U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
National Policy

ORDER
4040.26B

Effective Date:
01/31/2012

SUBJ: Aircraft Certification Service Flight Test Risk Management Program

1. Purpose of this Order. This order identifies specific elements of Federal Aviation Administration (FAA) Order 4040.9, FAA Aircraft Management Program, Chapter 6, Safety Program, which are unique to the Aircraft Certification Service (AIR). AIR participants must observe all elements of Order 4040.9, Chapter 6 unless otherwise stated in this order.

2. Audience. The primary audiences for this order are AIR flight test pilots (FTP), aviation safety engineers (ASE), human factors specialists who participate in test programs, and managers involved with flight test activities. For the purpose of the AIR Flight Program and this order, both ASE and human factors specialists whose duties include flight testing are considered to be flight test engineers (FTE). For the purposes of this order, the term "flight test" includes both ground and flight tests. The secondary audience includes aircraft certification project applicants, designated engineering representatives (DER) and organization designation authorization (ODA) holders.

3. Where I Can Find this Order. This order can be accessed on the Web at: http://www.faa.gov/regulations_policies/orders_notices/ .

4. Cancellation. This order cancels Order 4040.26A, Aircraft Certification Service Flight Safety Program, dated March 23, 2001.

5. Explanation of Changes. The major changes update Order 4040.26A to make it more consistent with the requirements of a Safety Management System and include:

a. Changing the name of the order from Aircraft Certification Service Flight Safety Program to Aircraft Certification Service Flight Test Risk Management Program.

b. Moving the Flight Program Safety Officer duties from this order to the Flight Test Operations Manual (FTOM).

c. Clarifying who can be on a flight test airplane and under what circumstances.

d. Clarifying Significant Safety Event (SSE) reporting.

Editorial changes have also been made throughout the document.

6. Organizational Structure, Roles, and Responsibilities. The structure of AIR flight test organizations is variable. Some directorates are co-located with aircraft certification office(s) (ACOs), in which case there may be one flight safety officer (FSO) for the entire Directorate. Other directorates have several remote ACOs, and each ACO will have its own FSO.

a. Service Level. Per Order 4040.9, each flight program is responsible for developing and maintaining an operations manual that includes, among other things, the flight program's Safety Program. The AIR Flight Test Safety Program is defined in the Flight Test Operations Manual (FTOM). The AIR flight program must establish a safety committee and assign a flight program flight safety officer (FPFSO).

(1) The AIR Flight Program Oversight Committee (FPOC) fulfills the role of the safety committee required by Order 4040.9. The primary responsibility of the safety committee is to set safety goals and review safety-related recommendations. The FPOC reviews AIR's plans, policies, procedures, conditions, and instructions for recent flight experience, and the responsiveness to corrective recommendations.

(2) The FPFSO represents the highest level of flight safety management within AIR. The Director of the Aircraft Certification Service, AIR-1 (or as delegated), will appoint an FPFSO to manage the AIR Flight Safety Program. The AIR FPFSO will be a member of the FAA National Safety Council (NSC). This person must be a Flight Program participant. The duties of the FPFSO are detailed in the FTOM.

b. Directorate/ACO/Facility Level. AIR directorate/ACO managers will assign a directorate/ACO/facility FSO (FFSO) through a memorandum to the assignee. Facility, as used in this order, is the same as a "flight program organization" defined in FAA Order 4040.9, "…is any office, staff, service, directorate, center, division, branch, or field office operating FAA aircraft and/or having FAA Flight Program participants." The FFSO will report directly to the directorate/ACO manager on matters relating to aviation safety and risk management. The duties of the FFSO are detailed in the FTOM. An assistant FFSO may also be assigned for larger ACOs or co-located ACOs.

7. Flight Test Risk Management.

a. General. AIR's Risk Management (RM) program is implemented in accordance with 41 Code of Federal Regulations (CFR) 102-33.180 and 102-33.185, and Order 8040.4, Safety Risk Management, and is an integral part of AIR's safety management system. AIR's RM program ensures that hazards associated with the conduct of flight test are identified and eliminated or mitigated within established parameters. The AIR RM process must be performed and documented for all FAA ground and flight tests conducted under a Type Inspection Authorization (TIA) or Letter of Authorization (LOA). This order establishes the procedures for RM within AIR. The AIR RM process also applies to other flights where FAA flight test aircrews will participate (i.e., familiarization, company tests, proof of concept, etc.). The AIR RM process applies not just to certification flight tests flown by FAA flight test crews but also those that are delegated to DER test pilots and flight analysts (a.k.a., FTE), since they must

follow applicable orders. In addition, this process applies when official FAA certification flight tests are conducted in accordance with a TIA by a delegated organization. Applicants who will be conducting flight tests under an Organization Designation Authorization (ODA), must include in their procedures manual a RM process that complies with this order. Order 4040.9 currency flights in rental aircraft will normally be regarded as low risk with no separate RM documentation required.

b. Requirements.

(1) General. Applicants who are regularly engaged in activities requiring FAA certification flight tests should be encouraged to develop a RM process for ACO acceptance.

(a) Projects involving applicants with an FAA-accepted RM process.

1 Acceptance criteria. To be found acceptable by the ACO, the applicant's RM process must comply, as a minimum, with the requirements of this order. The ACO should ensure that appropriate items of the FAA Flight Test Briefing Guide (Appendix B) are incorporated in company-developed briefing guides. Acceptance of the RM process must be formally documented (see Appendix F for an example).

2 Order or company process changes: When changes to this order are made, previously accepted company RM processes should be reviewed to ensure they are still compliant with this order. If an applicant makes changes to their FAA-accepted RM process, then the applicant should forward the new process to the ACO for acceptance.

3 Project planning. Acceptance of a company RM process does not relieve the ACO or an ODA of responsibility to review each project's RM plan in order to assess the possibility of additional mitigating procedures.

4 Operations. In cases where flight testing is conducted with a company that has an accepted RM process, all AIR flight test crewmembers are expected to follow that company's process. Flight test managers and/or crews, however, always have the option to modify flight test profiles, procedures, and/or limitations as necessary to satisfy FAA safety concerns. The FAA always has the option to halt testing if it is felt the tests are not being conducted safely.

(b) Projects involving applicants without an FAA-accepted RM process. For those certification flight test projects where the applicant has no accepted RM process, the procedures specified in this order should be used to ensure proper RM. The RM process should be a collaborative effort between the applicant and the FAA.

(2) RM Administrative Procedures. RM must be documented within or attached to the TIA or applicable LOA. Appendices D and E contain examples of accepted RM documentation forms; however, other formats may be acceptable. Implementation and administrative procedures may be developed at the locally.

(a) Approval Authority. RM approval/signature must be commensurate with the pre-mitigation risk level. The authority to sign an RM approval is delegated as follows:

1 Low Risk - The project pilot or project FTE, if no pilot is assigned.

2 Medium Risk - The manager in charge of flight test or the lead project pilot for large programs where there is more than one pilot assigned. This authority may also be delegated to the FFSO or another ACO test pilot not associated with the program. The test pilot or FTE flying the test should not approve his or her own RM plan for medium risk tests.

3 High - The manager in charge of flight test or next higher management level if the flight test manager is the pilot flying the test.

(b) Documentation of RM. An RM review is required prior to signing the TIA or LOA. TIA and LOA approvals will be the vehicle by which management ensures that the AIR RM process has been accomplished for each TIA or LOA signed. Facility managers, flight test managers, or their designees will sign all TIAs. These managers must understand that by signing a TIA, they are stating that they have assessed and accepted the test risks involved with the project. Therefore, it is necessary for the manager or the manager's designee to ensure that RM is completed before signing the TIA. The RM process to be used for each test project will be determined by, and is the responsibility of, the facility manager or designee. Factors to be considered when making such a determination include, but are not limited to, type of tests, knowledge base of particular tests (first time vs. done many times in the past), level of sophistication demonstrated by the applicant (experienced aircraft manufacturer vs. limited flight test experience), and flight crew proficiency and currency in both the test method(s) and aircraft type.

c. Definitions. The terms defined for the purposes of this order are contained in Appendix A.

d. AIR RM Process. Below are the general steps involved before, during, and after flight tests. See Appendix C for a more detailed description of the process.

(1) *Before* flight test, the following RM steps should be taken:

(a) Identify the test technique involved.

(b) Identify the hazard(s) associated with the test technique.

(c) Identify other hazards, including experience, training, currency, preparation, schedule pressure, health issue, etc.

(d) List the cause(s) of each hazard.

(e) List the effect(s) of each hazard.

(f) Perform a subjective risk assessment by:

1 Estimating the probability of each hazard occurring; defined as improbable, remote, occasional, probable, or frequent.

2 Estimating the severity of each hazard, if it occurs; defined as no safety effect, minor, major, hazardous, or catastrophic.

3 Defining the risk of each hazard as a combination of the probability and severity; defined as low, medium, high, or avoid. See Appendix C, Figure C-1, the Risk Assessment Chart, and Appendix G, which lists example risk assessments.

(g) Describe the mitigation steps for each hazard. Develop controls that mitigate all risks to an acceptable level.

(h) Describe any emergency procedures to accomplish, should the hazard occur.

(i) Document the RM plan and convene an SRB, if necessary. See Appendices D and E for examples of RM documentation.

(j) Gain appropriate acceptance and approval of the RM plan.

(2) *During* the flight test, the following RM steps should be taken:

(a) Properly use pre-flight briefing checklists, including briefing of appropriate RM plan. See Appendix B for the required briefing guide.

(b) Maintain configuration/conformity.

(c) Constantly re-assess risk.

(d) Have and follow procedures for making changes to the test profile.

(3) *After* the flight test, the following RM steps should be taken:

(a) Perform a thorough debriefing. The briefing guide in Appendix B contains a section for the post-flight debrief.

(b) Capture and document lessons learned and recommendations.

8. Safety Event Reporting and Response. It is the intent of AIR to provide the highest level of safety while accomplishing all flight operations, particularly the certification mission which may involve a higher than normal degree of risk associated with flight testing of new or modified aircraft. To enhance operational safety, each Directorate/ACO will establish and maintain a program to identify and report accidents, incidents, SSEs, safety issues, and hazards. Throughout AIR, flight participants must report all accidents, incidents, and SSEs in accordance with Order 4040.9. Below are details of the various reports.

a. SSE Report. The SSE report is the main reporting tool used to report all flight test and Flight Program (rental aircraft) safety events. An SSE is any ground or flight event, including accidents and incidents as defined in 49 CFR part 830 that affects or could affect the safety of the test participants or aircraft (including rental aircraft). Figure 1 shows a copy of the SSE report form. SSEs are reported by DERs and ODAs. To ensure all certification flight test personnel are kept informed of SSEs, DERs and ODAs are to report any SSE through the AIR facility responsible for their oversight. The primary focus of SSE reporting is to document and disseminate information, to capture lessons learned, and to minimize the chance of another occurrence. This definition includes occurrences as defined in Appendix B of Order 4040.9. SSE reports will follow the format described in Figure 1. Submit part 1 of the SSE report, a general synopsis of the event, as soon as practical after the event. Part 2, the details and recommendations, may be completed with part 1, if known at the time, or submitted later when

data is available and a review can be conducted. Depending on the nature of the event, a more comprehensive part 2 of the SSE report will be prepared by the FFSO at the request of the FPFSO. The suspense for submitting the final report will be mutually agreed to by the FFSO and the FPFSO. The normal reporting chain is the FFSO, FPFSO, SFSO. Events to be reported include:

(1) Accidents or incidents as defined by 49 CFR part 830 as described in paragraph (2) below.

(2) Ground or flight events whose outcome:

(a) Affected the safety of a crewmember and/or test participant.

(b) Increased the identified level of risk.

(c) Was unexpected and developed, or could have developed into an unsafe condition.

(d) Involved aircraft damage (except for Rejected Takeoff (RTO) and other runway testing, where damage is sometimes expected; i.e., blown tires).

(e) Resulted in injury to personnel, damage to equipment or property, loss of material, or loss of use.

(f) Produced lessons learned which could be beneficial to the FAA.

FIGURE 1. AIR SSE Report

AIR Safety Significant Event Report

Part 1	*Date:*	*Time:* *Local* ☐ *GMT* ☐	*Location:*
A/C Type:			
Check if also an:	☐ *Accident (serious injury or substantial damage)* ☐ *Incident (affects or could affect the safety of operations. See CFR 49 part 830)*		
If one of the above is checked, who was it reported to:			
Purpose of Test:			
Personnel onboard and any injuries:			
Synopsis of Event:			

Part 2 *(complete with Part 1 if known)*		
Description of prior testing: *a) Company testing and results:* *b) Build-up to event condition:*		
Risk Management Process: *a) Implementation and effectiveness:* *b) Adequacy of mitigation procedures:*		
Contributing factors (leave blank if not applicable): *a) Weather:* *b) Training & pilot proficiency (FAA & Company):* *c) Adequacy of instrumentation/TM:* *d) CRM considerations:* *e) Adequacy of program management:* *f) Conformity issues:* *g) Other:*		
Lessons Learned:		
Recommendations (optional):		
Name of Submitter:	*Phone:*	*Email:*

When complete, email to AIR Flight Program Flight Safety Officer.

b. National Transportation Safety Board (NTSB) Reports. Per 49 CFR part 830, the items listed below are to be reported immediately to the NTSB. See 49 CFR part 830 for details of what data are required to be reported.

(1) Flight control system malfunction or failure.

(2) Inability of any required flight crewmember to perform normal flight duties as a result of injury or illness.

(3) Failure of any internal turbine engine component that results in the escape of debris other than out the exhaust path.

(4) In-flight fire.

(5) Aircraft collision in flight.

(6) Damage to property, other than the aircraft, estimated to exceed $25,000 for repair (including materials and labor) or fair market value in the event of total loss, whichever is less.

(7) For large multiengine aircraft (more than 12,500 pounds maximum certificated takeoff weight):

(a) In-flight failure of electrical systems which requires the sustained use of an emergency bus powered by a back-up source such as a battery, auxiliary power unit, or air-driven generator to retain flight control or essential instruments;

(b) In-flight failure of hydraulic systems that results in sustained reliance on the sole remaining hydraulic or mechanical system for movement of flight control surfaces;

(c) Sustained loss of the power or thrust produced by two or more engines; and

(d) An evacuation of an aircraft in which an emergency egress system is utilized.

(8) Release of all or a portion of a propeller blade from an aircraft, excluding release caused solely by ground contact

(9) A complete loss of information, excluding flickering, from more than 50 percent of an aircraft's cockpit displays known as

(a) Electronic Flight Instrument System (EFIS) displays;

(b) Engine Indication and Crew Alerting System (EICAS) displays;

(c) Electronic Centralized Aircraft Monitor (ECAM) displays; or

(d) Other displays of this type, which generally include a primary flight display (PFD), primary navigation display (PND), and other integrated displays.

(10) Airborne Collision and Avoidance System (ACAS) resolution advisories issued either:

(a) When an aircraft is being operated on an instrument flight rules flight plan and compliance with the advisory is necessary to avert a substantial risk of collision between two or more aircraft;

(b) To an aircraft operating in class A airspace.

(11) Damage to helicopter tail or main rotor blades, including ground damage, that requires major repair or replacement of the blade(s).

(12) Any event in which an operator, when operating an airplane as an air carrier at a public-use airport on land:

(a) Lands or departs on a taxiway, incorrect runway, or other area not designed as a runway; or

(b) Experiences a runway incursion that requires the operator or the crew of another aircraft or vehicle to take immediate corrective action to avoid a collision.

(13) An aircraft is overdue and is believed to have been involved in an accident.

c. Accident Response Plan. Each operating flight test organization within AIR must have an accident response plan reflecting pertinent steps to be taken by various office personnel in case of an aircraft accident involving locally assigned FAA personnel on official duty. Address the provisions and requirements of Order 4040.25, FAA Aircraft Accident/Incident Response Plan, and Order 8020.11, Aircraft Accident and Incident Notification, Investigation, and Reporting, in this plan. The accident response plan should be flexible enough to accommodate variations in the appropriate response. As an example, the variations should accommodate an accident that may occur because of flight activity within the scope of Order 4040.9, flight testing of an applicant's aircraft in conjunction with a TIA, an LOA, or assistance to field inspectors on some other authority (e.g., memo, record of telecon). The plan should also account for variations in the organizational structure of the office or facility involved, and the resources available to those personnel tasked with implementing the response plan. In order to assure currency of contacts and procedures, a desk top exercise of the accident response plan must be performed annually and documented by memo to the FPFSO.

d. Accident Investigation Responsibilities.

(1) General. The manager of the regional Flight Standards division is responsible for assuring that all aircraft accidents/incidents that occur in the division's geographic area of responsibility are investigated and reported to ensure the proper discharge of FAA responsibilities. The NTSB will investigate all accidents and incidents involving FAA aircraft or airmen (reference: Order 8020.11).

(2) AIR. The AIR FPFSO will recommend to AIR-1, through the flight program manager, the formation of an AIR mishap safety investigation team, when deemed necessary, in order to capture lessons learned from a procedural perspective. These investigations will be performed in coordination with the FAA Office of Accident Investigation and Prevention (AVP) and the FAA SFSO.

9. Safety Support.

a. Internal Evaluations. Formal safety evaluations will be conducted throughout the AIR flight program in conjunction with flight program audits, in order to assure the least possible interruption to normal operational or organizational activities. The Internal Evaluation Program (IEP) is administered and scheduled at the flight program level by the FPFSO. It is designed to identify opportunities for continuous improvement, and ensure compliance with 14 CFR, Order 4040.9, and other DOT/FAA directives applicable to the FAA flight program. Root cause analysis and corrective action plans are required for non-compliance findings. AIR IEP audits are designed for continuous monitoring of the flight program, and will be conducted by the FFSO on an annual basis, in accordance with Order 4040.9.

b. Participation in flight testing. Only qualified flight test crewmembers can participate in the full range of flight test activities conducted by the FAA. Qualified flight test crewmembers include FTPs and FTEs in the flight program who are current (or who have a waiver) on flight test requirements. These requirements include specified medical, physiological, and training requirements. Only qualified flight test crewmembers may participate on high risk tests as defined in this order. Other engineers are considered "qualified non-crewmembers" per Order 4040.9 and may participate on medium and low risk tests if all of the following requirements have been met:

(1) There is a requirement (assignment of work) for the participation of the engineer.

(2) The engineer has completed physiological training, to include altitude chamber qualification for any flight prior to completion of pressurization system certification requirements or where pressurization may be a concern.

(3) The engineer has attended the preflight briefing, to include emergency and egress procedures.

Note: When engineers not assigned to the flight program are assigned to fly on a flight test mission, a Letter of Authorization should be executed for the flight(s).

c. Crew Resource Management (CRM). AIR flight program participants are required to attend initial and recurrent CRM courses as outlined in the AIR FTOM.

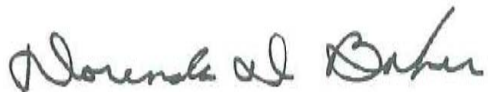
10. Distribution. This order is distributed to the branch level in AIR, directorates, and ACOs.

11. Suggestions for Improvement. Please forward all comments on deficiencies, clarifications, or improvements regarding this order to:

Aircraft Certification Service
Administrative Services Branch, AIR-510
ATTN: Directives Management Officer
800 Independence Avenue, SW
Washington, DC 20591

FAA Form 1320-19, Directive Feedback Information, is located as Appendix H to this order for your convenience. If you require an immediate interpretation, please contact AIR-200 at (202) 385-6346; however, you should also complete Form 1320-19 as a follow-up to the conversation.

12. Records Management. See FAA Orders 0000.1 **(**FAA Standard Subject Classification System) and 1350.15 (Records Organization, Transfer, and Destruction Standards), or your Records Management Officer/Directives Management Officer for guidance regarding retention or disposition.



Dorenda D. Baker
Director, Aircraft Certification Service

APPENDIX A. DEFINITIONS

The following terms are defined for the purposes of this order:

1. Cause - The reason why a hazard might occur; the producer of an effect.

2. Effect - That which is produced by the cause; consequence.

3. Emergency Procedures - The recommended steps in the event a hazard occurs.

4. Facility - Any office, staff, service, directorate, center, division, branch, or field office operating FAA aircraft and/or having FAA flight program participants.

5. Hazard - A condition, event, or circumstance, which could lead to an unplanned or undesired event (i.e., injury to personnel, damage to equipment or property, loss of material, or loss of function).

6. Letter of Authorization (LOA) – A letter from management that authorizes FAA personnel to fly onboard non-FAA aircraft for other than certification flights under a TIA (e.g., technology demonstrations, production surveillance, type validations). The LOA must contain a risk assessment section and be approved by the appropriate level of authority based on that risk.

Note: An LOA is not required for pilot proficiency/currency flights flown per 4040.9.

7. Mitigations - The steps taken to reduce the severity of a hazard's effect or the probability of a hazard's occurrence. They are directed at the causes of a hazard, as conscious and systematic steps to improve the safety of personnel and equipment to make the risk acceptable.

8. Probability -The likelihood of occurrence of the hazard. Probability levels are shown below. These terms are ***not*** related to 14 CFR 2X.1309 because they classify levels of probability, not the numerical value.

a. Improbable - Rarely occurs.

b. Remote - Unlikely to occur.

c. Occasional - Infrequent occurrence.

d. Probable - Likely to occur.

e. Frequent - Will occur often.

9. Risk - The expression of the impact of an undesired event in terms of event severity and probability. The risk is expressed as:

a. Low - Test or activity that presents no greater risk to personnel, equipment, or property than normal operations.

b. Medium - Test or activity that presents a greater risk to personnel, equipment, or property than normal operations and requires more than routine oversight.

c. High - Test or activity that presents a significant risk to personnel, equipment, or property. This necessitates close oversight at all levels.

d. Avoid - Test or activity which presents an unacceptable risk to personnel, equipment or property. Flight test must not be conducted if risk cannot be reduced.

10. Risk Assessment - The process by which probability and severity of the pre-mitigation hazards are defined for a specific test. This results in a subjective expression of risk (typically high, medium, or low).

11. RM - The process of identifying hazards, systematically quantifying or qualifying the degree of risk they pose for exposed individuals, populations, or resources, and working to reduce or eliminate risk. RM includes all steps taken before, during and after flight test that are designed to reduce current and future risk.

12. RM Plan - A project-specific plan formulated using an accepted RM process.

13. RM Process - This order defines the AIR-accepted process for managing flight test risk. Other processes may be defined in writing by applicants and accepted by the FAA so long as they comply with the spirit and intent of this order.

14. Severity - The consequence if the hazard occurs, expressed in terms of injury to personnel, damage to aircraft, reduction in safety margins, or increase in crew workload. Levels of severity are shown below:

a. No Safety Effect – There is no impact on safety. No worse than normal operations.

b. Minor - There is no significant effect on the aircraft or aircrew safety, but does slightly increase aircrew workload and/or decreases safety.

c. Major – There is a significant reduction in safety margins; slight injuries to aircrew or minor damage to aircraft.

d. Hazardous – There is a large reduction in safety margins; serious injury to aircrew or significant damage to aircraft.

e. Catastrophic – There is loss of aircrew life or loss of aircraft.

15. Significant Safety Event (SSE) – Any flight test safety related event occurring on any flight conducted by or with FAA certification personnel determined to be of significance to the flight test community. Determination of significance is made in consult with the FPFSO and reported as outlined in this order.

APPENDIX B. FAA FLIGHT TEST BRIEFING GUIDE

The following Flight Test Briefing Guide is a detailed list of most things that should be covered in a thorough pre- and post-flight briefing. This briefing guide may also be used for ground test as well as flight test. Many items may not apply, such as chase plane, or you may have unique items to your program that are beyond the scope of this list. It should be tailored to fit your program.

PRE-FLIGHT

- **General/Admin:**
  - Date/Flight no./test no.
  - Time hack.
  - Purpose of test.
  - Roll Call/Crew Info/call sign(s) (including chase crew and telemetry (TM) room).
    - Pilot in command, seat assignments, and rules for in-flight changes.
    - Test Director.
    - FTE(s)/specialists (instrumentation, photographer, etc.).
    - Observer(s).
  - Emergency duties.
  - Newcomers to aircraft? Arrange safety briefing.
  - Crew rest, crew duty day (flight crew and TM room participants).
  - Crew currency and qualification (FACTS currency for FAA).
  - Personal safety equipment (e.g., helmets, parachutes and their wind limits).
  - Ground personnel (including TM room) responsibilities.
  - Crash rescue personnel and responsibilities.
  - ATC/Range Coordination
- **TIA/LOA signed.**
- **SRB completed (if applicable).**
- **Review takeoff time, crew show-time, chase check-in time, range time.**
- **Test aircraft (A/C) configuration and status:**
  - A/C info (type/model/serial number/registration/…).
  - Instrumentation requirements and status special equipment (e.g., smoke generator, CO monitor, portable O2, cone, load banks, ice probes).
  - Inoperative systems for special test configurations (e.g., inoperative nose wheel steering for V_{mcg} test, free float spoilers to evaluate lift control malfunctions, etc.).
  - Open maintenance items/flight squawks.
  - Temporary operating limitations.
  - Conformity inspection (currency of the inspection).
  - Instrument calibrations (e.g., pitot-static).

- Airworthiness certificate.
- Changes since last flight (e.g., maintenance, instrumentation, software, cg).
- Weight and Balance:
  - Takeoff & target gross weight & cg for test.
  - Ballast configuration and movement.
- Fuel on board.
- Thrust rating.

➢ **Local Info:**

- Aircraft performance versus takeoff conditions.
- Airfield environment (runway conditions and obstructions).
- Communications: primary/secondary/emergency/test frequencies.
- Test area: location/altitude(s).
- Mission profile.
- Weather:
  - Current.
  - Go/no-go and/or requirements.
  - Forecast for test area and destination/alternate.
  - Sunrise/sunset/.
- NOTAMS.
- Fuel requirements (return to base/min on deck).
- Recovery and landing.
- Primary/alternate/emergency landing sites.
- Expected landing time.

➢ **Test Condition Details:**

- Flight test plan reviewed.
- Lessons learned reviewed.
- Applicant's flight test report reviewed.
- Detailed review of flight cards:
  - Who will fly and exchange of control.
  - Initial conditions/set-up.
  - Tolerances (Airspeed, Altitude, GW/cg, Wind, etc.).
  - Review of flight test technique.
  - AFM/TIA/LOA or special test limitations.
  - Buildup to final conditions.
  - Test predictions.
  - Review of company tests.
  - Instrumentation/data requirements.
  - Knock-it-off criteria and procedures (including ground personnel).
  - CRM (who is watching what. Who makes what calls).
  - Review unique recovery/emergency procedures.
  - ***Review risk assessment.***

- **Chase/Support Aircraft:**
  - Type/registration.
  - Crew/call sign.
  - Normal duties/procedures.
  - Position.
  - Intra-flight communications.
  - Rendezvous point/join-up.
  - Fuel plan.
  - Emergency procedures (lost sight/com, inadvertent IMC, mid-air, search and rescue).
- **Emergencies/Contingencies:**
  - Emergency recovery procedures (primary/secondary)(e.g., spin chute minimum, call-outs).
  - Aircraft recovery device procedures (spin chutes).
  - Crew escape/egress features/procedures (bail-out or on ground, bail-out minimums).
  - Rallying point after egress.
  - Emergency/survival equipment.
  - Local crash rescue crews briefed on aircraft and procedures.
  - Nearby emergency airfields.
  - TM room duties.

POST-FLIGHT

- **Landing/Flight/Block times.**
- **Aircraft Status:**
  - Aircraft squawks.
  - Instrumentation squawks.
  - Post-flight inspection results.
- **Discussion of test conduct:**
  - Were tests acceptably performed?
  - Were any limits approached or exceeded?
  - Was the required data gathered?
  - Was build-up adequate?
  - Was risk level accurate?
  - Any unusual events?
  - Chase/ground observations.
- **Discussion of results:**
  - Data analysis observations.
  - Regulatory compliance.
  - Any repeats necessary?
- **Reports Required?**
  - Accident/incident/SSE.
- **Lessons Learned.**
- **Plan for next flight.**

APPENDIX C. AIR FLIGHT TEST RISK MANAGEMENT PROCESS

1. Purpose: This appendix more fully describes the Risk Management (RM) process for flight test and flight-test-related operations within AIR. This appendix will first describe some basic "concepts" for RM, then describe in more detail the steps in the RM process at each stage of flight test (prior to flight testing, during flight testing and after flight testing), including a more detailed description of the SRB. For definitions of terms used in this appendix, refer to the body of this order.

2. Concepts: All flight testing within AIR will be based on the following concepts:

a. Accept no unnecessary risks. An "unnecessary risk" is any risk that, if taken, will not contribute meaningfully to the task.

b. Reduce risks to an acceptable level. Risk is a part of flight test, but by applying RM principles, flight-testing can be accomplished in a safe and efficient manner. Use all available resources to reduce risk as much as possible.

c. Manage risks in the concept and planning stages of operations. It is easier to accomplish many RM objectives when you begin to address them early in the program. For example, if safety and mitigations for flight test are considered when designing an aircraft, it is much easier to incorporate safety equipment such as spin chutes or instrumentation instead of trying to add those things when the aircraft is complete.

d. Make RM decisions at the appropriate level. The level of RM decisions must be commensurate with the level of risk, i.e., the higher the risk, the higher the level of management supervision.

e. Focus on test-related risk. Risk that is associated with normal flying operations, which has no increased chance of occurrence on the test mission due to the tested configuration, need not be specifically addressed. Instead, focus on the hazards that are more likely due to the configuration being tested and the test technique being performed.

f. Review all plans. RM plans are normally put through a safety review process in which project and non-project personnel review a flight test plan to identify potential hazards.

g. Utilize all available resources. Review the results of previous tests for lessons learned. Consult colleagues within the FAA and at the applicant who may have conducted similar tests. The NASA Flight Test Safety Database (http://ftsdb.grc.nasa.gov) is recommended as a reference for development of RM plans.

3. Risk Management Process — Prior to Flight Testing:

a. Identify the test technique involved. Example: Minimum Control Speed Air—Static (V_{MCA} Static). Generally, risk associated with flight test results from specific test techniques that place the crew and/or aircraft at a risk higher than that associated with operational flying.

However, there may be risks associated with flying a test airplane that result strictly from the airplane's configuration or the environment into which it is flown and these sources of risk must also be considered—in which case the words "test technique" would be broadened to include "normal" flight operations. An example of this would be an aircraft—which is otherwise capable of and normally flown in known icing conditions—being flown purposefully into heavy icing conditions.

b. Identify the hazard(s) associated with the test technique. Example: Loss of control. Ask "What adverse events might happen when accomplishing this test technique?" Note that one test technique may have several hazards and each should be addressed (e.g., another hazard with this test technique would be engine failure caused by inlet distortion, or fuel starvation).

c. List the cause of each hazard. Ask "Why might the hazard happen?" Example: Reducing speed below stall.

d. List the effect of each hazard. Ask "What will be the effect?" Example: Ground impact, loss of crew/aircraft. These should be related to either injury/loss of life or damage to aircraft/property.

e. Perform a subjective risk assessment by:

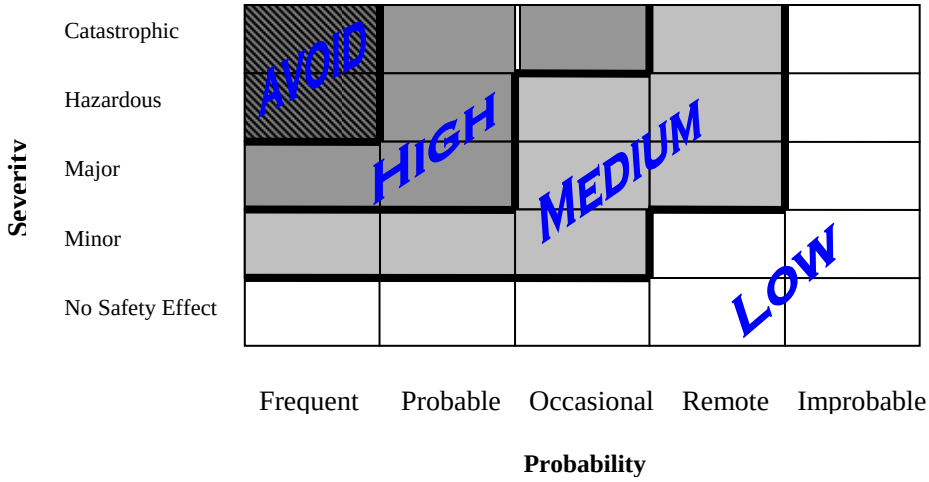
(1) Estimating the probability of each hazard occurring. Defined as improbable, remote, occasional, probable, or frequent. *Example: occasional.*

(2) Estimating the severity of each hazard, if it occurs. Defined as no safety effect, minor, major, hazardous, or catastrophic. *Example: catastrophic.*

(3) Defining the risk of each hazard as a combination of the probability and severity. Defined as low, medium, high, or avoid. *Using the examples above and Figure C-1, the risk would be considered high.*

(a) Subjective risk assessment. Figure C-1 is a notional depiction of how probability and severity are combined to produce a simplified, overall description of risk. Other methods of estimating risk may be used.

Figure C-1. Subjective Risk Assessment



(b) Is this risk before or after mitigation? Risk assessment (probability, severity, risk) is assigned prior to risk mitigation. This is to ensure the proper level of management oversight.

(c) Contributors to consider when performing subjective risk assessments. The following list contains examples of factors that should be considered in assigning a risk rating to specific test techniques. This is not a comprehensive list, but a beginning list of items to consider.

1 Workload.

2 Altitude and airspeed in relation to terrain and/or airplane recovery equipment.

3 Configuration (gross weight, center of gravity, etc.).

4 Environment (weather, air traffic control, particular airport conditions, darkness, turbulence, etc.).

5 Airplane internal environment (smoke, temperature, pressurization level, noise, etc.).

6 Design maturity.

7 Test condition sequencing. (Has proper “buildup” been considered?)

8 Adverse system or software effects.

9 Specific aircraft limitations.

10 Consequence of failure in technique, system, or structure.

11 Intentional failure conditions.

12 Simulator/lab results/historical experiences/predictive studies.

13 FAA and company test pilot proficiency/currency/familiarity with the type of test aircraft.

f. Describe the steps for Mitigation of causes for each hazard. Develop controls that mitigate all risks to an acceptable level. Mitigations are actions to minimize, understand, prepare or respond to causes of the hazards. They are actions the flight test crew has control over or events that the test crew can confirm have occurred (e.g., lab testing, simulator evaluations). Mitigations will address reducing either the probability of a cause, the severity of the effect, or both. Mitigations should be detailed and specific in nature. The following items should be considered when formulating mitigations. This is not a comprehensive list, but a beginning list of items to consider.

(1) Is the test condition really needed in its present form? Is concurrent testing feasible (see FAA Order 8110.4)? Can it be done adequately in the lab or simulator or even by analysis instead?

(2) Set limits on test conditions (e.g., minimum weather, altitude, minimum/maximum speed, maximum angle of attack, minimum crew size).

(3) Clearly define and brief "knock-it-off" criteria and who will make calls.

(4) Review test techniques and specifying steps to reduce the risk.

(5) If practical, practice the test technique on another aircraft first.

(6) Design the test for a conservative build-up of maneuver parameters.

(7) For build-up tests, utilize technically qualified personnel to evaluate the data and plan for subsequent tests. Allow adequate time to evaluate the build-up test points prior to continuing tests.

(8) Provide predictions and expectations to prepare participants. Update performance predictions with flight test data when possible.

(9) If available, pre-fly test in simulator, lab, etc.

(10) Provide special training and consultation (e.g., spin training).

(11) Provide special safety equipment and training (helmets, goggles, masks, oxygen, escape provisions, parachutes, fire extinguishers, etc.).

(12) Use of chase plane to provide visual data and alerts.

(13) Use of photo/video coverage.

(14) Use of telemetry or onboard instrumentation to monitor the tests in "real time" by either onboard personnel or ground monitors.

(15) Install hardware to protect structure and personnel (e.g., V_{MU} tailskid).

(16) Limit personnel onboard to the absolute minimum required to conduct the test safely.

(17) Schedule flight crews based on pilot qualifications and recent experience relative to the required tests being conducted.

(18) Request a thorough briefing of the applicant's testing, techniques and results. On tests that are highly dependent on pilot technique, consider having the applicant's pilot conduct the initial tests or demonstrate an example and observe his or her performance before conducting the tests yourself.

Note: There may not be applicant test data to review if this is concurrent testing (see Orders 8110.4 and 8110.41). However, even with concurrent tests there may be computer predictions or simulator results to review.

(19) On certain potentially hazardous ground tests (e.g., high energy RTOs), experienced ground crews should be included in the preflight briefing and be immediately available to support the tests if necessary (e.g., cooling fans, fire trucks, aircraft jacks). The ground crews should be briefed regarding when support will be required and whom it will be that can order support.

(20) Ensure local emergency personnel are briefed, on standby and/or nearby for quick response.

(21) Review weight and balance computations. Weigh the loaded aircraft if possible. This is particularly important on critical handling qualities tests at the extremes of the weight/cg envelope and on Weight/Altitude/Temperature (WAT)-limited performance tests.

(22) Minimize the number of actual engine cuts during runway performance testing if spool-down thrust can be properly accounted for by analysis and related systems failures can be accurately simulated.

(23) For high altitude flights, all FAA crewmembers must be briefed on oxygen use/ location and have current physiological training.

(24) For over-water flights, all crewmembers must be briefed on the location of water survival equipment, its use, and trained on its use, if necessary. Provide water survival gear if flying more than gliding distance from land.

(25) Test personnel involved with cold/hot weather testing should be briefed on appropriate survival skills and be properly equipped to endure the anticipated environment. If flying in these environments, adequate survival gear must be provided.

(26) Verify conformity. How long has it been since the conformity on the test airplane configuration was last conducted? Has anything changed since the design was reviewed?

(27) When elevated risk flight testing requires airfield takeoffs (e.g. field performance takeoffs, landings, Vmu, Vmcg, braking tests, etc.), or includes maneuvers where it is possible for the test aircraft to become airborne, all efforts should be made to avoid flying over densely populated airport environments. For these tests, select a suitable airfield without significant population density in close proximity to the airport boundaries.

g. Describe any Emergency Procedures to accomplish if the hazard occurs, despite mitigation steps. For example, for a spin test you would describe the specific spin recovery procedures and the use of the spin chute to affect recovery. See Appendix D for more examples.

h. Document and Accept RM.

(1) Formalize RM plan. Each project must have a RM plan of which complexity and depth will depend on the types of tests conducted. For projects with only low risk tests, a simple statement in the test plan or on the TIA may be sufficient. For tests involving increasing levels of risk, a more thorough RM plan is required. These plans may be an integral part of the project test plan (such as a section in the test plan) or may be a stand-alone document. Appendix D shows two examples of formats found to be acceptable but these examples should not be construed as the only way to document a RM plan. The objective is to plan properly to manage the risk and eventually to communicate that plan simply, clearly, and explicitly to the test crews.

(2) Review of RM plan. Review the RM plan for projects of applicants without an accepted RM process. This review will vary depending on the complexity and test risk level. Follow local implementation procedures as to how and when to conduct the review. The key is to review the RM plan and document the review. For more complex and higher risk test programs, an accepted method in the industry for conducting safety reviews is a SRB.

(a) SRB. The SRB is a method, which provides an opportunity to review the safety of the flight test program after the test team has determined that they are ready for testing. The value of the SRB is in the preparation by the team members prior to the actual board. Most of the technical details and issues should be resolved prior to the SRB (unless they have no impact on testing) in order to permit a clear focus on the *safety* aspects of the tests. Experience has shown that knowledgeable non-project personnel who are similarly involved in other projects provide valuable contributions to this process. They can identify areas possibly overlooked by the project team. The SRB may be done via face-to-face meetings or telephonic conference.

(b) Membership. Safety Review Boards should include the following participants, particularly for complex tests or for tests with medium, high risk or unique safety issues:

1 Chairperson: A manager, a flight safety officer, or test pilot orFTE.

2 Project manager and/or project engineers.

3 Project FTP and FTE.

4 Flight test branch representative (if assigned project pilot or FTE unavailable).

5 Outside observer with the appropriate experience (desired for independent look at safety issues).

6 Project manufacturing inspection district office (MIDO) specialist (desired for conformity and airworthiness issues).

7 Applicant representative(s).

8 DER pilot (when delegated).

9 Project aircraft evaluation group (AEG) pilot, if appropriate.

10 FFSO, if not acting as the chairperson.

(c) Sample SRB agenda. The following agenda is provided as a guideline for discussion topics in a safety review:

1 Description of aircraft configuration to be certified (especially, all recent configuration changes, software changes, and changes to control laws, etc.).

2 The results of applicant's ground and structural tests, and flutter test analysis results, if applicable. (Specifically address any configuration changes or aircraft limitations that have resulted based on test results.)

3 The aircraft operating and airspeed limitations, and any unique operating procedures required for safety reasons.

4 The results of any company critical flight tests flown by the applicant. This should include a summary of any "open" certification test requirements not yet pre-flown by the applicant and a review of the applicant pre-TIA flight test report.

5 The certification test plan with emphasis on test requirements and test procedures that may present an increased risk.

6 The RM plan, evaluating each element of procedures planned for the certification tests.

7 The test installations, test equipment and non-standard or non-test systems (e.g., ballast, fault insertion equipment, temperature sensors).

8 Review plans with the help of Appendix B (FAA Flight Test Briefing Guide) and the internet based NASA Flight Test Safety Database, currently located at: http://ftsdb.grc.nasa.gov.

9 Document SRB results and recommendations.

(3) Gain approval of RM plan (for applicants without an FAA-accepted RM process) from appropriate level and document approval. Refer to discussion in the body of this order concerning the "appropriate level" for approval. Appendix E contains an example for documenting approval of RM plans in a TIA.

4. Risk Management Process — During the Conduct of Flight Testing.

(a) Proper use of pre-flight briefing checklists. The FAA flight test crew must use the briefing guide (or equivalent) contained in Appendix B of this order. Not all items may apply and there may be items that are not on this checklist, so customize for the program. When flights are scheduled in blocks, the whole briefing guide can be used for the first flight and for subsequent flights in the same block, only appropriate parts of the briefing guide need be used, as necessary.

(b) Maintaining configuration/conformity. To achieve safe operation, it is important to maintain the conformity of the aircraft prior to and during flight testing, particularly when project delays occur. Conformity and inspection requirements identified in 18a of the TIA must be carefully reviewed when project delays are encountered. Prior to conducting flight tests, flight test personnel should verify aircraft conformity via an appropriate form signed by a MIDO / ODA quality assurance (QA) representative or, alternatively, by direct communication with the MIDO / designated airworthiness representative (DAR) / ODA QA, where necessary. If the project is delayed, aircraft conformity is limited to 90 days unless it is documented by a member of the project team that a longer period does not adversely affect flight test safety.

(c) Constantly re-assess risk. Risk contributors and assumptions should be checked for accuracy during the conduct of flight testing programs. New contributors (example: unplanned weather) should be considered. If, at any time, it becomes apparent that the risk involved in any test event has been underestimated, that test event should be discontinued and the risk re-evaluated. The post-flight briefing for such an event must include reference to any risk levels that were inaccurately assessed or considered unsatisfactory. The RM process must then be reevaluated for adequacy. Approval to fly the event on a subsequent flight is contingent on reassessing the risk and risk mitigation measures in accordance with the AIR RM process. It should be stressed that any ground or flight crewmember should have the ability to stop the test process if they feel the risk of continuing is unacceptable.

(d) Procedures for changes to test profile. RM is a deliberate team approach. However, in situations where it may be necessary to make changes to the flight test points (between flights and/or in-flight) due to unusual circumstances and operational considerations (such as remote locations, aircraft availability, weather), these changes are only permitted if they fall within the scope of the previously approved RM plan, without an increase of risk, and with concurrence of all test crewmembers. Involvement of the on-site project team is preferable if questions of benefit are raised, or increased risk is suspected. Care must be taken that all foreseeable scenarios are considered in making this determination; changes should not exceed the limits of the approved test plan nor compromise build-up to the desired test condition. Statements such as “perform other tests deemed necessary” under paragraph 18b. expansion of the TIA must be taken within the context of the requirements of this paragraph. Alternate statements may include “identify other tests which may be necessary as a result of this TIA.”

5. Risk Management Process — After Completion of Flight Testing.

(a) Post-flight briefing Debriefing is critical in the flight test process. A thorough debrief reviews and documents what was accomplished during the test, how successful the tests were and how well the test was run. Pay particular attention to the effectiveness of the RM process. Questions should be addressed, such as:

(1) "Were the risk levels accurate for what was done?"

(2) "Were there any new hazards encountered?"

(3) "Are there any new mitigations that can or should be implemented?"

(b) Capturing of lessons learned. There are always lessons to be learned during the conduct of flight test. Disciplined flight testers spend the time to pass these lessons along to others, in hopes of improving the safety of future flight test projects. Many avenues exist for capturing lessons learned, including:

(1) Verbal or documented debrief to your FSO and other co-workers.

(2) Use of the SSE reporting procedures discussed in paragraph 7 of the body of this order.

(3) Formal feedback to the internet-based NASA Flight Test Safety Database, currently residing at: http://ftsdb.grc.nasa.gov.

(4) Feedback to applicant's safety officer and/or lessons-learned database.

(c) Program Debrief. In the same sense that each flight should be debriefed at the conclusion of a test program, a stand-alone debriefing event should also be planned examining the test program as a whole. The goal of this event should be to review the test program in its entirety from initial planning to completion. Participants should include, at a minimum, ground and flight test personnel, program management, and discipline engineers, with representatives from all organizations involved in the flight test program. If an event, or series of events, of interest included other organizations (such as maintenance, fire rescue, or air traffic control), effort should be made to include appropriate personnel from those organizations. Items to be discussed should include, but not be limited to: validity of initial assumptions, effectiveness of test planning, risk assessment/alleviation efforts, lessons-learned, difficulties encountered during testing, unexpected events or results, and recommendations for the planning and conduct of future test programs of a similar nature. The results of this meeting should be documented and included in appropriate databases, such as the NASA Flight Test Safety Database.

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APPENDIX D. EXAMPLES OF RISK MANAGEMENT PLANS

***NOTE*: The examples contained in this Appendix should not be considered *required* formats. They are designed to simply show *one way* to document a project-specific Risk Management plan.**

Example 1 - Sample risk management plan in table format.

Test: [Description of test or test maneuver—can also be added as another column in the table below; can also assign a number to the test, for easy reference. *Example: Minimum Control Speed Air—Static (V_{mca} Static)*] (Project # XXXX)
Author: [Name, phone]

RISK			**MANAGEMENT**				
Hazard	**Cause**	**Effect**	**Probability (1)**	**Severity (2)**	**Risk (3)**	**Mitigation**	**Emer Proc (4)**
Describe "what might happen?" *Example: Loss of control*	Describe the "why might it happen?". *Example: Reducing speed below stall*	Describe the effect *Example: Ground impact, loss of crew/aircraft*	Describe the chances of the hazard occurring. *Example: Occasional*	Describe the consequences if the event does occur. *Example: Catastrophic*	State the overall risk. *Example: High*	Describe how the risk is minimized. Include all pertinent factors. *Example (partial):* *1. The pilots must be familiar with the airplane's handling characteristics at low-speed, high AOA, and stall departure recovery techniques.* *2. Pre-flight briefing to include engine failure procedures, the quick-start procedure, along with ditching procedures.* *3. Lat-Dir handling qualities and stall characteristics testing completed.* *4. etc.*	Describe what will be done IF the hazard occurs. *Example: Reduce AOA, increase speed and retard throttle as necessary to maintain directional control*

Notes: (1) Likelihood that the risk will occur—Improbable, Remote, Occasional, Probable or Frequent.
(2) Consequence *if* the hazard occurred—No Safety Effect, Minor, Major, Hazardous, or Catastrophic.
(3) Combination of Probability and Severity—Low, Medium, High, Avoid. Refer to Figure C-1 in Appendix C. Note that these definitions are used to assign the level of risk prior to consideration of risk mitigation effects.
(4) This column is your plan of action if the event still occurs.

Example 2 - Risk management item in a different format (one page per hazard).

This example has a different scale for risk assessment, and has sections for weather, crew size and emergency equipment. These are shown simply to convey that a variety of options are available to those performing risk management.

Hazard Number: A13	
Test Plan: Aero 1	
Flight Test Technique: V_{mca} Static.	
Hazard: *Loss of control*	
Cause: Low altitude stall.	
Effect: Ground impact, Loss of aircraft and crew.	

Risk Assessment					
Catastrophic	Avoid	High	**High**	Medium	Low
Hazardous	Avoid	High	Medium	Medium	Low
Major	High	High	Medium	Medium	Low
Minor	Medium	Medium	Medium	Low	Low
No Safety Effect	Low	Low	Low	Low	Low
Severity / Probability	Frequent	Probable	Occasional	Remote	Improbable

Minimizing Procedure:

1. *The pilots must be familiar with the airplane's handling characteristics at low-speed, high angle-of-attack, and stall departure recovery techniques.*
2. *Monitor structural loads real-time*
3. *Pre-flight briefing to include engine failure procedures, the quick-start procedure, along with ditching procedures (if over water).*
4. *Directional control handling qualities testing and Light / Aft stall characteristics will be completed prior to any V_{mca} tests.*
5. *Entry altitude should be a minimum of xxxx ft AGL.*
6. *Spin-chute (if installed) must be operational and pilot familiar with its operation.*
7. *Minimum crew only.*
8. *etc.*

Emergency Procedures: *Reduce angle-of-attack, increase airspeed and retard throttle as necessary to maintain directional control*

Weather Requirement and/or Flight Conditions: VMC, no clouds below.

Minimum Essential Aircrew: **YES** NO	***Parachutes Required:*** **YES** NO

RISK	LOW	MEDIUM	**HIGH**	AVOID

APPENDIX E. RECOMMENDED TIA DOCUMENTATION FOR RISK MANAGEMENT

TIA FOR APPLICANTS WITHOUT FAA-ACCEPTED RISK MANAGEMENT PROCESS

TYPE INSPECTION AUTHORIZATION PROJECT NUMBER:

(NAME OF PROJECT) PAGE XX OF XX

General

(*General description of the project goes here*.)

TIA Risk Management

This TIA has been assessed as *(Insert risk level; high, medium or low)* risk. The following hazards have been identified and procedures integrated to reduce or mitigate, to the maximum extent possible, the level of risk expected during the tests described in this TIA:

(*Describe Risk Management Plan or specifics. May simply refer to applicant's approved test plan, or stand-alone risk management plan for this project. Additionally, may—for certain low risk tests—refer to risk assessment & mitigation from Appendix G, Table G-1 of this order.)*

Flight Test Branch Manager : _____ _____

Signature Date

TIA Operating Limitations

(*List additional limitations resulting from safety reviews and/or refer to approved test plan section containing such limitations*.)

18A The Manufacturing Inspection (Branch) will accomplish the following:

1.

18B The Flight Test (Branch) will accomplish the following:

1.

TIA FOR COMPANIES WITH FAA-ACCEPTED RISK MANAGEMENT PROCESS

TYPE INSPECTION AUTHORIZATION (NAME OF PROJECT) PROJECT NUMBER:
PAGE X X OF XX

General
(*General description of the project goes here*.)

TIA Risk Management

The flight safety and Risk Management program of the [*applicant's name*] will be used to analyze hazards and minimize risks associated with flight testing authorized by this TIA. (*Reference ACO's documented acceptance of the applicant's risk management process*.)

*Flight Test Branch Manager
:

Signature Date

*May be signed by the FTP or FTE for medium or low risk tests.

TIA Operating Limitations

(*List additional limitations resulting from the ACO's review of the company's Risk Management for this specific project*.)

18A The Manufacturing Inspection (Branch) will accomplish the following:
1.

18B The Flight Test (Branch) will accomplish the following:

1.

APPENDIX F. EXAMPLE LETTER ACCEPTING COMPANY RISK MANAGEMENT PROCESS

[Date]

Mr. I. M. Safety
Director of Safety
Applicant Aircraft Company
P.O. Box 9999
Applicantville, USA

Subject: FAA Acceptance of [Applicant's] Risk Management Policy and Procedures, Flight Test Safety Program

Reference: [Applicant's letter submitting process]

Dear Mr. Safety:

We have reviewed and accept [Applicant] Report No. *XXXX* [Applicant's Risk Management Process document] submitted in your letter referenced above. This document defines the formal safety program for Engineering Flight Test and contains the procedures for risk mitigation of flight and ground tests. This document meets the specified requirements of Order 4040.26.

If this document is revised in the future, please submit a copy of the revised document to our office for review and acceptance. If you have any questions, please contact [FFSO name] at [Phone number].

Sincerely,

[Name]
Manager, Flight Test Branch
[ACO] Aircraft Certification Office

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APPENDIX G. TYPICAL EXAMPLES OF FLIGHT TESTS AT VARIOUS RISK LEVELS

NOTE: These are typical examples only, provided here for general guidance. The actual risk category must be evaluated on a case-by-case basis and it may be different from these examples depending on actual project-specific circumstances.

HIGH RISK

- Stall characteristics:
  - Aft cg accelerated stalls with rapidly changing dynamic conditions.
  - On airplanes equipped with unproved pusher systems that are masking potential deep stalls.
  - High altitude stalls on airplanes with potential engine flameout problems.
  - With critical ice shapes.
- High speed tests above $V_{ne}/V_{MO}/M_{MO}$.
- V_{MCA} tests at low altitude; particularly dynamic V_{MCA}.
- Flight control malfunction testing during takeoff and landing phases of flight, and asymmetric deployment of roll controls at high speeds.
- Ice shape testing, especially during the takeoff phase where special procedures are required.
- Maximum energy RTOs where wheel/brake fires are a possibility.
- Actual V_1 fuel cuts for takeoff performance.
- Autopilot malfunction tests at low altitudes.
- WAT limited takeoffs with actual engine cuts.
- V_{MU} test at low thrust to weight ratios.
- V_{mcg} tests.
- Nose-wheel steering malfunction tests.
- Spin testing.
- Lateral-directional testing on aircraft that can achieve extremely large sideslip angles.
- Dynamic lateral stability testing (Dutch rolls) on airplanes that are extremely unstable under certain conditions.
- In-flight thrust reverser deployments.
- Systems installation (with unproved design aspects) where FHA has identified catastrophic events.
- Stall characteristics on Restricted Category airplanes with asymmetric wing store configurations.
- H/V envelope determination.
- Helicopter low speed testing.
- Autorotation.
- PIO Testing.
- Max Crosswind Landings.

MEDIUM RISK

- Any tests involving low altitude operations (e.g., tower fly by).
- Icing tests flown behind a tanker (formation flying with potential restricted vision).
- Engine out operations at low altitude.
- In-flight unusable fuel tests that result in engine flameout.
- Emergency electrical power landings at night using standby instruments and reduced lighting (both external and internal).
- Emergency descents to demonstrate high altitude special conditions (possible physiological effects).
- Gravel runway field performance.
- High-G acrobatic tests.
- Abnormal flight control configuration testing. Includes pitch and roll disconnects or manual reversion for hydraulic systems.
- Natural ice flights with large shapes on unprotected surfaces.
- Cockpit and cargo smoke evacuation tests.
- Engine water ingestion tests.
- Asymmetric thrust reverser deployments on the ground.
- Abnormal operations of various onboard systems.
- Flights involving FADEC testing (EMI, software, etc.).
- TAWS (GPWS/EGPWS).
- High T/W V_{mu} tests (tail strikes).

LOW RISK

- Basic system function tests (electrical, hydraulic, fuel, environmental, anti-ice, avionics, etc.).
- High altitude airspeed calibrations (e.g., trailing cone).
- Climb performance/speed power, etc.
- Avionics STC follow-on tests that do not require handling qualities or high speed flight beyond V_{mo} (e.g., TCAS (no intruder/target aircraft), FMS).

NOTE: Table F-1 contains recommendations for low risk testing that may be used with no further considerations of risk mitigation necessary. This table may only be used for the specific types of tests listed. Document the use of this table in either the TIA or other approved flight test planning documents.

Table G-1 – Recommendations for Low Risk Testing

This table contains recommendations for low risk testing with no further consideration of risk mitigation necessary. The Flight Safety/Risk Management TIA requirement can be satisfied by referencing the applicable "***INDEX***" from the table below for repetitive type, low risk flight tests in the Risk Assessment Block on the Type Inspection Authorization or in other Flight Test Planning documents. In consideration of the above, this implies no flight operations outside the normal flight envelope of the test aircraft are required and all test points will honor AFM Limitations, including weight and balance considerations.

When flight characteristics or handling qualities are not altered because of the modification(s) to the test aircraft, the table can be referenced. If flight characteristics or handling qualities are altered, then the table is not applicable and a more formal risk assessment must be accomplished prior to TIA signature.

NOTE: All operations must adhere to basic 14 CFR part 91 requirements, i.e., cloud clearance, visibility, safe altitudes, etc.

INDEX	*TYPE OF TEST*	*AIRCRAFT CLASS*	*TEST/OPERATING AREA ALTITUDE RANGE*	*WEATHER REQUIREMENTS & FLIGHT CONDITIONS*	*REMARKS*
A	Avionics (including FMS functional GPS, TCAS II)	ASE, AME, Rotorcraft, LTA	Within gliding distance of land for aircraft not equipped for overwater ops or not capable of sustained OEI flight	VMC (Day or Night) (See remarks)	No operations below 500' AGL (excluding approach and landing), no high sink rates below 1500' AGL. At discretion of test crew, rotorcraft tests may be conducted below 500' AGL where nature of test requires such exception, and has been thoroughly pre-briefed. TCAS testing limited to VMC Day conditions. No flight involving formation flying or intruder/target aircraft. Testing in IMC may be performed when system integrity has been proven (successful ground EMI/RFI tests) and means other than the system being tested are available to fly under IFR. However, for the first takeoff and the first landing, the weather conditions are limited to no lower than circling minimums.
B	Night Evaluation of cockpit lighting	All	Within the National Airspace System or test area acceptable to flight crew	VMC Night	Excludes emergency electrical system evaluation.
C	EMI for cabin electrical systems installations	All (See remarks)	Within the National Airspace System or test area acceptable to flight crew	VMC (Day or Night) (See remarks)	May be medium risk if EMI could adversely affect critical systems such as fly-by-wire flight controls or FADEC. Testing in IMC may be performed when system integrity has been proven (successful ground EMI/RFI tests). However, for the first takeoff and the first landing, the weather conditions are limited to no lower than circling minimums.
D	Climb Performance	All	Within gliding distance of land for aircraft not equipped for over-water ops or not capable of sustained OEI flight	VMC Day	No operations below 500' AGL, no high sink rates below 1500' AGL. IMC may be acceptable for aircraft not on an experimental CofA.
E	Engine Cooling	Airplane, Rotorcraft	Within gliding distance of land for aircraft not equipped for over-water ops or not capable of sustained OEI flight	VMC day, no visible moisture	
F	Basic Systems Functional Tests	All	In accordance with Certificate Limitations	VMC/IMC Day or Night	These tests are simple functional tests similar to Production Flight testing or Return to Service after Maintenance.
G	High Altitude airspeed calibration	All	IAW Certificate Limitations	VMC Day	
H	Cockpit Evaluation for layout or Human Factors issues	All	IAW Certificate Limitations	VMC/IMC Day or Night	

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Appendix H. FAA Form 1320-19, Directive Feedback Information

Directive Feedback Information

Please submit any written comments or recommendations for improving this directive, or suggest new items or subjects to be added to it. Also, if you find an error, please tell us about it.

Subject: FAA Order 4040.26B

To: Administrative Services Branch, AIR-510

(Please check all appropriate line items)

☐ An error (procedural or typographical) has been noted in paragraph _____ on page _____.

☐ Recommend paragraph _____ on page _____ be changed as follows: *(attach separate sheet if necessary)*

☐ In a future change to this directive, please include coverage on the following subject *(briefly describe what you want added):*

☐ Other comments:

☐ I would like to discuss the above. Please contact me.

Submitted by: _____ Date: _____

FTS Telephone Number: _____ Routing Symbol: _____

FAA Form 1320-19 (10-98)