, utilize walkway covers to reduce trip hazards.

F. Quickly clean or barricade spills to prevent slips or falls.

G. Comply with warning lights, signs, or barriers and areas cordoned off by tapes or ropes.

H. Use proper lifting techniques and don't lift loads over 50 pounds by yourself.

I. All electrical connections shall be eighteen (18) inches minimum above the floor.

J. High-energy machines and devices will be de-energized prior to maintenance (Lockout/Tagout).

K. Batteries will NOT be charged in hangars without a waiver signed by the Chief of Maintenance.

L. Hazardous chemicals will be stored in the DFRC HAZMAT tool/chemical crib when not in use.

M. If an unsafe condition is observed, stop it in a non-confrontational manner and/or report it.

AIRCRAFT

N. NO electrical power is to be left connected to an aircraft when not attended.

O. Before approaching, touching, or climbing on an aircraft, obtain permission from the crew chief.

P. With aircraft parked in hangars, no welding, exposed heating elements, or spark-generating devices (i.e., grinder) will be utilized.

Q. Due to the narrow taxiway between the front row and the back row on Dryden's main aircraft parking ramp, all aircraft with research-type pitot booms installed on their radomes, or other equipment that would extend into the taxiway, are restricted to parking on the front row of the ramp.

R. Communication devices (i.e., cell phones, radios, etc.) may not be used within 25 feet of an aircraft or 50 feet of an open fuel cell.

VEHICLES

S. The driver must hold a valid flight line driver's license to operate a motor vehicle on the flight line.

T. Wear seat belts on all equipment or vehicles equipped with them.

U. Drivers shall observe speed limits and signs and yield right-of-way to pedestrians and aircraft on the facility.

V. Vehicles will not be left running while parked on a ramp or in hangars.

W. Engine-driven vehicles will NOT be parked in the hangar overnight without a written waiver signed by the Chief of Maintenance.

1-8.0 METRICS & TREND ANALYSIS

There are no metrics or trend analysis associated with this manual.

1-9.0 MANAGEMENT RECORDS & RECORDS RETENTION

Where applicable, management records and record retention are detailed in each subsequent chapter or appendices.

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Aircraft Support Organizations and Capability

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2-1.0 PURPOSE OF CHAPTER

The purpose of this chapter is to identify the support organizations and elements at Dryden that have been established to maintain, modify, inspect and operate aircraft. Though the Flight Operations directorate has the majority of the support capability, other Dryden Organizations also provide key support functions.

2-2.0 RELEVANT DOCUMENTS

2-2.1 Authority Documents

NPD -8700.2	NASA Policy for Safety and Mission Assurance (SMA) for Experimental Aerospace Vehicles (EAV)
NPR-8735.2	Management of Government Safety and Mission Assurance Surveillance Functions for NASA Contracts

2-2.2 Reference Documents

DCP-O-002	Work Order Process
DCP-O-007	Metrology System
DCP-O-014	Egress/Cockpit Familiarization
DCP-S-019	Quality Witnessing and In-Process and Final Inspection of Hardware
DHB-O-001	Operations Engineer's Handbook
DOC-O-009	Dryden Organizational Chapter for the Flight Operations Directorate
DOC-P-010	Code P Organization Chart
DOC-R-011	Code R Organization Chart
DOC-S-012	Code S Organization Chart
DOC-Y-014	Code Y Organization Chart
DOP-O-003	Receipt And Storage of NASA Explosives
DOP-O-010	Life Support Systems Standard Operating Procedure
DOP-O-013	Air Crew Life Support Training
DOP-O-017	Life Support Technician & Augmentee Qualification and Certification
DOP-O-121	Material Control
DOP-O-122	Manufacturing with Hazardous Material
DOP-O-300	Flight Operations Manual

DOP-O-402	Redline Changes to Drawings/Work Orders
DOP-O-403	Work Order, Parts Control Tag, and Telemetry Service Request for Shop Work
DOP-R-002	Research Experimentation, Flight Test Technique And Disciplinary Flight Research
DOP-Y-006	Airborne Science Configuration Control
DOP-Y-007	Airborne Science Configuration Control Board Process

2-2.3 Informational Documents & Links

http://xnet.dfrc.nasa.gov/Organizations/SMA/index.html

http://www.dfrc.nasa.gov/FOIA/orgchart_cd.html Dryden's Organizational Charts

http://www.dfrc.nasa.gov/Organizations/InstFab/calgroup.html

http://www.dfrc.nasa.gov/Organizations/InstFab/fabgroup.html

http://www.dfrc.nasa.gov/Organizations/InstFab/index.html

http://www.dfrc.nasa.gov/Organizations/InstFab/telgroup.html

http://www.dfrc.nasa.gov/Organizations/LifeSupport/index.html

http://xnet.dfrc.nasa.gov/Organizations/SMA/CodeSF/index.html

http://xnet.dfrc.nasa.gov/Organizations/SMA/CodeSH/index.html

http://xnet.dfrc.nasa.gov/Organizations/SMA/CodeSQ/index.html

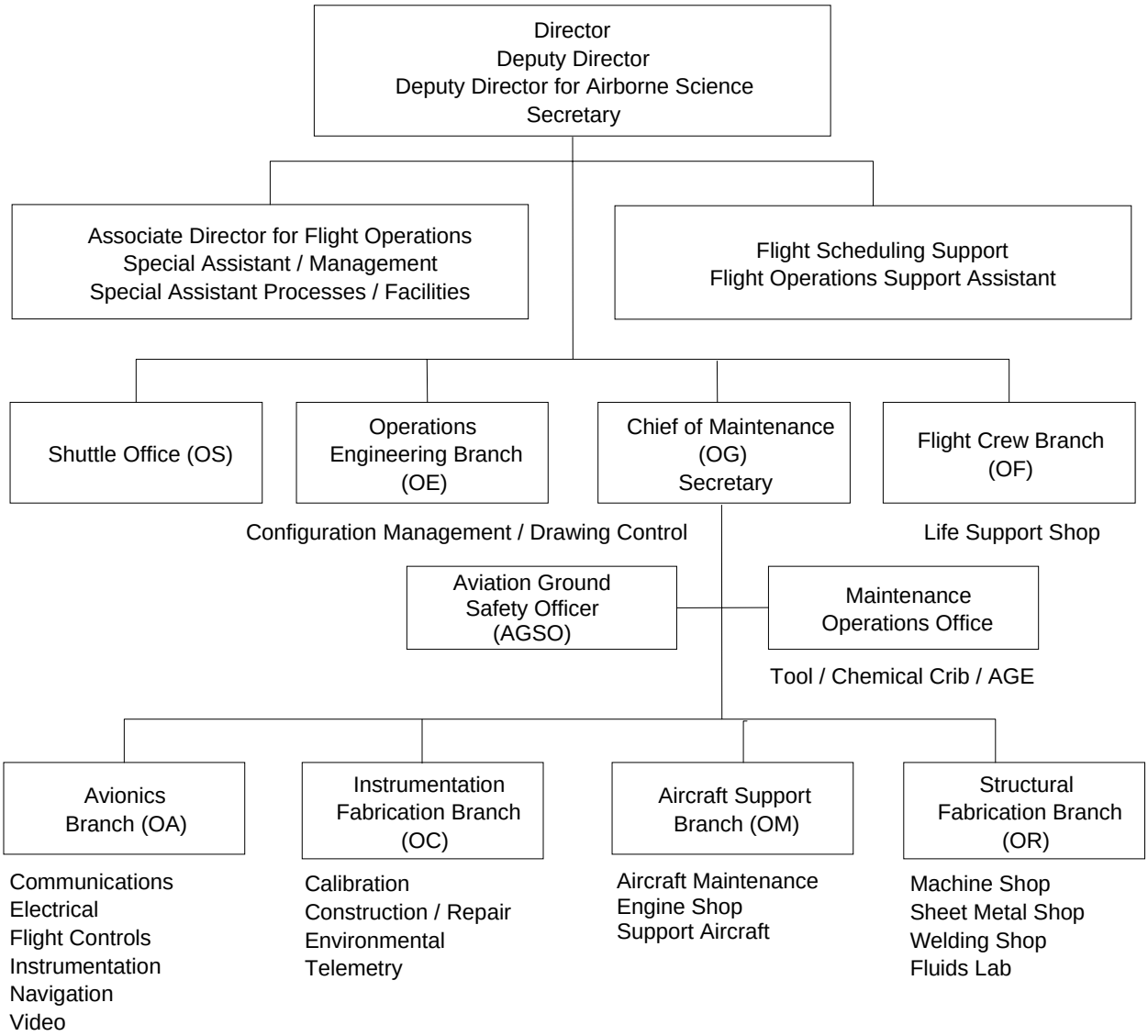
http://www.dfrc.nasa.gov/Organizations/StrucFab/index.html

2-3.0 FLIGHT OPERATIONS DIRECTORATE ORGANIZATIONAL LAYOUT

Reference

http://www.dfrc.nasa.gov/FOIA/orgchart_cd.html - Dryden's Organizational Charts

DOC-O-009 Dryden Organizational Chapter for the Flight Operations Directorate



The Dryden Flight Operations Directorate (Code O) is responsible for Operations and Systems Engineering, Maintenance, Modification, and in conjunction with the Safety Office (Code S), Safety and Aircraft Inspection(s).

2-4.0 OE – OPERATIONS ENGINEERING BRANCH

Reference

DHB-O-001 Operations Engineer's Handbook

Operations Engineers coordinate research related activities associated with Dryden research aircraft, and, in conjunction with aircraft crew chiefs, schedule and deconflict

aircraft maintenance, modification, instrumentation, systems tests, and other required project activities in preparation for flight. Details are found in DHB-O-001, Operations Engineer's Handbook.

2-5.0 OF – FLIGHT CREW BRANCH

The Flight Crew Branch encompasses the control and responsibility for the

- Flight Crew
- Life Support/Egress Group

2-5.1 Life Support/Egress

References

http://www.dfrc.nasa.gov/Organizations/LifeSupport/index.html

DOP-O-010	Life Support Systems Standard Operating Procedure
DOP-O-017	Life Support Technician & Augmentee Qualification and Certification
DCP-O-014	Egress/Cockpit Familiarization
DOP-O-003	Receipt And Storage of NASA Explosives
DOP-O-013	Air Crew Life Support Training

The Life Support Group is a subset of the Flight Crew Branch. The group's six major areas of responsibility are

A. Aircraft Normal/Emergence Oxygen Systems
B. Escape and Descent Systems
C. Air Crew Life Support Equipment
D. Survival and Recovery Systems
E. Shuttle Convoy Astro-van/Med -Ops Support operations
F. Industrial Safety Personnel Protection

2-6.0 OG – CHIEF OF MAINTENANCE

The Chief, Aircraft Maintenance Division (Chief of Maintenance) coordinates the aircraft maintenance and modification activities, which encompasses the control and responsibility for

A. Ground Safety Officer
B. Maintenance Operations Office
C. Avionics Branch
D. Instrumentation Fabrication Branch
E. Aircraft Support Branch
F. Structural Fabrication Branch

The Chief of Maintenance is the 'Owner' of the Aircraft Maintenance and Safety Manual.

2-7.0 AIRCRAFT MAINTENANCE DIVISION GROUND SAFETY OFFICE

2-7.1 Organization

The Aviation Ground Safety Officer (AGSO) is a full-time position assigned to the Aircraft Maintenance Division. The AGSO acts as an advisor to the Aircraft Maintenance Division Branch Chiefs, the Aircraft Maintenance Division Chief, the Director for Flight Operations, the Aviation Safety Officer, the Aviation Safety Manager, the Aviation Ground Safety Manager (AGSM), and the Office of Safety and Mission Assurance on matters involving ground safety. The AGSO has direct lines of communication to the Director for Flight Operations when, in his/her judgment, the situation dictates direct communication.

Each Branch Chief in the Aircraft Maintenance Division serves as the Branch Ground Safety Officer (BGSO) for his/her respective branch. The BGSO works in conjunction with the AGSO to address safety hazards and conditions unique to the individual branch work environment.

2-7.2 Concept of Operations

The Aviation Ground Safety Program resides under the Chief of Maintenance, who is responsible for planning, coordinating, implementing, and enforcing those programs that will help maximize DFRC productivity through the conservation of material and protection of personnel assets. The Aviation Ground Safety Program supports DFRC management directives and programs implemented by the Office of Safety and Mission Assurance. The goal of the program is to ensure that hazards to personnel and equipment are identified and eliminated or minimized to the maximum extent possible. Mishap prevention is greatly enhanced by a climate of positive safety attitudes.

2-7.3 Function and Duties

A. Basic Function – The AGSO shall act as the principal advisor to the Center Aviation Ground Safety Manager, the Chief of the Aircraft Maintenance Division, individual Aircraft Maintenance Division Branch Chiefs, the Aviation Safety Officer, and the Director for Flight Operations. He/she is responsible for fostering a safety attitude within the Aircraft Maintenance Division and the Flight Operations Directorate, for monitoring ground safety related occurrences, and identifying potentially risky practices and procedures.

B. Duties and Responsibilities

- Act as a focal point for all ground safety matters within the Flight Operations Directorate. Coordinate activities and share information with Center and other external safety organizations (AFFTC, other NASA Centers, etc.). (Aircraft Maintenance and Safety Manual, DCP-O-001)
- Participate in briefing new organizations and new employees on flightline and hangar safety. (AFFTC Instruction 10-2, AF form 483, DFRC DPD-1620.2A Parking Policy, DFRC DPD-1620.4 Traffic Policy, (Aircraft Maintenance & Safety Manual DCP-O-001)
- Assess and report to the Chief of Maintenance on the safety of the flightline, hangars, and ground support operations. (Aircraft Maintenance & Safety Manual DCP-O-001)
- Perform periodic inspections of hangars, shops, taxiways, ramps, aprons, and parking areas for safe operations and conditions.
- Participate as a member of the Center Aviation Safety Council. (Aircraft Mishap Response Procedure, DCP-S-001)
- Participate with the Aviation Safety Manager in periodic exercises to assess mishap response planning and reporting.
- Conduct or support ground or flight mishap investigations for the Chief of Maintenance, the Flight Operations Directorate, the Office of Safety and Mission Assurance, or the Center, as directed by appropriate authorities. These investigations may be either formal or informal.
- Work closely with Edwards AFB Airfield Manager and Safety Office regarding safety issues. (AFFTC Instruction 10-2, AF form 483, DFRC DPD-1620.2A Parking Policy, DFRC DPD-1620.4 Traffic Policy)

- Conduct weekly Code O staff safety meetings reporting on close calls.
- Advise the Chief of Maintenance on safety related training requirements for aircraft maintenance and back shop personnel (Aircraft Maintenance & Safety Manual DCP-O-001)
- Support Flight Operations Directorate, Chief of Maintenance, Aviation Safety Manager, Aviation Safety Officer, Aviation Ground Safety Manager, and the Office of Safety and Mission Assurance to conduct periodic reviews of all aviation related ground activities for compliance with established safety standards and practices. (Aircraft Maintenance & Safety Manual DCP-O-001)
- Conduct periodic inspections and audits to ensure the health of critical aviation ground safety processes.
- Provide reports, as requested, to the Chief of Maintenance on ground safety issues. (NF-1627, 1627A, 1627B, form DFRC 165, and Close Call Report form DFRC 127)
- Work in cooperation with the Aviation Safety Manager, Aviation Safety Officer, Aviation Ground Safety Manager, Office of Safety and Mission Assurance, and the Quality Assurance Office to address ground safety items of interest or concern. (Aircraft Mishap Response Procedure DCP-S-001)
- Assist the Aviation Safety Manager in the organization and presentation of the Quarterly Safety meetings. (Aircraft Mishap Response Procedure DCP-S-001)
- Assist Maintenance Division Supervisors (OG, OA, OM, OC, and OR) in conducting periodic branch safety meetings (at lest monthly) and assessing branch related ground safety concerns or issues.
- Support the Office of Safety and Mission Assurance in an annual review of DCP-S-001, Aircraft Mishap Response Procedures manual.
- Conduct an annual briefing of DCP-S-001 and the Flight Operations Directorate supplement to appropriate Aircraft Maintenance Division and Flight Operations Directorate personnel and to new personnel requiring this information as part of their duties.
- Prepare and review annually a Flight Operations Directorate supplement to DCP-S-001 to ensure that the Directorate provides required support for the Center Emergency Response

Plan. Coordinate this document with appropriate Directorate management personnel.

- Assist Dryden's Lifting Device and Equipment Manager (LDEM). Oversee critical lift for Flight Operations and Facilities. Oversee the training program for Mobile Cranes, Overhead Cranes, Forklifts, Man Lifts, Rigging, and Critical Lift. (Standard for Lifting Devices and Equipment NASA-STD-8719.9, DCP-S-009, Chapter 6, Critical Lift, and Chapter 7, Lifting Devices & Requirements.)
- Perform flightline driver's license training and issue flightline driver's licenses for the Air Force and maintain the training database. (AFFTC Instruction 10-2, AF form 483, DFRC DPD-1620.2A Parking Policy, DFRC DPD-1620.4, Traffic Policy, Aircraft Maintenance & Safety Manual DCP-O-001)
- Participate as a member of the Traffic Safety Committee. (AFFTC Instruction 10-2, AF form 483, DFRC DPD-1620.2A Parking Policy, DFRC DPD-1620.4 Traffic Policy, Aircraft Maintenance & Safety Manual DCP-O-001)
- Maintain safety awareness and appreciation for new safety related methods and concepts by attending aviation ground safety seminars or classes (typically annually).
- Represent the Flight Operations Directorate on the Facilities Operations Readiness Review (ORR) panel. (Facility Operational Readiness Review (ORR) DCP-S-031)
- Interface with Facilities for on-going work orders involving Flight Operations Directorate hangars, shops, and flightline areas, and attend weekly work order status meetings representing Flight Operations Directorate. (Code FD, FM, and DTI)
- Provide input and recommendations for safety awards to Flight Operations Directorate, Chief of Maintenance, Aviation Safety Manager, and the Office of Safety and Mission Assurance.
- Support the DFRC Disaster Preparedness Program. (Code SH)
- Accomplish safety related special projects as directed by the Chief of the Aircraft Maintenance Division or the Director for Flight Operations.

C. Individual Branch Ground Safety Officer Duties

- Each Branch Chief in the Aircraft Maintenance Division is designated as the branch ground safety officer (BGSO) to assist the AGSO in matters pertaining to branch specific operations, equipment, procedures, and practices. The BGSO is the focal point for gathering safety information and conducting monthly safety meetings within his/her branch on subjects pertinent to the safe maintenance and operation of branch equipment, procedures, and practices employed by employees in the conduct of branch related activities, and other subjects pertinent to the unique requirements of the individual branch. Suitable records of meetings are maintained by the Branch Chief to ensure that absent personnel are thoroughly briefed on information disseminated.
- The Branch Chief is responsible for conducting periodic informal work are safety walk-throughs to ensure that the branch work environment is free of unnecessary hazardous conditions.
- The Branch Chief continually monitors branch work procedures and practices to identify potential hazardous activities that warrant change and improvements.

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 maintenance practices or procedures, equipment deficiencies or hazards, human factor errors, crew resource management errors, or other valuable lessons learned will be publicized to the maximum extent possible consistent with NASA, DOD, and FAA policies and directives. Generally, the AGSO will assist the AGSM in determining what safety related information is worth outside dissemination and to which organizations the information should be provided. The AGSM will then disseminate the information through appropriate channels.

2-8.0 MOO – MAINTENANCE OPERATIONS OFFICE

Refer to Appendix B for a description of the Maintenance Operation Office (MOO). The appendix also includes NALCOMIS instructions.

2-9.0 OM – AIRCRAFT SUPPORT BRANCH

The Aircraft Support Branch provides civil service crew chiefs and mechanics for the Center's research aircraft and other aerospace vehicles. The branch also provides oversight for visiting or hosted programs. The OM Branch represents Flight Operations as the facility managers of hangars, flightline and aircraft ramps, and is responsible for the safe condition and operation of all activities conducted in and around these facilities.

2-9.1 Aircraft Maintenance Crew Chief

The crew chief is responsible for the overall flight worthiness of the research vehicle assigned. He/she ensures all requirements for maintenance, inspections, and modifications are accomplished per applicable procedures and processes. The crew chief is responsible for the safe working environment in and around the vehicle for all individuals associated with the Project.

2-9.2 Aircraft Mechanic

The aircraft mechanic is assigned to a specific Project to maintain the research vehicle to the highest level of flight worthiness. He/she works closely with the crew chief and other Project personnel to provide a safe working environment and a reliable research vehicle.

2-9.3 DFRC Engine Shop

The Engine Shop is responsible for the overall maintenance and flight worthiness of Center-owned engines. The Engine Shop chief is responsible for all levels of maintenance of the GE-404 engine. The shop performs Organizational maintenance, flightline troubleshooting, and component replacement for other Center-owned engines. The Engine Shop is responsible for working closely with the Maintenance Operations Office to ensure that engine/component, time/cycles, and power plant bulletins are properly tracked.

2-9.4 Support Aircraft

The Aircraft Support Branch oversees the Support Aircraft contract. The contractor provides maintenance for Dryden's fleet of chase, program support, and mission management aircraft

Even though the AS&SM is intended to give direction to the maintenance of Dryden's civil service maintained aircraft, the contractual requirements and obligations, along with any Statement of Work for support aircraft, may impose more stringent requirements than this document details. In such cases, the contractual

requirements, obligations, and any Statement of Work will take precedence.

2-9.5 Airborne Science Aircraft

The Aircraft Support Branch oversees the aircraft maintenance portion of the Airborne Science aircraft.

Even though the AM&SM is intended to give direction to the maintenance of Dryden's civil service maintained aircraft, the contractual requirements and obligations, along with any Statement of Work for Airborne Science aircraft, may impose more stringent requirements than this document details. In such cases, the contractual requirements, obligations, and any Statement of Work will take precedence.

2-10.0 OA – AVIONICS BRANCH

Technicians assigned to the Avionics Branch provide technical support of avionics systems for Dryden's research aircraft and vehicles.

This support includes the design, development, testing, maintenance, and modification of aircraft communications, electrical, flight control, instrumentation, navigation, and video systems and equipment.

2-10.1 Lead Avionics Technicians

The lead avionics technician is the responsible person for all activities and maintenance actions performed on the avionics and instrumentation systems on the aircraft he/she is assigned to. The Lead Technician is assigned by the Chief of the Avionics Branch.

2-10.2 Avionics Technicians

Additional avionics technicians are assigned by the Chief of the Avionics Branch as required to meet aircraft or project requirements.

2-10.3 Communications, Navigation, and Video Systems Shop

Technicians assigned to the communications, navigation, video shop provide the design, development, testing maintenance and modification of aircraft and mobile communications, navigation, video systems and equipment. This includes work performed on Dryden aircraft as well as on systems units removed from the aircraft/vehicle and worked on in the shop. Technicians from this shop may also be

assigned to work on aircraft electrical, instrumentation, and flight control systems on an as needed basis.

2-11.0 OC – INSTRUMENTATION FABRICATION BRANCH

Reference

http://www.dfrc.nasa.gov/Organizations/InstFab/index.html

The Instrumentation Fabrication Branch (OC) is responsible for providing Para-Engineering and Technical services which encompass telemetry support (system development, programming, troubleshooting to data decommutation and display), pressure and electronic calibration, environmental testing, the fabrication of electronic assemblies (including PCB design).

2-11.1 Calibration

Reference

http://www.dfrc.nasa.gov/Organizations/InstFab/calgroup.html

The Calibration Group conducts acceptance testing by simulating conditions the equipment will encounter during flight. The Group also conducts vibration tests on instrumentation equipment to detect resonance frequencies incompatible with flight conditions, and frequencies that would disrupt the data collection process during flight.

2-11.2 Environmental

The Environmental Group is a subsection of the Calibration Group.

Instrumentation used on NASA's aeronautical research platforms to telemeter data must be depended on to withstand extreme environmental conditions such as vibration, temperature, and altitude. The Environmental Group provides the testing, validation, verification, and assurances that systems put into/onto the research aircraft will be able to operate successfully within their environment.

2-11.3 Instrument Fabrication /Repair

Reference

http://www.dfrc.nasa.gov/Organizations/InstFab/fabgroup.html

The Fabrication Group is responsible for the layout, fabrication, buildup, testing troubleshooting, repair, and modification of ground based and airborne electronics.

Fabrication technicians have the ability to work independently or as part of a team. They are responsible for all stages of a project's planning and development and work directly with engineers and other customers to resolve anomalies and clarify project requirements.

2-11.4 Telemetry

Reference

http://www.dfrc.nasa.gov/Organizations/InstFab/telgroup.html

The Telemetry Group works with Instrumentation Engineers (RI) in the selection, assembly, programming and testing of telemetry systems. Every telemetry system is uniquely configured for a specific program and every research project carried out at Dryden where data is collected involves some assistance from the Telemetry Group.

2-12.0 OR – STRUCTURAL FABRICATION BRANCH

References

DCP-O-002	Work Order Process
DCP-O-007	Metrology System
DCP-S-019	Quality Witnessing and In-Process and Final Inspection of Hardware
DOP-O-121	Material Control
DOP-O-122	Manufacturing with Hazardous Material
DOP-O-402	Redline Changes to Drawings/Work Orders
DOP-O-403	Work Order, Parts Control Tag, and Telemetry Service Request for Shop Work

The Structural Fabrication Branch (OR) is responsible for providing Para-Engineering and technical service support through machine, sheet metal, welding, and fluids (hydraulic, pneumatic, tubing) shops for project and facility support, aircraft installation, modification and repair.

The organization is staffed with Aerospace Engineering Technicians that have the ability to work independently or as part of a team. They are responsible for all stages of a project’s planning and development and work directly with customers and engineers during the development process. They are responsible for layout, fabrication, buildup,

testing, troubleshooting, repair, and modification of project support hardware and vehicle integration.

2-12.1 Machine Shop

The machine shop is equipped with manual and numerically controlled equipment centered on a prototype capability. Shop personnel work in shops, on airborne platforms, or other locations.

2-12.2 Sheet Metal Shop

The sheet metal shop is equipped with manual and numerically controlled equipment centered on a prototype capability. Shop personnel work in shops, on airborne platforms, or other locations.

2-12.3 Welding Shop

The weld shop is equipped with manual MIG, TIG, ARC and gas welding and cutting capability. Welders are certified for aircraft and structural welding, and the shop is staffed with certified welding inspectors.

2-12.4 Fluids Lab

The fluids shop is equipped with manual equipment designed for one of a kind replacement or prototype hoses, lines and tubing for aircraft, AGE, or other project support.

2-13.0 AIRBORNE SCIENCE DIRECTORATE (Y)

References

DOC-Y-014	Dryden Organization Chapter for the Airborne Science Directorate
DOP-Y-006	Airborne Science Configuration Control
DOP-Y-007	Airborne Science Configuration Control Board Process

The Airborne Science Directorate, Code ‘Y’, maintains Dryden’s scientific platform aircraft with contractor support. All operations within the Airborne Science Program are under the auspices of Code ‘O’. Even though the AM&SM is intended to give direction to the maintenance of Dryden’s aircraft, the contractual requirements and obligations, along with any Statement of Work, may impose more stringent requirements than this document details. In such cases the contractual requirements, obligations, and any Statement of Work will take precedence.

2-13.1 ER-2

The ER-2 aircraft are typically maintained in accordance with Air Force Technical Orders. Mission and program constraints prohibit the airframe from being updated with the U-2 heritage type aircraft. This means that as time continues, the current technical publications will likely not provide sufficient or relative detail or instructions for various systems and their associated maintenance/upkeep. Therefore, a close and intimate relationship between Lockheed Aero/U-2 engineering and support groups is required.

2-13.2 DC-8

The DC-8 is a unique platform aircraft. The DC-8 series of aircraft are no longer in production but Boeing still provides engineering and technical support for DC-8 operators. Due to aircraft modifications a close and intimate relationship between Dryden Operations Engineering, contracted engineering, Boeing engineering, and commercial carriers who operate DC-8's is maintained.

2-14.0 AEROSPACE PROJECTS DIRECTORATE (P) SUPPORT/FUNCTIONS

Reference

DOC-P-010 Dryden Organization Chapter for Aerospace Projects Directorate

The Aerospace Projects Directorate manages all of Dryden's flight research projects. It serves the Center and other NASA installations, military, other Federal agencies, and other NASA Headquarters-approved customers. The primary function of the Directorate is to achieve project management objectives (scope, resources, schedule) in a safe and efficient manner.

The Dryden Project Manager is responsible for flight safety of his/her assigned research vehicle. As such, the Project Manager is responsible for ensuring configuration management and typically serves as chair of the Projects Configuration Control Board.

2-15.0 OFFICE OF SAFETY AND MISSION ASSURANCE (S) SUPPORT/FUNCTIONS

References

http://xnet.dfrc.nasa.gov/Organizations/SMA/index.html

DOC-S-012	Dryden Organization Chapter for the Office of Safety and Mission Assurance
NPD 8700.2	NASA Policy For Safety And Mission Assurance (SMA) For Experimental Aerospace Vehicles (EAV)
NPR 8735.2	Management Of Government Safety And Mission Assurance Surveillance Functions For NASA Contracts

2-15.1 Flight Assurance Office (SF)

Reference

http://xnet.dfrc.nasa.gov/Organizations/SMA/sf.html

The Flight Assurance Office implements Annual Operating Agreement (AOA); manages System Safety Budget; ensures the Airworthiness and Flight Safety process; ensures all Projects have a System Safety Program; manages Hazard Reports and Accepted Risk List; responds to Project Manager; and provides Range Safety support.

2-15.2 Safety, Health, & Environmental Office (SH)

Reference

http://xnet.dfrc.nasa.gov/Organizations/SMA/sh.html

The Safety, Health, and Environmental Office implements Annual Operating Agreement (AOA); ensures OSHA Safety and Environment processes; manages environmental activities budget; manages Safety, Health, and Environmental support contract; provides response to emergency 911 calls; plans and executes the Environmental Management Program; and provides liaison between DFRC and AFFTC for Environmental issues.

2-15.3 Quality Assurance Office (SQ)

The major responsibility of the Quality Assurance Office is to ensure that quality requirements are met throughout all project phases,

including preliminary and engineering design, development, fabrication, processing, maintenance, field use, flight or operations preparation, flight operations, and post-flight/operations analysis.

A. Assurances

Reference

http://xnet.dfrc.nasa.gov/Organizations/SMA/sq.html

Assurances are provided to support and aid in the success of Dryden's projects. Keeping informed of newly found defective materials, products, (through GIDEP), or services are just one of the many important functions that the organization is responsible for.

Verifying, auditing, and review of potential and existing facilities, internal and external, for Quality processes, proper working environment, support equipment, qualified and certified personnel, etc. is also another important function.

B. Inspections

Performing inspections is a subpart of the overall Quality Assurance Office duties. Personnel within the office have been qualified to perform aircraft, nondestructive, and support shop work inspections. These individuals have been issued stamps for "buying off" completed work.

The Quality Assurance Office also oversees the Dryden Designated Inspection (DI) system.

2-16.0 RESEARCH ENGINEERING (R) SUPPORT/FUNCTIONS

References

DOC-R-011	Dryden Organization Chapter for Research Directorate
DOP-R-002	Research Experimentation, Flight Test Technique And Disciplinary Flight Research

The Research Engineering group plays a key role in the research, development, proto-typing, verification and validation, and other aspects of new/altered design as well as integration of those technologies onto and into Dryden research aircraft. Whenever Research Engineering is planning to have any item installed on an aircraft, that item must be coordinated with the appropriate Flight Operations organization for authorization and installation.

Chapter Three
Qualification and Training

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3-1.0 PURPOSE OF CHAPTER

NOTE: This chapter of the Aircraft Maintenance and Safety Manual replaces DOP-O-018, Certification Training, in its entirety.

The purpose of this chapter is to describe the means used to establish the initial qualification of individuals to work on the flight line and in Dryden hangars on Dryden controlled aircraft. It also defines the specific training required to certify that a person is currently qualified to operate and maintain aircraft, systems and support equipment.

3-2.0 RELEVANT DOCUMENTS

3-2.1 Authority Documents

None.

3-2.2 Reference Documents

DCP-O-014	Egress/Cockpit Familiarization
DCP-S-014	Quality Inspector (QI) Designated Inspector (DI) Training
DOP-O-013	Air Crew Life Support Training
DOP-O-017	Life Support Technician & Augmentee Qualification and Certification
DOP-O-018	Certification Training
DOP-O-024	Aircraft Related Training
DOP-O-300	Flight Operations Manual

3-3.0 TRAINING REQUIREMENTS

References

DCP-S-014	Quality Inspector (QI) Designated Inspector (DI) Training
DOP-O-013	Air Crew Life Support Training
DOP-O-017	Life Support Technician & Augmentee Qualification and Certification
DOP-O-024	Aircraft Related Training
DOP-O-300	Flight Operations Manual

NOTE: The following training requirements are for civil service employees. Contractors training and certification will be in accordance with their contractual agreement, statement of work, or accepted quality processes. However, they must comply with the intent of the training outlined in this chapter.

All personnel who work on or near Dryden aircraft will comply with DOP-O-024, Aircraft-Related Training.

Aircraft maintenance personnel performing air crew duties as part of their assignment will be trained per DOP-O-300.

All maintenance personnel who have been identified as Designated Inspectors as part of their duties will be trained per DCP-S-014, Quality Inspector (QI)/Designated Inspector (DI) Training.

3-3.1 Air Crew Duties of Maintenance Personnel

References

DOP-O-300	Flight Operations Manual,
DOP-O-013	Air Crew Life Support Training

Aircraft maintenance personnel performing air crew duties as part of their assignment will be trained per DOP-O-300.

3-3.2 Certification Training

General Training can be taught and certified by an Aircraft Crew Chief or the Safety Office. Initial and Refresher Certification Training can be taught by the Flight Operations AGE Support Contractor or other certified instructor. Table 3-1, Certification Training and Recertification Requirements, lists training and recertification requirements.

It is the responsibility of each supervisor to identify which of the required training is to be taken by his/her employees. Training requirements for each individual will be identified and tracked on the Dryden Personnel Qualification Report located on the Code O turnstile.

NOTE: As it becomes available, the ASAT training database may be utilized to maintain training records.

3-3.3 Exclusions

Certification of equipment and facilities is not within the scope of this procedure but may be equally important as personnel certification as far as safety is concerned. High pressure systems, safety protective systems, propellant systems, vacuum systems, hoists, cranes, etc., will be tested periodically and certified to be capable of safely operating at their rated capacities, per NASA Dryden Process Instructions / Specifications and DCPs/DOPs.

This chapter shall not be used as a justification for allowing hazardous duty payments, environmental differential pay, or premium pay, nor will the fact that a job qualifies for hazardous duty pay imply that it is covered by this chapter. It has always been NASA policy to make all operations as safe as possible, even potentially hazardous testing. For guidance on hazard duty pay differentials, refer to 5 CFR 532, "Prevailing Rate System," 5 CFR 550, "Administrative Personnel, Office of Personnel and Management," and the Federal Personnel Manual.

The Airborne Science Program (ASP) “Required Training and Certification” is covered within its Quality Assurance Plans (QAP), Procedures section.

3-3.4 Responsibilities

Each Branch Chief shall assure that certification is properly conducted for personnel under their management of surveillance. This shall include selection and notification of names and assignments of qualified instructors/examiners, provisions of proper training aids, and maintenance of appropriate documentation. The Certifying Authority shall also schedule and assure accomplishment of re-certification.

The Certifying Authority (Instructor/Examiner) shall assure that each certification/re-certification candidate receives training, examination, and certification.

3-4.0 DESIGNATED INSPECTOR TRAINING REQUIREMENTS

Reference

DCP-S-014 Quality Inspector (QI) Designated Inspector (DI) Training

Designated Inspector oversight and training responsibility resides with Code S, Office of Safety and Mission Assurance.

3-5.0 LIFE SUPPORT/EGRESS TRAINING REQUIREMENTS FOR SELECTED TECHNICIANS

References

DCP-O-014	Egress/Cockpit Familiarization
DOP-O-017	Life Support Technician & Augmentee Qualification And Certification
DOP-O-024	Aircraft Related Training

A. Aircraft maintenance technicians may be certified by the Chief of the Life Support Shop and authorized by the Aircraft Support Branch Chief to perform maintenance on the aircraft escape system. These technicians will be authorized to work with a qualified life support technician during ejection seat installation and removals.

B. Formal training is training received from an approved military or aircraft company school for a particular aircraft ejection system. Continual on the job training is required to maintain proficiency on the ejection system that formal training was received on. An individual who has not performed ejection systems maintenance within 18 months will have their certification to perform ejection seat maintenance removed until refresher training has been accomplished by the Life Support Shop.

C. Training records for each individual certified to perform ejection seat maintenance will be maintained by the Chief of the Life Support Shop and certification information will be given to the Life Support Training Record keeper for incorporation in the individuals training record. Copies of all formal training will be placed in the employees' personnel folder.

3-6.0 CENTER MEDICAL OFFICER RESPONSIBILITIES

Monitor compliance for physical examination including type, extent, and frequency. If a person does not comply with the medical requirement, the Medical Officer will notify the appropriate supervisor.

3-7.0 CENTER INDUSTRIAL SAFETY OFFICER RESPONSIBILITIES

A. Monitor compliance with provisions of this chapter.

B. Annually inventory potentially hazardous operations with certifying authorities and jointly make necessary recommendations for adjustments in the list of personnel to be certified.

C. In conjunction with certifying authorities and the Medical Officer, identify certifying criteria for each job position.

D. Review currency.

3-8.0 CONTRACTING OFFICER TECHNICAL REPRESENTATIVE RESPONSIBILITIES

The COTR of any contract associated with Dryden Flight Operations will assure that the intent of this Aircraft Maintenance and Safety Manual are included in contractual requirements.

3-9.0 TRAINING RECORDS

Training records will be maintained on the Dryden Personnel Qualification Report located on the DFRC Code O turnstile.

Contractors will ensure that training records of their employees are kept and maintained. The AGE Shop will maintain records of all employees (civil service and contractors) that operate mobile cranes, forklifts, or man lifts.

NOTE: As it becomes available, the ASAT training database may be utilized to maintain training records.

Table 3-1
Certification Training and Recertification Requirements

General Training	Frequency	Notes
Cockpit Fam	12 mo.	Entry/Egress
Explosive Ordinance	12 mo.	
Oxygen Servicing	36 mo.	
High Pressure Gas	48 mo.	3000+ psi
Aircraft Maintenance & Safety Manual	One time	
FOD	12 mo.	
Aircraft Towing	One time	
Fire Extinguisher	12 mo.	
Confined Space Entry	As required	Requires physical
Critical Lift	As required	
Respiratory Protection	As required	Requires physical
Overhead Cranes	24 mo.	
A/C Tug	One time	
T-300/500 Tow Tractor	36 mo.	
Bomb Hoist	48 mo.	
Hydrazine Level 2	12 mo.	
Scissor Lift	24 mo.	
Hazardous Communications	One time	
Lockout/Tagout	One time	
Chemical Safety	12 mo.	
Cryogenics Safety	36 mo.	
Hearing Protection	12 mo.	
Audiogram	12 mo.	

Certification Training	Frequency	Notes
Aircraft Engine Run	24 mo.	By pilot/certified crew chief
Flight Line Drivers License	12 mo.	Comply with AFFTC 10-2
Mobile Crane	24 mo.	AGE shop. Requires physical
Fork Lift	24 mo.	AGE shop. Requires physical
Man Lift	24 mo.	Age shop. Requires physical
Munitions Transportation	12 mo.	Comply with AFOSH 127-100
Borescope	48 mo.	Engine shop
Hydrazine Level 3	12 mo.	F-16/ER-2 Emergency Response Team
Welding	36 mo.	
Hand Solder	As required	
Harness Cable	As required	
Wire Wrap	As required	
Fiber Optic	As required	

Chapter Four
Aircraft Maintenance and Modification

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4-1.0 PURPOSE OF CHAPTER

The purpose of this chapter is to describe the established process for the maintenance, modification, and inspection of aircraft operation at Dryden.

4-2.0 RELEVANT DOCUMENTS

4-2.1 Authority Documents

14 CFR 25.851	Airworthiness Standards, Fire Extinguishers
NPR 7900.3A	Aircraft Operations Management
42 U.S.C. 2473(c)(1), Section 203 (c)(1)	National Aeronautics and Space Act of 1958 (as amended)
FAA AC 20-132	Public Aircraft

4-2.2 Reference Documents

TO 1-1B-50-CD-1	Aircraft Weight & Balance Manual (CD, Located in Main TO Library)
DCP-M-006	Requests for Frequency Assignments
DCP-M-104	Flight Termination System (FTS) Configuration Control Process
DCP-O-002	Work Order Process
DCP-O-004	Engineering Drawing Control
DCP-O-011	Aircraft System Test Procedures Preparation and Release
DCP-O-013	Aerospace Vehicle Close-Out Photography Inspections
DCP-P-009	Research Project Flight Request
DCP-P-016	Configuration Management of Flight Research Projects
DCP-P-017	Configuration Change Process for Flight Project Critical Systems
DCP-P-018	Discrepancy Report Process for Flight Project Critical Systems
DCP-S-006	Quality Assurance Audit
DCP-S-019	Quality Witnessing and In-Process and Final Inspection of Hardware
DCP-X-009	Airworthiness and Flight Safety Review Process
DEI-O-012	Galvonic Cell and Battery Maintenance
DHB-O-003	Maintenance Action Form (MAF) Handbook

DOP-O-004	Engine Maintenance
DOP-O-007	Aircraft Cockpit Review
DOP-O-011	Aircraft Maintenance Operations
DOP-O-019	Aircraft Maintenance Standard Operating Procedure
DOP-O-023	Aircraft Weight and Balance (W&B)
DOP-O-400	Aerospace Vehicle/Fixture Maintenance
DOP-O-403	Work Order, Parts Control Tag, and Telemetry Service Request for Shop Work
DOP-Y-006	Airborne Science Configuration Control
DOP-Y-007	Airborne Science Configuration Control Board Process
DOP-Y-010	Code Y Configuration Management Plan
PI-00-E	Aircraft Tire Use and Maintenance
PI-20-O	Aircraft Hydraulic Oil Quantitative Sampling for Water Intrusion
PI-20-P	Aircraft Hydraulic Oil Quantitative Sampling for Particulate Contamination
QAP-Q-1.0	Airborne Science Quality Assurance Plan (QAP)

4-2.3 Informational Documents

None.

4-2.4 Forms

DFRC 317	AM&SM Waiver
Form 1671	Maintenance Action Form
ODT	Aircraft Maintenance Forms. See Chapter 8
NALCOMIS	Electronic Aircraft Maintenance Documentation. See Chapter 8.

4-3.0 MAINTENANCE/GENERAL

Authority to perform maintenance and to assure airworthiness of Dryden aircraft is delegated to the Flight Operations Directorate from the Director of the Dryden Flight Research Center. Airworthiness will be maintained by Dryden in compliance with approved airworthiness standards for aircraft, airframes, aircraft engines, propellers and accessories, or any parts thereof.

Only those persons specifically assigned as NASA civil service or contractor aircraft maintenance personnel will be permitted to perform maintenance on aircraft. When

required, depot level government or contractor teams may work specific modifications and aircraft upgrades.

Methods, processes, requirements and acceptability criteria utilized in the fabrication, modification, removal, installation and operation of aircraft parts, assemblies, components, systems and related equipment will be controlled and documented in accordance with approved procedures and will be verified by either designated inspection or Quality Assurance personnel.

4-4.0 AIRCRAFT MAINTENANCE

References

DEI-O-012	Galvonic Cell And Battery Maintenance
DHB-O-003	Maintenance Action Form (MAF) Handbook
DOP-O-004	Engine Maintenance
DOP-O-011	Aircraft Maintenance Operations
DOP-O-019	Aircraft Maintenance Standard Operating Procedure
DOP-O-400	Aerospace Vehicle/Fixture Maintenance
PI-00-E	Aircraft Tire Use and Maintenance

4-4.1 Aircraft Covered by Documentation

All aircraft maintenance will be performed to approved documentation (TOs, Maintenance Manuals, etc.), or to documented direction of Operations Engineering.

Dryden Flight Research Center aircraft will be maintained, to the maximum extent possible, as Public Aircraft (see AC 20-132) using procedures established by the airframe or power plant manufacturer as described in the approved maintenance and inspection manuals for each aircraft.

4-4.2 Aircraft with Modified Documentation

Procedures and inspections developed for research aircraft not having complete manuals, or revisions to existing manuals because of research modifications to the aircraft, shall be reviewed and approved by Operations Engineer, Systems Engineer, and Quality Assurance for the affected aircraft. If the Systems Engineer and Operations Engineer are the same or if there is no System Engineer assigned, then a Systems Engineer signature is not required.

4-4.3 Control of Documentation

Maintenance manuals for each aircraft shall be controlled by the Aircraft Technical Library under the cognizance of the Chief, Quality Assurance Branch, Code SQ. Maintenance manuals kept at the aircraft are the aircraft Crew Chief's responsibility to maintain and update as required. It is the Technical Librarian responsibility to send all revisions to the appropriate aircraft Crew Chief(s) as required.

4-5.0 AIRCRAFT WORKBOOK

All Dryden aircraft and/or major subcomponents will utilize an Aircraft Workbook or equivalent NALCOMIS documentation.

The forms specified in Chapter 8, Aircraft Workbook Documentation, or Appendix B-5.0, Documentation Utilizing NALCOMIS, are the only authorized forms for all Dryden aircraft and aircraft experiments, research items or other subsystems that utilize ODT forms and/or an aircraft workbook. Any deviation from this document shall be granted *only* through an AM&SM Waiver (DFRC 317), approved by the Chief of Maintenance or his designee.

4-5.1 Major Subcomponents

A. Major aircraft subcomponents will have their own workbook/NALCOMIS documentation. Pylons, flight test fixtures, experiments, etc. (i.e., those devices which themselves contain power sources, actuators, pressure vessels, instrumentation systems, and are typically removed from the aircraft for work and/or modification) are considered major aircraft components.

B. It is the responsibility of the Crew Chief or Operations Engineer to ensure a workbook or NALCOMIS equivalent is set up for major aircraft subcomponents.

4-6.0 HOW MAINTENANCE IS REQUESTED / AUTHORIZED / PERFORMED

References

DCP-O-002	Work Order Process
DCP-O-011	Aircraft System Test Procedures Preparation And Release
DCP-M-006	Requests For Frequency Assignments
DCP-P-009	Research Project Flight Request

DCP-P-016	Configuration Management Of Flight Research Projects
DCP-P-017	Configuration Change Process For Flight Project Critical Systems
DCP-P-018	Discrepancy Report Process For Flight Project Critical Systems
DOP-O-019	Aircraft Maintenance Standard Operating Procedures
DOP-O-400	Aerospace Vehicle/Fixture Maintenance
DOP-O-403	Work Order, Parts Control Tag, And Telemetry Service Request For Shop Work

Maintenance of aircraft and associated flight systems, subsystems, instrumentation, and experiments are each handled in the same manner per DOP-O-400. With exception of the Airborne Science ER-2 aircraft (which use Lockheed Aero Service Bulletins), all requested work is identified through established processes, such as the Work Order Process, DCP-O-002, or applicable Technical Directives, Technical Changes, Technical Orders, or FAA Advisories, Directives, etc.

Authorization to perform aircraft maintenance comes from the appropriate source, i.e., Tech Order, FAA directive, approved Work Order, etc.

Work to be accomplished is also identified by “write ups” noted by the pilot, maintenance crew, or Operations Engineer in the ODT-5A or NALCOMIS discrepancy forms.

All aircraft maintenance will be annotated in the appropriate documentation format (ODT-5/512/NALCOMIS/Work/Log book) (Reference Chapter 8 and Appendix B-5.0)

The Maintenance Operations Office tracks and updates flight and maintenance activities per DOP-O-011, in order to monitor and update aircraft status.

A Work Order is required if the work directly concerns an aircraft or an element of GSE or test equipment that functionally interfaces with an aircraft.

4-7.0 WORK ORDERS

Refer to DCP-O-002 for the Work Order Process.

Work Orders are generated to formally initiate and document any non standard or non-routine maintenance work to be performed. They typically are used to initiate the initial construction of an item, the modification of an aircraft or system, and to formally document, closeout, and account for Configuration Change Requests (CCR’s).

4-8.0 GENERATION OF SYSTEM TEST PROCEDURES

Refer to DCP-O-011 for Aircraft System Test Procedures Preparation and Release

Procedures that are not currently established or procedures that are to be modified to meet a specific intent are typically drafted by an Operations and/or Systems Engineer.

Regardless of who initiates or modifies a procedure, if the procedure is of the type outlined within DCP-O-011, then the procedure must be approved in accordance with the DCP.

4-9.0 AIRCRAFT MAINTENANCE CREW RESPONSIBILITIES

Aircraft maintenance personnel, in particular the aircraft Crew Chief, are responsible for the general safety and security of their aircraft and of all personnel that enter the aircraft area whether the aircraft is in the hangar or on the ramp. The aircraft crew is responsible for challenging any person entering the aircraft area that is not part of the normal aircraft crew. If, in the opinion of the Crew Chief, aircraft crew, or supervision that safety is impacted due to of the number of people present at a particular aircraft operation, they have the responsibility and authorization to terminate that particular aircraft operation until the safety issue is resolved. Any person requiring access on the aircraft shall first notify the aircraft Crew Chief or designee.

Aircraft maintenance personnel are responsible for obtaining and keeping current with their training requirements, performing all handling, servicing, maintenance and inspection procedures on aircraft assigned. In addition they are responsible for performing their duties safely and efficiently and keeping themselves familiar with latest technical and safety publications in their area of expertise.

The aircraft Crew Chief, aircraft crews, and supervisors are responsible for ensuring that all employees on the flight line have proper ear protection and adhere to all safety regulations.

Aircraft maintenance personnel will verify all work accomplished on aircraft and equipment meets all NASA procedures, directives, and applicable aircraft technical manuals.

Aircraft maintenance personnel will perform the following maintenance and service functions and activities associated with the center aircraft. They will verify all work accomplished on aircraft and equipment meets all NASA procedures, directives, and applicable aircraft technical manuals.

These functions will include

A. Servicing and preparing the aircraft for flight (including visiting aircraft as appropriate)
B. Performing pre-flight, through-flight, post-flight, time-interval, and special inspections, etc.
C. Providing functional operation of the aircraft, aircraft hangar, aircraft ground support equipment and maintenance shops
D. Positioning aircraft in hangars and on ramps.
E. Documenting all maintenance, inspections and services performed on assigned aircraft and their systems

4-10.0 ENGINE MAINTENANCE

Engine maintenance is to be accomplished per DOP-O-004, Engine Maintenance.

4-11.0 AIRCRAFT OPERATIONS DESIGNATED INSPECTION SYSTEM

NOTE: The following refers to the Dryden civil service Designated Inspection Process. Contractors Inspector processes/systems, if not carried out by Dryden, will be in accordance with their contractual agreement, statement of work, or accepted quality processes.

Contractor(s) may provide Inspection personnel specific to their program(s) as outlined within their contract(s), but for Dryden and its civil service portion of the workforce the Designated Inspection system is as follows:

The Dryden Flight Research Center has a unique type of inspection system. The Quality Assurance Section within the Safety Office has the responsibility for functions on Dryden aircraft, support facilities, and for special projects as assigned. In addition to the QAS Inspectors, certain individuals are designated as inspectors with authority to perform specified inspection functions on assigned aircraft, support equipment, and support facilities. The main differences between QAS Inspectors and Designated Inspectors (DI) are

1. Quality Inspectors are oriented towards the overall aircraft and related systems.
2. Designated Inspectors are limited in areas authorized to inspect; i.e., individual items of the aircraft and systems pre-flight inspections and functions.

In order to utilize specialized skills and experience inherent in personnel closely associated with specific Dryden functions, and to provide consistent support and implementation of NASA Dryden programs, designated personnel may be authorized to

perform as a Designated Inspector on specifically defined applications. Authorization is incumbent with the QAS at the written request of the individual's supervisor.

4-11.1 Designated Inspection Stamps

Designated Inspector certification is based on grade, knowledge of areas to inspect, in-house training inspection procedures, and competence in their work area. The following requirements, pertinent to the issuance and use of Designated Inspection Stamps, shall be strictly observed:

A. Application limits and constraints of individual stamps shall be clearly established and recorded.

B. Designees shall use their assigned stamps only within the established and recorded limits and constraints recorded within their appointing orders.

Within the established and recorded limits and constraints, Dryden Designated Inspection Stamps shall carry the same significance and authority as the QAS Stamp. This is in line with the fundamental policy that the stamp impression stands alone on its own merits and meaning and is neither increased nor decreased in significance by the individual to whom the stamp is assigned.

NOTE: Person inspecting and making inspection entries for flight hardware shall not be the same person doing any of the work covered by the inspection except for certified personnel complying with Non-Destructive Inspections (Special training). No person shall make inspection entries on items for which they are not qualified.

4-11.2 Designated Inspector

The Designated Inspector shall not have authority to inspect all aircraft, support equipment, or support facilities. Designated Inspectors appointing orders shall specifically state the aircraft, support equipment, or support facilities where they may perform their inspection function and shall clearly state any limits, restrictions, or authorizations necessary to clarify where designated inspector approval is intended.

Personnel who are authorized Designated Inspection (DI) authority have the responsibility to

A. Verify all support equipment is calibrated, load tested, and in serviceable condition.

B. Ensure all work accomplished on aircraft and equipment meets all NASA or contractor procedures, directives, and applicable aircraft technical manuals.

C. Review all articles, material and documentation submitted for approval and to withhold such approval at any time there is justification to do so.

4-12.0 AIRCRAFT INSPECTIONS

References

DCP-O-013	Aerospace Vehicle Close-Out Photography Inspection
DCP-S-011	Aircraft Acceptance Inspection
DCP-S-019	Quality Witnessing and In-Process and Final Inspection of Hardware

4-12.1 Aircraft Acceptance Inspection

Refer to DCP-S-011 for Aircraft Acceptance Inspection.

When an aircraft is obtained by or transferred to Dryden, an inspection will be made to determine its conditions and airworthiness. Historical records will be reviewed to ensure that the records reflect the actual condition of the aircraft. The inspection will also determine the inventory of technical documents and compliance with technical directives.

4-12.2 Pre-Flight, Through-Flight, & Post-Flight Aircraft Inspections

The Aircraft Support Branch and Avionics Branch (or contractors under their oversight) performs any one, or combination of, the following types of inspections:

A. Pre-flight – Pre-flight inspection at the operational or line level consists of checking the aircraft for flight preparedness by performing visual examination and operation tests to discover defects and malfunctions that, if not corrected, could adversely affect safety or mission accomplishment.

This Pre-flight inspection includes a check to determine if the aircraft has been properly serviced for flight. Pre-flight inspection must be accomplished within the prescribed time frame as authorized through the aircraft's technical orders, or for research aircraft, within 24 hours of flight, before the first flight of the day,

and following any period during which the aircraft is left unattended, or whenever an aircraft crew change is effected, and will include

1. Inspection to determine the general condition of the aircraft, using the daily pre-flight inspection guide and paying particular attention to correct fuel, oil, water/alcohol load, and security of caps.
2. Proper entries in the Aircraft Workbook/NALCOMIS NASA Form 1671 Maintenance Action Form.

Instrumentation pre-flights are valid for a five day period from the time of completion provided that the system has not been worked on during that time.

B. Through-flight – Through-flight inspection at the operational or line level follows generally the same procedures as pre-flight inspection but at less depth and with greatest emphasis on servicing of fuel, oil, and water/alcohol, and visual inspection of aircraft exterior and landing gear.

C. Post-flight – Post-flight inspection at the operational or line level is performed to verify the satisfactory functioning of equipment, to search for defects resulting from the previous flight, and to correct minor deficiencies such as chafing or leaks so as to prevent deterioration to a state that would require inspection at more frequent intervals. Inspection will be conducted according to the daily post-flight inspection guide.

4-12.3 Major Aircraft Inspections

Aircraft will be inspected and scheduled for inspection based on intervals and deviations prescribed by applicable Technical Orders or Maintenance Manuals. Documented entry into the ODT-5/512/NALCOMIS/Work Log Book is required for deviations within technical order/maintenance manual allowances. No further action is required while aircraft is within plus or minus 10% of the prescribed hourly inspection. (See B below for deviation allowances for calendar inspections.) Deviation expiration date/time must be annotated in the appropriate documentation (ODT-5/512/NALCOMIS/Work Log Book). Upon expiration of authorized deviation, the aircraft is DOWN and restricted from further flight until completion of subject inspection.

NOTE: The 10% deviation “rule” does not apply to egress or life support system inspections or time compliance changes. (See B below for calendar extensions.)

A. Periodic/Phase – Periodic or phased inspection at the intermediate level is a thorough searching examination of the aircraft and will be conducted at predetermined intervals. It consists of verifying predetermined minimum requirements set forth in a deck of maintenance cards, plus checking certain additional items scheduled for correction at less frequent intervals that may be accomplished in part, or phased during a periodic inspection and subsequent periodic inspections to follow.

A periodic or phased inspection may be deferred beyond the limits prescribed by applicable Technical Orders or Maintenance Manuals in order to meet operational requirements. The deferral must be unanimously recommended by the aircraft Operations Engineer or designee, the Chief of Maintenance or designee, and the Quality Assurance Branch Chief or designee. Downgrade or grounding condition requires final authorization from the flight Operations Directorate Office. Downgrade of aircraft must be accomplished per requirements specified later. ("Exceptional Releases" for uncleared red symbols.) A periodic or phased inspection may be increased in frequency to meet unusual requirements due to local or anticipated climatic or operational conditions if it is unanimously agreed to by the aircraft operations engineer or designee, the Chief of Maintenance or designee, and the Quality Assurance Branch Chief or designee. The inspection shall be logged in accordance with the Aircraft Workbook Documentation chapter, and shall reflect the adjustment in interval.

NOTE: Research aircraft will accomplish phase inspections at 100 airframe hour intervals versus 200 hours used by the DOD.

The Chief, Aircraft Quality Assurance Branch, may also authorize a special inspection (See item C below) at a more frequent interval whenever excessive use during the authorized inspection interval is considered to have compromised or impaired the reliability or integrity of the aircraft.

B. Calendar – Calendar inspection and replacement schedules will be identified by Technical Orders or by Operations Engineers and will be conducted at prescribed intervals, or deviations to those intervals, based on approved Dryden processes and procedures.

The following extensions are permitted for aircraft calendar time compliance maintenance and inspections:

1. For those maintenance and inspection requirements with calendar time compliance of 24 months or less, the requirement may be extended ten percent, not to exceed 30 days, by

approval of the Chief of Maintenance of the respective responsible maintenance organization.

2. For those maintenance and inspection requirements with calendar time compliance of more than 24 months, the requirement may be extended by 15 days per calendar year, not to exceed 60 days, by approval of the Chief of Maintenance of the respective responsible maintenance organization.
3. If the required maintenance or inspection time limit, plus the above extension, is exceeded, the aircraft will be placed on a red X, and approval to continue to operate the aircraft must be obtained by the normal red X downgrade process.

C. Special Inspection – Special inspections may be required by Airworthiness Directives, Technical Orders, Service Bulletins, Flight Safety Advisories, or Reports of Hard Landings, Severe Turbulence, Lightning Strikes, etc. They will be done in accordance with procedures previously established, or as established by the Operations Engineer and authorized by the Chief Aircraft Quality Assurance Branch, and may include Non Destructive Inspection (NDI) techniques.

4-12.4 Close-Out Photography Inspections

Photographs will be taken of flight critical areas that are not readily accessible after the completion of a particular step of a task or procedure. The visual record will be accomplished per DCP-O-013, Aerospace Vehicle Close-Out Photography Inspection.

4-13.0 NON DESTRUCTIVE INSPECTIONS (NDI)

Requests for NDI will be through the aircraft Quality Assurance Branch (SQ) or the MOO.

4-14.0 LIFE SUPPORT/EGRESS MAINTENANCE

4-14.1 Life Support Systems

Aircraft life support systems maintain flight personnel in a suitable atmosphere, allow communications, and provide for escape from high-performance aircraft. Specialized technical capability is required to perform maintenance on, and ensure that operational integrity of, life support systems. Only qualified (formally trained) personnel from the Life Support Section will perform maintenance on the aircraft escape

systems. (Refer to Chapter 3-5.0, Life Support / Egress Training Requirements for Selected Technicians.)

There is the potential that contractor or special shift working hours may be different than Dryden's life support hours. If for any reason life support personnel are not available and an aircraft ejection seat is removed from an aircraft and is to be left unattended, it must be stored in an approved (licensed) explosive storage area.

Aircraft Crew Chiefs or properly certified individuals may be authorized to inspect and certify installation of aircraft ejection seat assembles. This inspection will include the egress final inspection that is performed after ejection seat maintenance has been accomplished on the aircraft. The crew chief must have completed formal training described above and be current with the Life Support/Egress Training Requirements, as outlined in the training section, to remain certified.

4-15.0 REVIEWS AND AUDITS

References

DCP-S-006	Quality Assurance Audit
DCP-X-009	Airworthiness And Flight Safety Review Process
DOP-O-007	Aircraft Cockpit Review

4-15.1 Cockpit Safety Review

All modifications to aircraft cockpits that have potential impact on the operation of life support systems, or on egress envelope clearances, shall be given prior independent review. It is the responsibility of the individual research aircraft configuration control board to ensure that all available details of proposed cockpit modifications have been adequately reviewed by the Cockpit Safety Review Committee per DOP-O-007, Aircraft Cockpit Review, prior to approving the configuration change. For Program Support Aircraft, the Operations Engineer is responsible for making these details available to the Cockpit Safety Review Committee.

The Cockpit Safety Review Committee reviews all proposed modifications to Dryden aircraft cockpits that may have an impact on the life support system, ejection envelopes, or normal ingress or egress. The Committee is composed of the Aviation Safety Officer as Chairman; the Lead, Life Support Group; and the Chief, Operations Engineering Branch.

Any loose equipment to be carried aboard a Dryden aircraft must have the approval of the pilot in command before boarding the aircraft. In addition, any equipment other than a single 35mm camera to be carried aboard an aircraft with ejection seats or capsules or having limited cockpits must be approved by the Cockpit Safety Review Committee. Where applicable, a list of pre-approved equipment will be maintained in the aircraft workbook in addition to the Life Support Group office.

4-15.2 Quality Assurance Audits

Independent audits of Dryden flight projects are conducted by the Aircraft Quality Assurance Branch (SQ) per DCP-S-006. Their objectives are to

A. Determine if contractors/personnel are performing to NASA Dryden standards/contract requirements

B. Determine the skills of the people performing work

C. Assess/determine if the working environment is conducive to the work being performed

D. Ensure project quality/workmanship standards

E. Evaluate quality system and capability of off-site contractors

4-15.2.1 Audit Schedules

A. Contractor audits are scheduled every two years

B. Project audits are scheduled prior to first flights, after major modifications, and after extended down time

C. Above audits and any other audits (i.e., off-site contractors and/or shops/facilities/offices) are scheduled at the request of management

4-15.3 Airworthiness Reviews

NASA management conducts airworthiness and flight safety reviews per DCP-X-009, Airworthiness and Flight Safety Review Process to

A. Assure that research/airborne science projects are safe to fly and to maximize mission success

B. Ensure compliance with Dryden policy

C. Allow the AFSRB to determine the necessary procedures

D. Review flight activities and tests involving all aircraft, critical flight systems, and experimental facilities

4-16.0 CONFIGURATION & DRAWING CONTROL

References

TO 1-1B-50-CD-1	Aircraft Weight & Balance Manual (CD, Located in Main TO Library)
DCP-M-104	Flight Termination System (FTS) Configuration Control Process
DCP-O-004	Engineering Drawing Control
DCP-P-016	Configuration Management of Flight Research Projects
DCP-P-017	Configuration Change Process for Flight Project Critical Systems
DOP-O-023	Aircraft Weight and Balance
DOP-Y-006	Airborne Science Configuration Control
DOP-Y-007	Airborne Science Configuration Control Board Process
DOP-Y-010	Code Y Configuration Management Plan
QAP-Q-1.0	Airborne Science Quality Assurance Plan (QAP)

The purpose of a formal configuration management process is to ensure that Dryden aircraft have a means of review and approval for all changes to the baseline configuration of the aircraft, both hardware and software. The magnitude of the configuration control process is dependent on the impact of the changes or modifications to the flight safety of the aircraft. The configuration control process tracks all changes, modifications, and discrepancies to modified portions of aircraft, over and above baseline configuration.

4-17.0 WEIGHT & BALANCE

References

DOP-O-023	Aircraft Weight And Balance (W&B)
DOP-O-300	Flight Operations Manual
QAP-Q-1.0	Quality Assurance Plan (QAP)
TO 1-1B-50-CD-1	Aircraft Weight & Balance Manual (CD, located in main TO library.)

The weight and balance (center of gravity) characteristics of an aircraft will be logged and controlled throughout the period that the aircraft is on active flight status and under the control of the Dryden Flight Operations Directorate. Aircraft in operation at Dryden will be weighed in accordance with DOP-O-023, Aircraft Weight and Balance (W&B).

Weight and Balance books are maintained in the pilot's office for mission management aircraft, research test aircraft, and test support aircraft or in Code Y for DC-8 and ER-2 aircraft.

4-18.0 DUTY HOURS & SHIFTS FOR MAINTENANCE PERSONNEL

Regular and special shifts of personnel providing support of aircraft mission and program requirements will be initiated and maintained by the appropriate authorized individuals within the Code O Directorate. These individuals will also establish procedures that assure that an accurate record of aircraft status and work programs is passed on to the incoming shift to preclude the possibility of maintenance errors through faulty communication during shift changes.

A. The normal duty day for Flight Operations Maintenance personnel will not exceed 12 hours.

B. The rest period between duty days must be a minimum of 10 hours starting from the end of duty.

C. While on deployment the maximum duty day shall not exceed 14 hours when the deployed aircraft is flying a mission of 5 hours or longer. If the aircraft flies less than 5 hours, the 12-hour duty day limit shall apply.

D. Split shifts or split crew shall be considered as methods to keep the duty time within limits. A split shift is defined as 4 to 5 hours on the front end with a non-duty status for approximately 6 hours followed by a recovery operation of 4 to 5 hours.

E. The Director of Flight Operations or the Director's designee may extend the duty day by documenting in writing the rationale for the extension. Email or Fax documentation is acceptable.

4-19.0 ON-BOARD FIRE EXTINGUISHER BOTTLES (INTERIM POLICY)

Reference:

14 CFR 25.851 Airworthiness Standards, Fire Extinguisher

A. The Code of Federal Regulation 14, Chapter 1, Part 25, s25.851 requires aircraft on-board fire extinguishers of Halon 1211/1311 A-B-C. However, Halon extinguisher agent may not be readily available.

B. The replacement for Halon will be Halatron B-C. The CFR has yet to be updated to reflect this change.

C. If Halon fire extinguishers are not available, Halatron will be an acceptable substitute for Dryden aircraft use until the CFR is changed.

Chapter Five
Aircraft Servicing

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5-1.0 PURPOSE OF CHAPTER

The purpose of this chapter is to describe typical aircraft servicing operations and practices to be used on Dryden controlled aircraft.

5-2.0 RELEVANT DOCUMENTS

5-2.1 Authority Documents

AF Manual 91-201	Explosives Safety Standards
AFOSH 91-100	Aircraft Flight Line Ground Operations and Activities
TO 00-25-172	Ground Servicing of Aircraft and Static Grounding/Bonding
NFPA 70-513.10	National Electrical Code

5-2.2 Reference Documents

DCP-S-012	Explosive Devices Acquisition, Control and Disposition
DCP-O-019	Controlled Access and Handling of Aircraft Utilizing Hydrazine
DEI-O-040	Operation Of External Nitrogen (N2) Source For Pressure, Inertial, Environmental, Printed Circuit Board And Life Support Laboratories
DEI-R-010	Description, Safety Precautions, And Standard Operating Procedures For Nitrogen Recharger R-108
DOP-O-003	Receipt And Storage Of NASA Explosives
DOP-O-122	Manufacturing With Hazardous Material
PI-20-I	Aircraft Breathing 02 Purge
PI-20-O	Aircraft Hydraulic Oil Quantitative Sampling for Water Intrusion
PI-20-P	Aircraft Hydraulic Oil Quantitative Sampling for Particulate Contamination
PS-12-3	Electroexplosive System and Devices
PS-19-1	Oxygen System Design Methods and Processes

5-3.0 SERVICING/GENERAL

5-3.1 Aircraft/Engine Manufacturer's Maintenance Instructions

The applicable aircraft or engine manufacturer's maintenance instructions as to quantity, type, and grade of fuel, oil, hydraulic fluid, water/alcohol, etc., will be followed. A copy of the latest instructions or excerpts from them pertaining to the servicing requirements may be maintained onboard the aircraft or in the aircraft workbook for ready reference. If copies are kept a weekly verification shall be performed to minimize the potential for referencing obsolete information. At the time it is discovered that there is an update, the previous copies will be immediately destroyed and, if appropriate, new copies will replace the destroyed copies.

5-3.2 Risks and Hazards

There are inherent risks and hazards associated with the servicing of aircraft and their systems. Appropriate checkout and certification training per Chapter 3 shall be accomplished prior to any individual's attempt to service an aircraft.

5-3.3 Fuel, Oil, Hydraulic Fluid Markings

Type and grade of fuel, oil, hydraulic fluid, etc., used in the various systems of the aircraft will be stenciled or placarded adjacent to the filler cap of the system involved when there is sufficient room to do so. In the event that multiple grades or types are acceptable then it is left to the Crew Chiefs discretion to indicate a preferred type via stencil or placard, or omit stenciling and placarding altogether.

5-3.4 Aircraft Grounding

The static grounding/bonding of aircraft and aircraft related hardware (including fuel "bowsers" and drip cans) will be accomplished per AF TO 00-25-172, Ground Servicing of Aircraft and Static Grounding/Bonding.

5-4.0 FUELING/DEFUELING

5-4.1 Fueling, Normal

All fueling operations will be carried out as specified within the aircrafts servicing manual instructions. Aircraft Crew Chiefs are responsible for reviewing appropriate procedures with subordinates concerning all

fueling operations and ensuring that all mandatory provisions, including the subsequent portions of this section, are met.

5-4.2 Fueling/Defueling Operations for Aircraft Without Instructions

Aircraft without fueling/defueling operations specified within their manual constitutes a requirement that the assigned Operations Engineer will need to approve a documented fueling/defueling process that must be adhered to.

5-4.3 Safety Precautions

A. If a fuel leak occurs, all operations must be shut down until the leak is stopped and the spillage is contained and cleaned up using “Speedy Dry” or an appropriate absorbent material.

B. In case of a major spill (a spill that covers over 10 ft. in any direction, or is over 50 sq. ft. in area, or continues to flow, or is otherwise a hazard to persons or property), call 911 and request the base Fire Department be notified for cleanup and fire guard. Also see Chapter 6-12.0, Spills/Fire Prevention for more information.

C. Personnel who are splashed or sprayed by fuel should leave the area immediately, remove their clothing, and shower as quickly as possible to prevent skin irritation. Contaminated clothing will not be worn near any ignition source. Clothing will be free air-dried and should be washed in soap and water.

D. Provisions must be made to prevent moisture from entering fuel cells when fueling over the wing during bad weather.

E. When high winds are considered hazardous or when an electrical storm (lightning) advisory has been declared within 5 NM of the servicing area all fuel servicing operations will be suspended.

5-4.4 Fueling/Defueling Process

A. Before a fueling/defueling operation is started, all affected equipment must be grounded.

B. Personnel involved in refueling or defueling operations *will wear non-static producing clothing* (cotton). (Refer to Section 7-14.0, Apparel & Protective Equipment.) They will frequently dissipate static potential by gripping the static line of uninsulated ground wires or by gripping the clamp or jack fitting of the ground lines that are insulated.

C. When finished the proper fueling/defueling sequence will be to replace the fill cap, reel up the fuel hose, and disconnect the static bonding cable.

D. Aircraft must not be refueled or defueled within 100 feet of any hangar or structure or within 50 feet of any other aircraft with engines running, as measured from servicing/defueling points or vents.

E. Jet aircraft exhausts must not be directed toward fueling/defueling operations. Fuel trucks servicing aircraft must be brought to a stop as far as practical from the aircraft, preferably 20 feet. Upon signal from directing personnel, equipment will be moved into servicing position with caution. If possible, a minimum distance of 20 feet must be maintained between the fueling unit and fueling receptacle or vents on the aircraft.

F. When required for aircraft fueling or defueling operation, ground power units must be parked not less than 50 feet from the aircraft fueling points and/or vents. Consideration must be given to wind direction, ramp slope, locations of the aircraft fuel overflow vents, location of the servicing unit or fueling hydrant, and mechanical strain on the power receptacle. If utilized, a power unit must be positioned upwind from the source of fuel and vapors and uphill when applicable. It must be braked in position and if necessary chocked. Only approved cables will be used with the power unit. Under no circumstances will an auxiliary power unit be parked under any part of the aircraft. The operator must remain in the vicinity of ground units whenever they are being operated.

NOTE: AM&SM Waiver 2003-019 allows ER-2 aircraft to operate with the ground power unit in a specific location adjacent to the R/H horizontal tail.

G. The refuel/defuel supervisor may act as the ground power unit fire guard during normal defueling/defueling operations, if they are positioned in front of the aircraft, allowing full surveillance of the power unit at all times.

H. All operating servicing equipment not required for the fueling/defueling operations must be shut down and must not be restarted until all fuel vapors have dissipated. A clear path must be maintained between all ground support equipment and the aircraft to permit rapid evacuation of fueling vehicles and personnel in the event of an emergency.

I. Serviceable fire fighting equipment must be at hand and as follows:

1. At least one 50-pound or larger Halon wheeled extinguisher or a 100-pound dry powder extinguisher, must be located near the aircraft point of service.

2. For defueling operations one 50-pound or larger Halon wheeled extinguisher or a 30-pound dry powder extinguisher must be located near the aircraft.

J. Only essential personnel will be permitted in the aircraft or within 50 feet of the aircraft, during fueling or defueling operations.

K. Matches, lighters or other spark or flame producing devices (including non-approved handheld radios, cell phones, and battery operated tools) must not be brought within 50 feet of the aircraft.

L. Aircraft switches will not be operated, except those necessary for the fueling/defueling operation.

M. Aircraft will not be serviced while aircraft radio or radar equipment is in operation.

5-5.0 HYDRAULIC FLUID/ENGINE OIL

References

DD-2026	Air Force Oil Analysis Program
PI-20-O	Aircraft Hydraulic Oil Quantitative Sampling for Water Intrusion
PI-20-P	Aircraft Hydraulic Oil Quantitative Sampling for Particulate Contamination

5-5.1 Safety Precautions

Care must be taken to prevent contamination during the transfer of fluids; equipment must be kept scrupulously clean. Containers with unused fluids remaining in them will be marked and resealed to prevent contamination, provided that the fluid is not of a type where exposure to the atmosphere will in itself cause contamination (e.g., Oronite hydraulic fluid).

5-5.2 Servicing

A. The level of fluids in aircraft systems will be checked at the times specified by the aircraft or engine manufacturer.

B. Only the type and grade of fluids specified by the aircraft or engine manufacturer will be used in servicing the aircraft, power plant, or accessories.

C. Hydraulic test stands will not be connected to any aircraft without current documentary evidence of test stand filter cleanliness.

D. Test stand filter micron size must not be greater than that of the aircraft system.

E. If the unused fluids remaining are in quantities that are impractical or uneconomical to save for future use, they will be discarded in containers specified for this purpose. The containers will be emptied into special containers prescribed by the Hazardous Waste Disposal Guidelines.

5-5.3 Sampling

All hydraulic fluid will be sampled for water and particulate contamination per Dryden Process Instructions PI-20-O, Aircraft Hydraulic Oil Quantitative Sampling for Water Intrusion, and PI-20-P, Aircraft Hydraulic Oil Quantitative Sampling for Particulate Contamination.

Engine oil will be sampled as part of the Air Force Oil Analysis Program (OAP). Air Force form DD-2026 will be used.

5-6.0 OXYGEN

References

PI-20-I	Aircraft Breathing O_2 Purge
PS-19-1	Oxygen System Design Methods and Processes

5-6.1 Safety Precautions

A. Only fully trained and qualified personnel will be permitted to transport or handle oxygen. (See Chapter 3, Qualification and Training)

B. Liquid oxygen is extremely cold and will cause burns if skin contact is made.

C. Oxygen of the correct type and grade must be used.

D. Clothing, hands, tools, and equipment must be clean and free of oil and grease.

E. All Oxygen systems will be serviced according to manufacturer's instructions, or applicable Technical Order.

F. Oxygen bottle carts and LOX carts will not be parked or stored within 25 feet of any structure having fire resistant or non-combustible exterior walls or with automatic fire extinguishing systems; within 50 feet from any combustible structure or source of ignitions (such as a high traffic or smoking area); or within 75 feet from aircraft parking, fueling or defueling areas.

G. Servicing of oxygen systems will not be done inside the hangar.

5-6.2 Liquid Oxygen (LOX)

A. Aircraft oxygen systems will not be drained or serviced within 50 feet of hangars, structures, or fuel spills. The aircraft must be static-grounded before servicing begins.

B. Personnel servicing liquid oxygen systems must wear protective clothing, including rubber (not leather) gloves, apron, long sleeve shirt, and a face shield.

C. Drip pans or other suitable grease-free containers must be positioned under the overflow vents of aircraft being serviced with liquid oxygen to prevent the liquid from contacting the ramp.

5-6.3 Gaseous Oxygen (GOX)

A. At minimum, a face shield will be utilized when servicing gaseous oxygen due to its high pressure.

B. Purging of aircraft oxygen systems will be performed per NASA Dryden Process Instruction 20-I, Aircraft Breathing O_2 Purge.

C. Odor, purity, and contamination checks will be done at the prescribed intervals, or at any time odor is detected or contamination is suspected.

D. At a minimum, two persons are required for the servicing of GASEOUS OXYGEN systems -- one person at the control valve of the servicing equipment and one person stationed to observe the pressure in the aircraft system.

5-7.0 NITROGEN

References

DCP-S-009	Safety & Health Requirements Manual, Chapter 8, Pressure Vessels & Pressurized Systems Safety
DEI-O-040	Operation Of External Nitrogen (N2) Source For Pressure, Inertial, Environmental, Printed Circuit Board And Life Support Laboratories
DEI-R-010	Description, Safety Precautions, And Standard Operating Procedures For Nitrogen Recharger R-108

5-7.1 Safety Precautions

A. Only fully trained and qualified personnel will be permitted to handle nitrogen. (See Chapter 3, Qualification and Training)

B. Prior to each use, the user will verify that all high pressure flex hoses

1. Are serviceable, have end restraints, and are in good repair
2. Have a maximum working pressure (MWP) data tag attached
3. Are within annual inspection limit

If there is any doubt as to condition, the item will be tagged “Do Not Use”.

CAUTION

Nitrogen is heavier than air and displaces air. Extreme caution should be used when working with nitrogen to prevent oxygen starvation and potential unconsciousness.

CAUTION

Liquid nitrogen is extremely cold and will cause burns if skin contact is made.

5-7.2 Liquid Nitrogen (LN2)

A. Personnel servicing liquid nitrogen systems must wear protective clothing, gloves, and a face shield.

B. Drip pans or other suitable containers must be positioned under the overflow vents of aircraft being serviced with liquid nitrogen to prevent the liquid from contacting the floor/ramp.

5-7.3 Gaseous Nitrogen (GN2)

A. At minimum, a face shield will be utilized when servicing gaseous nitrogen due to its high pressure.

B. Care must be taken to assure that the quality of nitrogen is fit for the specific operation, i.e., water free, purity, etc.

5-8.0 TOXIC/EXOTIC FUELS

Reference

DCP-O-019 Controlled Access and Handling of Aircraft Utilizing Hydrazine

All employees working in facilities that are approved to hangar aircraft containing toxic/exotic fuels will be properly briefed to dangers and evacuation procedures.

5-8.1 Hydrazine

All Dryden aircraft that utilize Hydrazine will follow all applicable TO requirements and authorized processes.

Hydrazine equipped aircraft will adhere to the requirements in DCP-O-019, Controlled Access and Handling of Aircraft Utilizing Hydrazine.

5-8.2 Safety Precautions

A. Persons servicing toxic or exotic fuels will follow procedures established for that specific system and approved by the Dryden Safety Organization.

B. Aircraft crew chiefs will ensure that visitors in the area are made aware of Hydrazine dangers and evacuation procedures.

5-9.0 HAZARDOUS SUBSTANCES/MATERIALS

References

AFM 91-201	Explosives Safety Standards
AFOSH 91-100	Aircraft Flight Line Ground Operations and Activities
DCP-S-012	Explosive Devices Acquisition, Control and Disposition
DOP-O-003	Receipt And Storage Of NASA Explosives
DOP-O-122	Manufacturing With Hazardous Material
PS-12-3	Electroexplosive System and Devices

5-9.1 Safety Precautions

When working with hazardous materials, safeguards must be put in place to

A. Safely control employee exposure to hazardous materials during manufacturing

B. Comply with CAL OSHA and EPA requirements.

Refer to DOP-O-122, Manufacturing with Hazardous Materials.

5-9.2 Aircraft Pyrotechnic Operations

With the exception of aircraft seats and canopies, when it is required to remove safety pins in pyrotechnic systems (e.g., aircraft equipped with jettisonable auxiliary fuel tanks or spin chutes), aircraft must be taxied to a –pre-designated area away from buildings and other aircraft prior to pin removal.

5-9.3 Explosives Loading Operations

Aircraft explosives loading operations will only be conducted in the following areas, unless otherwise approved by the Dryden Explosive Safety Officer.

NOTE: The 1.1, 1.2, 1.3, and 1.4 are the class and division used to designate the hazard classification assigned to the explosive by the Department of Transportation (DOT). The A, B, and C explosives are used to designate the compatibility groups assigned to it by the Department of Defense (DOD) for storage and transportation. For a more detailed definition, see Title 49 CFR, AFM 91-201, and USAF TO 11A-1-46.

A. Class A and B explosives (1.1, 1.2, and 1.3) will only be loaded at the end of the runway (hot gun line/hammerhead).

B. Class C explosives (1.4), except for external fuel tank jettison cartridges, will only be loaded on the Southeast corner of the main NASA ramp behind Building #4800 or on the NASA taxiway to the shuttle area.

C. External fuel tank jettison cartridges may be installed/removed immediately outside of Hangars #1623, 4801, 4802, 4826, 4833, and 4840.

D. Egress systems maintenance, including installation/removal of ejection seat initiators, may be conducted inside the hangars by Life Support personnel and other maintenance personnel who have been trained and certified by Life Support.

5-10.0 AIRCRAFT STORAGE/PRESERVATION

When an aircraft is not to be maintained or flown for an extended period of time (30 days or longer), the aircraft shall be serviced per applicable TOs and Appendix A - “Flyable Storage Checklist”

5-10.1 Configuration Control of Aircraft in Flyable Storage

If the aircraft in flyable storage is assigned to an approved and funded Dryden project, then that project shall continue or assume the configuration control responsibilities. If the aircraft is not a project aircraft, then the Support Aircraft Configuration Control Board will assume responsibility for ensuring configuration control of the vehicle.

5-11.0 BATTERY SERVICING/MAINTENANCE

References

NFPA 70-513.10	National Electrical Codes
DCP-O-011	Aircraft System Test Procedures, Preparation, and Release

5-11.1 Aircraft Batteries

A. Aircraft Batteries covered by applicable military Technical Orders or their equivalent will be maintained in the aircraft as such. When maintenance or time change comes due on these batteries, the mechanic/technician will tag the unit per the approved process and immediately deliver the battery to the DFRC Battery Shop for maintenance.

B. Battery shop personnel will comply with the tool control procedures specified in Section 7-11.1. The tool control program only applies to work done while on the aircraft and not to back-shop work. A close-out inspection will be made to ensure that no FOD exists in components that will be installed in aircraft. Battery shop personnel who work on the aircraft for battery installation, removal, or other maintenance will be required to have a toolbox that is under tool control.

5-11.2 Aircraft Battery Storage

Aircraft batteries will be stored only in the DFRC Battery Shop.

5-11.3 Re-chargeable Batteries

Re-chargeable battery powered units such as radios, drills, and cell phones may not be re-charged in the hangar. (Reference NFPA 70-513.10.)

5-11.4 System and Subsystem Operation Batteries

A. Projects that require batteries for operation of systems and subsystems, such as flight controls, data systems, landing gear, emergency systems, etc., shall require a waiver per Chapter 1-5.0, Waiver Authority and Process before ANY charging of the batteries may be done in any hangar or enclosed area. DCP-O-011, Aircraft System Test Procedures, Preparation, and Release, will be followed before battery usage and charging will be allowed in hangar areas. The Battery System Service Procedure will be approved by a minimum of individuals associated with the program. These include the Operations Engineer, Systems Engineer, Quality Assurance, and the Chief of Aircraft Maintenance.

B. Some Dryden aircraft (i.e., G-3, King Air, etc.) have an Emergency Power Supply for the Standby ADI System. These power supplies contain a battery and require periodic maintenance to verify serviceability according to the aircraft manufacturer's technical publications. These units are maintained by technicians in the Avionics Branch. When maintenance comes due on these units, the mechanic/technician will tag the unit per the approved process and delivery the battery to the Avionics Branch Communications, Navigation, and Video Shop for maintenance.

5-11.5 Special Circumstances

There will be many project vehicles and circumstances that will require special battery care. It is the requirement and responsibility of all project personnel to assure that batteries are handled in the safest manner possible and that appropriate waivers, as required, are in place.

Chapter Six
Ground and Engine Operations

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6-1.0 PURPOSE OF CHAPTER

The purpose of this chapter is to describe typical aircraft ground operations to be used and to detail requirements for the operation of aircraft engines at the Dryden Flight Research Center.

6-2.0 RELEVANT DOCUMENTS

6-2.1 Authority Documents

AFII 11-218	Aircraft Operation and Movement on the Ground
AFVA 11-224	Aircraft Marshaling Signals

6-2.2 Reference Documents

DOP-O-004	Engine Maintenance
PI-20-H	Fuel System Safety for Hangared Aircraft
TO 00-25-172	Ground Servicing of Aircraft and Static Grounding/Bonding

6-3.0 AIRCRAFT TAXI

Aircraft taxi will be done by qualified flight crews **ONLY**.

6-4.0 AIRCRAFT MARSHALING

Aircraft shall be marshaled per Appendix D.

Qualified personnel familiar with standard marshaling signals appropriate for the type of aircraft used, and/or the pilot, will perform aircraft marshaling. The individual marshaling the aircraft shall ensure that they are forward of the aircraft, completely visible to the pilot.

6-5.0 ARRIVALS/DEPARTURES OF TRANSIENT AIRCRAFT

The MOO will be the POC for coordinating the arrivals/departures of transient aircraft after notification from the flight operations scheduler.

Dryden Maintenance Personnel will provide the following services for Transient Aircraft:

A. Receiving and departing assistance
B. Marshaling
C. Limited safety inspections
D. Chocking and grounding
E. Fueling (aircraft must have DOD Fuel Charge Card)
F. Other assistance as required

6-6.0 AIRCRAFT MOVEMENT/TOWING

Every person involved in the movement of an aircraft within the hangar or on the ramp (whether a tug operator, a person in the aircraft cockpit, or a "wing walker") is responsible for the safety of the aircraft during towing and must take action as a team and/or individually as necessary to prevent damage to the aircraft.

Clear, unmistakable communication must be maintained between the tug operator, persons in the aircraft, and “wing walkers” during towing operations. Aircraft ground communications systems will be used when available. Portable radios or air whistles may also be used.

6-6.1 Safe Towing Conditions

The tow director, coordinator, or tug operation (as appropriate) is responsible for assuring that the aircraft is prepared for safe towing and its intended path is clear. Specifically, the individual must ensure the following conditions prevail:

A. That aircraft is in proper configuration for towing per specific aircraft TO
B. That the tow bar used is the correct one for the aircraft, is in proper condition, and is correctly connected to the aircraft.
C. That the aircraft gear lock and scissors are secure for towing, and the aircraft weight distribution is safe for towing.
D. That the towing path is free of debris and clear of obstructions.
E. That in coordination with a person in the cockpit, aircraft brakes are properly operated as wheel chocks are removed and replaced.
F. That towing speed and tug speed does not exceed 5 miles per hour.

6-6.2 Braking

If an aircraft's brake accumulator is charged and/or there is a means to brake an aircraft from within the cockpit; or there is a need to operate associated power or hydraulic systems while an aircraft is being moved then a person must be in the aircraft cockpit for the specific purpose of operating wheel brakes.

6-6.3 Chocks

The tow director, coordinator, or tug operator (as appropriate) shall assign individuals to walk with chocks in close proximity to the main gear during the towing operation. Those individuals must be cognizant of their duties and briefed before the towing operation by the aircraft Crew Chief or the tug operator.

6-6.4 Wing Walkers

"Wing walkers" monitoring the path of aircraft wing extremities must be employed in the movement of ALL aircraft in confined areas where the potential for aircraft damage is greatest. A minimum of ten (10) feet or less of wing or tail area clearance is considered a confined space.

6-7.0 AIRCRAFT - HANGAR PARKING/GROUNDING

Reference

TO 00-25-172 Ground Servicing of Aircraft and Static Grounding/Bonding

A. When hangared, aircraft will be parked or in such a manner as to provide adequate clearance for exit of aircraft in the event of emergency and for Fire Department ingress to all aircraft within the hangar.

B. To further minimize damage to aircraft from sprinkler or deluge system malfunction, all canopies and windows on aircraft will be closed, and critically exposed areas covered at the end of each workday.

C. All aircraft parked or stored within hangars will be grounded to approved static ground.

D. Grounding clamps shall not be piggyback (attached to each other) where permanent grounding is required on equipment. Bonding and grounding cables shall be of bare conductor and gage that will be satisfactory from a durability standpoint. For proper grounding/bonding procedures, refer to TO 00-25-172, Section V.

6-8.0 FUEL LOADS FOR HANGARED AIRCRAFT

Reference

PI-20-H Fuel System Safety for Hangared Aircraft

Aircraft with combustible fuels (JP-5/JP-8/JP-10/JPTS) are permitted to be hangared and powered up with partial fuel loads at DFRC.

6-9.0 AIRCRAFT - FLIGHT LINE PARKING/GROUNDING

Aircraft on the flight line will be parked in designated areas and grounded to an approved static ground.

Due to the narrow taxiway between the front row and the back row on Dryden's main aircraft parking ramp, all aircraft with research-type pitot booms installed on their radomes, or other equipment that would extend into the taxiway, are restricted to parking on the front row of the ramp.

6-10.0 PERSONNEL & FOD SAFETY

Do not wear, or permit anyone else to wear or take, any articles of loose clothing or personal objects near the intake ducts of operating engines. Comply with established danger zones as defined in applicable aircraft TOs.

A. Anyone who must approach within a 30-foot radius of an operating engine must first remove hats, pencils, inspection mirrors, and ornaments such as pins and security badges, and secure them in pockets that can be fastened with a zipper or buttons.

B. Do not wear or take wigs, hairpieces, hairpins, hats, earrings, or items *that are not securely held in place* out on the flight line.

C. Ground Maintenance personnel will use only authorized headset cords for intercommunicating with the cockpit.

WARNING

Exceptionally long headset cords with slack can accidentally be drawn into the engine inlet when walking around the aircraft.

6-11.0 AIRCRAFT ENGINE GROUND RUN OPERATIONS

The Crew Chief shall have the appropriate aircraft run procedure and/or checklist with them in the cockpit for all aircraft engine ground runs.

6-11.1 Authorization

Per Chapter 3, Training and Certification, initial certification for the aircraft Crew Chief will be signed off by a pilot with a two-year certification and approved every two years thereafter by the Chief of Aircraft Support Branch. The Crew Chief may certify journeyman mechanics for engine operations with approval of the Aircraft Support Branch Chief. The Aircraft Support Branch Chief will also control the use of ground support equipment and assure that operators are qualified to operate that equipment.

6-11.2 Location

Aircraft engine starts and runs on the ramp will be conducted in areas approved by the Maintenance Operations Office.

In general, aircraft will be oriented so that jet exhaust

A. Will not be directed at adjacent buildings or aircraft, and will not obscure visibility with blowing dust.

B. Will not inhibit access of other aircraft to the hangars.

6-11.3 Engine Run Hours of Operation

High-speed engine runs above 80% or prolonged engine runs for engine trim shall not be made on the Dryden ramp during the hours of 7:00 AM until 4:30 PM. Engine runs above the 80% range or for prolonged periods of time will be conducted at one of the Air Force engine run pads designated for such operations. Scheduling of the Air Force engine run pads shall be made through the Maintenance Operations Office. Engine runs above 80% and for prolonged periods of time may be made on the Dryden ramp from 4:30 PM until 7:00 AM and on weekends and holidays with the concurrence of the Maintenance Operations Office.

6-11.4 Pre-Engine Start Safety

The following safeguards will be practiced by maintenance personnel. Before starting any aircraft engine, be sure that

A. There is adequate, clear ramp area for emergency access all around the aircraft.

B. Aircraft walk-around and engine inlet inspection completed just prior to engine start. The ramp is clean, free of debris.

C. The aircraft brakes are set and wheels chocked.

D. When applicable and available, an auxiliary ground power supply and/or ground start unit (of sufficient capacity to complete starting of the particular engine, whether electrical- or turbine-starter equipped) is properly connected to the aircraft, functioning normally, and being monitored by an operator.

E. A fireguard equipped with a serviceable wheeled extinguisher having a rating of not less than 80-BC and a minimum capacity of not less than 125 lb. for the particular engine is stationed near the engine.

F. An Air Force fire truck will be required to stand by on all “Green” engine runs and fuel leaks.

G. An Air Force fire truck may be utilized for any reasons not already covered at the discretion of Crew Chiefs.

H. Conduct visual FOD Inspection of compressor and engine inlet area immediately prior to engine run or flight.

The uses of intake screens are required for all maintenance ground operations unless specifically stated in the applicable TO. The condition of run-up screens is important in the prevention of FOD to engines. Before installing screens, thoroughly inspect the screens for broken frames or wire mesh, security of rubber grommets, and loose or trapped objects. Do not remove screens until the engine is stopped. Operate the engines at the lowest speed necessary.

Exceptions: The Aircraft Support Branch Chief will be consulted daily before making any engine runs without run screens. The use of screens is not required

- Where the aircraft has no provisions for attachments.
- When icing condition would make use of screens unsafe.
- When waivered by the Aircraft Support Branch Chief per Chapter 1-5.0, a logbook entry will be made.

6-11.5 Engine Start/Run Safety

The following practices shall be adhered to by maintenance personnel during engine runs:

A. Communication is maintained between the operator at the engine controls, the ground start equipment operator, and fire guard. The Air Force (“Eddy”) Ground Control frequency will be monitored when operating on an Air Force engine run pad.

B. Ground start units are monitored by an operator.

C. Approved ear protectors are worn.

D. On satisfactory completion of a start, see that power units and air starters are properly shut down, all power cords, lines, and hoses are disconnected from the aircraft, and, if required, the units are moved to an area that will not obstruct or impede the safe operation of the running aircraft or any other aircraft operations.

NOTE: AM&SM waiver 2003-019 allows ER-2 aircraft to operate with the ground power unit in a specific location adjacent to the R/H horizontal tail through taxi.

E. No entry into an engine inlet will be allowed for 15 minutes after shutdown to allow cool down and to reduce risk from the possible ignition of fuel vapors or inhalation of toxic fumes that may be present.

6-12.0 SPILLS/FIRE PREVENTION

NOTE: A major spill covers over 10 ft. in any direction, or is over 50 sq. ft. in area, or continues to flow, or is otherwise a hazard to persons or property.

6-12.1 Minor Spills

A. Each hangar has a portable HAZMAT spill cart that contains absorbent materials, brooms, etc.

B. Personnel will utilize HAZMAT carts and material to contain a minor spill.

6-12.2 Major Spills

In the event of major spillage (greater than five gallons) during any ground support operation of fuel, oil, or other potentially flammable/hazardous materials, the following critical actions must be taken:

A. Immediately shut down the engines or the engine-driven generators and hydraulic carts on the ramp.

- **Do not** disconnect power cord from aircraft until after the engine has stopped. Electric motor-driven generators and hydraulic stands in the hangar must be shut down by turning "OFF" the appropriate circuit breaker on the hangar wall.
- **Do not** turn off the generator or hydraulic stand by throwing the switch on the stand.

- **Do not** disconnect the power cord from the airplane until the generator has stopped running. The above procedure also applies when shutting down hydraulic stands.

B. Dial 911 and state nature of emergency. If 911 cannot be reached, call 41-911 to contact the Edwards Air Force Base Fire Department.

C. All personnel must leave the immediate area in which spillage has occurred, after taking essential actions to contain, confine, prevent ignition of, or suppress fires from fuel spillage, using positioned fire extinguishers at hand pending arrival of Fire Department personnel and equipment. This applies, with sound judgment, to all fuel spills regardless of extent.

D. Personnel must be strategically positioned around the contaminated area to prevent any powered equipment or other sources of ignition from entering the area.

Chapter Seven
Procedures and Guidance

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7-1.0 PURPOSE OF CHAPTER

The purpose of this chapter is to document specific Dryden procedures and guidance to be followed in the maintenance, modification, and inspection of Dryden controlled aircraft. The procedures are based on regulatory requirements to ensure safe practices and environment.

7-2.0 RELEVANT DOCUMENTS

7-2.1 Authority Documents

AFFTC 10-2	Control of Vehicles on the Airfield (Edwards AFB)
AFOSH STD 91-100	Aircraft Flightline-Ground Operations and Activities

7-2.2 Reference Documents

ASP-Q-4.09-003	Tool Control (paragraph 5.6 Confined Space Tool Control)
DCP-O-007	Metrology System
DCP-S-001	Aircraft Mishap Response Procedure
DCP-S-009	Safety & Health Requirements Manual: Chapter 6, Critical Lift Chapter 7, Lifting Devices & Requirements Chapter 10, Confined Space Safety
DFRC 324	Controlled Area Tool/Item List
DPD-1620.4	Traffic Policy
LMLM ESH Manual	Chapter 11, Confined Space Entry Program
NAVAIR 01-1A-35	Aircraft Fuel Cells and Tanks
NFPA 7-500.5	National Electric Code
NPD-8730.1	Metrology And Calibration
PS-20-1	Cleaning Methods and Processes
QAP-Q-1.0	Airborne Science Quality Assurance Plan (QAP)
TO 00-25-172	Ground Servicing of Aircraft and Static Grounding/Bonding.
TO 42A1-1-1	Evaluation and SVC Testing of Materials – Cleaning, Painting, Sealing, Protective Treating, Anti-Corrosion, Inspection Materials, and Related Items

AFOSH 91-100	Battery Powered Screwdrivers and Drills
AFFTC 10-2	Control of Vehicles on the Airfield

Applicable Aircraft Maintenance Manuals or Technical Orders (TOs).

7-2.3 Informational Documents

None.

7-2.4 Forms

AF form 483	Flight Line Drivers License
DFRC 127	Close Call Report Form
DFRC 324	Controlled Area Tool/Item List
NASA 1627	Incident Report Form

7-3.0 FACILITIES & HANGAR REQUIREMENTS

Dryden's Facilities and Hangars will be maintained in an efficient and effective manner to provide state of the art services and support for Dryden's mission requirements.

7-3.1 Facility Guidelines

Center facilities will be adequate for maintenance, modifications, repair, and servicing of all aircraft. General housekeeping will be a priority and housekeeping practices will be accomplished daily.

7-3.2 Hangar Guidelines

A. Hangars shall be of such size and type as to accommodate safe docking of all aircraft.

B. Hangars shall have sufficient space for movement of maintenance equipment, such as extension work stands, hydraulic work stands, cranes, and jacks, etc., around aircraft while docked to allow activities to be carried out in a safe and efficient manner.

C. Hangars shall be equipped with electric power, compressed air, water, and a suitable heating and ventilating system that will provide conditions conductive to safety and efficiency of operations.

D. Hangars shall be used for the docking, housing, and storing of aircraft, associated equipment, supplies, and personnel only. Associated ramp space and facilities for safe fueling and defueling and other maintenance operations will be provided.

7-4.0 HANGAR FIRE SYSTEMS

Assigned employees working in the hangar must know the location of the fire alarm boxes and telephones inside and outside the hangar.

Employees assigned in the hangars must be familiar with the locations and use of fixed and portable fire fighting equipment.

CAUTION

In the event of a fire alarm, no attempt shall be made to move aircraft from hangars. Towing aircraft creates a hazard for personnel evacuating the buildings and for fire truck movement into the area.

7-4.1 Actions to be Taken in the Event of Fire

A. The person discovering the fire will shout "FIRE".

B. If the fire is in the hangar and if the automatic fire detection system has not activated the sprinkler/foam system, the person nearest to the manual controls for the sprinkler/foam system on the wall of the hangar will manually activate the section of sprinklers over the fire. Alarms will automatically activate.

C. The fire shall also be reported by using telephones in hangars or outside of the hangar by dialing Extension 911. Dial 41-911 if 911 cannot be contacted. The Edwards Air Force Base Fire Department will respond.

D. The person sending the alarm to the Fire Department is responsible for posting guides to direct Fire Department personnel from the hangar door at the ramp to the scene of the fire.

E. Aircraft Support Branch personnel will attempt to extinguish the fire with available fire equipment while it is in the incipient stage (without undue risk to personnel).

F. No effort will be made to move aircraft from the hangar. Slippery floors resulting from the foam/water dispensed from the sprinklers present a hazard to vehicle and personnel movement.

G. At the sound of the fire alarm bells, ALL personnel not assigned specific duties by the preceding paragraphs will evacuate the buildings. Personnel must not re-enter the buildings until the "All Clear" signal has been given.

7-4.2 Fire Protection and Prevention

The provisions contained herein encompass preparatory measures and operating procedures essential to fire protection in areas where aircraft maintenance and repair are performed.

7-4.2.1 Responsibility

The Aircraft Support Branch Chief has the primary responsibility for observing and enforcing sound housekeeping and fire prevention practices in aircraft hangars, flight line, and other Dryden aircraft support facilities.

7-4.2.2 Requirements

A. Electric powered units equipped with explosion-proof motors will be utilized whenever possible in preference to gasoline or diesel powered equipment.

B. Unless otherwise stated within an approved procedure or TO, a lateral clearance of at least 25 feet will be maintained between gasoline or diesel powered equipment and the aircraft to which it is providing support. If 25 feet lateral clearance cannot be maintain, the cable from the power unit shall be extended to its full length.

C. Gasoline or diesel powered equipment, when used in the hangar, shall have no open arcing mechanism below 18 inches, and shall be provided with flame and spark arrestors or catalytic converters.

D. All wiring will have proper connections and be in good condition.

E. Maintain ventilation to ensure fumes are dissipated when using gasoline or diesel equipment in hangar.

F. Gasoline or diesel powered equipment will not be refueled while in the hangar or when the engine is running.

G. Wood materials and wooden articles such as steps and shelving shall be avoided and their use minimized.

7-5.0 ELECTRICAL POWER GUIDELINES

Prior to application of electrical power to an aircraft, refer to applicable TO and ensure

A. Aircraft electrical power shall be turned off at the power switch before connecting or disconnecting electrical power cord.

B. Prior to applying electric power on an aircraft, the aircraft workbook/documentation is reviewed to assure that it is safe to do so, i.e., there are no disconnected or loose plugs, systems, subsystems, or other maintenance items.

C. The Crew Chief or designee must be notified that power is to be applied.

Aircraft will not be left unattended with electrical power on. Turn off aircraft power switch, hangar wall power, or electrical power cart, and disconnect power cable from aircraft.

If aircraft electrical power should not be applied to the aircraft, install a red streamer or sign to the aircraft power receptacle door and document a description of aircraft power status in the aircraft workbook/documentation.

Aircraft electrical power cord will be disconnected from the aircraft at the end of each workday. Some aircraft may require the power cord be left connected for special equipment requirements.

Any deviations require a waiver, as described in Chapter 1-5.0, Waiver Process.

7-6.0 HYDRAULIC POWER GUIDELINES

Prior to application of hydraulic power to an aircraft, refer to applicable TO and ensure

A. The aircraft workbook/documentation is reviewed to assure that it is safe to do so, i.e., there are no disconnected or loose plugs, systems, subsystems, or other maintenance items.

B. The Crew Chief or designee must be notified prior to application of hydraulics.

C. The aircraft must be made secure around its perimeter to prevent unauthorized/accidental encroachment of operating surfaces/gears.

D. A red flashing light will be activated prior to the application of hydraulic power.

Any deviations from the above require a waiver, as described in Chapter 1-5.0, Waiver Process.

7-7.0 CARTS & ROLLING EQUIPMENT

All tool carts and rolling equipment shall be equipped with rubber tires or wheels. (Jacks supporting aircraft are not considered rolling equipment).

7-8.0 HOUSEKEEPING

Good housekeeping is important for an effective maintenance operation. It enhances fire prevention, FOD prevention, safety, and general appearance in the work environment. Housekeeping shall include but not be limited to the following

A. No flammable liquids shall be stored in open containers. Approved safety cans or small plastic bottles may be used. In either case they must be clearly marked as to the contents with an approved label that can be obtained from the DFRC tool/chem crib that identifies flammability and reactivity to humans.

B. Smoking is not permitted in the hangar, on the flight line, or within 50 feet of aircraft or fuel trucks. Smoking is permitted in designated areas only. Because of prevalent high wind conditions at Dryden, special attention to the disposal of smoking material is essential.

C. Fire protection equipment, fire lanes, walkways, and electrical panels shall be kept clear at all time.

D. All possible precautions shall be taken to prevent spilling of fuel, oil, grease, or similar materials on hangar floors or ramps. Any accidental spills shall be cleaned up immediately. Spills in excess of five gallons shall require the notification of the Dryden Safety Office at 911. The aircraft crew will then assist the Safety Office to clean up the spill. (Per Section 6-12.0, Spills/Fire Prevention)

E. All drip pans or buckets shall be emptied and cleaned at the end of each workday.

F. Air hoses, hydraulic hoses, and electrical cords that cross designated walkways shall be covered with clearly marked covers.

G. When no longer needed or at the end of each workday, all servicing equipment shall be neatly rolled up and not left under the aircraft. At the end of each workday, unplug or disconnect air hoses and non-essential electrical cords from wall source.

H. Hangar floors shall be kept clean and free of dust, rags, paper, or other objects. Hangar floors shall be swept at least once a week and residue picked up at the end of each workday.

I. Workbenches and tool carts shall be kept clean and orderly. All aircraft components shall be tagged as to their condition. Hardware such as nuts, bolts, clamps, etc. shall be properly stored or disposed of. Hardware will not be allowed to accumulate in the work area.

7-9.0 INSPECTION, POLICING, & SWEEPING OF OPERATIONAL AREAS

A. FOD inspections will be conducted daily in all areas that support operational aircraft. It is the responsibility of all employees to assure that the areas that they will be operating in are secure from FOD. Special attention must be given in and around construction areas. Additional inspections of areas after any aircraft accident or incident, including aircraft tire blowouts will be performed immediately.

B. Crew Chiefs will ensure that the area around their aircraft is free of FOD before each flight and/or engine run.

C. It is the responsibility of every person to remove foreign objects from vehicles, taxiways, aircraft parking areas, and runways immediately upon detection. Numerous maintenance personnel enter, exit, and cross the operational area daily.

D. Ramps, taxiways, engine trim pads, and armament arm/de-arm areas will be meticulously policed at all times. During towing or vehicle operations on these surfaces, personnel will be continuously on the alert for foreign objects that will be removed and placed in a receptacle. If the debris is extensive, request sweeper service.

   1. Personnel noting areas in need of mechanical sweeping or vacuuming will immediately notify their supervisor, who will, in turn, contact the Aircraft Support Branch Chief.

   2. FOD hazards such as deteriorating or damaged paving in aircraft parking areas and taxiways will be reported to the Aircraft Support Branch Chief immediately.

   3. Sweeping of aircraft parking areas, run pads, and taxiways will be accomplished at a minimum, weekly. Conditions may exist that require sweeping of specific areas more often and will be assessed by the Aircraft Support Branch Chief.

   4. Special attention will be given to cracks and expansion joints where the sweeper is not effective.

E. Provide waste receptacles for the disposal of flight line debris at strategic locations, and on all aircraft tugs. Aircraft tug FOD receptacles will be emptied each day.

F. FOD barrels/containers will be emptied and maintained as required.

7-10.0 FOD PREVENTION

Much of the damage experienced by aircraft and jet engines has been caused by loose objects (FOD) left in or near the aircraft engine or intake area during maintenance.

Particular emphasis must therefore be placed on controlling maintenance and housekeeping practices. The following can materially reduce the number of FOD occurrences resulting from aircraft or engine maintenance.

1. Ensure that all covers and guards are installed during aircraft maintenance. All parked aircraft will have protective duct covers installed when work is not being performed on the engines (unless formally waived, such as DC-8 while hangared). Do not remove covers until time of pre-flight inspection.
2. Inspect forward of and inside the inlet area for security of fasteners and determine that gaps or openings do not exist through which debris can enter the engine.
3. When maintenance is performed in, around, or in front of intakes use extreme caution to prevent FOD. If any foreign objects such as safety wire, washers, nuts, or bolts are accidentally dropped in the intake, stop maintenance until the dropped item has been found and retrieved. After maintenance, thoroughly clean the intake. When intake maintenance is completed, perform an intake inspection.
4. When an engine has been removed, thoroughly clean the engine bay and perform an engine bay inspection prior to engine installation.
5. Use care when positioning test equipment on or near the engine or inlet. Do not place an item of equipment, clothing, tools, etc. on the ramp or on an aircraft surface unless it is properly secured. Never place such items in an engine inlet or directly in front of or behind any jet aircraft.
6. After any aircraft inspection or maintenance, thoroughly inspect in the vicinity of the engine inlet and in locations in which loose objects could conceivably constitute a FOD hazard. Emphasis will be placed on insuring the security of latches, twist-lock fasteners, snap rings, cotter keys, rivets, etc. Inspect blow-in doors, ducting, and seals for security and evidence of deterioration.
7. Good housekeeping is essential. Immediately after completing an operation, clean up any scraps or shavings generated during drilling, trimming, etc. Place all hardware residues in appropriate receptacles and return maintenance stands and support equipment to their storage areas.

7-10.1 FOD Prevention Steps

The following steps will help to ensure a FOD-free work place.

A. Check personal gear: Bracelets, watches, earrings, eyeglasses, etc. shall be secured or stored prior to cockpit or confined space entry.

B. Do not wear garments with loose buttons, snaps, or torn pockets.

C. Do not carry anything in pockets that cannot be zipped, snapped, or otherwise fastened.

D. Clean mud from shoes.

E. Hold safety wire and cotter keys when cutting.

NOTE: Potting applied to diagonal cutting pliers creates a positive FOD control method by holding secure small wires or safety wire that is cut.

F. Keep bolts, washers, and other small hardware items in a container during assembly and disassembly.

G. Unpack parts and equipment away from work area.

H. When physical entry is required to inspect the intake and exhaust areas of engines, a pocketless coverall (bunny suit) or equivalent should be worn. This will reduce the possibility of a foreign object dropping from a pocket into an area where damage could result.

7-10.2 Vehicle FOD Prevention Steps

Cars, trucks, trailers, and mobile service vehicles that have access to aircraft operational areas are a potential source of FOD. Prevention that should be taken include

A. Regularly inspect all vehicles such as refueling trucks, supply trucks, contract vehicles, and maintenance vehicles that operate on the flight line and hangar areas for foreign objects.

B. Before a vehicle is driven onto taxiways, runways, or into aircraft parking areas, the driver will stop and check that there are no rocks or pebbles caught in the tire treads and that the load is secure. The driver will also check pickup beds for loose tools, hardware, trash, and other debris.

C. Vehicles must not be driven off the hard surface unless absolutely necessary. If it does become necessary to drive off to let an aircraft pass or for any other reason, the driver will once again check the load for security and the tires for foreign objects before re-entering the hard surfaced area. This does not apply to emergency vehicles responding to an emergency.

D. All vehicles will enter and leave the flight line at controlled access points unless an emergency vehicle is responding to an emergency.

7-11.0 TOOL CONTROL

Reference

DFRC 324 Controlled Area Tool/Item List

NOTE: The following refers to Dryden's civil service Tool Control program. Contractors Tool Control processes/system/program, if more stringent than Dryden's, will be in accordance with their contractual agreement, statement of work, or accepted quality processes.

For the purpose of this section, tools are defined as devices (such as a wrench) used to perform or facilitate manual or mechanical work, in this case the maintenance, operation, and repair of aircrafts, its systems, components, and associated experiments.

Other equipment (such as pens, pencils, etc.) or consumables such as nuts and bolts, etc. are not covered in the tool control process. However, it must be emphasized that good housekeeping is mandatory to prevent these items from becoming FOD.

Tool Control is a process that allows mechanics and technicians the capability of monitoring and accounting for personal tools utilized to perform aircraft maintenance tasks. The objective is to prevent potential hazards that could cause Foreign Object Damage or possible loss of aircraft. Training, discipline, motivation and being conscientious are key factors of a successful program and will be practiced daily. Tool control is part of every maintenance program.

A. Each mechanic and technician is responsible for
    1. Shadowing tools in their toolboxes (roll-a-way)
    2. Identifying each tool so that ownership of the tool can be easily determined. Initials, employee number, Social Security number, personal code, etc. can be used. The personal identification number will be listed on the tool inventory form.
    3. Keeping a complete and accurate inventory of every tool in their toolbox
    4. Giving their cognizant branch office a copy of their inventory
    5. Inventorying fabric tool pouches or bags
    6. Updating inventory records
    7. Accounting for all tools, equipment, hardware and cleaning materials used for maintenance
    8. Being diligent when working in or around fuel cells, cockpits, areas behind cockpit panels, and behind panels
    9. Logging into the aircraft workbook forms ODT5/512 or NALCOMIS torque wrench used, ECN for tracking purposes in case the item is found to be "out of tolerance".

B. Toolboxes, pouches, and bags will be audited during normal aircraft audits by Quality Assurance and may be inspected more frequently by the aircraft Crew Chief, or supervision.

C. When working in controlled areas (cockpits with ejection seats, fuel cells, or other areas identified as confined space), all items will be recorded on form DFRC 324, Controlled Area Tool/Item List, indicating the date, persons' name, and a description of the items taken into the controlled area.

D. When the previously recorded items are removed from controlled area the person removing the items will sign the form at time of their removal, and have them verified by a Designated Inspector or by a Quality Assurance Inspector. The DFRC 324 shall be kept on file in the appropriate Supervisors /Branch Maintenance Office for minimum of 60 days.

E. Each mechanic and technician is held responsible for accounting for their tools at all times whether it is before the start, during, or at the completion of each maintenance task.

7-11.1 Accounting For Tools, Equipment and Material

A. A red ‘X’ is mandatory for any lost or misplaced item on an aircraft, with the exception stated immediately below, and shall be entered in the aircraft’s ODT-5/512.

Exception: If an item is misplaced in the passenger cabin of a cabin class aircraft (DC-8, KingAir, etc.), a diagonal symbol shall be entered in the aircraft’s ODT-5/512.

B. Lost tools, and/or hardware will be reported to the Aircraft Support Branch Chief. Aircraft will not be released for flight until a full evaluation of lost tools or hardware has been made by the Aircraft Support Branch Chief, Quality Assurance, and Aircraft Crew.

C. The Director of Flight Operations will have the responsibility of releasing the aircraft for flight in the event that the tools and/or hardware are not found, by placing an appropriate statement within the proper documentation (ODT-5/512/NALCOMIS/Log Book).

7-12.0 TEST EQUIPMENT

References

DCP-O-007	Metrology System
NPD-8730.1	Metrology & Calibration
QAP-Q-1.0	Airborne Science Quality Assurance Plan (QAP)

Equipment used to maintain, repair, modify, and service aircraft must meet aviation standards. Precision measuring tools, meters, etc. must be recalibrated on a scheduled, periodic basis, and will be marked for calibration or “indication only” with a tag. (See DCP-O-007)

7-12.1 Equipment Maintenance and Inspection Monitoring

A. Specific personnel will be assigned to monitor the maintenance and inspection of equipment in accordance with the manufacturer's specifications and local instructions.

B. Any loaned or assigned equipment required in support of a project conducted by Dryden that has been obtained from the DOD or Contractor will be maintained in accordance with applicable technical order and directives.

C. Applicable historical records will be maintained on each piece of ground equipment in conformance with good maintenance practices.

7-12.2 Equipment Calibration

References

DCP-O-007	Metrology System
NPD-8730.1	Metrology And Calibration
QAP-Q-1.0	Airborne Science Quality Assurance Plan (QAP)

All measuring devices, instruments, test equipment, tools, and gauges as specified in DCP-O-007 used on aircraft, systems, or components will be calibrated and controlled. It is the user’s responsibility to keep assigned equipment calibrated and to deliver equipment to the proper calibration personnel. Any measurement device, instrument, tool, or gauge that does not have proof of current calibration shall be used for indication purposes only, i.e., non-critical measurements, those not intended to be used for certification/validation of a system(s).

7-13.0 USE OF ELECTRICAL TOOLS & EQUIPMENT IN AIRCRAFT HANGARS

Reference

AFOSH 91-100	Section 8.3.9 - Battery Powered Screwdrivers and Drills
NFPA 70-500.5	National Electric Code

A. Pneumatic drills and wrenches are preferred tools for use. However, the use of a non-battery powered, electric tool may be used in a limited and specific instance if approved by the Aircraft Support Branch Chief *and* the Safety, Health, & Quality Assurance Office.

B. Battery powered drills and screwdrivers may be used in hangars, however

   1. They must remain at least 5 feet from any part of the aircraft, and at least 18 inches above the hangar floor.

   2. Batteries must not be charged in the hangar.

C. Battery powered drills and screwdrivers may be used on aircraft that contain no fuel and after fuel tanks have been purged and LEL (Lower Explosive Limit) is acceptable.

D. Communications devices (such as cell phones, radios, pagers, etc.) not marked to be “intrinsically safe” may be used in hangars providing use is not within 25 feet of an aircraft or 50 feet of an aircraft with open fuel cells. Inside these limits, communication devices must be switched off.

E. Only UL approved, and properly designed electrical extension cords for aircraft hangar use are allowed for hangar use. Connection boxes/plugs must be kept at least 18 inches above the floor and disconnected when not in use.

F. All electrical power tools will be grounded. Grounding will be included in the conductor and/or source of electrical current. Grounding will be accomplished from the tool through the conductor to the receptacle outlet.

G. Water coolers and vending machines installed on hangar floors (and adjacent areas not physically separate) will conform to Class 1, Division 2, Hazardous Locations of the National Electric Code. Electric motors, telephones, J-Boxes, and/or connections will conform to Class 1, Division 2 requirements or situated at wall locations 18 inches or higher above floor level.

H. Use of grinding wheels or abrasive cutters in the hangar is prohibited. Exceptions to this requirement must be approved by the Chief of the Safety, Health, and Environmental Office and the Fire Marshal.

I. Electrical equipment, lighting fixtures, and devices will meet the requirements of the National Electric Code for Class 1, Division 2, Hazardous Locations, when installed in the following areas:

   1. The entire area of the hangar, including any adjacent areas not suitably cut off from the hangar, up to a level 18 inches above the floor.

   2. The area within 5 feet horizontally from aircraft power plants, fuel tanks, or aircraft structures containing fuel, and extending upward from the floor to a level 5 feet above the upper surface of the wings and engine enclosures.

7-13.1 Use of Battery Powered Tools on Flight Line

A. Battery powered tools can be used on aircraft on the flight line, except
   1. Within 10 feet of fuel vents
   2. Within 5 feet of aircraft engines and fuel tank areas
B. Battery powered tools shall not be used during aircraft fuel system maintenance or refueling.

7-14.0 APPAREL & PROTECTIVE EQUIPMENT

Although there is no official dress code at Dryden Flight Research Center, the nature of aircraft maintenance dictates the wearing of proper attire to perform the various tasks assigned in a safe manner.

NOTE: Some contractors are required by their statement of work to adhere to a dress code.

CAUTION

Summer temperatures can easily raise aircraft skin temperature well over 110 degrees F. Hot fuels and oils from a running engine could be over 400 degrees F. Liquid oxygen temperature is -361 degrees F. Injuries incurred can range from severe burns to cuts and abrasions from sharp objects on aircraft.

A. Aircraft maintenance personnel shall be properly attired. Short sleeve shirts or blouses are permitted. Shorts that are loose fitting (not form fitting), clean, neat, hemmed, and no shorter than mid thigh may be worn when not performing hazardous tasks. Shoes must cover the entire foot and be wide heeled. Tank tops and nylon mesh shirts are not permitted at any time. No tasks shall be performed without the proper attire.
B. In area where hazardous liquids or fuels are handled/processed, canvas or cloth sneakers and porous shoes with breather holes are prohibited. Additional foot protection may be required for employees that are exposed to additional foot injury hazards. Employees that desire safety shoes may obtain them thru the Life Support Shop, at the expense of NASA, with the approval of their supervisor.
C. Employees are expected to utilize existing protective equipment such as goggles, safety glasses, face shields, gloves, hard hats, etc. when such articles are required and provided for in a particular operation. During crane lifting operations, all personnel will utilize hard hats.
D. Ear protection shall be required of all employees having access to the flight line.
E. If worn in the vicinity of aircraft with running engineers, hats shall be held securely in place by ear protectors.

F. Personnel will not wear leather sole shoes or shoes with metal cleats or protruding nails while working on aircraft.

G. Personnel shall not wear nylon or other synthetic fabric clothing that generates static electricity. Cotton coveralls are available at the Tool Crib.

H. Personnel shall comply with requirements of Chapter 7-10.1, A-D, FOD Prevention, and Chapter 6-10.0, Personnel & FOD Safety.

7-15.0 OPEN FUEL CELLS/FUEL TANKS & MAINTENANCE

References

Applicable Aircraft Maintenance Manuals or Technical Orders (TOs)

ASP-Q-4.09-003	Tool Control (paragraph 5.6 Confined Space Tool Control)
DCP-S-009	Safety & Health Requirements Manual, Chapter 10, Confined Space Safety
LMLM ESH Manual	Chapter 11, Confined Space Entry Program
NAVAIR 01-1A-35	Aircraft Fuel Cells and Tanks
TO 00-25-172	Ground Servicing of Aircraft and Static Grounding/Bonding.

NOTE: This section replaces Process Instruction PI-20-E, Fuel Tank Repair Criteria in its entirety.

NOTE: TO NAVAIR 01-1A-35 and 00-25-172 listed above in are in no way intended to replace specific aircraft maintenance manuals or TOs, where detailed and specific technical information must be followed. These TOs give general safety, health, and environmental supplementation to specific aircraft technical data and are to be used as governing information when none exists.

Certain hazards are present during fuel system maintenance. The presence of hazards is normal and if precautionary measures are taken there will be no increased risk associated with the maintenance operations. Cooperation is required from all personnel to cope with conditions presented. Deviations shall not be permitted from safety practices, which increase the risk to the worker, aircraft, or facility.

7-15.1 Safety Precautions

A. Aircraft shall remain properly grounded.

B. No electrical power shall be on aircraft with open fuel cells unless authorized by an approved standard operating process or procedure.

C. No aircraft with open fuel cells shall be stored in a hangar unless these cells are preserved in accordance with applicable procedures or instructions.

D. All pneumatic tools will be effectively grounded to reduce the possibility of fire from static electricity.

NOTE: When work is performed in fuel cells a Confined Space Entry Permit is required in accordance with DCP-S-009, Chapter 10. It is the responsibility of the Aircraft Crew Chief or designee to notify the Aircraft Support Branch Chief.

7-15.2 Instruction

A. No fuel tank/cell repair work/entry is to be performed in any Dryden hangar or facility, without

1. Letter of approval from the Chief of Aircraft Maintenance or his/her designee
2. Written concurrence of the Chief of the Safety, Health and Environmental Office or his/her designee
3. Personnel involved in the activity have current confined space training.

B. Proper tank/cell purging in accordance with this section.

C. Chemicals, sealants, adhesives etc. must be authorized for usage in tank/cell, by a governing authority, cleaning materials and desired chemicals etc. must be cleared by Dryden Safety, Health, and Environmental Office and must be listed on the entry permit. This is a critical element in assuring the proper personal protective equipment is being used.

D. A count of all tools, equipment, hardware, and cleaning materials that are used will be made prior to the start of the work to be performed.

E. Any item(s) to be taken inside fuel tank/cells will be recorded on DFRC 324, “Controlled Area Tool/Item List” prior to entry.

F. Chief, Aircraft Maintenance and Dryden Safety, Health, and Environmental Office must clear deviations to requirements outlined in this instruction through a “Letter of Approval”.

G. Concurrent maintenance may be performed during the actual fuel tank repair, and during sealant curing provided NO POWER IS REQUIRED ON THE AIRCRAFT.

H. “POWER ON” maintenance is permissible during sealant curing provided “ALL TANK/CELL ACCESS PANELS HAVE BEEN INSTALLED.”

NOTE: Panels can be "tacked" on, but if aircraft is to be moved, refer to aircraft TOs and maintenance manual for requirements.

7-15.3 Operations

A. Defuel aircraft I/A/W TO NAVAIR 01-1A-35, and applicable aircraft maintenance manuals or TOs.

NOTE: If the fuel cell work to be accomplished does not require entry into the cell or tank, the Confined Space Entry permit is not required. The cell or tank will still be required to be defueled and purged I/A/W NAVAIR 01-1A-35 and the LEL recorded. It is preferred that this type of maintenance be performed in a designated flight line area to reduce the time of an open cell or tank in the hangers. The designated area will be spot # 11 on the main Flight Line or a location approved by the Chief of Aircraft Maintenance or their designee. During inclement weather the A/C may be placed in a hangar over night by temporarily installing the cell or tank cover plates.

WARNING

Confined space entry will be I/A/W DCP-S-009. A confined space permit issued by the Safety, Health, and Environmental Office is always required when entering a fuel cell or tank.

B. Drain, depuddle, purge, and perform fuel tank/cell repair I/A/W TO NAVAIR 01-1A-35, and applicable aircraft maintenance manuals or TOs.

WARNING

When air-purifying respirators are worn for fuel/tank entry and repair, an organic vapor cartridge will be used. Organic vapor cartridges must be replaced after 8 hours of accumulative usage and more often if entrant detects odors or taste that indicate a breakthrough in purifying medium.

7-16.0 LIFTS/CRITICAL LIFTS

References

DCP-S-009 Safety & Health Requirements Manual, Chapter 6, Critical Lift and Chapter 7, Lifting Devices & Requirements

A. All lifts (including fork lifts, mobile cranes, etc.) will be performed in accordance with DCP-S-009, Chapter 7, Lifting Devices & Requirements

B. Critical Lifts (lifting of high dollar, one-of-a-kind articles, aircraft, etc. whose loss would have serious programmatic impact) will be performed in accordance with DCP-S-009, Chapter 6, Critical Lifts.

C. Prior to use, the user will verify that all lifting slings and nylon straps

   1. Are serviceable and in good repair
   2. Have a manufacturing data tag attached
   3. Are within annual inspection proof test date limits (3 years) and lifting capacity

   If there is any doubt as to condition, the item will be tagged “Do Not Use”.

7-17.0 AIRCRAFT JACKING

Aircraft jacking will be performed by applicable TO, maintenance manuals, or approved procedure generated by DCP-O-011, Systems Test Procedure.

7-17.1 Safety Precautions

1. Aircraft will not be placed on jacks in front of or blocking exit of other aircraft within a hangar.
2. Only jacks of the proper load rating will be used to safely raise aircraft.
3. Adjustment extension on top of jacks must always have recommended thread engagement per placard on jack or in procedure.

7-18.0 FALL PROTECTION

Reference

AFOSH 91-100, available on line at http://www.e-publishing.af.mil/

It is Flight Operations’ practice to comply with applicable regulations of other Federal agencies exercising regulatory authority over NASA in specific areas (i.e., Department of Labor’s Occupational Safety and Health Administration, Department of Transportation).

To instill an awareness of health and safety in NASA employees and contractors and set objectives for fall protection that can be readily adhered to, Dryden’s Flight

Operations policy shall be to comply with the latest revision of AFOSH 91-100 for Fall Protection.

7-18.1 Responsibilities

It is the responsibility of Aircraft Support Branch Supervisor to ensure that proper precautions are taken to provide for a safe working environment. It is also the responsibility of all Dryden's maintenance personnel to be familiar with applicable Technical Orders, Standards, and Processes pertaining to fall protection.

7-18.2 General

The maximum use of stands and work platforms shall be made, whenever possible. When maintenance or inspections are performed on the aircraft, the specified designated safe walkways on the surface of the aircraft are used. For work not covered in applicable Technical Orders, Procedures, or Standards, the latest revision of AFOSH 91-100 will be used.

7-18.3 Procedures

The following is a paraphrased extraction from the Air Force Occupational Safety and Health Standard 91-100, dated May 1, 1998

Falls from aircraft working surfaces are potential sources of injuries. Some operations, which expose maintenance personnel to falls, are aircraft cleaning and painting, control surfaces and engine maintenance and inspections, and aircraft servicing. The maximum use of maintenance stands and work platforms, whenever possible, will reduce the exposure and risk. The use of long-handle mops during aircraft cleaning tasks may also reduce the need to work from aircraft surfaces.

A. Whenever it becomes necessary to perform required tasks where a worker can fall 10 feet or more, fall protection will be used. The two common systems are fall arrest and fall restraint. The preferred system is the restraint in that the lifeline or lanyard will prevent the worker from falling in case of a slip on an aircraft surface. The fall arrest system will incorporate a lanyard, which will prevent the worker from falling more than 6 feet. Anchorages for lanyards that tie off one worker will be capable of supporting at least 5000 pounds per worker attached or shall be designed, installed, and used as part of a complete personal fall arrest system which maintains a safety factor of at least two, under the supervision of a qualified person. Lanyards, D-rings, locking snap-hooks, and all components of a fall arrest system will also be capable of

sustaining a minimum tensile load of 5000 pounds. (Reference: 29 CFR 1910.66, Appendix C, and Personal Fall Arrest System, Section 1). See AFOSH 91-31 for more information on fall protection equipment.

B. When maintenance procedures require workers to walk or perform tasks where they can fall 10 feet or more the following will apply:

- Designated walkways will be used where possible.
- Personnel working on aircraft surfaces will wear non-slip soled shoes.
- Personnel will be provided and will use appropriate fall protection.

NOTE: When maintenance or inspections will be performed totally within the TO-specified designated safe walkways on the surface of large aircraft, fall protection is not required when tasks are performed according to specified TO procedures and conditions. This method will be used only after appropriate risk management measures have been assessed. In all other activities where work will be performed outside these walkways, appropriate protection will be provided to prevent falls from 10 feet.

NOTE: Horizontal lifelines (Skylines), if used in aircraft wash racks, corrosion control, or other aircraft maintenance areas, will be designed by a qualified person as defined in 29 CFR 1910.66, Appendix C, Section 1. Local procedures will be developed and used to ensure the number of personnel attached to the lifeline at any one time will not exceed the anchorage point design limits.

C. When aircraft surfaces are wet or covered with snow, frost, or ice, extra caution will be used. If the operational needs do not allow delays for conditions to improve, fall protection shall be used. When fall protection use is not feasible, the Aircraft Support Office will evaluate the situation, consider eliminating unnecessary requirements, and require use of elevated platforms or work stands.

D. When using mobile work platforms that have manufacturer-installed structural anchor points, harnesses shall be worn with lanyard attached to the structural anchor point. When mobile work platforms have not been manufactured with an approved structural anchor point, protective guardrail and toe boards must be installed on all open sides, except the side facing the aircraft when it is within 14 inches of the working surface.

NOTE: The side of the platform facing the stairway is not considered an open side when the stairway is equipped with the required handrails.

7-18.4 Fall Protection Guidance

The following will be incorporated into normal operation to prevent falls:

- Hold safety meetings to discuss fall hazards and protection.
- Conduct periodic reviews of specific hazards on each aircraft type.
- Use proper clothing and footwear.
- Use non-skid surfaces whenever possible and inspect often for condition.
- Use hangars to reduce hazards associated with weather conditions when practical.
- Use fall protection equipment when required by procedure or when otherwise feasible.
- Comply with applicable fall protection policies, procedures, and directives.
- Promote an atmosphere that encourages taking the proper amount of time to accomplish tasks not driven by flight schedules and not taking unnecessary risks

7-19.0 CLEANING & PAINTING OF AIRCRAFT

Reference

PS-20-1 Cleaning Methods and Processes

CAUTION

Physical hazards are present in the form of falls from aircraft during cleaning operations, contact with cleaning materials (flammable solvents and vapors of solvents), and spills of solvents.

7-19.1 Aircraft Cleaning

A. Aircraft cleaning will be performed per applicable Technical Manual's relating to subject aircraft.

B. Wheels, bearings, brakes, static ports, and other sensitive portions of the aircraft will be protected from water contamination by suitable covers.

C. Spraying solvents (i.e., PD680, Freon, or other solvents) is strictly prohibited in hangars.

D. Soap and water is the only approved washing medium in hangars.

E. Wiping cloths are the only method acceptable to remove accumulations of fuel, oil, or hydraulic residue from aircraft. Cloths must then be disposed of as hazardous waste.

7-19.2 Cleaners and Solvents

A. At no time will personnel clean aircraft parts, hangar floors, equipment, or clothing with gasoline or unauthorized solvents. All cleaning will be accomplished with high flash point (100 degree F or above) or nonflammable substances or liquids.

B. Cleaning substances, when stored in buildings, will be in approved containers with content stenciled on the container.

C. Flammable liquids will be stored in approved flammable storage cabinets in the Chemical Crib at the end of each working day.

D. At no time will flammable liquids be discharged into storm or sewer drains.

E. No highly flammable materials will be kept in work carts or toolboxes.

7-19.3 Aircraft Painting

Reference

TO 42A1-1-1 Evaluation and SVC Testing of Materials – Cleaning, Painting, Sealing, Protective Treating, Anti-Corrosion, Inspection Materials, and Related Items.

Aircraft painting or stripping can only be performed in prescribed areas at the Air Force Flight Test Center, with the following exceptions.

A. Less than a one square foot area may be spray-painted or have any paint removed while inside a Dryden hangar.

B. Touch-up painting or painting greater than one square foot may be approved by the Aircraft Support Branch Chief. Such approval will be based on the establishment of conditions and controls consistent with the requirements of TO 42A1-1-1.

C. All requests to perform painting operations in the hangar will be submitted through the Aircraft Support Branch Chief with sufficient lead time to permit required coordination.

7-20.0 VEHICLE OPERATIONS ON THE FLIGHT LINE & IN HANGARS

Reference

AFFTC 10-2 Control of Vehicles on the Airfield (Edwards AFB)

AF Form 483 Flight Line Driver's License

NOTE: This section replaces Process Instruction PI-20-N, Operation of Motor Vehicles on the Flight Line and in Hangars, in its entirety.

The following requirements and regulations are compiled from DFRC directives and Air Force Flight Test Center (AFFTC) Regulation 10-2 and must be followed by any person (NASA, contractor, TDY employees) operating a vehicle on DFRC or Edwards flight lines.

Operation of vehicles on the flight line is recognized as being essential in the flight operation mission of the Center; however, such operations may present a clear danger to aircraft and personnel unless safe and controlled practices are followed. Therefore, the operation of motor vehicles and the movement of personnel on the flight line of Dryden and Edwards Air Force Base shall be kept to a minimum.

To be eligible for operating vehicles, including bicycles, on the flight line, personnel must have a job assignment that requires frequent access to the flight line in order to accomplish their primary duties and have a valid flight line driver's certificate.

A. Responsibilities and Safety – The Aircraft Support Branch Chief and the Flight Operations Directorate has full responsibility for all flight line operations at Dryden. Individuals that require flight line privileges must conduct themselves in strict accordance with Air Force, Edwards Air Force Flight Test Center, and Dryden regulations. Any person violating those regulations shall have their driving privileges on the flight line revoked. Individual supervisors are responsible for ensuring the proper operation of vehicles by subordinate personnel.

B. No vehicle shall be driven within 25 feet of an aircraft unless that vehicle is engaged in servicing, loading or unloading, or is essential for mission support. No vehicle shall pass beneath any part of an aircraft without a spotter.

C. No vehicle shall be parked closer than 25 feet in front of, or 200 feet to the rear of any aircraft with engines in operation or about to be placed in operation. Vehicles parked at the side of the aircraft will be located clear of the wing tips and be clearly visible to the aircraft cockpit personnel.

CAUTION

Do not operate or park electric carts (GEM vehicles, golf carts, etc.) within 50 feet of LOX carts and vents or oxygen-rich environments.

CAUTION

If a fuel spill incident occurs in the hangar or on the flight line, vehicle shall not be started until the fuel spill has been cleaned up and it has been determined safe to start up vehicles by the Chief of OM and SH/Safety Office

D. If required to leave a vehicle unattended on the flight line, turn off the ignition, place the transmission in reverse (manual transmissions) or park (automatic transmissions) and set the parking brake.

E. Keys must be left in the ignition and the vehicle left unlocked when on the flight lines.

F. Flight line parking must not impede any aircraft support activity. Should aircraft maintenance activities become impacted due to vehicular traffic, flight line parking authorization may be revoked.

G. Vehicles will be checked for FOD prior to each use per Section 7-10-2.

7-20.1 Vehicle Operation on the Flight Line

Operation of vehicles on the flight line is recognized as being essential in the flight operation mission of the Center; however, such operations may present a clear danger to aircraft and ground personnel unless safe and controlled practices are followed. Therefore, the operation of motor vehicles and movement of personnel on the flight line at Dryden and Edwards Air Force Base shall be kept to a minimum and controlled per AFFTC Instructions 10-2, dated 12 March 2002.

The definition of a flight line is anywhere an aircraft can be parked, towed, or taxied, and all personnel requiring access to the flight line shall have a current Air Force flight line driver's license. (AF form 483)

Motor vehicles and bicycles using the vehicle access route shall remain on marked traffic lanes. They shall observe all motor vehicle traffic regulations as posted along the route, such as stop signs, warning signs, regulatory signs, and speed limits (the maximum speed limit on the vehicle access route is 15 m.p.h.). **Aircraft shall be given the right-of-way in any circumstance.** Secure all lightweight materials being transported and prevent loose items such as tools, nails, paper, trash, etc., from littering the route. Pedestrians shall walk alongside the marked traffic lanes of the vehicle access route and never walk beneath the wing or any part of an aircraft even if it extends over the route.

7-20.2 Vehicle Access to Lake Bed

Rogers Dry Lake Bed is considered an active runway; therefore, permission must be obtained prior to accessing the lakebed. Individuals must contact the Edwards AFB tower for permission with a reason given for your requirement to access the lakebed. You must also stay in radio contact with the Edwards AFB tower for the full time you are on the lakebed and inform them when you have exited the lakebed. The following regulations apply to lakebed access:

A. Contact Edwards tower “Eddy Ground” for permission to access the lakebed using your vehicle call sign (all radio equipped vehicles have a call sign marked on the radio). Example; "NASA Mobile 25 requests access to lake bed runway 05/23 from NASA ramp to recover NASA aircraft."

B. When permission has been granted, access the lakebed and take the most direct route to the runway you wish and drive parallel to the runway until you get to the aircraft.

C. Lakebed speed limit is 50 mph for general-purpose vehicles (such as SUVs, crew cabs, vans, etc.) within 50 feet of the runway edge markings. A maximum of 35 mph is allowed in other areas of the lakebed with extreme caution due to fissures in the lakebed that may damage a vehicle. Emergency vehicles responding to an emergency and EAFB Airfield Management vehicles during critical airfield situation are exempt from these restrictions.

D. Once business is concluded on the lakebed, contact Edwards tower (“Eddy Ground”) and inform them that you have exited the lakebed. Before entirely accessing the concrete ramp, vehicle operators are responsible for checking vehicle tires to ensure that no rocks or debris are caught in the tread.

7-20.3 Vehicles Operating in Hangars

A. Except for vehicles that have been previously authorized and are in direct support of flight readiness/support, general-purpose vehicles will not be operated or housed in hangars.

B. No vehicle shall be driven within 25 feet of an aircraft unless that vehicle is engaged in servicing, loading, unloading, or performing essential mission support. No vehicle shall pass beneath any part of an aircraft without a spotter.

C. It is preferred that special purpose vehicles and equipment (cranes, tow-tractors, hydraulic mules, generators, etc.) not be stored in hangars. However, they may be left in a hangar when actively supporting a project or Airborne Science uploading.

D. Vehicles with catalytic converters do not require spark arrestors; however, extreme care should be given due to the high temperatures of catalytic converters.

7-21.0 BICYCLES

Reference

DPD-1620.4 Traffic Policy

Bicycles are allowed in the hangars and on Dryden's flight line. Special care and consideration must be given to the immediate surroundings. Riders must

A. Obey all motor vehicle regulations
B. Must have a flight line driver's license to ride on flightline/ramp areas.
C. Be alert for approaching aircraft and vehicles and yield right-of-way to all motorized vehicles and aircraft
D. Be alert and aware of personnel within your vicinity
E. Not ride under any aircraft
F. Must, while operating a bicycle on the roadway, ride as near to the right of the roadway as possible and with the flow of traffic
G. All personnel, regardless of age (including dependants, contractors, retirees, etc.) who ride bicycles on the installation must wear an approved (i.e., ANSI or Snell) bicycle helmet. Workers operating bicycles in areas that require the use of ANSI approved hard hats for protection from falling and flying objects are allowed to use those helmets instead of approved bicycle helmets.

   EXCEPTION: Workers operating bicycles in industrial/flight line areas due to potential FOD need not wear a bicycle helmet.

7-22.0 MISHAPS, INCIDENTS, & CLOSE CALLS

References

DCP-S-001	Aircraft Mishap Response Procedure
DCP-S-008	DFRC Close Call Report Process
NASA 1627	Incident Report form
DFRC 127	Close Call Report form

7-22.1 Policy

The nature of the DFRC mission requires the interaction of people and equipment in a hazardous environment. Each individual must be aware and alert to unsafe working and environmental conditions on a continual basis.

The objective of the Aircraft Maintenance Ground 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 sound safety practices
3. Sustained safety awareness
4. Support of DFRC safety programs, which includes the timely reporting of hazards, mishaps, incidents, and close calls

7-22.2 Definition of Mishap, Incident, or Close Call

Refer to Table 7-1 for the definition of mishaps, incidents, and close calls. The Table as been copied from Tab B of DCP-S-001, Aircraft Mishap Response Procedure.

A NASA 1627 form needs to be initiated whenever any of these events occur.

7-22.3 Incident Reporting: Close Calls and Hazards

Dryden has initiated, in addition to the above NASA requirements, a DFRC Reporting System for close calls and for identifying hazards. DCP-S-008, DFRC Close Call Report Processing, defines the use of close call and hazard incident report form DFRC 127.

A. Ground Incident Reporting System

- Purpose of Incident Reports

  A hazard is anything (event, practice, or procedure) with the potential to cause damage to equipment or injury to personnel. The four purposes for incident reporting are to

  1. Report a hazard and the remedial action taken so that others may take similar action
  2. Report a hazard and recommend corrective action to others
  3. Document a continuing hazard so that a corrective action may be taken prior to the hazard leading to a mishap

4. 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 would have been a mishap if circumstance, quick reaction, procedure, or similar reason had not intervened. Over-reporting of incidents is preferred to not reporting incidents of significant concern.

Table 7-1
Mishaps, Incidents, or Close Calls

	Mishap Severity	**Investigation Requirements**
Mishap	**Severity**	**Investigation Requirements**
Type A Mishap	A mishap causing death and/or damage to equipment or property equal to or greater than $1,000,000.	Investigated by a board appointed by the appropriate Program or Institutional Associate Administrator. Five federal officials required on board.
Type B Mishap	A mishap resulting in permanent disability to one or more persons, hospitalization (within a 30-day period from the same mishap) of three or more persons, and/or damage to equipment or property equal to or greater than $250,000 but less than $1,000,000.	Investigated by a board appointed by the Field Installation Director, unless circumstances dictate a Headquarters directed investigation. At least three federal officials required on board.
Type C Mishap	A mishap resulting in damage to equipment or property equal to or greater than $25,000 but less than$250,000 r and/or causing occupational injury or illness that results in a lost workday case.	Analyzed locally by committees or individuals unless circumstances dictate a more formal investigation
Incident	A mishap consisting of personal Injury of less than Type C Mishap Severity but more than first-aid Severity, and/or property damage equal to or greater than $1,000, but less than $25,000.	Investigation procedures are the option of the DFRC Director.
Close Call	An occurrence in which there is no injury, no equipment/property damage equal to or greater than $1,000, and no significant interruption of productive work, but which possesses a high severity potential for any of the mishaps defined as Type A, B, C Mishap, or Incident	Investigation procedures are the option of the DFRC Director.

NOTE: Table derived from DCP-S-001, Aircraft Mishap Response Procedure.

Chapter Eight
Aircraft Workbook Documentation

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8-1.0 PURPOSE OF CHAPTER

The purpose of this chapter is to define the aircraft documentation requirements that are used during the maintenance, modification and/or inspection of Dryden controlled aircraft.

8-1.1 General

Aircraft maintenance, servicing, and inspection, including modification- or installations that change the compliment or configuration of the aircraft must be documented to provide:

A. Historical record of the aircraft configuration.

B. Current status of the aircraft and aircraft components.

C. Description of work being accomplished on the aircraft, identification of technical documents or instructions that describe the processes and identifications of personnel performing the work.

D. Authority to accomplish work.

E. Certification of quality of the work performed.

F. Identification of components by part and serial number.

G. Weight and balance of the aircraft.

H. Recording a downgrade of an uncorrected Red ‘X’ for a one-time flight.

8-1.1.1 Aircraft Documentation

Reference

Appendix C “Aircraft Workbook Forms Guide & Instructions”

A. For aircraft that utilize NALCOMIS, refer to Section 8-6.0.

It is the intent of the Flight Operations Directorate that all Dryden aircraft transition from paper aircraft workbooks to an electronic documentation database (NALCOMIS or its successor) as soon as practical.

B. For aircraft that are not utilizing NALCOMIS or the Standard Aviation Log Book, an Aircraft Workbook must be maintained.

Appendix C, “Aircraft Workbook Forms Guide & Instructions”, provides a form’s fill-out template including the *minimum* required entries for Aircraft Workbook forms.

8-1.1.2 Aircraft Symbology

Reference

TO 00-20-5-1-1 Symbols and their use.

There are three RED Symbols used:

1. RED X – Grounds an airplane; reflects un-flight worthy or hazardous condition. Flight is not allowed until the item is fixed or the symbol is dispositioned or downgraded as later described.
2. RED Dash – Depicts that an Inspection or scheduled maintenance is due. Flight is not allowed until the item is complied with or the symbol is dispositioned as later described.
3. RED Diagonal – Non-Grounding, reflects non-flight critical item discrepancy. Flight is allowed if the item is fixed or the item is dispositioned as later described.

8-1.2 Applicability

The forms specified within this document are the only authorized forms for all Dryden aircraft and aircraft experiments, research items, or other subsystems that utilize ODT Forms and/or an aircraft workbook. Any deviation from this document shall be granted *only* through an AM&SM Waiver (DFRC 317), approved by the Chief of Maintenance or his designee.

8-1.3 Governing Documentation

Dryden's ODT forms are the official, authorized forms for Dryden aircraft workbooks. These forms have been derived from forms utilized within the DOD in order to meet Dryden specific needs.

8-1.4 Dryden Form Origin

The historical root for mandatory aircraft workbook Dryden Forms follow.

8-1.4.1

Dryden Documentation/Forms Historical Root

DFRC 748	Operations Fact Sheet, unique to Dryden (See Note 1)
ODT-4D	AFTO Form 781H: Aerospace Vehicle Flight Status and Maintenance
ODT-14	AFTO Form 781: AFORMS Aircrew/Mission Flight Data Document
ODT-5A	AFTO Form 781A: Maintenance Discrepancy and Work Document
ODT-12A	AFTO Form 781A sign off requirements according to TO 00-20 series
ODT-512A	ODT-5, Aircraft Maintenance Discrepancy/Work Record & ODT-12, Part Removal and Installation Record
ODT-7	AFTO Form 781J: Aerospace Vehicle – Engine Flight Document AFTO Form 781K: Aerospace Vehicle Inspection, Engine Data, Calendar Inspection and Delayed Discrepancy Document
ODT-24	AFTO Form 781H (Back): Aerospace Vehicle Flight Status and Maintenance
ODT-2A	AFTO Form 781K (Back): Aerospace Vehicle Inspection, Engine Data, Calendar Inspection and Delayed Discrepancy Document
ODT-6	AFTO Form 781D: Calendar and Hourly Inspection Document
ODT-16	AFTO Form 781E: Accessory Replacement Document
Seat Report	Generated through NALCOMIS
DFRC 317	A DFRC generated document (a waiver) required when any deviation from this document or the AM&SM is “determined” to be ‘accepted’ by the appropriate authority

NOTE 1: Due to “one-of-a-kind” aircraft modifications performed at Dryden this internal document was developed to reflect interim deviations from an aircraft’s published Flight Manual. Its placement within the aircraft workbook is such that the pilot and crew can be kept continually aware of those deviations.

8-1.5 Forms Availability and Use

Forms may be obtained from the Maintenance Operations Office, or on-line via Dryden's e-forms. Continued reproduction of the ODT Forms is forbidden without first verifying that it is the current version on the server. Reproduction of forms shall be limited to no more than fifty per verified currency, to be reverified within ten forms from depletion.

Following this requirement will limit outdated form use to never exceed sixty, which is acceptable to management, for minor form changes. In the event of a major form change management will make notifications to assure that the updated forms are utilized within an appropriate time frame.

Forms that are required to be two-sided or be on heavyweight paper must be reproduced after being obtained from the on-line server to meet those specific requirements. This can be accomplished by taking the forms to reproduction or going to the Maintenance Control Office and having them produce a limited number of forms. Reproduction of the forms shall be limited to no more than fifty.

All forms and records, which include provisions for "numbering," shall have each page numbered in order as it is put into use. Numbering shall be applied in a continuously increasing sequence and a number will not be repeated for any type of form or record.

All "open" Discrepancy/Work items shall be properly dispositioned prior to releasing the Aircraft for flight.

Refer to the Appendix C for detailed information.

8-1.6 Workbook Use on Other Than Flight Vehicles

Workbooks are required for all articles/pylons/adapters that are continually removed, repaired, or modified off the aircraft. The project Operations Engineering and the Crew Chief will determine when a Flight Workbook is required.

Whenever a Workbook is utilized for articles/pylons/adapters, forms deemed not applicable by the Crew Chief and Operations Engineer need not be included into the Workbook. The minimum forms will include

DFRC 748	Operations Fact Sheet
ODT-5A or 512	Aircraft Maintenance Discrepancy/Work Record *
ODT-12 or 512	Aircraft Maintenance Work Record/Removals *

ODT-2A	Delayed Discrepancy Record
ODT-6	Calendar/Hourly Inspection Record
ODT-8	Work Order/Technical Order Log

* The type and order of required forms is left to the discretion of the Crew Chief.

8-1.7 Aircraft Release Authority

All aircraft are released for flight in a flight worthy or air worthy condition. The Director for Flight Operations establishes flight release signature authority requirements for all aircraft operated at DFRC. The Director determines which category below that each aircraft operated by DFRC falls within. DOP-O-300, Flight Operations Manual, establishes guidelines for pilot acceptance of aircraft for flight. The signature authority to release an aircraft for flight is as follows:

Research Test Aircraft: The Operations Engineer has signature authority to release the aircraft for flight. The aircraft commander signs the exceptional release for each flight.

Support Aircraft: The contractor chief of maintenance, crew chief, or other designated person has signature authority to release the aircraft for flight. If a support aircraft is placed into research test status, then the signature authority is in accordance with research test aircraft requirements. The aircraft commander signs the exceptional release for each flight. On cross-country flights, the aircraft commander signs the exceptional release for each flight in the absence of major aircraft maintenance requirements (typically grounding or flight safety maintenance requirements).

Airborne Science Platform Aircraft: Prior to the aircraft being placed into an approved configuration to support a specific block of data collection flight and the airworthiness of the aircraft is ascertained by the Operations Engineer, the signature authority is in accordance with the research test aircraft requirements above. The aircraft commander signs the exceptional release for each flight.

Once the aircraft configuration is finalized and the airworthiness status is approved by the Operations Engineer, the contractor chief of maintenance, crew chief, or other designated person has signature authority to release the aircraft for flight so long as only flight worthiness type maintenance, including minor repairs to experiments (as approved by the Operations Engineer), is performed between flights. Any airworthiness maintenance that is performed, such as

modifications to the experiment load or approved aircraft configuration, require Operations Engineer approval and reassessment of the aircraft airworthiness. The aircraft commander signs the exceptional release for each flight.

8-1.7.1 Flight Release of DC-8

A. After the successful conclusion of the shakedown flight, the DC-8 Operations Engineer shall issue a signed and dated memo delegating daily release authority to the crew chief, which includes, as a minimum, the Mission Title, Mission Configuration, Airworthiness Shakedown Flight results, and a statement outlining the condition of airworthiness release, i.e.: "The aircraft has been configured to meet the mission objectives and is in an airworthy flight status. Daily flight worthiness release via ODT-4 for the duration of this mission will be performed by the crew chief. Deviations from the approved configuration, baseline operational limitations, or Operations Fact Sheet must be approved by the Operations Engineer prior to flight." A copy of the signed and dated memo will be filed with the Operations Fact Sheet.

B. On subsequent flights, determination of the condition of the aircraft and whether an approval from the Operations Engineer is required (as stated above) shall be made by the aircraft commander in consultation with the crew chief.

8-2.0 RELEVANT DOCUMENTS

8-2.1 Authority Documents

None.

8-2.2 Reference Documents

DHB-O-003	Maintenance Action Form (MAF) Handbook
DOP-O-006	Fact Sheet Preparation and Update
DOP-O-300	Flight Operations Manual
TO 00-20-5-1-1	Symbols and Their Use
NALCOMIS	End User's Guide

8-2.3 Informational Documents

None.

8-2.4 Forms

DFRC 748 Operations Fact Sheet

Also see Section 8-3.0

8-3.0 AIRCRAFT WORKBOOK FORMS & RECORDS

This section details the contents of DFRC workbooks. It defines required and optional forms.

Refer to Appendix C for specific directions on filling out each form.

8-3.1 Required Forms and Records

The following forms and records shall be included in all Aircraft Workbooks. They are listed in their workbook sequence order and include a brief explanation.

Immediately below each form title, the form format requirements are listed such as single or double sided and the weight (thickness) of the medium (paper). These formats must be adhered to.

DFRC 317 Waiver	AM&SM Waiver. The Waiver's inclusion in the Aircraft Workbook is mandatory whenever a Waiver is in effect for that specific aircraft. (See Note 6)
DFRC 748	Operations Fact Sheet (See Note 1)
ODT-12A	Aircraft Maintenance Work Record: Removals (See Note 4)
ODT-14	Flight Data Document (See Note 2)
ODT-16	Accessory and Time Compliance Log (See Note 5)
ODT-2A	Aircraft Delayed Discrepancy Record
ODT-4D	Aircraft Flight Status & Servicing Record
ODT-512	Aircraft Maintenance Work Record (See Note 3)
ODT-5A	Aircraft Maintenance Discrepancy/Work Record
ODT-6	Calendar and Hourly Inspection Record (See Note 5)
ODT-7	Aircraft and Engine Operating Time Record
ODT-8	Work Order / Technical Order Log that reflects all

	applicable Work Orders and Technical orders that apply to the specific aircraft.
Seat Report	A computer printout of time compliance status for egress related systems. It is updated periodically by the Maintenance Operations Office, and constitutes the official record (See Note 5)

NOTE 1: Even if there are no changes to an aircraft there still shall be an Operations Fact Sheet used as a "place holder" stating "This Aircraft Has No Deviations From Its Published Flight Manual".

NOTE 2: If this form is to be kept in an area other than the aircraft workbook then an AM&SM Waiver (DFRC 317) must be approved. However, a copy of the form shall still be used as a "place holder" within the aircraft workbook, with an annotation of the waiver number and the location of the form; i.e., "As authorized in AM&SM Waiver # XXX; the actual ODT-14 will be maintained in the ER-2 pilots office."

NOTE 3: The ODT-512 is interchangeable with the ODT-5A as determined by the Crew Chief. The ODT-512 is located in the same position as the ODT-5A and can be inter-mixed with ODT-5A's.

NOTE 4: A separate book for the ODT-12 is permissible if an AM&SM Waiver (DFRC 317) has been approved stating so. There still shall be a "place holder" within the aircraft workbook that states that the ODT-12 is located in a separate book.

NOTE 5: An electronic report printout, with equivalent information/content may be substituted for this specified form only if an AM&SM Waiver (DFRC 317) has been approved stating so. However, the specified form shall still be used as a "place holder" within the aircraft workbook, with an annotation of the waiver number and that the electronic report printout contains the information, i.e., "As authorized in AM&SM Waiver # XXX; refer to report XXX, located in (or just aft of) the Seat Report section of this book."

NOTE 6: For any affected aircraft, a copy of each *accepted* waiver that is not used, as a 'space holder' as described in Notes 1, 2, 3 & 5, shall be maintained in the back of the aircraft's workbook. Upon expiration, rescission, or cancellation of an accepted waiver, the affected waiver shall be removed from the aircraft's workbook and destroyed.

Operations Fact Sheet

Reference

DOP-O-006	Fact Sheet Preparation and Update
DFRC 748	Operations Fact Sheet

Single Sided, Standard Weight Paper

Operations Engineering is responsible for maintaining the Operations Fact Sheets. Any configuration change, which affects the flight characteristics or functioning of on-board systems of Aircraft, not documented in the Pilot's Flight Manual or equivalent, shall be documented on the Operations Fact Sheet for the affected aircraft, which provides information to flight and maintenance crews.

The intent of the Operations Fact Sheet is to document those modifications that influence pilot or ground crew operation of the aircraft or any of its subsystems. The Operations Fact Sheet is an amendment to the Pilot's Flight Manual.

The Operations Fact Sheet describes the configurations change and the inter-relationship to existing systems. It also provides for instructions regarding operational procedures and provides information on predicted limitations, expected reactions, estimated changes in performance and other pertinent data. The Operations Engineer is responsible for the preparation of Operations Fact Sheets that are as complete in detail and as accurate in content as is possible.

Even though it is not applicable to all DFRC aircraft all DFRC aircraft workbooks shall contain an Operations Fact Sheet. This requirement is levied so that there is no possibility for omission of a valid Operations Fact Sheet.

For those aircraft where the Fact Sheet is not applicable it shall be stated upon the Operations Fact Sheet, “This Aircraft Has No Deviations From Its Published Flight Manual”.

The Operations Fact Sheet shall be maintained in the affected aircraft workbook for pilot and crew review.

ODT-4D – Aircraft Flight Status and Servicing Record

Single Sided, Standard Weight Paper

The Aircraft Flight Status and Servicing Record provides a record of flight number, flight crew, operating times, servicing, inspection status (due and completed), and pilot acceptance for flight. Space is provided for a total of four flights. If more than one sheet is used, the added sheets shall be stapled to the first sheet, and total times for the day shall be entered on the first sheet.

The Flight Status and Servicing Record is to be maintained by the Aircraft crew and signed by the pilot prior to and after each flight.

At the conclusion of each day’s flight activity, the completed Flight Status and Servicing Record(s) shall be removed from the Workbook for required processing and filing.

Aircraft servicing is recorded within the Servicing section of the form. There are fourteen servicing columns for up to four servicings.

ODT-14 – Flight Data Document

Single Sided, Standard Weight Paper

This form is used for information only. The form is updated by the crew chief or designee after each light or engine run. After each flying day it is sent to the MOO to compile pilot and aircraft times. It is then sent to the Pilot's Office for filing.

ODT-5A – Aircraft Maintenance Discrepancy/Work Record

Double Sided, Standard Weight Paper

This form is a numerically indexed record that provides a means for listing pilot and maintenance discrepancies and any work to be accomplished per Technical Orders, Work Orders, etc.

The ODT-5A shall also be used to document aircraft or research system preflight, post flight, and thru flights inclusive of mechanical, avionic, instrumentation, and experiment.

Use of this form is not required for the removal and installation of obvious exterior access doors, panels, and similar items. A thorough inspection must be completed, however, prior to close out of these areas.

NOTE: Access panels are not required to be tagged with parts control tags while removed.

Whenever an item needs to be loosened or removed to accomplish correction of the noted condition it must be documented within the ODT-5A, and/or ODT-12A.

The ODT-5A has incorporated into it the necessary documentation blocks to record a single removal and replacement action.

Each ODT-12A page is preferred to be associated with only one ODT-5A item (or "squawk"). If more than one removal is required the option of documenting the first removal on the ODT-5A is discretionary, however

1. If used as a unique record for each ODT-5/512 Item, the initiated ODT-12A page number shall be documented within the discrepancy's "Removals Continued On ODT-12 Pg #" section (Block 14) located at the bottom of each discrepancy *and* a line shall be drawn across the "P/N Out", and "S/N Out",

(Blocks 12 & 13) of the ODT-5A located just above the “Removals Continued On …” section located in the left lower portion of each discrepancy section.

2. If used as a non-specific record (sheet) for any ODT-5/512 Item then each ODT-5/512 Page number and Item number shall be recorded within the ODT-12 “Comments” block.

Completing the signature, date, and inspection stamp blocks located at the end of each ODT-5A and ODT-512A corrective action section, signifies that that the discrepancy has been fully and satisfactorily dispositioned and/or resolved according to proper processes, procedures, and maintenance practices. The inspection block, when stamped, attests to the fact that all associated documentation associated with the form is accurate and complete.

In the event that that the discrepancy requires the removal and/or replacement of items, those items will be annotated within the ODT-5A and/or ODT-12A forms. The ODT-5A corrective action shall not be signed off until all of the removals have been satisfactorily reinstalled.

In the event that any reinstalled items require an operational check and it is not feasible to perform one at this time, and the discrepancy has been satisfactorily resolved and is not dependant on the operational check, then the ODT-5A may be signed off leaving the ODT-12A item open until successful completion of the ops check.

In the event that the operational check fails then an ODT-5A discrepancy shall be initiated, a statement shall be entered into the ‘Comment’ section of the failed ops checked removal item stating “Ops check failed, refer to ODT-5A Page # __, Item # __ “. Draw a red “X” across the combined blocks of the Operation Check’s Date, Mech, and Insp blocks.

In the event that the written discrepancy is to comply with a Work Order, and in accomplishing the Work Order items need to be removed for access, those removed items will be annotated within the ODT-5A and/or ODT-12A forms. The ODT-5A can be signed off as complete once the Work Order has been accomplished and any removal on the ODT-5A has been fully reconciled. The associated removals for access documented within the ODT-12A do not have to be fully reinstalled and bought off prior to close out of the ODT-5A once the corrective action meets the resolution of the discrepancy.

ODT-512A – Aircraft Maintenance Work Record

Double Sided, Standard Weight Paper

The ODT-512A is a numerically indexed record that provides a means for listing pilot and maintenance discrepancies and any work to be accomplished per Technical Orders, Work Orders, etc. The ODT-512A is also to be used to track

compliance with aircraft or research system pre-flights, pos-flights, thru-flights that includes avionics and instrumentation.

The ODT-512A shall be retained in the Workbook until all items have been corrected or properly dispositioned and until such time as the next flight has been completed.

ODT-512A shall be used to record and verify removal, installation, and functional operation of all items and parts. The Aircraft crew chief/technician in charge, or in their absence, a designee, shall have authority to approve removals. Entries shall be legible and complete. Use of this form is not required for the removal and installation of obvious exterior access doors, panels, and similar items. A thorough inspection must be completed, however, prior to close out of these areas.

NOTE: Access panels are not required to be tagged with parts control tags while removed.

ODT-12A – Aircraft Maintenance Work Record: Removals

Double Sided, Standard Weight Paper

Use of this form is not required for the removal and installation of obvious exterior access doors, panels, and similar items. A thorough inspection must be completed, however, prior to close out of these areas.

NOTE: Access panels are not required to be tagged with parts control tags while removed.

Each ODT-12A entry

1. If the ODT-12 is utilized as a unique record associated with only one individual ODT-5/512 item (as preferred), then its traceability from the ODT-5/512, or its continuation to an additional ODT-12, shall be recorded in the appropriate boxes within the specific form. There is no need to reiterate the ODT-5/512 Page number and Item number within the “Comments” section of the ODT-12.
2. If utilized as a ‘catch all’ for any ODT-5/512 removals, and is not intended to be tied to a specific ODT-5/512 Item, then a reference shall be annotated with the originating ODT-5/512 Page number and Item number within the “Comments” section of the ODT-12.

This is critical to ensure that there is a clear, concise, and direct method of associating discrepancies with their resultant actions.

The ODT-12A form is a numerically indexed record that provides a means for documenting parts loosened, removed, replaced, or installed. The numbering will be of a serial type, i.e., 1, 2, 3, etc. with no duplicated page numbers.

An ODT-5A or ODT-512A entry is required prior to initiating an ODT-12A. If there is only one removal associated with a “write up” it can, and should, be taken care of on the ODT-5A/512A. In the event that there are two or more associated removals with a write up, then at the discretion of the individual writing the removals, they can either write the first removal on the ODT-5A and the remaining ones on the ODT12A, making sure to reference the ODT-12A page number on the ODT-5A; or, reference the ODT-12A page number on the ODT-5A item and proceed directly to the ODT-12A and document all of the removals there.

When part numbers are in disagreement, a reference to the approving document or Operations Engineering approval is given to approve substitution of the part.

In the event that the ODT-12A becomes full and there are further removals still required, then a new ODT-12A form is initiated. The new (continuing) ODT-12A page is identified on the reverse, bottom, left side of the full ODT-12A, in its specified block, by entering the new (continuing) ODT-12A page number.

The newly generated ODT-12A form shall document its preceding (associated) record by documenting its associated page number within the ‘page’ portion and applying a dash in the ‘Item’ portion of the “Items from” section; located in the upper, middle portion of the form, and placing a ‘dash’ within this area.

ODT-7 – Aircraft and Engine Operating Time Record

Double Sided, Standard Weight Paper

This form is a running record of engine operating time and aircraft flight time.

ODT-2A – Aircraft Delayed Discrepancy Record

Double Sided, Heavy Weight Paper

The Delayed Discrepancy Record is a numerically indexed record for each Aircraft, equipment, AGE, etc., for which a workbook is utilized.

The Delayed Discrepancy Record is used for transfer of items originally entered on the Aircraft Maintenance Work Record and which, for valid reasons (lack of parts, need for major assembly removal, or as defined by the Operations Engineer, etc.) cannot be repaired, reworked, or otherwise properly processed prior to the next scheduled flight. Recommendations for transfer shall be originated by, or indicate concurrence of, Operations Engineering. Items not

within the definition of "valid reasons" shall not be transferred to the Delayed Discrepancy Record but shall be retained on the Aircraft Maintenance Work Record and properly dispositioned as otherwise defined.

The Delayed Discrepancy Record shall not be used as a convenient means for "clearing" those entries which should be properly retained on the ODT-5/512 and dispositioned by adequate corrective action. Operations Engineering shall carefully screen transfers to the Delayed Discrepancy Record prior to approval.

All transfers to the Delayed Discrepancy Record must

1. Have originally been entered in the Aircraft Maintenance Work Record.
2. Indicate Operations Engineering recommendation or concurrence.
3. Be transferred by authorized personnel.
4. Be transferred **EXACTLY** as originally written with reference to the ODT-5/512 page number *and* status symbol.
5. Detail the rationale for the delay.

To assure that concerned supervisory personnel are cognizant of the number and types of transfers, one of the following listed personnel shall approve the physical transfer of entries from the ODT-5/512 to the Delayed Discrepancies:

1. Chief, Aircraft Support Branch.
2. Deputy Chief, Aircraft Support Branch.
3. Chief, Avionics Branch
4. Deputy Chief, Avionics Branch
5. Chief of Maintenance

Delayed Discrepancy Record entries prior to being worked-off shall be transferred back to the Aircraft Maintenance Work Record, ODT-5A or ODT-512A, as appropriate.

To prevent accumulation of old discrepancies in the Delayed Discrepancy Record, Operations Engineering and the Crew Chief shall reevaluate records during each periodic inspection or major modification and a determination made as to whether items can be cleared or if they must be retained in the Delayed Discrepancy Record.

The Delayed Discrepancy Record is a progressive record, which is not related to a particular flight or event. It shall be retained in the Workbook until all spaces have been utilized and correctly completed, then removed for processing and filing.

ODT-6 –

Calendar and Hourly Inspection Record

Double Sided, Heavy Weight Paper

The Calendar and Hourly Inspection Record is a numerically indexed form that provides a means for listing calendar, hourly, and special inspection items peculiar to an aircraft or equipment.

For accuracy and convenience of reference, all entries on this form should be made, whenever possible, in the same manner and order as the listings when applicable inspections are performed.

The Calendar and Hourly Inspection Record is retained in the Workbook, and the various spaces and columns are completed and updated as applicable inspections are performed. When all spaces are utilized and required entries are carried forward to a new page, or if the form is recapped and reentered on a new page, the completed page will be removed for filing.

ODT-16 – Accessory and Time Compliance Log

Double Sided, Heavy Weight Paper

The Accessory and Time Compliance Log is a numerically indexed form that provides a means for maintaining a current record of accessories or other items of equipment, including power plants, which require replacement at a specific number of flight hours, operating hours or calendar period, when specified in applicable Technical Orders, directives, or other approved sources of information.

For accuracy and convenience of reference, all entries on this form should be made, whenever possible, in the same manner as the listings in applicable Technical Orders or other directives.

The Accessory and Time Compliance Log is retained in the workbook, and the various spaces and columns are completed and updated as applicable operations are performed. When all spaces are utilized or if the form is recapped and reentered on a new page, the closed-out page will be removed and filed.

Seat Report

Single Sided, Standard Weight Paper

This is a computer printout of time compliance status for egress related systems. It is updated whenever a change in configuration or dates on items installed has

been changed by the Maintenance Operations Office, and constitutes the official record.

AM&SM Waiver (DFRC 317) – (Located through DALES “Turnstile”)

Single Sided, Standard Weight Paper

This is a computer printout of AM&SM Waivers. It must be kept in the back of the Workbook *if* there are any deviations authorized from the AM&SM.

ODT-8 – Work Order / Technical Log

Single Sided, Standard Weight Paper

The Work Order / Technical Log is a numerically indexed form that provides a means for documenting all Work Orders and Technical Orders that are applicable to a specific aircraft.

Whenever a Work Order or Technical Order is applicable to the aircraft it shall be written in the log and dated. When the work is to be carried out the item is to be written into the ODT-5 or ODT-512. The ODT-8 shall reference the ODT page and item number that it is transcribed to. When the work is completed the ODT-8 shall reflect the date that the work was complied on.

In the event that a Technical Order is rescinded prior to accomplishment, then the original Technical Order will be written into the ODT-5 or ODT-512 discrepancy section and the rescinding document, and date of the rescission, reflected in the Corrective Action section. The ODT-8 shall reflect the date that the ODT was bought off.

8-3.2 Optional Forms and Records

The following forms are for use at the discretion of the aircraft crew chief and Operations Engineer with the concurrence of the Chief of the Aircraft Maintenance Branch.

ODT-3	Inter-flight Worksheet
ODT-9	Inspection Work Card Carry-Over
ODT-15	Inspection Work Card
ODT-24	Aircraft Fuel and Flight Time Log
ODT-27	Load Status Document (Derived from AFTO Form 781C Avionics Configuration and Loads Status Document)
ODT-28	ER-2S Weight & Balance (Derived from LM Aero Weight and Balance Spread Sheet)

ODM 26 Technical Directive Record

ODT-3 – Inter-flight Worksheet

Single Sided, Standard Weight Paper

The form provides a ready reference of all pertinent Technical Orders, Service Bulletins, or Services provided while at other locations.

ODT-9 – Inspection Work Card Carry-Over

Double Sided, Heavy Weight Paper

The form (Card) provides documentation of individual Buy-Off items that were not completed during a phase inspection. This allows the Inspection Work Card to be closed out while documenting outstanding items yet to be performed.

ODT-15 – Inspection Work Card

Double Sided, Heavy Weight Paper

The form (Card) provides documentation of individual Buy-Off items for phase inspections.

ODT-24 – Aircraft Fuel and Flight Time Log

Single Sided, Standard Weight Paper

This form is an optional form and is used for the convenience of the Crew Chief to track daily fuel used and flight time accumulated. This information is beneficial for the end of the month Fuel and Flight Time Report.

ODT-27 – Load Status Document

Single Sided, Standard Weight Paper

The form documents data uploads to the aircraft, as in the case of ER-2s, the Load Status Document reflects the various experimenters' uploads.

ODT-28 – ER-2S Weight & Balance

Single Sided, Standard Weight Paper

This form is specific to the ER-2S aircraft and is recalculated for every experiment or aircraft reconfiguration.

ODM-26 – Technical Directive Record

Single Sided, Standard Weight Paper

The form provides a ready reference of all pertinent Technical Orders, Service Bulletins, similar work authorizations and directives that have been received at the Aircraft, or at equipment that utilizes the Workbook.

All Technical Orders for **Research Aircraft** will require entry in the ODM-26 as received.

Upon completion of any compliance with a Technical Order or other reference document, applicable "completion" entries shall be properly annotated in the ODM-26.

8-3.3 Aircraft Workbook Form Removal and Retention

Completed forms that have signed off discrepancies are removed from the Workbook (or placed in a different section of the Workbook) so that the flight crew can readily assess the maintenance status of the aircraft without having to thumb through several pages of forms.

Removal of forms ODT-4, ODT-5/512 shall not occur prior to the flight(s) covered by those forms, to permit pilot review of workbook before accepting the aircraft. Upon completion of flight the forms shall be removed from the workbook and delivered to the Quality Assurance Office for review prior to historical filing.

With the exception of the ODT-4 and ODT-5/512, all other forms, after completion, shall be removed from the workbook and delivered to the Quality Assurance Office for review prior to historical filing.

If during the review of the forms a discrepancy is found the form will be redirected back to the appropriate branch chief so that they are made aware of the nonconformance and so that they can obtain the appropriate correction by the appropriate individual. After correction the form shall be expeditiously returned back to the Quality Assurance Office for re-review.

After successful review the forms will be sent to the Maintenance Operation Office for filing.

Files shall be maintained for the duration indicated Table 8-1.

Table 8-1
Record Retention

Retain Permanently	Retain for 6 Months
ODT-2	ODT-4
ODT-6	ODT-14
ODT-7	ODT-24
ODT-5	ODT-16
ODT-512	
ODT-12	
ODT-8	

8-4.0 CLEARING/DOWNGRADING OF A RED 'X'

NOTE: A Red 'X' is mandatory for any lost or misplaced item on an aircraft, except if an item is misplaced in the passenger cabin of a cabin class aircraft (DC-8, KingAir, etc.), in which case a Red "Diagonal" symbol shall be entered in the aircraft's appropriate documentation (ODT-5/512/NALCOMIS/Log Book).

8-4.1 Clearing a Red 'X'

If the condition that constituted the Red X has been remedied, then documenting the corrective action in the appropriate documentation (ODT-5/512/NALCOMIS/Log Book) and having an inspector (DI or QAS) buy off the fixed discrepancy and placing their initial over the symbol, clears the discrepancy.

8-4.2 Downgrading a Red 'X' that has had partial corrective action

If their has been partial corrective action, and that action has resolved the safety of flight issue, then the maintenance technician will annotate what has been done in the Corrective Action section of the appropriate documentation (ODT-5/512/NALCOMIS/Log Book) and the Operations Engineer shall annotate something to the effect: "Partial corrective action accomplished resulting in symbol downgrade from Red X to a Red Diagonal, OK for Flight. Refer to new discrepancy, page xxx, item xxx.

A new discrepancy will be written, reflecting the resultant discrepancy and assigned a Red “dash” or Red “Diagonal” as appropriate. The original discrepancy will be referenced by page number and item number.

Once this new discrepancy is written the original discrepancy *may* be signed off and stamped, with the inspectors initial over the original Red X; thus clearing the original Red X after documenting the resultant remaining discrepancy after the partial corrective action was taken.

8-4.3 Temporary Downgrade of an Uncorrected/Unworked Red ‘X’

If there has been no corrective action, full or partial, then the Red X cannot be cleared or permanently downgraded. However, it may be necessary to fly the aircraft in order to get it to a repair facility or for some other reason. This can only be authorized for a limited and/or restrictive amount of flight as follows:

The Director of Flight Operations *or* Deputy Director of Flight Operations shall approve downgrading of an uncorrected RED X. During their absence, the approval authority shall be by their designee, the *Designated* Director for Flight Operations.

Once the downgrade has been officially authorized and the project pilot is satisfied that there are no unresolved safety concerns, then the downgrade will be recorded within the aircraft Work Book as follows:

A. Local Operations

The authorizing official (Director of Flight Operations *or* Deputy Director of Flight Operations) will make three entries into the aircraft Work Book:

1. In the “Corrective Action” block of the grounding “Discrepancy”, annotate authorization of downgrade by basically stating: “RED X changed to RED Diagonal” for a specified number of flights and annotate any restrictions to the operation or performance of the aircraft. Then date and sign above the entry.
2. Create a new “Discrepancy”: Annotate: “Aircraft status reverts to RED X after (specified) flights.”
3. Update the Aircraft Status (ODT-4): Enter the appropriate symbol into the “Status Data” block.

B. Cross Country Operations

The pilot-in-command will notify the authorizing official of the situation by phone. If the authorizing official concurs with the exceptional release, he/she will direct the pilot to annotate the Aircraft Workbook as discussed under “Local Operations”, above.

C. Deployment Operations

The Crew Chiefs will have a current listing (that is required to be updated and validated prior to each deployment) of the above-authorized individuals with their twenty-four hour contact information. Dependant on the operational area’s amenities the aircraft Work Book will be documented as specified below:

The Crew Chief will initiate and facilitate communications between the appropriate individuals on the deployment and the Operations Engineer and individual authorized to down grade the RED X on the phone.

1. If the Deployment location has Fax access:

   A faxed copy of the authorization for the downgrade will be required. The Crew Chief will annotate in the aircraft Work Book as discussed under “Local Operations” as if they were the authorizing official except they will reference the fax in the “Corrective Action” block. The fax will then be placed in the front of the aircraft Work Book.

2. If the Deployment area does not have Fax access:

   The Crew Chief will make the required annotations in the aircraft Work Book as required per “Local Operations” above, however he will add in the “Corrective Action” block a statement that basically states “as directed by (the authorizing official) via (communication device)”.

   In the extremely unlikely event that there is no communications available at all, i.e., no phones, radios, etc. The downgrading of the RED X will then be authorized via mutual concurrence of the Crew Chief, and Project Pilot that there are no un-addressed safety issues and that they deem it safe to operate. The Project Pilot will annotate the aircraft Work Book as discussed under “Local Operations” above, as if he were the authorizing official.

8-4.4 Unrecovered Tools/Items: Symbol Assignment & Document Process

NOTE: A Red 'X' is mandatory for any lost or misplaced item on an aircraft, with the exception of item(s) misplaced in the passenger cabin of a cabin class aircraft (DC-8, KingAir, etc.), in which case a Red "Diagonal" symbol shall be entered in the aircraft's appropriate documentation (ODT-5/512/NALCOMIS/Log Book).

In the event that a lost item has not been recovered, a Red 'X' condition will be dispositioned as follows:

In the corrective action portion of the aircraft's appropriate documentation (ODT-5/512/NALCOMIS/Log Book), it will be annotated that the tool control process was followed and documented, to no avail. Dependant on aircraft classification the following processes will be adhered to:

A. Research and Development Aircraft

Dryden Aircraft Support Branch Chief will acknowledge completion of exhaustive effort by signing within the corrective action portion of the aircraft's appropriate documentation (ODT-5/512/NALCOMIS/Log Book), and follow the "Clearing/Downgrading of a Red 'X'". Once the Red 'X' is dispositioned, initiate a new discrepancy carrying a Red "/" (Diagonal) symbol, stating that the item was not recovered after performing the recovery process procedure. Prior to, or immediately after the first flight since the item initially became lost, the ODT-5/512 discrepancy shall be transferred to the ODT-2 records in accordance with this document, in order to permanently document the items disappearance until such time as the item becomes found.

B. Airborne Science Platform Aircraft

The contractor Operations Maintenance Manager will acknowledge completion of exhaustive effort by signing within the corrective action portion of the aircraft's appropriate documentation (ODT-5/512/NALCOMIS/Log Book), and follow the "Clearing/Downgrading of a Red 'X'". Once the Red 'X' is dispositioned, initiate a new discrepancy carrying a Red "/"(Diagonal) symbol, stating that the item was not recovered after performing the recovery process procedure. Prior to, or immediately after the first flight since the item initially became lost, the ODT-5/512 discrepancy shall be transferred to the ODT-2

records in accordance with this document, in order to permanently document the items disappearance until such time as the item becomes found.

C. Mission Management Aircraft

The contractor Site Manager will acknowledge completion of exhaustive effort by signing within the corrective action portion of the aircraft's appropriate documentation (ODT-5/512/NALCOMIS/Log Book), and follow the "Clearing/Downgrading of a Red 'X'". Once the Red 'X' is dispositioned, initiate a new discrepancy carrying a Red "/"(Diagonal) symbol, stating that the item was not recovered after performing the recovery process procedure. Prior to, or immediately after the first flight since the item initially became lost, the ODT-5/512 discrepancy shall be transferred to the ODT-2 records in accordance with this document, in order to permanently document the items disappearance until such time as the item becomes found.

D. Program Support Aircraft

The contractor Site Manager will acknowledge completion of exhaustive effort by signing within the corrective action portion of the aircraft's appropriate documentation (ODT-5/512/NALCOMIS/Log Book), and follow the "Clearing/Downgrading of a Red 'X'". Once the Red 'X' is dispositioned, initiate a new discrepancy carrying a Red "/"(Diagonal) symbol, stating that the item was not recovered after performing the recovery process procedure. Prior to, or immediately after the first flight since the item initially became lost, the ODT-5/512 discrepancy shall be transferred to the ODT-2 records in accordance with this document, in order to permanently document the items disappearance until such time as the item becomes found.

E. If Classification of Aircraft is not managed as outlined above

The Red 'X' disposition process shall be followed as specified within the AM&SM, "Clearing/Downgrading of a Red 'X'". Once the Red 'X' is dispositioned, the appropriate individual initiates a new discrepancy. It is the intent of this process that the minimum level of concurrence and disposition of an un-recovered item within the 'Corrective Action' portion of the aircraft's appropriate documentation (ODT-5/512/NALCOMIS/Log Book), be at a minimum that of a Dryden Branch Chief equivalent. If it is not clear

and/or there is any confusion or ambiguity then it is the Crew Chief, Designated Inspector, or Dryden oversight representatives responsibility to contact the Chief of Maintenance for the proper clarification on disposition of the Red 'X' to a Red'/' (Diagonal). A DFRC 317 Waiver may be necessary to give documented authority for the disposition process for that individual project. The Waiver process is described within the AM&SM Forms documentation, "DFRC 317 Waiver".

8-5.0 TRANSPORTING OF AIRCRAFT WORKBOOK FORMS

The following will be incorporated to ensure that Workbook data/information is always available on the ground, if needed.

A. Aircraft Workbooks will not be carried on the aircraft during local flight whether the local flights are at EAFB or at a deployment site.

B. Aircraft Workbooks can be carried on transit flights; however, appropriate ODT forms must be copied and remain on the ground when the aircraft departs.

C. When the aircraft transits from one deployment are to another, appropriate ODT forms must be copied and faxed back to DFRC prior to departure.

D. Blank ODT forms should be carried on all flights in case the aircraft must divert to an alternate landing site.

E. Airborne Science contractor will develop a procedure to define which Workbook forms are applicable and how items A through D are implemented.

8-6.0 DOCUMENTATION UTILIZING THE NASA AVIATION LOGISTICS COMMAND MANAGEMENT INFORMATION SYSTEM (NALCOMIS)

References

DHB-O-003 Maintenance Action Form (MAF) Handbook

NALCOMIS End User's Manual

An automated baseline shall be established, using NALCOMIS, for each Aircraft, and certain items of Aerospace Ground Equipment (AGE), ejection seats, engines, etc., as determined by the Aircraft Maintenance Modification Branch. All actions taken regarding aircraft, engines, AGE, ejection seats, engines, etc., will be documented in NALCOMIS. These include but are not limited to

1. Aircraft Delayed Discrepancy Record
2. Flight Preparedness Summary
3. Aircraft Maintenance Discrepancy/Work Record.
4. Calendar and Hourly Inspection Record
5. Aircraft and Engine Operating Time Record
6. Work Orders (not for issuing)
7. Technical Order/Technical Directives
8. Part Removal and Installation Record
9. Flight Data Document
10. Life Limited Components
11. Aircraft Fuel and Flight Time
12. Egress Items Due Time Change

All documentation will be completed using a computer linked to the NALCOMIS server. The following forms will be computer generated as needed.

NASA Form 1671 Maintenance Action Form (MAF)
NASA Form 1672 Aircrew Flight Form (hard copy for info only)
NASA Form 1673 Flight Preparedness Summary Form

All actions will have two computer-generated numbers that are sequential in order of Julian Date - Serial Number. The two numbers are

1. Maintenance Control Number (MCN)
2. Job Control Number (JCN)

Whenever an action is taken for other than aircraft, it is necessary to reference other (OTR) (i.e., assets, aerospace ground equipment, engines, aircraft seats) for other than aircraft.

Maintenance Action Form Documentation (MAF) – NASA Form 1671 – MAINTENANCE ACTION FORM

This form is a computer generated numerical record that provides a means for listing pilot and maintenance discrepancies and any work to be accomplished per Technical Orders, Work Orders, etc. The MAF will also to be used to track compliance with aircraft or research system pre-flights, through-flights, and post-flights, which include avionics and instrumentation.

NOTE: For detailed instructions, the NALCOMIS End User's Manual, located in Maintenance Operations Office, shall be utilized.

DISCREPANCIES

Whenever work is to be accomplished or a discrepancy is discovered, a Maintenance Action will be generated giving a concise but adequate statement describing the work to be accomplished along with the appropriate Up/Down status.

Up status (**arrow up**) designates a red diagonal or red dash, and down status (**arrow down**) designates a red X.

All discrepancy items must have a maintenance action generated, even if a discrepancy is immediately corrected. Also note that physical discrepancies, which were included in the Discrepancy Record (ODT-5/512), must be included in the maintenance action. Maintenance action forms must provide complete documentation of discrepancies and corrective actions. Info write-ups will use arrow up status for MAFs and start the discrepancy block with the word 'INFO'.

DELAYED DISCREPANCY

These discrepancies will be documented in the maintenance action discrepancy block. The delayed discrepancy will be placed in a delayed discrepancy status using the code M5.

The Delayed Discrepancy Record is used for items, which, for valid reasons (lack of parts, need for major assembly removal, or as defined by the Operations Engineer, etc.) cannot be repaired, reworked, or otherwise properly processed prior to the next scheduled flight. Recommendations for a delayed discrepancy status shall be originated by, or indicate concurrence of, Operations Engineering. Items not within the definition of "valid reasons" shall not be placed in a Delayed Discrepancy status but shall be retained on the Maintenance Action Form in a job status code of "M3-AWM" as delayed. Operations Engineering shall carefully screen changes in the status code from awaiting maintenance to a “Delayed Discrepancy” prior to approval.

All transfers to the Delayed Discrepancy status will have a comment placed in the discrepancy block of the MAF. It will state, "placed in a delayed discrepancy status per ___name____ and __date__."

To prevent accumulation of old discrepancies in a Delayed Discrepancy Status, Operations Engineering and/or the Crew Chief shall reevaluate MAFs during each periodic inspection or modification. A determination made as to whether items can be cleared or if they must be retained in a Delayed Discrepancy Status.

Appendix A
Flyable Storage Checklist

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A-2.0 REQUIRED CALENDAR OPERATIONS DURING FLYABLE STORAGE 145

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A-4.0 RETURNING STORED AIRCRAFT TO FLIGHT STATUS 146

A-1.0 PARKING AIRCRAFT LONGER THAN 30 DAYS (FLYABLE STORAGE)

CAUTION

Lubricating oil is moderately toxic to skin, eyes, and respiratory tract. Goggles and gloves are required. Good general ventilation is normally adequate. Failure to observe this warning may result in injury to personnel.

A-1.1 Flyable Storage; Preliminary System Check and Servicing

To begin flyable storage operations, the following conditions are performed in accordance with the applicable Technical Order or Job Guide for the aircraft to be placed into storage. Lines that are not applicable will be marked as such ("N/A").

		TECH	INSP/DI
a.	Aircraft positioned on parking site.	_____	_____
b.	Nose radome closed and secured.	_____	_____
c.	Leading edge and trailing edge flaps fully retracted.	_____	_____
d.	All stores downloaded.	_____	_____
e.	Aircraft safe for maintenance.	_____	_____
f.	All pneumatic storage containers discharged to 50 to 60 psig.	_____	_____
g.	Landing gear tires serviced.	_____	_____
h.	Landing gear struts serviced.	_____	_____
i.	Hydraulic systems serviced.	_____	_____
j.	Oxygen system serviced.	_____	_____
k.	Fuel system fully serviced.	_____	_____
l.	Moisture drained from each fuel tank.	_____	_____
m.	Engine oil system fully serviced.	_____	_____
n.	Aircraft battery removed.	_____	_____
o.	Flight control batteries removed.	_____	_____

p.	Inertial navigation system battery removed.	_____	_____
q.	Hydrazine fuel tank removed.	_____	_____
r.	Engine dry motoring run accomplished (unless item A-2.0D is accomplished).	_____	_____

A-1.2 Flyable Storage; Protective Measures

NOTE: Accomplish (*****) items if aircraft is to be stored outside.

		TECH	INSP/DI
a.	Install chocks forward and aft of each main landing gear wheel.	_____	_____
b.	Connect aircraft ground cable from earth ground to aircraft.	_____	_____
c.	Install main landing gear ground lock pins, clean exposed areas of main landing gear door actuator rods and oleo struts with lint-free cloth and lubricating oil. *Wrap main gear oleo struts and door actuator rods with barrier material and secure with tape.	_____	_____
d.	Install nose landing gear ground lock pin, clean exposed areas of nose landing gear door actuator rods, nose gear steering and oleo struts with lint-free cloth and lubricating oil. *Wrap nose landing gear oleo strut and door actuator rods with barrier material and secure with tape.	_____	_____
e.	Arresting hook up and locked with ground lock pin installed.	_____	_____
f.	Ensure canopy jettison handle is fully seated.	_____	_____
g.	Install escape system safety pin in canopy jettison handle.	_____	_____
h.	Ensure main power switch is set to OFF.	_____	_____
i.	Ensure throttle is in cutoff position.	_____	_____

j.	Ensure that all seat ejection handles are in the CONTROL LOCKED position and pin installed.	_____	_____
k.	Ensure emergency oxygen manual pull ring has not been actuated.	_____	_____
l.	Install nose air data probe cover and secure with tape.	_____	_____
m.	Install angle-of-attack transmitter covers and secure with tape.	_____	_____
n.	Install side air data probe cover and secure with tape.	_____	_____
o.	Install engine inlet cover and secure with tape.	_____	_____
p.	Cover all static pressure ports with barrier material and secure with tape.	_____	_____
q.	Cover EPU exhaust duct opening with barrier material and secure with tape.	_____	_____
r.	Cover air duct scoop openings with barrier material and secure with tape.	_____	_____
s.	Apply tape around fire doors.	_____	_____
t.	Cover nacelle vent openings with barrier material and secure with tape.	_____	_____
u.	Install covers over static dischargers and secure with tape.	_____	_____
v.	*****Cut to fit and install Edgpak on rudder, ventral fins, flaperons, elevons, ailerons, and fixed trailing edges and secure with tape.	_____	_____
w.	*****Cut to fit and install Edgpak on vertical stabilizer leading edge and horizontal stabilizer leading and trailing edges and secure with tape.	_____	_____
x.	Install engine exhaust cover and secure with tape.	_____	_____
y.	Canopy closed and polished.	_____	_____

z.	Apply tape over access panel seams on aircraft upper surfaces.	_____	_____
aa.	*****Cover aircraft antennas with barrier material and secure with tape.	_____	_____
bb.	*****Cover nose radome with barrier material and secure with tape.	_____	_____
cc.	*****Cover wing leading edge flaps with barrier material and secure with tape.	_____	_____
dd.	*****Cover wing tips and launchers with barrier material and secure with tape.	_____	_____
ee.	*****Cover vertical stabilizer tip with barrier material and secure with tape.	_____	_____
ff.	*****Seal gun port opening with barrier material and secure with tape.	_____	_____
gg.	*****Wrap main and nose landing gear wheels with barrier material and secure with tape.	_____	_____
hh.	Apply tape around in-flight refueling receptacle door.	_____	_____
ii.	Cover canopy with two layers of barrier material. Apply each layer individually, pull tight, and attach by taping to the metal surface of the canopy frame	_____	_____

A-2.0 REQUIRED CALENDAR OPERATIONS DURING FLYABLE STORAGE

During flyable storage, the following calendar operations will be accomplished

A. Jack and turn main and nose gear wheels every 15 days. If this is not complied with, tires & wheels must be changed prior to flight.

B. Drain water from fuel tanks every 30 days.

C. Operations established by the Chief of Maintenance.

D. If it is required that engines be operational, this will be documented in the ODT-5 or NASA Form 1671 Maintenance Action Form (NALCOMIS).

A-3.0 REQUIRED MAINTENANCE INSPECTION DURING FLYABLE STORAGE

During flyable storage, the parked aircraft does not require any maintenance inspection operations except as established by the Chief of Maintenance or his designee.

A-4.0 RETURNING STORED AIRCRAFT TO FLIGHT STATUS

A. Remove all tape and covers installed per Section A-1.2, Items i. through ii.

B. Change wheels and tires if item A-2.0A has not been accomplished.

C. Service aircraft and engine per applicable maintenance manual, Technical Order, or job guide.

D. Document aircraft status in the ODT-5 or NASA form 1671, Maintenance Action Form (NALCOMIS).

E. Perform review of applicable TOs, service bulletins, and perform any outstanding inspection items.

Appendix B
Maintenance Operations Office Functions

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B-1.0 MAINTENANCE OPERATIONS OFFICE ASSOCIATED OPERATIONS

The Dryden Maintenance Operations Office is the interface with the Air Force Flight Test Center (AFFTC) Maintenance Operating Center (MOC) for all Dryden support requirements, including Airborne Science.

The Dryden Maintenance Operations Office is the focal point for aircraft maintenance and material control coordination.

B-1.1 Maintenance and Material Control

Maintenance References

DEI-O-012	Galvonic Cell And Battery Maintenance
DHB-O-003	Maintenance Action Form (MAF) Handbook
DOP-O-004	Engine Maintenance
DOP-O-011	Aircraft Maintenance Operations
DOP-O-019	Aircraft Maintenance Standard Operating Procedure
DOP-O-400	Aerospace Vehicle/Fixture Maintenance
PI-00-E	Aircraft Tire Use and Maintenance

Material Control References

DCP-S-009	Safety & Health Requirements Manual, Chapter 9, Hazard Communication
NPD-4100.1	Supply Support and Material Management Policy
NPR-4100.1D	NASA Materials Inventory Management Manual
NPR-8735.1A	Procedures for Exchanging Parts, Materials, And Safety Problem Data Utilizing the Government-Industry Data Exchange Program (GIDEP) and NASA Advisories

The purpose of the maintenance/material control processes are to formalize the process of tracking the configuration of the baseline aircraft apart from the research modifications that are tracked through the configuration control process. This process is established to provide the aircraft crew chief, maintenance crew, and all program personnel an accurate current status of the basic aircraft and aircraft components.

The Airborne Science aircraft maintenance and material control are controlled through Code Y and contractor processes while Code O

research and support aircraft are maintained by the Maintenance Operations Office (MOO) and include

A. Current flight hour status on the aircraft and required components to be tracked by flight hour.

B. Status of calendar inspections for each aircraft and engine.

C. Fatigue life tracking on required aircraft and engines.

D. Ballistics tracking for all aircraft pyrotechnics and replacement scheduling.

E. Tracking of all incorporated and unincorporated Time Compliance Technical Orders (TCTO)

F. Airframe and Power Plant Changes and bulletins (AFC, PPC, AFB, PPB), and all component change requirements.

G. Tracking of all maintenance items such as aircraft discrepancies, removal/replacement of components, inspection, and ground/in-flight aborts.

H. Provides oversight for maintaining, ordering, and carcass tracking of aircraft spares.

B-2.0 CHEMICAL CRIB

All controlled chemicals will be stored in a Chem Crib. Chemicals will be returned to the Chem Crib prior to the end of each shift.

B-3.0 TOOL CRIB

Tools loaned from the Tool Crib will be on loan for a maximum of seven working days. If the tool is required for a longer period of time, it must be turned in and then re-issued.

B-4.0 AGE

References

PI-02-A	Contractor Use of Discrepancy Reports, KSC Form 2-151
PI-02-B	Contractor Use of Problem Reports, KSC Form 2-151
PI-02-C	Contractor Work Control System Test and Inspection Record Book

B-4.1 Motor Pool

The AGE contractor maintains motor pool vehicles.

B-4.2 Battery Shop

The AGE contractor maintains the lead acid batteries.

B-4.3 Support Equipment

The AGE contractor maintains and provides training for ground support equipment.

Appendix C
Aircraft Workbook Forms Instructions, Guide, & Minimum Requirements

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C-1.0 PURPOSE OF APPENDIX

The Aircraft Maintenance & Safety Manual (AM&SM) is created as a top-level document to establish governing Policies for the maintenance and control of aircraft operated and maintained by Dryden. Aircraft forms are vital for the current and historical record of an aircrafts condition, maintenance, and configuration. This appendix provides the *minimum* requirements, via specific instructions, for filling out the forms that are utilized within an Aircraft Workbook.

NOTE: Refer to Section 8-6.0 for NALCOMIS instructions for aircraft utilizing automated forms and documentation.

C-1.1 Content

The forms specified within this appendix are the only authorized forms for all Dryden aircraft and aircraft experiments, research items, or other subsystems that utilize ODT Forms and/or an aircraft workbook. Any deviation from this appendix shall be granted *only* through an AMSM Waiver (DFRC 317), approved by the Chief of Maintenance or his designee.

C-1.2 Aircraft Workbook Forms Covered, Minimum Content & Form Sequence

The following are the minimum Aircraft Workbook Forms content requirements and Aircraft Workbook form sequence requirements:

1.	DFRC 748	Operations Fact Sheet (See Note 1)
2.	ODT-4D	Aircraft Flight Status & Servicing Record
3.	ODT-14	Flight Data Document (See Note 2)
4.	ODT-5A	Aircraft Maintenance Discrepancy/Work Record
5.	ODT-512A	Aircraft Maintenance Work Record (See Note 3)
6.	ODT-12A	Aircraft Maintenance Work Record: Removals (See Note 4)
7.	ODT-7	Aircraft and Engine Operating Time Record
8.	ODT-2A	Aircraft Delayed Discrepancy Record
9.	ODT-6	Calendar and Hourly Inspection Record (See Note 5)
10.	ODT-16	Accessory and Time Compliance Log (See Note 5)
11.	Seat Report	This is a computer printout of time compliance status for egress related systems. It is updated periodically by the Maintenance Operations

		Office, and constitutes the official record (See Note 5)
12.	DFRC 317 Waiver	This is the official document that authorizes deviation from the AMSM and this document. The Waiver's inclusion in the Aircraft Workbook is mandatory whenever a Waiver is in effect for that specific aircraft. (See Note 6)
13.	ODT-8	Work Order/Technical Log

NOTE 1: Even if there are no changes to an aircraft, there shall still be an Operations Fact Sheet used as a "place holder" stating "This Aircraft Has No Deviations From Its Published Flight Manual".

NOTE 2: If this form is to be kept in an area other than the aircraft workbook, an AMSM Waiver (DFRC 317) must be approved. However, a copy of the form shall still be used as a "place holder" within the aircraft workbook, with an annotation of the waiver number and the location of the form; i.e., "As authorized in AMSM Waiver # XXX; the actual ODT-14 will be maintained in the ER-2 pilots office."

NOTE 3: The ODT-512A is interchangeable with the ODT-5A as determined by the Crew Chief. The ODT-512A is located in the same position as the ODT-5A and can be inter-mixed with ODT-5A's.

NOTE 4: A separate book for the ODT-12A is permissible if an AMSM Waiver (DFRC 317) has been approved stating so. There shall still be a "place holder" within the aircraft workbook that states that the ODT-12A is located in a separate book.

NOTE 5: An electronic report printout, with equivalent information/content may be substituted for this specified form only if an AMSM Waiver (DFRC 317) has been approved stating so. However, the specified form shall still be used as a "place holder" within the aircraft workbook, with an annotation of the waiver number and that the electronic report printout contains the information, i.e., "As authorized in AMSM Waiver # XXX; refer to report XXX, located in (or just aft of) the Seat Report section of this book."

NOTE 6: For any affected aircraft, a copy of each *accepted* waiver that is not used, as a 'space holder' as described in Notes 1, 2, 3 & 5, shall be maintained in the back of the aircraft's workbook. Upon expiration, rescission, or cancellation of an accepted waiver, the affected waiver shall be removed from the aircraft's workbook and destroyed.

DFRC 748 Operations Fact Sheet
(Ref to DOP-O-006 for Process)

Fact Sheet No: - 1 -	Airplane Model: - 2 -	Date: - 3 -	Prepared By: (Type name) - 4 -
Serial No.: - 5 -	Signature: - 6 -		
- 7 -			
Fact Sheet Number:_____ - 8 - _____			

DFRC 748 (08/01)

1. Record the Fact Sheet number.
2. Record the aircraft model, i.e., “F/A-18A”.
3. Record the date that this Fact Sheet is valid on.
4. Record the name of the individual who prepared the Fact Sheet.
5. Record the aircraft’s Tail Number.
6. The individual who prepared the Fact Sheet records their signature here.
7. The body of the Fact Sheet resides here.
8. Record the Fact Sheet Number.

ODT-4D: Aircraft Flight Status & Servicing Record

Flight # - 11 - - 12 -

Date MM DD YY	Crew Chief	Model	Serial Number
- 1 -	- 2 -	- 3 -	- 4 -

Certification of PR, PR/TH, TH, BPO, QT, ICT, WAI, PLI

Flt No	Type	Sys	Accomplished by	Completed Date	Completed Time	Flt No	Type	Sys	Accomplished by	Completed DATE	Completed TIME
- 5 -	- 6 -	- 7 -	- 8 -	/ - 9 - /	- 10 -					/ /	:

Vehicle Release (authorized Signature) : - 13 -

Status Data				Flight Condition Data			
Status Today		Box No.	Pilot Signature Signifies Acceptance Of Exceptional Release *(Enter box no)*	Cond Aft Flt	Pilots Signature *(Enter after each flight)*	Over Temp Encountered	Aux Engine or APU Op
1	5	- 14 -	- 15 -	- 16 -	- 17 -	- 18 -	- 19 -
2	6						

		Aircraft Time	Landings T&G	Landings FS	Landings Total	Operating Time								
						- 32 -	*	*	*	*	*	*	*	*
Previous		- 20 -	- 23 -	- 26 -	- 29 -	- 33 -								
FLI	1	- 21 -	- 24 -	- 27 -	- 30 -	- 34 -								
	2													
Total		- 22 -	- 25 -	- 28 -	- 31 -	- 35 -								
					Cycles	- 36 -								

SERVICING

	Fuel Type: - 37-		Fuel Grade: - 38 -		Oil Type: - 39 -		Hydro Type: - 40 -													
	- 41 -		*		*		*		*		*		*		*		*		*	
	Serv - 42 -	In	Serv *	In	Serv *	In	Serv *	In	Serv *	In	Serv *	In	Serv *	In	Serv *	In	Serv *	In	Serv *	In
1	- 43 -	- 45 -																		
2																				
TOI	- 44 -	- 46 -																		

	- 47 -		*		*		*		*		*		*		*		Servicing Certification
	Serv - 48 -	In	Serv *	In	Serv *	In	Serv *	In	Serv *	In	Serv *	In	Serv *	In	Serv *	In	(sign & Date)
1	- 49 -	- 51 -															- 53 -
TOT	- 50 -	- 52 -															

ODT-4D (12/02)

1.	Record the flight date.
2.	Record the Crew Chief's name.
3.	Record the aircraft model, i.e., "F/A-18A".
4.	Record the aircraft serial (tail) number.
	Certification of Pre-Flight (PR), Combined Pre-Flight--Thru-Flight (PR/TH), Thru-Flight (TH), Basic Post Flight (BPO), Quick Turn (QT), Integrated Combat Turn (ICT), Walk Around Inspection (WAI), AND Pre-Launch Inspection (PLI)
5.	Record the Flight Number.
6.	Record the abbreviation of the type inspection. (See Note 1)
7.	Record the System Number that is affected (if applicable).

8.	Record, by signature, the person who accomplishes or supervises the PR, combined PR/BPO, combined PR/TH, QT, ICT, WAI, or PLI.
9.	Record local date accomplished.
10.	Record local time completed, MAJCOMs have the option of using Zulu time. (See Note 2)
11.	Record flight number. If flight number consists of two parts, record first part.
12.	Record flight number. If flight number consists of two parts, record second part.
13.	The Appropriate person signs to acknowledge that the aircraft is configured, forms have been reviewed, and that the aircraft is safe and ready for flight. (See Note 3)

STATUS TODAY - At initiation of this form, bring forward the last status symbol of the previous form to block 14 of the new form. The status symbol recorded in these columns always represents the most serious condition. When status changes occur, the maintenance technician responsible for the change will use the next open box to record the applicable symbol.

Symbol entries recorded in these columns will never be erased, initialed over, or changed even if entered in error. Explain any symbols entered in error by an ODT-5/512 entry prior to entering a new correct status symbol in the next open box.

Enter symbols in the ‘‘STATUS TODAY’’ block of the ODT-4D to reflect current status of the aerospace vehicle. A black last name initial indicates no known discrepancies, which require a symbol exists and no inspections are due and/or overdue on the aerospace vehicle.

14.	Record the box number of the ‘‘STATUS TODAY’’ column for which a conditional/exceptional release is being signed. This entry is the responsibility of the Crew Chief.
15.	Record by signature: The Pilot signs this block, signifying acceptance of the aircraft from the Crew Chief. The conditional/exceptional release block shall never be signed prior to the Vehicle Release (block 13) being signed. A conditional/exceptional release is required before flight. Under no circumstances will the conditional/exceptional release be granted when the aircraft status is indicated by a Red X symbol. (See Note 4)
16.	Record upon completion of a flight: The pilot will indicate, opposite the applicable flight number, the condition after flight. If discrepancies were encountered during flight, enter the total number of such discrepancies in the appropriate block. If no discrepancies were encountered, enter ‘‘OK’’ in the appropriate block.
17.	Record: The pilot enters their signature. In addition, a description of each discrepancy encountered during flight will be entered in the ODT-5/512.
18.	Record, if an over-temperature of a jet engine is encountered, the number of such encounters opposite the applicable flight number. Record a description of conditions encountered, including temperatures reached and duration of the over-temperature, on the ODT-5/512. Additionally, if an over-temperature is encountered during ground operation, record a descriptive entry on the ODT-5/512.

19.	Record any pertinent auxiliary engine or APU operation information.
20.	Record, upon initiation of a new form, by transcribing the total time since new from the ‘‘TOTAL’’ block 22 of the previous form to the ‘‘PREVIOUS’’ block 20 of the new form.
21.	Record at the completion of each flight, the flight time (duration) in the appropriate flight blocks.
22.	Record a new airframe time “TOTAL” entry by adding the column of entries and recording them in the ‘‘TOTAL’’ block at the end of the specified flying period.
23.	Record, upon initiation of a new form, by transcribing the total time of touch and go’s since new from the ‘‘TOTAL’’ block 25 of the previous form to the ‘‘PREVIOUS’’ block 23 of the new form. (See Note 6)
24.	Record, at the completion of each flight, the number of touch and go’s in the appropriate flight blocks. (See Note 6)
25.	Record a new touch and go “TOTAL” entry by adding the column of entries and recording them in the ‘‘TOTAL’’ block at the end of the specified flying period.
26.	Record, upon initiation of a new form, by transcribing the total time of full stops since new from the ‘‘TOTAL’’ block 28 of the previous form to the ‘‘PREVIOUS’’ block 26 of the new form. (See Note 6)
27.	Record, at the completion of each flight, the number of full stops in the appropriate flight blocks. (See Note 6)
28.	Record a new full stop “TOTAL” entry by adding the column of entries and recording them in the ‘‘TOTAL’’ block at the end of the specified flying period.
29.	Record, upon initiation of a new form, by transcribing the previous time from the ‘‘TOTAL’’ block 31 of the previous form to the ‘‘PREVIOUS’’ block 29 of the new form. (See Note 6)
30.	Record, at the completion of each flight, the number of touch and go’s, *and* the number of full stop landings in the appropriate flight blocks. (See Note 6)
31.	Record a new ‘total’ “TOTAL” entry by adding the column of entries and recording them in the ‘‘TOTAL’’ block at the end of the specified flying period. (See Note 6)
32.	Enter/Select the desired item to track the time of. **NOTE:** On the electronic form each asterisk on the form has a pop-up menu to select from.
33.	Record, upon initiation of a new form, by transcribing the total time of the selected item’s hours (if appropriate) since new from the ‘‘TOTAL’’ block 35 of the previous form to the ‘‘PREVIOUS’’ block 33 of the new form.
34.	Record, at the completion of each flight, the hours of each item’s operation time during that flight (as appropriate). (See Note 5)
35.	Record a new item’s time “TOTAL” entry by adding the column of entries and recording them in the ‘‘TOTAL’’ block at the end of the specified flying period.
36.	Record, at the completion of each flight, the engine cycles (as appropriate). (See Note 5)
37.	Servicing Section
38.	Enter the type of fuel.
39.	Enter the grade of fuel.

40.	Enter the type of oil.
41.	Enter the type of hydraulic fluid.
42.	Enter/Select the desired item to track the servicing of. **NOTE:** On the electronic form, each asterisk on the form has a pop-up menu to select from.
43.	Enter/Select the desired quantity that the item is serviced in. **NOTE:** On the electronic form, each asterisk on the form has a pop-up menu to select from.
44.	Record the amount serviced.
45.	Record the total amount serviced by adding the column.
46.	Record the total quantity in the system.
47.	If required, total this column.
48.	Enter/Select the desired item to track the servicing of. **NOTE:** On the electronic form, each asterisk on the form has a pop-up menu to select from.
49.	Enter/Select the desired quantity that the item is serviced in. **NOTE:** On the electronic form, each asterisk on the form has a pop-up menu to select from.
50.	Record the amount serviced.
51.	Record the total amount serviced by adding the column.
52.	Record the total quantity in the system.
53.	If required, total this column.
54.	Record and Date by entering the signature of the individual who performs or supervises the servicing, draining, or ‘‘in-tanks’’ check of items in blocks 41 through 52, corresponding with the numbered servicing or draining entries recorded within those blocks and servicing date. (See Note 8)

NOTE 1: The maintenance person who accomplishes or supervises the PR/BPO, combined PR/BPO, combined PR/TH, TH, QT, ICT, WAI or PLI will enter in the appropriate columns the type inspection.

NOTE 2: Once the last entry space is filled in the form and the flight is not yet to take place, a new form must be initiated. When initiating a new form, transfer the time and date of the completed inspection (provided the preflight validity period has not expired) and carry forward the individual’s name who accomplished the inspection in Block 8. The individual transcribing the entries enters the abbreviations ‘‘CF,’’ their first and last name initial in the ‘‘ACCOMPLISHED BY’’ column of the old form. Print the name of the individual in the ‘‘ACCOMPLISHED BY’’ column on the new form as well as the time and date.

NOTE 3: Refer to Chapter 8, Section 8-1.7 for aircraft release signature authority.

For all other Airborne Science Flights, unless other requirements are imposed by the Chief of Maintenance, this block shall be signed by the Crew Chief. The Crew Chief’s signature in block 13 acknowledges that the aircraft is configured, forms have been reviewed, and that the aircraft is safe and ready for flight.

NOTE 4: FOR AIRBORNE SCIENCE ER-2: The pilot is responsible for signing the block specifically to confirm that he is accepting the aircraft and that he has reviewed the forms for applicable flight information through

1. Review of ODT forms for previous flight squawks and fixes
2. Review of flight status symbol
3. Review of Weight and Balance for:
4. '0' fuel weight
5. Fuel load for flight
6. CG
7. Delta 'T' Speed

This review may be through a verbal and/or visual communication with the Crew Chief; however, the pilot must sign this block prior to flight.

FOR ALL OTHER AIRCRAFT, EXCLUDING THE ER-2: The pilot is responsible for signing block -17- to confirm and attest that they are accepting the aircraft and that they have reviewed the aircraft workbook forms.

When a release is signed, it will not require another signature during the period of pre-flight validity unless additional red symbol discrepancies are encountered or the ODT-4B has to be removed.

When an additional symbol is entered or the form is removed, the prior signature is no longer valid and another exceptional release is necessary.

When the designated personnel have not signed the exceptional release, the aircraft commander will sign the release. When a pilot signs a release, it is effective only for those flights in which the releasing pilot participates as an air crew member.

For aircraft (including bailed and government furnished property) undergoing maintenance at a contractor's facility, conditional/exceptional releases shall be signed by personnel identified by the contractor in a listing provided to the Dryden Chief of Maintenance Office.

An exceptional release may be granted as a conditional release. A conditional release allows an aircraft to be flown although a discrepancy exists that restricts the aircraft's capabilities.

When such conditional releases are granted, the conditions of the release will be described by an appropriate entry in the ODT-5/512. Additionally, enter ''conditional, see ODT-5/512, (page number and item number)'' in the next open line after the exceptional release signature. For example, a conditional release would be given to an

aircraft with defective landing lights, as the aircraft would not be able to be flown during hours of darkness.

To indicate what outstanding items are to be covered by the conditional/exceptional release, maintenance personnel will draw a red line under the entire last entry on the ODT-5/512. When the conditional/exceptional release is signed, the releaser places their initials at the left margin of the ODT-5/512 beside the red line entry. If no additional red symbol entries are encountered and another individual signs a conditional/exceptional release, the individual will initial immediately above the original initials on the ODT-5/512. If new red symbol entries are entered, draw a new red line under the last item to indicate coverage of the next exceptional release signature. If the same person that signed the previous conditional/exceptional release reviews the discrepancies and corrective actions, the individual may initial beside the red line and release the aircraft without another signature in block 18 provided the status has not changed.

NOTE 5: For selected engines, maintain a history of cycles for compressors, turbine disks, and other designated components to determine fatigue life. The pilot will document, on the ‘‘FLIGHTS’’ line, cycles which have occurred during the flight. The definition of cycles for each engine is included in the applicable aircraft -1, -2, and -6 TOs and the appropriate engine scheduled inspection and maintenance requirements manual.

NOTE 6: Since not all of Dryden’s aircraft count the number of “touch and go’s”, it is up to the Operations Engineer assigned to the aircraft to determine how to document/handle this. *Caution must be used not to overstate or understate landings* since some aircraft life limits and component changes are tied to this.

NOTE 7: Per TO 00-20, accurate running totals of oil added to each engine are essential for performing accurate OAP analysis and preventing potentially catastrophic engine/ component failures. Ensure amounts of oil serviced for each engine are annotated on the aircraft AFTO FORM 781J in the appropriate engine ‘‘OIL ADDED’’ column. For engine programs that do not require oil samples to be taken, there is no requirement to record amounts of oil serviced on the 781J. Using the AFTO FORM 781J to maintain precise, cumulative totals of oil added between OAP samples will facilitate proper documentation in the DD FORM 2026, OIL ANALYSIS PROGRAM SAMPLES ‘‘OIL ADDED SINCE LAST SAMPLE’’ block”. Dryden’s ODT-7 is equivalent to the 781J, but does not account for oil.

NOTE 8: Line through all unused blocks in a servicing number row. For example, if only fuel is checked or serviced, line through oil and ‘other’ blocks not checked or serviced in the servicing. This will ensure that no additional entries are made on a service line that has been certified in block 29.

ODT-14: Flight Data Document
(See Note 2)

DATE MO. DAY YR.	MODEL	SERIAL NUMBER	LOCATION	SHEET NO.	FLIGHT TIME	MISSION SYMBOL
- 2 -	- 3 -	- 4 -	- 5 -	- 1 -	- 47 -	- 6 -

NASA DFRC FLIGHT NUMBER	ORGANIZATION	FIRST INITIAL	LAST NAME	DUTY CODE	FLIGHT CONDITIONS					LANDINGS				PENE-TRATIONS		APPR-OACHES		[redacted]	LOCAL USE	[redacted]
					DAY VFR	DAY INST	NIGHT VFR	NIGHT INST	SIMUL INST	TYPE	NO.	TYPE	NO.	SIM	WEA	PRE	N-P			
- 7 -	- 8 -	- 9 -	- 10 -	- 11 -	- 12 -	- 13 -	- 14 -	- 15 -	- 16 -	- 17 -	- 18 -	- 19 -	- 20 -	- 21 -	- 22 -	- 23 -	- 24 -		- 26 -	
																	-	- 25 -	-	- 27 -

FLIGHT DATA BY SORTIE				FLIGHT TIME AND LANDING DATA BY SORTIE						TRANSCRIBING CHECK INITIALS		
	FROM	TO	ATC SERVICES	LANDING	TAKE-OFF	FLIGHT TIME	LANDINGS			PILOT	MAINT	OPS
							TOUCH GO	FULL STOP	TOTAL			
[redacted] 1	- 28 -	- 29 -	- 30 -	- 31 -	- 32 -	- 33 -	- 34 -	- 35 -	- 36 -	- 37 -	- 38 -	- 39 -
2												
5												
6												
					TOTAL	- 40 -	- 41 -	- 42 -	- 43 -	- 44 -	- 45 -	- 46 -

ODT-14 (08/02)

1.	Record Sheet number (page number).
2.	Record date of form origination.
3.	Record the aircraft model, i.e., “F/A-18A”.
4.	Record the aircraft serial number.
5.	Record Location. (See Note 1)
6.	Record Mission Symbol. (See Note 1)
7.	Record NASA DFRC Flight Number. (See Note 1)
8.	Record Organization. (See Note 1)
9.	Record first initial. (See Note 1)
10.	Record last name. (See Note 1)
11.	Record duty code. (See Note 1)
12.	Record day VFR. (See Note 1)
13.	Record day INST. (See Note 1)
14.	Record night VFR. (See Note 1)
15.	Record night INST. (See Note 1)
16.	Record simulated INST. (See Note 1)
17.	Record type of landing. (See Note 1)
18.	Record number of landing type. (See Note 1)
19.	Record type of landing. (See Note 1)
20.	Record number of landing type. (See Note 1)

21.	Record SIM penetration. (See Note 1)
22.	Record Weather penetration. (See Note 1)
23.	Record PRE penetration. (See Note 1)
24.	Record N-P approaches. (See Note 1)
25.	Record sortie. (See Note 1)
26.	Record local use info. (See Note 1)
27.	Record credit. (See Note 1)
28.	Record flown from. (See Note 1)
29.	Record flown to. (See Note 1)
30.	Record ATC services. (See Note 1)
21.	Record landing time. (See Note 1)
32.	Record take-off time. (See Note 1)
33.	Record flight time. (See Note 1)
34.	Record touch and go's. (See Note 1)
35.	Record full stops. (See Note 1)
36.	Record total 34 & 35. (See Note 1)
37.	Record pilots initials. (See Note 1)
38.	Record maintenance initials. (See Note 1)
39.	Record op's initials. (See Note 1)
40.	Record total flight time. (See Note 1)
41.	Record total touch and go's. (See Note 1)
42.	Record total full stops. (See Note 1)
43.	Record 'total' of totals 41 & 42. (See Note 1)
44.	Record pilots initials. (See Note 1)
45.	Record maintenance initials. (See Note 1)
46.	Record op's initials. (See Note 1)
47.	Record flight time. (See Note 1)

NOTE 1: The original document root is from TO 00-20 and per Section 3-10 "AFTO FORM 781, AFORMS AIRCREW MISSION FLIGHT DATA DOCUMENT (FIGURES 3-1 AND 3-2)". The following is stated:

"3-10.1 The AFTO FORM 781 is the source document for logging flight activity for individuals authorized to take part in a mission. This form provides input to G081/CAMS and the Air Force Operations Resource Management System (AFORMS) flying time

interface. Maintenance personnel and the aircraft commander (A/C) are jointly responsible for completion of this form.

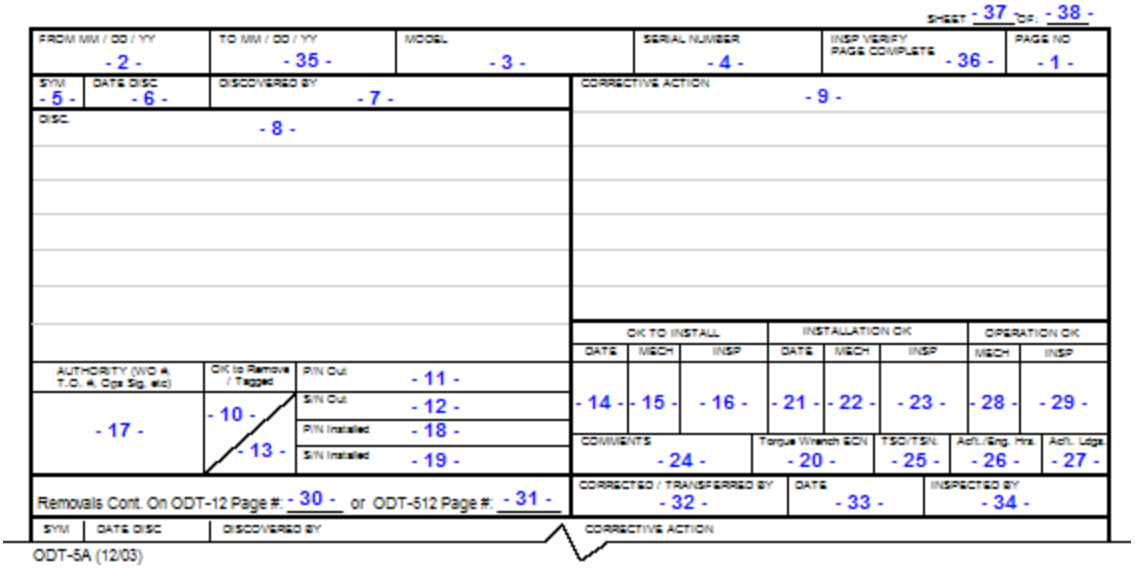
3-10.2 All maintenance personnel or aircrew trainer technician/operator will assure that sufficient copies of the AFTO FORM 781 are aboard the aircraft or available at the ATD. These forms will have blocks 2 through 5 completed and in a quantity that will satisfy mission requirements.

3-10.3 The aircraft commander will properly date and complete the AFTO FORM 781 to show all pertinent flying data and flying time for all personnel authorized to participate in the flight. After completion of the flight, he or she will initial block 36 of the form.

3-10.4 Remove the completed AFTO FORM 781 from the aircraft forms binder and enter data into the automated maintenance management system at maintenance debriefing. Send to either unit operations or maintenance plans and scheduling (MAJCOM option)."

NOTE 2: These entries are typically entered at the MOO from information received from the pilot(s) and then checked and filed by the Pilot's Office.

ODT-5A: Aircraft Maintenance Discrepancy/Work Record



1.	Record the Records page number. (These are to be of a non-recurring, sequential format, i.e., 1, 2, 3, …).
2.	Record the records initiation dates Month/Day/Year, i.e., 09/25/02).
3.	Record the aircraft model, i.e., “F/A-18A”.
4.	Record the aircrafts tail number, i.e., “847”.
5.	Record the appropriate ‘symbol’ associated with the discrepancy.
6.	Record the date that the discrepancy was discovered.
7.	Record the name of the individual who discovered the discrepancy.
8.	Record the discrepancy. Accurately and succinctly describe the condition.
9.	Record corrective actions taken. If the discrepancy was transferred to the delayed discrepancies (ODT-2), then document the ODT-2 page and item number and have the Branch Chief and Operations Engineer annotate their approval within this section.
10.	The Crew Chief or appropriate cognizant individual places their initials in this block, signifying acknowledgement that a part is to be removed and that it is safe to do so.
11.	Record the part number of the removed part. (See Note 1 and Note 2)
12.	Individual removing item documents the item’s serial number. (See Note 1)
13.	The individual removing the item places their initials in this block, signifying that they have completed and attached a parts control tag to the item.
14.	The date of the installation request is inserted within this block.
15.	The individual requesting the OK to install shall look over the area to determine that it is free from defects and FOD. Also, the individual requesting the OK to install shall have looked over the part to be installed and verified that

	any interfacing connections are free from defects. Upon completion of the visual checks, the individual seeking the OK to install shall place their initials within this block and contact a QI/DI for their authorization to proceed.
16.	The QI/DI, through imprinting their stamp, signifies and affirms that the installation is OK to proceed, that there is no FOD, that the surrounding areas are free from defects, and that any specialty tools that were used are within current calibration requirements.
17	Record the TO number utilized to perform the maintenance and/or if a different part number is installed than removed, referencing the authorizing TO. If the different part number is not specified/referenced by a TO, the Operation Engineer's signature is recorded here, documenting, signifying, and giving authorization for use and that the part to be installed is an acceptable and flight worthy part. (See Note 3)
18.	Record the part number installed. (See Note 1, Note 2, Note 3, and Note 4)
19.	Record the serial number of the part to be installed. (See Note 1, and Note 5)
20.	Record any torque wrench(es) ECNs that were used and document their name/type and ECN.
21.	The date that the installation was acceptably completed is inserted within this block.
22.	The individual that is requesting 'Installation OK' places their initials within this block, affirming that the installation is ok, that there is no FOD, that the surrounding areas are free from defects, and that any specialty tools that were used are within current calibration requirements.
23.	The QI/DI, through imprinting their stamp, signifies that they have looked over the installation and surrounding area and that the areas are free from defects and FOD. Also, they are documenting (attesting) that they have looked over the part to be installed and its interfacing connections and that they are free from defects.
24.	If utilized as a 'catch all' for any ODT-5/512 removals, and is not intended to be tied to a specific ODT-5/512 Item, then a reference shall be annotated reflecting the originating ODT-5/512 Page number and Item number; otherwise this block is optional. Record any comments.
25.	Record, if a trackable item, the new item's Time Since Overhaul/Time Since New (TSO/TSN). (See Note 7)
26.	Record, if a trackable item, the new item's previous accumulated aircraft/engine hours. (See Note 7)
27.	Record, if a trackable item, the new item's previous accumulated number of landings. (See Note 7)
28.	Record initials of individual performing any required operational checkout. (See Note 6)
29.	Record successful completion of the operational checkout by QI/DI imprinting their stamp impression. (See Note 6)
30.	If more removals are associated with this squawk, enter them into the ODT-12A. Record the initial ODT-12A Page number in this block.
31.	If more removals are associated with this squawk, enter them into the ODT-

	512A. Record the initial ODT-512A Page number in this block.
32.	Record the name of the individual who corrected the discrepancy or transferred the discrepancy.
33.	Record the date on which the ODT-5A discrepancy is completed, transferred, or transcribed to a new Record
34.	Final buy-off by QI/DI. By QI/DE imprinting their stamp in this block, they are attesting that the Corrective Action is the appropriate fix for the discrepancy and accomplished properly. It also attests to verification of accuracy of all associated blocks of the removal/installation portion of the Correction Action, if applicable. The buy-off also verifies that any transfer of information was correctly made.
35.	Record the date on which this ODT-5A page is completed or transcribed to a new Record.
36.	Record that the page is complete, i.e., all items on this page have been corrected/completed/transferred, by imprinting a QI/DI stamp impression.
37.	Optional Block. When filing paperwork, insert the sheet number within the sequence, i.e., ***1*** of 2.
38.	Optional Block. When filing paperwork, insert the ending sheet number of the sequence, i.e., 1 of ***2***.

NOTE 1: If the part numbers or serial numbers are not legible and they cannot be historically traced or verified, then they must be replaced. If they can be historically traced and verified, then they must have their proper identification reestablished upon them per Operations Engineer and Crew Chief consensus on the method.

NOTE 2: Make appropriate entries into the removed/installed parts Historical Record (AFTO 95 or equivalent) if the part is so controlled/tracked.

NOTE 3: If the installed part number differs at all from the part number that was removed, authorization must be reflected in the IAW/Authority (Block 17) and documented in the form of a TO reference or an Operations Engineer signature, signifying that the part is an acceptable replacement item.

NOTE 4: If the same part is being reinstalled or the installed part has the exact part number as the item that was removed, printing “SAME” in the block is satisfactory as long as the original part number removed is legible.

NOTE 5: If the same part is being reinstalled, printing “SAME” in the block is satisfactory as long as the removed part serial number is legible.

NOTE 6: If the there is no operational check(s) required, a line drawn across blocks 14 and 15 with “N/A” annotated in the middle is satisfactory.

NOTE 7: Make appropriate entries into the removed/installed parts Historical Record (AFTO 95 or equivalent).

ODT-512A: Aircraft Maintenance Work Record

For Maintenance Operations Use Only
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MODEL	SERIAL NUMBER	INSP VERIFY PAGE COMPLETE	PAGE NO
- 3 -	- 4 -	- 38 -	- 1 -

SYM	DATE DISC	DISCREPANCY	CORRECTIVE ACTION
- 5 -	- 6 -	- 7 -	- 9 -

DISCOVERED BY	Removals Continued From ODT-512, Pg:	CORRECTED / TRANSFERED BY	DATE	INSPECTED BY
- 8 -	- 2 -	- 10 -	- 11 -	- 12 -

AUTHORITY (WO #, T.O. # Ops Sig, etc)	ITEM	SERIAL NUMBERS		OK to Remove / Tagged	OK TO INSTALL			INSTALLATION OK			OPERATION OK (PER ESTABLISHED REQMTS AND LIMITS)		
	1. PART NAME 2. PART NUMBER REMOVED 3. PART NUMBER INSTALLED	S/N REMOVED	S/N INSTALLED	MECH	DATE	MECH	INSP	DATE	MECH	INSP	DATE	MECH	INSP
- 20 -	1. - 13 - 2. - 14 - 3. - 23 -	- 15 -	- 24 -	-16a- -16b-	- 21 -	- 22 -	- 28 -	- 29 -	- 30 -	- 33 -	- 34 -	- 35 -	- 36 -
		COMMENTS - 31 -				Torque Wrench ECN - 32 -		TSO/TSN: - 17 -	- 25 -	Acft./Eng. Hrs. - 18 -	- 26 -	Acft. Ldgs. - 19 -	- 27 -
	1.												

ODT-512 (12/03) Reverse

Removals Continued On ODT-512 Pg #: - 37a -
Removals Continued On ODT-12 Pg #: - 37b -

1.	Record the Records page number. (These are to be of a non-recurring, sequential format, i.e., 1, 2, 3, …).
2.	Record the page number from which the removals are continued from, if appropriate.
3.	Record the aircraft model, i.e., “F/A-18A”.
4.	Record the aircrafts tail number, for its serial number, i.e., “847”.
5.	Record the appropriate ‘symbol’ associated with the discrepancy.
6.	Record the date that the discrepancy was discovered.
7.	Record the discrepancy. Accurately and succinctly describe the condition
8.	Record the name of the individual who discovered the discrepancy.
9.	Record corrective actions taken. If the discrepancy was transferred to the delayed discrepancies (ODT-2,) then document the ODT-2 page and item number and have the Branch Chief and Operations Engineer annotate their approval within this section.
10.	Record the name of the individual who corrected the discrepancy or transferred the discrepancy.
11.	Record the date on which this ODT-512A page is completed, transferred, or transcribed to a new Record
12.	This is a ‘paperwork complete and accurate’ verification: Record and document verification that the correction is completed or that any transfer was correctly made, by QI/DI imprinting their stamp impression, attesting to the accuracy of all associated stamps, removals, and other associated items related to this sqk.

13.	Record the item's name.
14.	Record the part number of the removed part. (See Note 1 and Note 2)
15.	Record the serial number of the removed part. (See Note 1)
16a.	The Crew Chief or appropriate cognizant individual places their initials in this block, signifying acknowledgement that a part is to be removed and that it is safe to do so.
16b.	The individual removing the item places their initials in this block signifying that they have completed and attached a parts control tag to the item.
17	Record, if a trackable item, the removed part's Time Since Overhaul/Time Since New (TSO/TSN). (See Note 7)
18.	Record, if a trackable item, the removed part's accumulated aircraft/engine hours. (See Note 7)
19.	Record, if a trackable item, the removed part's accumulated number of landings. (See Note 7)
20.	Record the TO number utilized to perform the maintenance and/or if a different part number is installed than removed, referencing the authorizing TO. If the different part number is not specified/referenced by a TO, the Operation Engineer's signature is recorded here, documenting, signifying, and giving authorization for use, and that the part to be installed is an acceptable and flight worthy part. (See Note 3)
21.	The date of the installation request is inserted within this block.
22.	The individual requesting the OK to install shall look over the area to determine that it is free from defects and FOD. Also, the individual requesting the OK to install shall have looked over the part to be installed and verified that any interfacing connections are free from defects.
	Upon completion of the visual checks, the individual seeking the OK to install shall place their initials within this block and contact a QI/DI for their authorization to proceed with the installation.
23.	Record the part number installed. (See Note 1, Note 2, Note 3, and Note 4)
24.	Record the serial number of the part to be installed. (See Note 1 and Note 5)
25.	Record, if a trackable item, the new item's Time Since Overhaul/Time Since New (TSO/TSN). (See Note 7)
26.	Record, if a trackable item, the new item's previous accumulated aircraft/engine hours. (See Note 7)
27.	Record, if a trackable item, the new item's previous accumulated number of landings. (See Note 7)
28.	The QI/DI, through imprinting their stamp, signifies and affirms that the installation is ok to proceed, that there is no FOD, that the surrounding areas are free from defects, and that any specialty tools that were used are within current calibration requirements.
29.	The date that the installation was acceptably completed is inserted within this block.
30.	The individual that is requesting 'Installation OK' places their initials within this block, affirming that the installation is ok; that there is no FOD, that the

	surrounding areas are free from defects, and that any specialty tools that were used are within current calibration requirements.
31.	Optional Block. Record any comments.
32.	Record the ECN's, of any torque wrench(es) that were used; document their name/type and ECN.
33.	The QI/DI, through imprinting their stamp, signifies that they have looked over the installation and surrounding area and that the areas are free from defects and FOD. Also, they are documenting (attesting) that they have looked over the part to be installed and its interfacing connections and that they are free from defects.
34.	The date that the Operational Check was acceptably completed is inserted within this block.
35.	Record initials of individual performing any required operational checkout. (See Note 6)
36.	Record successful completion of the operational checkout by QI/DI imprinting their stamp impression. (See Note 6)
37a.	If more removals are associated with this squawk, enter them into the ODT-512A. Record the initial ODT-512A Page number in this block.
37b.	If more removals are associated with this squawk, enter them into the ODT-12A. Record the initial ODT-12A Page number in this block.
38.	Record that the page is complete, i.e., all items on this page have been corrected/completed, by QI/DI imprinting their stamp impression.
39.	This block is for use by Maintenance Operations Office.

NOTE 1: If the part numbers or serial numbers are not legible and they cannot be historically traced or verified, they must be replaced. If they can be historically traced and verified, they must have their proper identification reestablished upon them per Operations Engineer and Crew Chief consensus on the method.

NOTE 2: Make appropriate entries into the removed/installed parts Historical Record (AFTO 95 or equivalent) if the part is so controlled/tracked.

NOTE 3: If the installed part number differs at all from the part number that was removed, authorization must be reflected in the IAW/Authority (block 20) and documented in the form of a TO reference or an Operations Engineer signature, signifying that the part is an acceptable replacement item.

NOTE 4: If the same part is being reinstalled or the installed part has the exact part number as the item that was removed, printing "SAME" in the block is satisfactory as long as the original part number removed is legible. If no part is to be reinstalled, write "N/A".

NOTE 5: If the same part is being reinstalled, printing "SAME" in the block is satisfactory as long as the removed part serial number is legible. If no part is to be reinstalled, write "N/A".

NOTE 6: If a part was removed *and* the there is no operational check(s) required, annotate “N/A” across block 22 and 23.

NOTE 7: Make appropriate entries into the removed/installed parts Historical Record (AFTO 95 or equivalent).

ODT-12A: Aircraft Maintenance Work Record: Removals

For Maintenance Operations Use Only
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MONTH	YEAR	A/C OR EQUIPMENT MODEL / SERIAL NUMBER	FROM ODT-5 or 512 (PG # / ITEM #) OR ODT-12 PG #	INSP VERIFY PAGE COMP	PAGE NO.
- 32 -	- 33-	- 4 -	PAGE#: - 1 - ITEM #: - 2 -	- 31 -	- 3 -

AUTHORITY (WO #, T.O. # Ops Sig, etc)	ITEM	SERIAL NUMBERS		OK to Remove / Tagged	OK TO INSTALL			INSTALLATION OK			OPERATION OK (PER ESTABLISHED REQMT'S AND LIMITS)		
	1. PART NAME												
	2. PART NUMBER REMOVED	S/N REMOVED	S/N INSTALLED	MECH	DATE	MECH	INSP	DATE	MECH	INSP	DATE	MECH	INSP
	3. PART NUMBER INSTALLED												
- 13 -	1. - 6 -	- 8 -	- 15 -	- 5 - / - 9 -	- 10 -	- 11 -	- 12 -	- 17 -	- 18 -	- 19 -	- 27 -	- 28 -	- 29 -
	2. - 7 -												
	3. - 14 -	COMMENTS - 20 -				Torque Wrench ECN - 16 -		TSO/TSN: - 21 -	- 22 -	Acft/Eng. Hrs. - 23 -	- 24 -	Acft. Ldgs. - 25 -	- 26 -

ODT-12A (12/03) Reverse

Removals Continued On DT-12 Pg # - 30 -

1.	Record the ODT-5A *page* number that this record is associated with. If this is a new ODT-12A page to extend removals from a previous ODT-12A page, insert the ODT-12A page number that this page is a continuance of.
2.	Record the ODT-5A *item* number that this record is associated with (each ODT-5A page has three items (sqks) associated with it). If this is a new ODT-12A page to extend removals from a previous ODT-12A page, draw a dash in this area.
3.	Record the ODT-12A Records page number. (These are to be of a non-recurring, sequential format, i.e., 1, 2, 3,…).
4.	Record the aircraft or Equipment Type and Serial (Tail) Number i.e., "F-18A / 847"
5.	The Crew Chief or appropriate cognizant individual places their initials in this block, signifying acknowledgement that a part is to be removed and that it is safe to do so.
6.	Record the item's name.
7.	Record the part number of the removed part. (See Note 1 and Note 2)
8.	Individual removing item documents the items serial number. (See Note 1)
9.	The individual removing the item places their initials in this block signifying that they have completed and attached a parts control tag to the item.
10.	The date of the installation request is inserted within this block.
11.	The individual requesting the OK to install shall look over the area to determine that it is free from defects and FOD. Also, the individual requesting the OK to install shall have looked over the part to be installed and verified that any interfacing connections are free from defects. Upon completion of the visual checks, the individual seeking the OK to install shall place their initials within this block and contact a QI/DI for their authorization to proceed with the installation.
12.	The QI/DI, through imprinting their stamp, signifies and affirms that the installation is OK to proceed, that there is no FOD, that the surrounding

	areas are free from defects, and that any specialty tools that were used are within current calibration requirements.
13.	Record the TO number utilized to perform the maintenance and/or if a different part number is installed than removed, referencing the authorizing TO. If the different part number is not specified/referenced by a TO, the Operation Engineer's signature is recorded here, documenting, signifying, and giving authorization for use, and that the part to be installed is an acceptable and flight worthy part. (See Note 3)
14.	Record the part number installed. (See Note 1, Note 2, Note 3, and Note 4)
15.	Record the serial number of the part to be installed. (See Note 1 and Note 5)
16.	Record any torque wrench(es) ECN's that were used. Document their name/type and ECN.
17.	The date that the installation was acceptably completed is inserted within this block.
18.	The individual that is requesting 'Installation OK' places their initials within this block affirming that the installation is ok, that there is no FOD, that the surrounding areas are free from defects, and that any specialty tools that were used are within current calibration requirements.
19.	The QI/DI, through imprinting their stamp, signifies that they have looked over the installation and surrounding area and that the areas are free from defects and FOD. Also, they are documenting (attesting) that they have looked over the part to be installed and its interfacing connections and that they are free from defects.
20.	If utilized as a 'catch all' for any ODT-5/512 removals and is not intended to be tied to a specific ODT-5/512 Item, then a reference shall be annotated reflecting the originating ODT-5/512 Page number and Item number; otherwise, this block is optional. Record any comments.
21.	Record, if a trackable item, the removed part's Time Since Overhaul/Time Since New (TSO/TSN). (See Note 7)
22.	Record, if a trackable item, the new item's Time Since Overhaul/Time Since New (TSO/TSN). (See Note 7)
23.	Record, if a trackable item, the removed part's accumulated aircraft/engine hours. (See Note 7)
24.	Record, if a trackable item, the new item's previous accumulated aircraft/engine hours. (See Note 7)
25.	Record, if a trackable item, the removed part's accumulated number of landings. (See Note 7)
26.	Record, if a trackable item, the new item's previous accumulated number of landings. (See Note 7)
27.	The date that the Operational Check was acceptably completed is inserted within this block.
28.	Record initials of individual performing any required operational checkout. (See Note 6)
29.	Record successful completion of the operational checkout by QI/DI imprinting their stamp impression. (See Note 6)

30.	Record the ODT-12A page number that the removals are continued to/on (if applicable).
31.	Record that the page is complete, i.e., all items on this page have been corrected/completed, by QI/DI imprinting their stamp impression.
32.	Optional Block. Record the month that this record is for.
33.	Optional Block. Record the year that this record is for.
34.	This block is for use by Maintenance Operations Office.

NOTE 1: If the part numbers or serial numbers are not legible and they cannot be historically traced or verified, they must be replaced. If they can be historically traced and verified, they must have their proper identification reestablished upon them per Operations Engineer and Crew Chief consensus on the method.

NOTE 2: Make appropriate entries into the removed/installed parts Historical Record (AFTO 95 or equivalent) if the part is so controlled/tracked.

NOTE 3: If the installed part number differs at all from the part number that was removed, authorization must be reflected in the IAW/Authority (block 12) and documented in the form of a TO reference or an Operations Engineer signature, signifying that the part is an acceptable replacement item.

NOTE 4: If the same part is being reinstalled or the installed part has the exact part number as the item that was removed, printing “SAME” in the block is satisfactory as long as the original part number removed is legible.

NOTE 5: If the same part is being reinstalled, printing “SAME” in the block is satisfactory as long as the removed part serial number is legible.

NOTE 6: If the there is no operational check(s) required, a line drawn across blocks 14 and 15 with “N/A” annotated in the middle is satisfactory.

NOTE 7: Make appropriate entries into the removed/installed parts Historical Record (AFTO 95 or equivalent).

ODT-7: Aircraft and Engine Operating Time Record

FROM MO. DAY YR.	TO MO. DAY YR.	MODEL	SERIAL NUMBER	INSP. VERIFY PAGE COMP.	PAGE NO.
- 2 -	- 3 -	- 4 -	- 5 -	- 24 -	- 1 -

ENGINE DATA TYPE/MODEL: - 6 -

SERIAL NUMBER	PSN	HOURS INST. (A/C)	HOURS INST. (ENGINE)	HOURS RMVD. (A/C)	HOURS RMVD. (ENGINE)	ENGINE CHANGE DUE TIME	NEXT PE. INSPECTION DUE
- 7 -	- 8 -	- 9 -	- 10 -	- 11 -	- 12 -	- 13 -	- 14 -

AIRCRAFT AND ENGINE OPERATING TIME RECORD

DATE MO. DAY YR.	AIRCRAFT	ENGINE #1	ENGINE #2	ENGINE #3	ENGINE #4	ENGINE #5	ENGINE #6	ENGINE #7	ENGINE #8
PREVIOUS	- 15 -	- 16 -							
-/17 /	- 18 -	- 19 -							
TOTAL	- 20 -	- 21 -							
/ /									
/ /									
CARRIED FORWARD	- 22 -	- 23 -							

ODT-7 (08/02)

1.	Record the record's page number. When more than one sheet of this form is required, enter the page number and total number of pages.
2.	Record the date that the Record is initialized on. After the initial card is transcribed to a new Record, the date of the old record's "TO" date shall be recorded into the new Records "FROM" block.
3.	Record the date on which this Record is completed or transcribed to a new Record.
4.	Record the aircraft model, i.e., "F/A-18A".
5.	Record the aircraft serial number.
6.	Record the engine type/model, if applicable.
7.	Record the engine serial number(s).
8.	Record engine position number.
9.	Record the aircraft hours at time of engine installation.
10.	Record the pre-existing engine hours at time of engine installation. (See Note 1)
11.	Record the aircraft hours at time of engine removal.
12.	Record the total engine hours at time of engine removal.
13.	Record when the engine's next time change is due. (See Note 1 and Note 2)
14.	Record when the engine's next P.E. Inspection is due. (See Note 3)
15.	Record the previous aircraft time; acquired from the "carried forward" block (22), of the previous record.
16.	Record the previous engine time(s) (up to eight); acquired from the "carried forward" block (23 & equivalent blocks to the right of block 23), of the previous record.

17.	Record the date of documentable engine run and/or aircraft flight.
18.	Record aircraft flight duration. (See Note 4)
19.	Record aircraft engine hours. (See Note 4 and Note 5)
20.	Record the sum of the aircraft time just flown added to the last 'total/previous' time entry.
21.	Record the sum of the engine time just flown added to the last 'total/previous' time entry.
22.	Record the total aircraft time accumulation (to be transferred to a new record's "previous" block (15). (See Note 6)
23.	Record the total engine time accumulation (to be transferred to a new record's "previous" block (16). (See Note 6)
24.	Record that the page is complete, i.e., all items on this page have been completed, by imprinting a QI/DI stamp impression.

NOTE 1: When an engine change occurs, post a brief entry in the next open date line and reopen entries for the new engine together with active entries of other columns in the ''TOTAL'' block. Transcribe total cycles accumulated on the removed engine to the engine AFTO FORM 95. Extract accumulated cycles on the newly installed engine from the AFTO FORM 95.

NOTE 2: Determination must be made to reflect whether the engine time change due is in acft or engine hours.

NOTE 3: Determination must be made to reflect whether the engine P.E. Inspection due is in acft or engine hours.

NOTE 4: When corrections are made to the airframe and engine operating time and cycle documentation data, enter them in red to highlight the changes. For automated forms, draw a red line under the corrected data line to highlight the action.

NOTE 5: Determination must be made to reflect whether the engine accumulation time is reflected in acft or engine hours.

NOTE 6: When all columns have been completely filled in or when columns have been utilized to the extent that initiation of a new ODT-7 becomes necessary, total all columns in the appropriate blocks in the line titled ''CARRIED FORWARD.'' Carry these individual totals along with other applicable data forward to the appropriate blocks of the new ODT-7. (See Note 1 and Note 4)

ODT-2A: Aircraft Delayed Discrepancy Record

FROM MM DD YY	TO MM DD YY	MODEL	SERIAL NUMBER	INSP VERIFY PAGE COMPLETE	PAGE NO
- 2 -	- 12 -	- 3 -	- 4 -	- 13 -	- 1 -

ITEM NO.	FROM ODT-5/512 PG # / IT #	DATE OF ORIGINAL ENTRY	DISCREPANCY AND REASON FOR DELAY	DELAY APPROVED BY AND DATE	X-FER'd TO ODT-5/512 FORM /PAGE #/ ITEM #	X-FER VERIFIED BY AND DATE
- 5 -	- 6 -	- 7 -	- 8 -	- 9 -	- 10 -	- 11 -

ODT 2A (02/03)

1.	Record the record page number.
2.	Record the record creation date. After the initial card is transcribed to a new Record then the date of the old record's "TO" date shall be recorded into the new Records "FROM" block.
3.	Record the aircraft model, i.e., "F/A-18A".
4.	Record the aircraft serial number.
5.	Record the appropriate 'symbol' associated with the delayed discrepancy and a sequential item number, i.e., 1, 2, 3, etc.
6.	Record the ODT-5/512 page and item number of the discrepancy being delayed.
7.	Record the ODT-5/512 date that the transferring discrepancy was originally entered into the ODT-5/512 on.
8.	Record all delayed discrepancies verbatim from the ODT-5/512, urgent action TCTOs, Category I routine action safety modification TCTOs, and outstanding routine action TCTOs in this block. Red X entries will not be entered in the ODT-2. A rationale for the delay must also be entered.
9.	Record the approving authority authorizing the delay and the date. (See Note 1)
10.	When ready to work off, the delayed discrepancy shall be documented through the ODT-5A or ODT-512A. Record the Form Type (ODT-512A or ODT-5A), Page #, and Item # (if appropriate), that the delayed discrepancy is transferred (or referenced) back into.
11.	Record a stamp impression of the QI/DI and record the date, signifying and attesting that the discrepancy was properly transferred back into the ODT-5A or ODT-512A.
12.	Record the date that the last item was completed or the date of item carry-over to a new record. If carried over to a new record, the new record's "From" date (Block 2) shall have this date recorded within it.
13.	Record that the page is complete, i.e., all items on this page have been corrected/completed, by imprinting a QI/DI stamp impression.

NOTE 1: Requirement determination needs to be defined. Transfers are only authorized after Branch Chief *and* Operations Engineering concurrence on the face of the ODT-5/512

ODT-6: Calendar and Hourly Inspection Record

FROM MO. DAY YR.	TO MO. DAY YR.	MODEL	SERIAL NUMBER	INSP. VERIFY PAGE COMP.	PAGE NO.
- 2 -	- 9 -	- 3 -	- 4 -	- 10 -	- 1 -

INSPECTION ITEM	FREQUENCY	NEXT DUE	C/W	NEXT DUE	C/W	NEXT DUE	C/W
- 5 -	- 6 -	- 7 -	- 8 -				

ODT-6 (08/02)

1.	Record the Records page number. When more than one sheet of this record is required, enter the page number, and total number of pages.
2.	Initially the record creation date is recorded. After the initial card is transcribed to a new Record, the date of the old record's "TO" date shall be recorded into the new Records "FROM" block.
3.	Record the aircraft model, i.e., "F/A-18A".
4.	Record the aircraft serial (tail) number. (See Note 1). Record those items to be inspected or tested at specified hourly or calendar periods. To establish uniformity, list the special hourly and calendar inspection items in appropriate interval groups, in the sequence that they appear in the (6.) scheduled inspection and maintenance requirements manual. Use a two-line entry for those items requiring inspection at either an hourly interval or a calendar period. Use one line to indicate the hourly interval and the next line to indicate the calendar time at which the inspection is due.
5.	Enter additional items that may be required due to the type of mission, geographical location, or at the direction of the MAJCOM or GP/CC following the listing obtained from the applicable (6.) scheduled inspection and maintenance requirements manual. Do not list recurring inspection items that are prescribed on inspection workcards on this form. Document special inspections (e.g., NDI) established to track and re-verify repairs to fracture critical structures.
6.	Record the frequency of the inspection in this column.
7.	In the first NEXT DUE column, enter the aircraft hours, engine hours, or date the next inspection is due. Upon completion of the inspection, line out the date or hours reflected in the old ''NEXT DUE'' column and enter the new date or hours in the adjacent ''NEXT DUE'' column, and so forth.
8.	Record the date on which this Record is completed or transcribed to a new Record.
9.	Record the date that the card is completed and/or open items transferred to a new record.
10.	Record that the page is complete by imprinting a QI/DI stamp impression.

ODT-16: Accessory and Time Compliance Log

Aircraft Type and Model - 2 -				Serial No. - 3 -			Page No. - 1 -	
Nomenclature of Part or Special Insp.	Serial No.	Replace Every (Hrs. or Months)	Previous Operating Time	Installed (A/C Hrs. or Date)	Replacement Due (A/C Hrs. or Date)	Removed (A/C Hrs. or Date)	Time Accum. while Inst. in this A/C	Total Operating Time
- 4 -	- 5 -	- 6 -	- 7 -	- 8 -	- 9 -	- 10 -	- 11 -	- 12 -

ODT-16 (08/02)

1.	Record the Log's page number. When more than one sheet of this log is required, enter the page number, and total number of pages.
2.	Record the aircraft type and model, i.e., "F/A-18A".
3.	Record the aircraft serial (tail) number.
4.	Record the nomenclature and type of accessory or equipment requiring replacement at a specified interval.
5.	Record the serial number, normally found on the data plate. If the serial number is not on the accessory, enter ''none.'' When new forms are being prepared to replace lost forms and the serial number cannot be identified without expenditure of excessive man-hours, enter the word ''unknown.''
6.	Record the operating interval or the calendar period at which the accessory or component should be replaced. This replacement time will be found in the applicable (6.) scheduled inspection and maintenance requirements manual or related commodity series TOs. When the replacement intervals for items are reduced locally, enclose the entry in this block within parentheses. Also enclose within parenthesis items prescribed locally or by the MAJCOM. Use of the parentheses denotes unique replacement intervals.
7.	Record the previous operating time or usage of the accessory. (TO 00-20-1, Chapter IV contains specific instructions for computing the previous operating time for accessories having a different replacement time on various aerospace vehicles or engines on which it may be used or when accessories are added to the replacement manual.)
8.	Record the aerospace vehicle or engine time to the nearest hour or to the calendar date for items that are changed on an hourly or calendar basis.
9.	Record the aerospace vehicle or engine time to the nearest hour, calendar date, cycles, or rounds fired when an accessory or item of equipment is due for replacement. This entry will be the maximum allowable operating time of the accessory. For hourly time change items, add the time to the aerospace vehicle or engine hours entered in column 8. When an accessory that has not been overhauled prior to installation is being reused, subtract the previous operating time from the maximum allowable operating time.
10.	Record the aerospace vehicle or engine time to the nearest hour, cycles, rounds fired, or calendar date at which the accessory or item of equipment was removed. For components requiring replacement based on actual operating time, such as APUs, entries in columns 8, 9, and 10 will be in terms of

	component operating time instead of aerospace vehicle time. Maintain forms for engine-mounted accessories in terms of engine operating time.
11.	Record the accumulated time, cycles, or rounds fired on the accessory during this installation period. Compute this by subtracting the installation time, cycles, or rounds from the removal time, cycles, or rounds.
12.	Record the time, cycles, or rounds the accessory was operated since new or last overhaul. Compute this by adding the accumulated time entry of column 11 to the previous operating time entry in column 7. For example, if an item having 250 hours previous operating time is installed at 550 hours and removed at 1050 hours, the operating time will be 750 hours (column 12). Entries for items having only a calendar replacement interval will reflect the calendar period of installation as computed from the date of installation to the date of removal.

Seat Report

ORG : 1.

NALCOMIS
INSTALLED EXPLOSIVE DEVICE
SEAT / PARACHUTE REPORT

DATE : 2.
TIME : 3.
REQ BY : 4.
PAGE : 5.

TAIL NO : 6.
ASSEMBLY PART NO : 7.

SERNO : 8.
ASSEMBLY SERIAL NO : 9.

TEC : 10.
SEAT : 11.

DODIC	NOMENCLATURE	LOT NUMBER	EXPLO PART NO	EXPLO SERNO	LOC CODE	LOC DESCRIPTION	MODEL	DATE MFGR	DATE OPEN	DATE INSTL	DATE EXPIR
12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.

1.	Reflects the Organization.
2.	Reflects the date of report request.
3.	Reflects the time of report request.
4.	Reflects the name of individual downloading report.
5.	Reflects the current page number of the report.
6.	Reflects the aircraft’s tail number associated with this report.
7.	Reflects the assembly part number associated with this report.
8.	Reflects the serial number associated with this report.
9.	Reflects the assembly serial number associated with this report.
10.	Reflects the shop’s code associated with this report.
11.	Reflects the number of seats associated with this report.
12.	Reflects the associated code of an item associated with this report.
13.	Reflects the name of an item associated with this report.
14.	Reflects the lot number of an item associated with this report.
15.	Reflects the explosive’s part number of an item associated with this report.
16.	Reflects the explosive’s serial number of an item associated with this report.
17.	Reflects the code of the items higher assembly.
18.	Reflects the associated items higher assembly.
19.	Reflects the model number of the item (if applicable).
20.	Reflects the manufactured date of the item.
21.	Reflects the “opened” date of the item.
22.	Reflects the installation date of the item.
23.	Reflects the expiration date of the item.

DFRC 317 Waiver

REQUEST

Record #: - 1 -

- 2 - Proposed By

- 3 - Phone # / Ex

- 4 - Date

Title / Reason

- 5 -

Deviation Requested

- 6 -

Justification

- 7 -

Anticipated Duration: - 8 -

REVIEW

Reviewed By: - 9 - Date: - 10 -

Concurred By: - 11 - Date: - 12 -

DETERMINATION (When a request is innitiated the status is automatically determined to be "Open")

- 13 - ☐ Accepted ☐ Rejected ☐ Canceled ☐ Open

Authorized By: - 14 - Date: - 15 -

Comment/Reason

- 16 -

DFRC 317 (06/02)

1.	An automated record number is generated by the database. It is a compilation of the year generated and a three-digit serial number; i.e., the fourth waiver in 2002 has a record number of: 2002-004.
2.	The waiver requester types in their name.
3.	The waiver requester types in their phone number or extension.
4.	The waiver requester types in the date of the request.
5.	The waiver requester types in a short title or reason for the waiver request. This title or reason is used in the database indexing function.
6.	The waiver requester types in the deviation requested.
7.	The waiver requester types in justification for the deviation request.
8.	The waiver requester types in the anticipated duration of the waiver.
9.	The requester's supervisor types in their name once the request is satisfactorily reviewed. (See Note 1)
10.	The requester's supervisor types in the date that it is satisfactorily reviewed.
11.	The requester's Branch Chief types in their name once the request is concurred with. (See Note 1)

12.	The requester's Branch Chief types in the date that it is concurred with on.
13.	The appropriate Chief assigns a "Determination" status to the request. (See Note 1)
14.	The appropriate Chief who has the authority to make the determination types their name.
15.	The appropriate Chief who has the authority to make the determination types the date that the determination was made on.
16.	The appropriate Chief who has the authority to make the determination types any notes or comments they deem necessary.

NOTE 1: Requirement must be further established/refined concerning the reviewer's and concurring individual's position/authority as well as determining who are "appropriate Chief's".

ODT-8: Work Order / Technical Log

								PAGE NO. - 1 -
MODEL - 2 -			SERIAL NUMBER - 3 -					PAGE COMPLETE - 12 -
DATE MO. DAY YR	W.O or T.O. NUMBER	TITLE OR DESCRIPTION		KIT ORDER DATE	GROUNDING DATE	COMPLIED WITH		
						DATE	MECH.	INSP.
- 4 -	- 5 -	- 6 -		- 7 -	- 8 -	- 9 -	- 10 -	- 11 -

ODT-8 (08/02)

1.	Record the Records page number. (These are to be of a non-recurring, sequential format, i.e., 1, 2, 3, …).
2.	Record the aircraft model, i.e., “F/A-18A”.
3.	Record the aircraft’s tail number, for its serial number, i.e., “847”.
4.	Record the date that the Work Order or Technical Order was written.
5.	Record the Work Order or Technical Order’s number.
6.	Record the Work Order or Technical Order’s Title or Description.
7.	If a Technical Order kit is required, record the date the kit was ordered; otherwise line through this block.
8.	If a Technical Order record the grounding date. If there is not a grounding date or this entry is to log a Work Order, then write “N/A.
9.	Record the date the entry was complied on.
10.	Record the name of the individual who complied with the item.
11.	Record the QI/DI who has verified that the item is completed by stamping this block.
12.	After verifying that the log has been completed per requirements, the Crew Chief, QI, or DI will place their stamp in this section, signifying such.

Appendix D
Aircraft Marshaling

D-1.0 AIRCRAFT MARSHALING 185

D-2.0 SIGNALS 187
D-2.1 Ground Movement Signals for all Aircraft 188
D-2.2 Additional Signals For Hovering Aircraft 203

D-1.0 AIRCRAFT MARSHALING

Reference

AFI 11-218 Aircraft Operation and Movement on the Ground

AFVA 11-224 Marshaling Signals

Aircraft marshaling will be performed by qualified personnel familiar with standard marshaling signals. The Aircraft Marshaller shall ensure that he/she is forward of the aircraft and completely visible to the pilot.

Aircraft marshaling signals shall be displayed in maintenance and operations work areas and other flight line buildings frequented by ground crew personnel who are required to know these signals.

Visual Marshaling Signals

All signals pertaining to the operation of aircraft systems, that is, speed brakes, flaps, etc., originate with the pilot or Marshaller. The Marshaller (Crew Chief) and the pilot must be constantly alert to ensure that marshaling personnel do not act before receiving and acknowledging the proper signals.

NOTE: Pilots must ensure that their taxi speed is such that the ground Marshaller or signalmen can maintain proper position safely.

In transmitting visual signals, the pilot’s hands must be in clear view of the Marshaller. Specific signals are

1. Apply External Electrical Power to Aircraft
   Pilot's hands above the head; left fist partially clenched; right hand moved in direction of left hand, with first two fingers extended and inserted into circle made by fingers of the left hand (similar to marshaller signal 17).

2. Disconnect Power from Aircraft
   Pilot's left fist partially clenched; right hand moved away from left hand, withdrawing first two fingers from circle made by fingers of the left hand (similar to marshaller signal 18).

3. Apply External starting Air to Aircraft
   Pilot's left hand cupped; right fist fully clenched; right fist moved in direction of left hand and inserted into cup made by left hand (similar to marshaller signal 19.).

4. Disconnect External Starting Air from Aircraft:
   Pilot's left hand cupped; right fist moved away from left hand, withdrawing fist from cupped left hand (similar to marshaller signal 18.).

5. Speed Brake Operation
Pilot's hand cupped then opened and closed.

6. Wing Flaps Down
Pilot's hands in front; palms together horizontally then opened from the wrist alligator-mouth fashion (similar to marshaller signal 23).

7. Wing Flaps Up
Pilot's hand in front, horizontally, palms open from the wrists, then suddenly closed (similar to marshaller signal 24).

8. Trim Set for Takeoff:
Pilot forms "T" with hands.

9. Safety Pin Check
Pilot displays seat pin before requesting removal of chocks. Marshaller also displays ground safety pins before stowage (aircraft having TO procedures that differ are exempt).

10. Insert Chocks
Fists closed; thumbs extended inwards, swing arms from extended position inwards (similar to marshaller signal 21).

11. Remove Chocks
Fists closed; thumbs extended outwards; swing arms outwards (similar to marshaller signal 22 in Figure 3-6). Crew Chiefs must not remove chocks until pilot has displayed seat pins. If aircraft is parked in an alert hangar, or there is other overhead obstruction, the pilot taxis clear before removing and displaying seat pins (aircraft having TO procedures that differ are exempt).

12. "OK"
Thumb and forefinger forming circle.

13. Armament Switches Off or Safe
(Used during arming and de-arming of aircraft). Pilot must reach forward then raises and lowers forward portion of hand to simulate door opening and closing. Marshaller repeats to indicate clear for safe opening or closing, then an "OK" signal if operation is proper.

14. Pilot Heat Check
Pilot grasps extended forefinger of left hand with right hand. Marshaller gives "OK" signal if system is operating properly.

15. Nose Gear Steering Check
Pilot, with hands at head level, palms toward marshaller, moves hands back and forth simulating movement rudder pedals. After acknowledgment from marshaller, pilot performs steering check and marshaller gives "OK" signal if nose gear moves properly.

16. Probe Check
Pilot raises arm upward and in a position resembling a probe. Marshaller gives "OK" signal if no malfunctions are observed.

17. Clearance to Release Drag Chute
Pilot extends arm outward and down; alternately clenches and opens hand. Marshaller is to:

    a. Respond with an affirmative nod if all is clear to release chute.

    b. Give the "OK" signal when drag chute separates from aircraft.

18. Clear to Lower Canopy
Pilot pats top of helmet; marshaller pats top of head.

19. In-flight Refueling Door Check
Pilot places hand on top of helmet with palm down and fingers forward, then raises and lowers forward portion of hand to simulate door opening and closing, repeats to indicate clear for safe opening or closing, then an "OK" signal if operation is proper.

20. Pilots are to use other signals, similar to marshaller's signals as necessary.

D-2.0 SIGNALS

NOTE: Where possible, the signals in this Appendix comply with North Atlantic Treaty Organization (NATO) Standardization Agreement 3117, Air Standardization Coordinating Committee Air Standard 44/42A, International Civil Aviation Organization (ICAO), and Federal Aviation Agency (FAA) signals.

D-2.1 Ground Movement Signals for all Aircraft

1. PROCEED TO NEXT MARSHALLER

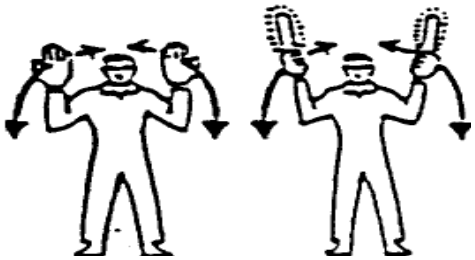
Right or left arm down, other arm moved across the body and extended to indicate the direction of next marshaller.

2. This Marshaller

Arms above head in a vertical position with palms facing inward.

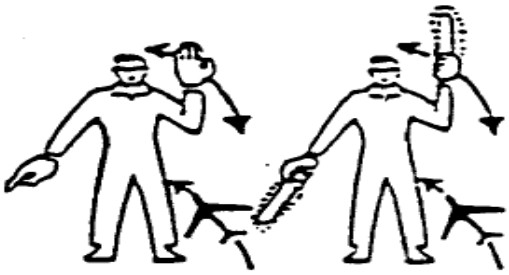
3. Move Ahead

Arms a little aside, palms facing backwards and repeatedly moved upward-backward from shoulder height.



4. Turn to Port (Left)

Point right arm downward, left arm repeatedly moved upward-backward. Speed of arm movement indicating rate of turn.

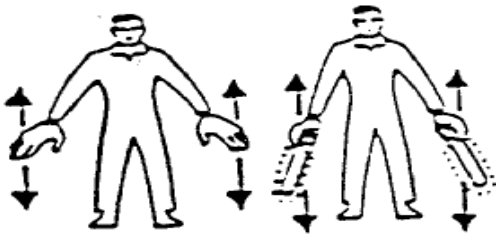


5. Turn to Starboard (Right)

Point left arm downward, right arm repeatedly moved upward-backward. Speed of arm movement indicating rate of turn.

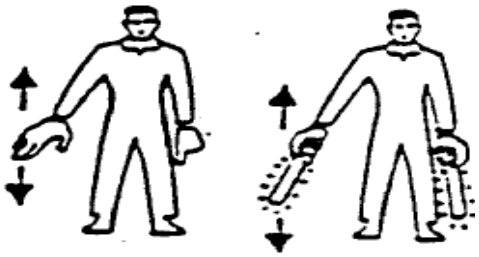
6. Slow Down

Arms down with palms toward ground then moved up and down several times.



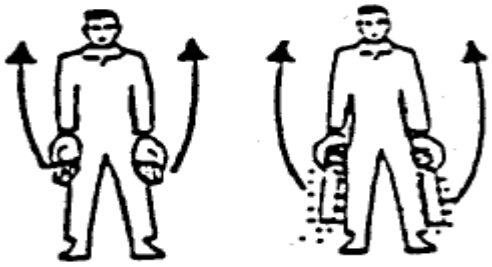
7. Slow Engine(s) on Indicated SIDE

Arms down with palms toward ground, then either right or left arm waved up and down indicating that left or right side engines respectively should be slowed down.



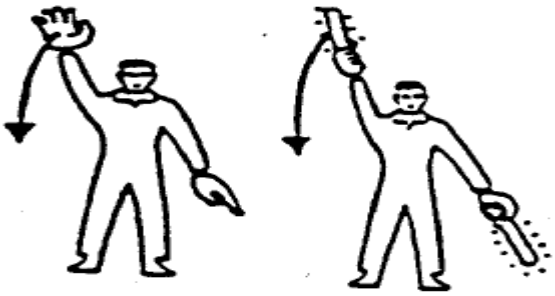
8. Move Back

Arms by sides, palms facing forward, arms swept forward and upward repeatedly to shoulder height.



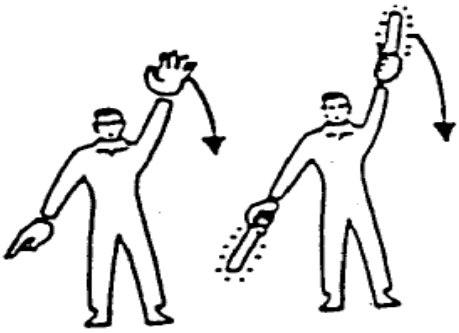
9. Turn While BACKING-TAIL TO STARBOARD (RIGHT)

Point left arm down and right arm brought from overhead, vertical position to horizontal forward position, repeating right arm movement.



10. TURN WHILE BACKING-TAIL TO PORT (LEFT)

Point right arm down and left arm brought from overhead, vertical position to horizontal forward position, repeating left arm movement.

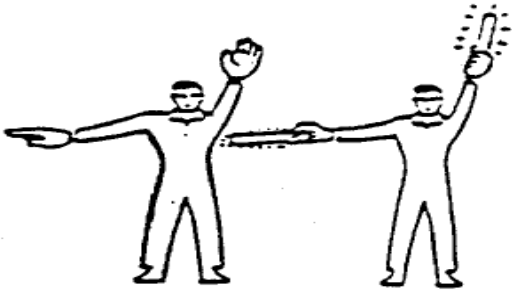


11. CLEARANCE FOR PERSONNEL TO APPROACH AIRCRAFT

A beckoning motion with right hand at eye level.

12. PERSONNEL APPROACH THE AIRCRAFT

Left hand raised vertically overhead, palms towards aircraft. The other hand indicates to personnel concerned and gestures towards aircraft.

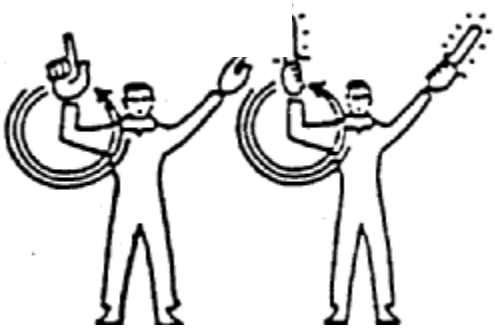


13. STOP

Arms crossed above the head, palms facing forward.

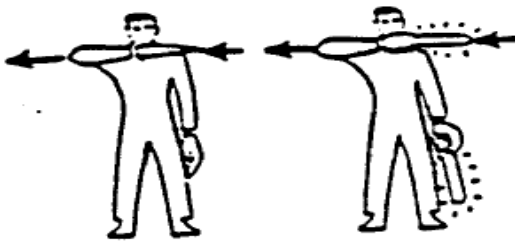
14. START ENGINE(S)

Circular motion of right hand at head level with left arm pointing to engine. ICAO and NATO: Numbers of fingers extended on left hand indicates engine to be started.



15. CUT ENGINE(S)/ROTORS

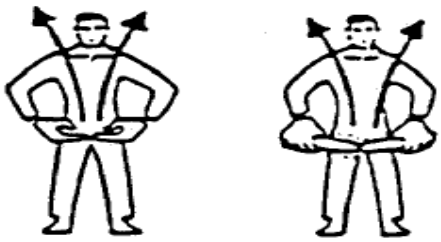
Either arm and hand level with shoulder, hand moving across throat, palm downward.



16. ABANDON AIRCRAFT

Marshaller first gives signal to cut engines, followed by signal simulating unfastening seat belt and shoulder straps and throwing them up and off.

No ICAO signal.
No NATO signal.



17. AUXILLARY POWER UNIT-CONNECTED

Hands above head, left fist partially clenched, right hand moved in direction of left hand with first two fingers extended and inserted into circle made by finger of the left hand.

No ICAO signal

18. AUXILLARY POWER UNIT-DISCONNECTED

Hands above head, left fist partially clenched, right hand moved away from left hand, withdrawing first two fingers from circle made by fingers of the left hand.

No ICAO signal.

19. EXTERNAL STARTING AIR-CONNECTED

Hands above head, left hand cupped, right fist fully clenched, right fist moved in direction of left hand and inserted into cup made by left hand.

No ICAO signal.
No NATO signal.

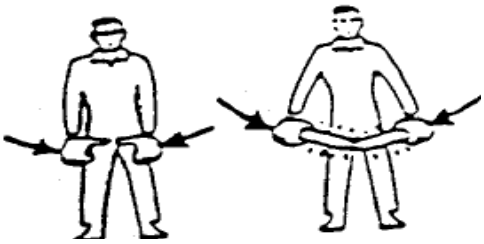
20. EXTERNAL STARTING AIR-DISCONNECTED

Hands above head, left hand cupped, right fist moved away from left hand withdrawing fist from cup made by left hand.

No ICAO signal.
No NATO signal.

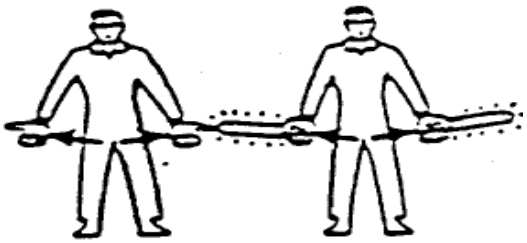
21. CHOCKS-INSERTED

Arms down, fists closed, thumbs extended inwards swing arms from extended position inwards.



22. CHOCKS-REMOVED

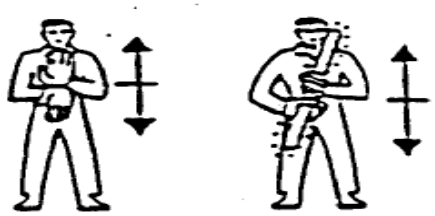
Arms down, fists closed, thumbs extended outwards swings arms outwards.



23. LOWER WING FLAPS OR FLAPS ARE EXTENDED

Hands in front, palms together horizontally then opened from the wrist.

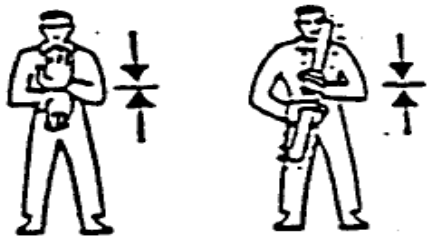
No ICAO signal.



24. RAISE WING FLAPS OR FLAPS ARE UP

Hands in front horizontally, with palms open from the wrists, then suddenly closed.

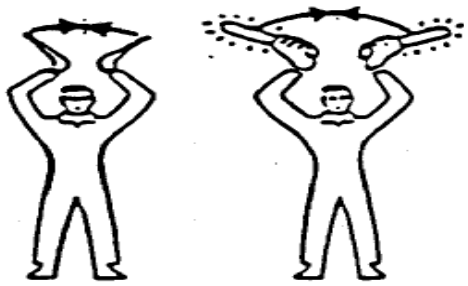
No ICAO signal.



25. TAIL WHEEL/NOSE WHEEL-LOCK

Hands together overhead, palms open from the wrists, then suddenly closed.

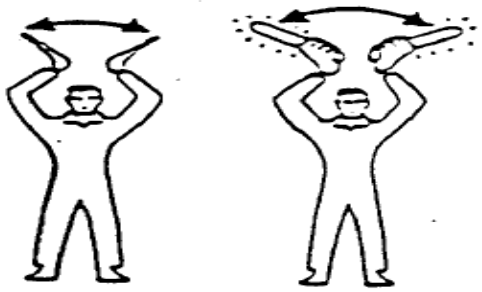
No ICAO signal.
No NATO signal.



26. TAIL WHEEL/NOSE WHEEL-UNLOCK

Hands overhead, palms together then opened from the wrists to form a vertical V.

No ICAO signal.
No NATO signal.

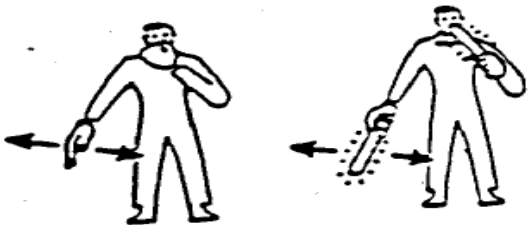


27. TILLER BAR/STEERING ARM IN PLACE

Hold nose with left hand, right hand moving horizontally at waist level.

The affirmative signal immediately following signals means: MAN IS TENDING BAR.

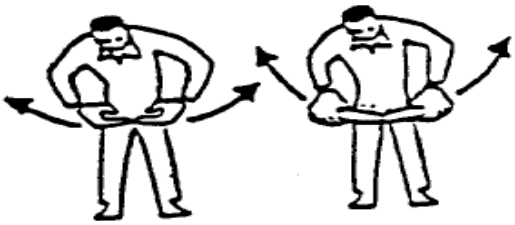
The negative signal immediately following signal means: NO ONE TENDING BAR.



28. WEAPON BAY-OPEN

Body bent forward at the waist, hands held with fingertips touching in front of body and elbow bent at approximately 45 degrees, then arms swing downwards and outwards.

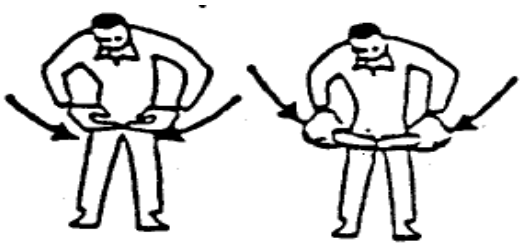
No ICAO signal.



29. WEAPON BAY-CLOSE

Body bent forward at the waist and arms extended horizontally, then arms swing downward and in until finger tips touch in front of the body with elbows bent at approximately 45 degrees.

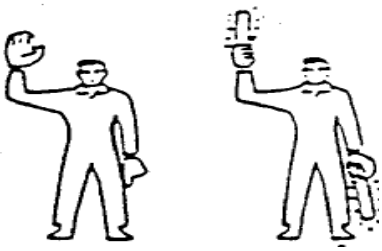
No ICAO signal.



30. MARSHALING FINISHED

Right arm raised with elbow at shoulder height with palm facing forward.

No ICAO signal.
No NATO signal.



31. AFFIRMATIVE (ALL CLEAR OR "OK")
Hand raised, thumb up.

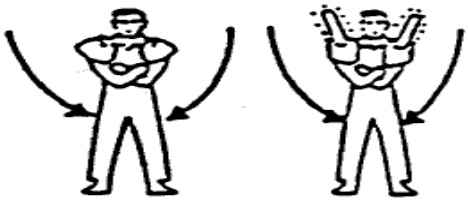
ICAO Signal for "ALL CLEAR".

32. NEGATIVE (NOT CLEAR)
Hand raised, thumb down.

No ICAO signal.

33. FOLD WINGS/HELICOPTER BLADES/SWEEP WINGS AFT
Arms straight out at sides, then swept forward and hugged around shoulders.

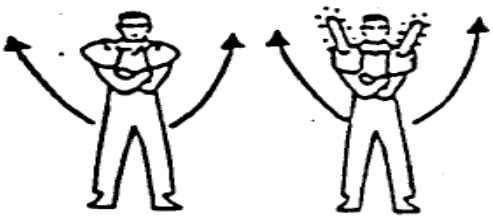
No ICAO signal.



34. SPREAD WINGS/HELICOPTER BLADES/SWEEP WINGS FORWARD

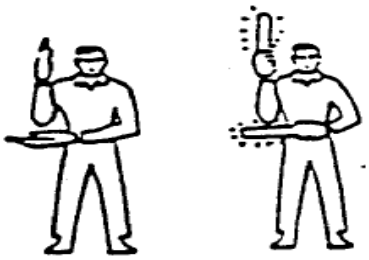
Arms hugged around shoulders, then swept straight out to the sides.

No ICAO signal.



35. LOCK WINGS/HELICOPTER BLADES

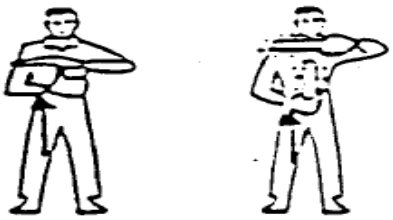
Hit right elbow with palm of left hand.



36. UP TAIL HOOK

Right fist, thumb extended upward, raised suddenly to meet horizontal palm of left hand.

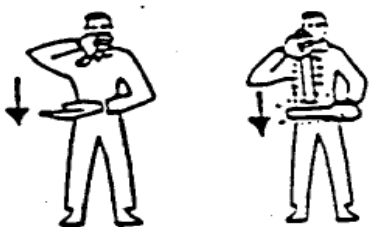
No ICAO signal.



37. DOWN TAIL HOOK

Right fist, thumb extended downward, forward suddenly to meet horizontal palm of left hand.

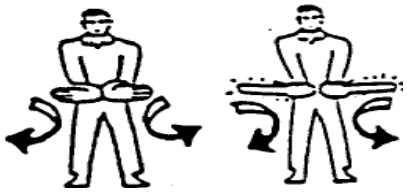
No ICAO signal.



38. OPEN AIR/SPEED BRAKES OR AIR/SPEED BRAKES ARE OPEN

Hands in front, palms together vertically then opened from the wrists.

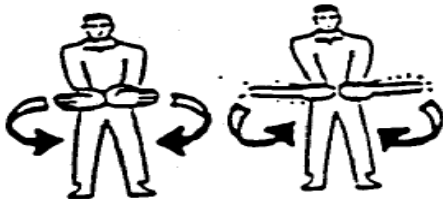
No ICAO signal.



39. CLOSE AIR/SPEED BRAKES OR AIR/SPEED BRAKES ARE CLOSED

Hands in front, vertically with palms open from the wrists, then suddenly closed.

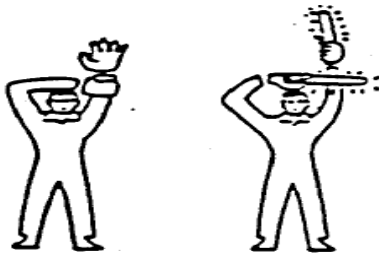
No ICAO signal.



40. DOWN LOCKS/LANDING GEAR PINS INSTALLED

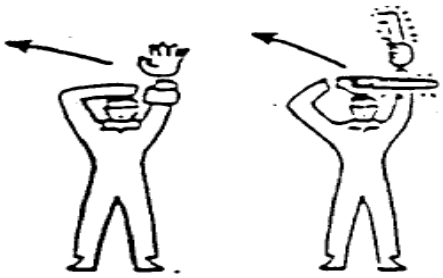
With arms above head, the right hand clasps left forearm.

No ICAO signal.



41. DOWN LOCKS/LANDING GEAR PINS REMOVED

With arms and hands clasped as in "INSTALLED" position, the right hand unclasps the left forearm. No ICAO signal.

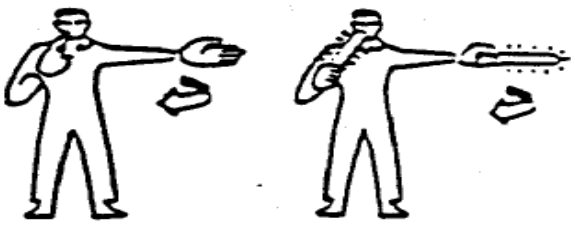


42. ENGAGE NOSE GEAR STEERING

Point to nose with index finger while indicating direction of turn with other index finger.

43. DISENGAGE NOSEGEAR STEERING

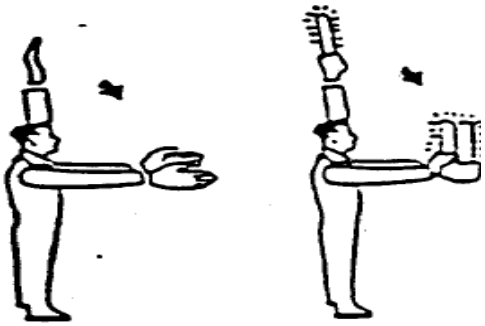
Point to nose with index finger, lateral wave with open palm of other hand at shoulder height.



D-2.2 Additional Signals For Hovering Aircraft

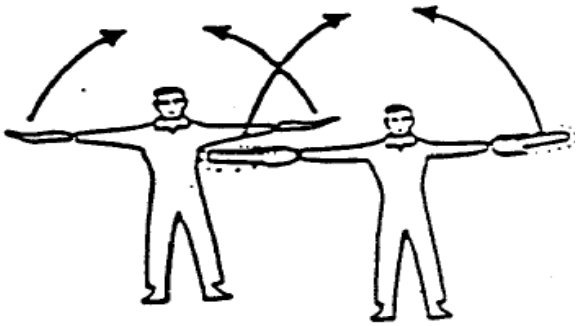
44. LANDING DIRECTION

Marshaller turns and faces toward point where aircraft is to land, the arms are lowered repeatedly from a vertical position to a horizontal position, stopping finally in the horizontal position.



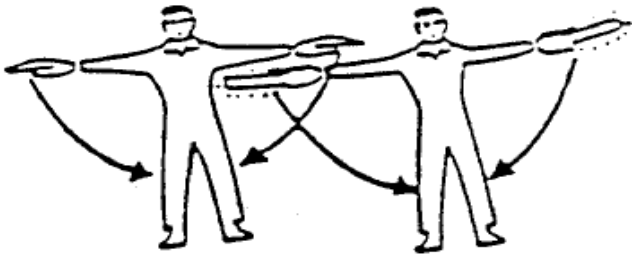
45. VERTICAL MOVEMENT-MOVE UPWARD

Arms extended horizontally sideways beckoning upwards, with palms turned up. Speed of movement indicates raise of ascent.



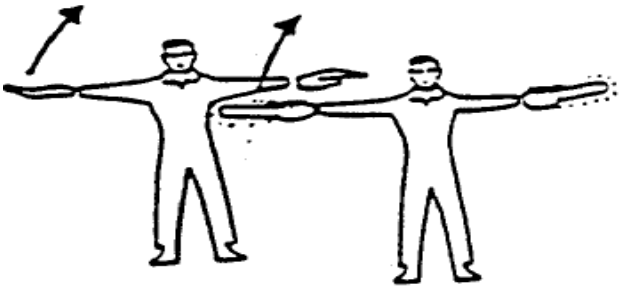
46. VERTICAL MOVEMENT-MOVE DOWNWARD

Arms extended horizontally sideways beckoning downwards with palms turned down. Speed of movement indicates rate of descent.



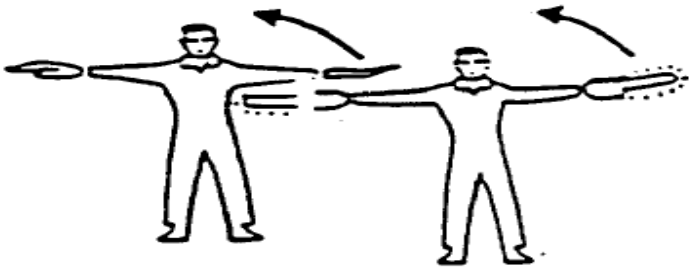
47. HORIZONTAL MOVEMENT-MOVE TO RIGHT (STARBOARD)

Left arm extended horizontally sideways in direction of movement and other arm swung over the head in same direction, in a repeating movement.



48. HORIZONTAL MOVEMENT-MOVE TO LEFT (PORT)

Right arm extended horizontally sideways in direction of movement and other arm swung over the head in the same direction, in repeating movement.

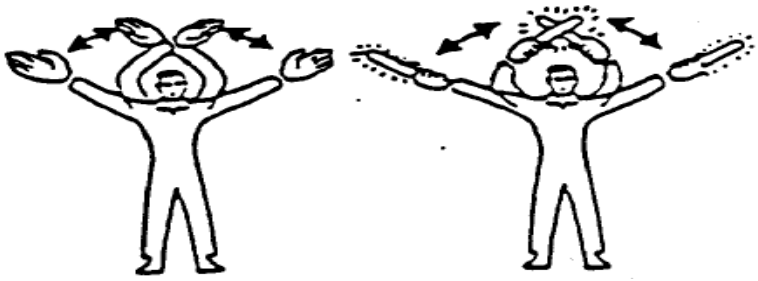


49. LOWER WHEELS

When aircraft approaches with landing gear retracted, Marshaller gives signal by side view of a cranking circular motion of the hands.

50. WAVE OFF

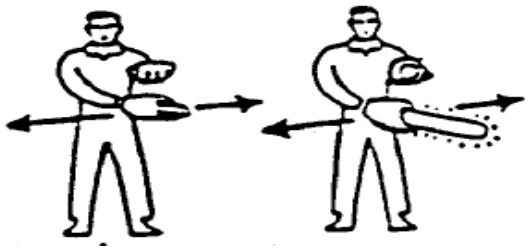
Waving of arms over the head.



51. RELEASE LOAD

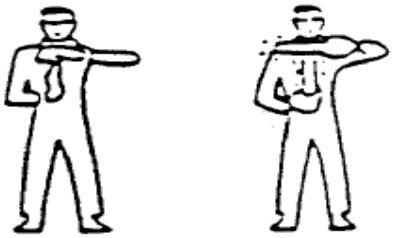
Left arm extended forward horizontally, fist clenched, right hand making horizontal slicing movement below the left fist, palm facing body.

No ICAO signal.



52. LOAD HAS NOT BEEN RELEASED

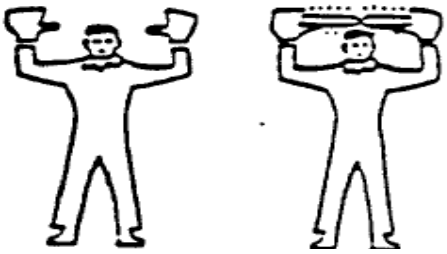
Bend left arm horizontally across chest, with fist clenched, palm downward; open right hand pointing up vertically to center of left fist.



53. DROOP STOPS IN

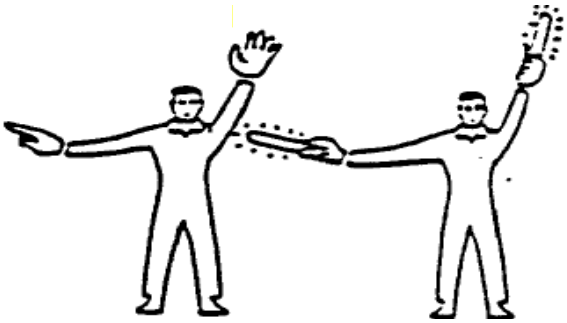
Hands above head level, thumbs pointing in.

No ICAO signal.



54. REMOVE BLADE TIE-DOWNS

Left hand above head, right hand pointing to individual boots for removal.



55. WHEELS OR SLING LOAD THIS HIGH

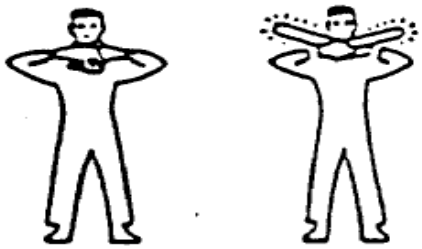
Hands extended before body and palms facing each other. The bottom hand indicates the ground and the top hand the wheels or bottom of sling load. The distance between the hands will indicate the height of the wheel or bottom of sling load above the ground.

No ICAO signal.
No NATO signal.

56. CARGO LOAD SECURE

Arms extended forward, elbows flexed, right hand grasping left fist.

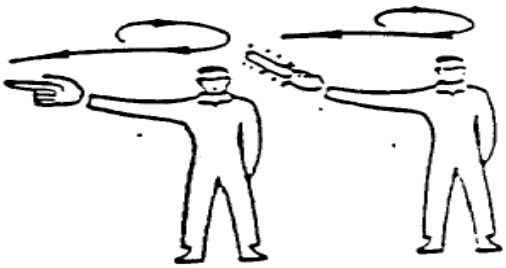
No ICAO signal.
No NATO signal.



57. TAKE OFF THIS WAY (at pilot's discretion)

Marshaller conceals left hand and makes circular motion of right hand over head in horizontal plane ending in a throwing motion of arm towards direction of take off.

No ICAO signal.



58. ENGAGE ROTOR(S)

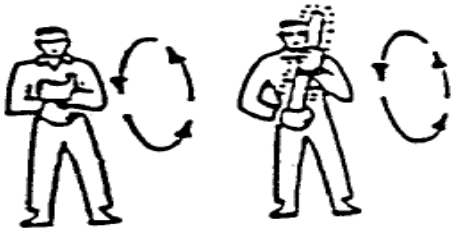
Circular motion in horizontal plane with right hand above head.

No ICAO signals.

59. HOOK UP LOAD

Hands make a rope climbing motion.

No ICAO signal.



60. SPREAD PYLON

Bend elbows across chest, palm downward. Extend arm outward to horizontal position, keeping palm open and facing down.

No ICAO signal.

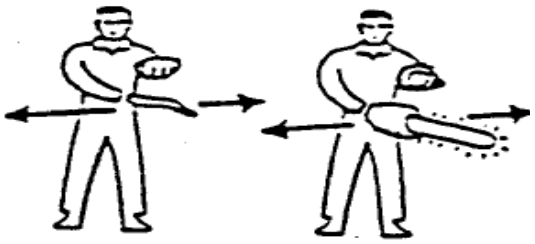
61. FOLD PYLON

Extend right arm horizontally, palm downward. Bend arm across chest, keeping palm down.

No ICAO signal.

62. CUT CABLE

A signal similar to "Release Load" except that the right hand has the palm downwards and not clenched. Rapid repetition of right hand movement indicates urgency.



Document History Log

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

Status Change	Document Revision	Effective Date	Page	Description of Change
Baseline		9-1-00		
Revision	A	2-13-02	70	Pg. 70 – section 6.7 third paragraph added to clarify that the weight and balance log is maintained in the pilots' office. Chapter 6 – entire chapter modified ODT 5 & 12 were combined Deleted research aircraft from NALCOMIS reporting system Section 8.3 – power drills section modified
Revision	B	10-29-02		Added deviation/waiver information to Sections 1.1 and 2.0. Cosmetic edits throughout.
				Upon conversion to DHB-O-004, Baseline, 6-12-03**:** Reformatted, reorganized, reworded; redefined intent, policies, guidelines, and references of what was DCP-O-001 and created this DHB.
				Administrative change, 6-25-03**:** Fixed typos in the Flow Chart on page 16. Changed OB to OG, fixed the spelling error for calibrations, and change the title to Avionics Branch from Airborne Avionics Branch.
Revision	C	9-1-04	All	• Convert document back to DCP-O-001. • Major re-write of entire document. • Review and incorporation of AM&SM waivers through -024
Revision	D	4-20-05	31, 37, 38	• Removed references to cancelled Dryden Policy Directives DPD-5330.2 and DPD-5339.2 • Updated Tables of Contents page numbers