

**AIRBUS A319-111,
G-EZAC**

**Overhead Brest,
France**

15 September 2006

Serious Incident

Investigation Synopsis

The aircraft was dispatched under the provisions of the operator's Minimum Equipment List with the Auxiliary Power Unit (APU) generator on line, substituting for the No 1 main generator which had been selected off after a fault on the previous flight had caused it to trip off line. During the cruise, the APU generator disconnected from the system, probably because of a recurrence of the original fault. This caused the loss of a substantial number of aircraft services, including some flight instruments and all means of radio telephony (RTF) communication. Manual reconfiguration of the electrical system should have recovered many of the services but the flight crew was not able to achieve this. Since they were without RTF communications, the crew considered that the best option was to select the emergency transponder code and continue the flight in accordance with the flight plan.

In the light of the initial findings of the investigation, four safety recommendations are made. The investigation is continuing.

Safety Recommendation 2006-142

Safety Recommendation 2006-142

It is recommended that Airbus should revise, for the A320 aircraft series, the fault monitoring logic of the Generator Control Unit to prevent the monitoring system from incorrectly interpreting a fault within the GCU as an external system fault.

Date Safety Recommendation made: 13 December 2006

LATEST RESPONSE

Response received: 07 October 2008

The origin of this event is a lack of robustness in the differential protection trip implemented in the GCU EMM, which has caused the loss of AC ESS bus bar. Such failure mode can not occur on GCU non EMM. Affected aircraft are with GCU PN 767584x (where x could be A to I).

To address this AAIB SR, AIRBUS has developed a new GCU std.

The main objective of this new GCU is to improve the robustness of the differential protection trip related to the 'GLC welded' failure mode.

On top of this new GCU standard is to improve the robustness of the differential protection trip related to the 'GLC welded' failure mode.

On top of that, this standard will be used to implement other corrections and improvements such as the management of the FIRE trip protection reset logiv, the PW bypass valve failure BITIE message and other specific improvements for Long Range aircraft (this GCU is common between SA and LR fleet).

The standard GCU EMM 5.2 will be available for all SA A/C models with GCU EMM and will be proposed as standard in production for A320 family. Through a MSCN. An AIRBUS SB will be issued to cover this modification.

Safety Recommendation Status **Closed**

AAIB Assessment **Adequate**

RESPONSE HISTORY

N/A

Safety Recommendation 2006-143

Safety Recommendation 2006-143

It is recommended that Airbus should introduce, for Airbus A320 series aircraft, a modification to automatically transfer the electrical feed to the AC Essential busbar in the event of the loss of the No 1 Main AC busbar.

Date Safety Recommendation made: 13 December 2006

LATEST RESPONSE

Response received:

Modification 37317 has been certified on January 10th 2007: AC Essential, generator switching. Install auto switching system for AC and DV ESS bus. It is standard for A320 family from March 2007. Refer to ARS SA24.0028 for in-service actions.

This SR is also addressed by AAIB SR 2007-067.

Associated SB 24-1120 has been issued on May 31, 2007. EASA will mandate this SB and an AD is to be issued.

Safety Recommendation Status Closed

AAIB Assessment Adequate

RESPONSE HISTORY

N/A

Safety Recommendation 2006-144

Safety Recommendation 2006-144

It is recommended that Airbus should advise all operators of A320 series aircraft with Radio Telephony (RTF) communications reliant upon a single busbar of the consequent possibility of loss of all RTF communications.

Date Safety Recommendation made: 13 December 2006

LATEST RESPONSE

Response received:

Such event could only occurs on aircraft fitted with digital AMU.

Digital AMU have PN 4031zz0x010x where zz can be SA or SB (non SATCOM option) or LA or LB (SATCOM option) and x from 1 to 4.

AIRBUS has issued FCOM TR 74 (issue 1 on March 2007, issue 2 on February 2008) to state on the loss of the VHF com in case of DC ESS BUS FAULT.

Safety Recommendation Status **Closed**

AAIB Assessment **Adequate**

RESPONSE HISTORY

N/A

Safety Recommendation 2006-145

Safety Recommendation 2006-145

It is recommended that, for A320 series aircraft with digital Audio Management Units, Airbus should take modification action aimed at ensuring that electrical power supplies required for Radio Telephony communications have an improved level of segregation.

Date Safety Recommendation made: 13 December 2006

LATEST RESPONSE

Response received:

Such event could only occur on aircraft fitted with digital AMU.

Digital AMU have PN 4031zz0x010x where zz can be SA or SB (non SATCOM option) or LA or LB (SATCOM option) and x from 1 to 4.

AIRBUS has developed modification 37782 that consists of an improvement of the AMU power supply logic in order to keep the digital AMU audio functions in case of DC essential bus loss, as already provided with an analog AMU.

This modification is standard for production aircraft from MSN 3153.

Associated AIRBUS A320-23-1333 has been issued on May 9, 2007 and is currently at revision 2 dated February 18, 2008.

Note that due to the automatic reconfiguration mandated in the few next months, SB A320-33-1333 become nice to have in this failure scenario.

Safety Recommendation Status **Closed**

AAIB Assessment **Adequate**

RESPONSE HISTORY

N/A

Safety Recommendation 2008-081

Safety Recommendation 2008-081

It is recommended that the EASA require modification of Airbus A320-series aircraft to provide changeover of the electrical power feed to the AC Essential busbar in the event of de-energisation of the AC BUS 1 busbar.

Date Safety Recommendation made: 19 August 2009

LATEST RESPONSE

Response received: 16 June 2010

EASA has issued an Airworthiness Directive (AD) 2009-0235, effective on 12 November 2009, mandating the modification of the Electrical Power Distribution System, in accordance with Airbus Service Bulletin A320-24-1120.

The AD 2009-0235 is applicable to A318, A319, A320, and A321 aeroplanes, as requested by this Safety Recommendation.

Safety Recommendation Status Closed

AAIB Assessment Adequate

RESPONSE HISTORY

Response received: Date Unknown

After review of the potential issues and concerns resulting from the consequence of the various system losses as a result of the loss of power supply to alternating current (AC) BUS 1 and the in-service experience in respect of the necessary corrective actions EASA will mandate the installation of Airbus modification 37317 (SB A320-24-1120) by the issuance of an Airworthiness Directive.

AAIB Assessment – Partially Adequate Open

Safety Recommendation 2008-082

Safety Recommendation 2008-082

It is recommended that Airbus review the adequacy of flight deck push-button selectors and make changes as required to ensure that an immediate and unmistakable indication of the selected position is always provided to the flight crew.

Date Safety Recommendation made: 19 August 2009

LATEST RESPONSE

Response received: No response

Safety Recommendation Status Closed

AAIB Assessment N/A

RESPONSE HISTORY

N/A

Safety Recommendation 2008-083

Safety Recommendation 2008-083

It is recommended that the EASA and the FAA introduce certification requirements aimed at ensuring the flight deck control selectors are designed such that an immediate and unmistakable indication of the selected position is always provided to the flight crew. The indication should not rely solely on the illumination of a caption, as this may not be visible in some ambient conditions and may fail to function in some failure situations.

Date Safety Recommendation made: 24 August 2009

LATEST RESPONSE

Response received: 10 February 2010

EASA Certification Specifications for Large Aeroplanes (CS-25) was upgraded at amendment 3 to introduce a new chapter 25.1302 which contains requirements meeting the intent of this recommendation [refer also to Notice of Proposed Amendment (NPA) 15/2004 on The Agency Website].

In particular 25.1302(b) requires flight deck controls and information being presented in a clear and unambiguous form and enabling flight crew awareness of the effects on the aeroplane or systems resulting from crew actions.

The related Acceptable Means of Compliance (AMC) 25.1302 provides further details and recommendations on how to comply with 25.1302 requirements. Flight deck controls are addressed in chapter 5.3.

Thus the Agency believes that the current requirements satisfactorily address this issue.

Safety Recommendation Status **Closed**

AAIB Assessment **Adequate**

RESPONSE HISTORY

N/A

Safety Recommendation 2008-083

Safety Recommendation 2008-083

It is recommended that the EASA and the FAA introduce certification requirements aimed at ensuring the flight deck control selectors are designed such that an immediate and unmistakable indication of the selected position is always provided to the flight crew. The indication should not rely solely on the illumination of a caption, as this may not be visible in some ambient conditions and may fail to function in some failure situations.

Date Safety Recommendation made: 19 August 2009

LATEST RESPONSE

Response received: 17 May 2010

The Office of Accident Investigation and Prevention convened a Safety Recommendations Review Board to review the enclosed response to FAA Safety Recommendations 09.253 and 09.254. As a result, the Review Board has classified recommendations 09.253 and 09.254 as "Open-Acceptable Action," pending final resolution.

Safety Recommendation Status Closed

AAIB Assessment Adequate

RESPONSE HISTORY

Response received: 23 February 2010

The FAA concurs with Safety Recommendation 09.253 (AAIB 2008-083). This recommendation is addressed by the FAA and European Aviation Safety Agency (EASA) harmonized efforts to issue specific regulations regarding human factors requirements installed systems and equipment on the flight deck. This effort resulted in EASA's recently published regulation, CS 25.1302 issued with amendment 25-3 in late 2007, and the subsequent FAA draft 14 CFR 25.1302 and associated guidance provided in draft AC 25.1302, Installed Systems and Equipment for Use by the Flightcrew. These rules and associated guidance are focused on improving the human factors characteristics of flight deck installed systems and controls and specifically require controls to be shown to be clear, unambiguous, and enable flightcrew awareness (provide adequate feedback) as suggested in this recommendation. The FAA's rule, 14 CFR 25.1302, is currently planned to be released for public comment in November of 2010 with an anticipated final issuance of this new regulation in 2012.

We anticipate providing a follow-on response to FAA SR 09.253 by April of 2011.

AAIB Assessment – Adequate Closed

Safety Recommendation 2008-084

Safety Recommendation 2008-084

It is recommended that the EASA require modification of Airbus A320-series and other applicable public transport aircraft to ensure that all RTF communication systems are not reliant on a single busbar for their electrical power.

Date Safety Recommendation made: 19 August 2009

LATEST RESPONSE

Response received: 16 June 2010

EASA has issued the Airworthiness Directive (AD) 2009-0235, effective on 12 November 2009, requiring the modification of the Electrical Power Distribution System, in accordance with Airbus Service Bulletin A320-24-1120.

The implementation of the automatic changeover of the Alternating Current (AC) Essential Bus bar of the Electrical Power Distribution System in accordance with the above mentioned Airbus Service Bulletin, addresses the requirements of this Safety Recommendation

The AD 2009-0235 is applicable to A318, a319, A320, and A321 aeoplanes, as requested by this Safety Recommendation.

Safety Recommendation Status Closed

AAIB Assessment Adequate

RESPONSE HISTORY

N/A

Safety Recommendation 2008-085

Safety Recommendation 2008-085

It is recommended that the EASA and the FAA re-categorise the loss of all RTF communications for public transport aircraft as 'Hazardous'.

Date Safety Recommendation made: 19 August 2009

LATEST RESPONSE

Response received: 27 October 2009

In the case of the A319 G-EZAC incident, the failure effects are not limited to the loss of radio-communication but include also the loss of multiple aircraft systems: autopilot, flight director, autothrust, EGPWS, Transponder and TCAS, as a consequence of the unsuccessful reconfiguration of the electrical feed to the AC Essential busbar.

According to current CS-25 (Amdt 6) Book 2 - AMC 25-11 Note to S 4 a. (3) (viii), the non-restorable loss of all navigation and communication functions is classified catastrophic, but the failure condition "Loss of communication" alone is classified major.

EASA considers that this classification is still correct, taking into account existing large aeroplane designs and known service experience.

Notwithstanding the above statement, for the A320 aircraft family, it is recognised that the risk of incomplete or unsuccessful manual reconfiguration of the electrical network, in case of loss of AC BUS 1, which leads potentially to loss of multiple systems, needs to be addressed. AD action (Proposed Airworthiness Directive (PAD) Nr 09-086 "Electrical Power AC and DC ESS BUS Power Supply - Modification", issued the 29 June 2009) is taken to mandate a modification of the electrical network configuration management logic consisting in adding an automatic switching of the AC and DC ESS BUS power supply such that upon the loss of the AC BUS 1, the AC BUS 2 will automatically take over the power supply.

Safety Recommendation Status **Closed**

AAIB Assessment **Not Adequate**

RESPONSE HISTORY

N/A

Safety Recommendation 2008-085

Safety Recommendation 2008-085

It is recommended that the EASA and the FAA re-categorise the loss of all RTF communications for public transport aircraft as 'Hazardous'.

Date Safety Recommendation made: 24 August 2009

LATEST RESPONSE

Response received: 17 May 2010

The Office of Accident Investigation and Prevention convened a Safety Recommendations Review Board to review the enclosed response to FAA Safety Recommendations 09.253 and 09.254. As a result, the Review Board has classified recommendations 09.253 and 09.254 as "Open-Acceptable Action," pending final resolution.

Safety Recommendation Status Closed

AAIB Assessment Not Adequate

RESPONSE HISTORY

Response received:

Part 25 requirements that address critically and reliability of two way radio communications are: 14 CFR 25.1307(d), which requires that each aircraft have two autonomous radios that cannot be disabled by a single malfunction, 14 CFR 25.1431(b), which states that radio and electronic equipment must be supplied with power under the requirements of 25.1355© requiring an alternate power source be available for the radio systems. Although there is not precedence for prescribing hazard categorization of failure types in 14 CFR 1309 there are other requirements that cover critically and reliability of radio communications.

The FAA does not prescribe hazard categorization of specific failure types, but instead validates the manufacturer's justification of the failure ensuring it meets the definition of the hazard category proposed. This is consistent with 14 CFR 25.1309 and published in associated advisory material. Within 14 CFR 25/1309, there is no venue to prescribe hazard categories for specific failure conditions existing or proposed. No action is possible to amend 14 CFR 25.1309 with regard to Safety Recommendation 09.254.

We will continue our review of advisory materials that may direct radio hazard categories, research communications out procedures for affected countries of operation. We intend to harmonize our final response with EASA's response by August of 2010.

AAIB Assessment – Not Adequate Closed

Safety Recommendation 2008-086

Safety Recommendation 2008-086

It is recommended that the EASA require Airbus to modify the Airbus A320-series Master Minimum Equipment List (MMEL) to require an operator, prior to dispatch, to attempt to identify the fault that rendered an Integrated Drive Generator (IDG) inoperative and to prohibit dispatch with an IDG inoperative for those faults whose recurrence could result in significant disruption of aircraft systems.

Date Safety Recommendation made: 19 August 2009

LATEST RESPONSE

Response received: 29 July 2010

Following the situation experienced by this aeroplane, the consequences on the aircraft systems and the crew workload were reviewed and deemed severe enough to recommend checking the manual in relation to the alternating current essential feed (AC ESS FEED) alternative supply function in case of dispatch with an Integrated Drive Generator (IDG) inoperative.

In addition to clearing the latent failure of the AC ESS FEED alternate supply function, which might be pre-existing before the dispatch, it was considered that performing this check will also have the effect of re-familiarising flight crews with this function, should they need it in flight.

In conclusion, the dispatch with an IDG inoperative (MMEL Item AC Main Generation #1) was reviewed and revised. The corresponding MMEL Temporary Revisions references are:

TR 01-24/01M - Issue 01

TR 01-24/02M - Issue 01

TR 01-24/03M - Issue 01

Safety Recommendation Status Closed

AAIB Assessment Adequate

RESPONSE HISTORY

N/A

Safety Recommendation 2008-087

Safety Recommendation 2008-087

It is recommended that the EASA require Airbus to revise the A320-series Master Minimum Equipment List to include a requirement to check for correct operation of the AC ESS FEED changeover function prior to dispatch with a main generator inoperative.

Date Safety Recommendation made: 19 August 2009

LATEST RESPONSE

Response received: 29 July 2010

As a result of the Safety Recommendation 2008-086, it is agreed with Airbus to update the Master Minimum Equipment List (MMEL), so as to include an operational check of the manual AC ESS FEED alternate supply function when dispatching under MMEL item Alternating Current (AC) Main Generation #1.

Dispatching under MMEL item AC Main Generation #2 is disregarded since the next worst-case failures in flight do not specifically impair the AC ESS and DC ESS bus bars power supply, compared to the aircraft full-up configuration.

Based on further aircraft design considerations, it is agreed with Airbus to make this operational check only applicable to aircraft not being fitted:

- with Generator Control Unit (GCU) Standard 5.2 or
- with automatic AC ESS FEED alternate supply function or
- with power supply segregated Audio Management Units (AMU)

This is based on the following rationale:

-The situation experienced by A319 G-EZAC was resulting from a logic of the GCU Standard 5.1, when deferring the aircraft with one AC Main Generation inoperative. Robustness of the GCU internal logic is improved by the implementation of the Standard 5.2

-The automatic AC ESS FEED alternate supply function, when installed, is considered as a significant mitigation factor upon loss of AC BUS #1.

-Although the functional effects on the aircraft were not limited to total loss of radio-communications, this failure condition is considered as a factor to the severity of the overall situation experienced by A319 G-EZAC.

The MMEL was revised accordingly. The associated MMEL Temporary Revisions references are:

TR 01-24/01M - Issue 01

TR 01-24/02M - Issue 01

TR 01-24/03M - Issue 01

Safety Recommendation Status	Closed
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AAIB Assessment	Adequate
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RESPONSE HISTORY

N/A

Safety Recommendation 2008-088

Safety Recommendation 2008-088

It is recommended that Hamilton Sundstrand modifies its repair and overhaul procedures as necessary, to ensure that a unit with an excessive service rejection rate or a recurrent fault is not repeatedly released back to service.

Date Safety Recommendation made: 24 August 2009

LATEST RESPONSE

Response received: 16 March 2010

Hamilton Sundstrand has made changes in our processes at our Dijon, France, Phoenix Arizona and Miramar, Florida repair facilities which we believe address the concerns presented in the AAIB Safety recommendation 2008-088. These changes include a multiple Return Unit Process and a Quality Clinic Investigation Procedure.

The Hamilton Sundstrand Repair facilities utilize an electronic data processing system called JDE One world that is used to maintain historical records for repairs that have been processed by Hamilton Sundstrand repair facilities. This system includes a database which is shared with all Hamilton Sundstrand repair facilities.

Using this database and in accordance with aerospace Industry standard practice, Hamilton Sundstrand implemented a multiple Return Unit (MRU) process that identifies units that have been returned to any HS repair facilities three times in a 12 month period. The identification is done automatically through the JDE One World system. When a unit is received at the Hamilton Sundstrand repair facility. The repair administrator will open a repair using JDE Open World. The system will automatically search the Hamilton Sundstrand records to see if the unit had been returned previously to any Hamilton Sundstrand repair facilities worldwide and if the above criterion is met a multiple return unit (MRU) text is added to the sales order as follows; 'THIS PART WAS SERVICED AT A HS REPAIR STATION AT LEAST 3 TIMES IN THE PREVIOUS 12 MONTHS AND IS CONSIDERED A MULTIPLE RETURN UNIT'.

This MRU alert is used to notify the Repair Engineering and Repair Administration of the multiple return statuses. Repair Engineering will review the history of the suspect unit, and contact other Hamilton Sundstrand support groups as necessary regarding the unit's condition and the need for special processing. Any resulting MRU investigation will be coordinated by our Customer Service Engineering personnel with Design Engineering involvement to address all resulting design changes.

This Hamilton Sundstrand MRU procedure was implemented into the master Hamilton Sundstrand JDE One World order entry system in January of 2009. Hamilton Sundstrand Dijon France, Phoenix Arizona and Miramar Florida repair facilities implemented this procedure in March 2009.

The Hamilton Sundstrand Dijon France repair facility implemented a similar procedure earlier; it is referred to as the quality clinic Investigation Procedure, which was instituted in the 3rd quarter of 2007.

With these improved procedures in place, Hamilton Sundstrand is confident that the concerns presented by the AAIB Safety recommendation 2008-088 have been effectively addressed.

Safety Recommendation Status

Closed

AAIB Assessment

Adequate

RESPONSE HISTORY

N/A

Safety Recommendation 2008-089

Safety Recommendation 2008-089

It is recommended that the EASA and the FAA review their measures for monitoring and approving component repair organisations to ensure they have systems in place to identify units with an excessive service rejection rate of recurrent faults.

Date Safety Recommendation made: 19 August 2009

LATEST RESPONSE

Response received: 26 April 2021

The European Union Aviation Safety Agency (EASA) has included the topic of "Recurrent Defects" in its Safety Promotion programme. In December 2020, an article was published on the EASA Safety Promotion website which details possible options for managing recurrent faults effectively and for reducing the associated risks within a Continuing Airworthiness Maintenance Organisation (CAMO).

The main points outlined are as follows:

- Correctly report and record defects in the technical log book.
- Monitor, analyse and investigate recurrent faults through the defect control system.
- Establish clear policies and coordination between the CAMO, the maintenance organisation and all personnel involved in any maintenance activity.
- Follow the relevant maintenance and troubleshooting procedures provided by the Type Certificate Holder.

The full article is published at the following link:

<https://www.easa.europa.eu/community/topics/recurrent-defects>

Safety Recommendation Status Closed

AAIB Assessment Adequate

Action Status Planned Action Completed

RESPONSE HISTORY

Response received: 29 April 2016

On 11 December 2015, the EASA Management Board reviewed Rulemaking Programme 2016-2020, replacing the due rulemaking task covering safety recommendation UNKG-2008-089 by the issuance of a Safety Information Bulletin. The SIB is scheduled to be issued before end of 2016.

AAIB Assessment – Partially Adequate Open

Response received: 14 June 2010

A new Rulemaking Task has been added to the Rulemaking Programme. The objective of this task will be to upgrade the existing regulation EC 2042/2003 to require maintenance organisations putting in place procedures for identification and control of components with recurrent faults.

AAIB Assessment – Adequate Closed

Safety Recommendation 2008-089

Safety Recommendation 2008-089

It is recommended that the EASA and the FAA review their measures for monitoring and approving component repair organisations to ensure they have systems in place to identify units with an excessive service rejection rate of recurrent faults.

Date Safety Recommendation made: 19 August 2009

LATEST RESPONSE

Response received: 02 November 2009

We cannot speak for EASA; however, we do want to state there is a significant difference between EASA maintenance requirements (part M and part 145) and the United States Code of Federal Regulations (CFR) maintenance requirements. Under EASA regulations, an operator must maintain an aircraft used in commercial service in accordance with EASA part 145. Under Title 14 CFR, the certificate holder is responsible for operational control over its equipment. Title 14 CFR requires the operator to be responsible for compliance with the appropriate maintenance regulations and the effectiveness of its FAA-approved maintenance program.

An example is, 14 CFR section 121.373 "Continuing analysis and surveillance, (a) Each certificate holder shall establish and maintain a system for the continuing analysis and surveillance of the performance and effectiveness of its inspection program and the program covering other maintenance, preventative maintenance and alterations and for the correction of any deficiency in those programs, regardless of whether those programs are carried out by the certificate holder or by another person." This regulation clearly puts the responsibility to identify excessive service rejection rates or recurrent faults on the certificate holder.

In addition, the basis of CFR maintenance programs is operational control. Many of the CFRs require the operator to control and track maintenance of its equipment. The CFRs require the operator to track equipment faults and reliability and to take corrective action as necessary.

The recommendation to require an approved maintenance organization to have procedures to track excessive service rejection rates or recurrent faults may diminish operator responsibility. FAA Safety Recommendation 09.255 does not seem feasible at this time because a maintenance organization that is not part of an air carrier is not required to have operational control over the components. That responsibility is the air carrier/operator.

We have determined current regulations already in place satisfy the concerns of FAA Safety Recommendation 09.255. Therefore, we consider FAA Safety Recommendation 09.255 closed and plan no further action.

Safety Recommendation Status

Closed

AAIB Assessment

Partially Adequate

RESPONSE HISTORY

N/A

Safety Recommendation 2008-090

Safety Recommendation 2008-090

It is recommended that the EASA require improvements to the fault monitoring logic of the type of Generator Control Unit (GCU) used on A320-series aircraft with the aim of preventing the monitoring system from incorrectly interpreting a fault within the GCU as an external system fault.

Date Safety Recommendation made: 19 August 2009

LATEST RESPONSE

Response received: 14 April 2013

The specific case of the fault monitoring logic of the Generator control Unit (GCU) used on A320-series aircraft has led to a review with the TC holder.

As a result, a new GCU standard 5.2 (Mod 39670) has been developed and certified on October 13, 2008 to improve the robustness of the differential protection trip related to the "GLC welded" failure mode. This is the standard in production on A320 family and associated SB 24-1124 was issued on December 2, 2008.

It has been determined that there were no reason to mandate this improvement because the impact is Minor (and Major during T/O and Landing).

As a consequence it is deemed that no unsafe condition exists and no further corrective action that those already undertaken by Type Certificate Holder (TCH) are necessary.

Safety Recommendation Status Open

AAIB Assessment Partially Adequate

RESPONSE HISTORY

N/A

Safety Recommendation 2008-091

Safety Recommendation 2008-091

It is recommended that Airbus re-evaluate its systems for achieving adequate design quality for aircraft systems to include the possibility that flight crews may not always perform the required corrective actions and to ensure that the initial failure probability and/or hazard assessments are revised in the light of in-service experience.

Date Safety Recommendation made: 19 August 2009

LATEST RESPONSE

Response received: No response

Safety Recommendation Status **Withdrawn**

AAIB Assessment **N/A**

RESPONSE HISTORY

N/A

Safety Recommendation 2009-063

Safety Recommendation 2009-063

It is recommended that the EASA extend the guidance material provided for the EASA 25-1309 certification standard for failure effects analyses, to include consideration of the effects of delayed or non-achieved crew actions, in addition to crew errors.

Date Safety Recommendation made: 24 August 2009

LATEST RESPONSE

Response received: 29 March 2010

EASA certification Specifications for Large Aeroplanes CS-25 was upgraded at amendment 3 to introduce a new chapter 25.1302 which contains requirements meeting the intent of this recommendation (refer also to NPA 15/2004 on the Agency website).

The principle is to require flight deck equipments designs and integration that preclude flight crew errors or non/delayed actions, and if errors or non/delayed actions occur, clear information shall be available to the crew to take action. In particular:

- CS 25.1302(b)(1) require that controls and information be provided in a clear and unambiguous form.
- CS 25.1302(b)(2) requires that controls and information be accessible and usable by the flight crew in a manner consistent with the urgency, frequency, and duration of their tasks.
- CS 25.1302(b)(3) requires that equipment presents information advising the flight crew of the effects of their actions on the aeroplane or systems, if that awareness is required for safe operation. The intent is that the flight crew be aware of system or non-achieved crew action, the system indications shall reflect and make the crew aware of the situation.
- CS-25.1302© requires that installed equipment be designed so its behaviour that is operationally relevant to flight crew' tasks is: predictable unambiguous; designed to enable the flight crew to intervene in a manner appropriate to the task.

As even well-trained crew may make errors, CS 25.1302(d) requires that equipment be designed to enable the flight crew to intervene in a manner appropriate to the task.

The related Acceptable Means of Compliance AMC 25.1302 provides further details and recommendations on how to comply with 25.1302 requirements.

Safety Recommendation Status Closed

AAIB Assessment Adequate

RESPONSE HISTORY

N/A