

SUMMARY SHEET
Airworthiness Directive Implementation Aviation Rulemaking Committee
AD Implementation Working Group

Primary Report and Recommendation	Prevent class 2 ADs from being undone during normal maintenance actions (T1-R3-B2). Each air carrier should develop processes and procedures to ensure AD configurations are maintained (T1-R3-B3). Air carriers must have a process in place to continually verify AD accomplishment (T2-R4-B6). Process enhancements or physical marking of AD installations for nonstructural ADs. This alerts mechanics to the presence of an AD installation in the area where they are working (T2-R11-B1). Quality assurance sampling of ADs to verify the correct setup, and/or a sampling program that verifies demodification has not occurred (T2-R11-B2). <u>Maintaining AD Configurations</u>
Secondary Report and Recommendation	None.
Assigned Members	Bill Williams (FX) Bill Tsai (Boeing) Joe DiPalmo (FAA) Carlos Valadares (EM) Craig Fabian (ARSA) Adam Troeger (AA)
Links to Other Working Groups	ADWG T2-R4-B5, and the SIWG T1-R2-B2 and T2-R1-B3.
Date Sent to ARC	12/07/10
Date of ARC Approval	2/16/11

WORKING GROUP REVIEW OF ISSUE/PROBLEM

The working group believes there is enough correlation between T1-R3-B2 T1-R3-B3, T2-R4-B6, and T2-R11-B1 and T2-R11-B2 to combine them into the same Summary sheet. There is also linkage with Service Information Working Group recommendation's T1-R2-B2, and T2-R1-B3; and the AWDG T2-R4-B5.

With respect to T1-R3-B2, Class 2 ADs are very prescriptive; there is a high risk that subsequent maintenance may inadvertently create an unintentional alteration from the mandated condition or configuration where the creation of the non-compliant condition is more likely to occur if the technician is unaware of the AD requirements. This possibility is particularly troublesome when the design approval holder's manuals do not reflect the AD-mandated condition or configuration - an example is the standard wiring practices manual (SWPM) that no longer reflects how a particular area

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of the aircraft must be wired. See the working group proposal to address the recommendations and findings section for a more detailed description of class 2 ADs and high risk ADs.

With respect to T1-R3-B3, unless process enhancements are provided to ensure configurations are maintained, aircraft maintenance technicians (AMT) working in the vicinity of AD installations with a high risk of unintentional alteration anytime after the AD is implemented may inadvertently deconfigure the AD installation by employing standard maintenance practices. This condition may be more difficult to detect if the AD does not contain a repetitive inspection requirement or if the area is not inspected per an associated maintenance program workcard. Process enhancements include, but are not limited to the following approaches:

- Ensuring design changes by design approval holders (DAHs) associated with ADs are appropriately incorporated in the DAH's instructions for continued airworthiness so that the required configuration or corrective action is universally applied.
- Notifications to be added to the air carriers' manuals (i.e., AMM, CMM, workcards, et al.). The AD requirements should be added to the air carrier's manuals prior to approval and issuance of the AD compliance workcards.
- Verification of AD compliance by virtue of previously accomplished service bulletins (or other service instructions contained in an NPRM) are in accordance with the final AD requirement, and
- Determining the need for specific labor classification/skills (e.g., avionics, structures, NDT, and/or aircraft engines), or limiting variation by utilizing a "center of excellence," or using other methods of ensuring continued AD compliance where an uninformed or unqualified AMT, performing other maintenance in the area, may inadvertently take the aircraft out of the mandatory compliance.

With respect to T2-R4-B6, unless there is a method of continually verifying ADs (such as re-verification at maintenance check visits), multiple ADs in the same area; overlapping and confusing AD mandates, and subsequent maintenance performed over the years may result in inadvertent AD unintentional alteration. This may be exacerbated by work instructions that can inadvertently omit detailed AD requirements that are needed to ensure continued AD compliance.

With respect to T2-R11-B1, some planning processes may not include an AD Compliance Control Board meeting or equivalent where predefined potential actions are reviewed and confirmed; this may make them more susceptible to AD non compliance issues. This AD compliance Board or equivalent meeting would consist of all affected departments (i.e., engineering, Planning, QA/QC, the AD Group, and other affected workgroups) that are responsible for ensuring AD implementation and compliance. It is during this meeting that the risk of unintentional alteration should be discussed, and specific inspections that must be accomplished as related to §39.11 must be discussed - with appropriate mitigation strategies determined, which may include, but may not be limited to, additional process enhancements or the potential physical marking of ADs in the area.

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With respect to T2-R11-B2, one method of ensuring continued AD compliance is re-verification of ADs at scheduled maintenance visits (e.g. at a C- or D-Check) via an AD sampling program where based on risk assessment, a population of closed ADs are re-verified.

REGULATIONS AND GUIDANCE IDENTIFIED FOR REVIEW

- (1) AC 120-79A (Developing and Implementing an Air Carrier CASS Program)
- (2) AC 120-92A (Safety Management System for Aviation Service Providers)
- (3) AC 120-102 (Incorporation of EWIS ICA into Operator's Maintenance Program)
- (4) FAA Order 8900.1 ATOS EPI/SAI data Collection Tools (as applicable)
- (5) 14 CFR 21.50 (ICA and Manufacturer's Maintenance Manuals having AWL Sections)
- (6) 14 CFR 121.373 (Continuing Analysis and Surveillance [CASS])
- (7) 14 CFR 121.1109 (Supplemental Inspections)
- (8) 14 CFR 121.1111 (EWIS Maintenance Program)
- (9) 14 CFR 121.1113 (Fuel Tank System Maintenance Program)
- (10) Draft AC 39.xxxx (AD Management)

WORKING GROUP PROPOSAL TO ADDRESS THE RECOMMENDATION(S)/FINDING(S)

The Working Group recommends that AFS-300 adds the following best practices to draft AC 39.xxxx, which is dedicated for the AD Management and Compliance Planning processes. Draft coordinating language is to be included in the affected FAA guidance documents (above) will be submitted to the FAA (AFS-300) by 10 December 2010.

With respect to T1-R3-B3, T2-R4-B6, and T1-R3-B2 the working group recommendation includes process enhancements as identified in the Issues/Problems section, above as measures of alerting the technicians of any installed ADs that could affect the task being worked. One such enhancement includes updating and adding notifications and cautions to the air carriers' manuals (i.e., the AMM, CMM, and workcards) under §43.13 (c). This allows the air carrier to address the ongoing compliance issues with the AD concern per the applicable instructions for continued airworthiness (ICAs). For certain newer ADs, ICAs are provided by the design approval holder (DAH) per §121.1109 (supplemental inspections), §121.1111 (EWIS Maintenance Program), and §121.1113 (fuel tank system maintenance program) are examples of current requirements for ICA for changing conditions. Further, §21, subpart C requires that all changes to design be approved and the FAA should not approve a design change that results in and AD without requiring a subsequent change to or creation of the ICA (as required by §21.50) that ensures the AD mandates are continued after the original modification or action to address the unsafe condition.

Further, when the DAH references ICA revisions or sections in the SB that are incorporated by reference in an AD, the air carrier should evaluate whether revision to its maintenance program is necessary to prevent inadvertent AD unintentional alterations. Per §21.50, §25.1529, §25.1729, §25 Appendix H, the DAH is required to provide ICAs for the type design and changes to the type design.

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Further, if applicable the air carrier should verify that an ICA/AWL, as a result of an AD, is incorporated into the air carrier's AD sampling (reverification) program when the air carrier determines that a high risk of unintentional alteration is noted during an assessment of the new AD. With regards to the ICA/AWL, the design process and the development stage are addressed by the ADWG and the SIWG.

With respect to T2-R11 B1, the consensus of the work group is that although some ADs specifically mandate marking or color coding for AD installations, when this requirement is not specified in the AD/SB, process enhancements described in T1-R3-B3, T2-R4-B6 and T2-R11-B2 are strongly recommended over AD marking as a measure of preventing unintentional alteration of class 2 AD installations. These process enhancements are intended for application to ADs adopted in the future and not for ADs already tracking in an air carrier's maintenance program. These process enhancements are intended to apply to already installed ADs only as an air carrier option when, for example, installing an AMOC. There is no definition for class 2 ADs listed in this summary sheet; however, as used in this document, class 2 refers to ADs having a high risk of non-compliance through the course of normal maintenance (for a description of class 1 and class 2 ADs. Factors that may identify a high risk AD unintentional alteration may include actions in areas that are frequently maintained, serviced, or exposed to elements; and particularly if the installed or new AD is a workmanship intensive modification or components that are frequently repaired.

With respect to T2-R11-B2, the workgroup believes that another method of detecting potential AD non-compliance would be a sampling (AD reverification) program utilizing a process audit procedure during scheduled maintenance visits can be an effective method of monitoring continued AD compliance. Although we see AD sampling as a separate program from CASS AD handling (see AC 120-79A), and for the AD sampling program, the air carrier can take advantage of elements of the CASS audit method where it addresses ADs per §121.373 (CASS). Further, the AD sampling (reverification) program should verify that targeted ADs (those ADs assessed and included in the air carrier's sampling program) are appropriately evaluated, accomplished, and tracked, and that any ADs that have been reconfigured are appropriately evaluated for compliance along with other modifications in the affected area. We agree that a risk assessment is applicable for future ADs that include ICA/AWL content, and after review by the air carrier (during AD compliance planning), those ADs determined to have above average risk may be included in the air carrier's AD sampling (reverification) program.

With respect to T2-R11-B1, RT2-R11-B2, T2-R4-B6, T1-R3-B2, and T1-R3-B3, each new AD should be evaluated for risk of future non-compliance using safety management systems (SMS) principles as applicable in AC 120-92A. Air carrier valid risk assessment upon implementing each new should include crafting and implementing preventative measures to eliminate and/or reduce the severity and/or frequency of possible inadvertent AD unintentional alteration. Further, practical risk management

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should include a program to ensure that potential hazards that could result from implementing a new AD are identified and controlled. A safety assurance program should be implemented by the air carrier to evaluate the continued effectiveness of implemented control strategies, and there should be a program implemented that supports the identification of new potential hazards. One component of such AD risk management program is the AD sampling program that is slated to be added to draft AC 39.xxx (see Appendix A of this summary sheet).

ALTERNATIVES CONSIDERED

Physical marking of ADs was considered; and while this practice may not be possible or practical in all scenarios, there may be instances where an air carrier may desire or be required to mark AD installations; however, each scenario should be individually and carefully evaluated. Another consideration is that marking requirements per the 2007 EAPAS/EWIS rule as related to §121.1111 add requirements for certain color-coding (marking) of wiring, wiring terminals, switches, connectors, and components. With the addition of a program that would include AD marking, there would be a saturation of color-coding and marking that may prove confusing to the maintenance technician. Furthermore, AD marking of wiring locations without providing associated information (like a notification in the AMM or work instruction card) could potentially cause problems and aircraft delays caused by the technician stopping to research the origin (why/what) of the marking.

IMPLEMENTATION PLAN

To ensure AD continuing compliance, implementation includes adding approaches in AC 39.xxxx, which is proposed separately to address AD management best practices and guidance. Draft language for the AC 39.xxxx will be submitted to the FAA by 10 December 2010 with a publishing due date of 6/30/11; and the affected ATOS EPIs and SAIs documents impacting draft AC 39.xxxx will be revised at the appropriate quarterly interval after final guidance is published. To ensure AD continuing compliance, Air carriers should implement these AD handling best practices into their AD management programs in a timely manner and timeframe that is peculiar to each air carrier.

ASSUMPTIONS/CONSTRAINTS

The air carrier should use a risk-based approach to identify a population of ADs that are targeted for re-verification and the objective of the AD sampling audit should be to assess AD continuing compliance. Furthermore, the scope of the audit should include examination of the installed AD for comparison with requirements specified in the text of the AD, the service bulletin, and/or in other service instructions that are incorporated by reference into the AD. As applicable (and as impacted by AMOCs), these AD requirements would subsequently be translated via the air carriers AD compliance document into the air carriers scheduled maintenance program. The assumption is that AD sampling (re-verification) would be accomplished on closed ADs, but not to a degree where an intrusive/invasive inspection might lead to inadvertent harmful impact on continuing AD compliance

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or other airworthiness features. Regarding overlapping ADs, this recommendation does not specifically address overlapping ADs as it is encompassed in the air carriers' process enhancements listed above in the summary sheet. In addition, overlapping ADs are largely addressed by the FAA AD Development Working Group during the service bulletin development process per T2-R4-B5 summary, and by the Service Information Working Group in the ATA Spec 111 Lead Airline Process (T1-R2-B3 and T2-R3-B1/2/3).

The AIWG assumes that each air carrier will have an AD Compliance Control Board or equivalent method for evaluating its maintenance program to ensure ADs are properly reviewed for initial and continuing compliance. Current regulations (e.g., §121.1109, §121, 1111, and §121.117), require that new ADs be provided with ICA content to allow for a determination of risk for AD unintentional alteration and implementation of mitigation strategies.

With regards to CASS (AC 120-79A), a further assumption is that air carrier will generate and retain AD maintenance and current status records in accordance with their manual; and that ADs will be appropriately evaluated, accomplished, and tracked. Furthermore, ADs found to have been inadvertently reconfigured (undone) are appropriately evaluated for accomplishment, and for other modifications in the affected area (i.e., Supplemental Type Certificate (STC), and major repairs, and alterations). If applicable the air carrier would update/modify its maintenance program to ensure that CASS is functioning properly.

ISSUES FOR WORKING GROUP CONSIDERATION

Although added man-hours will be required to accomplish an AD re-verification sampling during maintenance inspection check intervals, this is outweighed by ensuring AD continuing compliance, and of adding a measure to prevent unintentional alteration.

ISSUES FOR ARC CONSIDERATION

See assumptions/constraints

FINDING NO.: T1- R3- B2, T1- R3- B3, T2- R4- B6, T2-R11-B1, AND T2-R11-B2

With Regards to T1-R3-B2, the team found that AD 2006–15–15 (a class 2 AD as defined in this report) specifies wire bundle routing and modifications that were very prescriptive subsets of SWPM practices. As a result, it is possible that in subsequent maintenance, an air carrier or repair station maintenance technician could demodify some or all of the installation and render it noncompliant with the AD through the use of the standard practices defined in the SWPM; if he or she were unaware the wiring was an AD-required installation.

With regards to T1-R3-B3, the team noted that determinations of compliance with AD configuration requirements are made differently than determinations of compliance with the requirements of other elements of airworthiness. Further, the team noted that *Class 1* ADs requires a configuration change

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that easily can be controlled by normal air carrier processes after implementation; however, *Class 2*: type AD requires a configuration change that, after implementation, potentially has a higher opportunity than class 1 ADs for being undone through the air carrier's standard maintenance practices or operations.

With regards to T1-R4-B6, the team found systemic problems in the AD process where multiple ADs affecting airworthiness in the same area of the airplane resulted in overlapping and confusing mandates for air carriers. This can lead to inadvertent noncompliance or reversal of previous AD actions.

With regards to T2-R11-B1 and -B2, the team found that unless otherwise directed, maintenance technicians working in the vicinity of the class 2 installations anytime after the AD is implemented typically employ standard maintenance practices. This raises the risk of inadvertently taking the airplane out of compliance with elements of the AD.

RECOMMENDATION NO.: T1- R3- B2, T1- R3- B3, T2- R4- B6, T2-R11-B1, AND T2-R11-B2

With regards to T1-R3-B2, each air carrier should develop processes and procedures to prevent class 2 ADs from being undone during normal maintenance actions.

With regards to T1-R3-B3, each air carrier should develop processes and procedures to— ensure AD configurations are maintained.

With regards to T2-R4-B6, the Team recommends the following related to AD development: Air carriers must have a process in place to continually verify AD accomplishment.

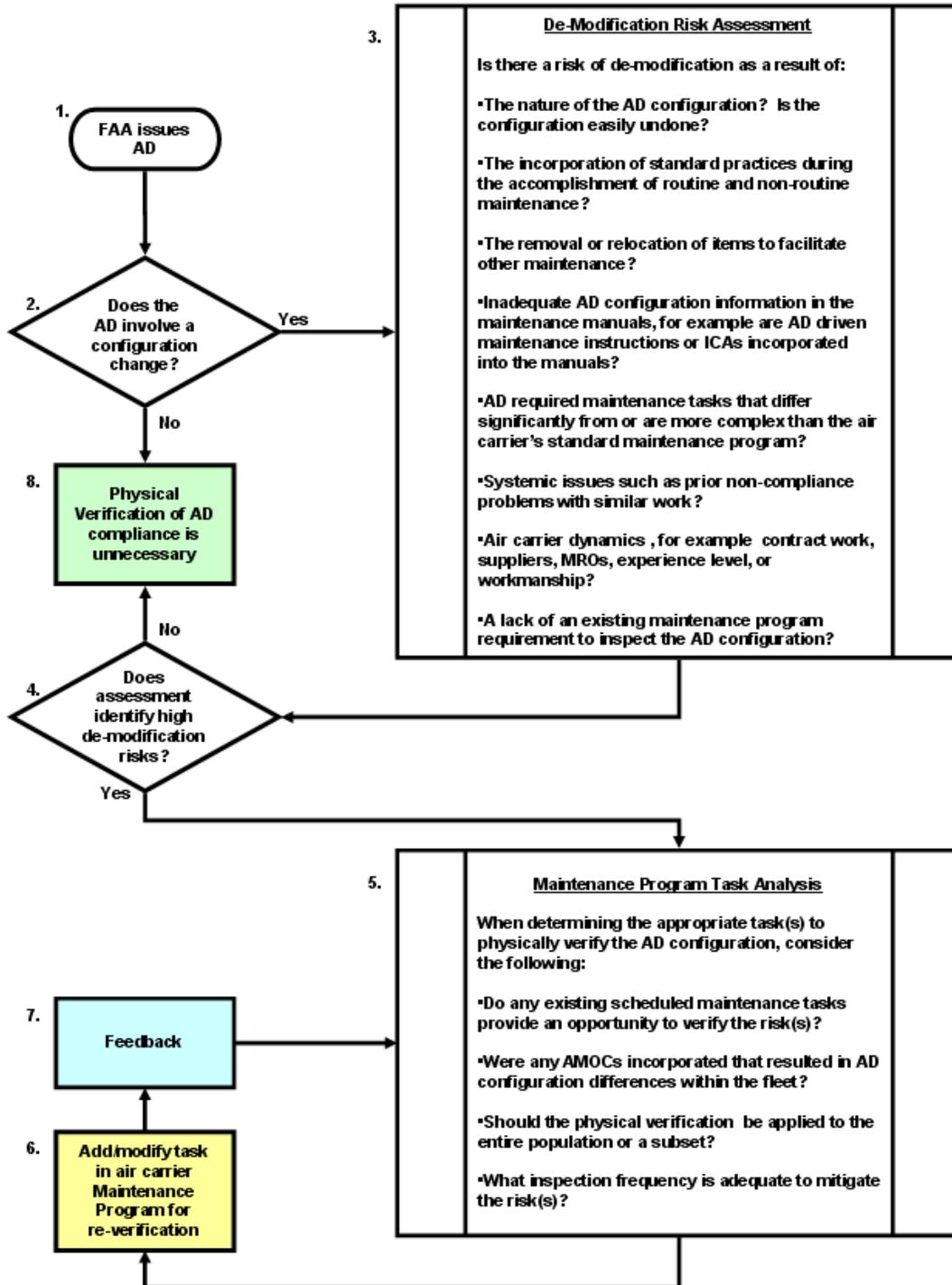
With regards to T2-R11-B1, air carriers should develop practices to address normal maintenance or other actions that could possibly demodify an AD configuration, particularly class 2 ADs. These could include the following: Process enhancements or physical marking of AD installations for nonstructural ADs. This alerts mechanics to the presence of an AD installation in the area where they are working.

With regards to T2-R11-B2, Air carriers should develop practices to address normal maintenance or other actions that could possibly demodify an AD configuration, particularly class 2 ADs. These could include the following: Quality assurance sampling of AD projects to verify the correct setup, and/or a sampling program that physically verifies that de-modification has not occurred.

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Figure E-1 Physical Verification Flow Chart

AD Compliance – Physical Verification Analysis – Flow Chart



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Appendix A

Physical Verification Instructions Figure F-1 Physical Verification Instructions

1	<p>Preparation:</p> <p>FAA issues AD.</p>	<p>Initiate analysis for newly issued ADs. This process may also be applied to previously accomplished service bulletins or ADs with known concerns.</p>	<p>Proceed to step 2</p>
2	<p>Decision:</p> <p>Does the AD involve a configuration change?</p>	<p>If the AD involves a configuration change, an unintentional alteration risk assessment should be performed. If the AD does not involve a configuration change, a physical verification maintenance task is unnecessary.</p>	<p>Yes, proceed to step 3</p> <p>No, proceed to step 8</p>
3	<p>Assessment:</p> <p>Unintentional Alteration Risk Assessment</p>	<p>The operator should develop their own risk based assessment process to determine if the AD configuration under consideration exhibits a high risk of unintentional alteration through the course of normal maintenance. The analysis should be comprehensive enough to include but not be limited to the elements listed in the flowchart.</p>	<p>Proceed to step 4</p>
4	<p>Decision:</p> <p>Does the assessment identify a high risk of unintentional alteration?</p>	<p>Has the risk assessment identified a high risk(s) of an unintentional alteration of the AD configuration, resulting in non-compliance with the AD? If yes, a maintenance program task analysis should be performed to identify the appropriate task(s) to mitigate the identified risk(s). If no, a physical verification of the AD configuration is unnecessary.</p>	<p>Yes, proceed to step 5</p> <p>No, proceed to step 8</p>

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5	Analysis: Maintenance Program Task Analysis	The air carrier should perform an analysis to identify a maintenance task or tasks that would mitigate the identified risk(s) to continued AD compliance. The analysis should be based on operator experience, operator systems, and the unintentional alteration risk, with consideration for but not limited to the items listed in the flowchart.	Proceed to step 6
6	Outcome: Maintenance task added to air carrier's maintenance inspection program.	The unintentional alteration risk assessment has determined a need to add a task(s) to the maintenance program to physically verify AD compliance in regard to the identified risk(s). The maintenance program task analysis has identified the appropriate task(s) to mitigate the identified risk(s).	
7	Feedback:	The air carrier may choose to include a feedback element to its AD compliance physical verification program. Events such as physical verification task results, maintenance program changes, or regulatory changes may trigger a re-evaluation of the analysis that was performed in step 5. The design of the feedback element would depend on the organization and resources of the air carrier.	
8	Outcome: Physical verification of AD compliance is unnecessary	The lack of a configuration change, or an unintentional alteration risk assessment of a configuration change, has determined that a physical verification of AD compliance is unnecessary.	