

System Reset: Use with Caution



A system reset is not always the quick fix that it may seem. Performing an inappropriate manual system reset in flight can seriously impair the safety of the flight. Multiple system resets on the ground without performing the necessary troubleshooting actions can also have serious consequences.

This article addresses when system resets are applicable and how to perform them correctly.

This article is also available on safetyfirst.airbus.com and on the Safety first app for iOS and Android devices.



CASE STUDY

Event Description

AUTO BRK FAULT at engine start

At engine start of an A320, the **BRAKES AUTO BRK FAULT** ECAM alert triggered. The flight crew set the A/SKID & N/W STRG switch to OFF and then back to ON (fig.1). This action cleared the alert.

First A/SKID N/WS FAULT during the takeoff roll

The **BRAKES A/SKID N/WS FAULT** ECAM alert triggered during the takeoff roll prior to the inhibition phase. After the aircraft became airborne, the flight crew cleared the alert by setting the A/SKID & N/W STRG switch to OFF then ON.

Second A/SKID N/WS FAULT during approach

The **BRAKES A/SKID N/WS FAULT** ECAM alert triggered again on approach. The flight crew set the A/SKID & N/W STRG switch to OFF and ON for a third time and this action cleared the alert.

Main landing gear tires burst at landing

The flight crew noticed unusual braking behavior immediately after touchdown. They applied full reverse thrust and manual braking. The aircraft came to a stop, but the flight crew was unable to begin taxiing. The four main landing gear tires had burst during landing.

Event Analysis

Similar faults were observed during the previous flights

There were seven occurrences of **BRAKES AUTO BRK FAULT** and two occurrences of **BRAKES A/SKID N/WS FAULT** recorded on this aircraft over the two months prior to the event. System resets and testing the BSCU were the only maintenance actions carried out each time.

Unauthorized resets of the braking and steering functions hid the deteriorating condition of the braking system

There is no reset procedure associated with **BRAKES AUTO BRK FAULT** and **BRAKES A/SKID N/WS FAULT** ECAM alerts in the A320 QRH. The use of the A/SKID & N/W STRG switch to reset the braking and steering functions in flight is mentioned in the System Reset table of the QRH, but it is only authorized with the **BRAKES SYS 1(2) FAULT** and **BRAKES BSCU CH 1(2) FAULT** ECAM alerts. The unauthorized resets that the flight crew performed during the flight hid the deteriorating condition of the braking system.

Dual tachometer failure

A dual tachometer failure was at the origin of the delay in the braking system activation. The unauthorized in-flight reset prevented the BSCU from detecting the failure of the tachometers and this led to the BSCU considering that 0 kt was the actual wheel speed. After 15 seconds, the braking function was recovered with a default deceleration speed. At the same time, the BSCU was unable to compute the anti-skid order and sent full hydraulic pressure to the brakes and caused the four tires to burst. ■



(fig.1) A/SKID & N/W STRG switch

WHAT IS A SYSTEM RESET?

A system reset is the action of switching off a system and then switching it back on again with the objective to retrieve normal system behavior or recover a previously lost function. It is different from re-engaging a tripped Circuit Breaker (C/B).

Tripped Circuit Breaker

A C/B will trip when there is an overload of electrical current detected in the circuit. This is to protect from overheating or a short-circuit condition in the wiring that could lead to further damage or fire. Management of tripped C/Bs is not covered by this article. In this article, the term “reset” describes the action of switching off a system and switching it back on again. This action can also be called a “cycle”.

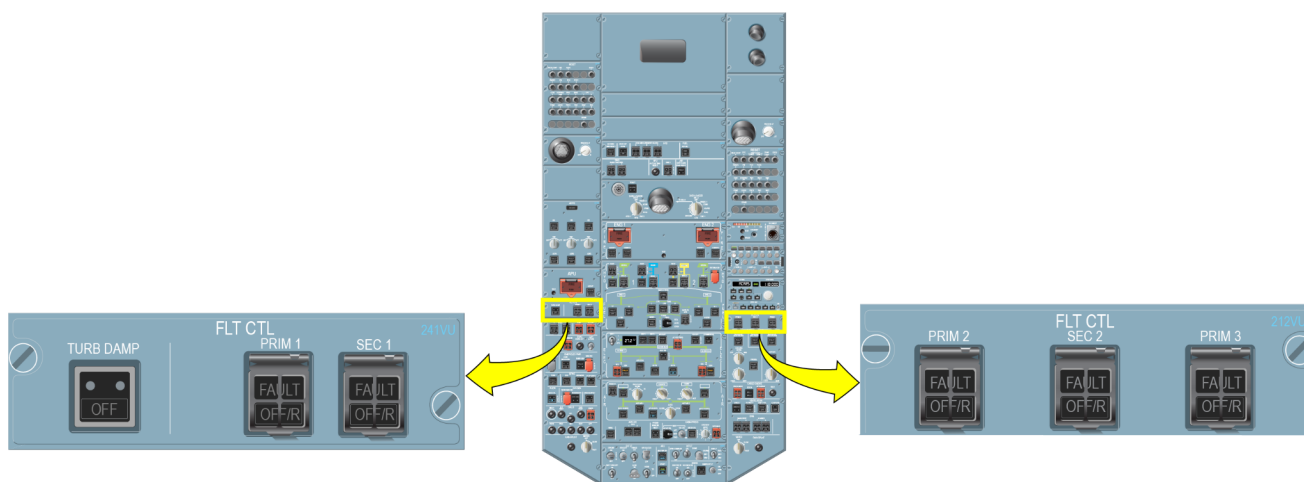
Automatic Reset vs. Manual Reset

Certain avionic systems, such as the Flight Management System (FMS), have an automatic reset function. The reset action is completely managed by the system that has an automatic failure detection mode. Maintenance or flight crews perform a manual reset by using the cockpit control for the system, a circuit breaker, or a dedicated reset button (also called a reset switch). This article focuses only on these types of manual resets.

Manual Reset Using System Controls

For specific systems, such as the flight control system, the maintenance or flight crews can perform a system reset from the cockpit using pushbutton-switches available on the overhead panel (**fig.2**).

(fig.2) Example of pushbutton-switches on the overhead panel of an A330 aircraft



Manual Reset Using a Circuit Breaker

Pulling a system C/B and then pushing it back in will trigger a system reset because this will isolate and then restore the power supply to all parts of the system. It will also cause the software of the system to reload. This is considered as a “hard system reset”.

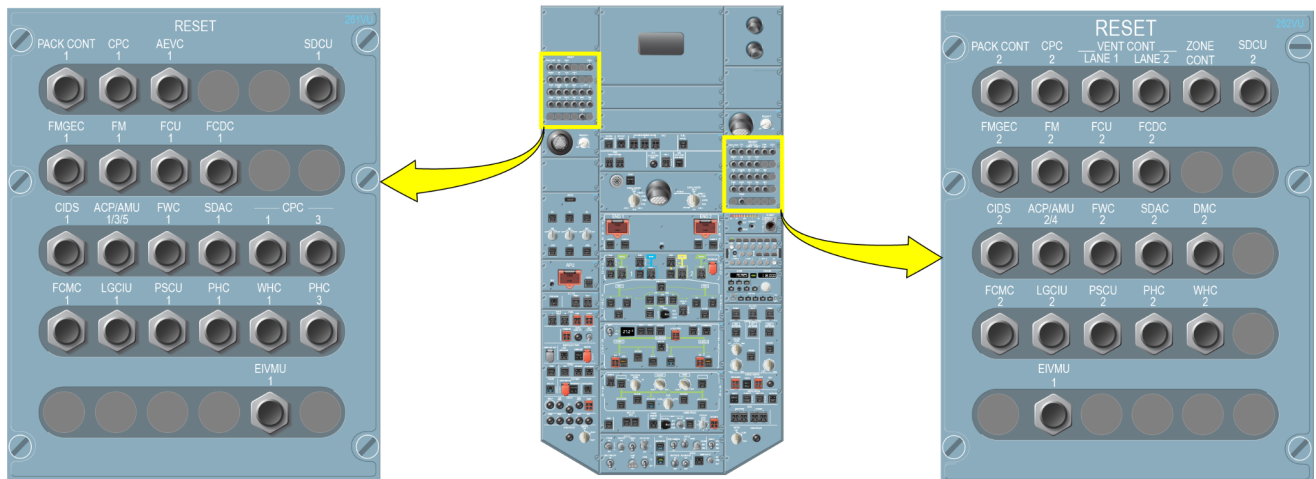
There are two types of C/Bs: traditional C/Bs and electronic C/Bs. The traditional C/B is manually opened and closed. The electronic C/B, also called Solid State Power Controller (SSPC), is controlled by a remote interface (on A220/A380/A350). Various system C/Bs are located in the cockpit of Airbus

A220/A300/A310/A320 aircraft, the avionics bay, the cabin, and the cargo compartments. There are no C/Bs in the cockpit of Airbus A330/A340/A350/A380 aircraft. They are replaced by system reset buttons on the overhead panel.

Manual Reset Using a Reset Button

Pulling a system reset button (**fig.3**) then pushing it back in the cockpit will only reset the system software part (only available on Airbus A330/A340/A350/A380 aircraft). This is known as a “soft reset” because the system will remain powered.

(fig.3) Reset buttons available on the top part of the overhead panel of an A330 aircraft



Inappropriate system resets can have serious consequences

Past events have highlighted how some system resets can have irreversible consequences. One example is where a system cannot be recovered after an inappropriate system reset in flight. Another example is where a reset of flight control computers is unduly performed. Depending on the system malfunction encountered, this can cause unexpected movements of the flight control surfaces, which may lead to serious consequences if performed in flight.

Avionics systems are interconnected systems, therefore, a system reset of one system can have significant consequences for the other systems that rely on its data. Inappropriate system resets can have unexpected side effects and hide deteriorating conditions of the system. In combination with a failure of another system, the safety of the flight can be impaired. Therefore, it is important that maintenance personnel and flight crews only perform system resets in accordance with the guidance in the relevant procedures, as for the cases described in this article. ■

A220 reset philosophy

For A220 aircraft, the flight crew can perform system resets only if specifically requested in an EICAS*/FCOM/QRH procedure. There is no system reset table published for the A220, contrary to all other Airbus aircraft, except for the A300B2/B4.

Maintenance resets must only be performed when requested by a specific task in the A220 Fault Isolation Manual or in the Aircraft Maintenance Publication (AMP).

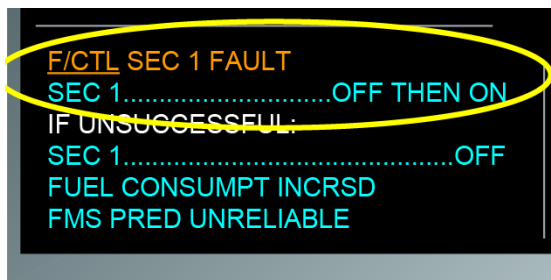
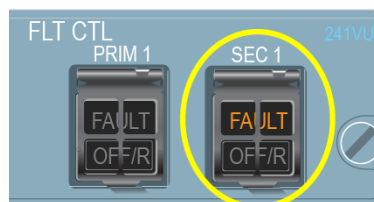
*EICAS: Engine-Indication and Crew-Alerting System on A220 is the equivalent of the ECAM on other Airbus aircraft.

SYSTEM RESETS BY THE FLIGHT CREW

The flight crew can perform system resets only in the three cases listed below.

CASE 1: A Dedicated Step in the ECAM/OEB/FCOM/QRH Procedure

A system reset can be specifically requested in an ECAM/OEB/FCOM/QRH procedure (**fig.4**).



(**fig.4**) Example of a SEC 1 FAULT ECAM alert on A330 aircraft

CASE 2: As an Option After ECAM Procedure (except A300B2/B4)

ECAM procedures do not necessarily request a system reset. In this case, as per the "Airbus Operational Philosophy" section of the FCTM, the PF should call out "STOP ECAM" after they perform the ECAM actions.

Before the review of the status of the aircraft on the STATUS page, if the PF considers that it is necessary to perform a system reset to recover the operation of the affected system, it is the responsibility of the flight crew to first check if such reset is authorized in the System Reset table of the FCOM/QRH.



KEYPOINT

If there is no reset procedure available in the System Reset table of the FCOM/QRH associated with the malfunction or ECAM alert encountered, the flight crew must not attempt a reset.

For A320 family aircraft, **on the ground only**, the flight crew can still perform a reset that is not listed in the A320 System Reset table as described in Case 3 below.

The System Reset table lists the specific conditions necessary for the reset procedure

The reset procedures are the result of in-depth analysis to define the authorized resets and their associated conditions, such as the maximum number of resets possible, if they are authorized on the ground only, or also in flight. These conditions must be respected.



Resets that are only authorized on the ground can have dramatic consequences if performed in flight.

System resets can trigger functional tests that may lead to movement of the flight control surfaces, which is why they must not be performed in flight. This can also cause reversion of the flight control laws with associated loss of flight envelope protection.

Read and do the procedure

A reset procedure must be performed in “read and do” mode. The flight crew must not apply the system reset procedure from memory and they must always follow the relevant procedure (ECAM/OEB/QRH/FCOM), or refer to the System Reset table in the QRH/FCOM.

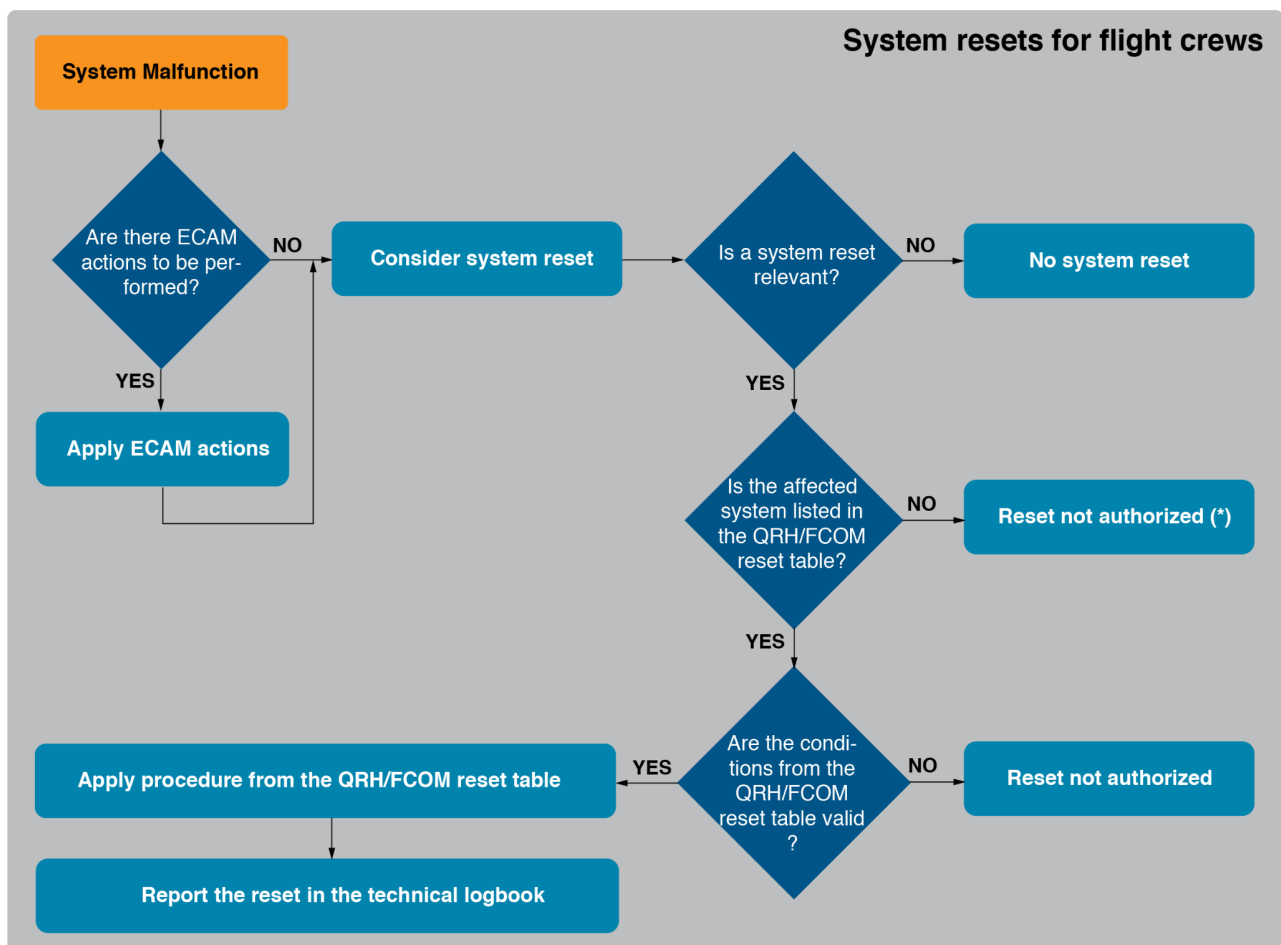
The need for crosscheck

Performing a system reset is an action that can have irreversible consequences. A crosscheck action is necessary before resetting a system when using a guarded cockpit control, a C/B, or a reset button.

Report any reset to maintenance

Any manual system reset that the flight crew does on the ground or in flight must be reported to maintenance and recorded in the aircraft logbook regardless of it being successful (i.e. system recovered) or not. The number of attempted resets should also be specified to help maintenance monitor the resets as an indication of the system condition.

(fig.5) Flow diagram for flight crew system resets



(*) For A320 family aircraft, some resets may be authorized on ground (See Case 3 below)

CASE 3: System Resets for Electrical Transient Faults for A320 Family Aircraft on the Ground Only

Electrical transients may lead to intermittent system failures

A320 family aircraft systems can be affected by electrical transients during power-up, APU, or engine start, or any electrical transfer.

To manage the side-effects of these transients, depending on the affected system, it is possible to perform system resets from the A320 QRH System Reset table and also system resets that are not specifically listed in the System Reset table.

The affected system is listed in the QRH System Reset table

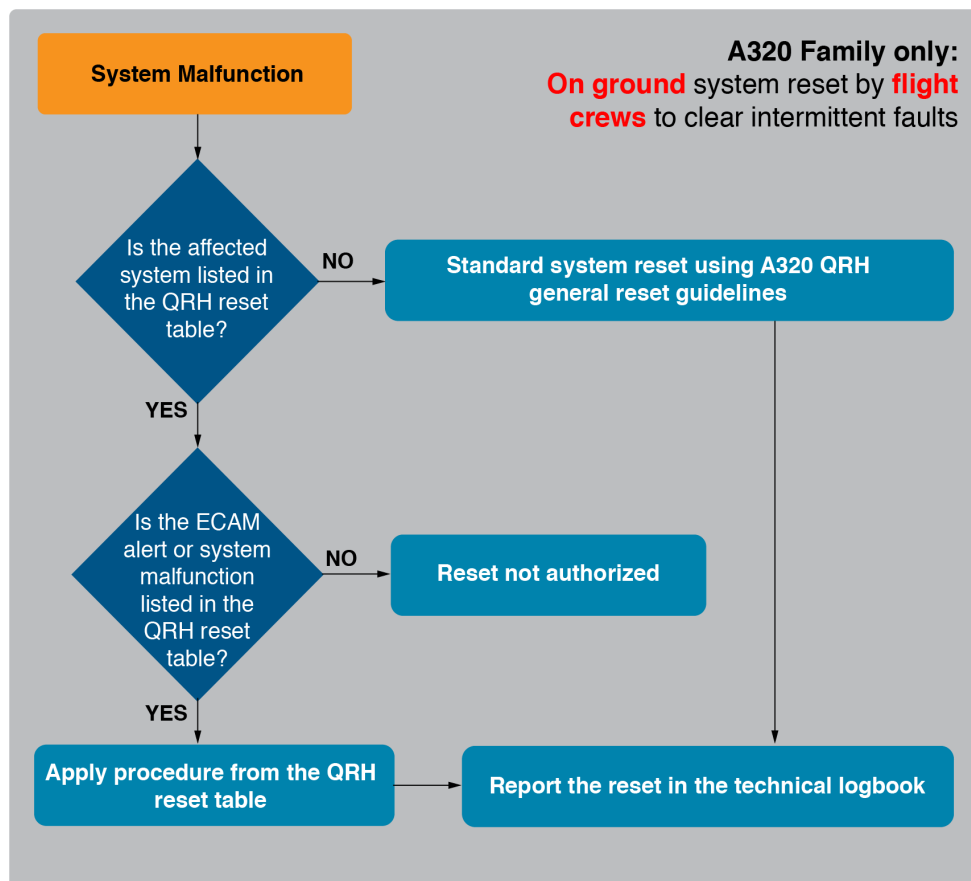
If the affected system is listed in the QRH System Reset table, the associated reset procedure and conditions must be applied, but only for the corresponding ECAM alerts or system malfunctions listed in the reset table. For other ECAM alerts or malfunctions of the affected system not specifically listed in the System Reset table, a system reset is not authorized.

The affected system is not listed in the QRH System Reset table

If the affected system is not listed in the QRH System Reset table, the system can be reset on the ground only by applying the general guidelines provided in the General part of the System Reset section of the A320 QRH.

Crosscheck and report

As for any reset, a crosscheck must be done when using a guarded cockpit control, a C/B, or a reset button and the reset must be reported in the aircraft technical logbook. ■



(fig.6) Flow diagram for flight crew system resets on A320 family aircraft on the ground

SYSTEM RESETS BY MAINTENANCE PERSONNEL

Caution for System Resets on Ground

System resets can cause system components to move or operate, which is a risk of serious or fatal injury to people in close proximity to the aircraft. This can also cause damage to the aircraft if in contact with ground equipment. Specific precautions must be taken when performing tasks on or near flight controls, flight control surfaces, around landing gears and landing gear doors, or any other moving parts or components.

Maintenance personnel can perform system resets only in the two cases listed below.

CASE 1: Resets Requested in a Maintenance Procedure

Resets may be required when applying a troubleshooting procedure from the Troubleshooting Manual (TSM) for A300/A310/A320/A330/A340/A380 or the Aircraft Fault Isolation document (AFI) for A350.

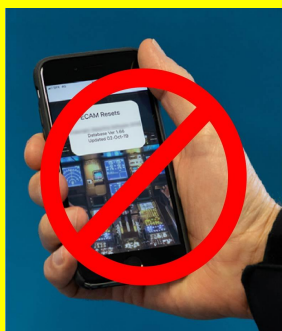


KEYPOINT

Performing a system reset on the ground must always be part of a troubleshooting procedure.

Performing unauthorized “quick fix” resets on the ground to dispatch an aircraft can affect the conditions of the next flights. The ECAM alert may be cleared for dispatch, but the underlying issue is not fixed and this can hide a deteriorating condition in the system.

Use of third party smartphone or tablet applications is not authorized by Airbus



There is a growing number of unauthorized applications that present a list of system resets for Airbus aircraft. These applications are not validated by Airbus. The specific conditions for each system reset are not described by these applications and the information can be inaccurate and out of date. Therefore, **these applications must not be used**, because they can represent a safety risk. An OIT about this topic is available on the AirbusWorld portal: **OIT 999.0042/19 “Un-approved maintenance instructions available on the internet or as applications”**.

CASE 2: Specific Condition for A320 Aircraft

Electrical Transients

As already described in Case 3 for flight crew resets, A320 family aircraft operations can be affected by electrical transients at power-on. That is why it is allowable to perform resets on A320 family aircraft that are not part of a dedicated TSM task.

TSM System Reset Table

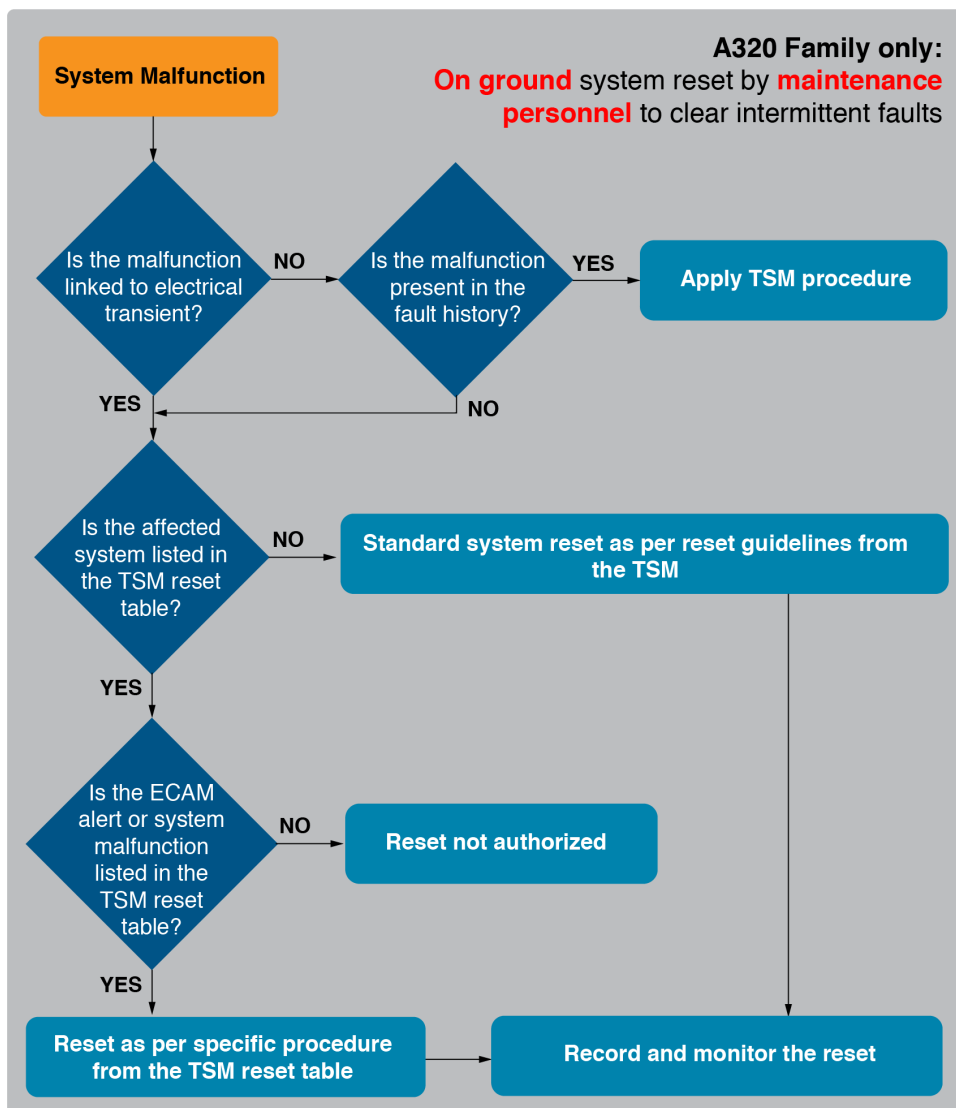
The A320 TSM contains a list of authorized resets with their associated conditions in the "System Reset Guidelines" task of the ATA 24 chapter. These authorized resets are the same as the authorized resets on the ground in the System Reset table of the A320 QRH.

Fault due to Electrical Transient or Without Previous Record

When it is obvious that a fault is due to electrical transients, or is not present in the fault history, the affected system can be reset under certain conditions. If the affected system is listed in the System Reset table of the ATA 24 TSM task, a system reset is authorized, but only for the ECAM alerts or system malfunctions specifically listed in the table. For other ECAM alerts or system malfunctions not listed in the System Reset table, a reset is not authorized, despite the system itself being listed in the reset table. If the affected system is not listed in the System Reset table, a reset is authorized with no specific restrictions.

Fault not Obviously due to Electrical Transient With Previous Record

If the fault is not obviously due to electrical transients and is present in the fault history (repeated intermittent failure), then the application of the appropriate TSM procedure(s) is required.



(fig.7) Flow diagram for maintenance personnel system resets on A320 family aircraft on the ground

Monitoring System Resets

Always Record System Resets

An efficient method to record and monitor system resets must be implemented. Any attempted reset must be recorded whether a maintenance reset requested during the fault confirmation part of a TSM/AFI task is successful (intermittent failure, no further action required) or not successful (permanent failure, fault isolation actions to perform).

A Management System for System Resets

Repetitive failures can occur despite maintenance actions, but they may not necessarily reappear over consecutive flights. Operators shall have a dedicated management system for repetitive failures to comply with continued airworthiness regulations.

Repetitive Failure Management

Repetitive resets of the same system could indicate a permanent failure. Appropriate troubleshooting actions must be initiated to mitigate the risk of latent failures on the ground with multiple resets, which could reappear later in flight.

It is important to properly track repetitive occurrences of system malfunctions over several flights. This is usually an indication that the fault condition still exists and deeper troubleshooting is required. ■



Contributors:**Serge BLIND**

Engineering Safety
Aircraft Safety
Enhancement

Jean-François**BOURCHANIN**

Flight Control System
Technical Advisor
Engineering Support

Olivier FERRAN

Senior Flight Operations
Engineer
Flight Operations Support
and Training Standards

Franck GAY

Maintenance Instructor
Technical Training
Development

Cyril MONTROYA

Maintenance Safety
Enhancement Manager
Customer Support

Capt. Vincent SIBELLE

Training and Flight
Operations Pilot Instructor
Flight Operations Support
and Training Standards

With thanks to

**Denis CADOUX and
Ian GOODWIN** from

Product Safety,

Fabien ARNE and

Laurent COUTURET from

Braking and Steering

System Engineering

Support, **Marc LE-LOUER**

from A300/A310 Flight

Operations Support and

Capt. Xavier LESCEU from

Airbus Canada.

Unauthorized resets of an aircraft system can hide a deteriorating condition of the system. What may seem to be a "quick-fix" on the ground to dispatch the aircraft can lead to a system fault reappearing in flight that may even affect the safety of the flight.

If not specifically requested in an ECAM/OEB/FCOM/QRH procedure, the flight crew can only consider attempting a reset to recover the operation of an affected system if it is listed in the System Reset table of the FCOM/QRH. If there is no reset procedure available in the System Reset table of the FCOM/QRH, which is associated with the malfunction or ECAM alert encountered, then the flight crew must NOT attempt to reset the system. Any system reset performed by the flight crew needs to be reported to maintenance personnel and must be recorded in the aircraft technical logbook, including the number of attempts and outcomes.

For A320 aircraft only, due to possible electrical transients, the flight crew can perform on ground resets that are not listed in the reset table.

Maintenance system resets are only performed in accordance with specific TSM/AFI tasks. Troubleshooting can start with resets but should not end there. The appropriate troubleshooting actions or at least recording actions should always follow.

For A320 aircraft only, the same on-ground resets from the System Reset table of the QRH are available in the A320 TSM and can be used to manage intermittent faults and ease the aircraft dispatch. In this case, it is possible to perform system resets that are not specifically listed in the TSM.

Manual system resets performed by flight crew or maintenance personnel are not a way to fix repetitive faults. Multiple and unreported resets can hide degraded system conditions. The fault could reappear later and have significant consequences during a flight. An efficient system for reporting and managing system resets is crucial for monitoring the health of all aircraft systems, which is key to maintaining safe aircraft operations.

Safety first, 2021. Safety first is published by Airbus S.A.S. 1, rond point Maurice Bellonte - 31707 Blagnac Cedex/France.

Editor: Yannick Malinge, Chief Product Safety Officer.

Editorial team: Guillaume Estragnat, Vanessa Sadi, Gwyneth Duggan, Tim Roach.

20192534. Reference: X00D16031905.

Photos by Airbus.

© Airbus S.A.S. 2021 – All rights reserved. Proprietary documents.

By taking delivery of this Brochure (hereafter "Brochure"), you accept on behalf of your company to comply with the following guidelines:

- No other intellectual property rights are granted by the delivery of this Brochure than the right to read it, for the sole purpose of information.
- This Brochure and its content shall not be modified and its illustrations and photos shall not be reproduced without prior written consent of Airbus.
- This Brochure and the materials it contains shall not, in whole or in part, be sold, rented, or licensed to any third party subject to payment.

This Brochure contains sensitive information that is correct at the time of going to press.

This information involves a number of factors that could change over time, effecting the true public representation. Airbus assumes no obligation to update any information contained in this document or with respect to the information described herein.

Airbus S.A.S. shall assume no liability for any damage in connection with the use of this Brochure and of the materials it contains, even if Airbus S.A.S. has been advised of the likelihood of such damage.

Safety first

The Airbus Safety magazine

The Airbus magazine contributing to the enhancement of the safety of aircraft operations by increasing knowledge and communication on safety related topics.

Safety first is published by the Product Safety department. It is a source of specialist safety information for the use of airlines who fly and maintain Airbus aircraft. It is also distributed to other selected organizations and is available on digital devices.

Material for publication is obtained from multiple sources and includes selected information from the Airbus Flight Safety Confidential Reporting System, incident and accident investigation reports, system tests and flight tests. Material is also obtained from sources within the airline industry, studies and reports from government agencies and other aviation sources.

All articles in Safety first are presented for information only and are not intended to replace ICAO guidelines, standards or recommended practices, operator-mandated requirements or technical orders. The contents do not supersede any requirements mandated by the State of Registry of the Operator's aircraft or supersede or amend any Airbus type-specific AFM, AMM, FCOM, MMEL documentation or any other approved documentation.

Articles may be reprinted without permission, except where copyright source is indicated, but with acknowledgement to Airbus. Where Airbus is not the author, the contents of the article do not necessarily reflect the views of Airbus, nor do they indicate Company policy.

Contributions, comments and feedback are welcome. Enquiries related to this publication should be addressed to:

Airbus - Product Safety department (W)

1, rond point Maurice Bellonte
31707 Blagnac Cedex - France
safetycommunication@airbus.com

Visit us at safetyfirst.airbus.com or install the Safety first app:

