Airbus A330/A340 avionics

I. Read the text about Airbus A330/A340 avionics. Match the acronyms from the text to their definitions.

1. **_____ -** a flight deck instrument display system that displays flight data electronically rather than electromechanically
2. _____ - a vacuum tube that contains one or more electron guns and a phosphorescent screen, and is used to display images
3. _____ - a system that monitors aircraft functions and relays them to the pilots. It also produces messages detailing failures and in certain cases, lists procedures to undertake to correct the problem
4. _____ - a modular component of an airplane,[3] ship or spacecraft(or any other manufactured device) that is designed to be replaced quickly at an operating location
5. _____ - a specialized computer system that automates a wide variety of in-flight tasks, reducing the workload on the flight crew to the point that modern civilian aircraft no longer carry flight engineers or navigators
6. _____ - provides a texture resembling the display of the navigation or map displays found in many digital cockpits and GPS units

The avionics of the A330/A340 are highly integrated for optimal crew use and for optimal maintenance. As with all previous new and **derivative** aircraft since the A300FF of 1981, the primary data bus standard is ARINC 429 with ARINC 600 packaging. Other industry bus standards are used in specific applications in which ARINC 429 is not suitable.

Instruments

The six Cathode Ray Tubes (CRTs) on the main instrument panel display present flight and systems information to the pilots. This arrangement provides excellent visibility of all CRTs. Flight information is provided by the Electronic Flight Instrument System (EFIS) consisting of a Primary Flight Display (PFD) and a Navigation Display (ND) in front of each pilot. The Electronic Centralized Aircraft Monitor (ECAM), consisting of the engine/warning display on the upper screen and aircraft systems display on the lower screen, provides the systems information. Sensors throughout the aircraft continuously monitor the systems, and if a parameter moves out of the normal range, they automatically warn the pilot. During normal flight, the ECAM presents systems displays according to the phase of flight, showing the systems in which the pilot is interested, such as some secondary engine data, **pressurization**, and cabin temperature. The pilot can, by manual selection, **interrogate** any system at any time. Should another system require attention, the ECAM will automatically present it to the flight crew for action. Should a system fault occur that results in a cascade of other system faults, ECAM identifies the originating fault and presents the operational checklists without any need for added crew actions. The information display formats currently in use enable the pilots to assimilate the operational situation of the aircraft much more easily than on the previous generation of aircraft.

There are substantial advantages on the maintenance side as well; the entire Electronic Instrument System (EIS) consists of only three Line Replaceable Unit (LRU) types, enabling significant **dispatchability** and spare stocks availability. In fact, all the flight information (including standby) is presented on only 11 instruments of 6 types. A new EIS using liquid crystal displays is installed on the A330/A340 and A320 family of aircraft, offering improved capabilities and cost of ownership.

Navigation

Dual Flight Management Systems (FMS; integrated with the Flight Guidance and Flight Envelope computing functions) combine the data from the aircraft navigation sensors, including the GPS installation. Backup

navigation facilities are included in each pilot's multipurpose control/display unit (MCDU), allowing the aircraft to be dispatched with an **inoperative** FMS. The FMS permits the crew to select an optimal flight plan for their route from a selection in the airline navigation data base, allowing the aircraft to fly automatically, through the autopilot or flight director, from just after take-off until the crew elects to carry out **a precision approach** and **automatic landing**. The "canned" flight plan captures the data needed for flight from the specifications entered by the crew prior to departure, as well as along the route as conditions change and more current information on weather and routing becomes available. New FMSs, with improved cost of ownership and capability, are installed on aircraft delivered from mid-2000. The same new FMSs are being installed on the A320 family.

Flight Controls

The flight control system of the A330/A340 is essentially the same as that of the A320, with five computers of two different types allowing the pilot to control the aircraft in **pitch**, **roll**, and **yaw**. The layout of the pilot controls is essentially the same as that of the A320 series, as are the **handling** qualities. The technology features are also essentially the same, with extensive use of dissimilarity in the hardware and in the software, and extensive segregation in the hydraulic and electrical power supplies and signaling lanes. As with the A320 series, mechanical signaling is used for the **rudder** and for the horizontal stabilizer trim backup.

Detail changes have been introduced reflecting the longer mission times, especially of the A340, to provide better access to the system, and the opportunity has been taken to reduce the variety of backup submodes that the crew must use, making the aircraft even easier to fly. Like the A320 series, the A330/A340 is a conventional, naturally stable airliner. The electronic flight controls offer a number of advantages to the pilot. There is a large reduction in manually operated mechanical parts, easier troubleshooting, and no need for **rigging**. Optimal use of the control surfaces is facilitated, as is the use of maneuver load alleviation. The passengers and crew benefit as well, since the aircraft is more comfortable and easier to fly with precision in turbulence, while the flight envelope and structural protection features allow the crew to immediately use the whole capability of the aircraft should it be needed in an extreme situation.

II. Look back at the text and complete the sentensces with appropriate prepositions.

1. The engineers will present the design _____ the board of directors today.
2. The space shuttle avionics system consists _____ more than 300 major electronic black boxes located throughout the vehicle.
3. CAD/CAM software enables engineers _____ work more effectively.
4. Technicians are not permitted _____ enter the restricted area.
5. The team of engineers discussed the design again prior _____ the meeting with the board.
6. In case of loss of lift, the aircraft loses the capability _____ flying.

III. Work in groups of three and explain the words in bold to each other.

Student A: explain the words from the Instruments section.
Student B: explain the ords from the Navigation section.
Student C: explain the words from the Flight Control Section.

LANGUAGE FUNCTIONS FOR AVIATION

Expressing conditional future

Look back at the text. Find examples of sentences expressing conditional future.

Rules:

To express the results of a possible future condition we use the following structure:

If + present tense (usually the Present Simple), + future tense (usually the Present Simple)

If the gear does not go down, we will have to do a belly landing.

If FedEx does not vacate the runway soon, we will have a huge delay.

The sequence of the clauses can be reversed. We still use the present tense in the condition clause and the future tense in the result clause.

We will have to do a belly landing if the gear does not go down.

We will have a huge delay if FedEx does not vacate the runway soon.

We can use *unless* instead of *if not* to express a negative condition.

Unless they hurry up, we will miss our slot.

PRACTICE SECTION

Fill in the gaps below with appropriate form of the verbs in brackets.

1.If we _____ (fly) into this storm, we _____ (experience) severe turbulence.

2.We _____ (have) to pay delayed flight compensation to many passengers if we _____ (miss) this slot.

3.You _____ (cross) any runway unless you _____ (be) instructed to do so by the controller.

4.If you _____ (squawk) 7500 during your flight, the ATCO _____ (read) always this as 'seven five – man with knife', that is your aircraft has been hijacked.

5.Ryanair's pilots _____ (go) on a one-day strike if they _____ (not/get) better paychecks soon.

Over to you:

1.You / become a successful avionics engineer / if / …

2.If … you / earn a lot of money as an avionics engineer.

3.If aviation industry / develop further / avionics engineers …

Compare and discuss your ideas in pairs.