NAVAIR MANUAL M-13034.1
13 APR 2016

NAVAIR AIRWORTHINESS AND CYBERSAFE PROCESS MANUAL

Implemented and Endorsed by NAVAIRINST 13034.1F.

Chapter 1 – Purpose, Authority, and Background

1. Purpose

a. To establish detailed policy, responsibilities, and procedures for executing airworthiness and CYBERSAFE reviews resulting in Naval Air Systems Command (NAVAIR) flight clearances and/or CYBERSAFE certifications for all Department of the Navy (DON) Public Aircraft Operations (PAOs), per references (a) through (e).

b. This manual applies to all DON aircraft and all aircraft conducting DON PAOs including air vehicles and aircraft systems owned, leased, operated, used, designed, or modified by any DON entity or component, whether or not they are reflected in the official United States Navy and/or United States Marine Corps (USMC) inventory, and regardless of operating area, including but not limited to:

(1) All manned and unmanned air vehicles and aircraft systems, including pre-accepted aircraft. Examples include, but are not limited to; all air vehicles and aircraft systems in-service and under development, including Joint Program Office systems being developed for DON use, all Assistant Secretary of the Navy for Research, Development and Acquisition designated aviation acquisition programs being developed or acquired for DON use, and to fleet units that own, operate, or manage DON air vehicles and aircraft systems.

(2) Manned and unmanned air vehicles and aircraft systems in standard and non-standard configurations, including hardware, firmware, software, flight envelopes, and operation. Examples include, but are not limited to; stores and store suspension equipment, Aviation Life Support Systems (ALSS) utilization, and airborne and surface based components for unmanned air systems (UAS).

(3) Developmental Testing (DT), Operational Testing (OT), Follow-on Operational Test and Evaluation (FOT&E), and fleet operations. This instruction does not supersede or take precedence over the process for formal certification of readiness for DT, OT, or recertification for FOT&E required by applicable acquisition directives.

2. Authority

a. DON Airworthiness Authority. The Commander, NAVAIR (AIR-00), is the DON Airworthiness Authority via the following statutory and regulatory authorities:

- Title 49 U.S.C., Section (§) 40103;
- Title 10 U.S.C., § 5013;
- References (c), (d), and (f).

(1) Per references (c) and (d), reference (a) directly delegates day-to-day execution of airworthiness authority to the DON Airworthiness and CYBERSAFE Directorate, AIR-4.0P. AIR-4.0P is the single delegated authority for the issuance of interim and permanent flight clearances (FCs) for all DON air vehicles and aircraft systems and provides direction and tasking to NAVAIR competencies to execute the airworthiness process on behalf of AIR-00.

(2) Reference (f) establishes that AIR-00 is also the Technical Authority for Naval aviation systems and, per Defense Federal Acquisition Regulation Supplement (DFARS) 209.270-2, the Design Control Activity, specifically responsible for ensuring the airworthiness of Naval aviation systems or equipment.

b. CYBERSAFE Technical Authority. Per reference (g), CYBERSAFE technical authority for all DON aviation systems is assigned to the Assistant Commander for Research and Engineering (AIR-4.0). Additionally, per reference (h), AIR-4.0P is designated as CYBERSAFE Program Director (CSPD) and is delegated process execution responsibilities for NAVAIR CYBERSAFE certifications which are defined in the cyber-related portions of this manual, applicable task-specific AIR-4.0P and competency Standard Work Packages (SWPs), Standard Skills Packages (SSPs), and other operating guides.

3. Background

a. Airworthiness Concepts. Assessment of the airworthiness of an air system configuration determines its ability to safely attain, sustain and terminate flight (“complete” in case of UAS) per approved usage limits. All manned aircraft must be airworthy. UAS may have a lower level of inherent airworthiness and a higher probability of catastrophic failure than manned

aircraft. Assessment of Safety of Flight (SOF) determines the property of an air system configuration to safely attain, sustain, and terminate or complete flight (to include in-flight or post-flight aircrew survivability), within prescribed and accepted limits for injury or death to personnel, damage to equipment, property, and/or environment. The intent of assessing SOF is to show that the level of system safety risk (hazards resulting in death, injury, occupational illness, damage to or loss of equipment or property, or damage to the environment) have been appropriately identified by the Technical Area Experts (TAE), accepted by the appropriate authority, and concurred with by the fleet or test user for high and serious risks per references (i) and (j).

(1) Airworthiness Overview: The assessment of airworthiness is a multi-disciplinary concept requiring not only the establishment of initial (design-based) airworthiness of an aircraft system, but also the continuing airworthiness of that aircraft system throughout its life cycle. The determination of airworthiness is executed via an airworthiness certification process that encompasses engineering and life cycle support requirements necessary to design, build, and maintain an air vehicle as airworthy and safe for flight. The engagement of appropriately qualified people, the execution of proven and documented processes and standards, and availability of effective tools are keys to successful execution of airworthiness processes.

(2) Systems Command (SYSCOM) Airworthiness: Within NAVAIR, different organizations are delegated Technical Authority over specific aspects of the overall SYSCOM Airworthiness process. Each competency contributes uniquely to the acquisition and life cycle support of airworthy Naval Aviation assets. As an example, a Flight Clearance authorizes flight in a specific aircraft configuration to specified limits. Configuration Management (CM) is the responsibility of Assistant Commander for Acquisition (AIR-1.0). Authority to modify an aircraft is managed by Assistant Commander for Logistics and Industrial Operations (AIR-6.0). Corporate Operations and Total Force (AIR-7.0) provides operational and business services including cybersecurity and authority to operate for information technology solutions. Air vehicle limits for that configuration are determined by personnel from Test and Evaluation (AIR-5.0) and/or Air Vehicle Engineering (AIR-4.0) and approved by

empowered AW TAEs. AIR-4.0P and the program Class Desk coordinate with AIR-1.0, 4.0, 5.0, 6.0, and AIR-7.0 to ensure that the integrity of these critical tenets of airworthiness are maintained.

(3) Tenets of Airworthiness: The evaluation of an air vehicle or aircraft system to be in and to remain in, an airworthy state requires the execution of processes across a wide range of technical, operational and logistical disciplines. These tenets include continuing airworthiness (encompassing configuration management, maintenance, and materiel management), training systems and training devices, safety management systems and system safety risk assessment, flight test specific processes and procedures (including continuation criteria and aircraft operating limit databases), independent systems engineering processes, and the resultant airworthiness certification products. See Figure 1 for a graphical depiction of the tenets of airworthiness.

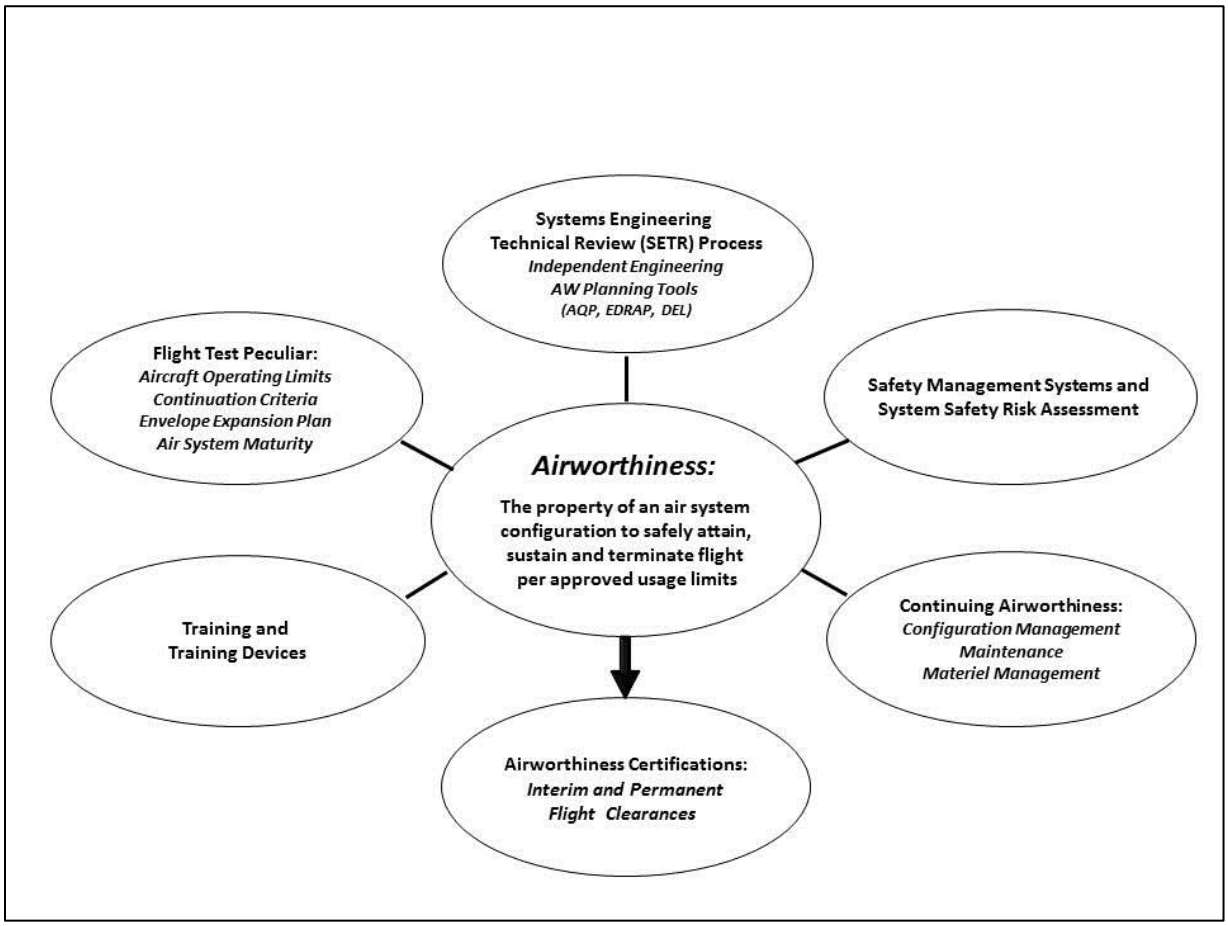

Figure 1- Tenets of Airworthiness

Chapter 2 – Policy

1. General Airworthiness Policy. Per reference (c), all DON PAO (including CAS and non-program of record activities) shall have an airworthiness approval in the form of a flight clearance issued by COMNAVAIRSYSCOM. As aircraft systems develop and mature, they undergo configuration changes and/or expansion of the operational flight envelope. At each step, from first flight through retirement of the platform, airworthiness must be assured and certified by a NAVAIR flight clearance. NAVAIR flight clearances are issued in the form of interim or permanent clearances and are products resulting from a DON airworthiness assessment, as required by reference (b).

a. Flight Clearance. A flight clearance is a formal document that provides assurance of airworthiness and SOF, and ensures system safety risk has been identified and accepted at the appropriate level, within acceptable bounds for the intended mission. Flight clearances provide flight operating limitations for specific air vehicle and air system configurations and store loadings.

(1) Interim Flight Clearance (IFC). IFCs provide NAVAIR airworthiness approval of aircraft systems operating in non-standard configurations, envelopes, conditions, or aircraft systems that have no permanent flight clearance, such as new Type/Model/Series (T/M/S) aircraft. IFCs are valid until the specific expiration date or other conditions specified in the IFC are met. IFCs are commonly used in the Research, Development, Test and Evaluation (RDT&E) community, but can also be used on a temporary basis for fleet operations. They are also the authoritative document that permits the use of a draft NATOPS and/or NATIP product by DT units and for a preliminary NATOPS and/or NATIP product by OT units.

(2) Permanent Flight Clearance (PFC). PFCs come in the form of NATOPS and NATIP or specific AIR-4.0P approved products that are determined to be equivalent to NATOPS and NATIP (e.g., F-35 Flight Series Data). The NATOPS provides standardized aircraft operating procedures, limitations, technical data, and training requirements necessary for safe and effective operation of the aircraft model or aviation support activity. The NATIP provides critical technical data and limitations for all

weapons, weapon systems, avionics, and mission systems required for the operator to safely and effectively employ the aircraft weapon and mission systems. The program Class Desk is responsible for transitioning IFC information to PFCs once testing is complete, however not all IFCs will generate changes to the PFC.

b. Flight Clearance Applicability. A flight clearance is valid only for the defined configurations and flight envelopes and operations specified in the clearance. There are cases when multiple flight clearances apply to the same T/M/S or Bureau Number aircraft. Care must be taken to ensure that when multiple flight clearances are applicable, the most restrictive set of limits are observed to ensure airworthiness standards are not compromised. Any change to the specified configuration or flight operation requires issuance of a separate or revised flight clearance. NAVAIR flight clearances are additionally only valid when aircraft are maintained per references (k) and (l) and/or NAVAIR accepted and/or approved maintenance and structural life management plans.

c. Thresholds for Flight Clearance. For manned or unmanned fixed wing aircraft, a flight clearance is required when there is intent or the potential for flight (e.g., high-speed taxi). For fixed-wing UAS with operator-controlled taxi capability, the threshold is low-speed taxi. For manned and unmanned rotary wing or tilt-rotor aircraft, a flight clearance is required for engagement or turning of the rotors.

d. Authority to Modify Aircraft. Per references (k), (l), and (ab) NAVAIR is the only authority to approve, modify, or withhold modification of U.S. Navy aeronautical equipment. Per references (k) and (l), the Aircraft Controlling Custodian (ACC) has the authority to modify one aircraft under their command; however, a flight clearance must be obtained to fly an aircraft system in that non-standard configuration.

e. Flight Certification Plan (FCP). Each Program Office is responsible for planning and obtaining the varied certifications (e.g., LASER certification, Weapons certification, CNS/ATM certification, CYBERSAFE, cybersecurity risk management framework (RMF) authorization to operate (ATO), etc.) required before conducting operations. Typically the System Engineering Plan (SEP) addresses the needed certifications and may include a

FCP to coordinate timing of certifications with milestone decisions and operational requirements. A FCP should detail how and when all required flight certifications will be obtained.

f. Airworthiness Qualification Plan (AQP). An AQP is highly recommended for all programs, but required for each new aircraft development program (e.g., new type/model/series), major upgrade program, Foreign Military Sales (FMS) case, Joint Program, and when a Program intends to utilize non-DON airworthiness certifications and/or non-DON TAEs. An AQP defines the plan for an air system to achieve interim and permanent flight clearances over the system life cycle, including the roles, responsibilities, processes and products to establish the initial and continuing airworthiness basis for the air system. Reference (t) should be used to establish the airworthiness criteria, standards, methods of compliance and data artifacts. In cases where multiple airworthiness organization are involved, the AQP shall delineate the use of Recognition Agreements, acceptance of previous certificates, the conduct of engineering reviews, and the treatment of unique configurations, limitations, and operations to ensure there are no gaps in the airworthiness certification basis.

g. Acceptance of Airworthiness Certifications and Data. Airworthiness authorities (AAs) depend upon and interact with other AAs in order to minimize duplicative effort in establishing an airworthiness basis and certifying air vehicles for which they are responsible. Reference (b) enclosure 3, paragraph 14.b, permits the DoD to leverage a previous certification by a recognized AA. In such cases, the procuring Service must fully understand the particular standards to which the system was previously certified, the exact configuration, and the design usage and environment in order to assess what specifically could be accepted as a (partial) certification basis. The flight clearance process shall utilize airworthiness certifications and data from other recognized AAs to the maximum extent possible in establishing the airworthiness basis and operating limitations for aircraft purchased, leased, contracted, and/or used by the DON.

(1) Recognition Agreements. Relationships may be established with other domestic and/or foreign government agencies and/or AAs to facilitate the use of existing airworthiness certifications and/or data as a basis for DON

airworthiness approval. These relationships are affirmed after evidentiary review of policy, processes, people, and tools specific to that agency or AA. The extent of the relationship is documented via formal Recognition Agreement between the affected parties. Three tiers of AA recognition characterize the scope of recognition assessments. Tier 1 looks to gain confidence in the life cycle airworthiness governance of an AA and addresses the existence of and adherence to policy, the empowerment of qualified people, the execution of documented and repeatable processes, and the appropriateness and availability of tools. Tier 1 is sufficient for compliance with reference (b) and allows DON personnel to operate in foreign-owned aircraft. Tier 2 addresses the maintenance, design, or production organization approvals and would allow an organization to provide maintenance services, for example, on DON aircraft. Tier 3 requires an examination and comparison of specific design and qualification specifications, standards, criteria to determine sufficiency and to allow acceptance of the previously issued certification for DON use. The recognition of an AA is further explained in reference (b).

(a) Other U.S. Government AAs. NAVAIR maintains an agreement with the U. S. Air Force and U. S. Army that outlines the mutual acceptance of airworthiness certifications, assessments, and airworthiness certification data as the basis for issuance of Service-specific airworthiness findings, see reference (u). Airworthiness artifacts of other U.S. Government agencies may be leveraged when appropriate as determined by AIR-4.0P.

(b) Civil AAs. Issuance of DON flight clearances for Commercial Derivative Aircraft (CDA) may be based on an Federal Aviation Administration (FAA) or other recognized foreign civil AA issued Type Inspection Authorization, Type Certificate (TC), Supplemental TC (STC), or other supporting airworthiness certificates, see references (v) and (w). It is imperative that DON-unique configuration, usage and continuing airworthiness requirements are clearly stated in the CDA Program's contractual documentation. This utilization includes, but is not limited to; training philosophy, maintenance plan, operational envelope, flight profiles, flight manuals, and environmental factors. Per reference (x), the Armed Services maintain a Memorandum of Agreement with the FAA for airworthiness support of CDA aircraft.

(c) Foreign Military AAs. Recognition of foreign military AAs is predominately used within the DON to support the safe flight of DON Service members, civilians, and contractors as passengers and/or aircrew on foreign-owned military aircraft as required by reference (b) and per SWP NAC-01, Conduct of Foreign Airworthiness Authority Recognition Assessments.

(2) For air vehicles and/or air systems purchased, leased, contracted, and/or used by the DON that the DON wishes to leverage a previous certification from a recognized AA, the NAVAIR Assistant Program Manager for Systems Engineering (APMSE) class desk or Integrated Product Team (IPT) lead shall determine if the configuration, operating envelope, limitations, and usage spectrum are the same as that certified by the original AA, and document this in writing to AIR-4.0P. If there are DON-unique requirements, appropriate TAEs (as determined by AIR-4.0P) will be required to review the DON-unique requirements and ensure that system safety risks have been identified and the above normal risks have been accepted at the appropriate level (per reference (j)). If there are no DON-unique requirements, appropriate TAEs are informed of this action, but are not asked to provide engineering assessment of the aircraft.

2. IFC Specific Policy. IFCs are primarily used to support the RDT&E, DT, and OT processes where configurations are not standardized and may change, requiring frequent airworthiness assessments. IFCs may also be used to support fleet-deployed forces when a determination of airworthiness and SOF is critical to the fleet mission. IFCs are issued for new and/or modified aircraft system configurations, including hardware, firmware, and software changes; expansion of flight envelopes; and nonstandard operations.

a. An IFC is required when the air system will:

(1) Commence its first test flight, and/or subsequent developmental test flights in a non-standard configuration or operating envelope;

(2) Undergo DT with a draft NATOPS and/or NATIP and/or equivalent NAVAIR-approved product;

(3) Undergo OT, FOT&E, or fleet operations with the preliminary NATOPS and/or NATIP and/or equivalent NAVAIR-approved product;

(4) Operate outside of envelopes or limits approved by the NATOPS, NATIP, or equivalent NAVAIR-approved product;

(5) Operate in a configuration or loading not approved via formally released NAVAIR Technical Publications, Technical Directives (TDs) (including interim TDs), or specified in a NATOPS, NATIP, or equivalent NAVAIR-approved product; and,

(6) Operate with original equipment manufacturer (OEM), contractor, or system owner operating manuals or equivalent NAVAIR-approved product in the absence of a permanent flight clearance (NATOPS or NATIP).

b. IFCs are required until all applicable PFCs (NATOPS, NATIP, and/or equivalent NAVAIR-approved product) have been updated. If flight limitations and/or warnings, cautions, and notes are affected, an IFC is required, despite a configuration becoming standard (e.g., production-line Engineering Change Proposals (ECPs), TDs, etc.) until the PFC update is released.

(1) Tailored Technical Standards for Test Applications. Special purpose configurations of DON aircraft and weapons systems not intended for fleet introduction, but intended for limited operation in a controlled test and evaluation environment, may use tailored application of technical standards. In this case, the IFC provides an airworthiness assessment and ensures that safety risks have been appropriately identified by the TAE, and accepted by appropriate authorities for that specific limited environment, test location, and/or limited test duration.

(2) IFC Flight Envelope Restriction. IFC Flight Envelope Restrictions are issued by AIR-4.0P to provide a temporary restriction in flight envelope or other limitations while long-term resolutions are in-work. An IFC Flight Envelope Restriction is typically communicated via Naval Message or other approved distribution method and should specify the restriction to the current IFC or PFC, an explanation of the restriction, and conditions that would allow the restriction to be lifted. IFC Flight Envelope Restrictions are not used to Ground

Chapter 5 – Assessment of Risk in a Flight Clearance

The NAT, APMSE, and TAEs will assess the systems safety risks that a requested flight clearance may incur. SOF, risk to personnel, non-program property, and probability of aircraft loss (due to questions regarding the airworthiness of the system) may all be assessed and a clearance may be issued stating these system safety risks and considerations. If analysis indicates that the system meets SOF requirements, but based on the available data, there are questions regarding the airworthiness of the system, the clearance will be issued (see SWP4P00-028, Hazard Identification and Risk Acceptance in Flight Clearances) after system safety risks are appropriately documented and mitigated. When this type of clearance is issued, the decision to fly or not then becomes an operational risk-based decision, see reference (ad). In most cases, this type of FC will be limited to IFCs supporting RDT&E operations, Category 3 UAS, or Type 2 CAS.

Chapter 7 – Exclusions

A flight clearance is not or does not:

a. Authorize operation of the aircraft system;

b. Assign aircraft or authorize aircrews or operators;

c. Authorize modification of the aircraft system;

d. Authorize installation of equipment;

e. Grant exemption from the formal NAVAIR CM Process, defined in reference (ab);

f. Constitute a safety review, to the level of those performed by the Naval Safety Center, or imply that such a review has been performed;

g. Preclude the need for a range clearance;

h. Indicate adequate sponsorship or funding;

i. Guarantee the modification or aircraft system will perform its intended function;

j. Indicate adequate logistics support;

k. Preclude the need for coordination with the facility, range, ship, or airspace controlling authority to conduct operations;

l. Authorize ground or flight testing;

m. Authorize changes to OEM documentation;

n. Authorize the use of a laser system;

o. Provide acceptance of cybersecurity risks (ATO); and/or

p. Required for a UA weighing five (5) or fewer pounds that is operated inside an unoccupied building or enclosed structure

(except for personnel essential to the safe operation of the UAS) and there is no potential for open-air flight.

Chapter 8 – Conditions Requiring a New Flight Clearance

The following conditions must be evaluated to determine if a new or modified flight clearance is required:

1. New and/or Modified Configuration. Examples of configuration changes requiring a flight clearance include, but are not limited to:

a. Structural and material changes;

b. Modification to the exterior contour and mold line of the air vehicle (addition and/or removal of antenna, wing fence, ventral fin, vortex generator, air induction system, auxiliary inlets, etc.); and,

c. Carriage and release of stores, mixed loads, out of sequence release, or expanded limitations not specifically authorized by NATIP or NATOPS. This shall include:

(1) Deviations in store mass properties that exceed the original certified store limits by the following; weight +/- 5%, center of gravity (CG) +/- 0.5 inches, and mass moments of inertia +/- 10%;

(2) Changes in autopilot software affecting separation characteristics;

(3) Changes in structural properties affecting load paths; and,

(4) Modification to weapons release or firing system, including stores management system and associated weapon software.

d. Any changes in software. Software changes are divided into different levels (see Appendix B)

(1) Subsystem modifications that do not interface or affect flight operations, propulsion, or weapons control, such as User Data Files changes generally do not require a flight clearance, however, in this case the aircraft platform class desk shall have written certification from the subsystem

development lead, or weapon and/or store software IPT lead stating that there is no aircraft interface or airworthiness concern.

(2) Flight clearances can be issued to allow undefined changes in software versions without the need to obtain a new flight clearance, referred to as 'green box' clearances. These will be considered on a case by case basis and are generally only authorized for flight testing of a software system that does not interface with the primary systems of the aircraft and/or due to the software architecture changes to that system cannot affect the airworthiness of the aircraft. Flight clearances can also be granted to allow several defined versions of software to be interchanged or to allow defined changes in software gains or parameters.

(3) Fleet software releases are issued by OPNAV rather than AIR-4.0P.

e. Modification to the flight control system, including software revisions within the flight control system or within systems that provide data to the flight control system.

f. New or modified propulsion system or its control system, including software.

g. Modification of the displays, annunciation or critical information presented to the aircrew or operator which may affect situational awareness, aircraft control, weapon/store release and weapon system employment.

h. Installation of equipment, including Non-Developmental Items (NDI) or Commercial-Off-The-Shelf (COTS) systems, mounted to the air vehicle (whether interior or exterior) that is not part of the configuration authorized by NATOPS.

i. Changes to a UAS or target system, including the remote control station, data links, flight control system, communications systems/links, unique launch and recovery equipment, etc., as well as the air vehicle. Changes include hardware, firmware, and/or software.

j. Modification of the ALSS.

k. Modification of any aircraft subsystem interfacing with and affecting flight operations, propulsion, or weapons control, e.g., mission computer, radar, and navigation, warning systems.

(1) When required, flight clearances for mission planning systems shall be requested by the platform making use of the system.

(2) If a mission planning system produces an artifact that, when loaded into the aircraft computer, affects flight controls, autopilot, automatic weapons release, etc. that is not already covered in NATOPS or NATIP or another flight clearance document, then a flight clearance is required.

(3) When no airworthiness or SOF impact is present, no flight clearance is required.

(4) For mission planning systems the platform class desk officer shall determine the need for a flight clearance with input from the weapons and/or mission planning system class desk. If the platform class desk has any doubt, the class desk should request advice from AIR-4.0P. AIR-4.0P will provide advice according to prevailing policy and best engineering practices.

l. Carry-on, carry-off, Roll-on, Roll-off equipment that either interfaces directly with aircraft systems and/or has potential to interfere with aircraft systems, including mission related electronic and/or battery powered devices of any kind.

m. Flight test instrumentation, including, but not limited to; wingbooms, nosebooms, sensitive gauges, and camera pods.
2. New or Modified Envelope. Examples of flight envelope changes requiring a flight clearance include, but are not limited to:

a. Envelope expansion, evaluation of crosswind landing or wet runway landing limits, Instrument Meteorological Conditions (IMC) flight (see NAVAIRINST 13034.3, Procedures for Obtaining Authorization for Flight in Instrument Meteorological Conditions), emergency procedures, structural or flight control limits, wind envelopes, dynamic interface limits, air show procedures, or helicopter external lift, cargo hook system, and tow limits.

b. Use of flight test techniques and/or procedures that are non-standard. Non-standard techniques and procedures are those that are planned for flight test and are not generally accepted by the aviation community in a formal publication such as the United States Naval Test Pilot School or United States Air Force (USAF) Flight Test Manuals, equivalent Non-Department of Defense (DoD) Government Agency Manuals (such as National Aeronautics and Space administration (NASA)), published Industry Standards, or DON program unique flight test practices and guidelines agreed to between the appropriate technical area and the test team such as those delineated in the F/A-18E/F Maneuver Test Library. Examples of "standard" techniques include pitch, roll, and yaw doublets at constant frequency or amplitude. Example of "non-standard" technique would include a pitch, roll, and yaw doublet at increasing frequency and amplitude.

c. Intentional operation in degraded mode for test purpose not covered by NATOPS (e.g., simulation of partial loss or malfunction of flight control system, engine, avionics, etc.), this includes testing of the failure mode and establishing limits and envelopes for this mode.

3. Missions or flight profiles that are outside of the scope of the intended use of NATOPS. Examples include, but are not limited to: Airshows or Flight Demonstrations (as defined by reference (c)). Airshows and Flight Demonstrations introduce unique technical challenges that need to be considered in light of the different mission aspects when compared to the as-designed missions reflected in NATOPS. Simply put, NATOPS are not written with the airshow/flight demonstration “mission” in mind. Coordination with the appropriate Program Office Systems Engineering (class desk) and unit conducting the airshow is required to ensure the planned maneuvers and flight profile are conducted within the bounds of an existing flight clearance when possible, or if a specific airshow/flight demonstration flight clearance is required.

Appendix A – Acronyms

AA – Airworthiness Authority
ACC – Aircraft Controlling Custodian
ALSS – Aviation Life Support Systems
APMSE – Assistant Program Manager for Systems Engineering
AQP – Airworthiness Qualification Plan
ARC – Aircraft Reporting Custodian
ASN(RD&A) - Assistant Secretary of the Navy for Research, Development and Acquisition
ATM – Air Traffic Management
ATO – Authorization to Operate
CAS – Contracted Air Services
CCB – Configuration Change Board
CDA – Commercial Derivative Aircraft
CM – Configuration Management
CNAF – Commander Naval Air Forces
CNO – Chief of Naval Operations
CNS – Communication, Navigation, Surveillance
COA – Certificate of Authorization
DAA – Designated AADCCB – Decentralized Change Control Board
DCMA – Defense Contract Management Agency
DON – Department of Navy
DT – Developmental Testing
EDRAP – Engineering Data Requirements Agreement Plan
ECP – Engineering Change Proposal
FAA – Federal Aviation Administration
FC – Flight Clearance
FCA – Functional Configuration Audit
FCO – Flight Clearance Officer
FCP – Flight Certification Plan
FCR – Flight Clearance Releaser
FCRA – Flight Clearance Releasing Authority
FOT&E – Follow-on Operational Test and Evaluation
GFR – Government Flight Representative
HERO – Hazards of Electromagnetic Radiation to Ordnance
IC – Interim Change
IPT – Integrated Product Team
IFC – Interim Flight Clearance
IMC – Instrument Meteorological Conditions
LAA – Limited Airworthiness Agent
MIL-HDBK – Military Handbook
NAS – National Airspace System

NASA – National Aeronautics and Space Administration
NAT – National Airworthiness Team
NATIP – Naval Aviation Technical Information Product
NATOPS – Naval Air Training and Operating Procedures Standardization
NAVAIR – Naval Air Systems Command
NAVAIRINST – NAVAIR Instruction
NAWDC – Naval Aviation Warfighting Development Center
NTTP – Naval Tactics, Techniques, and Procedures
OEM – Original Equipment Manufacturer
OPNAV – Office of the Chief of Naval Operations
OPNAVINST – OPNAV Instruction
OT – Operational Testing
PAO – Public Aircraft Operation
PCA – Physical Configuration Audit
PEO – Program Executive Officer
PFC – Permanent Flight Clearance
PMA – Program Manager Air
RCC – Range Commander's Council
RDT&E – Research, Development, Test and Evaluation
RMF – Risk Management Framework
RR – Rapid Response
SE – Systems Engineering
SECNAVINST – Secretary of Navy Instruction
SEP – Systems Engineering Plan
SFF – Safe For Flight
SMS – Safety Management System
SOF – Safety of Flight
SSRA – System Safety Risk Assessment
STC – Supplemental Type Certificates
TAA – Test Airworthiness Agent
TAE – Technical Area Expert
TC – Type Certificates
TD – Technical Directive
TFCO – Test Flight Clearance Officer
T/M/S – Type/Model/Series
TYCOM – Type Commander
UA – Unmanned Aircraft
UAS – Unmanned Aircraft System
U.S. – United States
USA – United States Army
USAF – United States Air Force
USC – United States Congress
USCG – United States Coast Guard

USMC – United States Marine Corps

Appendix B – Definitions

1. Airworthiness. The property of an air system configuration to safely attain, sustain, and terminate ("complete" in case of Unmanned Aircraft Systems (UAS)) flight per approved usage limits.

2. Airworthiness Authorities (AA). Naval Air Systems Command (NAVAIR) Airworthiness Directorate (AIR-4.0P) Director, Military Director, and Deputies are responsible for all operations of AIR-4.0P and airworthiness support for the Department of the Navy (DON). The AAs are empowered by the Commander, NAVAIR (AIR-00) and authorized to release all DON flight clearances.

3. Aircraft Controlling Custodian (ACC). A Naval administrative function within major commands exercising administrative control of assignment, employment, and logistic support of DON aircraft and engines, as assigned by the Chief of Naval Operations. The command exercising administrative control of assignment, employment, and logistic support of aircraft.

4. Aircraft Owner. All Navy aircraft, including unmanned aircraft, are owned by the DON. To facilitate management of aircraft the Navy operates in terms of Custody either ACC or Aircraft Reporting Custodian. Program Offices do not own aircraft nor do TYCOMs. Contracted aircraft are owned by the contractor but the DON becomes responsible for the airworthiness and continuing airworthiness of those contractor owned aircraft when the aircraft are supporting PAO or State operations.

5. Aircraft Pedigree. An accounting of the history of an aircraft from its production to its current condition. This includes documentation of the original and subsequent design and airworthiness certifications, ownership, configuration changes, maintenance records, flight envelopes, usage, qualifications of operators and maintainers, incidents and discrepancies, the current aircraft material condition, and any other applicable information in the aircraft-service history.

6. Aircraft Reporting Custodian (ARC). A Naval administrative function, assigned by the ACC, at the lowest organizational level; to account for, provide information about assigned

aircraft, or support equipment. This does not necessarily imply or require physical custody.

7. Aircrew. Personnel located within the air vehicle with duties assigned to operate or assist in the aircraft system operation.

8. Authorization to Operate (ATO). The document stating that the system has been approved by the cognizant RMF authorizing official for operation within the Navy or Department of Defense enterprise based on assessment establishing an acceptable level of risks.

8. Aviation Life Support System (ALSS). Equipment required for aircrew to operate aircraft and for aircrew flight safety including aircraft escape system, special environmental protective system, personal parachute system, aviator's personal protective and survival equipment, aircrew mounted mission systems (e.g., night vision goggles), search and rescue gear, and aircraft fixed seat system. The man-mounted ALSS standard configuration is identified in the Aviation Crew Systems Technical Manual for Aircrew Protective Equipment, NAVAIR Document 13-1-6-7-1.

9. Aircraft System. A manned or unmanned fixed wing, rotary wing, tilt rotor aircraft, vertical and/or short take-off and landing (V/STOL) aircraft, airship, manned balloon, or aerial target. Aircraft systems include all onboard hardware, firmware, and software, equipped with or without stores. Store loading is considered to be part of the aircraft system. The remote control station, UA launch and recovery, and data link systems for unmanned aircraft are also part of the aircraft system. Unmanned tethered aerostats and balloons are not considered aircraft or aircraft systems.

10. Civil Aircraft. Aircraft, other than public aircraft, per 49 U.S.C. § 44101. The FAA is the AA for all civil aircraft, as well as the licensing of civil pilots and mechanics.

11. Commercial Derivative Aircraft and Aircraft System. Any aircraft system having a basic design previously certified by the Federal Aviation Administration, or other equivalent AA that is adapted to perform specific DON missions.

12. Continued Airworthiness: All the tasks (e.g., maintenance, configuration control, etc.) to be conducted to verify that the conditions under which a flight clearance have been granted are still valid to ensure the safety of the aircraft at any time.

13. Continuing Airworthiness. Aspects of airworthiness that go beyond initial engineering analysis of the aircraft system to include, maintenance, configuration management, training of aircrew and maintainers, ordnance handling, parts management, and safety management systems (SMS), all which serve to ensure the safe continued operation of the aircraft system.

14. Cybersecurity. Measures that protect and defend information and information systems by ensuring their availability, integrity, authentication, confidentiality, and non-repudiation. These measures include providing for restoration of information systems by incorporating protection, detection, and reaction capabilities.

15. Designated Airworthiness Authority (DAA). The AIR-4.0P Chief Airworthiness and Senior Airworthiness Engineers and other designated personnel who are empowered by AIR-00 and authorized to release all DON flight clearances.

16. Engineering Data Requirements Agreement Plan (EDRAP). The EDRAP represents the negotiated written agreement established during the flight clearance planning process between the Integrated Product Team or Externally Directed Team leader and the Technical Area Experts. The written plan shall contain a detailed description of the engineering data that the competencies require to establish the system airworthiness with confidence. It should be understood that not all characteristics of a system or planned test can be known well ahead of the system development or test plan development. Therefore some deviation from the original EDRAP agreement should be expected as detailed knowledge of the system or test becomes available. See reference (e) for additional information on EDRAP formats.

17. Firmware. Firmware is the programmable content of a hardware device, which can consist of machine language instructions for a processor or configuration settings for a fixed-function device and gate array or programmable logic

device. A common feature of firmware is that it can be updated post-manufacturing by electronic means (reprogramming).

18. Flight Clearance. A flight clearance is a formal document that provides assurance of airworthiness and safety of flight (SOF), and ensures system safety risk has been identified and accepted at the appropriate level, within acceptable bounds for the intended mission.

19. Flight Clearance Facilitator. Individual tasked to assist in development and progression of the draft flight clearance as the document advances through the engineering review of airworthiness. Facilitators are generally aircraft platform specific and funded by the respective program office.

20. Flight Clearance Process. The process by which an independent engineering analysis is performed to provide assessment of airworthiness and safety of flight, and ensure that system safety risk has been identified and accepted at the appropriate level, within acceptable bounds for the intended mission, resulting in issuance of a flight clearance.

21. Interim Flight Clearance (IFC) Flight Envelope Restriction. An IFC issued by AIR-4.0P to restrict operations (other than full grounding), due to safety issues. It specifies the restriction, an explanation of the restriction and conditions that must be followed to allow the restriction to be lifted.

22. Limited Airworthiness Agents (LAA). The Flight Clearance Releasing Authority empowered by the AA to release IFCs at diverse levels of authority according to their experience and abilities. These empowered LAAs exist at various sites as required for convenience and operational efficiency.

23. Mission Equipment. Any piece of equipment (electrical or otherwise), on an aircraft that is used to fulfill an aircraft's particular mission or task during takeoff, flight, and landing. Mission equipment may be carry-on or carry-off.

24. National Airworthiness Team (NAT). The NAT represents the cross competency group of empowered personnel dedicated to the processing, tracking, and issuance of NAVAIR flight clearances. The NAT is headed by the civilian and military airworthiness director(s). The empowered personnel at various sites,

including AAs, DAAs, Test Airworthiness Agents (TAAs), and LAAs, in conjunction with the AIR-4.0P support staff and facilitators constitute the NAT.

25. Nonstandard Configuration. Any aircraft system configuration, including stores, onboard avionics, software not approved via published NAVAIR technical publications (maintenance manuals), Technical Directives (TDs), Naval Aviation Technical Information Product (NATIP), or Naval Air Training and Operating Procedures Standardization (NATOPS). Published TDs include Formal Changes, Interim Changes, Rapid Action Minor Engineering Changes, and Bulletins per NAVAIR 00-25-300. Nonstandard configurations include but are not limited to changes in external configuration, changes to hardware, firmware, software, modification, change in personal flight equipment, modification to an external store, modification to payload, changes to Ground Control Station hardware, or software for an UAS.

26. Nonstandard Operating Envelope or Limits. Any operating envelope or limit not authorized by the NATOPS, NATIP, or NAVAIR-approved operator manual.

27. Operator. Personnel not located within the air vehicle with duties assigned to operate or assist in the aircraft system operation. Typically remote control station staff for UA and UAS.

28. Pre-accepted. A Pre-accepted aircraft is an aircraft system for which development or procurement has been funded by the Government and where the Navy retains an equitable interest in the aircraft, and which has not been accepted into the Naval aircraft inventory.

29. Public Aircraft Operations (PAO). The U.S. Armed Forces considers an aircraft operation "Public" when the aircraft is owned by the Armed Forces, or is used by the Armed Forces and operates outside of the purview of its FAA airworthiness certificate (e.g., configuration, operational use, or maintenance) and applicable operating regulations under 14 CFR. See 49 U.S.C. § 40102 (a)(41) and 41 U.S.C. § 40125. FAA Advisory Circular 00-1.1 provides guidance on whether operations are public or civil. For additional information see the NAVAIR PAO knowledge portal:

https://myteam.navair.navy.mil/corpapps/ams/home/pao/sitepages/default.aspx .

30. Software Levels. Changes to software and/or firmware are divided into levels according to software criticality, type of change, and what systems in the aircraft systems are affected, see reference (h).

a. Safety Critical Software (Level I): Includes software and/or firmware products that:

(1) Directly control the flight dynamics of the aircraft. Examples are flight control computer software and engine control software;

(2) Directly control a flight critical system, provided there is not a backup system that is immediately available if the primary fails. Example is software within the Heads Up Display that controls how and where flight critical information is displayed when no backup attitude display is available;

(3) Provide flight critical data to a flight critical system provided there is not a backup system that is immediately available if the primary fails. Examples are attitude, airspeed data provided by the inertial navigation system, and air data computer without secondary sources; or,

(4) Control the release timing of stores and/or the flight dynamics of stores within the stores separation region. Example is release timing software within the Stores Management Set.

b. Safety-Related Software (Level II):

(1) Includes software and/or firmware that provide critical data to flight critical systems and in-flight management systems that control primary warning or caution systems, fire suppression, stores release systems, essential attitude, and navigation instruments that have independent backup systems immediately available.

(2) Software and/or firmware that provide non-critical data to flight critical systems and in-flight management systems

that control aircrew or operator advisories, stores release systems, and navigation instruments. Examples include:

(a) F/A-18 Mission Computer, and Cockpit Display Software that is not flight critical (e.g., fuel displays or engine instruments that have an independent backup);

(b) Inertial Navigation Systems that have independent backup attitude systems immediately available; and,

(c) Environmental control systems with independent warning or caution systems.

c. Non-Critical Software (Level III): Software, firmware that controls, and/or provides data to perform non-flight critical functions. Examples include radar warning receiver and fire control radar.

31. Safety of Flight (SOF). The property of an air system configuration to safely attain, sustain, and terminate ("complete" in case of UAS) flight (to include in-flight or post-flight aircrew survivability), within prescribed and accepted limits for injury or death to personnel, damage to equipment, property, and/or environment.

32. State Aircraft. For the purposes of this instruction, a "public" aircraft operating outside of U.S. National Airspace is referred to as a "state" aircraft.

33. Store. Any device intended for internal or external carriage or mounted on aircraft suspension and release equipment, whether or not the item is intended to be separated in flight from the aircraft. Stores include missiles, rockets, missile, rocket launchers, bombs, mines, torpedoes, sonobouys, fuel tanks, aerial targets, countermeasures (chaff, flares, and decoys), all types of pods, and dispensers (e.g., refueling, gun, instrumentation, electronic, cargo, bomblet, countermeasures, and chemical spray). Items dispensed from pods and dispensers are part of the store, and are also stores, and therefore are subject to the applicable portions of the requirements herein. Aircraft thrust augmentation devices such as Jet Assisted Takeoff units or auxiliary engines, are not included. Specific equipment items mounted outside aircraft mold lines may be defined as a store by the procuring activity;

for example, the PAVE PENNY and LANTIRN pods were considered stores even though they are mounted to special pylons not incorporating store suspension equipment.

34. Suspension Equipment. A device such as a rack, adapter, missile launcher, or pylon; used for store carriage, employment, and/or jettison.

35. Test Airworthiness Agents (TAA). The Test Flight Clearance Officers manage the test flight clearance process and are empowered by the AAs to release all test IFCs.

36. Termination of Flight. The point at which the air system is no longer under power at the completion of a mission, or the mission is concluded as a result of a crash landing or ejection.

37. TYCOM. Refers to commands that have responsibility for the readiness of their forces, which includes maintenance and logistics as well as the assignment and training of their personnel. TYCOMs are responsible to train, man and equip fleet forces. Each of the two Fleet Commanders-in-Chief has subordinate "type" commanders who supervise specific categories of forces and activities (e.g., Naval Air Force, Naval Surface Force and Submarine Force). The Commander, U.S. Naval Air Forces, Pacific Fleet (COMNAVAIRPAC) is designated as the Commander, Naval Air Forces (CNAF) for the U.S. Fleet Forces Command, with the Commander, U.S. Naval Air Forces, Atlantic Fleet (COMNAVAIRLANT) as his deputy.

38. UA. A remotely piloted or autonomous air vehicle designed for purposes other than as a direct-to-target weapon of destruction. Targets, long-loiter weapons, and weapons originally designed to be aircraft are considered to be UA. Conventional missiles, cruise missiles, and guided bombs are not considered UA.

39. UA System. A UAS is an UA and its remote operating system. The operating system can be built into the vehicle or be part of the support equipment for remotely piloted vehicles. This "system" includes the remote control station, data links, flight control system, communications systems and links, UA-unique launch and recovery equipment, etc., as well as the air vehicle. The remote control station may be located on the ground (stationary or mobile), on a ship, submarine, aircraft, etc.