March 12, 2007

From: Key Safety Information Development Team

To: Mr. Ali Bahrami
Manager, Transport Airplane Directorate, ANM 100
and
Mr. Dave Cann
Manager, Aircraft Maintenance Division, AFS-300
Federal Aviation Administration

Dear Mr. Ali Bahrami and Mr. Dave Cann:

Attached is our report for the Key Safety Information (KSI) project developed by the KSI Development Team over six multiple day meetings in Renton, Washington.

The KSI Report is the culmination of an industry effort initiated by the Certification Process Study (CPS) effort and directed to be implemented by Commercial Aviation Safety Team (CAST) through Safety Enhancement #24. The KSI Development Team consisted of aircraft and engine manufacturers, airline operators, and aviation regulatory agencies. The goal of the project and the report is to increase the level of aviation safety via an Advisory Circular that describes methods and processes whereby OEM's can make operators aware of Key Safety Information. All parties have worked together to develop a mutually agreed document that also outlines operator's and regulatory agency's responsibilities in the process.

Thank you for giving us this opportunity to enhance aviation safety. We look forward to hearing from you.

Sincerely,

The KSI Development Team
(signatures on separate page)

Enclosure

KSI Report

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FINAL REPORT

March 2007

KEY SAFETY INFORMATION PROCESS DESCRIPTION AND RECOMMENDATIONS

Abstract

This report contains the "KSI Team's" recommendations for implementing the Commercial Aviation Safety Team (CAST) Safety Enhancement #24. SE#24 is implemented via the "Key Safety Information" process developed by the Certification Process Study (CPS) Response Team.

1. Executive Summary

The FAA Commercial Airplane Certification Process Study (CPS) highlighted that changes made at air carriers, maintenance and repair organizations to the maintenance, operation and training procedures without thorough review and understanding of the original basis of certification are a contributing factor to aviation accidents and incidents.

The Commercial Aviation Safety Team (CAST) also identified similar concerns in their Safety Enhancement #24. At the direction of the CAST to implement SE#24, the Transport Airplane Directorate lead a joint FAA-industry team (namely the "KSI Team") to develop a process to **identify key maintenance and operation procedures, hereafter referred to as Key Safety Information (KSI), during airplane systems development and certification at the manufacturers, and to provide a means for effective communication and protection of such information during maintenance, operation, and training functions at the air carriers, and at the maintenance and repair organizations (MRO).**

To develop the KSI process, the KSI Team reviewed the system safety process, the maintenance processes, and the air carriers operation processes such as Instructions for Continued Airworthiness (ICA), Certification Maintenance Requirement (CMR), Airplane Flight Manual (AFM), Flight Crew Operation Manual (FCOM), and the Flight Standardization Board (FSB.) The review highlighted that

- The system safety process adequately identifies key maintenance and operational needs.

- The airplane manufacturer's maintenance and operational documents are produced according to the certification and continued airworthiness needs.

- The traceability between the maintenance and operational requirements identified in the system safety assessment and the actual maintenance and operation processes can be improved further.

- The communication, application, and protection of key maintenance and operational procedures at air carriers, maintenance and repair organizations can be improved further.

For greatest ease and effective implementation, the KSI Process leverages as much as possible the existing maintenance and operational processes. The KSI process uses a set of criteria for identifying KSI during TC and STC. The OEM (or certificate

holder) identifies KSI during the design and certification phase, starting with the system safety assessment. Each item of key safety information is summarized and documented in a "KSI Document". The KSI Document is a convenient means to capture the KSI and it serves as a pointer to the appropriate documents where the details of each KSI item is described, i.e. the instructions for continued airworthiness (ICA), or in the flight manual as appropriate. **The KSI process captures and highlights key procedures and associated tasks that should be protected and correctly performed throughout the life of the airplane(s). To maintain the original certified level of safety, the operators incorporate the KSI in their maintenance and operation programs. The FAA inspectors oversee the Operators program to ensure correct application and management of the KSI.**

The KSI process can be implemented with few changes to existing maintenance and operational processes:

- The KSI Process does not change the certification authority approval of OEM documents that contain procedures and associated tasks identified as KSI Although non-approved documents like the AMM and FCOM may contain KSI, the OEM may change the procedures identified as KSI in its document without having to seek approval from the authorities, as long as the changes do not impact the safety intent of the KSI.

- The KSI process does not change the local authority approval of air carrier documents that contain procedures and associated tasks identified as KSI .

- The processes to establish airworthiness limitation items (ALI) and Certification Maintenance Requirements (CMR) are not changed

- There need not be KSI identifiers in the manuals that contain procedures identified as KSI and associated tasks.

2. Background

Safety Enhancement #24

In 1998 the FAA implemented the Safer Skies initiative which sought to understand the root causes of aviation accidents and incidents, and then to identify and implement "safety enhancements" to various aspects of commercial aviation. The initiative is managed by the Commercial Aviation Safety Team (CAST), a joint FAA-industry team. The CAST selected the FAA's Aircraft Certification Service as the lead organization to implement "Safety Enhancement #24" developed in July 2002 by the Approach and Landing Accident Reduction study. The Transport Airplane Directorate was charged with implementing Safety Enhancement #24 which states:

> *Develop a process to identify key safety information during airplane systems development and certification at the manufacturers, and to ensure effective communication and protection of such information during maintenance, operation, and training functions at air carriers, maintenance and repair organizations.*

The Key Safety Information concept was developed by the Certification Process Study. The goal of the KSI process is, once KSI are identified in the certification process, the KSI should not be modified without thorough review and understanding of the original basis of certification of a new TC or STC. In August 2004, the Transport Airplane Directorate convened a joint FAA-industry team to determine precisely how the KSI process would be implemented.

3. Key Safety Information Concept

In March 2002, the Federal Aviation Administration (FAA) issued the *Commercial Airplane Certification Process Study: An Evaluation of Selected Aircraft Certification, Operations, and Maintenance Processes* (CPS report). That report, developed by another joint FAA-industry team, acknowledged the important advances in achieving the current high level of safety in air carrier operations, but noted that accident history highlight the complexities of accident prevention. The report contained findings and observations regarding potential areas of improvement in design, certification, operations, and maintenance processes related to transport-category airplanes. The CPS report also examined the information paths and interfaces associated with these processes. The findings that motivated the development of the KSI concept were the following:

> *Finding 2: There is no reliable process to ensure that assumptions made in the safety assessments are valid with respect to operations and maintenance activities, and that operators are aware of these assumptions when developing their operations and maintenance procedures. In addition, certification standards may not reflect the actual operating environment.*

Finding 3: A more robust approach to design and a process that challenges the assumptions made in the safety analysis of flight critical functions is necessary in situations where a few failures (2 or 3) could result in a catastrophic event.

Finding 4: Processes for identification of safety critical features of the airplane do not ensure that future alterations, maintenance, repairs, or changes to operational procedures can be made with cognizance of those safety features.

Among these, Finding 4 was the cornerstone of the KSI concept development.

In January 2002 the FAA chartered the Certification Process Study Response Team (CPS Response Team) to develop solutions to the concerns raised in the CPS report. Although the root causes of accidents are rarely, if ever, singular, one of the underlying factors identified by the CPS Response Team is the need to systemically improve the transfer of critical (key) safety information between the manufacturer and the operator, and the protection of that information throughout the life of the aircraft. The CPS Response Team completed its work in December 2004 with a number of recommendations. Salient to this report is a recommendation to establish a process to capture key safety information (KSI) starting from safety assessments during design of new airplanes and ensure effective communication and protection of these KSI during maintenance, and operation functions for the airplane. KSI includes underlying operational and maintenance procedures that require strict adherence for continued operational safety of the airplane. The process would establish under § 25.1529 a "KSI Document" to capture the actions taken to address key safety information. Air carriers and maintenance and repair organizations would develop processes to ensure cognizance and management of KSI as a condition of FAA approval of their operations specifications.

Thus the KSI concept is not about preventing specific classes of accidents that occurred in the past, rather it is about a process to heighten awareness of the information deemed critical to safety that should be generally used in the prevention of accidents.

To implement the KSI concept above, the following process was developed. In short, the KSI process involves:

Step 1. **Identify KSI During New Design Development**

The original equipment manufacturer (OEM for airplanes, engines or propellers) identifies the KSI during design, certification, and development of system safety assessments.

Step 2. **Trace KSI from System Safety Assessment to the KSI Document**

The OEM develops an initial KSI tracking document (called KSI document) to ensure traceability of a KSI from the system safety assessment to maintenance and operation documents.

Steps 3 & 4. **Validate the KSI Document for Completeness and Correctness & Finalize the KSI Document**

The OEM establishes and finalizes the final tracking document (KSI document) with inputs from the Certification Maintenance Coordination Committee (CMCC), and the Flight Standardization Board (FSB.) The OEM will verify that the maintenance and operational procedures used to satisfy the intent of the KSI correctly meet the intent of the System Safety Assessment.

Step 5. **Publish Documentation with Cognizance and Controls for the KSI**

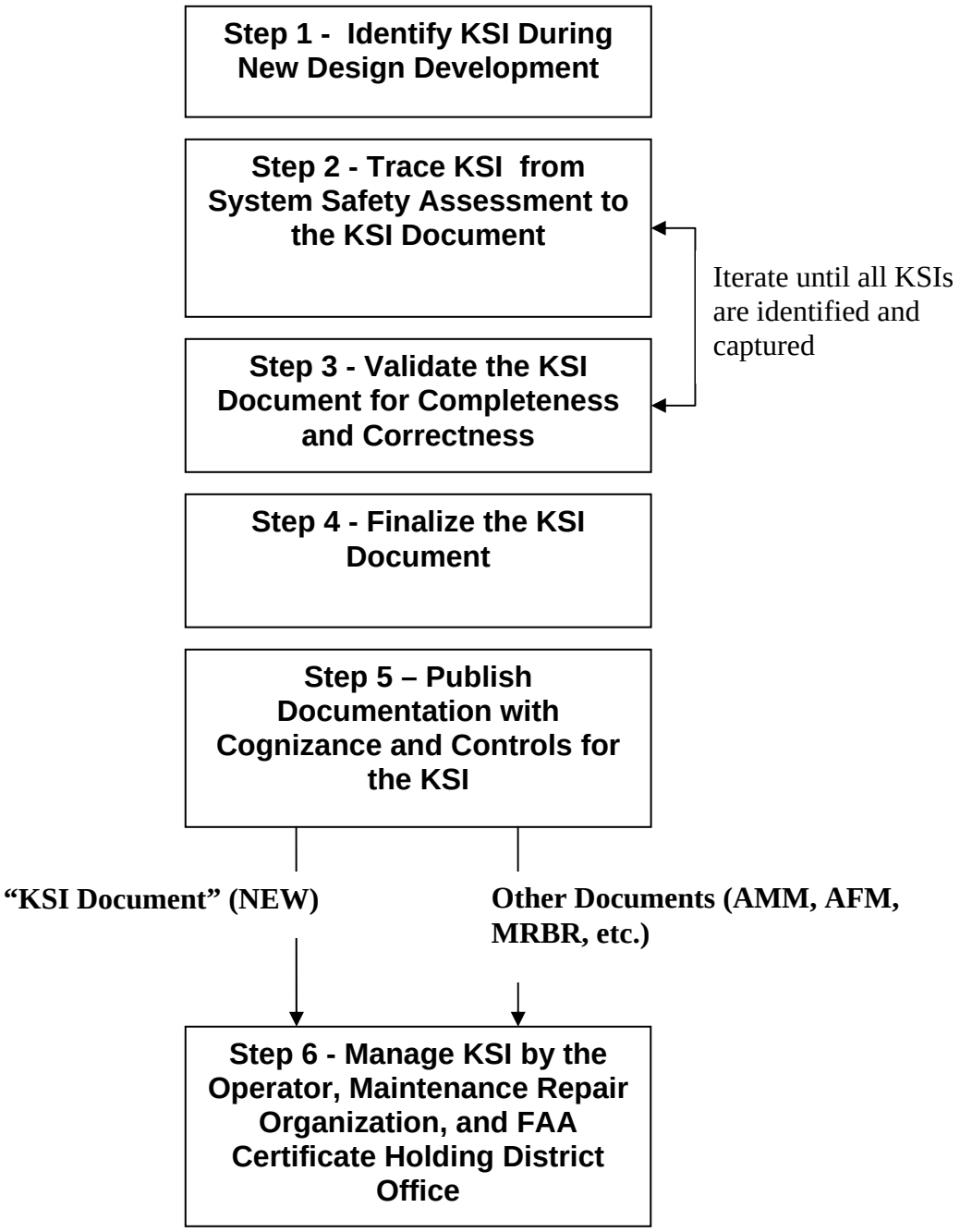
The OEM publishes the KSI Document (as a standalone document) along with the normal maintenance and operation publications.

Step 6. **Manage KSI by the Operator, Maintenance Repair Organization, and FAA Certificate Holding District Office**

The KSI is incorporated in the Operators and CHDO processes.

The KSI process flow is shown in Figure 1.

Figure 1. THE KSI PROCESS



4. "KSI Development Team" members and their organizations

In August 2004, the Transport Airplane Directorate convened a joint FAA-industry team to determine how the KSI process would be implemented. The team participants are:

COMPANY	NAME
AAL	Brown, Tim Pekny, Ron
Airbus	Knepper, Roger
ARSA	Hawthorne, Paul
ATA	Anderson, Ric
Boeing	Moreen, Scott
Brazilian ANAC	Cristofani, Nivaldo Forni, Andre Reitz, Lindolfo
Embraer	Bethel, Don Fernandez, Felipe Eudes Pontes Linguanotto, Pedro Geraldo
FAA	Basse, Barry (AFS-302) Grant, Robert (ANE-110) Le, Linh (ANM-117) Reinert, Mike (AIR-140) Rice, Mark (SEA-AEG) Zielinski, Mike (retired) (ANM-105)
FedEx	Stedke, Trevor Berger, Kevin
NWA	Horton, Lloyd
Pratt & Whitney	Morgan, Keith
Rolls Royce	Burkett, Mike
TCCA	Marko, Jim

5. Applicability and Usage

The KSI process should be implemented on new Type Certificate (TC) application submittals. The KSI process is not implemented retroactively to the existing fleet except when Supplemental Type Certificate (STC) applications are submitted. See section 8 for guidance for STC applications. The KSI process is applicable only to airplane systems.

5.1. New designs certification

5.1.1. Instructions for Continued Airworthiness for Airplane TC, STC

The maintenance procedures identified as KSI should be used to support compliance to 14 CFR 25.1529 and be included in the instructions for continued airworthiness (ICA) for all new type certificate and supplemental type certificate applications.

5.1.2. Operating Procedures for Airplane TC, STC

If a flight crew procedure is identified as KSI, it should be used to support compliance to 14 CFR 25.1581 and 25.1585 as appropriate and be included in the appropriate operating manuals. Since the KSI selection criteria described herein are associated with system failure conditions, it is expected that most flight crew operation KSI would be associated with non-normal procedures per 14 CFR 25.1585(a)(2).

5.2. Tool to upkeep originally certified safety level

The KSI is guidance to the Operators and the Maintenance, Repair, and Overhaul (MRO) entities in their daily operations. Certain KSI of the airplane design and operations need special consideration during operation, maintenance, repair, and alteration to ensure the margin of safety for the airplane provided by the original certification effort is maintained. Experience has shown that in some accidents there was a lack of awareness of the potential impact of actions taken, and in other accidents relatively simple mistakes were made that had catastrophic consequences.

6. Definitions

6.1. Key Safety Information: Maintenance and operational procedures used to carry out the “tasks” (see definition of procedure and task in sections 6.3 and 6.4 below) that are key to the safe operation of transport category airplane systems; failure to perform these key procedures correctly could contribute to a hazardous or catastrophic failure condition. These specific procedures are contained within the ICA (Instructions for Continued Airworthiness), AFM (Airplane Flight Manual), FCOM (Flight Crew Operating Manual), FSB Report, and they are listed in the KSI Document.

Notes:
a) KSI does not include maintenance or operational task intervals. This is because these intervals are derived from and controlled by other processes

such as CMR, MSG-3, airworthiness limitations, and operator reliability programs.
b) KSI is related to airplane-level safety, and it is not intended to capture personnel safety items highlighted in various manuals by Notes, Cautions, and Warnings.

6.2. **Key Safety Information Process:** Process to identify, evaluate, and document the KSI during the airplane Type Certification process (which is performed at the airplane manufacturer or modifier,) and to ensure effective communication, application, and protection of such information during maintenance, operation, and training functions at air carriers, maintenance and repair organizations.

6.3. **Task**: Short description (e.g. a descriptive title) of what is to be accomplished by a procedure. Example: “Operational check of static inverter.”

6.4. **Procedure**: Instructions for how a task is to be accomplished. A procedure consists of one or more sequential steps. Procedures are shown in maintenance, operation, or training manuals.

7. KSI Process Description

The KSI process uses a set of criteria for identifying KSI during TC and STC. The OEM (or modifiers) identifies KSI during the design and certification phase, starting with the system safety assessment. Each item of key safety information is summarized and documented in a “KSI Document”. The procedures associated with each KSI item are described in the instructions for continued airworthiness (ICA), and in the flight manual as appropriate. The KSI process captures and highlights key procedures and associated tasks that must be protected, maintained and correctly performed throughout the life of the airplane(s) so that the certified level of safety can be maintained. The operators incorporate the KSI in their maintenance, operation, and training programs. The FAA inspectors oversee the Operators program to ensure correct application and management of the KSI. The KSI process consists of six steps. Each step of the KSI process is described in detail as follow.

7.1. Step 1 – Identify KSI During New Design Development

The airplane OEM, with support from the engine and propeller OEMs, identify KSI starting from the system safety assessment during the original system, engine, and propeller design or modification processes. These KSI may be maintenance procedures, or operational procedures.

System safety requirements are not limited to 14 CFR 25.1309. However, the system safety assessment as a process, and for KSI identification purposes, is modeled after the ARAC proposed Advisory Circular 25.1309-Arsenal. The meaning of the terms used in the KSI process (such as catastrophic failure condition, hazardous failure condition, single failure, latent failure, common cause, etc.) are

identical to the terminology used the proposed AC 25.1309-Arsenal. The complete ARAC proposal for revising 14 CFR Part 25.1309 and advisory materials may be found at:

http://www.faa.gov/regulations_policies/rulemaking/committees/arac/media/tae/TAE_SDA_T2.pdf.

The OEM would identify KSI using the following criteria:

Identify maintenance and operational tasks and procedures related to mitigating the risk of:
- a single failure leading to a catastrophic or hazardous failure condition
- a foreseeable common cause failure leading to a catastrophic failure condition
- a latent failure in a dual-failure combination leading to a catastrophic or hazardous failure condition

Guidance for applying the above criteria:

a) Although the system safety assessments identify maintenance and operational actions that are directly related to compliance with FAA regulations (e.g. 25.1309), these actions are not described in detail in the system safety assessment reports. The procedures and associated tasks that meet the above criteria describe in detail how to perform these actions.
b) In the context of the KSI Process a **foreseeable** common cause failure is a common cause failure that has occurred in-service, or a common cause failure that engineering judgment predicts could occur. Engineering judgment may enable an assessment that a common cause failure is not foreseeable. The assessment logic and rationale should be readily obvious, so that a knowledgeable, experienced person would unequivocally conclude that the common cause failure simply would or would not occur. Common cause failures that have catastrophic effects are generally prohibited by system safety regulations, such as 25.671, 25.901, 25.933, and 25.1309. When the design and associated procedure are provided to mitigate the catastrophic failure condition such procedure should be a KSI. Note that the common cause failure criterion does not include identification of common cause failures leading to hazardous failure conditions. This is because compliance to 14 CRF 25.1309 does not require an analysis of hazardous common cause failures. This is reflected in the AC 25.1309-Arsenal.
c) The criteria need not apply to failure conditions that result from combining a single failure with an independent operational or environmental condition that is not within the airplane approved flight envelope. Examples for independent operational conditions not within the airplane or engine approved flight envelope are exceedingly high AOA/Stall or high speed above VMO/MMO, Negative-G flight conditions, very high deceleration rate at very high pitch attitude. Examples for independent environmental conditions not within the airplane or engine

approved flight envelope are extreme head winds, extreme tail winds, extreme cross wind, severe icing conditions in flight, severe atmospheric disturbance.

d) Failure conditions that result from combining a latent failure with a foreseeable common cause failure (e.g., latent ram air turbine failure in combination with multiple engine flameouts due to volcanic ash) should be considered for KSI identification. Applying the criteria would result in the latent failure being considered for KSI treatment. In practice, we do not expect many such failure conditions in new designs.
e) The criteria need not apply to failures resulting from software or complex hardware design errors. This is because the operators (or their third party contractors) generally do not have the ability to modify software-based system components in their maintenance, operation, or training procedures. Such errors if found would be corrected by the manufacturer of such components. The only major concern here is to ensure the correct software and hardware is installed, in cases where such software-based components are field-loadable.
f) Procedures and associated tasks of engine or propeller parts whose failures alone or in combination with airplane failures that meet the KSI criteria would be included in the KSI process.
g) During development of MMEL proposals, the KSI criteria may be used as supplementary guideline to support identification of significant limitations and/or operational maintenance tasks. No KSI is to be identified in the MMEL, and conversely the Maintenance and Operations procedures (M and O) required for dispatch are not included in the KSI Document.
h) The KSI identification is a cooperative effort between the safety analysts, the system designers, maintenance specialists, operation specialists, and other stakeholders.
i) Certification Maintenance Requirements (CMR) associated with dual failure combinations would be included in the KSI Document.
j) Maintenance Steering Group MSG3-FEC 5 and 8 tasks, or tasks resulting from other MSG-3 analysis, that meet the KSI identification criteria would be included in the KSI Document.

7.2. Step 2 – Trace KSI from System Safety Assessment to the KSI Document

After the KSI are identified starting from the system safety assessment, the KSI would be collected in a “KSI Document”, as shown in Figure 2, and communicated internally within the OEM (or modifier) to all the disciplines in charge of implementing KSI in various manuals, including design, maintenance, and operations.

The reasons for selecting a KSI should be provided to allow the operator to determine if any proposed change (received from the operator's network) has an effect on the intent of the SSA and corresponding KSI. Without this information readily available, the operators would have to contact the OEM for every instance a change is contemplated. Operators will be better informed to interface Maintenance and Operations personnel and differentiate between items that could be changed without effecting system safety assessment intent and those that must be rejected.

With the “why” information available, Operators could also offer the rational to the submitter why such a change should be rejected. This would make the management of the KSI more efficient for both OEM and operators.

The procedures identified as KSI and related tasks are expected to be contained in (but not limited to) the following documents:

a) Maintenance: Maintenance Review Board Report (MRBR), Airworthiness Limitation Section (ALS), Airplane Maintenance Manual (AMM), Engine Maintenance Manual (EMM), Propeller Maintenance Manual (PMM). Although most of the maintenance related KSI should be contained in the above documents, in few cases it may be necessary for the KSI Document to show the procedures in Component Maintenance Manual (CMM) or other similar documents; in which cases the OEM usually controls the information contractually with the suppliers.
b) Operations: AFM and associated FCOM
c) Training: Flight Safety Board Report.

Once the KSI document is developed, proceed to Step 3 – Validate the KSI Document. It may be necessary to iterate between Steps 3 and 2 until all KSI are identified.

7.3. Step 3 – Validate the KSI Document for Completeness and Correctness

Because the goal of the KSI process is to increase cognizance of safety information in the operational environment, it is crucial to involve the air carriers in the assessment of the KSI. To validate the KSI Document, it is recommended that **the OEM seek inputs from organizations like the Certification Maintenance Coordination Committee (CMCC), the Maintenance Review Board (MRB), the Industry Steering Committee (ISC), and the Flight Standardization Board (FSB) to ensure the Operators are cognizant of the reasons for, and intents of, the KSI.**

In evaluating the KSI document, it should be understood that:

a) The KSI Process does not change the approval of OEM documents by the Certification Authority. The fact that the currently non-approved OEM documents (e.g. AMM, FCOM) contain KSI does not result in a need for approval from the certification authorities, and in these cases the OEM can change the procedures associated to a KSI without approval of the certification authorities.

b) **Once the KSI are established during certification, post-certification changes to the KSI shall not affect the intent and interest of the KSI, and shall maintain coherence with the system safety analysis**.

c) The KSI procedures and tasks that are contained in the approved documents (MRBR & ALS, AFM and FSB Report) are also approved, by default, in accordance to existing regulations applicable to these documents.

d) The process to establish airworthiness limitation items is not affected by the KSI process (i.e. the KSI process itself does not generate additional airworthiness limitations).

e) The process to establish Certification Maintenance Requirement (CMR) is not affected by the KSI process (i.e., the KSI process itself does not generate additional CMR).

7.4. Step 4 – Finalize the KSI Document

Once the decisions are made on how the KSI would be implemented in the OEM (and in some cases supplier) documents, the KSI Document would record the KSI type, title, the reference(s) of the document(s) in which the KSI procedures and associated tasks can be found, and the reason for having the KSI. The next actions in the KSI process for the OEM is to submit the KSI Document to the responsible ACO in support of compliance to 14 CFR 25.1529 (ICA), and 25.1581 (AFM), and to support the FSB (training). The FAA (with support of the OEM) may identify in the FSB-Report training areas of special interest and emphasis for KSI related (flight crew) operational tasks and procedures.

The KSI Document does not require approval by the Authority even if it contains references to approved documents such as the AFM and MRBR.

Figure 2. Content of KSI Document

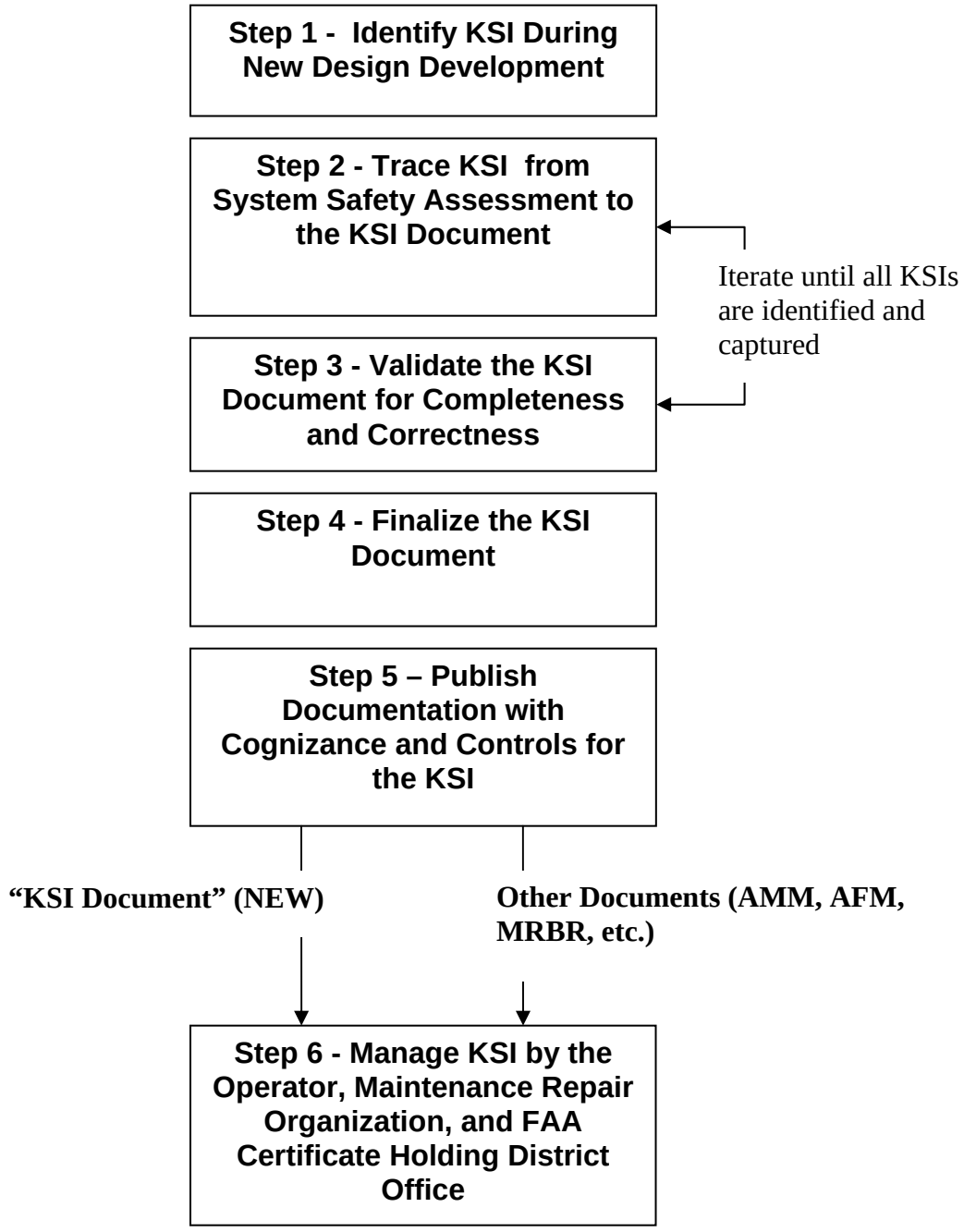
1. Scope and applicability

The Key Safety Information process described herein is applicable to airplane systems.

IMPORTANT:
This document contains key safety information that is essential to the safe operation of airplanes. The procedure/task specified herein must be protected, maintained and correctly performed throughout the life of the airplane(s). Failure to perform this key procedure/task correctly could contribute to a hazardous or catastrophic failure condition

2. KSI Process description

THE KEY SAFETY INFORMATION PROCESS



3. KSI items

The following information is provided for each KSI:

- KSI type
- KSI title
- reference(s) to the document(s) in which the KSI procedures and associated tasks can be found
- reasons for having the KSI
    - Potential consequences if the KSI procedure/task is not performed as requested (e.g. resulting aircraft level hazard, dynamics of the concerned failure condition, flight deck effects)
    - Intent of the KSI (e.g. failures to be detected and/or components to be protected, crew corrective actions)

Legend:

KSI Type	M**aintenance procedure,** O**perational procedure,** T**raining procedure**
KSI Title	**Title of the procedure**
Document References	**References in the approved documents : e.g.: MRBR, AFM, FSB Report or other document where the info is located.** **References in the non approved documents : e.g.: AMM, FCOM**

Airplane Program/Type/Model: ABE123	**ATA: XY**	

KSI Type	Title	Document References	Reasons for having the KSI
M	OPERATIONAL CHECK OF STATIC INVERTER AND DC ESS. BUS SUPPLY	MRB REPORT REFERENCE N°: 24.xx.yy AMM REFERENCE N°: 24 ….	Potential consequences if the maintenance task /procedure is not performed as requested is in combination with another event/failure the loss of all AC bus bars, which can potentially lead to an accident in icing conditions due to possible false airspeed and loss of flight control protections. The intent of the maintenance task/procedure is to verify that - the AC ESS BUS is supplied by the batteries through the static inverter - the DC ESS BUS is supplied by the batteries when the CSM/G does not run and the Normal AC generation is lost.
M	Inspect Engine Part XYZ ……	MRB REPORT REFERENCE N°: EMM REFERENCE N°: …	Potential consequence if maintenance task is improperly performed: engine burst Intent of this KSI: Detect damage and remove part from service before damage propagates to failure.
O	Land at nearest airport	AFM REFERENCE N°: … FCOM REFERENCE N°: ….	Describe consequence Describe intent of KSI

7.5. Step 5 – Publish Documentation With Cognizance and Controls for the KSI

The KSI Document will be provided to the operators in addition to the usual publications (e.g. MPD, MRBR, AMM, AFM, etc…) Once published, the OEM maintains configuration control of the KSI document in case changes are made by the OEM. Post-certification changes that impact the safety intents of the KSI are not expected to occur frequently, if at all. However should the OEM make such a change, the OEM should inform the Authority and the Operators of that change.

It is expected that the KSI Document would be used as a "master" document from which the operators manage the KSI. Each KSI would have corresponding procedure(s) in the appropriate operator manuals.

Note: The KSI are not required to be labeled in the manuals (e.g. MPD, MRBR, AMM, AFM, etc.). However, at the OEM's or modifier's discretion, the procedures that correlate to the KSI items in the KSI Document may be highlighted as such in the manuals.

7.6. Step 6 – Manage KSI by the Operator, Maintenance Repair Organization, and FAA Certificate Holding District Office

7.6.1. Each operator would use and manage all KSI in its operation. To do so, each operator would develop and implement procedures and processes to:

7.6.1.1. Indicate how it would review and approve any changes to procedures/tasks identified as KSI by the OEM to ensure the certificated level of safety is maintained. The process would identify who has the authority within the operator to make approvals on these changes, where this authority resides within the operator's organization, and the qualifications of the position that holds that approval authority. These changes should not impact the safety intent of the KSI as defined by the OEM.

7.6.1.2. Show how it would respond to changes in the KSI provided by the OEM. The process should provide sufficient detail on the analysis required to formulate a disposition on the changes.

7.6.1.3. Incorporate the KSI process into the policies and manuals required by the applicable regulations such as 121.133 (Preparation) and 121.135 (Manual contents), 135.21 (Manual requirement) and 135.23 (Manual contents). The process that describes changes to this program would include how the KSI associated with each task is analyzed to sustain an equivalent level of safety. The process also would identify who has the authority to make approvals on these changes, where this

authority resides within the operator's organization, and the qualifications of the position that holds that approval authority.

7.6.1.4. Use the appropriate oversight programs (such as Continuing Analysis and Surveillance System (CASS)) to give special emphasis to monitoring KSI.

7.6.1.5. Consider revisions to the Required Inspection Item (RII) program based upon information contained in the KSI Document.

7.6.1.6. Develop and incorporate flightcrew procedures and relevant training considering the KSI Document.

7.6.1.7. Develop and conduct maintenance training considering the KSI Document.

7.6.2. Consistent with 14 CFR Part 145.205 requirement, each maintenance repair organization accomplishing maintenance for a part 121 or part 135 operator would develop procedures and processes to use the operator's acceptable method for modifying the maintenance procedures that have been identified as KSI.

7.6.3. Each FAA CHDO would develop procedures and processes to examine an operator's program as described above and consider this information during the process of approving an operations specification.

Note: The KSI process does not change the process for approval of operator documents by the local authority, or by the ACO as applicable.

8. Application of KSI process in STC

For current fleet of airplanes, the KSI document does not exist. The first opportunity to create the KSI document presents itself when a system related STC is applied. Depending on the modification, system safety regulations such as 25.1309, 25.981, etc, may be applicable, and system safety analysis may be necessary to show compliance. If the newly created or modified safety analysis identifies hazardous or catastrophic failure conditions and that they also meet the KSI identification criteria, the STC applicant should take the opportunity to create the KSI document for the modified areas of the airplane. The operator of the modified airplane can then incorporate the new KSI document into their operation and maintenance as described in Step 6 of the KSI process above. The KSI process would apply only to the change areas.

9. Implications to regulations, policies, or processes

9.1. FAA Order 8300.10

At this writing, AFS is in process of combining 3 orders 8300.10 Airworthiness Inspector Handbook, 8400.10 Air Transportation Operations Inspectors Handbook into one web based electronic handbook order. This will be organized by subject matters. Revision to the new e-handbook may be delayed and a handbook bulletin guidance is being considered in the interim. The timing of the e-handbook may not support the release of the KSI guidance. Therefore, a placeholder is reserved for incorporation of KSI into the new e-handbook.

9.2. FAA Order 8110.54

The Order should be reviewed and revised as necessary to reflect the KSI process implementation.

9.3. AC25-19 Certification Maintenance Requirement

No change to AC25-19 is necessary due to the KSI process implementation.

9.4. Maintenance Steering Group MSG-3 Process

No changes to MSG-3 process are necessary due to the KSI process implementation.

9.5. Fuel tank system Critical Design Configuration Control Limitations and Airworthiness Limitation Items

Fuel tank system CDCCL and ALI will not be included in the KSI document because the procedures for maintaining these items are sufficiently controlled.

9.6. AC 33.4-2 Instructions for Continued Airworthiness: In-service Inspection of Safety Critical Turbine Engine Parts at Piece-Part Opportunity

No change to AC 33.4-2 is necessary due to the KSI process implementation. Maintenance and inspection processes for parts identified by this AC to require in-service inspections would be evaluated for inclusion in the KSI document.

9.7. AC 120-16D Air Carrier Maintenance Program

This AC should be reviewed by AFS and, if necessary, revised to reflect the implementation of the KSI process.

9.8. AC 120-79 Developing and Implementing a Continuous Analysis and Surveillance System

This AC should be reviewed by AFS, and revised as necessary to reflect the implementation of the KSI process.

10. Recommendations

The KSI Development Team recommends that the FAA:

10.1. Implement the KSI process as described in sections 5 through 7 of this report via an Advisory Circular of the 120-series because this process crosses functional boundaries between Certification and Operations.

Note: the KSI process can be implemented independently of recommendations described in paragraphs 10.2 and 10.3 below.

10.2. Review the policies listed in section 9 of this report and revise them as necessary to integrate the KSI process and philosophy throughout applicable AVS processes.

10.3. Revise Appendix H25.4(a)

Currently the Airworthiness Limitations section is restricted to only those replacement time, inspection interval and related inspection procedures required by 25.571 for damage tolerant structures and by 25.981 for fuel tank systems. This restriction does not account for the Certification Maintenance Requirements (CMR) necessary to uphold the basis of certification for other airplane systems under 14 CFR 25.1309, causing them to be possibly tracked via means other than the Airworthiness Limitations section. CMR's are currently used as the systems counterpart to the Airworthiness Limitations for structures and fuel tank systems. However, unlike Airworthiness Limitation Items (ALI), CMR does not have the same clear regulatory basis upon which to standardize its process, other than advisory materials per AC 25-19. Airworthiness Limitations are just as relevant for redundant systems that have hazardous and catastrophic failure effects as they are for redundant fuel tank systems and damage tolerant primary structures. Furthermore, the Airworthiness Limitations requirements of A33.4 (for engines) and A35.4 (for propellers) do not limit the scope of Airworthiness Limitations to "structural" issues. Since H25.4 applies to these same engines and propellers as installed on the airplane, this inconsistency needs to be reconciled.

One way to address the issue is to add a new paragraph to H25.4(a) that requires the identification of the tasks and intervals determined to be Certification Maintenance Requirements that support compliance with Part 25 requirements such as 25.1309.

Should H25.4(a) be revised as recommended above, the AC 25-19 could be revised to provide clearer guidance for the standardization and control of escalation of maintenance intervals associated with the tasks required to satisfy

14 CFR 25.1309. This would provide consistent guidance for maintenance requirements for all “critical” airplane systems, including fuel tank systems.

APPENDIX A

Issues Worthy of Further Reviews

During the development of the KSI process the KSI Development team examined the following issues and concluded that they were worthy of further review, although they did not influence the implementation of the KSI process. These issues do not necessarily impact FAA regulations or policies, but they do point out areas where improvements or clarifications are needed.

A1. "One Stop Shopping" Business Trend in the Maintenance Repair and Overhaul Market

14CFR section 145.205, paraphrased, states that when doing work for a 121,or 135 certificate holder having a continuous airworthiness maintenance program that work must done in accordance with that certificate holders program and applicable sections of it maintenance manual. This is really nothing new, but new is the concept of "one stop shopping". This is a concept whereby the carriers are using the OEM's to manage their LRU's. When doing this the provider is not being considered as a person(s) whom the carriers arranges to have maintenance done (FAR 121) so in most case holds no operating certificate nor are any audits performed by the carriers. So, LRUs are sent to the one stop shop provider and then sent to a Repair Station for any required maintenance. That provider has no regulatory requirement to do anything according to the carriers program or maintenance manual.

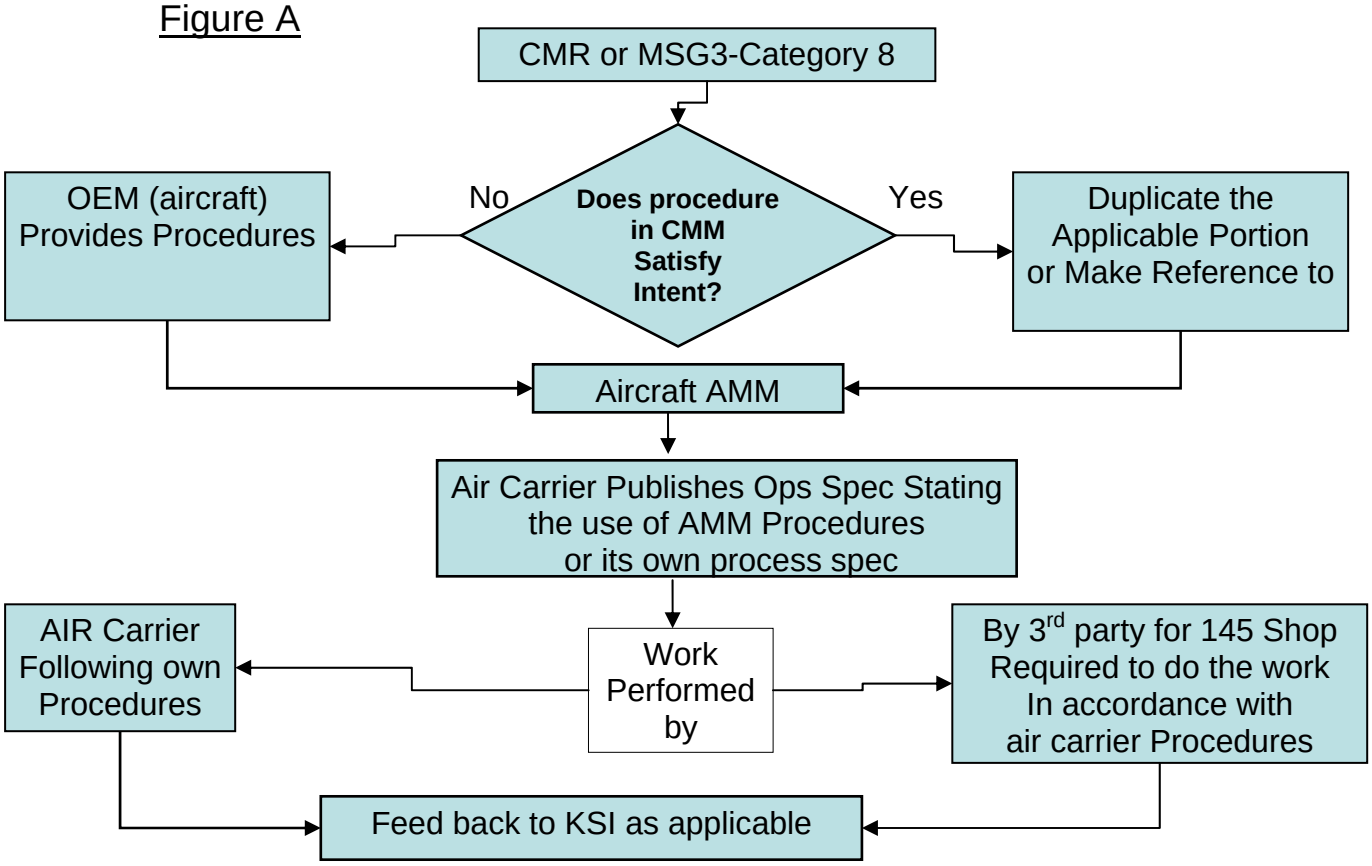
When the part arrives at the MRO it arrives with a Repair Authorization from the one stop provider. The MRO then uses whatever document, he used to gain his RA approval, to perform the maintenance. This is especially true when the LRU OEM is also the MRO. Parts pooling is another source of lack of consistency in controlling KSI on LRU's. Which carriers procedures are used when the part comes from one carrier and goes to another?

A2. Latent Failure Inspection Procedures Contained in Component Maintenance Manual (CMM)

When an Operator sends a component to the component manufacturer for maintenance or repair, the Operator assumes the component works correctly when it returns from the component manufacturer. If that component has a Certification Maintenance Requirement applied to it from the airplane system safety analysis, the Operator has no visibility on whether or not the CMR on that component is satisfied. After careful

deliberations, the KSI Development Team decided that the CMM issue was not KSI specific and should be looked at separately from the KSI development process. The KSI Team put forth several suggestions that may be worthy of pursuing. One suggestion was to incorporate the CMM procedure into the airplane maintenance manual as depicted in the Figure A below. Another suggestion was the airplane OEM puts into place a procedure to validate CMM and potential revisions with regard to the CMR, MSG3, KSI, etc.

Figure A



APPENDIX B

Validation of the KSI Process

To ensure the KSI process is designed correctly, the KSI Development Team

- ensured the KSI process does not duplicate existing processes.
- ensured the KSI process can be integrated with existing processes, such as CMR, MSG-3, RII, FSB, etc., so that the KSI process enhances the existing processes and thereby improves on safety.
- **ensured that the objectives of SE#24 and Finding 4 are met. In essence, the objective is to provide the OEMs and operators a process to capture and communicate the key safety information to ensure the level of safety intended by the airplane's original certification basis is protected for the operational life of the airplane.**