DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL OPERATIONS
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WASHINGTON, DC 20350-2000

OPNAVINST 13210.1A
N88
SEP 03 2009

OPNAV INSTRUCTION 13210.1A

From: Chief of Naval Operations

Subj: NAVAL AVIATION POLICY FOR AIRCRAFT SAFETY SYSTEMS AVIONICS

Ref: (a) CNO WASHINGTON DC 102155Z Apr 06
(b) SECDEF Memo of 22 Jun 06, Reducing Preventable Accidents
(c) OSD Memo of 11 Oct 05, Military Flight Operations Quality Assurance implementation
(d) SECNAV Memo of 02 Feb 06, MFOQA Implementation
(e) COMNAVSAFECEN ltr 3750 Ser 13/0414 of 15 Mar 01
(f) The European Organisation for Civil Aviation Equipment (EUROCAE) ltr ED-112 of Mar 03 (NOTAL)
(g) CJCSI 3170.01F
(h) OPNAVINST 5100.24B

Encl: (1) Sample Waiver Request

1. Purpose. To update policy on the incorporation and installation of required avionics safety systems in Navy and Marine Corps aircraft. This instruction is a complete revision and should be reviewed in its entirety.

2. Cancellation. OPNAVINST 13210.1.

3. Background. In December 1996, the Chief of Naval Air Forces-chaired Air Board sponsored the Human Factors Quality Management Board (HFQMB) to conduct an analysis of aircraft avionics safety systems. The study addressed flight incident recorders, flight data recorders, global positioning system navigation equipment, ground proximity warning systems, collision avoidance systems and integrated material diagnostic systems. The Air Board concurred with the HFQMB findings that incorporation of these systems was necessary to achieve Naval aviation mishap reduction goals established by the Secretary of Defense (SECDEF). As highlighted in reference (a), additional emphasis on these requirements is necessary to meet the SECDEF goal of a 75 percent reduction in preventable mishaps from the Fiscal Year 2002 baseline. The urgency was further emphasized

in reference (b) by the Secretary's direction that "We will fund as a first priority those technologies and devices that save lives and equipment. We will retrofit existing systems, and consider these devices as a 'must fund' priority for all new systems." Additionally, the rapid advancement of technology requires updating the descriptions of the avionics safety capabilities listed below in paragraph 4, to keep pace with current best practices and initiatives. Reference (c) mandates Department of Defense-wide implementation of Military Flight Operations Quality Assurance (MFOQA), with reference (d) providing implementation guidance for all Department of the Navy aircraft.

4. Discussion. The background above clearly indicates that technologies are available and mature to help keep our military aircraft and their aircrew safer to continue carrying out their primary missions. The following four safety capabilities are required, with specific safety criteria to meet compliance:

a. Controlled Flight Into Terrain (CFIT) Avoidance. CFIT avoidance systems use on-board sensors, digital terrain databases, and/or external signals to determine dangerous proximity to or closure toward terrain and provide cues and warnings to the aircrew. Sensor only systems have evolved into systems that combine sensor information with aircraft position, velocity vectors and local terrain topography to predict future flight-path conflicts, and give appropriate direction to the aircrew on how to best avoid the impending impact. Depending on the platforms' avionics architectures, each system integration needs to account for both the flight environment and performance characteristics of the aircraft Type/Model/Series (T/M/S). In order to be considered compliant for CFIT avoidance, the system shall be required to meet the following criteria:

(1) CFIT protection capability:

(a) Use real-time aircraft data such as altitude, position, velocities and accelerations in all axes.

(b) Recognize an impending collision with terrain.

(c) Provide a warning early enough to allow the pilot to safely avoid impact.

(d) Operate over water, level and descending terrain.

(e) Provide protection under all weather and illumination conditions.

(f) Provide protection throughout the entire flight regime during all normal aircraft maneuvers, to include takeoff and landing.

(g) Additionally, forward looking protection to account for varying/rising terrain should be considered.

(2) Pilot Vehicle Interface (PVI) capabilities:

(a) Provide aural, visual, and/or tactile signal warnings.

(b) Be audible and intelligible over all other cockpit communications and ambient noise.

(c) Convey a sense of urgency and be easily understood by the pilot.

(d) Voice warnings shall have the highest priority over other queued voice warnings and tones.

(e) Persist for entire duration of the warning condition.

(f) Require no inputs from the pilot or additional crew members for normal operation.

(g) Be capable of pilot initiated suppression of cueing, with default to "ON" at power-up.

(h) Provide system output data to the aircraft recording system even when pilot cueing is suppressed.

(i) Minimize nuisance warnings.

(j) The system should also be directive in nature and provide appropriate actions to take for the given situation.

Note: reference above to "pilot or additional crew members" is left to the discretion of the platform to determine which, if any, cues are made available to other than the pilot in command. The decision may impact integration and test funding, and may impact crew coordination training as well.

b. Crash Survivable Recorder (CSR). CSR capability is designed to record and protect aircraft information in-flight to aid the determination of mishap causal factors. A modern CSR combines the functions of both a flight data recorder and flight instrument recorder, including aircraft performance, aircraft system status, and cockpit voice and/or video recording, into a single digital data retention system, which is designed to survive or avoid the destructive forces of an aircraft crash. These "black boxes" are the commercial standard. In the past, these systems were recovered post-mishap and used solely for investigation purposes. Currently, they are a potential source for MFOQA data, and a properly designed CSR system could provide data for both functions, resulting in significant cost savings. A CSR may be fixed, deployable, or telemetric in design, each having desirable attributes depending on the application. A cost benefit analysis during design is appropriate to determine which type has the lowest life cycle cost and highest reliability. In no way shall the term CSR be construed to mean a fixed recorder-only solution. In order to be considered compliant for CSR, the system shall be required to meet the following criteria:

(1) CSR capability:

(a) Record aircraft parametric and audio data for the purpose of aiding the determination of cause(s) in the event of a mishap.

(b) Record parameters conforming to reference (e), or its successor in force at the time of the production/install decision for the respective platform. This information includes minimum recording times, with capture of the entire flight most desirable but a minimum of 30 minutes.

(c) Provide data survivability in a crash environment (fixed - on aircraft), through ejection from the crash environment (deployable), or an off-aircraft telemetry method.

(d) Be designed to meet the survivability standards per reference (f), or successors in force at the time of the production/install decisions.

(2) Tailoring of the parameter list may be requested for a particular T/M/S after a cost-benefit analysis is performed to accommodate specific platform unique requirements/restrictions.

c. Airborne Collision Avoidance System (ACAS). ACAS provides cues and warnings to the aircrew of conflicting air traffic. ACAS capability is being mandated in selected regions of the world as required equipment for operations in civil/commercial air routes. The Traffic Alert and Collision Avoidance System is a commercial standard. Commercial systems do not satisfy tactical aircraft and military helicopter requirements due to platform mission profiles and performance dynamics. Research and development efforts are underway to address solutions for these platforms. Current development efforts focus on providing the aircrew with warnings without having directive maneuver recommendations. This capability would provide "conflict avoidance" capability vice "collision avoidance." All aircraft shall program for ACAS capability as soon as a solution for tactical, helicopter, and tilt rotor aircraft is available. In order to be considered compliant for ACAS, the system shall be required to meet the following criteria:

(1) Airborne collision avoidance protection capability:

(a) Recognize an impending collision with other aircraft and provide advisories and warnings early enough to allow the pilot to safely avoid impact.

(b) Provide protection under all weather and illumination conditions.

(c) Provide protection throughout the entire flight regime during most normal aircraft maneuvers, to include takeoff and landing.

(d) The unique needs of tactical aviation may preclude protection during certain operational flight maneuvers (e.g., formation flight, aerial refueling, aerial combat, etc).

(2) PVI capabilities:

(a) Provide aural, visual, and/or tactile signal warnings.

(b) Be audible and intelligible over all other cockpit communications and ambient noise.

(c) Convey a sense of urgency and be easily understood by the pilot.

(d) Provide flight crew advisories of surrounding air traffic (situational awareness).

(e) Provide flight crew warnings of aircraft posing a potential midair collision (conflict avoidance).

(f) Persist for entire duration of the warning condition.

(g) Require no inputs from the pilot or co-pilot for normal operation.

(h) Be capable of pilot initiated suppression of cueing, with default to "ON" at power-up.

(i) Provide system output data to the aircraft recording system even when pilot cueing is suppressed.

(j) Minimize unnecessary advisories and warnings.

(k) It is desired that all warnings should be directive in nature and provide appropriate actions to take for the given situation (collision avoidance).

d. MFOQA. MFOQA is a knowledge management process consisting of post flight, off-aircraft analysis of flight data downloaded after every flight. It provides aircrew, maintenance personnel, and leadership the capability to review flight operations with a quantitative analysis of aircrew and aircraft system performance, and long term trends measuring the safe and efficient use of the aircraft. Analysis is available locally, immediately after each flight, and can be applied in the aggregate across all flight records stored in an enterprise

MFOQA database. MFOQA will aid in risk management and improve readiness across the spectrum of operations, including maintenance, operations, safety and training, from the squadron to enterprise levels. The maintenance aspect of MFOQA supplements current maintenance procedures and processes and does not replace any systems. The Navy MFOQA Program of Record is the approved enterprise solution for Naval aircraft. Other solutions, however, may be required to satisfy unique Naval air operations requirements.

(1) Aircraft data:

(a) Utilize aircraft data downloaded after every flight to achieve immediate analysis capability.

(b) Downloaded data will be available for review and analysis within 30 minutes after the induction of the data into the supporting ground station computer system.

(c) Require data of sufficient quality (content, frequency, accuracy, resolution, capacity) such that the craft flight can be reconstructed, to include post-flight animated replay. At minimum, a threshold set of parameters are required to analyze the aircraft time-history position in space, and additional parameters are required for analysis of each system of interest. MFOQA parameter characteristics are described in Commander, Naval Air Systems Command (NAVAIR) system specification for MFOQA (PMA209-6001/R-series). Other than the threshold parameters for aircraft time-history position, there is no "required" list. Any other parameters are optional and subject to cost/benefit analysis as to whether or not it should be recorded. As a rule of thumb, any parameter already transduced and in the aircraft data stream is worthy of capture.

(d) Translate data from the native, raw, aircraft format into a standard format described in the NAVAIR MFOQA System specification series documents.

(e) Managed aircraft data locally such that it is maintained at the local level for a sufficient period of time and is automatically translated and sent via an approved electronic connection to the centralized enterprise server.

(2) Database interfaces:

(a) Access an aircrew information system such as the Type Commander Readiness Monitoring System to acquire data about the aircrew as part of each flight record.

(b) Access an aircraft information system, such as the Automated Intelligence Information Reporting System to acquire data about the aircraft as part of each flight record.

(3) Accessibility: Be accessible by authorized users via the Navy Marine Corps Intranet One-Net/Information Technology-21 shipboard intranet system network (or subsequent) in use in the local area.

(4) Reporting:

(a) Provide post mission aircrew debrief capability.

(b) Provide aircraft maintenance and troubleshooting capability. This criteria does not replace existing maintenance reporting requirements, but should complement existing programs for each T/M/S.

(c) Provide flight data analysis capability.

(d) Provide mishap investigation support capability to aid in the determination of causal factors.

(e) Provide capability to automatically generate reports periodically (time based), responsively (event based), and ad hoc (on user demand).

5. Requirements Documents. The requirements set forth in paragraph 4 above shall be incorporated in required capabilities documents developed under the provisions of reference (g). Compliance shall be verified and documented in milestone reviews.

6. Commonality. Preferred solutions for required avionics safety systems should be common across multiple platforms. Where independent solutions are developed, a business case analysis shall demonstrate an overall cost savings, considering total life cycle costs based upon system integration,

procurement, and life cycle management or a well defined need for a unique solution for a specific T/M/S. Program managers and Requirements Officers (RO) will prioritize integration and installation of each required safety system when funded by the resource sponsor. When cost effective, commercial-off-the-shelf solutions shall be utilized. Where reasonable, safety systems should be combined into multi-functional solutions for cost savings, ease of integration, and footprint/weight savings. This includes transferring specific hardware equipment into increased capability software solutions when they become available. When commercial standards and technology do not support a military aircraft solution, a research and development initiative shall be created and funded to address the deficiency. The Director, Air Warfare Division (OPNAV (N88)) and NAVAIR Air Combat Electronic Program Manager (PMA209) must aggressively seek science and technology and research and development opportunities. All new or modified systems shall be reviewed for potential joint program designations to gain further cost and commonality efficiencies.

7. Waivers. The policy set forth in this directive applies to all Navy and Marine Corps aircraft. Requests for exception to the policy shall be submitted for waiver approval on a case-by-case basis.

a. Requests for waiver shall be forwarded to OPNAV (N88) per the sample provided in enclosure (1). Requests shall include the following:

(1) T/M/S affected.

(2) Capability requiring waiver.

(3) Justification for the request.

(4) Assessment of risk involved per reference (h).

(5) Actions taken and plan, including schedule, for bringing the T/M/S into compliance.

b. Requests for waiver may be initiated by platform sponsors, program managers, or any activity having funding/ownership responsibility for a particular T/M/S. Requests should be directed to the T/M/S RO who will coordinate

with the Avionics Safety Systems (OPNAV (N883C1) RO for appropriate approval within OPNAV (N88). Issuance of an approved waiver provides relief only from the specific capability and is an assumption/acceptance of the inherent risk of not equipping the applicable aircraft with the safety system or capability in question. The requests for waiver will be reviewed by OPNAV (N883C1) and the appropriate T/M/S RO. They will make recommendations to OPNAV (N88) regarding approval of the waiver, and the T/M/S RO will initiate the appropriate issue sheet to address safety requirements in the next Program Objective Memorandum/Program Review (POM/PR) cycle.

c. Waivers will be reviewed annually by OPNAV (N88) to determine progress with compliance plans. Issue sheets will be re-submitted as required until the waiver can be fiscally resolved.

d. Per reference (b), the intent of the waiver request described in subparagraph 7a will be used with the intent to employ the waiver process until such time as the required capability can be developed, integrated, tested, and installed.

8. Responsibilities

a. NAVAIR PMA209, in conjunction with Commander, Naval Safety Center (COMNAVSAFECEN), Aviation Safety Programs Directorate (Code 10), shall promulgate and maintain technical standards for the safety systems capabilities identified within this instruction. In addition, PMA209 will provide OPNAV (N88) technical support in the determination of T/M/S system compliance and maintain subject matter expertise concerning current industry safety system technology.

b. Head, Collaborative Warfare and Common Systems (OPNAV (N883C)) shall monitor and maintain the status of compliance with this instruction on a platform-by-platform basis. Coordination will be made with platform sponsors to identify and submit funding issues during the POM/PR process. Compliance with the policy set forth above will be evidenced by the presence of funding lines to support procurement and installation. Compliance for each T/M/S will be tracked in the form of a compliance matrix, which will also document any aircraft out of compliance and possessing a current and viable

waiver. OPNAV (N883C) will maintain and publish the compliance matrix at least quarterly, which will be used during the POM/PR process for establishing budget priorities.

9. Records Management. Records created by this instruction, regardless of media and format, shall be managed in accordance with Secretary of the Navy Manual 5210.1.

10. Reports Control. Reporting requirements contained within this instruction are exempt from reports control per Secretary of the Navy Manual 5214.1.

D. L. PHILMAN
Director, Air Warfare

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Sample Waiver Request

NAVAIR/PEO Ltr Hd

13200
Ser
Date

From: Program Executive Officer, XXX Programs (PMA2XX)
To: Director, Air Warfare (OPNAV (N88))

Subj: AVIONICS SAFETY CAPABILITY WAIVER REQUEST FOR XX HELICOPTER or AIRCRAFT

Ref: (a) OPNAVINST 13210.1A, NAVAL AVIATION POLICY FOR AIRCRAFT SAFETY SYSTEM AVIONICS

1. In accordance with reference (a), the following information is provided:

a. Type/Model/Series (T/M/S):

b. Capability Requiring Waiver: Controlled Flight Into Terrain, Crash Survivable Recorder, Collision Avoidance System, and/or Military Flight Operations Quality Assurance. List the specific criteria for each capability for which the waiver is being requested.

c. Justification for the Request: Is the capability not technically mature to integrate into this T/M/S? Are alternate options being considered?

d. Assessment of the Risk: Describe the risk level. Use COMNAVSAFECEN data to validate the risk level, with potential impacts to other aircraft systems/mission impacts highlighted.

e. Actions Taken and Plan to Achieve Safety Compliance: What has been accomplished to date? What is the platform's "get-well" plan? Does the plan address technology, integration, and funding issues?

f. Date by which waiver is needed? Why?

2. Document the point of contact for the platform PMA requesting the waiver here. The PMA209 counterpart with which this waiver has been coordinated should also be documented. List name, code, phone, and email address for each.