

## Ensuring a Correct Aircraft Technical Configuration



Flying on an aircraft with an incorrect aircraft technical configuration can cause unexpected system behaviors that could lead to an accident or a serious incident. This can occur when an aircraft is dispatched with a computer standard that is not authorized to be installed on that aircraft. Incorrect technical configuration or documentation can also create inconsistency between the documentation and the actual aircraft technical configuration.

This article recalls the key aspects of technical configuration management. It highlights the importance of checking the Part Number (P/N) of the software installed on data loadable computers and describes the tools that Airbus has developed to help Operators make sure that they install the appropriate P/N on their aircraft.

This article is also available on [safetyfirst.airbus.com](https://safetyfirst.airbus.com) and on the Safety first app for iOS and Android devices.



# SEVERAL REPORTED INCORRECT AIRCRAFT TECHNICAL CONFIGURATIONS

More than 30 cases of incorrect aircraft technical configuration were reported to Airbus over the last two years. In all cases, the aircraft was dispatched with a computer standard that was not authorized to be installed on the aircraft.

## Consequences of an Incorrect Aircraft Technical Configuration

### A risk of incorrect behavior of some aircraft systems

Incorrect aircraft technical configuration can lead to unexpected system behaviors, which could affect the safety of a flight, especially if the incorrect configuration has an effect on flight control or flight guidance computers, or causes certain system functions to become unavailable.

### A risk of documentation providing inappropriate information or procedures

A mismatch in the aircraft technical configuration can also cause the aircraft documentation (e.g AMM, IPC, FCOM, QRH, MMEL) to not reflect the actual technical configuration of the aircraft. This may result in documentation that provides inappropriate information or procedures to the flight crew or the maintenance personnel. ■

“Incorrect aircraft technical configuration can lead to unexpected system behaviors, which could affect the safety of a flight”

## HOW AIRCRAFT TECHNICAL CONFIGURATION EVOLVES

### The “As Delivered” Configuration

Every new aircraft delivered to an Operator is equipped with the latest computer standards and full compatibility with all of its systems is ensured. This is called the “As delivered” initial certified configuration of the aircraft.

### The “As Reported” Configuration

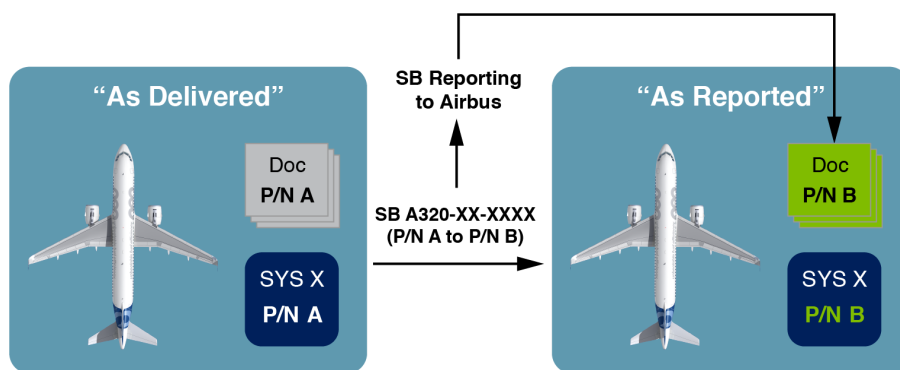
Operators can implement system improvements, corrections or add new functions, through modifications accomplished by Service Bulletins (SBs) during the entire service life of their aircraft. A SB replaces the original component with an updated component. The new component has a new Part Number (P/N) corresponding to the new standard. The Operator must report the embodiment of the service bulletin to Airbus, because Airbus uses this “As Reported” configuration of the aircraft to customize the content of the aircraft maintenance and operational documentation (fig.1).

“Airbus uses the “As Reported” configuration of the aircraft to customize the content of the aircraft maintenance and operational documentation”



## KEYPOINT

**Reporting SB embodiment to Airbus is essential to have up-to-date maintenance and operational documentation.**



(fig.1) Reporting SB embodiment ensures that aircraft documentation is updated to match with the actual technical configuration of the aircraft.



## INFORMATION

For more information on service bulletin configuration management, refer to the “**SB Configuration Management**” article published in [Airbus FAST magazine #57](#) in 2016.

### IPC Spare Parts

The Illustrated Parts Catalog (IPC) enables Operators to use a compatible P/N instead of the original P/N of a component if it is not available. This prevents unnecessary grounding of an aircraft in the case of a component failure.

Only P/Ns that are listed in the IPC as spares can be used to replace the installed P/N. This reinforces the need to report the embodiment of service bulletins to Airbus to ensure that the IPC provides the correct spare P/Ns.

Operators should be aware that if they use an IPC spare part, the aircraft documentation remains customized to the “**As reported**” configuration (fig.2).



## KEYPOINT

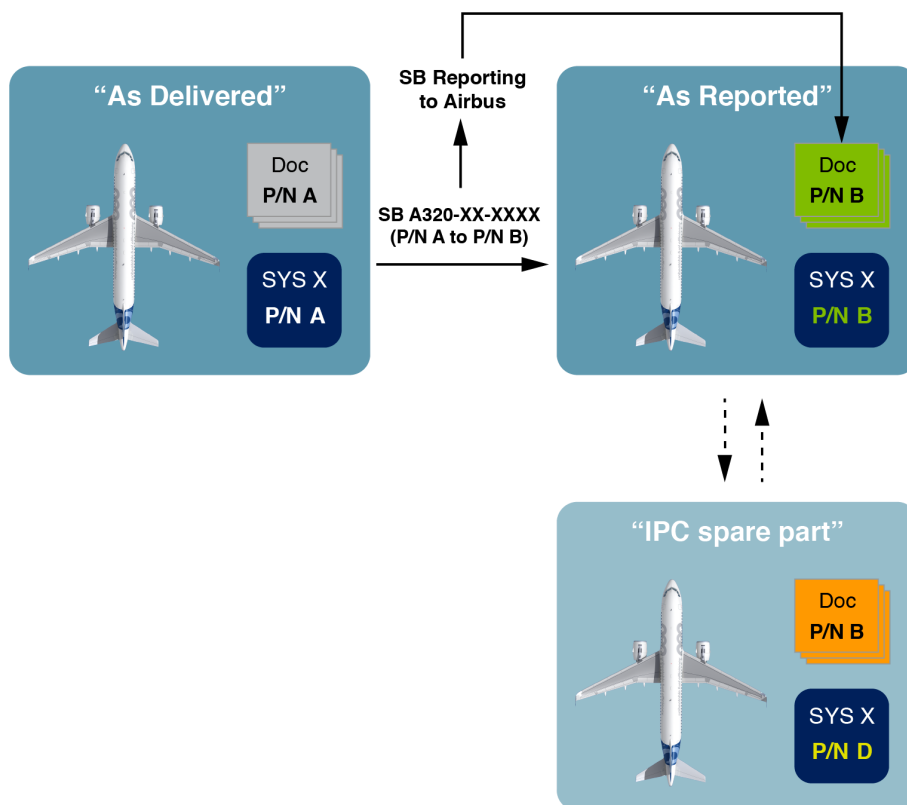
**If the IPC does not list spare P/Ns, the replacement component must have the same P/N.**

**If the IPC provides a spare P/N, it may be used to avoid unnecessary grounding of the aircraft.**

**If a spare P/N from the IPC is used, the aircraft documentation remains customized to the “As reported” configuration.**

### Check with Maintenance

Ground technicians should contact their maintenance engineering department if they have any doubt about the “**As Reported**” configuration versus the actual aircraft technical configuration. ■



(fig.2) When an IPC spare P/N is used, the documentation remains customized to the original P/N

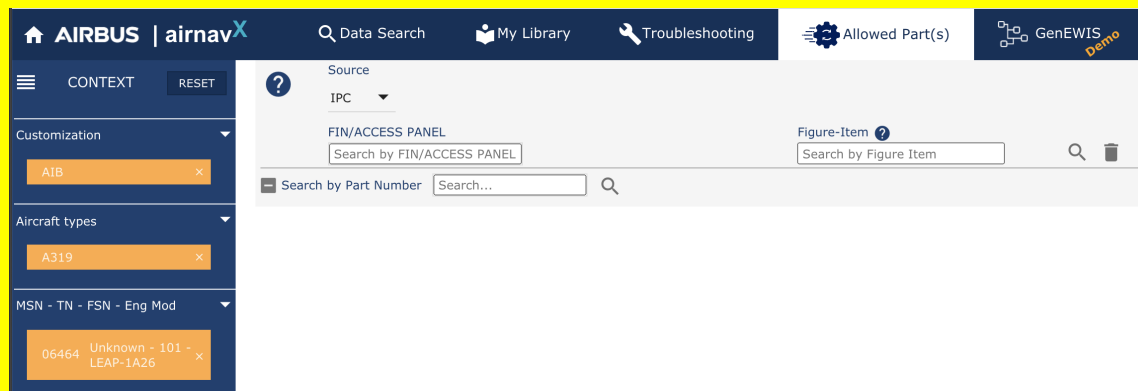


## INFORMATION

For more information on interchangeability and mixability rules, refer to the "Interchangeability/IPC spares PN" documentation available in the **airnav<sup>x</sup>** help center.

### A useful tool: The Allowed Part(s) search function in **airnav<sup>x</sup>**

The **airnav<sup>x</sup>** tool, enabling operators to access the technical documentation for their aircraft, was updated in early 2021 to introduce the Allowed Part(s) search function. This function enables the Operator to quickly find a spare P/N if the original P/N is not available as a spare. The search can be made using the Functional Item Number (FIN), Access panel, IPC figure item reference, or directly using the P/N.



(fig.3) Interface of the Allowed Part(s) search function

# HANDLING DATA LOADABLE COMPUTERS

## How Technology Evolved to Ease Computer Updates

### Line Replaceable Units (LRUs) and On Board Replaceable Module (OBRM)

To update a computer to a new standard on A300, A310, A320 family, A330, and A340 aircraft, a Line Replaceable Unit (LRU) can be replaced with an LRU at a new standard. For some computers on A320 family, A330, and A340 aircraft, the update can also be done by changing only a part of the computer hardware called On Board Replaceable Module (OBRM).

### Data Loading Units (DLUs)

A more recent generation of computers known as **Data Loadable Units (DLUs)** are now used for the majority of computers. Operators can update DLUs by directly loading updated software onto the units, also known as the **Field Loadable Software (FLS)**, using an interface in the cockpit or a portable data loader. Operators do not need to remove DLUs from the aircraft to perform their update. DLUs ease computer upgrades, simplify management of spare parts, and as a result, save time and cost.

Most of the computers installed on A220, A350 and A380 aircraft are DLUs. DLUs have been progressively introduced on A320 family, A330, and A340 aircraft since 2009. All currently delivered A320 family and A330 aircraft are equipped with several DLUs. Some computers on older A320 family, A330 and A340 aircraft are also being progressively replaced with newer DLUs. When installed with the relevant software standard, a DLU has the equivalent behavior of the older LRU that is not data loadable.

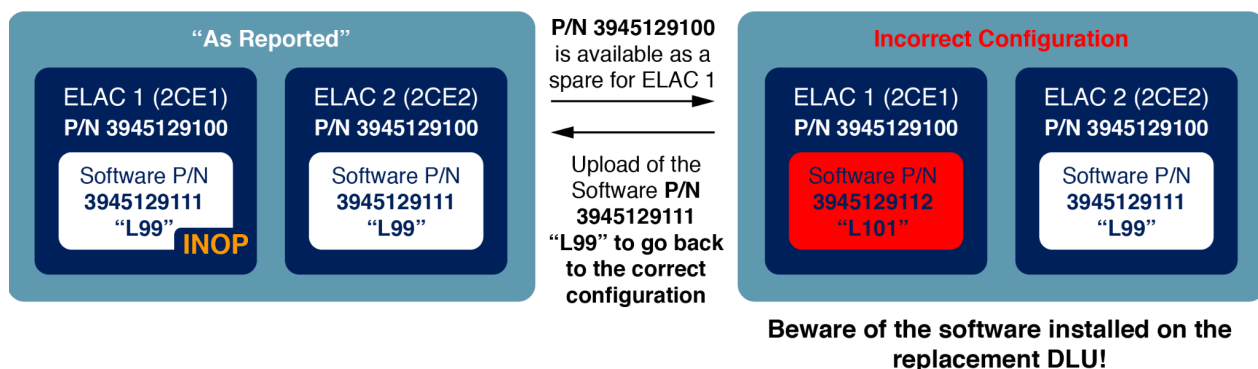
## Ensuring the Correct Software is Installed

Maintenance technicians must check the P/N of the software installed on a DLU to identify the actual computer standard. Checking the P/N of the DLU hardware alone is no longer sufficient. The software P/N must also be checked and treated like any other aircraft component, and its configuration should be managed in the same way.

### Cases of Incorrect Software Installed

Failing to check the software P/N installed on a DLU caused many of the reported cases of incorrect aircraft technical configuration. As a typical example, when a DLU fails and is replaced with a DLU that has the same hardware P/N, the P/N of the software preinstalled on the new unit may not be correct (**fig.4**).

(fig.4) Example of incorrect technical configuration of Elevator & Aileron Computers (ELAC) on A320 family aircraft due to non-compatible software preinstalled on the replacement computer



## The LRU Identification Steps in the AMM/MP/AMP

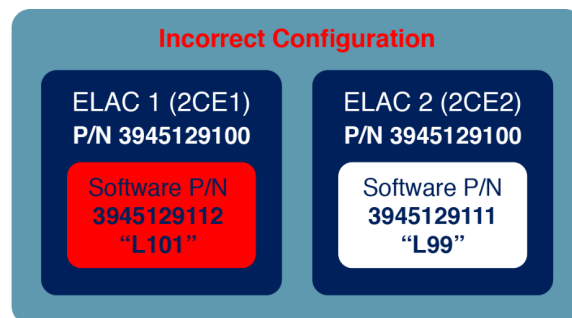
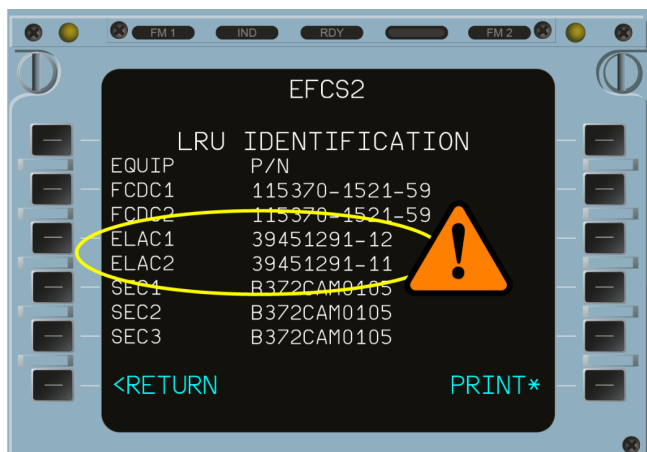
The ground technicians must perform all of the steps in the AMM/MP/AMP tasks for computer removal and installation. This includes the LRU IDENTIFICATION steps that enable them to check that both the P/N of the hardware and the P/N of the software of a computer are correct.

The LRU identification page can be accessed via the **SYSTEM REPORT / TEST** page on the MCDU (A320 family, A330, A340 aircraft) or via the OMS (A220, A350 and A380 aircraft).



## KEYPOINT

The **LRU IDENTIFICATION** step of the AMM/MP/AMP task for computer installation is the last opportunity to check via the MCDU/OMS that the correct software P/N is installed on a computer.



(fig.5) Example of an incorrect technical configuration visible on the LRU IDENTIFICATION page of an A320 family aircraft

## Managing Software on A220, A350 and A380 Aircraft

The A220, A350 & A380 aircraft introduced new challenges in configuration management for airlines due to the high number of software to manage and the increased possibility of customization compared with A320 family or A330/A340 aircraft.

To ensure smooth FLS operations, A350 and A380 Operators should have specific processes and roles dedicated to software configuration management within their organization. **ISI 00.00.00095** and **00.00.00188** articles are available on the AirbusWorld portal and provide generic FLS management recommendations in line with ARINC 667.



## INFORMATION

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Airbus Customer Support has published the ISI articles listed below on the AirbusWorld portal as well as an A220 Service Letter to help Operators and MROs to manage FLS.

**ISI 00.00.00095:** Field Loadable Software Management - FLS Applicable Standards and Classifications

**ISI 00.00.00188:** Field Loadable Software Management - FLS Applicable Recommendations

**ISI 00.00.00189:** Field Loadable Software Management - FLS List. This article provides Operators with the way to extract the SW configuration of the aircraft and the list of FLS FIN that can be installed on A320 family and A330/A340 aircraft)

**ISI 00.00.00240:** FLS Media Digitalization - PDL adaptation

**ISI 00.00.00317:** How to manage FLS with LSBM

**ISI 00.00.00329:** FLS electronic Delivery

**ISI 00.00.00333:** How to rebuild a FLS Media from a digitalized FLS

**ISI 00.00.00334:** Correspondence matrix between Media PNR and FLS PNR

**ISI 00.00.00337:** 1st Webinar A320-A330/A340 families - FLS Media Digitalization

**ISI 00.00.00384:** 2nd Webinar A320-A330/A340 families - FLS Media Digitalization

**A220 Service Letter CS-SL-46-00-0003:** Field Loadable Software List

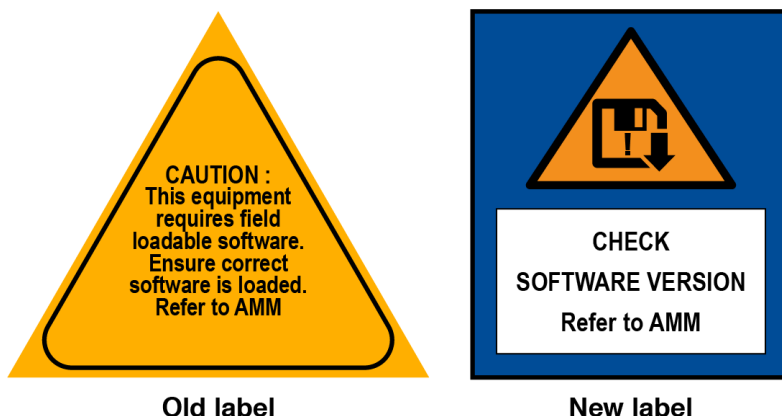
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### Mixing DLU with non-DLU on A320/A330/A340 Aircraft

A mix of DLU and non-DLU computers is possible on A320 family, A330, and A340 aircraft. It requires clear identification of the computers that are DLUs and a strict adherence to the interchangeability and mixability rules defined in the IPC.

#### DLU identification:

A placard located on the computer hardware enables ground technicians to identify any computer that is a DLU (**fig. 6**).



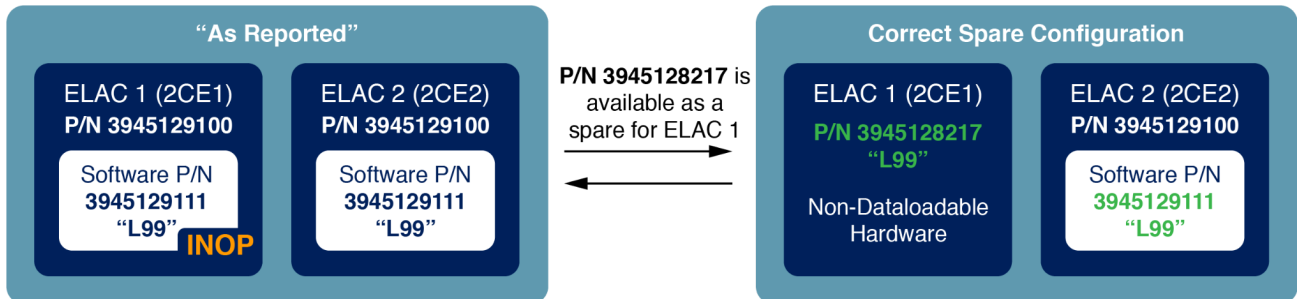
(fig.6) Examples of DLU identification placard



## Mixability of DLU and Non-DLU Computers

For some computer standards, both a DLU and a non-DLU version are available and are two-way interchangeable units. The IPC usually enables the DLU and non-DLU versions to be interchanged provided that the software of the DLU version is also loaded with the correct software P/N.

(fig.7) Example of mixability for DLU and non-DLU ELAC computers on A320 family aircraft



### IPC Qualified condition:

IF 3945129100, SEE 3945128217: NON-DATALOADABLE **ELAC L99 P/N 3945128217** IS TWO WAYS INTERCHANGEABLE AND MIXABLE WITH DATALOADABLE **ELAC L99 P/N 3945129100** WITH OPERATIONAL SOFTWARE **P/N 3945129111** LOADED.

## Awareness & Training for Maintenance

Operators should ensure that maintenance technicians who work on A320 family, A330, and A340 aircraft are aware of the presence of DLUs on their aircraft and perform the necessary training to manage DLUs correctly. ■



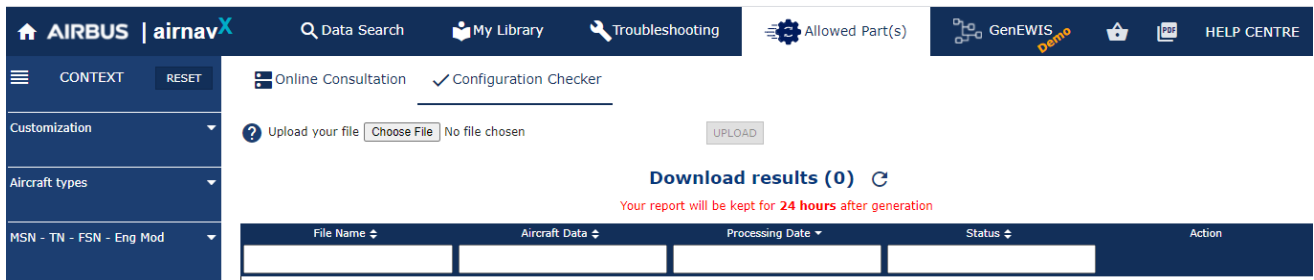


# CONFIGURATION CHECKER TOOL

**Available since June 2021 (A320 family, A330, A340, A350 & A380 aircraft)**

Airbus developed a tool called the Configuration Checker to further assist Operators in the management of their aircraft technical configuration: this tool is available in the Allowed Part(s) menu of **airnav<sup>x</sup>** since June 2021 for A320 family, A330, A340, A350, and A380 aircraft.

(fig.8) view of the interface of the Configuration Checker tool in the Allowed Part(s) menu of **airnav<sup>x</sup>**



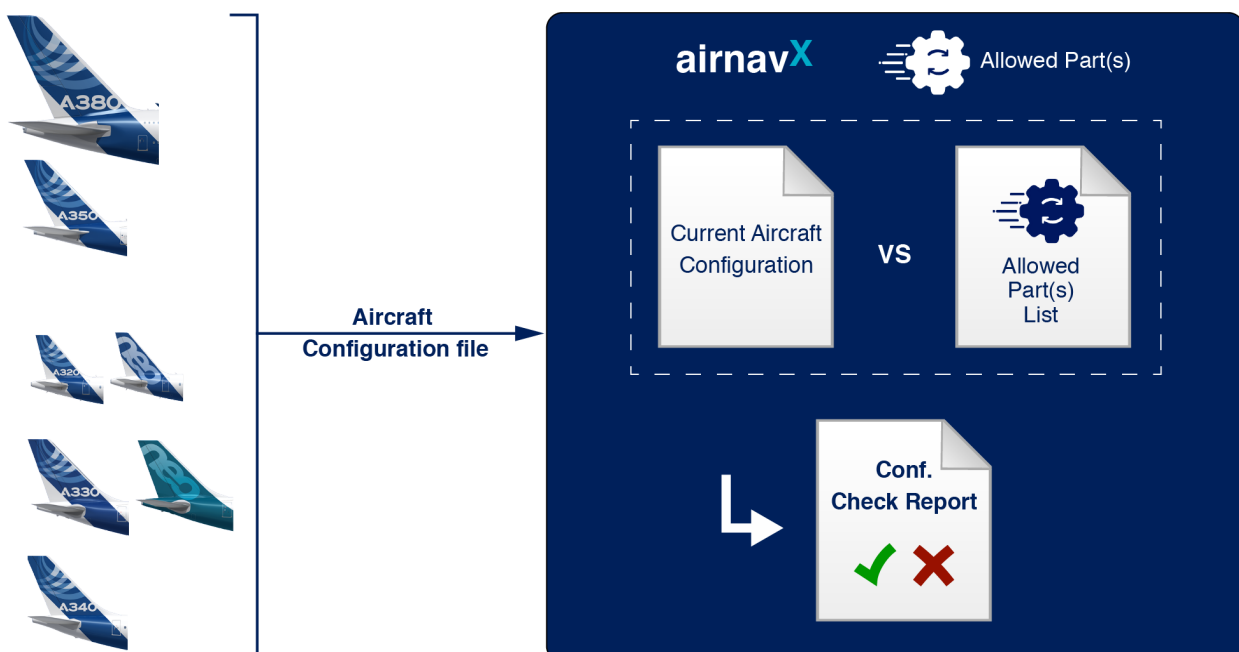
## A Comparison Between the P/N Installed on the Aircraft and the List of Allowed P/Ns

Operators can upload the aircraft configuration file that contains the P/Ns installed on an aircraft into the Configuration Checker. The tool then compares the installed P/Ns with the list of allowed P/Ns per position and provides a report that highlights the configuration mismatches, if any.

The Configuration Checker tool brings an additional safety check on top of the LRU IDENTIFICATION step against any configuration mismatch.

Note that the uploaded data is not archived and the report is only visible to the Operator. ■

(fig.9) Concept of the Configuration Checker tool



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Proper aircraft configuration management and consistent aircraft documentation are key elements to flight safety:

- Operators must ensure correct aircraft technical configuration management and inform Airbus when they have embodied service bulletins on their aircraft so that their documentation reflects the actual aircraft technical configuration. This will ensure that the maintenance technicians and flight crew have the appropriate information and procedures to safely maintain and operate the aircraft.
- Operators must only use a spare part that is listed in the IPC to prevent the grounding of an aircraft if the original P/N is not available.
- Maintenance technicians must check the software P/N installed on Data Loadable Units to ensure that the correct software standards are installed on the computers. The LRU identification step of the AMM/MP/AMP procedure for installation of a computer is the last opportunity to check that the software installed on a computer is correct. This step must not be skipped, even if the technicians are under operational pressure.

Since June 2021, the Configuration Checker tool is available to Operators in the Allowed Parts menu of **airnav<sup>x</sup>**. This provides an additional safety net to check that the aircraft current technical configuration is in line with the list of allowed parts.

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The Airbus Safety magazine

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