

U.S. OFFICE OF
SPECIAL COUNSEL
WASHINGTON, D.C.

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April 23, 2012

Ms. Tracy L. Biggs
Attorney, Disclosure Unit
U.S. Office of Special Counsel
1730 M Street, N. W., Suite 218
Washington, D.C. 20036-4505

Re: OSC File Numbers DI-11-2238 and DI-11-2709

Dear Ms. Biggs:

Please find FAA Inspector Daniel Mirau and my written Supplemental response to the OSC Supplemental data you forwarded to us for comment. Attached, please find our Supplemental Response document dated April 23, 2012. It includes five (5) attachments.

Inspector Mirau and I have previously provided our signed "Consent to Public Release of Written Comments on Agency Report" OSC form and that also permits our consent of our additional Supplemental Report and data enclosed as attachments 1-5. Be advised, one (1) of the enclosed attachments is not to be released as so stated on the attachment package.

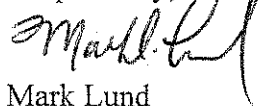
We will continue to follow FAA Management's and Delta's corrective actions and may have need to obtain The U. S. OSC's assistance again.

We sincerely thank you and The U.S. OSC for assisting us in keeping Americans safe in The United States' air transportation system.

We trust that you will be forwarding a copy of the Report and our Responses to our Minnesota State Representatives Senator Amy Klobuchar and Congressman Chip Cravaack, who serve on their respective Aviation Subcommittees, at the time OSC has completed the formal processing of our public safety disclosure.

Please contact use if you need anything from us in the final processing of our disclosure.

Respectfully,



Mark Lund
612-253-4557



Daniel Mirau
612-253-4551

FAA Aviation Safety Inspectors
FAA-Delta Air Lines Certificate Management Office
Minneapolis, Minnesota

To: President Barack H. Obama, United States of America

The Honorable John L. Mica, Representative from Florida
Chairman, U.S. Congressional Committee on Transportation and Infrastructure

The Honorable Chip Cravaack, Representative from Minnesota
Vice-Chairman, House Subcommittee on Aviation

The Honorable Jay Rockefeller, Senator from West Virginia
Chairman, U.S. Senate Committee on Commerce, Science, and Transportation

The Honorable Amy Klobuchar, Senator from Minnesota
Senate Subcommittee on Aviation, Operations, Safety and Security

Secretary Ray LaHood, U.S. Department of Transportation

Acting Administrator Michael P. Huerta, U.S. Federal Aviation Administration

From: Mark S. Lund, Aviation Safety Inspector, Minnesota

Daniel J. Mirau, Aviation Safety Inspector, Minnesota

U.S. Federal Aviation Administration Delta Air Lines Certificate Mgmt. Office,
Minneapolis, Minnesota

Subject: Our Supplemental Response to: The United States Office of Special Counsel,
File Numbers. DI-11-2238 and DI-11-2709

U.S. Department of Transportation Office of Inspector General Investigation
Report Dated November 1, 2011, "FAA Oversight of Delta Air Lines Fuel
Tank Safety

And Electrical Wiring Interconnection System Maintenance Programs"
Investigation Number I11A004SINV

April 23, 2012

Dear President Obama:

As we understand from the U.S. Office of Special Counsel (OSC), this written supplemental response will accompany their Report when it is forwarded to your office. We have signed our consent so that this response will be made available to the American citizens with the public release of the OSC Report, File Nos. DI-11-2238 and DI-11-

2709. We respectfully offer this written response, as U.S. Government employees in service to the citizens of The United States of America in the performance of our duties, to ensure and maintain public safety in America's air transportation system.

We understand that we are protected by the laws of the United States of America from retaliatory acts against us by Federal Aviation Administration (FAA) management for our whistleblower disclosure of FAA management's continued demonstration to disregard their oath of office to the American people by catering to the desires of the airline(s), instead of addressing the safety concerns raised; and electing to retaliate against your employed FAA Aviation Safety Inspectors for disclosing airline safety concerns in their efforts to ensure the American public's safety. FAA Management continues to thwart the effectiveness of the Aviation Safety Inspector to uphold the public's safety.

Our disclosure to the Office of Special Counsel (OSC) was initiated due to one (1) FAA Delta Certificate Management Office Supervisor, Mr. Sam Varajon's, acts of aggression towards one of us for our attempts to ensure the public's safety on Delta Air Lines, Inc. (Delta) with Fuel Tank Safety (FTS) and Electrical Wiring Interconnection Systems (EWIS) Federal Aviation Regulations. Federal safety regulations enacted to prevent another TWA Flight 800 or Swiss Air Flight 11 aircraft accident that killed hundreds of American souls. Our failed attempts to gain the public's safety through FAA Management within the FAA Delta Air Lines Certificate Management Office (FAA-Delta-CMO) caused us to escalate our concerns to Senior FAA Flight Standards Management Officials and the OSC.

We provided in our first response to the OSC, January 25, 2012, the public safety reasons for FAA's enactment of FTS and EWIS Federal Aviation Regulations. These Regulations required Instructions for Continued Airworthiness (ICAs) "paperwork documentation" to be developed by aircraft manufactures, such as The Boeing Company and Airbus, to maintain the continued safe operation of these aircraft. The actual maintenance instruction, "paperwork documents" was to be provided by the aircraft manufactures to the airline operators, such as Delta, so that these maintenance instructions, "paperwork," could be incorporated into Delta's Continuous Airworthiness Maintenance Program (CAMP). The ICAs developed by Boeing and Airbus had to be Approved by the FAA Certification Offices (FAA-ACO) as required by 14CFR Part 25. The airlines, such as Delta are required by 14CFR 121.1111 (EWIS) and 14CFR 121.1113 (FTS), to include in their CAMP inspections and procedures for maintenance, "paperwork," that must be based on an FTS and EWIS programs approved by the FAA-ACO.

The FAA EWIS ICA approval process is detailed in FAA Advisory Circular 25-27A, which requires the use of an analysis process by design approval holders (i.e., Boeing and Airbus) referred to as EZAP (enhanced zonal analysis procedure) for developing maintenance and inspection instructions, "paperwork," such that aircraft fires and explosions caused by defective electrical wiring components (EWIS) are prevented. The FAA approval process is detailed and consists of much document "paperwork" and results in much aircraft document "paperwork" maintenance and inspection instructions to maintain the safety of the aircraft operated in 14CFR Part 121 passenger operations. All this documentation "paperwork" created, developed and produced, with FAA approval, is to keep American citizens alive on U.S. airlines. The safety is contained in the "paperwork," the inspection and maintenance instructions, that FAA also required EWIS training of airline maintenance and inspection personnel, to ensure the work instructions contained in the "paperwork" was followed correctly and would maintain the continued safety of the aircraft. (ATTACHMENT 1)

In our disclosure to OSC and to Mr. John Allen, FAA Flight Standards Director, we provided a picture of burned/shorted fuel tank wiring that occurred on a Delta Boeing B757 operating on passenger flights in January of 2011. The event is stated in the DOT-OIG interview of FAA Mr. Fred Sobeck, dated August 11, 2011, page 15, line item 337, as provided to us by the OSC. Yet, Mr. Sobeck stated that the FAA John Allen directed IAC team, for which Mr. Sobeck was a member, did not investigate the cause of this serious safety event; An event similar to the probable cause of the TWA 800 accident. One has to question the importance of the public's safety to FAA officials when a burned electrical wiring event on a Boeing B757 passenger aircraft is not part of the Director of Flight Standards IAC special team investigation of Delta's FTS and EWIS compliance. After all, the safety method to prevent an occurrence like this is mostly "paperwork documentation."

If inspection and maintenance instruction tasks are missing, incorrect, or as Mr. Sobeck states in his interview, beginning at line item 231, "half a sentence can be missing, or the operator decided to leave a word out, or something like that, that's what I am talking about." Apparently, this is not an FAA management safety concern if the airline, such as Delta, leaves out parts of a maintenance instruction that has been approved by the FAA-ACO as is required by the enacted Federal Aviation Regulations with an elaborate FAA approval process. Apparently, FAA Management does not consider this a risk to the public's safety.

The FAA official interview excerpts, taken by the DOT-OIG investigator and provided to us by the OSC, were incomplete. The common, mutually agreed to FAA Flight Standards Director John Allen IAC Team position, was that the incomplete and

incorrect work instructions contained in Delta's EWIS developed task cards are not public safety concerns. We dispute that and are angry that FAA Senior Officials demonstrate their disregard to the public's safety. We understand that our responses and the documentation collected by the OSC will be released to the public, including media sources. We will let the public determine if their safety is protected by FAA Management.

We have already concluded that FAA Management does not place priority on the public's safety. As was the case in the past years Southwest Airlines Congressional Hearings, FAA Management, including the current FAA Principal Inspector's of the FAA-Delta-CMO, is still operating in collusion with Delta Air Lines and continues their aggression towards FAA Aviation Safety Inspectors in our attempts to ensure the public's safety.

To aid the public's, and the media's, determination as to whether FAA Management is acting on behalf of their safety with all U.S. Airlines, including Delta, we have attached excerpts of the FTS and EWIS 14CFR Final Rule documentation, highlighted in yellow, the areas that speak to the public's safety. Page numbered 4 of 93, speaks to the FAA conclusion that current maintenance practices are not adequate for addressing maintenance requirements for wiring components. Page numbered 5 of 93, speaks to the potential of fires on the aircraft due to short circuits of electrical devices. Page 16 of 93, provides that the design approval holder's (as example, Boeing and Airbus) FAA approved EWIS ICA's provide at least one (1) source of FAA-ACO approved data for their compliance with 14CFR 121.1111 (EWIS). Page 42 of 93, provides, that the airlines very likely would use (notice the word stated here is "use."). Most likely, the airlines, such as Delta Air Lines, would "use" the EWIS ICAs developed by the TC holder (Boeing and Airbus in Delta's case). The FAA comment does provide for an airline to develop their own EWIS ICAs, However, they still must comply with the FAA-ACO Approval requirements, **see our ATTACHMENT 1. (ATTACHMENT 2)**

Delta Air Lines elected to incorporate the EWIS ICAs developed by Boeing and Airbus as their compliance with 14CFR Part 121.1111. They also stated they would develop their instructions and procedures using the OEM (Boeing and Airbus) task cards and AMM (Aircraft Maintenance manual) and that their job card authors would be required to have EWIS training. Delta provided to FAA Supervisory Principal Avionics Inspector Sam Varajon, Delta Document "paperwork" Engineering document number 10-484667-20, dated September 10, 2010, providing to FAA their compliance method for 14CFR 121.1111. **(ATTACHMENT 3)**

We have also provided the cover page of the Delta Engineering document for revision A and B. The cover page provides the reason for the subsequent revision and gives evidence that the September 10, 2010 document was reviewed by the FAA. FAA Supervisor Principal Avionics Inspector Sam Varajon was the FAA Official overseeing and approving Delta's EWIS compliance.

The September 10, 2010 document does not provide the correct EWIS FAA-ACO Approved Boeing Source Document, D6-84438, May 15, 2010. Despite Delta references this document on Sheet 2, their EWIS ICA compliance chart on page 3 lists the "MPD." (Maintenance Planning Data); An incorrect EWIS ICA Source Document, again more "paperwork" improperly reviewed and accepted by FAA Supervisor Sam Varajon.

Delta's submitted compliance document to FAA Supervisor Varajon lists incorrect ICA source documents for the Delta Boeing fleets. Yet, when revision A was released, because of an FAA finding regarding training, the incorrect chart was not identified by FAA Varajon and his selected team of two (2) others that were regularly meeting with Delta. The "MPD" document listed on Delta's ICA chart is not even a document that has FAA oversight, and has no FAA approval. FAA Supervisor Varajon did not identify the incorrect listed EWIS ICA compliance "paperwork" documents.

It was FAA Aviation Safety Inspector Mark Lund that informed Varajon by email of January 18, 2011 that the EWIS source document listed by Delta as the "MPD" was incorrect and should be the correct document "MRBR" (FAA Approved Maintenance Review Board Report). (**ATTACHMENT 4, page 2, paragraph 3**).

Contrary to what Varajon states in his sworn testimony to the DOT-OIG Investigator, beginning line item 1315 through line item 1442, he directed Delta to revise their Engineering document, 10-484667-20, to revision B dated February 2, 2011 to list the correct FAA-ACO Approved EWIS source document D6-84438, which includes by reference the FAA ACO Approved MRBR. (**ATTACHMENT 3, sheet 11 of Rev B**) At line item 1403 in Varajon's sworn testimony, he denies why the Rev B change, he states, "Could be." FAA Supervisor Varajon was visibly angry when FAA Inspector Lund presented this to him. Varajon stated to Lund that he would get Delta to revise the document. Inspector Lund responded to him that it was his choice as it was late in the review process and other FAA Inspectors had already completed their reviews utilizing the non-FAA-ACO Approved "MPD."

FAA Supervisor Varajon's interview statements faulting the FAA-ACO and the FAA-AEG are unfounded and intended to distract his improper involvement with Delta's EWIS compliance document. FAA Varajon had Delta's September 10, 2010 EWIS

compliance document. On October 28, 2010, it was revised due to an FAA finding with training. **(ATTACHMENT 3)** By the time of Varajon's letter of February 4, 2011 **(ATTACHMENT 4)** to Delta stated that some of the Boeing fleets were found acceptable even when Varajon knew that some evaluating FAA Inspectors under his Supervisory authority had not done a complete review utilizing the FAA-ACO Approved EWIS source document and did not evaluate the EWIS zone program on Delta south fleets, B767, B777, B737, MD 88/90.

An FAA Inspector from the FAA-Delta-CMO Atlanta office told FAA Varajon this while on a speaker call in Varajon's office in the presence of FAA Inspector Lund. Varajon became visibly angry and stated this would not hold up his approval. FAA Inspector Lund's email of February 3, 2011 to FAA Supervisor Varajon, clearly provided written communication to Varajon that some FAA Inspectors in Atlanta did not conduct their EWIS evaluations with the correct FAA-ACO Approved source documents. **(ATTACHMENT 4, email dated February 3, 2011)** Yet, Varajon's letter of February 4, 2011, states the B767/777/737 and MD 88/90 fleets were found ok, "no pending issues." **(ATTACHMENT 4, letter dated February 4, 2011)**

FAA Inspector Lund was the only reviewing FAA Inspector for Delta's EWIS compliance that identified the errors with Delta's compliance document and the FAA evaluating Inspectors. Inspector Lund had also told Varajon and provided written correspondence to him stating that other FAA Inspectors were not conducting their Delta EWIS compliance evaluation properly and some had no knowledge of zone inspection requirements or the correct FAA-ACO Approved Source Documents required to be used in their evaluations. **(ATTACHMENT 4)**

We present this document history because of the false accusations made against FAA Inspector Lund in FAA Supervisor Varajon's DOT-OIG interview provided to us by the OSC. FAA Varajon stated in the DOT-OIG investigation interview that he was not made aware of Delta's EWIS non-compliance. The fact is FAA Supervisor Varajon was made fully aware of EWIS findings on the Boeing B757 aircraft as well as other fleet types before he approved Delta's EWIS maintenance program that did not comply with 14CFR 121.1111 and FAA guidance. Some of the non-compliance findings of Delta's submitted Boeing B757 EWIS maintenance program to FAA Supervisor Varajon is attached. **(ATTACHMENT 4)**

FAA Supervisor Varajon's sworn testimony to the DOT-OIG also present false accusations of FAA Inspector Lund and not performing his public safety functions. His testimony beginning line item 819 through line item 851, he presents false Inspector performance of FAA Inspector Lund. He offers to the DOT-OIG Investigator Lund's

past history even though this is not part of the questioning. At line item 833, FAA Varajon lies under oath when he states, "Mr. Lund refused to go back to the property (Northwest Airlines) after that because he refused to be escorted while doing his job." FAA Varajon fails to advise the DOT-OIG Investigator that FAA Inspector Lund was removed from doing his safety duties by letter from FAA Management and that his public safety whistleblower disclosure at the time was substantiated by the DOT-OIG Report, Unsafe Maintenance Practices at Northwest Airlines, Report AV-2007-080, September 28, 2007. FAA Supervisor Varajon has full knowledge of this DOT-OIG Investigation event. He brought it up in his testimony without being questioned by the DOT-OIG Investigator.

FAA Supervisor Varajon again lies under oath beginning line item 953-963, where he presents FAA Inspector Lund as unprofessional. The fact is, Delta legacy Boeing B757 Northwest Airlines employees were in full cooperation with FAA Inspector Lund and they advised Inspector Lund that legacy Delta Management was not receptive to their input for EWIS revisions, as such, they could not make the requested changes. In fact two (2) Delta legacy Northwest Airlines employees that were working with FAA Inspector Lund stated they were sorry and that the work relationship with him was always good. One (1) Delta senior maintenance program employee told FAA Inspector Lund that all EWIS revisions he was requesting were correct but Delta Management would not listen to them and would not make the changes. One Delta legacy Northwest employee, no longer with Delta, even telephoned FAA Inspector Lund to tell him that their work relationship was always good.

FAA Supervisor Varajon lies under oath during his DOT-OIG Investigation sworn testimony beginning line item 1178 through line item 1303 when he speaks to EWIS zone inspection findings. Varajon states, the audit team has discovered zonal issues, that there were some missing portions to the 757 program for zonal inspections, and were going to do the violation based on what's missing in the documents."

At line item 1185, Varajon refutes the DOT-OIG questioning as this finding is not related to FAA Inspector Lund's previous findings to him. Yet, in fact, FAA Inspector Lund did provide FAA Supervisor Varajon EWIS zonal non-compliance with Delta's program. Emails by FAA Inspector Lund to FAA Supervisor Varajon, of January 18, 2011, Memo of Record dated January 31, 2011, email of February 22, 2011 and February 24, 2011 all address Delta's non-compliance with required EWIS zonal inspection task requirements. These documents to Varajon address both training and maintenance instructions for conducting EWIS zone inspection tasks. His testimony to DOT-OIG line item 1185 states that FAA Inspector Lund's zonal findings were only for training. The

documents provided in this response as attachment 4 prove he is lying under sworn oath to the DOT-OIG Investigator. (ATTACHMENT 4)

Beginning line item 1482 of Varajon's sworn testimony, FAA Supervisor Varajon provided a false response to DOT-OIG questioning regarding another FAA Inspector bringing to Varajon's attention before FAA approval of Delta's non-compliance with their submitted EWIS program. Varajon states at line item 1499, that the other inspector did not bring up anything, "other than reflecting what he heard from Mark." This again is not true, FAA Inspector Mark Lund was in Varajon's office when the other FAA Inspector from Atlanta called. The Atlanta FAA Inspector told Varajon that Delta had not submitted all EWIS zone inspection task cards for FAA evaluation. The Atlanta Inspector told Varajon that he had checked with other Atlanta Inspectors on the other legacy Delta aircraft fleets in Atlanta and they had not received zonal task cards nor were they all familiar with the EWIS zone requirements. Varajon became angry because it was too late for him to do another review of all Delta zone task cards before he gave Delta his approval. He angrily stated during the telecom clearly heard by the Atlanta FAA Inspector and FAA Inspector Lund that this would not hold up his approval!

The other FAA Inspector from Atlanta must have given Varajon more information of Delta's EWIS non-compliance because why would he tell the DOT-OIG Investigator at line item 1499 that he, "took those issues to Mr. Xxx and Ms. Yyy for review." Varajon did not respond directly to the questioning when he was asked if they were documented, line item 1504, of his sworn testimony.

At line item 1813 of Varajon's sworn testimony, he attempts to re-assign his public safety regulatory responsibilities to Delta Air Lines. He states, "I think it's the company's responsibility to take it and run with it and make sure that they are in compliance, and that's going to be the direction I'm going to take with the company on this issue." FAA Supervisor Varajon was the FAA Official required to give Delta Air Lines Approval for their EWIS program once they were fully compliant with the EWIS Regulations enacted to keep the public safe. He knowingly did not ensure full compliance when he gave his FAA approval. Now he states he is giving that responsibility for the public's safety to Delta Air Lines. If that is the case, why is FAA Supervisor Varajon in an FAA Authority position if he foregoes his public safety duties to Delta Air Lines?

According to the DOT-OIG FAA interview statements of FAA Supervisor Sam Varajon provided to us by the OSC, FAA Supervisor Sam Varajon lied under oath to the DOT-OIG Investigator when he stated that (FAA Inspector) Lund had not provided him findings of Delta's EWIS non-compliance to 14CFR 121.1111 before he gave Delta his

FAA Approval for Delta's EWIS program. (ATTACHMENT 4 and DOT-OIG "Swore Interview of Sam Varajon, Case Number I11A004SINV, August 16, 2011 at 12:20pm")

FAA Supervisory Principal Avionics Inspector Sam Varajon, of the FAA Delta Air Lines Certificate Management Office, lied under oath during the U.S. Department of Transportation-Office of Inspector General's official investigation of the American public's safety on Delta Air Lines.

FAA Supervisor Varajon refused to provide training to the FAA reviewing inspectors under his authority. FAA Supervisor Varajon refused to have a meeting with all FAA reviewing Inspectors to make sure the review was done IAW FAA requirements. These were recommended to him multiple times and he chose not to act on the recommendation. (ATTACHMENT 4) Now after his inappropriate FAA approval, all Delta fleets are currently under FAA re-evaluation for FTS and EWIS compliance. Noncompliant FAA Enforcement Actions against Delta have resulted and the FAA Flight Standards Director IAC Team confirmed "a lot of errors were found" in Delta's EWIS maintenance program "paperwork documentation".

Varajon became aggressive, threatening FAA Inspector Lund with disciplinary action. FAA Supervisor Sam Varajon solely miss-managed Delta's compliance with Federal Regulations for FTS and EWIS enacted to keep the American public safe even when he was numerous times informed of the noncompliance issues before he, alone, FAA approved Delta's EWIS program.

FAA Supervisor Varajon caused our public safety disclosure to FAA Flight Standards Director, Mr. John Allen, and eventually to the OSC. The major reason it went to the OSC was because Varajon was assigned to John Allen's FAA Flight Standards IAC Special Team investigation of Delta's compliance. Yet, Mr. Allen was told Varajon was the instigator. The IAC Team document states that a purpose of the IAC is to protect the reputation of FAA Management. It provides for a disciplinary process and does not focus on public safety. We provided comments and a copy of the FAA IAC document in our previous reply.

FAA official Mr. Fred Sobeck's interview excerpts, page 15, beginning with line item 353, provides for FAA Varajon's full involvement in the IAC Team evaluation. Why would FAA officials allow the FAA Supervisor that was the instigator of our public safety disclosure to be part of a Flight Standards Headquarters' evaluation of Delta's compliance when he was the FAA approving official that allowed the noncompliance?

The public will have to ask this question. Line item 367 of Sobeck's interview provides that Varajon was also involved in the IAC Team's conclusions. Why? His involvement creates distrust of FAA Senior Management Officials and supports the true purpose of the FAA Flight Standards IAC investigatory process is to protect the reputation of FAA Management as stated in their IAC Document.

As we stated in our previous response, we will not use FAA's internal disclosure process. We will continue to use the OSC disclosure process until such time as FAA Management demonstrates they can be trusted.

Can the public trust FAA Management with their safety?

Mr. Sobeck's testimony, beginning line item 384, discusses Delta's Continuing Analysis and Surveillance System (CASS) required of Delta by 14CFR 121.373. Delta's Engineering document of **ATTACHMENT 3, page 7**, states that Delta's Quality Assurance will provide oversight for Delta's implementation and review for any compliance issues. Why did not Delta's Quality Assurance detect the noncompliance errors? Why has there been FAA Enforcement actions taken for EWIS and FTS, and are pending processing as listed in the OSC supplemental data, if Delta's CASS, Quality Assurance oversight was effective? It was not effective.

14CFR 121.373 requires of Delta to have an effective CASS. In addition, Mr. Sobeck's testimony indicates agreement that CASS should have identified the findings. Yet, the IAC Team, he was part of, did not assess Delta's CASS effectiveness. They left this to FAA Management in the Delta CMO. We had reviewed, about October 2009, Delta's CASS program at the time of the Northwest Airlines and Delta merger and found it to be un-acceptable. Delta's merged CASS program was accepted by FAA Management despite knowledge of our deficiency findings with Delta's CASS program.

FAA Supervisor Sam Varajon also agreed in his sworn DOT-OIG testimony, beginning line item 1746 through 1766 that Delta's CASS program was not effective. As an FAA Official overseeing Delta Air Lines, why didn't he identify this deficiency without the involvement of the FAA Flight Standards IAC and our Whistleblower Disclosure?

According to FAA Aircraft Evaluation Group Inspector John Flores' testimony excerpts, beginning line item 216, a lot of errors were found in Delta's EWIS/FTS "paperwork" documentation. This documentation is required by 14CFR 121.1111 (EWIS) and 14CFR 121.1113 (FTS) regulations enacted for public safety and the Flight Standards IAC Team found "a lot of errors in the-administrative errors in the paperwork."

We noticed a lot of “hmm” pause, speech stumbling in the OSC provided DOT-OIG testimony excerpts such that it was obvious the responding FAA officials were trying to word their responses to “dance around” a direct public safety impact. All FAA Flight Standards IAC Team members mutually agreed a lot of errors in aircraft maintenance instruction “paperwork” is trivia, not a concern for the public’s safety.

Does the public want correct maintenance instructions “paperwork” to be provided to the Delta aircraft mechanic, make sure it is followed, such that the maintenance performed to the aircraft is correct and safe? Is this not also what we expect from our automobile mechanic? That maintenance is performed correctly and completely, so we are not exposed to an accident, injury, or death? FAA rule enactment required these “paperwork” maintenance instructions to be approved by the FAA-ACO engineers, the aircraft design engineers, and evaluated by FAA Aircraft Evaluation Group (AEG) Safety Inspector Specialists. It must be very important for ensuring the public’s safety as it is part of the rule requirements. Yet, the Director of Flight Standards IAC Team found that “paperwork” errors are not a public safety threat. Their finding does not support the FAA rule making process. Their position encourages miss-trust in regards to the public’s safety.

It is clear from FAA Supervisor Varajon’s testimony that he lacks full knowledge of FAA EWIS requirements. He clearly does not understand the EWIS zone inspection requirements. The deficiencies in Delta’s zone inspection requirements were clearly presented to him before he gave Delta’s approval. He was provided email correspondence informing him of Delta’s zone inspection concerns, **ATTACHMENT 4**, letter of January 31, 2011. He was provided excerpts of FAA Advisory Circular AC 25-27A, that provides for the importance of EWIS zone inspection tasks. **ATTACHMENT 1** excerpts, beginning on AC page 20, provides for the EWIS inspection types and their significance.

The AC appendix, page A11, contains a Note that explains why separation of stand alone tasks from zone tasks is required and they are not to be treated the same. The Note speaks to the human factors element that a stand alone GVI (General Visual Inspection) forces the maintenance technician to look at a specific item, contrary to the zonal GVI that does not focus on a particular item. They are not interchangeable as FAA Supervisor Varajon seems to think as he is laughing in response to the DOT-OIG’s investigative questioning, beginning line item 1581 of the testimony provided to us by the OSC.

The American Public has to question why he is in the FAA position to approve Delta's compliance. Varajon was removed from the FAA Supervisory Principal Avionics Inspector position during the DOT-OIG investigation. FAA Southern Regional Director Mr. Tom Winston was involved in making that decision. Varajon is now back in the Supervisory Principal Avionics Inspector position with the FAA authority for Delta Air Lines. Why is he back in the position?

The FAA Advisory Circular (AC) 25-27A is very well written and does include its use by air carrier operators. The AC provides the reason why the different requirements for EWIS ICAs, stand-alone GVI and DET tasks, zonal inspection tasks, cleaning and restoration, and protection instructions "paperwork" are required, are specific in their application and are individually necessary. The AC also provides many pages of EWIS defects that could lead to aircraft fires that should be identified by the zone inspection if done by a properly trained aircraft maintenance person using correct and complete maintenance instructional "paperwork." The FAA Flight Standards IAC Team found "paperwork" errors not to be a public safety concern.

In FAA John Flores' testimony, beginning line item 298, he speaks to the zone inspection requirements. Beginning at line item 311, he addresses the fact that, "a lot of the time wiring was neglected in the past, even though (it was to be included in the zone inspection criteria). Beginning at line item 323, he speaks to fire caused by defective wiring and accumulation of combustible material. At line item 345, he speaks to, "a defect in the wiring can cause a fire." Line item 348, he provides the inspection type, stand-alone GVI or DET or zone inspection, with the intent to prevent a fire on the aircraft. At line item 358, he provides, "the operator would have to implement all those tasks that were generated in the source document and approved by the (FAA) ACO."

Delta Air Lines did not incorporate all EWIS zone inspection tasks into their Continuous Airworthiness Maintenance Program (CAMP) at the time FAA Supervisor Varajon approved their EWIS program when he was fully aware it was not compliant to the FAA ACO Approved EWIS ICA Source documents.

Delta Air Lines, over the years of operating some of their aircraft types, did not maintain all aircraft manufacture developed zone tasks as current EWIS identified zone tasks. This was the case on the Delta Boeing B757. The landing gear zone tasks, engine zone tasks, had lost their identity and therefore were not accounted for in Delta's EWIS maintenance instructions. Varajon's letter of February 4, 2011 to Delta Air Lines accounts for the discrepancy with Delta's zone program. Page 4, paragraph V, of Varajon's letter provides an overall problem with Delta's aircraft zone program. Though his comments are not fully accurate, it does give evidence that he was made aware of

zone program noncompliance across Delta's fleet of aircraft before he approved Delta's EWIS maintenance program. (ATTACHMENT 4)

To further evidence the safety significance of incorrect "paperwork" for Delta's maintenance work instruction for accomplishing an EWIS zone inspection on the B757 landing gear, Delta was required to conduct a re-inspection due to work instruction errors "paperwork administrative errors" as FAA Management refers to them. On December 16, 2011, Delta Air Lines was required to re-inspect eight (8) Boeing B757 aircraft for accomplishment of a proper EWIS zone inspection of the aircraft's landing gear, Delta Engineering Document number 498514-14M, dated December 16, 2011. (ATTACHMENT 5)

The Delta document provides statement that the aircraft had to be inspected at the next "RON" (regular overnight stop). This is an immediate inspection, almost an aircraft grounding event that according to FAA interview statements, is a public safety concern. (John Flores DOT-OIG Interview beginning line item 210 through 224) But yet, it is "only an administrative error in the paperwork," as stated in testimony by the FAA Director of Flight Standards' IAC Team, including FAA Supervisor Sam Varajon. If it is only administrative, than why after the DOT-OIG interviews is FAA Management now requiring Delta to inspect aircraft quickly if it is not a public safety concern?

FAA ACO Engineer Mr. Dean Thompson rejected, November 11, 2011, Delta's request to substitute a DVI (Detailed Visual Inspection) of the MRBR specified structural program for landing gear as a replacement for the EWIS zone inspection specified GVI (General Visual Inspection) of the landing gear zones as specified in the FAA-ACO Approved EWIS ICAs. As such, FAA Enforcement Action against Delta Air Lines for their EWIS non-compliance, FAA EIR File number 2011SO275338.

Despite the FAA-ACO rejection of Delta's EWIS instructions for inspection of the landing gear, FAA Supervisory Principal Inspector Nick Pearson wanted to allow Delta continued operation of the non-compliant eight (8) Boeing B757 aircraft.

The aircraft landing gear areas contain many electrical wire runs. The landing gear area electrical wiring was the defect in the MD-88 aircraft landing gear wiring that grounded many of American Airlines and Delta aircraft in 2008 after the Congressional hearings for Airworthiness Directive non-compliance. The landing gear area has many moving parts, fluids, and potential for electrical wire damage. Delta had previously performed the landing gear inspection with incorrect, incomplete work instruction cards ("errors in the paperwork") with non-approved FAA-ACO EWIS instructions. The

procedure they were using was rejected by FAA-ACO Engineering resulting in the FAA initiated Enforcement action and the immediate inspection of the aircraft.

It is obvious that FAA Supervisor Sam Varajon sided with Delta Air Lines when he approved Delta's EWIS program, with this zone inspection non-compliance, when he was made known of the non-compliance with Delta's zone program. It is in his letter of February 4, 2011 to Delta. (**ATTACHMENT 4**). FAA Supervisor Varajon's email of November 11, 2010 states that the only approved EWIS ICA procedures are those in the aircraft maintenance manual. The aircraft's EWIS approved zone inspection task instructions "paperwork" are in the aircraft maintenance manual. Yet, he approved Delta's EWIS program when the zone program was not fully complied with and he knew it. (**ATTACHMENT 4, page 1**)

It is also obvious that FAA Supervisor Nick Pearson is siding with Delta Air Lines by allowing EWIS non-compliant aircraft to continue operating in passenger service. He has demonstrated he really does not want to know about Delta's non-compliance as demonstrated in his routine statements to FAA Aviation Safety Inspectors that he will take the side of Delta unless the FAA Inspector convinces him otherwise. I, FAA Aviation Safety Inspector Mark Lund have been in Pearson's presence when he has stated this.

FAA Supervisor Sam Varajon attacked FAA Aviation Safety Inspector Mark Lund with his aggressive attempts of disciplinary action against him for pointing out non-compliance in Delta's EWIS program, including the zone program. (**ATTACHMENT 4**).

FAA Supervisory Principal Inspectors Varajon and Pearson have demonstrated they have a preferred interest in supporting Delta Air Lines than the safety of the American public.

Yet, these FAA Supervisors have the authority to approve airline programs that are required to keep the American public safe but prefer to support the airline at the expense of the public's safety. How ironic is the current FAA Management structure? Where is the integrity for the public's trust in FAA Management to keep them safe? We can not find it.

FAA Aviation Safety Inspectors are committed to the public's safety. It is FAA Management, and the aggressive pressure they apply to the Safety Inspectors to keep them from disrupting the airline's operation instead of allowing and supporting their public safety duties. FAA Management is the biggest FAA risk to the American public's

safety. This case demonstrates this at even the highest FAA Flight Standards level IAC Team involvement when many errors were found in required EWIS maintenance instructions, required by Federal Aviation Regulations enacted for the public's safety, yet, it is not a public safety concern to Senior FAA Flight Standards Management as stated in their IAC Report and member interviews. In January 2011, a Delta Air Lines Boeing B757 operating in passenger service had fuel tank electrical wiring short and burn. The FAA's Flight Standards Director was shown pictures of the burned electrical wiring. Yet, his assigned IAC Team did not investigate this event for which EWIS regulations were enacted to prevent.

We submit the public will determine if they are safe or not because of aircraft maintenance instructions containing errors that may again lead to in flight fires and fuel tank explosions with subsequent loss of American lives.

With the current FAA management lack of public safety mentality demonstrated in this case of the FAA-Delta-CMO, one has to question the EWIS and FTS compliance state of the other U.S. Airlines required to be in compliance with these public safety regulations. FAA Flight Standards Director John Allen questioned the EWIS/FTS compliance status with FAA Aviation Safety Inspector Mark Lund during their meeting of May 2011.

Are the other U.S. Airlines in full compliance with the Federal public safety requirements of EWIS and FTS?

Mr. President and Congressional Representatives, maybe you could ask the FAA Officials this question on behalf of the American public's safety. Ask the FAA to provide evidential proof of compliance when you ask them.

We are in agreement with FAA-ACO Engineer Stephen Slotte's email statements of September 15, 2011 to the DOT-OIG Investigator. His comments on page two (2) provide as we understand the 14CFR 121.1111 EWIS compliance rule. About half way done in his last paragraph on page 2, he states, "The rule does not require them to use the EWIS ICA developed by Boeing or any other manufacture. It requires them to incorporate maintenance and inspection tasks that were developed using an EZAP (enhanced zonal analysis process) in accordance with appendix H of Part 25 and approved by FAA. It doesn't specify who must develop those tasks. However, in reality **the operators choose to use the ICA developed by the manufactures. In doing so, they must incorporate the EWIS ICA into their maintenance programs without changes to the actual procedures.**" He goes on to provide an example for the DET inspection of a No. 1 IDG (electrical generator) power feeder cable, and how to do this

inspection, than we (FAA-ACO) expect that is exactly what will be done. His comments support what is recorded in the narrative of the Final Rule docket and we are in agreement with it. To note, Mr. Slotte's name is the technical expert listed in FAA's Rule making docket. **(ATTACHMENT 2, page 1, bottom of page)**

We are also in agreement with FAA-ACO Engineer Dean Thompson and his reasons for rejection of Delta's request to substitute landing gear zone inspection tasks. We have had telephone conversations with Mr. Thompson during our FAA EWIS/FTS review and found him very knowledgeable and helpful.

As we have provided evidence earlier in this response, Delta elected to incorporate the Boeing and Airbus developed EWIS ICAs into their maintenance program. Therefore, the criteria provided by Mr. Slotte applies to Delta, and as this OSC, DOT-OIG investigation case demonstrates, Delta was not in full compliance to the EWIS rules enacted to keep Americans safe on airlines. And with full knowledge of Delta's non-compliance, FAA Supervisor Varajon approved of Delta's continued operation in passenger service beyond the Federal rule compliance date of March 10, 2011.

We have read the many pages of "paperwork" documentation developed by the FAA for guidance and the explanations as to why it is important for passenger safety that airlines, such as Delta, have a compliant EWIS and FTS maintenance program based on FAA ACO Engineering approval. All of the effort and resources spent to get these maintenance requirements "paperwork/documentation" incorporated into the airlines' maintenance program is to keep the public safe from an in flight explosion or fire already experienced by TWA 800 and Swiss Air Flight 11 aircraft accidents. A lot of FAA approval oversight was intentionally built into this regulatory process at the cost of many tax payer dollars. And yet, one (1) sole FAA Supervisor can give all that public safety effort away with the stroke of his signature, and then aggressively accuse FAA Aviation Safety Inspectors of not doing their job. Who is holding FAA Supervisor Varajon and Pearson accountable?

The Delta documentation provided to us by the OSC as Attachments 5 and 6 is very hard to read. We do offer up, in our quick review, that Delta also exhibits a lack of full understanding with FTS and EWIS compliance requirements. This may be explained because they are being led by FAA Supervisors Varajon and Pearson who have demonstrated a lack of knowledge with FTS and EWIS requirements and are more interested in supporting Delta than the American Public's safety. The FAA Operations Specifications D070 errors referenced in their Airworthiness Directive (AD) findings, first item, has nothing to do with their AD compliance. The current Ops Spec is D097 and it is not issued to show compliance with the AD. It is issued by the FAA Principal

Inspector when the airline shows compliance with 14CFR 121.1113 (FTS) and 14CFR 121.1111 (EWIS). We did not take the time to evaluate all Delta findings on Attachment 5.

OSC Attachment 6, Delta document, Engineering Report 10-100511-20, issue dated October 12, 2011, "FAA FTS/EWIS Compliance Audit Corrective Action Plan," does not provide any guidance or criteria for the actual writing of the EWIS/FTS maintenance work instructions on Delta's work cards used by their aircraft maintenance personnel. The instructions, the how to do the task, that ensures, as Mr. Slotte stated (the task is done exactly as expected) is what was found to have, as Mr. Flores stated, "a lot of errors." Yet, this Delta audit, again being overseen by FAA Supervisors Varajon and Pearson, fails to ensure the work instruction provided to the aircraft mechanic is complete and correct for accomplishing the required task correctly as approved by the FAA-ACO.

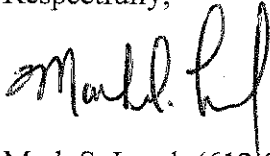
FAA Supervisors Varajon and Pearson have not allowed us to participate in FAA's evaluation of Delta's compliance with EWIS and FTS even though we have good knowledge of the program requirements. It is obvious that the direction given by FAA Supervisors Varajon and Pearson is not going to ensure Delta's full and continued compliance with FTS and EWIS Rules enacted to keep the public safe.

We again greatly wish to thank the OSC and the DOT-OIG for their due diligence in reaction to our public safety concern. The compliance requirements for FTS and EWIS are very complicated even for us seasoned FAA Aviation Safety Inspectors. We very much appreciate the feedback we received throughout the investigation process. We appreciate being treated with respect and not with aggression and accusations. We will continue to monitor FAA Management's oversight of Delta's compliance to the corrective actions they state will occur. If necessary, we will use your services again. Thank you so much for helping us keep the American public safe.

We have great respect for Mr. Fred Sobeck, Mr. John Flores and the FAA ACO Engineers. It has been an extraordinary amount of work they have accomplished with enactment of the Federal Aviation Regulations for FTS and EWIS. We found the FAA documentation and the aircraft manufacture's data to be excellent and very usable. We have had occasion over the years to converse with Mr. Sobeck and are appreciative of his openness and expertise. We have regular conversations with Mr. Flores due to his position with the FAA-SEA-AEG as the Boeing B757 Avionics Specialist. He does his home work and is prompt with his technical response to us. We talked with him during our evaluation of Delta's FTS/EWIS program to make sure we had a correct understanding.

To you Mr. President and Congressional Representatives, we make ourselves available for any needs you may have. We are both military veterans and are proud to serve the American public in our safety duties as FAA Aviation Safety Inspectors.

Respectfully,



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FAA Aviation Safety Inspector



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Attachments (5)



U.S. Department
of Transportation
**Federal Aviation
Administration**

Advisory Circular

Subject: Development of Transport
Category Airplane Electrical Wiring
Interconnection Systems Instructions for
Continued Airworthiness Using and
Enhanced Zonal Analysis Procedure

Date: 05/04/10
Initiated By: ANM-100

AC No: 25-27A

1. Purpose.

a. This advisory circular (AC) describes parts of the compliance process for the “Enhanced Airworthiness Program for Airplane Systems/Fuel Tank Safety (EAPAS/FTS)” rule. That rule requires design approval holders (DAHs) and applicants to develop instructions for continued airworthiness (ICA) consisting of maintenance and inspection tasks, intervals, and procedures for the representative airplane’s electrical wiring interconnection systems (EWIS) for each affected type design. The DAH must also review any fuel tank system ICA it has developed in compliance with Special Federal Aviation Regulation No. 88 (SFAR 88) in order to ensure compatibility with the EWIS ICA, including minimizing redundant requirements. The DAH must then submit the EWIS ICA to the Federal Aviation Administration (FAA) oversight office for review and approval.

b. This AC provides guidance for developing maintenance and inspection instructions for EWIS using an enhanced zonal analysis procedure (EZAP). For the purposes of this AC, the term “maintenance” encompasses both “maintenance” and “preventive maintenance,” as those terms are defined in Title 14, Code of Federal Regulations (14 CFR) 1.1. For airplane models whose maintenance programs already include a zonal inspection program, the logic described here provides guidance on improving those programs. For airplanes without a zonal inspection program, use of this logic will produce zonal inspections for wiring that can be added to the existing maintenance program. This AC contains information that can be used by operators to improve EWIS maintenance practices. It stresses the importance of inspecting EWIS and promotes a philosophy of “protect and clean as you go” when performing maintenance, repair, or alterations on an airplane.

Operator's Maintenance Program, will contain guidance related to making changes to the approved-ICA-based maintenance and inspection program tasks.

e. Requirements of §§ 121.1111 and 129.111. The EAPAS/FTS rule also requires part 121 certificate holders and part 129 air carriers operating U.S.-registered airplanes to incorporate into their maintenance program tasks based on FAA-approved EWIS ICA. AC 120-99, *Incorporation of Electrical Wiring Interconnection System (EWIS) Instructions for Continued Airworthiness into an Operator's Maintenance Program*, will contain guidance for these regulations.

f. Explanation of Maximum Payload Capacity. For purposes of the requirements in § 26.11, payload capacity is defined by § 119.3. The current text of § 119.3 is found in appendix E of this AC.

3. How this Information was Derived. The guidance in this AC is based on recommendations given to us by the Aging Transport Systems Rulemaking Advisory Committee (ATSRAC). It is drawn from maintenance, inspection, and alteration best practices identified through extensive research by ATSRAC and Federal government working groups.

4. Objective.

a. The objective of this AC is to improve maintenance and inspection programs for all EWIS (as defined by § 25.1701) installed on transport category airplanes. Applying this information will improve the likelihood that EWIS degradation from many causes, including environmental, maintenance-related, and age-related problems, will be identified and corrected. In addition, this information has been reviewed to ensure that maintenance actions, such as inspection, repair, overhaul, replacement of parts, and preservation, do not (1) cause a loss of EWIS function, (2) cause an increase in the potential for smoke and fire in the airplane, and (3) inhibit the safe operation of the airplane. This objective is met through the adoption of the following:

(1) Enhanced zonal analysis procedure (EZAP). The EZAP will allow the user to determine the appropriate general or detailed inspections and any cleaning tasks (also referred to as restoration tasks by some manufacturers) needed to minimize the presence of combustible material. An EZAP can be used to develop new wiring cleaning and inspection tasks for both zonal and non-zonal inspection programs. Using this procedure to develop a maintenance program will help ensure that proper attention is given to wiring installations during maintenance. The EZAP provides a logical procedure for selecting inspections (either general or detailed) and other tasks to minimize combustibles. Examples could be cleaning (or restoration) procedures or the changing of an air filter. For an airplane without a zonal inspection program, an EZAP will identify new wiring inspection tasks. Appendix A of this AC provides step-by-step details of the EZAP process.

(2) Guidance for a general visual inspection (GVI). This AC clarifies the definition of a general visual inspection and provides guidance on what is expected from such an inspection, whether performed as a stand-alone GVI or as part of a zonal inspection.

(3) **Protections and cautions.** This AC provides guidance for developing actions and cautionary statements to be added to maintenance instructions for the protection of wire and other EWIS components. Maintenance personnel will use these enhanced procedures to minimize contamination and accidental damage to EWIS while working on an airplane.

(4) **“Protect and clean as you go” philosophy.** This philosophy is applied to airplane EWIS through inclusion in operators’ maintenance and training programs. This philosophy stresses the importance of protective measures when working on or around wire bundles, connectors, and other EWIS components. It stresses how important it is to protect EWIS during structural repairs, STC installations, or other alterations by making sure that metal shavings, debris, and contamination resulting from such work are removed. The “protect and clean as you go” philosophy is translated into specifics by the protection and caution recommendations described in section 15 of this AC. More information is contained in section 13 of this AC, *Causes of Wire and Other EWIS Component Degradation*.

(5) **Consolidation with fuel tank requirements.** The FAA has developed an extensive program to address safety problems associated with fuel tanks. Fuel tank systems contain EWIS that may be routed independently or may be integrated with other airplane systems’ EWIS. One part of the Fuel Tank Safety Rule, SFAR 88, requires development of maintenance and inspection instructions to ensure the safety of the fuel tank system. Other sections of the Fuel Tank Safety Rule require operators to include fuel tank safety maintenance and inspection instructions in their maintenance or inspection programs. An objective of this AC is to ensure that fuel tank system ICA developed to comply with SFAR 88 are compatible with the EWIS ICA, including minimizing redundant requirements. See section 2 of this AC for details.

b. To fully realize the objectives of this AC, type certificate holders, STC holders, air carriers, air operators, maintenance providers, and repair stations will need to redefine their current approach to maintaining and altering airplane wiring and systems. This redefinition must reach both overall philosophy and specific maintenance tasks. This may require more than simply updating maintenance manuals and work cards and improving training. Maintenance personnel need to be aware that airplane EWIS must be maintained in an airworthy condition. They also need to recognize that a visual inspection of EWIS has inherent limitations. Small defects such as breached or cracked insulation, especially in small-gage wire, may not always be apparent. Therefore, effective EWIS maintenance combines good visual inspection techniques with improved wiring maintenance practices and training.

c. **General Compliance Information.** Sections 5 through 12 of this AC provide general information regarding the performance of the EZAP. The EZAP process is described in detail in appendix A and appendix B of this AC.

d. **EWIS Degradation and Maintenance Information.** Sections 13 through 15 of this AC contain general information on (1) causes of wire and other EWIS component degradation, (2) EWIS maintenance guidance, including the levels of inspection applicable to EWIS maintenance, and (3) protection and caution recommendations. The information in these sections can be used by manufacturers in developing EWIS maintenance guidance and by operators to improve EWIS maintenance practices.

5. Enhanced Zonal Analysis Procedure (EZAP)—General Guidance.

a. The EZAP described in this AC was developed to identify tasks to (1) minimize accumulation of combustible materials, (2) detect EWIS component defects, and (3) detect EWIS installation discrepancies that may not be reliably detected by inspections contained in existing maintenance programs. An EZAP logic diagram and an accompanying step-by-step explanation are contained in appendix A of this AC. The EZAP process outlined in appendix A is to be used by type certificate holders. It is also to be used by modifiers such as STC holders/applicants to determine if the design change requires new EWIS ICA, or revisions to existing EWIS ICA. If the STC applicant/holder does not have access to the data required to perform the EZAP outlined in appendix A, then the process outlined in appendix B of this AC may be used.

b. An EZAP will result in safety improvements for airplanes operated with a maintenance or inspection program that includes a zonal inspection program (ZIP). It is unlikely that ZIPs developed in the past considered wire or other EWIS components, except for the most obvious damage that could be detected by a GVI.

c. For airplane models without a ZIP, the EZAP logic is likely to identify a large number of EWIS-related tasks that will need to be consolidated into the existing systems maintenance or inspection program. DAHs who have airplane models without a ZIP might find it worthwhile to develop a ZIP in accordance with an industry-accepted method, such as Maintenance Steering Group 3 (MSG-3), in conjunction with an EZAP.

d. When performing the EZAP, evaluate items such as plumbing, ducting, control cables, and other system installations located in the zone for possible contributions to wiring or other EWIS component degradation or failures. The results of the analysis will indicate whether a restoration task, a zonal GVI, a stand-alone GVI, or a detailed inspection (DET) is required to inspect the EWIS in the zone. The way to determine the best type of inspection is graphically represented in figure 2, step 8, of appendix A of this AC. The type of inspection is determined by completing EZAP Worksheet 3A or EZAP Worksheet 3B of appendix A of this AC. EZAP Worksheet 3A is used for airplanes with a ZIP. EZAP Worksheet 3B is used for airplanes without a ZIP.

e. New tasks identified by the EZAP logic should be compared against existing tasks in the maintenance program to ensure that they are compatible with each other. Also, existing maintenance task type and frequency should not affect the outcome of the EZAP analysis. The analysis for a particular zone should be completed to identify appropriate EWIS tasks and their frequency. After the analysis is complete, these new EWIS tasks should be compared to existing maintenance program tasks to assess where the new tasks and the existing maintenance program tasks can be logically combined. The EZAP analysis should not be adjusted in order to make the tasks and intervals fit the existing maintenance program just for the sake of aligning tasks. Refer to the description in figure 1, step 9, of appendix A of this AC for a detailed discussion on task consolidation and alignment.

f. Operators may want to use the EZAP logic to identify additional inspection and cleaning tasks for any design changes on their airplanes for which EZAP ICA are not available. EWIS ICA developed by a DAH might not have taken into account modifications made to the airplane

by someone other than the DAH who developed the EWIS ICA. Also, when an STC is no longer supported by the STC holder, operators may want to perform an EZAP on the zone(s) affected by the modification.

6. EWIS ICA Developed Using an EZAP.

a. An EWIS ICA task is either an inspection task or a restoration task. The inspection task can be a zonal general visual inspection (GVI), stand-alone GVI, detailed inspection (DET), or a combination of these. A restoration task is usually a cleaning task, but it can also be a task such as replacing an air filter in order to reduce the likelihood of contamination build-up within a zone. EWIS ICA are comprised of all the data required to perform these inspection or restoration tasks. The EWIS ICA can be, and almost always are, comprised of several different data components. It is all of these data components put together that define any particular EWIS ICA. The data components of EWIS ICA can be, and often are, located in multiple documents produced by the applicant or DAH.

b. As an example, EWIS ICA data components can be located in a Maintenance Review Board Report (MRBR), a maintenance planning document (MPD), a maintenance implementation document (MID), an airplane maintenance manual (AMM), a standard wiring practices manual/electrical standards practices manual (SWPM/ESPM), or a stand-alone ICA document produced by a DAH or STC applicant. These data components are items such as:

- Task reference number(s).
- Task type (for example, DET, stand-alone GVI).
- Task interval.
- Task description (for example, perform a DET inspection of the power feeders and connected EWIS components).
- Task procedure (in other words, instructions on how to perform the actual task(s)).

Note: The task procedure should describe how to accomplish the maintenance task. For example, if the task description states to perform a stand-alone GVI of the EWIS in the zone, then the procedure should instruct the maintenance technician to inspect the EWIS within the zone. In the past, some task procedures have instructed the technician to merely inspect the “wires” or “wiring” in the zone. Such a procedure would not be acceptable since wire is only one component of an EWIS. An EWIS includes many components such as clamps, connectors, bundle ties, and stand-offs as defined by § 25.1701. However, in certain cases it may be acceptable for the inspection task to specify a particular EWIS component, such as a wire bundle or high current carrying cable, as being the focus of a specific inspection. For example, service history may show that on a particular airplane model, the power feeders in a specific zone should be the focus of an inspection. Therefore, specifying to perform a DET or stand-alone GVI of the power feeders

and their connected EWIS, instead of a DET or stand-alone GVI of the EWIS in the zone, would be more effective in aiding the maintenance technician to detect possible defects in the power feeder rather than instructing them to inspect all the EWIS within the zone. Such an approach should be considered on a case-by-case basis.

- Task applicability (in other words, model, engine type).
- Airplane zone identification.

Note: According to Air Transport Association (ATA) iSpec 2200, *Information Standards for Aviation Maintenance*, zones are identified by the airplane manufacturer “to facilitate maintenance, planning, preparation of job instructions, location of work areas and components, and a common basis for various maintenance tasks.” ATA iSpec 2200 contains guidelines for determining airplane zones and their numbering. The EZAP process uses these manufacturer-identified zones. The zones are not created uniquely for EZAP.

- Access instructions.
- Supporting procedures as necessary.

c. Both airplane manufacturers and STC holders/applicants produce EWIS ICA but the process they use is different, and each of these DAHs produce the EWIS ICA in different forms. It is not possible to provide a one-size-fits-all answer for what comprises EWIS ICA. The DAH must identify all of the components comprising the EWIS ICA and identify all of these components in a single document. This single document has become known as the source document. The regulatory requirement for the source document is contained in part 25, appendix H, paragraph H25.5(b) and is discussed in section 7 of this AC.

7. EWIS ICA Source Document as Required Part 25, Appendix H, Paragraph H25.5(b).

a. Paragraph H25.5(b) imposes some specific requirements for documentation and identification of EWIS ICA. It requires that the EWIS ICA developed in accordance with paragraph H25.5(a)(1) must be in the form of a document appropriate for the information to be provided, and that they must be easily recognizable as EWIS ICA. This document must either contain the required EWIS ICA, or specifically reference other documents that contain this information. The document required by paragraph H25.5(b) is referred to as the source document (SD). The entire EWIS ICA must be contained or referenced in the SD. However, paragraph H25.5(b) does not prescribe a specific data form for either the EWIS ICA or the SD (if they are not one and the same). The form the EWIS ICA data takes, and the form of the SD, is at the discretion of the DAH or applicant, as long as it meets the requirements of paragraph H25.5(b) and the data it contains (or references) meets the requirements of paragraph H25.5(a)(1). Some airplane manufacturers plan to use existing documents as their SD. This could be an MRBR, MPD, MID, or some other document. Others are planning to develop new forms of documentation to specifically address the new EWIS ICA SD requirement.

Whatever form the DAH uses to document the EWIS ICA, the SD must clearly identify the data that comprise the EWIS ICA or contain the actual data in order to be in compliance with paragraph H25.5(b).

(1) As described above, paragraph H25.5(b) requires that each EWIS ICA be easily recognizable as EWIS ICA. This means that the EWIS ICA will need to be uniquely identified as such. As an example, some DAHs place “(EZAP)” or “(EWIS)” after each task description to signify that the task is a part of the EWIS ICA. Keep in mind that the purpose of this requirement is to enable easy identification of ICA tasks after they have been incorporated into an operator’s maintenance program. The requirement is meant to ensure traceability. The identification requirement is not for the benefit of the technician who performs the actual maintenance task, but rather for the people who must keep track of the EWIS ICA, such as personnel at an operator or maintenance facility who track maintenance tasks, or an FAA principal inspector.

(2) There are some unique requirements regarding operator-requested revisions to approved EWIS ICA that necessitate they be easily identifiable. Refer to section 12 of this AC for information regarding operator-requested revisions to EWIS ICA.

b. Future Revisions to the FAA-Approved Source Document (SD). After initial approval of the source document, a DAH will likely need to revise the document at some point in order to account for any new or revised EWIS inspection or restoration procedures developed due to production changes or design changes mandated by ADs. Revisions to EWIS ICA such as task deletion, addition, or interval escalation could also occur due to a request by the Industry Steering Committee (ISC) and can be addressed by a specific airplane model’s Zonal Working Group. Any agreed to revisions would be reflected in an update to the MRBR. Proposed revisions to the SD should be submitted to the FAA oversight office, ACO, or office of the Transport Airplane Directorate, as applicable, for review and approval. Upon approval, the FAA oversight office will issue a formal FAA-letter approving the new SD revision. A DAH can then use that approval letter as proof that the EWIS ICA contained in, or referenced by, the SD has been FAA approved. The SD should be revised and submitted for FAA approval when an existing EWIS inspection or restoration task type or task interval is proposed, as well as any proposed task deletions. The revised SD should also be submitted for review and approval if any of the referenced procedures, such as an AMM procedure or procedures referenced within the AMM procedure, is revised such that that any references to that procedure by the SD would no longer be valid. An example of this would be a change to the AMM procedure number or title of the procedure.

8. EWIS ICA Developed by Type Certificate Holders or Applicants. For EWIS ICA data¹ identified in the MRBR, MPD, MID, or other type of SD, the items listed below are considered to constitute EWIS ICA. The FAA oversight office must review this material for its

¹ The MRBR, MPD, or other document used as the SD may reference the information comprising the actual EWIS ICA. The airplane manufacturer or operators would use this referenced information to develop the task cards (sometimes referred to as job cards) or other documents that are used by maintenance technicians.

acceptability before issuing an approval. The items listed below are also the data that airplane manufacturers and/or operators (or other FAA-approved maintenance providers) will use to develop the task, or job, cards used by the maintenance technician to perform the EWIS inspection or restoration tasks.

a. Controlling reference numbers for the individual EWIS ICA tasks as listed in the MRBR, MPD, MID, or other SD. These reference numbers can be referred to as MRBR reference number, Maintenance Manual (MM)/MPD reference number, Maintenance Significant Items (MSI) reference number, task number, and so forth. The nomenclature and the documents called out by the reference numbers can vary among DAHs. Also, tasks may have been given more than one number by the manufacturer to identify them as parts of different documents. So one task, for example, may have an MPD reference number as well as an MRBR reference number. If more than one number identifies any single EWIS task, then each of those numbers must be considered part of the EWIS ICA. All numbers considered necessary to fully identify and track the EWIS ICA should be considered part of the ICA.

b. Type of task (for example, restoration/cleaning, stand-alone GVI, zonal GVI, and DET as identified in the SD).

c. Task interval (in other words, how often the maintenance task must be accomplished—for example, every 16,000 flight cycles or 3,000 days).

d. Applicability (for example, 767-200, A340, EMB-145) as identified in the SD. Some models within the same family of airplanes may have differing maintenance requirements based on available options (for example, freighter versus passenger version, engine types).

e. Airplane zone identification for airplanes with a zonal program (for example, Zone 201).

f. Task description as given in the SD (for example, Inspect (General Visual) all exposed EWIS in the wheel well. NOTE: Gear extended, doors in open position.)

g. Task procedure(s). These are the actual instruction(s) on how to perform the zonal GVI, stand-alone GVI, DET, and restoration/cleaning tasks that support the task description listed in the SD.

h. Supporting task procedure(s), if any, necessary to perform the task procedure in any other document referenced by the task procedure.

i. Instructions for protections and caution information that will minimize contamination and accidental damage to EWIS. (This can appear in different places, such as in the AMM or in the SWPM/ESPM.) If contained in the SWPM or ESPM (or other similar document), this information will be contained in chapter 20. Sometimes this information is repeated in the standard practices chapter (chapter 20) of the AMM. In any case, it is general caution and protection information, and we do not expect that unique procedures will be developed for individual EWIS ICA for a particular airplane model or even models produced by the same manufacturer. Any protection and caution information specific to EWIS ICA must be referenced in the SD.

10. FAA and FAA Oversight Office Approval of EWIS ICA.

a. The requirements for the FAA to approve EWIS ICA are contained in § 25.1729 and in § 26.11(b) and (c). Section 25.1729 requires applicants to prepare EWIS ICA in accordance with part 25, appendix H, sections H25.4 and H25.5, and to have them approved by the FAA. In this case, approval by the FAA means approval by the ACO or office of the Transport Airplane Directorate with oversight responsibility for the company or person requesting the approval. Section 26.11(b) and (c) require that DAHs and applicants prepare EWIS ICA in accordance with paragraphs H25.5(a)(1) and (b) of appendix H. These also must be approved by the FAA, but in this case by the FAA oversight office. In summary, there are three different compliance scenarios that require FAA approval of EWIS ICA:

- (1) Section 26.11(b) requirements for TC holders.
- (2) Section 26.11(c) EWIS ICA requirements for STC and amended TC holders/applicants.
- (3) Section 25.1729 EWIS ICA requirements for TC, amended TC, and STC applicants.

b. The following guidance is related only to paragraphs H25.5(a)(1) and (b) of appendix H to part 25. Guidance for the other EWIS ICA requirements in appendix H may be found in AC 25.1701-1, *Certification of Electrical Wiring Interconnection Systems on Transport Category Airplanes*.

c. The FAA oversight office will approve the SD required by paragraph H25.5(b). Approval of the SD signifies approval of the actual EWIS ICA contained either in the SD itself, or in other documents referenced in the SD. If the SD references data contained in other documents, the FAA oversight office, ACO, or office of the Transport Airplane Directorate must review that data to ensure compliance with paragraphs H25.5(a)(1) and (b). Please note that this includes all task procedures related to the tasks descriptions. This means that approval of the SD also signifies approval of any referenced data. It does not, however, necessarily signify approval of the entire referenced document. For example, EWIS ICA task procedures contained in the AMM will be considered FAA approved, but the entire AMM is not considered FAA approved. This is because the AMM contains maintenance data other than EWIS maintenance data. Once the SD has been submitted by an applicant or DAH and found to be in compliance by the ACO in the case of an ICA developed for § 25.1729, or by the ACO or office of the Transport Airplane Directorate (FAA oversight office) in the case of ICA developed for § 26.11, a letter will be issued signifying approval of the EWIS ICA. The DAH may communicate the approved version of the EWIS ICA (in other words, attach the FAA approval letter to the EWIS ICA source document) to the operators to show that the EWIS ICA are approved.

Note: FAA Aircraft Evaluation Group (AEG) approval of MRBRs that contain EWIS ICA tasks does not signify FAA approval of the EWIS ICA as required by § 25.1729 or § 26.11. The FAA oversight office (ACO or office of the Transport Airplane Directorate) will issue this approval.

d. A DAH located outside of the United States should submit the required regulatory material to the FAA through that DAH's civil aviation authority (CAA). This applies to the draft

Work areas should be cleaned while the work progresses to ensure that all shavings and debris are removed. The work area should be thoroughly cleaned after work is complete, and the area should be inspected after the final cleaning.

(2) Repairs should be performed using the most effective methods available. Since wire splices are more susceptible to degradation, arcing, and overheating, the recommended method of repairing a wire is with an environmentally sealed splice.

d. Indirect Damage. Events such as pneumatic duct ruptures or duct clamp leakage can cause damage that, while not initially evident, can later cause wiring problems. When events such as these occur, surrounding EWIS should be carefully inspected to ensure that there is no damage or potential for damage evident. Indirect damage caused by these types of events could be broken clamps or ties, broken wire insulation, or even broken conductor strands. In some cases, the pressure of the duct rupture could cause wire separation from the connector or terminal strip.

e. Contamination. EWIS contamination refers to either of the following situations: (1) presence of a foreign material that is likely to cause degradation of EWIS or (2) presence of a foreign material that is combustible or capable of sustaining a fire after removal of the ignition source. An EWIS contaminant may be in solid or liquid form.

(1) **Solid contaminants.** Solid contaminants such as the following can accumulate on wiring and other EWIS components and could degrade or penetrate wiring or other EWIS components.

- Metal shavings/swarf
- Debris
- Livestock waste
- Lint
- Dust

(2) **Fluid contaminants.** Chemicals in fluids such as the following can contribute to degradation of wiring and other EWIS components.

- Hydraulic fluid
- Battery electrolytes
- Fuel
- Corrosion inhibiting compounds
- Waste system chemicals

- Cleaning agents
- De-icing fluids
- Paint
- Soft drinks
- Coffee

(3) Contaminants requiring special consideration.

(a) Special consideration is required for the following:

- Hydraulic fluids
- De-icing fluids
- Battery electrolyte

(b) These fluids, although essential for airplane operation, can damage EWIS components, such as connector grommets, wire bundle clamps, wire ties, and wire lacing, causing chafing and arcing. EWIS components exposed to these fluids should be given special attention during inspection. Contaminated wire insulation that has visible cracking or breaches to the core conductor can eventually arc and cause a fire. Wiring and other EWIS components exposed to, or in close proximity to, any of the above chemicals may need to be inspected more frequently for damage or degradation.

(c) When cleaning areas or zones of the airplane that contain both wiring and chemical contaminants, special cleaning procedures and precautions may be needed. Such procedures may include wrapping wire connectors and other EWIS components with a protective covering prior to cleaning. This would be especially true if pressure washing equipment is used. In all cases, the airplane manufacturer's recommended procedures should be followed.

(4) Waste system contamination. Waste system spills also require special attention. Service history has shown that these spills can have detrimental effects on airplane EWIS and have resulted in smoke and fire events. When this type of contamination is found, all affected components in the EWIS should be thoroughly cleaned, inspected, and repaired, or replaced if necessary. The source of the spill or leakage should be located and corrected.

f. Heat. Exposure to high heat can accelerate degradation of EWIS by causing wire insulation dryness and cracking. Direct contact with a high heat source can quickly damage insulation. Burned, charred, or even melted insulation are the most likely indicators of this type of damage. Low levels of heat can also degrade wiring over a longer period of time. This type of degradation is sometimes seen on engines, in galley wiring such as in coffee makers and ovens, and behind fluorescent lights, especially ballasts.

g. Cold. Exposure to extremely cold temperatures, such as those found at a transport category airplane's typical cruising altitude, or wires exposed to cold temperatures while the airplane is parked in a cold environment, increases the rigidity of wire insulation in those wires that have little or no current flow. Vibration or other types of movement of EWIS during this time could lead to wire faults. This is important to remember when performing maintenance to, or around, these wires in a cold environment. EWIS located outside of the pressurized fuselage, such as those located in landing gear wheel wells, wing leading and trailing edges, and in the horizontal and vertical stabilizers are routinely subjected to these extreme cold temperatures.

14. General EWIS Maintenance Guidance. Areas to be inspected should be clean enough to minimize the possibility that collected dirt, grease, or other contaminants might hide unsatisfactory conditions that would otherwise be detected during inspection. For any cleaning considered necessary, you should use the airplane manufacturer's procedures or other methods, techniques, and practices acceptable to the FAA. The cleaning process itself should not compromise the integrity of EWIS.

a. Preventing Accumulation of Combustibles. Some applicants may set a numerical limit on the amount of contamination that may accumulate in a zone in order to avoid combustion of the contaminants. Other applicants may choose not to set a numerical limit, but rather give instructions that EWIS be cleaned to significantly remove the amount of combustible material. If an applicant has set a limit, EWIS should be cleaned at frequent enough intervals that the accumulation of combustibles never exceeds this limit. If no limit has been set, EWIS should be cleaned at frequent enough intervals that accumulation of combustibles never reaches unacceptable levels. Determining the interval would involve making an estimate of the rate at which combustible material will accumulate in that particular zone and setting intervals to occur with enough frequency so that unacceptable levels are not reached. If at an inspection the contaminants in a zone have not yet accumulated to the level considered excessive, or to the set level that triggers the need for cleaning, a determination must be made about whether the contaminant accumulation will have exceeded the limit or reached excessive levels before the next inspection. If that is expected to be the case, then the EWIS should be cleaned during the current inspection even though the contaminants have not yet exceeded the accumulation limit or reached excessive levels.

b. Levels of Inspection Applicable to EWIS. Though the term "detailed visual inspection" remains valid for a detailed inspection using only eyesight, this may represent only part of the inspection called for in EWIS ICA used to establish an operator's maintenance program. We recommend that the acronym "DVI" not be used because that term may exclude tactile examination, which is sometimes needed. Instead, we provide the following definitions. See figures 1 and 2 for examples of EWIS that are contaminated. Such contamination could cause EWIS component degradation and also prevent an effective GVI or DET inspection if it were not cleaned. Additionally, depending on the type and amount present, contaminants may also be combustible and sustain a fire should electrical arcing occur.

Figure 1: EWIS Contaminated with Dust and Dirt

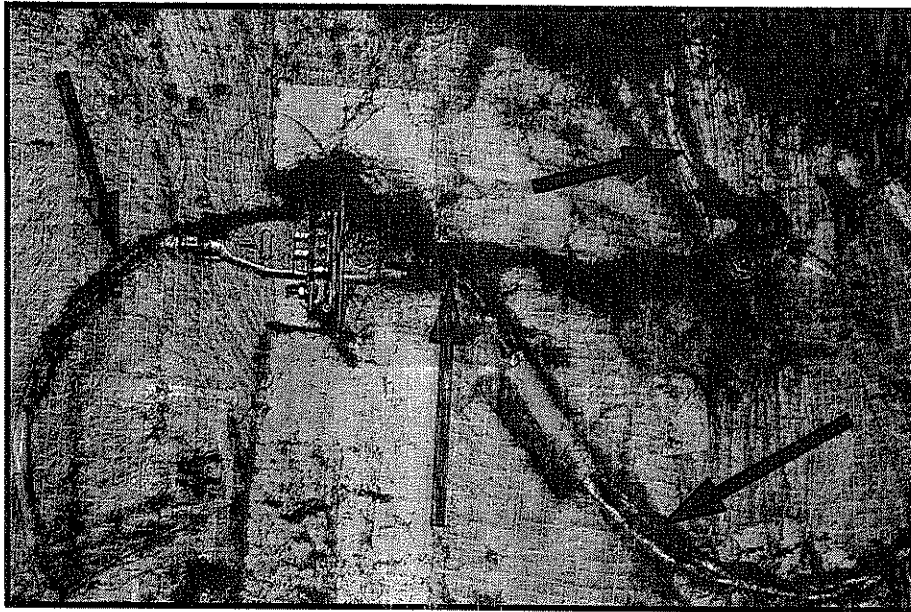
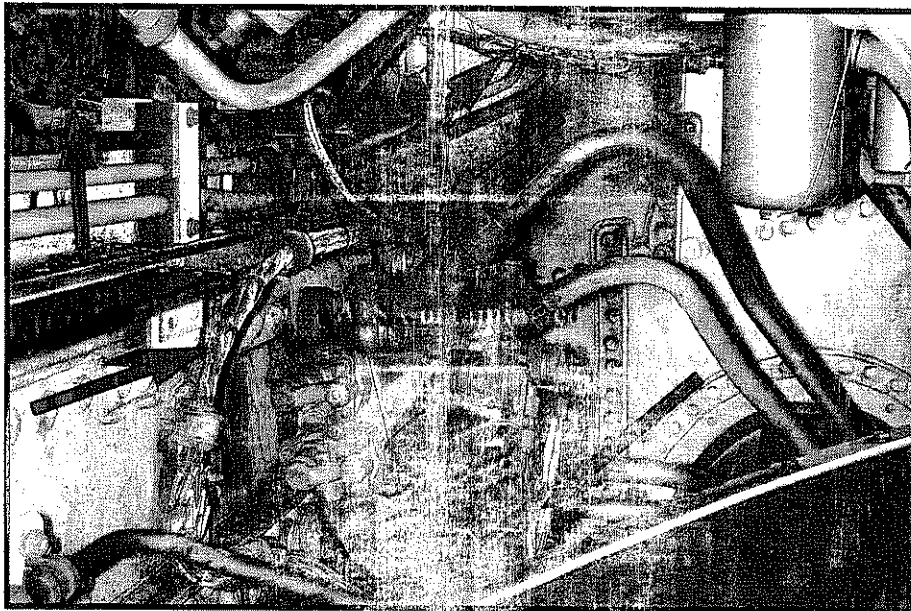


Figure 2: EWIS Contaminated with Grease



(1) **Detailed inspection (DET).** A DET is an intensive examination of a specific item, installation, or assembly to detect damage, failure, or irregularity. Available lighting is normally supplemented with a direct source of good lighting, as an inspector deems appropriate.

Inspection aids such as mirrors, magnifying lenses, or other means may be necessary. Surface cleaning and elaborate access procedures may be required. A DET can be more than just a visual inspection, since it may include tactile assessment in which a component or assembly is checked for tightness/security. It may require the removal of items such as access panels and drip shields, or the moving of components.

Note: Tactile assessment as used in the context of an EWIS DET does not require the disassembly of wire bundles to inspect individual wires within the bundle.

(2) General visual inspection (GVI). A visual examination of an interior or exterior area, installation, or assembly to detect obvious damage, failure, or irregularity. This level of inspection is made from within touching distance unless otherwise specified. A mirror may be necessary to enhance visual access to all exposed surfaces in the inspection area. This level of inspection is made under normally available lighting conditions such as daylight, hangar lighting, flashlight, or droplight and may require removal or opening of access panels or doors. Stands, ladders, or platforms may be required to gain proximity to the area being checked.

(a) Recent changes to this definition have added proximity guidance (within touching distance) and the allowance of a mirror and flashlight to improve visual access to exposed surfaces when performing a GVI. These changes should result in more consistent application of the GVI. They also support expectations of the types of EWIS discrepancies that should be detected by a GVI.

(b) When performing a GVI, there is usually no need to remove equipment or displace EWIS unless the access instructions specifically call for it.

(c) The area to be inspected should be clean enough to minimize the possibility that collected dirt or grease, or other contaminants, might hide unsatisfactory conditions that would otherwise be obvious. For any cleaning considered necessary, you should use the airplane manufacturer's procedures or other methods, techniques, and practices acceptable to the FAA. The cleaning process itself should not compromise the integrity of EWIS. Avoid using high pressure cleaning and abrasive materials that could damage wire insulation and other EWIS components.

(d) In general, the person performing a GVI is expected to identify degradation from wear, vibration, moisture, contamination, excessive heat, aging, and so forth, and assess what actions are appropriate to address the discrepancy. This assessment should consider potential effects on adjacent system installations, particularly if those systems include wiring. You should address any observed discrepancies, such as chafing, broken clamps, sagging, interference, contamination, and so forth.

(e) An EWIS stand-alone GVI applies the above inspection techniques to wires, cables, and other EWIS components identified in the inspection procedure.

(3) Zonal inspection. This is a collective term comprising selected GVIs and visual checks that are applied to each zone of the airplane, defined by access and area, to check system and powerplant installations and structure for security and general condition. A zonal inspection is essentially a GVI of an area or zone to detect obvious unsatisfactory conditions and

discrepancies. Unlike a stand-alone GVI, it is not directed to any specified component or assembly.

c. EWIS-Related Guidance for Zonal Inspections. The following EWIS degradation conditions are typical of what should be detectable and addressed as a result of a zonal inspection (as well as a stand-alone GVI). Maintenance and training documentation should include these items. This list is not intended to be all-inclusive and may be expanded as appropriate.

(1) Wire/wire harnesses.

- Wire bundle/wire bundle or wire bundle/structure contact/chafing
- Wire bundles sagging or improperly secured
- Wires damaged (obvious damage because of mechanical impact, overheating, localized chafing, and so forth)
- Lacing tape and/or ties missing/incorrectly installed
- Wiring protection sheath/conduit deformed or incorrectly installed
- End of sheath rubbing on end attachment device
- Grommet missing or damaged
- Dust and lint accumulation
- Surface contamination by metal shavings/swarf
- Contamination by liquids
- Deterioration of previous repairs (for example, splices)
- Deterioration of production splices
- Inappropriate repairs (for example, an incorrect splice)
- Inappropriate attachments to or separation from fluid lines

(2) Connectors.

- External corrosion on receptacles
- Backshell tail broken
- Rubber pad or packing on backshell missing
- No backshell wire securing device

- Foolproofing chain broken
- Safety wire missing or broken
- Discoloration/evidence of overheat on terminal lugs/blocks
- Torque stripe misaligned

(3) Switches.

- Rear protection cap damaged
- Missing hardware (screws, washers, and so forth)
- Loose hardware
- Improper hardware

(4) Ground points.

- Corrosion
- Loose hardware

(5) Bonding braid/bonding jumper.

- Braid broken or disconnected
- Multiple strands corroded
- Multiple strands broken

(6) Wiring clamps or brackets.

- Corroded
- Broken/missing
- Bent or twisted
- Unstuck/detached
- Attachment faulty (bad attachment or fastener missing)
- Protection/cushion damaged

(7) Supports (rails or tubes/conduit).

- Broken
- Deformed
- Fastener missing
- Edge protection on rims of feed-through holes missing
- Racetrack cushion damaged
- Drainage holes (in conduits) obstructed

(8) Circuit breakers, contactors, or relays.

- Signs of overheating
- Signs of arcing
- Missing hardware (screws, washers, and so forth)
- Loose hardware
- Improper hardware

d. Wiring Installations and Areas of Concern. Maintenance material should address the following installations and areas.

(1) Wiring installations.

(a) Clamping points. Damaged clamps, migration of clamp cushions, or improper clamp installations aggravate wire chafing. Airplane manufacturers specify clamp type and part number for EWIS throughout the airplane. When replacing clamps, use those specified by the airplane manufacturer. Tie wraps provide a rapid method of clamping, especially during line maintenance operations. But improperly installed tie wraps can have a detrimental effect on wire insulation. When new wiring is installed as part of an STC or other modification, the drawings will provide wire routing, clamp type and size, and proper location. Examples of significant wiring alterations are the installation of new avionics systems, new galley equipment, and new instrumentation. Wire routing, type of clamp, and clamping location should conform to the approved drawings. Adding new wire to existing wire bundles may overload clamps, causing wire bundles to sag and wires to chafe. Raceway clamp foam cushions may deteriorate with age, fall apart, and thus fail to provide proper clamping.

(b) Connectors. Worn environmental seals, loose connectors, missing seal plugs, missing dummy contacts, or lack of strain relief on connector grommets can compromise connector integrity and allow contamination to enter the connector, leading to corrosion or grommet degradation. Connector pin corrosion can cause overheating, arcing, and pin-to-pin

shorting. Drip loops should be maintained when connectors are below the level of the harness, and tight bends at connectors should be avoided or corrected.

(c) Terminations. Terminations, such as terminal lugs and terminal blocks, are susceptible to mechanical damage, corrosion, heat damage, and contamination from chemicals, dust, and dirt. Over time, vibration can cause high-current-carrying feeder cable terminal lugs to lose their original torque value, resulting in arcing. One sign of this is heat discoloration at the terminal end. Proper build-up and nut torque is especially critical on high-current-carrying feeder cable lugs. Corrosion on terminal lugs and blocks can cause high resistance and overheating. Dust, dirt, and other debris are combustible and could sustain a fire if ignited from an overheated or arcing terminal lug. Terminal blocks and terminal strips located in equipment power centers (EPC), avionics compartments, and throughout the airplane need to be kept clean and free of combustibles.

(d) Backshells. Wires may break at backshells from excessive flexing, lack of strain relief, or improper build-up. Loss of backshell bonding may also occur because of these and other factors.

(e) Sleeving and conduits. Damage to sleeving and conduits, if not corrected, may lead to wire damage. So damage such as cuts, dents, and creases on conduits may require further investigation for condition of wiring within.

(f) Grounding points. You should check grounding points for security (in other words, finger tightness), condition of the termination, presence of corrosion, and cleanliness. Grounding points that are corroded or have lost their protective coating should be repaired.

(g) Splices. Both sealed and non-sealed splices are susceptible to vibration, mechanical damage, corrosion, heat damage, chemical contamination, and environmental deterioration. Power feeder cables normally carry high current levels and are very susceptible to installation error and splice degradation. All splices should conform to the TC or STC holder's published recommendations. In the absence of published recommendations, we recommend use of environmentally sealed splices.

(2) Areas of concern.

(a) Wire raceways and bundles. Adding wires to existing wire raceways may cause undue wear and chafing of the wire installation and inability to maintain the wire in the raceway. Adding wire to existing bundles may cause wire to sag against the structure, which can cause chafing.

(b) Wings. Wing leading and trailing edges are difficult environments for wiring installations. On some airplane models, wing leading and trailing edge wiring is exposed whenever the flaps or slats are extended. Slat torque shafts and bleed air ducts in these areas are other potential damage sources.

(c) Engine, pylon, and nacelle area. These areas experience high vibration, heat, and frequent maintenance, and they are susceptible to chemical contamination.

being modified, or other documentation that supports the applicant's position as to the necessity of creating new or revised EWIS ICA.

(d) The FAA oversight office, in conjunction with the applicable AEG office, reviews and approves the SD, which indicates approval of the EWIS ICA referenced or contained in that document.

11. Making EWIS ICA Available to Operators and Other Persons. Section 26.11(e)(4) requires that the compliance plan submitted by the DAH or applicant contains a proposal for how the approved EWIS ICA will be made available to affected persons. Section 26.11(f) requires that the compliance plan be implemented in accordance with § 26.11(e). The rule does not specify the manner in which the DAH must make the EWIS ICA available. It simply requires the DAH to make them available. The "affected persons" that the rule refers to are operators and others required to comply with the requirements of §§ 26.11, 25.1729, 121.1111, and 129.111.

12. Operator Changes to EWIS ICA. Sections 121.1111 and 129.111 require that the EWIS maintenance program be based on EWIS ICA that have been developed in accordance with provisions of appendix H and approved by the FAA oversight office. Guidance for air carriers and air operators on how to make changes to FAA-approved EWIS ICA is contained in AC 120-99, *Incorporation of Electrical Wiring Interconnection System (EWIS) Instructions for Continued Airworthiness into an Operator's Maintenance Program*.

13. Causes of Wire and Other EWIS Component Degradation. The following are considered principal causes of wiring degradation and should be used to help focus maintenance programs.

a. Vibration. High vibration areas tend to accelerate degradation over time, resulting in "chattering" contacts and intermittent symptoms. High vibration of tie-wraps or string-ties can cause damage to insulation. In addition, high vibration will exacerbate any existing wire insulation cracking.

b. Moisture. High moisture areas generally accelerate corrosion of terminals, pins, sockets, and conductors. It should be noted that wiring installed in clean, dry areas with moderate temperatures appears to hold up well.

c. Maintenance. Scheduled and unscheduled maintenance activities, if done improperly, may contribute to long-term problems and degradation of EWIS. Certain repairs may have limited durability and should be evaluated to ascertain if rework is necessary. Repairs that conform to manufacturers' recommended maintenance practices are generally considered permanent and should not require rework. Care should be taken to prevent undue collateral damage to EWIS while performing maintenance on other systems.

(1) Metal shavings and debris have been discovered on wire bundles after maintenance, repairs, modifications, or STC work has been performed. Take care to protect wire bundles, connectors, and all other EWIS components during maintenance, repairs, or modification work.

STEP 4: Are there, or are there likely to be, combustible materials in zone? This question requires evaluating whether the zone might contain combustible material that could cause a fire to be sustained in the event of an ignition source arising in adjacent wiring. Examples include the presence of fuel vapors, dust/lint accumulation, and contaminated insulation blankets.

- With respect to commonly used liquids (for example, oils, hydraulic fluids, and corrosion prevention compounds) refer to the product specification to assess potential for combustibility. The product may be readily combustible only in vapor mist form. If so, an assessment is required to determine if conditions might exist in the zone for the product to be in this state. You should consider hydraulic fluid to be combustible in a mist form even if the product specification states that it is not combustible in its liquid state.
- Liquid contamination of wiring by most synthetic oil and hydraulic fluids (for example, skydrol) may not be considered combustible. It is a concern, however, if it occurs in a zone where dust and lint are present, because wet or oily surfaces attract dust and lint.

Assess what sources of combustible products may contaminate the zone following any single failure considered likely from in-service experience. For example, consider unshrouded pipes with connections within the zone to be potential contamination sources. Forced air ventilation in a zone tends to blow dust and lint through the air, causing it to lodge on the surfaces of wiring and other EWIS components. Wet or oily surfaces attract more dust and lint. This needs to be considered when you are assessing the possibility of a buildup of combustibles in the zone.

- Avionics and instruments located in the flight compartment and equipment bays tend to attract dust, dirt, and other contamination. Because of the heat generated by these components and their relatively tightly packed installations, you should consider that these zones have the potential for accumulating combustible material. Forced air ventilation is often used in these areas, causing lint and dust to be blown about the area and often resulting in a buildup of dust and lint on the surfaces of wiring and other EWIS components. Always use the EZAP logic for these zones. For flight compartment and equipment bays, the answer to the question in step 4 should be “yes.”

Although moisture (whether clean water or otherwise) is not combustible, its presence on wiring, or other current carrying EWIS components increases the probability of arcing from small breaches in the insulation. This could cause a localized fire in the wire bundle. The fire could spread if there are combustibles in close proximity. The risk of a sustained fire caused by moisture-induced arcing is mitigated in step 5 by identifying a task to reduce the likelihood of accumulation of combustible material on or adjacent to the wiring and other EWIS components.

STEP 5: Is there an effective task to significantly reduce the likelihood of accumulation of combustible materials? Most operator maintenance programs have not included tasks directed towards removing combustible materials from EWIS components or adjacent areas or preventing their accumulation. Evaluate whether accumulation on or adjacent to the EWIS can be significantly reduced.

Though restoration tasks such as cleaning are the most likely applicable tasks, the possibility of identifying other tasks is not eliminated. For example, a detailed inspection of a hydraulic pipe

of the criteria for considering task interval alignment is access requirements for the zone. Task intervals should be aligned to the maximum extent possible so undue disturbance of EWIS and other systems located within the zone does not occur. If a task is aligned with an existing zonal inspection, it must be identified as an EZAP-related task to prevent the possibility that it could be deleted or inappropriately escalated.

- Stand-alone GVIs and DETs identified by the EZAP should not be consolidated into the ZIP. They must be introduced and retained as dedicated tasks in the scheduled maintenance program under ATA 20 (the ATA category for electrical wiring), or ATA 28 in the case of combined SFAR 88 and EWIS inspection tasks. These tasks, along with tasks identified to reduce accumulation of combustible materials (known as cleaning or restoration tasks), should be uniquely identified to ensure they are not consolidated into the zonal program or deleted during future program development. Within Maintenance-Steering-Group-3-based MRBRs, these may be introduced under ATA 20 with no failure effect category assigned. While a stand-alone GVI and a DET cannot be combined with existing zonal inspections, the intervals for performing them should be aligned with other maintenance tasks in the zone, such as zonal GVIs, to the extent possible.

Note:

In the past, there has been some confusion about using existing zonal GVIs in lieu of EZAP-identified stand-alone GVIs. However, a zonal GVI does not satisfy the intent of a stand-alone GVI. Although on the surface it may appear that the zonal GVI would accomplish the same inspection of the EWIS within a zone that a stand-alone GVI would, it does not. This is because the stand-alone GVI forces the maintenance technician to pay particular attention to the EWIS that is identified as being necessary to inspect. It is this particular attention that will help ensure that EWIS degradation issues are identified and corrected before a potential safety issue arises. While a zonal GVI is a recognized and effective inspection technique, it does not focus particular attention on EWIS or any other system or structural component within the zone and, therefore, cannot be used in lieu of a stand-alone GVI when the EZAP identifies a stand-alone GVI as necessary.

For programs without a ZIP:

Although some non-zonal inspection programs may already include some dedicated inspections of EWIS that may be equivalent to new tasks identified by an EZAP, it is expected that a significant number of new EWIS inspections will be identified for introduction as dedicated tasks in the system and powerplant program. All new tasks identified by an EZAP should be uniquely identified to ensure they are not deleted during future program development.

over 900 production approval holders. TAD works closely with other FAA offices throughout the country and with foreign regulatory authorities to accomplish this mission.

36. Zonal Inspection—A collective term comprising selected general visual inspections and visual checks that are applied to each airplane zone, defined by access and area, to check system and power plant installations and structure for security and general condition. Zonal inspections are discussed in greater detail in section 10 of this AC.

37. Zonal Inspection Program (ZIP)—A part of an airplane model's overall maintenance program where the whole of the airplane is divided into zones. For each zone of the airplane, applicable maintenance instructions are identified.

those zones with EWIS components, characteristics and components of all systems installed in the zone would be listed. The EWIS in the zone would be described, including information on the full range of power levels carried in the zone. And the presence or possibilities for ignition sources or accumulation of combustibles would be noted.

Combustibles are any materials that could cause a fire to be sustained in the event of an ignition source. Examples of combustible materials would be dust or lint accumulation, contaminated insulation blankets, and fuel or other combustible liquids or vapors. Wire contaminants are foreign materials that are likely to cause degradation of wiring. Wire contaminants can also be combustibles. Some commonly used airplane liquids, like engine oils, hydraulic fluids, and corrosion prevention compounds, might be readily combustible, but only in vapor or mist form. In that case, an assessment must be made of conditions that could exist within the zone that would convert the liquid to that form. Combustibles appearing as a result of any single failure must be considered. An example would be leaks from connection sites of unshrouded pipes. For the purposes of this new requirement, the term combustible does not refer to material that will burn when subjected to a continuous source of heat as occurs when a fire develops. Combustibles, as used here, will sustain a fire without a continuous ignition source.

An EZAP must address:

- Ventilation conditions in the zone and the density of the installations that would affect the presence and build-up of combustibles and the possibilities for combustion. Avionics and instruments located in the flightdeck and equipment bays, which generate heat and have relatively tightly packed installations, require cooling air flow. The air blown into the area for that cooling tends to deposit dust and lint on the equipment and EWIS components.
- Liquid contamination on wiring. Most synthetic oils and hydraulic fluids, while they might not be combustibles by themselves, could be an aggravating factor for accumulation of dust or lint. This accumulation could then present fuel for fire. Moisture on wiring may increase the probability of arcing from small breaches in the insulation, which could cause a fire. Moisture on wires that contain insulation breaches can also lead to "arc tracking." As discussed previously, arc tracking is a phenomenon in which an electrical arc forms a conductive carbon path across an insulating surface. The carbon path then provides a short circuit path through which current can flow. Short circuit current flow from arc tracking can lead to loss of multiple airplane systems, structural damage, and fire.
- EWIS in close proximity to both primary and back-up hydraulic, mechanical, or electrical flight controls.
- The type of wiring discrepancies that must be addressed if they are identified by general visual or detailed inspections. A listing of typical wiring discrepancies that should be detectable during EZAP-derived EWIS inspections is given in AC120-XXX, Section B "Guidance for Zonal Inspections."
- Proper cleaning methods for EWIS components.

Once information about such contaminants and combustibles within an airplane zone is collected, each identified possibility for combustion would then be addressed to determine whether a specific task could be performed to reduce that possibility. An example of a specific task to reduce build-up of combustibles on EWIS components is the use of temporary protective covers (such as plastic sheeting) over EWIS components in a zone where corrosion prevention fluids are being used. This would minimize the amount of fluid contamination of the EWIS components. Preventing fluid contamination reduces the probability of other contaminants, like dust and dirt, accumulating on the EWIS components. If no task can be developed to prevent accumulation of combustibles in a zone, such as the dust blown through the air by cooler fans, then tasks must be developed to minimize their buildup, such as scheduled cleaning.

Developing an ICA to define such tasks would include assessing whether particular methods of cleaning would actually damage the EWIS components. Although regular cleaning to prevent potential combustible build-up would be the most obvious task for an EWIS ICA, other procedures might also be called for. A detailed inspection of a hydraulic pipe might be appropriate, for instance, if high-pressure mist from a pinhole caused by corrosion could accumulate on a wire bundle in a low ventilation area, creating a possibility for electrical arcing.

Proximity of EWIS to both primary and back-up hydraulic, mechanical, or electrical flight controls within a zone would affect the criticality of inspections needed, their level of detail, and their frequency. Even in the absence of combustible material, wire arcing could adversely affect continued safe flight and landing if hydraulic pipes, mechanical cables, or wiring for fly-by-wire controls are routed close to other wiring.

The EZAP-generated ICA must be produced in the form of a single document, easily recognizable as EWIS ICA for that specific airplane model. The single document is relevant to the maintenance and inspection aspects of the ICA, and not the standard wiring practices manual or electrical load analysis, etc.

The ICA must define applicable and effective tasks, and the intervals for performing them, to:

- Minimize accumulation of combustible materials.
- Detect wire contaminants
- Detect wiring discrepancies that may not otherwise be reliably detected by inspections contained in existing maintenance programs.

As noted earlier, among the types of tasks to be developed from an EZAP are general visual inspections (GVI) and detailed inspections (DET). A GVI is defined as a visual examination of an interior or exterior area, installation, or assembly to detect obvious damage, failure, or irregularity. This level of inspection is made from within touching distance of the inspected object unless otherwise specified. It is made under normally available lighting conditions such as daylight, hangar lighting, flashlight, or droplight and may require removal or opening of access panels or doors. It may be necessary to use a mirror to improve visual access to all exposed surfaces in the inspection area. Stands, ladders, or platforms may be required to

- (8) Ilyushin Aviation IL 96T
- (9) Bristol Aircraft Britannia 305
- (10) Handley Page Herald Type 300
- (11) Avions Marcel Dassault - Breguet Aviation Mercure 100C
- (12) Airbus Caravelle
- (13) Lockheed L-300"

b. NPRM Preamble Discussion (70 FR 58526, October 6, 2005). Part 26 was proposed as a new Subpart I to Part 25. The placement of these requirements was changed in the final rule.

“B. Part 25 Subpart I—Continued Airworthiness and Related Part 25 Changes

As discussed below, the following proposals are applicable to holders of existing TCs for transport category airplanes and applicants for approval of design changes to those certificates. On July 12, 2005, we issued policy statement PS-ANM110-7-12-2005, “Safety – A Shared Responsibility – New Direction for Addressing Airworthiness Issues for Transport Airplanes” (70 FR 40166). The policy states, in part, “Based on our evaluation of more effective regulatory approaches for certain types of safety initiatives and the comments received from the Aging Airplane Program Update (July 30, 2004), the FAA has concluded that we need to adopt a regulatory approach recognizing the shared responsibility between design approval holders (DAH) and operators. When we decide that general rulemaking is needed to address an airworthiness issue, and believe the safety objective can only be fully achieved if the DAHs provide operators with the necessary information in a timely manner, we will propose requirements for the affected DAHs to provide that information by a certain date.”

We believe that the safety objectives contained in this proposal can only be reliably achieved and acceptable to the FAA if the DAHs provide the operators with the EWIS- and fuel-tank-system-related maintenance information required by the proposed operational rules for Parts 91, 121, 125, and 129. Our determination that DAH requirements are necessary to support the initiatives contained in this proposal is based on several factors:

- Developing EWIS and fuel tank system ICA is complex. Only the airplane manufacturer, or DAH, has access to all the necessary type design data needed for the timely and efficient development of the required EWIS and fuel tank system maintenance tasks.

- FAA-approved EWIS and fuel tank system ICA need to be available in a timely manner. Due to the complexity of these ICA, we need to ensure that the DAHs submit them for approval on schedule. This will allow the FAA Oversight Office having approval authority to ensure that the ICA are acceptable, are available on time, and can be readily implemented by the affected operators. Additionally, accurate and timely information is necessary to ensure alignment with the requirements of the Fuel Tank Safety Rule (FTSR). The compliance deadline for the operational requirements of the FTSR was extended to facilitate this alignment, as stated

in the Federal Register notice "Fuel Tank Safety Compliance Extension (Final Rule) and Aging Airplane Program Update (Request for Comments)" (69 FR 45936).

- The proposals in this NPRM affect a large number of different types of transport airplanes. Because the safety issues addressed by this proposal are common to many airplanes, we need to ensure that technical requirements are met consistently and the processes of compliance are consistent. This will ensure that the proposed safety enhancements are implemented in a standardized manner.

- The safety objectives of this proposal need to be maintained for the operational life of the airplane. We need to ensure that future design changes to the type design of the airplane do not degrade the safety enhancements achieved by the initial incorporation of EWIS and fuel tank system ICA. We need to be aware of future changes to the type designs to ensure that these changes do not invalidate the maintenance tasks assigned to a particular type design when the ICA are first developed under the requirements of this proposal.

Based on the above reasons and the stated safety objectives of FAA policy PS-ANM110-7-12-2005, we are proposing to implement DAH requirements applicable to EWIS and fuel tank system ICA.

In the past, we have issued a similar requirement in the form of a special federal aviation regulation (SFAR). But SFARs appear in various places in the CFR and are difficult to reference as a whole. The FAA believes that placing these types of requirements in a new subpart of part 25, which contains the airworthiness standards for transport category airplanes, would provide a single, readily accessible location for this type of requirement. Therefore, we are proposing new subpart I to part 25 to contain these requirements.

In preliminary discussions with foreign airworthiness authorities of the concept of this new subpart, they have expressed concerns that their regulatory systems may not be able to accommodate these types of requirements in their counterparts to part 25. While agreeing on the need for these types of requirements, they have suggested that it may be more appropriate to place them in part 21 or another location. As discussed below, because we expect these new subpart I requirements to be similar to new part 25 airworthiness standards, we have tentatively decided to place them in part 25. However, we specifically request comments on the appropriate location of these requirements, particularly from the foreign authorities. If, based on comments received, we conclude that another location is more appropriate, we may move them in the final rule. Because such a move would not affect the substance of the requirements themselves, we would not consider this to be an expansion of the scope of this rulemaking that would require additional notice and comment procedures.

Section 25.1 Applicability.

As stated in § 25.1, part 25 currently prescribes airworthiness standards for issuance of TCs, and changes to those certificates, for transport category airplanes. As discussed in more detail above, with this NPRM the FAA is proposing to expand the coverage of part 25 to include a new subpart I containing requirements that must be complied with by current holders of these certificates. Therefore, we are proposing to amend § 25.1, "Applicability," to state that part 25

Appendix F

1. Background.

a. Over the years there have been a number of in-flight smoke and fire events where contaminants ignited by electrical faults allowed the fire to be sustained and spread. The FAA and the National Transportation Safety Board (NTSB) have conducted aircraft inspections and found wiring contaminated with items such as dust, dirt, metal shavings, lavatory waste water, coffee, soft drinks, and napkins. Sometimes wire bundles and surrounding areas have been found to be completely covered with dust.

b. In recent years Federal government and industry groups have realized that current maintenance practices may not be enough to address aging non-structural systems. Over time, insulation can crack or breach, thus exposing the conductor. While age is not the sole cause of wire degradation, the likelihood of EWIS damage from inadequate maintenance, contamination, improper repair, or mechanical damage increases over time. Examples include the practice of needling wires to test the continuity or voltage, and using a metal wire or rod as a guide to feed new wires into an existing bundle. These practices could cause a breach in the wiring insulation that can contribute to arcing.

c. Research has shown that maintenance work on other aircraft systems can cause collateral damage to nearby wiring. Normal maintenance actions, even using acceptable methods, techniques, and practices, can, over time, contribute to wire degradation. A person inspecting an electrical power center or avionics compartment, for example, may inadvertently cause damage to wiring in a nearby area. Zones of an airplane subject to a high level of maintenance activity display more deterioration of wiring insulation. Undisturbed wiring will have less degradation than wiring that is disturbed during maintenance.

d. Typical analytical methods used for developing maintenance programs have not provided a focus on wiring. As a result, most operators have not adequately addressed EWIS deterioration in their programs. We have reviewed current inspection philosophies to identify improvements that could lead to a more consistent application of inspection requirements, whether for zonal, stand-alone GVI, or DET inspections, as they relate to airplane wiring.

e. We believe it would be valuable to provide guidance on the type of deterioration a person performing a GVI, DET, or zonal inspection could expect to discover. Though it may be assumed that all operators provide such guidance to their affected personnel, it is evident that significant variations exist, and a significant enhancement to wiring inspection could be obtained if standardized guidance material existed. Achievement of the objectives of this AC is dependent on each operator conducting GVI and DET inspections as defined in this document. These definitions should be incorporated in operators' training material and in the introductory section of maintenance planning documentation.

CFR Final Rule

▼ Federal Register Information

[Federal Register: November 8, 2007 (Volume 72, Number 216)]
[Page 63363-63414]

▼ Header Information

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Parts 1, 21, 25, 26, 91, 121, 125, and 129.

[Docket No. FAA-2004-18379; Amendment Nos. 1-60, 21-90, 25-123, 26-0, 91-297, 121-336, 125-53, 129-43]

RIN 2120-AI31

Enhanced Airworthiness Program for Airplane Systems/Fuel Tank Safety (EAPAS/FTS)

▼ Preamble Information

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule.

SUMMARY: This final rule amends FAA regulations for certification and operations of transport category airplanes. These changes are necessary to help ensure continued safety of commercial airplanes. They improve the design, installation, and maintenance of airplane electrical wiring systems and align those requirements as closely as possible with the requirements for fuel tank system safety. This final rule organizes and clarifies design requirements for wire systems by moving existing regulatory references to wiring into a single section of the regulations specifically for wiring and by adding new certification rules. It requires holders of type certificates for certain transport category airplanes to conduct analyses of their airplanes and make necessary changes to existing Instructions for Continued Airworthiness (ICA) to improve maintenance procedures for wire systems. It requires operators to incorporate ICA for wiring into their maintenance or inspection programs. And finally, this final rule clarifies requirements of certain existing rules for operators to incorporate ICA for fuel tank systems into their maintenance or inspection programs.

DATES: These amendments become effective December 10, 2007.

FOR FURTHER INFORMATION CONTACT: If you have technical questions about the certification rules in this action, contact Stephen Slotte, ANM-111, Airplane & Flight Crew Interface, Federal Aviation Administration, 1601 Lind Avenue, SW., Renton, WA 98057-3356; telephone (425) 227-2315; facsimile (425) 227-1320, e-mail steve.slotte@faa.gov. If you have technical questions about the operating rules, contact Fred Sobeck, AFS-308, Aircraft Maintenance Division, Federal Aviation Administration, 800 Independence Avenue, SW., Washington, DC 20591; telephone: (202) 267-7355; facsimile (202) 267-7335, e-mail frederick.sobeck@faa.gov. Direct any legal questions to Doug Anderson, Office of Regional Counsel, Federal Aviation Administration, 1601 Lind Avenue, SW., Renton, WA 98057-3356; telephone (425) 227-2166; facsimile (425) 227-1007, e-mail Douglas.Anderson@faa.gov.

SUPPLEMENTARY INFORMATION:

Enhanced Airworthiness Program fo

Authority for This Rulemaking

The FAA's authority to issue rules regarding aviation safety is found in Title 49 of the United States Code. Subtitle I, Section 106 describes the authority of the FAA Administrator. Subtitle VII, Aviation Programs, describes in more detail the scope of the agency's authority.

This rulemaking is promulgated under the authority described in Subtitle VII, Part A, Subpart III, Section 44701, "General requirements." Under that section, the FAA is charged with promoting safe flight of civil aircraft in air commerce by prescribing minimum standards required in the interest of safety for the design and performance of aircraft; regulations and minimum standards in the interest of safety for inspecting, servicing, and overhauling aircraft; and regulations for other practices, methods, and procedures the Administrator finds necessary for safety in air commerce. This regulation is within the scope of that authority because it prescribes--

New safety standards for the design of transport category airplanes, and
 New requirements necessary for safety for the design, production, operation, and maintenance of those airplanes, and for other practices, methods, and procedures relating to those airplanes.

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V. The Amendments

I. Executive Summary

Safety concerns about wiring systems in airplanes were brought to the forefront of public attention by a midair explosion in 1996 involving a 747 airplane. Ignition of flammable vapors in the fuel tank was the probable cause of that fatal accident, and the most likely source was a wiring failure that allowed a spark to enter the fuel tank. All 230 people aboard the airplane were killed. Two years later, an MD-11 airplane crashed into the Atlantic Ocean, killing all 229 people aboard. Although an exact cause could not be determined, the presence of resolidified copper on a portion of a wire of the in-flight entertainment system cable indicated that wire arcing had occurred in the area where the fire most likely originated.

Investigations of those accidents and later examinations of other airplanes showed a collection of common problems. Deteriorated wiring, corrosion, improper wire installation and repairs, and contamination of wire bundles with metal shavings, dust, and fluids (which would provide fuel for fire) were common conditions in representative examples of the "aging fleet of transport airplanes." The FAA has concluded that current maintenance practices do not adequately address wiring components, wiring inspection criteria are too general, and maintenance instructions do not describe unacceptable conditions, such as improper repairs and installations, in enough detail.

With this final rule we are introducing new maintenance, inspection, and design criteria for airplane wiring to address conditions that put transport airplanes at risk of wire failures, smoke, and fire. We are adding requirements for type certificate holders and applicants for type certificates and supplemental type certificates to analyze the zones of their airplanes for the presence of wire and for the likely accumulation of contaminant materials. This final rule also requires them to develop maintenance and inspection tasks to identify, correct, and prevent wiring conditions that introduce risk to continued safe flight. We are requiring that these tasks be included in new Instructions for Continued Airworthiness for wiring and that they be compatible with Instructions for Continued Airworthiness for fuel tank systems. The EWIS ICA must not conflict with the ICA for fuel tanks, and must avoid duplication and redundancy.

Too frequent disturbance to electrical wiring by repeated moving, pulling, and flexing of the wire bundles will induce unnecessary stress on the wiring and its components, which in turn could lead to degradation, expedited aging, and failures. Thus it is important that redundant tasks and unnecessary disturbances to the electrical wiring be minimized. We are amending Title 14 Code of Federal Regulations (CFR) parts 91, 121, 125, and 129 operating rules to require operators of transport category airplanes to incorporate maintenance and inspection tasks for wiring into their regular maintenance programs and we are clarifying existing requirements for fuel tanks¹. We are creating a new subpart of part 25 to contain the majority of the certification requirements for airplane wiring, including new rules to improve safety in manufacture and modification. Finally, we are creating a new part 26 for design approval holder requirements relating to continued airworthiness and safety improvements and new subparts in parts 91, 121, 125, and 129 for the same types of requirements for operators.

¹ We are not amending 14 CFR part 135 because presently there are only 20 airplanes with sufficient passenger or payload capacity to be affected by this rule that fly in part 135 operations. Should part 135 be amended to permit widespread usage of these larger transport category airplanes, we may extend the operating requirements of today's rule to part 135 at that time.

Accompanying this final rule are guidance materials in the form of advisory circulars (AC), which present one way, but not the only way, to comply with specific parts of these regulations.

One of the ACs presents a suggested curriculum for electrical wiring interconnection system (EWIS) training. Existing Sec. 121.375 requires that

certificate holders or anyone performing maintenance have a training program. This requirement ensures that anyone determining the adequacy of maintenance work (including inspectors) is fully informed about the procedures and techniques involved and is competent to perform them. AC 120-94 provides guidance for complying with Sec. 121.375 as it applies to EWIS maintenance and inspection. In AC 120-94 we provide a suggested training program to address the informational needs of the various people who come in contact with airplane EWIS, and we encourage operators to include this training voluntarily. While the Aging Transport Systems Rulemaking Advisory Committee (ATSRAC) had recommended some form of EWIS training be required for anyone likely to come into contact with EWIS, we have determined the associated cost would be unduly burdensome. There are 11 other ACs accompanying this rule which provide guidance on different requirements contained here. A few of them have been revised for clarification. In those instances, this will be noted in section III. Otherwise, except for minor editorial changes, the guidance accompanying this rule is being published in the same form in which it was proposed and will not be discussed here.

Since the Notice of Proposed Rulemaking (NPRM), the National Transportation Safety Board (NTSB) has issued Safety Recommendations A-06-29 through -35 pertaining to fires on one particular model of regional jet. In the 6 months between October 2005 and March 2006, there were a total of 6 fires on regional jets. A seventh fire occurred prior to that 6-month period. The NTSB stated that, in addition to the danger posed by the fires, 2 of the incident airplanes temporarily lost all flight displays. The NTSB's investigation revealed that all of the fires originated from the same electrical component--an electrical contactor located in the avionics compartment beneath the floor of the captain's seat. The fires were caused by moisture-induced short circuits between the electrical terminals of the contactors. We have issued airworthiness directives (AD) to correct this unsafe condition. However, if the requirements in this final rule had been in effect, the type of failure that caused these 7 fires would not have occurred. This is because several of the new requirements directly address design issues that led to the fires. This final rule is meant to proactively address wiring conditions existing in the transport airplane fleet that we now know affect safe flight and can be detected, corrected, or prevented. We express present value benefits and costs using a 7% discount rate. The total estimated benefits of this final rule, \$801 million (\$388 present value) over a 25-year period, are comprised of operational benefits and safety benefits. The operational benefits are estimated at \$506.3 million (\$237.5 million present value). The safety benefits are estimated at \$294.6 million (\$150.6 million present value). This final rule will prevent a portion of fatal and non-fatal incidents and accidents while decreasing the impact that EWIS discrepancies have on airline operations. The estimated total cost of this final rule is \$416 million (\$233 million present value) over 25 years. The majority of these costs (\$292.2 million, or \$147.6 million present value) will be borne by operators. The remainder of the projected costs will be borne by aircraft and engine manufacturers, and, to a much lesser extent, the FAA Oversight Offices.

II. Background

A. Summary of the NPRM

1. The Proposed Rule

On October 6, 2005 (70 FR 58508), the FAA published in the Federal Register the Notice of Proposed Rulemaking (NPRM) entitled Enhanced Airworthiness Program for Airplane Systems/Fuel Tank Safety (EAPAS/FTS), which is the basis of this final rule.

In that NPRM, we proposed development of Instructions for Continued Airworthiness (ICA) for wiring systems and subsequent incorporation of those ICA into operators' maintenance programs. We also proposed alignment of the compliance times for operators to incorporate wire and fuel tank system ICA into their maintenance programs.

We proposed changes in the certification rules to require more attention during the design and installation of airplane systems to conditions that could

A. Overview

This rule is a result of years of study, data gathering, and collaboration with industry. It has been developed as a solution to the problem of wire contamination and wire damage on airplanes, which can result in system failures, smoke, and fire, and can threaten continued safe flight.

Examinations by the Aging Systems Task Force of representative airplanes from the fleet of aging transports revealed wiring that was deteriorated, corroded, improperly installed and repaired, and contaminated with materials such as metal shavings, dust, and fluids.² The NTSB, as well as working groups of the FAA, industry, and other Civil Aviation Authorities, found these conditions to be common across the fleet, not just isolated instances of poor maintenance. While systems have always been subject to careful scrutiny of their safety and reliability during the certification process, the wires that connect those systems had been considered appropriately cared for when fitted and maintained according to standard industry practices.

² Transport Aircraft Intrusive Inspection Project final report dated December 29, 2000.

Now we know that airplane wiring needs more attention. It needs to be considered as a discrete system, and given the same careful scrutiny as other systems. The design of wiring systems is important for creating safe separation from other wires and systems and protecting it from damage. Inspection and maintenance is important in uncovering and repairing wire damage and preventing buildup of contaminants that can cause damage and that also provide fuel for fire. Wire must be inspected regularly and contaminant buildup must be prevented.

In considering the problems found on transport category airplanes, we explored various alternatives. One alternative was to do nothing. But the result of that approach would be a continuation of incidents and accidents caused by deteriorated wiring systems. Once we knew there was a problem affecting safe flight, doing nothing was not really an option. We could have asked for voluntary support. But voluntary programs in the past have not always resulted in complete participation, and a voluntary program could not guarantee the level of safety we want to ensure. Accordingly, we decided to develop a rule to correct potential safety problems with airplane wiring, and to require compliance of all those whose participation is necessary to achieve that goal.

This rule enlists the aid of design approval holders in assessing the wiring on their airplanes and in developing inspection and maintenance tasks that operators can use to maintain wire safety. It requires operators to incorporate into their inspection and maintenance programs tasks for maintaining wire safety that are based on those developed in accordance with requirements. It introduces new certification rules for wire separation, identification, system safety, protection from damage, access, and other aspects of wire safety. It creates a new subpart in the certification rules for wire certification so that the many existing requirements are more easily found. It also requires that design approval holders align inspection and maintenance tasks for wiring with those for fuel tank systems, to avoid duplication and to ensure that the most rigorous task is accomplished. As an example, if the EWIS ICA calls for a general visual inspection of a certain wire and the fuel tank ICA calls for a detailed inspection of the same wire, the general visual inspection task would be removed from the EWIS ICA and the detailed inspection would be retained in the fuel tank ICA, identified as both a fuel tank task and an EWIS task.

B. Design Approval Holder (DAH) Requirements (Part 26)

For design approval holders this final rule differs from the proposal in the following four ways.

The physical location of the rule has changed, from the proposed location in part 25, subpart I, to a new part 26.³

³ Since the comments refer to the NPRM, however, the commenters' original references are retained, including references to proposed ACs.

The compliance date has been changed from December 16, 2007, to 24 months after the effective date of the rule.

Two changes were made to the compliance plan requirement.

The definition of the "representative airplane" has been clarified.

We have also made minor wording revisions to section 26.11 for clarification. They do not change the requirements.

1. Requirements To Develop ICA

As discussed above, this rule introduces requirements for design approval holders (DAH) to assess their airplanes in relation to wiring.

The assessment must be performed with an enhanced zonal analysis procedure (EZAP), which is outlined in a part-25-series advisory circular accompanying this rule entitled AC 25-27 "Development of Transport Category Airplane Electrical Wiring Interconnection Systems Instructions for Continued Airworthiness Using an Enhanced Zonal Analysis Procedure." This AC was originally titled AC 120-XX "Program to Enhance Aircraft Electrical Wiring Interconnection System Maintenance." The material contained in that proposed AC is now presented in two separate ACs. Guidance for carrying out an EZAP

analysis, as required in the new parts 25 and 26 regulations in this final rule, is presented in the newly titled No. 25-27 AC named above, which will be referred to in the rest of this document as the DAH EZAP AC. Guidance for the operator requirements will be presented in a separate 120-series AC titled "Incorporation of Electrical Wiring Interconnection System (EWIS) Instructions for Continued Airworthiness into the Operator's Maintenance Program."

For each zone on the airplane that contains wiring, DAHs must develop maintenance and inspection tasks to prevent contaminant buildup on that wiring and maintain safety. They must then make those tasks available to operators in the form of ICA readily identifiable as pertaining to wiring. They must also assess those wiring ICA in relation to ICA for fuel tank systems to make sure there are no conflicts or redundancies between the two. The rule includes requirements for the DAH to submit a compliance plan to the FAA outlining how it intends to meet these requirements.

2. Changes to Location of Design Approval Holder Requirements

In the NPRM, we noted that we had not decided on the final location of the continued airworthiness and safety improvements design approval holder requirements of part 25, subparts A and I. We requested comments on this issue, and received 7 comments on the rule location. Transport Canada and British Airways stated that they wanted the requirements in part 21. This was to keep the procedural requirements of the new subpart with the present procedural requirements of part 21 and out of the airworthiness standards parts of the regulations. EASA, Airbus, Boeing, Aerospace Industries Association, and the General Aviation Manufacturers Association stated that they wanted the requirements in a new part or in part 21. EASA said these requirements must be in a

mandatory part of its system and CS (Certification Specifications) -25, its equivalent to our part 25, is not mandatory. Others who commented wanted to maintain part 25 as strictly an airworthiness standard. Based on these comments and on discussions with Transport Canada, EASA, and the Brazilian Agencia Nacional de Aviacao Civil, we decided to create a new part 26 and move the enabling regulations out of part 25 and into part 21--Certification Procedures for Products and Parts. We did this for several reasons.

First, moving these requirements to a new part keeps part 25 as strictly an airworthiness standard for new transport category airplanes. This is important because it maintains harmonization and compatibility among the United States, Canada, and the European Union regulatory systems. Second, integrating the requirements into part 21 improves the clarity of how the part 26 requirements will address existing and future design approvals.

In creating the new part 26, we renumbered the previous sections of part 25, subpart I, and we incorporated the changes discussed in this preamble. A table of this renumbering follows:

determine that the ICA for the production modification also applies to them.

7. Impact on Operators

Boeing asked that we separate the operational rule from DAH requirements, with a separate comment period, so that defined service information and associated costs can be evaluated by the operators.

Boeing contended that consolidating DAH and operational requirements into one rulemaking action with one comment period prevents the FAA from obtaining accurate cost estimates and prevents operators from determining the true impact of the proposal on their operations. NACA also expressed concern that operators cannot know the full impact of this rule until DAHs develop the required ICA.

We have decided against separating the operational rules from the DAH requirements. Separating the rules would not change the technical requirements contained in this final rule but would substantially delay implementation of the EAPAS safety initiative. Thus, it is essential to include both certification and operational requirements in the final rule to ensure maximum safety benefits to the flying public.

In addition to issues of timeliness, we note that while some operators will not know the precise effects of the ICA developed by TC holders on their maintenance programs, they should have a good understanding of the nature and scope of the program from the NPRM and the guidance material provided in the DAH EZAP AC (AC No. 25-27). As discussed, both of these were derived from ATSRAC's recommendations, which operators played a major role in developing. In addition, since 2004, multiple operators have been involved with several airplane manufacturers in developing EWIS ICA using the EZAP analysis described in the DAH EZAP AC. This has been accomplished by integrating EWIS ICA development into the airplane manufacturer's normal maintenance development program. Operators of the airplane model for which a maintenance program is being developed (or revised) are always involved in the development of that program. Therefore, these operators do know the impact of integrating these new EWIS ICA into their maintenance programs.

8. EZAPs Already Completed

Boeing asked that we include a statement in the final rule indicating that EZAP analyses conducted prior to the effective date of the final rule, and resultant ICA, comply with subpart I (now part 26) requirements. Boeing questioned the statement that the proposed time frames are supported by experience gained by EZAPs already performed, when the NPRM did not discuss the acceptability of those analyses. It noted that several EZAP analyses were conducted using MSG-3⁵ methods, which differ slightly from those contained in proposed AC 120-XX (now the DAH EZAP AC, No. 25-27). Boeing noted that, for those cases, it must show the FAA Oversight Office how the previous analyses were conducted, make any necessary changes, obtain industry agreement, and have the FAA approve the resulting ICA.

⁵Air Transport Association (ATA) Maintenance Steering Group 3 (MSG-3) is a document containing a logic process used by the airlines and manufacturers to develop scheduled maintenance programs for an airplane.

We believe that work done before adoption of the rule will reduce the level of effort required for DAHs to comply with the rule. But we also recognize that some additional work may be necessary for DAHs to show compliance. For example, EWIS ICA may not have been aligned with FTS ICA or may not have been developed for the "representative airplane" as defined in the rule. Therefore previous work cannot automatically be considered compliant. Because we cannot say with any confidence that no more work will be required, we are not adopting Boeing's recommendation.

9. Wire Inspections

The National Air Traffic Controllers Association (NATCA) called the proposal inadequate because it relies on enhanced zonal inspections to detect latent failures in the wiring system, and it said that zonal inspections detect only visible deteriorated wire.

The commenter said that without periodic or real-time monitoring of airplane wiring, there is no way to predict a degraded state and prevent future wire failures.

NATCA recommended that we include requirements for either continuous on-board detection of airplane wiring faults, such as that provided by system self-test features, or periodic maintenance tasks, to detect both visible and hidden degradation in the wiring system.

The requirements adopted today do not prevent use of wire monitoring or fault detection technology. Multiple non-destructive inspection (NDI) tools and real-time monitoring techniques are being developed for use in aircraft wiring inspection. However, current NDI reflectometry technology is not yet mature enough for its use to be mandated by the FAA. Although real-time monitoring technology, such as arc fault circuit breaker technology, is further along in development, it too is not yet mature enough to address all circuit types. We expect that these technologies, when available, may be relatively more expensive than conventional methods, so the need for visual inspection of EWIS would remain even if this technology were widely available. We made no change based on this comment.

10. Protections and Cautions

Boeing requested that we remove from subpart I (now part 26) the requirement to include ICA instructions for protection and caution information to minimize contamination and accidental damage during maintenance activities. It suggested this language should be added to the operating rule. Boeing considers the methods of protecting wiring during maintenance to be best determined by the maintenance provider and dependent on the type of maintenance activity underway. Boeing also noted that operators who have already developed protection schemes based on their experience will be required by the operational rules to replace this with the one provided by the TC holder. Boeing does not believe this is a positive step towards increased protection of EWIS.

United Airlines stated its support for requiring airplane manufacturers to include specific recommendations for when and how to protect wire bundles from damage during different phases of maintenance.

We infer that Boeing is referring to the requirement in H25.5(a)(1)(vi). That requirement applies both to new type certificates complying with Sec. 25.1729 (proposed as Sec. 25.1739) and existing type certificates complying with part 26. The requirement is consistent with ATSRAC's recommendations. These recommendations were based on recognition that the TC holder will have the best understanding of EWIS material properties and vulnerabilities, and will be in the best position to identify what protection and caution measures are needed. If operators have developed their own instructions, they may be used as alternatives or as supplements to those provided by the TC holder, if approved by their Principal Inspector (PI). We have provided guidance to the FAA field offices to allow for consideration of an operator's alternative to that approved by the FAA Oversight Office. We made no rule change based on this comment.

11. Alignment of EWIS and Fuel Tank ICA

AIA/GAMA and GE requested that the last sentence of proposed Sec. 25.1805(b) (now Sec. 26.11(b)), requiring minimization of redundant requirements between EWIS and fuel tank ICA, be deleted. The commenters stated that this is an economic and customer service issue beyond the scope of the FAA's safety interest.

Boeing requested we include, within proposed Sec. 25.1805(b), the levels of alignment of FTS and EWIS maintenance actions that will be acceptable for compliance. While Boeing sees the benefit of eliminating redundant maintenance activities, it considers itself unable to determine how to show compliance with this requirement.

Minimizing redundant requirements is not just an economic issue for operators. One of ATSRAC's findings is that repeated disturbance of EWIS during maintenance is itself a source of safety problems.

Therefore, while ensuring that all necessary maintenance is performed, it is also our objective to minimize disturbance by eliminating redundant requirements. Too frequent disturbance to electrical wiring by repeated moving, pulling, and flexing of the wire bundles will induce unnecessary stress on the wiring and its components, which in turn could lead to degradation, expedited aging, and failures. Thus it is important that redundant tasks and unnecessary disturbances to the electrical wiring be minimized. Operators will review their maintenance tasks and coordinate with the DAHs to ensure that tasks are incorporated into their maintenance program for the highest level of safety and performed in the manner most suitable

for their operation.

As discussed earlier, Boeing and other TC holders have been required to develop ICA since 1981, and maintenance manuals even before that. In developing ICA, TC holders routinely review individual tasks to align them with other tasks being developed. This is done both to avoid redundancy and to eliminate confusing or conflicting instructions that could inadvertently lead to improper maintenance with unsafe consequences. The purpose of the requirement to align the ICA is no different. The intended "levels of alignment" are the same as would be expected for ICA developed in connection with original type certification. The MSG-3 and Maintenance Review Board (MRB) processes, with which Boeing and other affected TC holders are familiar, have the same objectives. The DAH EZAP AC, "Development of Transport Category Airplane Electrical Wiring Interconnection Systems Instructions for

Continued Airworthiness Using an Enhanced Zonal Analysis Procedure," No. 25-27, describes means of compliance that will achieve these objectives. It provides a step-by-step process to assist applicants in compliance with the electrical wiring interconnection system (EWIS) maintenance requirements. This process includes a step requiring an analysis of the related maintenance tasks to ensure that they are consolidated and/or aligned to maximize effectiveness and eliminate redundancies and duplications between the EWIS and fuel tank ICA.

The airplane manufacturer will align the ICA requirements to the greatest extent possible. No change to the final rule is necessary.

12. Approval of ICA

Boeing and AIA/GAMA requested further clarification of proposed Sec. Sec. 25.1739 (now Sec. 25.1729) and 25.1805(b) (now Sec. 26.11(b)) requirements that ICA prepared in accordance with paragraph H 25.5 of Appendix H be submitted to the FAA Oversight Office for approval. AIA/GAMA, Airbus, and FedEx recommended that EWIS ICA be accepted by the FAA, rather than approved, with the exception of any applicable airworthiness limitation items (ALI), which should be approved. The commenters were concerned that the proposed requirements are not consistent with the current requirement in Sec. 25.1529 that ICA be found acceptable to the FAA (except for ALI, which must be approved). FedEx also stated that creation of separate "FAA-approved"

ICA will lead to confusion and fragmentation of what should be an integrated inspection program.

As discussed earlier, one of the primary objectives of these DAH rules is to ensure that operators have at least one source of FAA-approved data and documents that they can use to comply with operational requirements. This objective would be defeated if the required data and documents were not, in fact, approved. Only by retaining authority to approve these materials can we ensure that they comply with applicable requirements and can be relied upon by operators to comply with operational rules. We believe that there are differences between EWIS ICA and other ICA that necessitate approval of EWIS ICA.

EWIS ICA are the means for compliance with some of the technical requirements of new subpart H (Sec. 25.1707 relating to system separation and Sec. 25.1711, component identification).

EWIS ICA contain highly technical information such as electrical loads data and wiring practices standards that are more complex than typical maintenance instructions.

EWIS ICA require a degree of consistency and standardization that may not be necessary for other ICA.

We agree that further clarification is needed regarding FAA Oversight Office approval of EWIS ICA. We do not intend to approve all documents that contain EWIS ICA details, such as the airplane maintenance manual. We do intend to review references in all documents that are referred to in the EWIS ICA source documents. We have made changes to the AC guidance information (AC 25.1701-1) to clarify exactly what documents the FAA Oversight Office will approve. No change

to the final rule is necessary.

13. Rule Applicability

Today's rule is applicable to airplanes with a passenger capacity of 30 or more passengers or a payload capacity of at least 7,500 pounds operating in parts 121 and 129. NATCA requested that we consider revising the rule applicability to address all transport airplanes regardless of size or type of operation. It stated

We also disagree that subpart AA should not be created. The new requirements contained in subpart AA are necessary to raise the level of safety by correcting fleet-wide continued airworthiness issues.

Airworthiness directives only address specific unsafe conditions that exist in a product and are likely to exist or develop on products of the same type design. Continued airworthiness issues, such as EWIS maintenance, affect all transport category airplanes. In addition, using ADs to implement these requirements would mean that ADs would need to be continually issued as new models, model variants, or modifications are introduced by a DAH. The use of the AD process to impose the requirements contained in subpart AA would not be the most effective method to address these issues.

We do not believe that adopting the new subpart instead of issuing ADs will prevent operators from being able to accurately comment on the cost and feasibility of the manufacturers' proposed requirements. It would be impractical to set up a comment period for each specific set of maintenance changes developed by the manufacturers, as the commenter appears to want. However, a substantial cost/benefit analysis is always prepared to support any proposed 14 CFR regulation and public comments are solicited. This is a more comprehensive analysis than those prepared for an AD. We made no changes due to this comment.

3. Type and Scope of Requirements

The Air Transport Association (ATA) commented that in proposed Sec. 121.1101 (a), the words "may include, but are not limited to" can be interpreted to mean that at a minimum the operator's maintenance program must incorporate 100% of all design changes and 100% of all ICA, not just the EWIS/FTS design changes and ICAs to be developed. ATA stated there is no justification presented in the NPRM for such an open-ended regulatory requirement. It said this requirement cannot be interpreted consistently by all operators impacted or by all the FAA Aviation Safety Inspectors with oversight responsibility. ATA recommended that the second sentence of Sec. 121.1101(a) be rewritten as follows:

These requirements may include revising the maintenance program by incorporating the intent of applicable revisions to the Instructions for Continued Airworthiness, as identified in this subpart.

As explained in the NPRM (at 58538-9), this rulemaking is one of several to adopt new requirements relating to continued airworthiness, and the purpose of creating these new subparts is to have a common location for all of these requirements, both existing and proposed. The purpose of Sec. 121.1101(a) (and its counterparts, Sec. 91.1501(a), 125.501(a), and 129.101(a)), is to identify the type and scope of requirements that may be included within this subpart. It is purposely broad to encompass possible future rulemaking but does not itself impose requirements. Any future requirements will be proposed through the normal rulemaking process and all interested parties will be afforded the opportunity to comment on them.

As under current requirements for ICA, a TC holder is required to update ICA to address any new design change for which they get approval. An operator altering an airplane to incorporate the new design change would have to update its maintenance program "based on" the approved ICA. TC holders may also update their ICA in the absence of design changes, but, as under existing regulations, these updates would not be mandatory unless we issue an AD mandating them, which we would do only if necessary to address an unsafe condition. Operators may also independently revise their EWIS and fuel tank ICA. Under today's final rule, these changes would have to be approved by their Principal Inspector.

F. Operating Requirements for EWIS (Parts 121 and 129)

1. Requirements for Maintenance and Inspection Program Revisions

For those operating under parts 121 and 129, we are establishing, within the new Continued Airworthiness and Safety Improvements subparts, requirements to revise maintenance and inspection programs to include maintenance and inspection tasks for EWIS. The tasks must be based on ICA developed in accordance with Appendix H.

We have extended the compliance dates for Sec. Sec. 121.1111 and 129.111. They were originally proposed with a compliance date of December 16, 2008. But as a result of comments discussed earlier we have decided to fix the time for compliance as a number of months after the effective date, rather than as a hard date, and to also allow some additional time beyond that which was originally contemplated. The compliance date for these rules is now 39 months after the effective date of the rule. We have also revised these rules to clarify meaning, as discussed below.

2. ICA Developed by Design Approval Holders

Boeing noted that the proposed operational regulations would require that the maintenance program revisions be based on ICA developed by the DAH.

Boeing would like clarification of the interpretation of the term "based on." It asked whether certificate holders are expected to adopt, without change, the ICA provided by the DAHs.

As discussed previously, it was not our intent to require operators to use ICA developed by TC holders. While we think it is very likely that operators will use those ICA, we intend that they be able either to develop their own or to contract with third parties for ICA, as long as they meet the applicable requirements. We have revised the operational rules to clarify this flexibility. Deviations from the EWIS or fuel tank system maintenance programs that have been developed in accordance with the requirements of SFAR 88 or Appendix H must be approved by the operator's Principal Inspector, who will coordinate the changes with the FAA Oversight Office as appropriate. Similarly, later changes to either the EWIS maintenance program or the fuel tank system maintenance program must be approved by the operator's Principal Inspector, who will coordinate the changes with the FAA Oversight Office, as appropriate. In some cases, coordination with the Oversight

Office will be necessary to ensure that the program's original objectives are still met. Details of these coordination procedures are defined in an FAA order and described in an advisory circular.

3. Different Requirements for Existing and Future Designs

RAA requested that proposed Sec. 121.911 (now Sec. 121.1111) be revised so the performance objective of the "retrofit" requirements may be distinguished from the design changes that may be considered for newly manufactured fleet types. The commenter assumed that each OEM will be required to re-certify to the new standards provided in the part 25 proposal, and that carriers would be subjected to a massive retrofit program. NACA requested that we clarify requirements by being more specific about differences between new production aircraft and retrofitting aircraft. They ask if all the part 25 enhancements will become ICA and fall under these requirements.

At the outset, Sec. 121.1111 requires neither "retrofit" nor "design changes." It simply imposes requirements for operators' maintenance programs. We agree that some clarification is appropriate. As explained in the NPRM, the purpose of Sec. 26.11 is to require type certificate holders to develop ICA for existing airplanes that would enable operators to comply with this section. For those airplanes, only certain provisions of new paragraph H25.5 (H25.5(a)(1) and (b)) are required. But for all future airplane designs subject to new Sec. 25.1729, type certificate applicants must show compliance with all provisions of paragraphs H25.4(a)(3) and H25.5. Our intent in the operational rules is to require operators to incorporate into their maintenance programs all of the EWIS ICA developed for each of their airplanes. For existing airplanes, this would be limited to ICA meeting paragraphs H25.5(a)(1) and (b). For future airplanes, this would also include ICA meeting the remaining requirements of paragraphs H25.4(a)(3) and H25.5. We have revised Sec. 121.1111 (and Sec. 129.111) to clarify these differences.

KLM disagreed with the requirement for operators of all airplanes, regardless of the airplane's age, to implement maintenance program inspections and procedures for EWIS. The commenter contended that the amount of exposure to deteriorating factors on new aircraft is limited, so there is negligible benefit to performing additional maintenance tasks on wiring. The commenter also pointed out that checking wiring on a new aircraft may even cause more wiring failures due to maintenance near the wiring. KLM suggested we consider a threshold for starting the first inspections.

Although older airplanes have been exposed to more stressors that can accelerate the degradation of wire and other EWIS components, age is not the

and components of the aircraft. The five years of data and accompanying analysis is included in the final regulatory evaluation and in appendix

C. These types of failures are more serious (in terms of cost and time) than the delay of \$24.43 per minute as reported by ATA and used in that evaluation. The operational impacts (as estimated in the final regulatory evaluation) of wiring failures have safety impacts and increase the likelihood of a more serious event.

7. Training Costs

GE commented that training addressed in proposed AC 120-YY is commercially available, at \$60 per employee trained, to be repeated biannually. It stated that costs of having employees occupied in training rather than production were not factored into our estimate. GE said the training it investigated involves 17 modules, at an average of 30 minutes each, resulting in 8.5 hours per trained employee, biannually, in addition to the \$60 /employee/year. GE said the cost to operators and service shops of providing training is therefore \$308/employee/year. U.S. Airways stated that the average annual cost of \$131,108 for developing a training program seems to be significantly below actual costs. United Airlines asked if operators will be expected to follow proposed AC120-YY. It says "target level one" training alone takes 40 hours and the three hours quoted in the NPRM seems extremely low.

The FAA agrees that the required training might be available commercially. We base our cost estimates on module C of AC 120-94, which requires less intensive training than the program identified by commenters. The training required by this final rule does not apply to production personnel, but to maintenance and inspection personnel only, as required by Sec. 121.375. Therefore we did not consider the cost of having production personnel in training. We believe that the training covered by Module C is the minimum additional training required to comply with the new EWIS inspection requirements. We estimated the time to conduct this training at 3 hours for target groups 1, 2, 4, and 6, as provided by ATSRAC and stated in the initial regulatory evaluation.

Training for the remaining modules and target groups is voluntary and not required for compliance with this final rule. No changes were made as a result of these comments.

RAA stated that using care when working around wiring, being knowledgeable about electrical systems, and teaching technicians that a maintenance/alteration task is not complete until the area is thoroughly cleaned are simply common sense and need not be mandated.

The commenter expressed confidence these maintenance practices already exist among its members, and said that specific retrofit requirements can be more efficiently mandated by Airworthiness Directives.

RAA said one member suggested it would enhance its training not on how to develop inspection programs, but as a preventative maintenance aide for technicians. The commenter suggested the FAA (with industry assistance) issue an "Electrical Systems Installation & Repair Standard Practices Hand Book" that supplements or replaces the sections in AC 43.13, along with video training modules. RAA suggested that training on concepts like proper routing of wire bundles with sufficient supports that are not so tight as to increase the possibility of chafing within the bundle would be more beneficial than inspecting after the fact. The commenter said that availability of quality training to many technicians will result in a cultural change in the industry that can roll over to other practices. The final regulatory evaluation clearly shows that the benefits exceed the costs of the proposed EWIS maintenance requirements. As stated in the NPRM preamble discussion, investigations of previous accidents and examinations of other airplanes shows that deteriorated wiring, corrosion, improper wire installation and repairs, and contamination of wire bundles with various contaminants are common conditions in today's transport category fleet. Current maintenance practices do not adequately address wiring components, wiring inspection criteria are too general, and unacceptable conditions, such as improper repairs and installations, are not described in enough detail in maintenance instructions. We commend the RAA member airline for volunteering to enhance its EWIS training program and we encourage other companies to do the same. A complete EWIS training course, developed by ATSRAC, is contained in AC 120-94. Also, we have produced a course on good wiring practices which is available to the public through our Oklahoma City training center.

8. Costs for EZAP Analysis and Inspection of Engines

projected to be retired from service before the end of the 25-year amortization period.

We believe that ATSRAC's analysis is relevant to today's fleet. The regulatory evaluation cites ATSRAC's non-intrusive inspection report finding 3,372 total discrepancies during the non-intrusive wiring inspections of 81 airplanes. The "effectiveness measure" looks at continuing failures, malfunctions, or defects in the current fleet as reported by operators, and evaluates them with respect to the Intrusive Inspection Report. This final rule will change the certification, design, installation, and maintenance practices for EWIS, which, up to this time, have changed very little since the jet age began. In addition, the physical environments in which wires are installed and the types of hazards they are exposed to are very similar regardless of airplane age. At the same time, airplane designs have become more vulnerable to EWIS safety problems because they are more dependent on electrical systems and less dependent on mechanical systems, as in the case of electronic flight control systems.

We chose the 25-year benefit period because we expect, on average, that a newly manufactured airplane would be in service for that period of time. There will also be airplanes delivered in the next 25 years that are impacted by these requirements. As stated in the preliminary regulatory evaluation the 25-year analysis parallels the expected useful life of an aircraft impacted by this proposal.

14. Accidents Indirectly Initiated by EWIS

The NTSB was concerned that the cost-benefit analysis does not account for indirect EWIS-initiated accident causes, such as those that occurred during the June 6, 1992, accident involving COPA flight 201 that crashed near Tucuti, Panama. For that accident, an instrument's gyroscope wire was believed to have frayed and shorted, leading to erroneous instrument indications and the pilots' loss of control of the airplane. The Board believes that the number of EWIS-related accidents and incidents that can be prevented will exceed that predicted by the FAA.

We acknowledge that functional effects of wiring failures may have contributed to additional incidents and accidents. Although additional benefits could be estimated for indirect causes, we have focused our analysis on direct causes only.

I. Harmonization Changes to Transport Category Certification Rules (Part 25)

1. FAA/JAA (Joint Aviation Authority) Harmonization

At the time the EWIS certification requirements in this final rule were being developed, several existing part 25 certification requirements were also undergoing revision as part of a separate joint harmonization effort with the European JAA.⁹ These rules were the result of an effort to develop a common, or "harmonized" set of standards between 14 CFR part 25 and JAR-25, which was then the European counterpart to part 25. Because this harmonization effort was essentially complete when drafting of this final rule began, the harmonized rules were used as the baseline for the new EWIS certification rules. The harmonized rules are finalized here. This final rule also further revises several of the harmonized rules to accommodate the new EWIS requirements.

⁹ The JAA is the Joint Aviation Authority of Europe and the JAR is its Joint Aviation Requirements, the equivalent of our Federal Aviation Regulations. In the time since these rules were developed, in 2003, the European Aviation Safety Agency (EASA) was formed. EASA is now the principal aviation regulatory agency in Europe, and we intend to continue to work with EASA to ensure that this rule is also harmonized with its Certification Specifications (CS). But since the harmonization efforts involved in developing these rules occurred before EASA was formed, it was the JAA that was involved with them. So while the JAR and CS are essentially equivalent, and in the future we will be focusing on the CS, it is the JAR that will be referred to in the historical background discussions in this final rule.

We received no comments about sections 25.899, 25.1309, and 25.1310.

(1) Section Sec. 25.1711 requires that electrical wiring interconnection systems (EWIS) components be labeled to identify the component, its function, and its design limitations, if any. If the EWIS is part of a system that requires redundancy, the labeling must also include component part number, function, and separation requirements for bundles. This specificity of labeling will be required to ensure that maintenance can be handled properly and with the appropriate caution for maintaining the safety features the wiring system was designed to provide. The information marked on the wires will be used by maintenance personnel for repair and cautionary tasks, and by modifiers so that original safety features are retained during modifications. The future airplane manufacturer and anyone who modifies the airplane will bear the burden of this labeling requirement.

(2) Section Sec. 26.11 requires that existing TC holders develop Instructions for Continued Airworthiness (ICA) for EWIS, and that those ICA be approved by the FAA. Applicants for approval of design changes will be required to develop revisions to those EWIS ICA for any modifications to the airplane that might affect them. Section Sec. 25.1729 and Appendix H will apply the requirement for EWIS ICA to future applicants for TCs. EWIS ICA will be used by operators to prepare their maintenance programs. This requirement is necessary to ensure that wiring is properly maintained and inspected to avoid problems that could affect safety.

(3) Section 26.11 will also require that TC holders submit to the FAA a plan detailing how they intend to comply with its requirements. This information will be used by the FAA to assist the TC holder in complying with requirements. The compliance plan is necessary to ensure that TC holders fully understand the requirements and are able to provide information needed by the operators for the operators' timely compliance with the rule.

(4) Anyone operating an airplane under part 121 will be required to revise their existing maintenance program to incorporate the maintenance and inspection tasks for EWIS contained in the EWIS ICA. The information incorporated into the maintenance program will be used by maintenance personnel to maintain the integrity of airplane wiring systems. This requirement is necessary to ensure that wiring is properly maintained and inspected to avoid problems that could affect safety.

(5) As a result of the revised maintenance programs that will be required for airplanes operating under part 121, maintenance personnel will be performing inspections and maintenance procedures to address safety issues specific to wiring systems. Although this final rule does not specifically require new training, existing Sec. 121.375 requires that certificate holders or persons performing maintenance have a training program to ensure that persons determining the adequacy of such work (including inspectors) are fully informed about the procedures and techniques involved and are competent to perform them. To comply with this requirement in relation to requirements for revised maintenance programs for EWIS included in this final rule, certificate holders will be required to develop any additional training program needed to ensure that the appropriate personnel are adequately prepared to carry out the revised maintenance programs.

(6) The revision to part 25 Appendix H requires that future manufacturers include acceptable EWIS practices in their ICA, presented in a standard format. This information will be used by maintenance personnel for wiring maintenance and repairs. The requirement is necessary because information about cautionary tasks during maintenance that can prevent situations that could compromise safety need to be available to maintenance personnel. Standard wiring practices manuals, in which this information is presented, often differ from manufacturer to manufacturer and so are difficult for maintenance personnel to find specific information in. The requirement for a standard format is meant to correct this. Because of this rule, manufacturers will change their Standard Wiring Practices Manuals (SWPM).

Annual Burden Estimate

To provide estimates of the burden to collect information, the FAA developed categories. The following summary table contains the impacted entities, average

45105, 46105, 46301.

34. Amend Sec. 121.1 by adding a new paragraph (g) to read as follows:

Sec. 121.1 Applicability

(g) This part also establishes requirements for operators to take actions to support the continued airworthiness of each airplane.

35. Amend part 121 by adding new subpart AA to read as follows:

Subpart AA--Continued Airworthiness and Safety ImprovementsSec.

121.1101 Purpose and definition.

121.1103 [Reserved]

121.1105 [Reserved]

121.1107 [Reserved]

121.1109 [Reserved]

121.1111 Electrical wiring interconnection systems (EWIS) maintenance program.

121.1113 Fuel tank system maintenance program.

Subpart AA--Continued Airworthiness and Safety Improvements

Sec. 121.1101 Purpose and definition.

(a) This subpart requires persons holding an air carrier or operating certificate under part 119 of this chapter to support the continued airworthiness of each airplane. These requirements may include, but are not limited to, revising the maintenance program, incorporating design changes, and incorporating revisions to Instructions for Continued Airworthiness.

(b) For purposes of this subpart, the "FAA Oversight Office" is the aircraft certification office or office of the Transport Airplane Directorate with oversight responsibility for the relevant type certificate or supplemental type certificate, as determined by the Administrator.

Sec. 121.1103 [Reserved]

Sec. 121.1105 [Reserved]

Sec. 121.1107 [Reserved]

Sec. 121.1109 [Reserved]

Sec. 121.1111 Electrical wiring interconnection systems (EWIS) maintenance program.

(a) Except as provided in paragraph (f) of this section, this section applies to transport category, turbine-powered airplanes with a type certificate issued after January 1, 1958, that, as a result of original type certification or later increase in capacity, have--

(1) A maximum type-certificated passenger capacity of 30 or more, or

(2) A maximum payload capacity of 7500 pounds or more.

(b) After March 10, 2011, no certificate holder may operate an airplane identified in paragraph (a) of this section unless the maintenance program for that airplane includes inspections and procedures for electrical wiring interconnection systems (EWIS).

(c) The proposed EWIS maintenance program changes must be based on EWIS Instructions for Continued Airworthiness (ICA) that have been

Enhanced Airworthiness Program fo...

developed in accordance with the provisions of Appendix H of part 25 of this chapter applicable to each affected airplane (including those ICA developed for supplemental type certificates installed on each airplane) and that have been approved by the FAA Oversight Office.

(1) For airplanes subject to Sec. 26.11 of this chapter, the EWIS ICA must comply with paragraphs H25.5(a)(1) and (b).

(2) For airplanes subject to Sec. 25.1729 of this chapter, the EWIS ICA must comply with paragraph H25.4 and all of paragraph H25.5.

(d) After March 10, 2011, before returning an airplane to service after any alterations for which EWIS ICA are developed, the certificate holder must include in the airplane's maintenance program inspections and procedures for EWIS based on those ICA.

(e) The EWIS maintenance program changes identified in paragraphs (c) and (d) of this section and any later EWIS revisions must be submitted to the Principal Inspector for review and approval.

(f) This section does not apply to the following airplane models:

- (1) Lockheed L-188
- (2) Bombardier CL-44
- (3) Mitsubishi YS-11
- (4) British Aerospace BAC 1-11
- (5) Concorde
- (6) deHavilland D.H. 106 Comet 4C
- (7) VFW-Vereinigte Flugtechnische Werk VFW-614
- (8) Ilyushin Aviation IL 96T
- (9) Bristol Aircraft Britannia 305
- (10) Handley Page Herald Type 300
- (11) Avions Marcel Dassault--Breguet Aviation Mercure 100C
- (12) Airbus Caravelle
- (13) Lockheed L-300

Sec. 121.1113 Fuel tank system maintenance program.

(a) Except as provided in paragraph (g) of this section, this section applies to transport category, turbine-powered airplanes with a type certificate issued after January 1, 1958, that, as a result of original type certification or later increase in capacity, have--

(1) A maximum type-certificated passenger capacity of 30 or more, or

(2) A maximum payload capacity of 7500 pounds or more.

(b) For each airplane on which an auxiliary fuel tank is installed under a field approval, before June 16, 2008, the certificate holder must submit to the FAA Oversight Office proposed maintenance instructions for the tank that meet the requirements of Special Federal Aviation Regulation No. 88 (SFAR 88) of this chapter.

(c) After December 16, 2008, no certificate holder may operate an airplane identified in paragraph (a) of this section unless the maintenance program for that airplane has been revised to include applicable inspections, procedures, and limitations for fuel tanks systems.

(d) The proposed fuel tank system maintenance program revisions must be based on fuel tank system Instructions for Continued Airworthiness (ICA) that have been developed in accordance with the applicable provisions of SFAR 88 of this chapter or Sec. 25.1529 and part 25, Appendix H, of this chapter, in effect on June 6, 2001 (including those developed for auxiliary fuel tanks, if any, installed under supplemental type certificates or other design approval) and that have been

Attachment 3

Confidential and Proprietary Industry Document Removed



Fw: EWIS

Sam Varajon
ASO-ATL-DELTA-CMO-27, Atlanta, GA

Michael Hickey, Terry L
Homan, Eric Morey,
Charles Stange, John
to: Tamburi, Paul Biever,
Rory Ernst, Connie J
Henke, Steven Lerbakken,
Mark Lund

11/15/2010 04:38 PM

Cc: John McCann, J D Schwab

History: This message has been forwarded.

Avionics:

Mr. Lerbakken has brought to my attention that Delta had placed a statement in the DC-9 Job Instruction Cards (JIC) to conduct the applicable EZAP / EWIS inspection for the DC-9 fleet in accordance with the applicable maintenance manual in a "NOTE". Previously, they had placed a statement in the Job Instruction Cards (JIC) that only referenced the maintenance manual. Which ignored the fact that the Instructions for Continued Airworthiness (ICA) in the maintenance manual were the only approved procedures to follow. The company had committed to change the language in the JIC to accomplish the task in accordance with the applicable AMM. The current Delta - SOP states:

"A "NOTE" has the lowest order of importance. It is used as an instruction to better clarify or enhance a procedure."

This is unacceptable, check you fleet type JIC and let me know, if the cards have the same type of note in them.

Thanks:

Sam Varajon
Federal Aviation Administration
Supervisory Principal Avionics Inspector
FAA - DALA CMU
Ph. #952-814-4326
FAX. #952-814-4329

Your feedback is appreciated:

http://www.faa.gov/about/office_org/headquarters_offices/avs/offices/afs/qms

----- Forwarded by Sam Varajon/AGL/FAA on 11/15/2010 04:22 PM -----

From: Steven Lerbakken/AGL/FAA
ASO-ATL-DELTA-CMO-27, Atlanta, GA
To: Sam Varajon/AGL/FAA@FAA
Date: 11/15/2010 04:17 PM
Subject: EWIS

Sam, as per our conversation I have attached a sample workcard for the Delta DC-9. As you will be able to see they have attached a note to the EZAP steps calling out the AMM to accomplish the steps. The note is explained in the SOP Technical procedures/ General Procedures/ Miscellaneous- General Procedures. I have also attached a section of the SOP that defines a Note. Steve



Note SOP.doc STEVE LERBAKKEN
FAA ASI
steven.lerbakken@faa.gov
952-814-4357



- 2510-2303M-W25219.pdf

B757 EWIS

Mark Lund

to: Sam Varajon

01/18/2011 04:37 PM

AGL-MSP-NWA-CMO-01, Minneapolis, MN

Cc: John McCann, Paul Biever, Connie J Henke, John Tamburi, Rory Ernst

Sam: Rory and I met with Delta folks, Ron Little, Doug Hill, Merle Carlson, and B737 lead and B757 maintenance programs...

We should talk in case Delta contacts you down there in Atlanta.

Points of our meeting:

- 1) The currently submitted B757 PMDB does not list all work cards developed by Delta. Delta to submit a revised PMDB which will again slow down the FAA review process.
- 2) We directed Delta to comply with the Boeing task instructions for the system task cards in that, "GVI of EWIS do task 20-60-04-102-001." The specific task number is what is in the Delta manual and it is what is specified as the Boeing task instruction. This may apply across fleets. We informed the Delta developed task card has to direct accomplishment as the instruction specified by Boeing developed ICAs.
- 3) The Zonal inspection tasks, Delta needs to provide in their manual system the work instructions for accomplishing a zone inspection. The B757 MRB is the source document and it provides zone inspection task instructions. The ACO approved source document for the B757 is the MRB not the MPD as Delta has preferred to comply with. This was pointed out to Doug Hill per Delta's implementation EO. The MPD does not account for all the zonal coding found in the MRB as a cross reference. This has made FAA review more complex to account for all tasks as Delta has used the MPD.

The B757 MRB revised definitions, systems and zone inspection sections with front matter for program requirements. Delta has not yet provided these and they state they will be in TOPP. Merle Carlson and the B757 maintenance programs integrator, Dave Mikelson understand this.
- 4) We shared our concern with cleaner skills and the various skills used by Delta on their fleet task cards. Delta informs that the skills are not used and yet when we questioned why they were being used on new task cards, they had no good answer. Delta states they have AMTs and Inspectors. Ron Little was not aware of the use of cleaner on pre-NWA task cards. Ron Little stated Cleaner will not be used and will be either Mechanic or Inspector accomplishing EWIS tasks. Delta to investigate TOPP sections for revision of skills and submit necessary revisions.
- 5) The TOPP listing in the Delta EWIS implementation document is not complete. I, FAA, as well as Delta, have identified other TOPP sections needing revisions than what is listed in the Delta EO.
- 6) Delta Blue tail airplanes are to retain the current TOPP Aircraft Time Limitations and the submitted PMDB is only for reference. Delta has not submitted revised Blue tail Time Limitations for EWIS despite that is what the controlling Time Limitations are. I provided example of errors in the B737.
- 7) Delta is to submit via Share Point site, a folder for "Revised Task Cards and PMDB" based on our discussion today. Delta will revise task cards to direct work instruction task number as per Boeing task cards and ensure all task cards are listed in PMDB. Also, they will provide the SFAR 88 task cards which are EWIS and they did not submit to date. Delta stated that SFAR 88 are still being reviewed due to past issues and they elected not to submit as part of EWIS. Boeing has revised their SFAR 88 task cards to include EWIS and so I asked for the SFAR88/EWIS task cards for evaluation of Delta's EWIS program.
- 8) The B757 MRB revised definitions to include EWIS, Combustible Material, terms for EWIS programs. Not found in Delta's program. Delta stated they would review MRB for EWIS program requirements for

incorporation into Delta TOPP sections. Remember Delta decided to use MPD as source document instead of the MRB.

9) On B757, I directed that the Delta task card needed to conform to the source document, i.e., the Boeing B757 developed task card, "Do This Task, General Visual Inspection of EWIS, Task 20-60-04-102-001." Boeing directs to a task number that is identified in the Boeing B757 Aircraft Maintenance Manual. This task number is also in Delta's, both blue and red tail, B757 and specifically provides the instruction for the task. The specific instruction needs to be in Delta's task card. Delta questioned the other Boeing fleets, i.e., B747/B767. I stated that whatever was specified in the source document task card work instructions must be so stated and provided for in the Delta task card for that fleet. The Boeing task cards are EWIS ICAs and as such, Delta needs to comply with the baseline ICA's for task instructions. FAA advised Delta that the Delta fleet POC needed to work through the FAA fleet PPM.

This is a summary only. Delta wanted me, FAA to send them a letter but I told them we were to work through our POC to resolve issues and than FAA would do one letter to approve Delta's program...(I understood from you last we talked that we will not go back and forth with a letter writing campaign...

Call and Rory and I can talk with you.

Mark Lund
952-814-4316

B757 EWIS Status-pre-merger NWA

Mark Lund

to: Sam Varajon

01/31/2011 03:17 PM

AGL-MSP-NWA-CMO-01, Minneapolis, MN

cc: Connie J Henke, Eric Morey, John Tamburi

Sam: attached is my memo status of my evaluation of Delta's EWIS compliance.



Review status Memo.doc

Respectfully,

Mark Lund
FAA B757 PPM Avionics
952-814-4316

Memorandum for Record

January 31, 2011

TO: Sam Varajon
FAA Supervisory Principal Avionics Inspector
FAA-Delta Air Lines-CMU

FROM: Mark Lund
FAA Boeing B757 Partial Program Manager, Avionics
FAA-Delta Air Lines-CMU

SUBJECT: Status of Evaluation for Delta Air Lines' Incorporation of Boeing B757
EWIS ICAs into Their CAMP for Compliance with 14CFR 121.1111

As of this date, January 31, 2011, my evaluation is incomplete due to the late submission of EWIS task cards, a complete PMDB report, revisions to TOPP and training.

- 1) Delta has not submitted their Open and Close panel task card for evaluation. The Boeing ICA's for installation of panels contains a Caution prior to installing panels.
- 2) Delta provides a skill and crew of Cleaner on task cards 2010-1005, 2010-1028, 2010-1030, 2010-1033, 2010-1038, 2010-6183. The skill is presented as a number as used by pre-merger Delta but conflicts with TOPP 40-00-25 for skill identifiers used by pre-merger Northwest Airlines. TOPP 20-20-05 also provides for the use of skill levels and are designated by use of sign off blocks on the work cards. The task cards have been revised to remove 'Cleaner' from the sign off blocks and Delta had advised during our meetings they do not utilize a cleaner position. It appears current TOPP sections that provide for skill levels and cleaners between pre-merger Delta and Northwest Airlines are in need of revision.
- 3) The cleaning tasks as required by the Boeing ICAs, and to be accomplished by Delta individuals, are not presented in the Delta developed training for EWIS.
- 4) The protection of EWIS during any maintenance, alteration, or repair, as required in the Boeing ICAs by task 20-60-07-842-001, is not presented in the Delta developed training for EWIS. The Delta training presents protect and clean as a philosophy and not as a task requirement.
- 5) PMDB task number 60247 description should include zone 543.
- 6) MRB System tasks for the detailed inspection of EWIS on the engines are not accounted for in the Delta PMDB report. MRB System number 20-051 through 20-062 are not accurately listed in Delta's PMDB.
- 7) Delta lists an MRB 20-064, yet the MRB shows this task for a Rolls Royce engine when Delta operates the Pratt engine on their B757 aircraft.

Memorandum for Record

January 31, 2011

- 8) MRB System tasks 20-073 through 20-076 were not found in the Delta submitted PMDB. The MRB lists them to be applicable to Delta's B757 aircraft.
- 9) Delta has provided AMDS task cards written with different ship effectivities for ETOPS, or 55/56/58 series aircraft. PMDB task number 70938 has a variable if a Hydraulic Motor Generator (HMG) is installed. Yet, Delta did not create task cards for their HMG equipped and not equipped B757 aircraft.
- 10) PMDB task number 6012 lists AMDS work cards number 2510-2217 and 2510-2216. The work cards were not found on the share point site.
- 11) It is not clear in the AMDS work card as to which work steps are Delta's Zone Inspection Program tasks and which are System or stand alone tasks. As provided in the Boeing ICAs for a Zonal Inspection task, it is a General Visual Inspection of the stated zone, the boundaries of the zone. At times, Delta uses terminology, "Perform a General Visual Inspection of the following: Zone 143 (EZAP)." It appears at times, Delta added the "(EZAP) to structural items and not the specified zone provided in the Boeing Zonal ICA's as listed in the B757 MRB document and provided in the zone inspection program rules.
- 12) The B757 MRB provides for a zone inspection of each engine. Yet, the zone inspection for each engine was not found in the AMDS task card work steps for the 410 and 420 zones as stated in the MRB item 0600-410-01Z and 0600-420-01Z.
- 13) The Delta developed training is not adequate in providing a clear understanding of the zone inspection program and the zone inspection task to be accomplished by the individual performing the task. The example given in the training for a zonal inspection is actually a detailed inspection for a system MRB task. It is not a zonal inspection task as defined by Boeing in the FAA Approved MRB.
- 14) The Boeing developed EWIS ICA's and the FAA Approved MRB for the zonal inspection program and the zone inspection task are dependant on the mechanics understanding of the zone inspection program and inspection task requirements. The Delta Airbus A330 Aircraft Maintenance manual also provides instructions for accomplishing zonal inspections, "05-20-00, Scheduled Maintenance Checks." Airbus provides, "that people who do zonal tasks have an adequate knowledge of the aircraft construction and systems installations, thus a list of items contained in the zones to be inspected is not given." Airbus also provides that any items removed to gain access to the zones, must also be examined.
- 15) Delta developed EWIS training does not present AMDS task cards. The majority examples given are for the pre-merger Delta Job Instruction Cards (JIC).

Memorandum for Record

January 31, 2011

16) The Delta training does not provide for the inspection standards contained in TOPP 40-10-10, EWIS program contained in TOPP 30-20-70, or TOPP 20-20-05 Zonal Inspection Program.

This FAA evaluation is not complete. Delta TOPP sections have not had a complete review due to their late submission with the revised B757 task cards and PMDB. The TOPP sections should be the basis for Delta training.

Delta has chosen to use Aircraft Maintenance Technicians to accomplish "Inspector" tasks on lower order checks in the line environment. It is imperative that Delta provide in their TOPP, job instruction cards, AMDS task cards, and training clear and direct instructions for individuals performing EWIS maintenance tasks such that all the requirements for EWIS are complied with by Delta Air Lines, Inc.

MD80 and MD90 EWIS Source Documents

Mark Lund

to: Sam Varajon

02/03/2011 08:14 AM

AGL-MSP-NWA-CMO-01, Minneapolis, MN

Sam: Inspector Eric Morey has sent me at least 3 emails with copies of the EWIS Handbook and he unable to find the MD80 Maintenance Implementation Document. Not sure what he is trying to do with the email traffic. This morning, February 3, 2011, I did email him the MD80 MID Source Document and he has received it. I also placed on our server "Y" drive (which the FAA Delta Atlanta-CMU has as there "Q" drive) both the MD80 and MD90 MID EWIS source document. They are in folder "EWIS Source Documents". John McCann should have access to these as do you. The other Delta South Boeing Fleets are covered by the single source document (D6-84438) and referenced fleet MRBR (737, 747, 757, 767, 777), as you already know. I placed this D6 document on the "Y" "Q" server as well so that both offices have access to it.

Eric had previously told me he and they in Atlanta, used the MPD Maintenance Planning Document for there review and also stated the MPD is FAA approved, (not true, certain sections maybe such as CMRs, Airworthiness Limitations).

We need to talk when you get in. It is my commitment to you to support you in some good resolution outcome with the current state of the submitted Delta EWIS Continuous Airworthiness Maintenance Program (CAMP).

Respectfully,

Mark Lund
FAA B757 PPM Avionics
FAA-Delta-CMU
952-814-4316

B757 EWIS Spoke to Tom Ahr

Mark Lund

to: Sam Varajon

02/22/2011 02:42 PM

AGL-MSP-NWA-CMO-01, Minneapolis, MN

Mr. Varajon:

I spoke to Mr. Tom Ahr at 14:15 today as you suggested to ensure acceptable correction to B757 EWIS ICA's as time is running out.

Mr. Ahr states he has no reason to meet with me. He stated that you, Eric (Morey) and Connie (Henke) were briefed on Delta's response to the letter you sent over and found Delta's response acceptable.

Mr. Ahr was not receptive to me informing him that the B757 MRBR document Revision May 2010 (which is not FAA ACO approved) does not contain a cross reference of zone tasks to the task card as the appendix in the MRBR is incorrect. Mr Ahr stated that you said the MRBR of May 2010 is acceptable. Therefore, no more discussion is necessary.

I also attempted to inform Mr. Ahr of the non-standard zone inspection language used on the Delta developed task cards (AMDS/JIC) and it is not in accordance with the Boeing FAA ACO approved task card instructions. A clear understanding of the zone inspection tasks and the zone inspection program is in the letter you sent to Delta. I have not been privy to Delta's proposed response as I was not part of the meeting that was held when Delta offered up their response to your letter of February 4, 2011. Currently, all zone inspection tasks developed by Delta Air Lines of those submitted and I reviewed, do not comply with the Boeing/FAA ACO approved task card instructions.

Again, Mr. Ahr was unwilling to resolve this stating the Delta responses to your letter have been agreed to by yourself. Mr. Ahr said that training was the only open issue for which they have an extension for response.

I informed Mr. Ahr that I was attempting again (for the fourth time now) to advise Delta to of the need to meet the FAA-ACO approved requirements for the zone inspection tasks.

Mr. Ahr had no interest in this and held the position that the only item needing resolution with FAA approval for EWIS was the training issue.

I advised Mr. Ahr that you had informed me to call him to gain resolution and he was not receptive to my efforts. I also advised Mr. Ahr that I would be out of town next week and that time was running out. Hence, my effort again to explain to Delta the requirements for the B757 EWIS ICA's in order to obtain FAA approval.

It is my suggestion that you and I meet to discuss the current state of Delta submitted B757 ICA's. As of this date, February 22, 2011, I am unable to recommend approval to you.

Sincerely,

Mark Lund
FAA B757 Partial Program Manager, Avionics
FAA-Delta-CMU
952-814-4316

Delta EWIS Maintenance Program Compliance

Mark Lund

Sam Varajon

02/24/2011 08:44 AM

AGL-MSP-NWA-CMO-01, Minneapolis, MN

Cc: Connie J Henke

Mr. Varajon (FYI-I have copied you Connie because I showed you Delta EWIS noncompliance yesterday):

As follow up to our avionics meeting of yesterday, February 23, 2011, I provide the following further evidence of Delta's non-compliance with incorporation of EWIS ICAs developed by the aircraft manufacture as required and approved by the FAA Aircraft Certification Office (ACO) 14CFR 121.1111, for which Delta Air Lines, Inc. is to be in compliance with by March 10, 2011, clearly requires that Delta Air Lines' Continuous Airworthiness Maintenance Program (CAMP) be revised to include EWIS inspections and procedures developed by the aircraft manufacture (Boeing/Douglas and Airbus) that have been approved by the FAA ACO.

As of this date, the Delta Air Lines' Boeing B757 aircraft EWIS maintenance program submissions do not comply. The task card instructions written by Delta Air Lines do not comply with the Boeing ICA task instructions for the requirements of General Visual Inspection, Detailed Inspection and zone inspection requirements. Delta TOPP 40-10-10, which contains Delta's inspection standards and terminology does not comply with EWIS maintenance program requirements. Delta did not provide this TOPP document on the share point site for FAA review. Yesterday, I reviewed the copy Inspector Henke has and it does not comply.

The FAA ACO has provided statement and justification for the EWIS ICA inspection criteria and standards in FAA Advisory Circular AC 25-27A. In part it states, "These changes should result in more consistent application of the GVI (General Visual Inspection). They also support the expectations of the types of EWIS discrepancies that should be detected by a GVI." The AC provides much understanding as to the expectations of the EWIS program developed by the aircraft manufacture.

As far as my review of the Boeing/Douglas developed ICAs as approved by the FAA ACO, they meet the recommendations provided in AC 25-27A.

However, the Delta Air Lines, developed task cards for their EWIS and TOPP manual standards for their maintenance program do not.

Yesterday, I again briefed Inspector Henke of the deficiencies with Delta's EWIS submissions and existing CAMP using Delta's Boeing/Douglas MD90 as the example. This is a most recent fleet type to Delta Air Lines and presents in simple fashion the non-compliance Delta has for their EWIS program.

I offer to you again to visit with me so that you have a clear understanding as to the Delta EWIS program deficiencies existing in their attempts to provide an EWIS CAMP based on the FAA ACO approved ICAs.

I had recommended to you on at least two (2) occasions to gather the FAA avionics inspectors under your supervision together in a meeting to compare review notes such that we, FAA were providing a standard review of Delta's program. You have not acted on my recommendation.

It is obvious to me that some other FAA inspectors have not used the EWIS source documents, as approved by the FAA ACO, have not used the task ICA instructions developed by the aircraft manufacture, and do not have a clear understanding of EWIS maintenance requirements in application of General Visual Inspection (GVI), Detailed Inspection (DET) and a zone inspection program. All of these require a standard knowledge by FAA inspectors in order to review for acceptance Delta's EWIS program for approval.

It is not my attempt to fault the FAA inspector in their review. But, to point out errors in the FAA review process such that your final approval is valid for Delta Air Lines' compliance with 14 CFR 121.1111 and that public safety is not jeopardized.

We both know Delta has had their share of wire defects. Most recently January 20, 2011, Delta's B757, ship 653, N653DL, a legacy Delta aircraft, which experienced a burned electrical wire bundle due to a potential electrical short in the fuel tank boost pump wiring. This wire bundle also contains fuel quantity indication wiring and feeds into the fuel tank. A serious event when one considers the TWA 800 accident.

I have tried to remedy the non-compliance issues with Delta's B757 maintenance program personnel. They have been unwilling to work resolution as they have stated the Delta EWIS program is all acceptable as you have apparently stated to them. They have advised me that all that is left for resolution with you, the FAA, is a training issue.

Yesterday, February 23, 2011, I informed you in our avionics meeting that the Delta developed EWIS training was not acceptable as it is incorrect in its instruction for GVI, DET and zone inspection task requirements. Your response to me did not support my finding. I had provided to you, in my January 31, 2011 memo of B757 EWIS findings to you, the deficiencies in the Delta EWIS training program. Yet, your February 4, 2011 letter to Delta does not present my training findings.

There really is no reason why Delta has not been able to develop correct and proper EWIS training as the requirements for their MD90 aircraft have had EWIS maintenance instructions for GVI, DET and zonal inspection tasking in Delta's MD90 Aircraft Maintenance Manual since pages dated June/December of 2008. Almost three (3) years ago, Boeing/Douglas provided the inspection criteria to Delta in their aircraft maintenance manual. Why is the training not correct today? Why am I apparently the only FAA Inspector identifying these deficiencies in my review of Delta's B757 EWIS maintenance program?

In your letter of February 4, 2011 to Delta Air Lines you advise Delta of FAA non-compliance findings for legacy Delta Air Lines B757 aircraft. The finding states, "It was found (by FAA) when reviewing the Boeing B757 Maintenance Planning Document (MPD) Item 20-014-00; the corresponding Delta Job Instruction Card (JIC) Operation (OPN) 55032 did not show in the Detail Instruction a full maintenance task procedure or a requirement to do the work In Accordance With Aircraft Maintenance Manual (AMM) 20-60-04."

There are a couple of points of error in FAA's review findings with this FAA non-compliance finding.

The first, is that the Boeing B757 MPD is not the FAA ACO approved source document required to be complied with by Delta Air Lines and reviewed by the FAA Inspector as required by 14CFR 121.1111 and guidance found in FAA Handbook 8900.1, Volume 6, Chapter 11, Section 24, "Evaluate/Inspect Part 121 and 129 Operator's Electrical Wiring Interconnection Systems Maintenance Program." The Boeing MPD document should not be used as the EWIS source document. In fact, the FAA-SEA-AEG in my discussions with the B757 MRB Chairman advises against using the MPD because it has no FAA oversight on the document.

The second, is that if the reviewing inspector had utilized the Boeing B757 ICA task cards or aircraft maintenance manual as the FAA ACO approved source of the task instructions, he would have seen that the instructions direct the work to be done in accordance with a twelve (12) digit task number that provides the specific EWIS work instruction steps to be accomplished. Not a six (6) digit AMM reference. I had directed this noncompliance finding to Delta in a meeting with them on January 18, 2011 for which I provided you an email follow up to that meeting.

Again, I stress highly, it is not my intent to fault the reviewing FAA inspectors. This non-standard FAA review process that in fact has occurred could have been illuminated if we had all met early on to ensure a clear understanding of program requirements and presented a single, unified voice to Delta Air Lines.

This did not occur, and rightfully so, Delta has a right to experience frustration.

However, ultimate 14CFR 121.1111 compliance is the full responsibility of Delta Air Lines as an FAA Certificated 14CFR Part 121 Air Carrier.

There is no excuse for Delta not being in full compliance as of this date. Boeing/Douglas has provided all EWIS ICAs to Delta well in advance of the March 10, 2011 date.

If Delta decides they want to complain to FAA Washington Headquarters to voice complaint of our FAA review, I am prepared to support our position and you, as FAA Supervisory Principal Avionics Inspector, in that Delta had all the resources necessary and time to be in full compliance.

In honesty, I would have to bring to question, Delta Air Lines, Inc. qualification to hold an air carrier certificate to ensure compliance with aircraft maintenance program required Federal Aviation Regulations (FAR). They have clearly demonstrated a failure despite having all resources and data available to them.

Sam, I have appreciated working with you the past year or so as you have been the Supervisor PAI. I appreciate the support you have given me and your willingness to put forth the un-popular effort to ensure Delta's compliance. To that I say thank you in supporting me in my public safety duties.

What I have presented in this letter I can support and provide evidence that Delta's EWIS maintenance program does not comply with 14CFR 121.1111 and FAA guidance requirements and is not acceptable for FAA Approval, your approval.

As I have stated in past communications with you, I commit my support to you in obtaining Delta's compliance such that you can grant FAA Approval with Operations Specifications for their EWIS CAMP.

You are the FAA Approving Official for Delta's EWIS program. I have done due diligence on my review and have been up against Delta's refusal to correct my non-compliance findings due in large part to their assumption that the other Delta fleets have already been found acceptable by the FAA. You state these other fleets in your letter of February 4, 2011.

As such, I am not fully aware of any further correction activity by Delta Air Lines to ensure compliance on their B757 fleet and they have been unwilling to meet with me, even at your direction, to ensure my findings are corrected such that Delta is in full compliance.

You had received my written findings prior to the February 4, 2011 letter you sent to Delta. The zone program/GVI inspection requirements are in the letter. It is obvious to me that some FAA Inspectors as well as Delta maintenance programs individuals do not fully understand the EWIS maintenance program requirements. Delta has advised me that you have been briefed with their corrective action responses and the only item pending resolution is with training...As such, time may be run out for zone, GVI, EWIS task instruction and program revisions for Delta Air Lines to be in full compliance by March 10, 2011.

I am available today to meet with you to discuss and I will be out of the office next week in Orlando, FL conducting ATOS surveillance activities of Delta Air Lines, Inc. I am due back in the office on March 7, 2011.

Respectfully,

Mark Lund
FAA Aviation Safety Inspector
FAA-B757 Partial Program Manager, Avionics
FAA-Delta-CMU
952-814-4316

Attachment 4

Letter of February 4, 2011 removed pending proprietary information review.

Attachment 5

Confidential and Proprietary Industry Document Removed