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**Datasheet for the decision  
of 27 September 2011**

**Case Number:** T 0233/08 - 3.5.06

**Application Number:** 03078744.4

**Publication Number:** 1426870

**IPC:** G06F 15/177

**Language of the proceedings:** EN

**Title of invention:**

Remote aircraft manufacturing, monitoring, maintenance and management system

**Applicant:**

The Boeing Company

**Opponent:**

-

**Headword:**

Remote aircraft maintenance system/BOEING

**Relevant legal provisions:**

RPBA Art. 4(2), 13(1,3)

**Relevant legal provisions (EPC 1973):**

EPC Art. 56

**Keyword:**

"Inventive step - no"

**Decisions cited:**

G 0002/92

**Catchword:**

-



Case Number: T 0233/08 - 3.5.06

**DECISION**  
of the Technical Board of Appeal 3.5.06  
of 27 September 2011

**Appellant:** The Boeing Company  
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Seattle  
WA 98124-2207 (US)

**Representative:** Land, Addick Adrianus Gosling  
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**Decision under appeal:** Decision of the Examining Division of the  
European Patent Office posted 1 August 2007  
refusing European patent application  
No. 03078744.4 pursuant to Article 97(1) EPC  
1973.

**Composition of the Board:**

**Chairman:** D. H. Rees  
**Members:** A. Teale  
M.-B. Tardo-Dino

## Summary of Facts and Submissions

I. The appeal is against the decision, dispatched on 1 August 2007, by the examining division to refuse European patent application No. 03 078 744.4. The decision was based on the main and auxiliary requests I to VI received on 25 May 2007 and auxiliary requests VII and VIII received on 21 June 2007. Insofar as the reasons for the decision remain relevant to the appellant's final requests, the subject-matter of the independent apparatus claim according to the main and auxiliary requests IV, VI, VII and VIII was found to lack inventive step, Article 56 EPC 1973, in view of document D4, albeit in the case of auxiliary requests VII and VIII on a *prima facie* basis. The subject-matter of the independent apparatus claim according to auxiliary request IV was also found to lack inventive step, Article 56 EPC 1973, in view of the combination of documents D4 and D3, these documents being as follows:

D3: WO 02/065683 A2 and

D4: WO 02/079918 A2.

According to the decision, auxiliary requests VII and VIII were ultimately not admitted into the proceedings, Rule 86(3) EPC 1973.

II. During search the search division issued a partial search report, Rule 46(1) EPC 1973, stating that it considered the application to lack unity and the claims to set out four groups of inventions: 1 to 29 (relating to collecting system data from a plurality of platform systems), 30 to 35, 36 to 38 (relating to remote error

handling) and 39. If the European Search Report was to cover more than the first group of inventions then further search fees were to be paid for the three further groups of inventions. No further search fees were paid. Consequently the European Search Report was only drawn up for the first group of inventions, namely claims 1 to 29.

- III. In a notice of appeal, received on 28 September 2007, the appellant requested that the decision be set aside in its entirety and that a patent be granted based on the claims according to the main or auxiliary requests I to VI received on 25 May 2007 or according to auxiliary requests VII and VIII received on 21 June 2007. The appeal fee was paid on 28 September 2007.
- IV. With a statement of grounds of appeal, received on 11 December 2007, the appellant filed claims according to a main and auxiliary requests I to VIII. The appellant reiterated the request that the decision be set aside and requested that a patent be granted according to the main or one of the auxiliary requests. If the board did not intend to set aside the decision, then oral proceedings were requested.
- V. In an annex to a summons to oral proceedings the board expressed doubts *inter alia* regarding the inventive step, Article 56 EPC 1973, of the subject-matter of the independent apparatus claims of all requests. The board also raised objections under Article 84 EPC 1973 (clarity), Rule 35(13) EPC 1973 (consistency of terminology) and Rule 27(1)(b) EPC 1973 (acknowledgement of D4 in the description). The board

also stated that, should any further amendments be submitted, the appellant was requested to identify the disclosure of the amended features in the original application. Any amendments were to be submitted at the latest one month before the oral proceedings.

- VI. With a letter received on 26 August 2011 the appellant filed sets of claims, each with a corresponding description, according to a main and auxiliary requests I to VIII and a set of claims according to an auxiliary request I'. Regarding auxiliary request I', the appellant stated that it should be allowed into the proceedings as it clarified the novelty objection of the main request and auxiliary request I, but provided no further explanations.
- VII. With a letter received on 11 September 2011 the appellant filed a set of claims according to an auxiliary request I''.
- VIII. Oral proceedings were held on 27 September 2011 during which the appellant filed a set of claims according to an auxiliary request I'''. The appellant also requested that the decision under appeal be set aside and that a patent be granted on the basis of the set of claims according to the main request or to the auxiliary request I and the description attached to each of them, or of the auxiliary request I', all as filed on 26 August 2011, or according to the set of claims of the auxiliary request I'' as filed on 11 September 2011, or of the auxiliary request I''' as filed during the oral proceedings, or on the basis of the set of claims according to the auxiliary requests II to VIII as filed on 26 August 2011 and the description attached to each

of them. In the course of the oral proceedings the board expressed doubts concerning the clarity, Article 84 EPC 1973, of claim 1 according to auxiliary request IV. The appellant objected that the clarity of this claim had not been questioned so far in the proceedings and thereupon made the further auxiliary request that the case be remitted so that the first instance could take a position on this issue.

IX. At the end of the oral proceedings the board announced its decision.

X. Claim 1 according to the main request reads as follows, the claims according to this request also comprising an independent method claim 20:

"An aircraft wireless data communication system comprising: an aircraft having a plurality of aircraft systems (12); each of said aircraft systems (12) having a system actual configuration identity; each said system actual configuration identity being transferable as a system actual configuration identity file; a computer/server being adaptable to electronically communicate with each of said plurality of aircraft systems (12), characterised in that each said system actual configuration identity file being combinable in said computer/server to form an aircraft actual configuration identity; said aircraft actual configuration identity being transferable as an aircraft actual configuration identity file; and said computer/server being in wireless communication with at least one ground-based network of computers; wherein any one of said ground-based network of computers is operable to: receive a real-time status of each of said

aircraft systems (12); and send a data set to said computer/server, wherein said data set includes an authorized aircraft configuration identity, including the identity of each software and hardware part of the aircraft, transferable as an authorized aircraft configuration identity file."

XI. Claim 1 according to auxiliary request I reads as follows, the claims according to this request also comprising an independent method claim 18:

"An aircraft wireless data communication system comprising: an aircraft having a plurality of aircraft systems (12); each of said aircraft systems (12) having a system actual configuration identity; each said system actual configuration identity being transferable as a system actual configuration identity file; a computer/server being adaptable to electronically communicate with each of said plurality of aircraft systems (12), the computer/server further comprising a configuration management subsystem (46), said configuration management subsystem (46) being in communication with said aircraft systems (12) and adaptable to retrievably obtain and report said actual aircraft configuration identity file; characterised in that each said system actual configuration identity file being combinable in said computer/server to form an aircraft actual configuration identity; said aircraft actual configuration identity being transferable as an aircraft actual configuration identity file; and said computer/server being in wireless communication with at least one ground-based network of computers; wherein any one of said ground-based network of computers is operable to: receive a

real-time status of each of said aircraft systems (12); and send a data set to said computer/server, wherein said data set includes an authorized aircraft configuration identity, including the identity of each software and hardware part of the aircraft, transferable as an authorized aircraft configuration identity file and wherein the system further comprises an aircraft data load system wherein a difference determinable by said configuration management subsystem (46) between said authorized aircraft configuration identity file and said actual aircraft configuration identity file is reportable to said aircraft data load system and to said ground-based network of computers."

- XII. The claims according to auxiliary request I' contain three independent claims: claim 1 to a method for performing a software update for at least one of a plurality of aircraft systems in an aircraft; claim 7 to an aircraft wireless data communication system for use in a method according to any of claims 1 to 6 and claim 15 to an information system adapted for use on a mobile platform and for use in the system of any of claims 7 to 13.
- XIII. The claims according to auxiliary request I'' contain two independent claims: claim 1 to an aircraft wireless data communication system and claim 10 to a method for performing a software update for at least one of a plurality of aircraft systems in an aircraft.
- XIV. Claim 1 according to auxiliary request I''' is the same as claim 1 according to auxiliary request I except that the following passage has been appended at the end:



", wherein new software parts are loaded automatically from said data load system to said aircraft systems (12) when permitted by loading interlocks".

The claims according to this request also contain an independent method claim 18.

XV. Claim 1 according to auxiliary request II reads as follows, the claims according to this request also comprising an independent method claim 19:

"An aircraft wireless data communication system comprising: an aircraft having a plurality of aircraft systems (12); each of said aircraft systems (12) having a system actual configuration identity; each said system actual configuration identity being transferable as a system actual configuration identity file; an onboard [*sic*] computer/server being adaptable to electronically communicate with each of said plurality of aircraft systems (12); each said system actual configuration identity file being combinable in said onboard computer/server to form an aircraft actual configuration identity; said aircraft actual configuration identity being transferable as an aircraft actual configuration identity file; and said onboard computer/server being in wireless communication with at least one ground-based network of computers; wherein any one of said ground-based network of computers is operable to one of: receive a real-time status of each of said aircraft systems (12); and send a data set to said onboard computer/server, wherein said data set includes an authorized aircraft configuration identity, including the identity of each software and hardware part of the aircraft,

transferable as an authorized aircraft configuration identity file; said onboard computer/server adapted to communicate with at least one software based platform system; said onboard computer/server being adaptable to wirelessly communicate with said ground-based network of computers; said ground-based network of computers being linkable with a plurality of users; and each of said plurality of users via said ground-based network of computers and said onboard computer/server being capable of: send [sic] a command set to said onboard computer/server."

XVI. Claim 1 according to auxiliary request III reads as follows, the claims according to this request also comprising an independent method claim 18:

"An aircraft wireless data communication system comprising: an aircraft having a plurality of aircraft systems (12); each of said aircraft systems (12) having a system actual configuration identity; each said system actual configuration identity being transferable as a system actual configuration identity file; a computer/server being adaptable to electronically communicate with each of said plurality of aircraft systems (12), the computer/server further comprises a configuration management subsystem (46), said configuration management subsystem (46) being in communication with said aircraft systems (12) and adaptable to retrievably obtain and report said actual aircraft configuration identity file; characterised in that each said system actual configuration identity file being combinable in said computer/server to form an aircraft actual configuration identity; said aircraft actual configuration identity being

transferable as an aircraft actual configuration identity file; and said computer/server being in wireless communication with at least one ground-based network of computers; wherein any one of said ground-based network of computers is operable to: receive a real-time status of each of said aircraft systems (12); and send a data set to said computer/server, wherein said data set includes an authorized aircraft configuration identity transferable as an authorized aircraft configuration identity file; and wherein the system further comprises an aircraft data load system for automatically loading new software parts from said data load system to said aircraft systems (12) when permitted by loading interlocks."

XVII. Claim 1 according to auxiliary request IV reads as follows, the claims according to this request also comprising an independent method claim 16:

"An aircraft wireless data communication system comprising: an aircraft having a plurality of aircraft systems (12); each of said aircraft systems (12) having a system actual configuration identity; each said system actual configuration identity being transferable as a system actual configuration identity file; an onboard computer/server being adaptable to electronically communicate with each of said plurality of aircraft systems (12); each said system actual configuration identity file being combinable in said onboard computer/server to form an aircraft actual configuration identity; said aircraft actual configuration identity being transferable as an aircraft actual configuration identity file; and said onboard computer/server being in wireless communication

with at least one ground-based network of computers; wherein any one of said ground-based network of computers is operable to one of: receive a real-time status of each of said aircraft systems (12); and send a data set to said onboard computer/server, wherein said data set includes an authorized aircraft configuration identity transferable as an authorized aircraft configuration identity file; said onboard computer/server adapted to communicate with at least one software based platform system comprising a system configuration of said aircraft; said system configuration comprising:

- a platform electronic hardware configuration;
- a platform electronic software configuration; and
- a platform hardware configuration

said onboard computer/server being adaptable to wirelessly communicate with said ground-based network of computers; said ground-based network of computers being linkable with a plurality of users; and each of said plurality of users via said ground-based network of computers and said onboard computer/server being capable of: send [*sic*] a command set to said onboard computer/server, wherein said command set further comprises:

- a configuration report command;
- a software loading command;
- a system functional test command;
- a maintenance information command; and
- a system monitoring command."

XVIII. Claim 1 according to auxiliary request V reads as follows, the claims according to this request also comprising an independent method claim 20:

"An aircraft wireless data communication system comprising: an aircraft having a plurality of aircraft systems (12); each of said aircraft systems (12) having a system actual configuration identity; each said system actual configuration identity being transferable as a system actual configuration identity file; a computer/server being adaptable to electronically communicate with each of said plurality of aircraft systems (12); each said system actual configuration identity file being combinable in said computer/server to form an aircraft actual configuration identity; said aircraft actual configuration identity being transferable as an aircraft actual configuration identity file; and said computer/server being in wireless communication with at least one ground-based network of computers; wherein any one of said ground-based network of computers is operable to one of: receive a real-time status of each of said aircraft systems (12); and send a data set to said computer/server, wherein said data set includes an authorized aircraft configuration identity, including the identity of each software and hardware part of the aircraft, transferable as an authorized aircraft configuration identity file; wherein an electronic firewall (42) is disposed between the plurality of aircraft systems (12) and the computer/server."

XIX. Claim 1 according to auxiliary request VI reads as follows, the claims according to this request also comprising an independent method claim 20:

"An aircraft wireless data communication system comprising: an aircraft having a plurality of aircraft systems (12); each of said aircraft systems (12) having

a system actual configuration identity; each said system actual configuration identity being transferable as a system actual configuration identity file; a computer/server being adaptable to electronically communicate with each of said plurality of aircraft systems (12); each said system actual configuration identity file being combinable in said computer/server to form an aircraft actual configuration identity; said aircraft actual configuration identity being transferable as an aircraft actual configuration identity file; and said computer/server being in wireless communication with at least one ground-based network of computers; wherein any one of said ground-based network of computers is operable to one of: receive a real-time status of each of said aircraft systems (12); and send a data set to said computer/server, wherein said data set includes an authorized aircraft configuration identity transferable as an authorized aircraft configuration identity file; and wherein the computer/server (12) is linked to a plurality of electronic part identification placards, EIPs, (50) and the collection of information from the plurality of EIPs (50) forms part of the aircraft actual configuration identity."

XX. Claim 1 according to auxiliary request VII reads as follows, the claims according to this request also comprising an independent method claim 20:

"An aircraft wireless data communication system comprising: an aircraft (11) having a plurality of aircraft systems (44); each of said aircraft systems (44) having a system actual configuration identity; each said system actual configuration identity being

transferable as a system actual configuration identity file; a computer/server (12) being adaptable to electronically communicate with each of said plurality of aircraft systems (44), characterised in that: each said system actual configuration identity file being combinable in said computer/server (12) to form an aircraft actual configuration identity; wherein the computer/server (12) is linked to a plurality of electronic part identification placards, EPIPs, (50), that identify via individualized part numbers that specific non-computer based hardware components are installed on the aircraft (11); wherein the collection of information from the plurality of EPIPs (50) forms part of the aircraft's actual configuration identity, said aircraft actual configuration identity being transferable as an aircraft actual configuration identity file; said computer/server (12) being in wireless communication with at least one ground-based network of computers; wherein any one of said ground-based network of computers is operable to: receive a real-time status of each of said aircraft systems (44); send a command set to said computer/server (12) and send a data set to said computer/server (12), wherein said data set includes an authorized aircraft configuration identity, including the identity of each software and hardware part of the aircraft (11), transferable as an authorized aircraft configuration identity file."

XXI. Claim 7 according to auxiliary request VIII reads as follows, the claims according to this request also comprising an independent method claim 1:

"An aircraft wireless data communication system comprising: an aircraft (11) having a plurality of aircraft systems (44); each of said aircraft systems (44) having a system actual configuration identity; each said system actual configuration identity being transferable as a system actual configuration identity file; a [sic] onboard computer/server (12) being adaptable to electronically communicate with each of said plurality of aircraft systems (44), characterised in that an aircraft onboard health manager (180) being adaptable to electronically communicate with the onboard computer/server (12) and with each of said plurality of aircraft systems (44); each said system actual configuration identity file being combinable in said onboard computer/server (12) to form an aircraft actual configuration identity; said aircraft actual configuration identity being transferable as an aircraft actual configuration identity file; and said onboard computer/server (12) being in wireless communication with at least one ground-based network of computers; wherein any one of said ground-based network of computers is operable to:

- receive a real-time status of each of said aircraft systems (44);
- send a data set to said onboard computer/server (12), wherein said data set includes an authorized aircraft configuration identity, including the identity of each software and hardware part of the aircraft (11), transferable as an authorized aircraft configuration identity file; and
- send a command set to said onboard computer/server (12);

wherein the command set comprises a request for performance of a specific test wherein the health



manager (180) receiving the request, requests a selected aircraft system to perform a test, and wherein the results of the test are transmitted by the health manager (180) to the ground-based network of computers."

## **Reasons for the Decision**

### 1. *Admissibility of the appeal*

In view of the facts set out at points I, III and IV above, the appeal is admissible, since it complies with the EPC formal admissibility requirements.

### 2. *The context of the invention*

2.1 The application concerns an aircraft wireless data communication system linking a computer/server on the aircraft with a ground based computer system which can be accessed by authorized users from computer networks located at the airline organisation, part suppliers and the aircraft manufacturer. Safety is a major consideration, and an electronic firewall on the aircraft between the computer/server and some aircraft systems prevents software or data affecting flight systems from being modified unless certain safety requirements, enforced by interlocks, are met, for instance, that the aircraft is on the ground, that the wheels are stationary and that the engines have been shut off.

2.2 The computer/server is in communication with aircraft systems, for instance the flight controls, engine

controls and autopilot, and, safety interlocks allowing, can view system status and parameters and upload or download data (for instance maps) and software to and from the aircraft systems and relay these to and from the ground based computer system. As a result an airline can more easily meet its regulatory obligation to maintain an authorized aircraft configuration, the aircraft's configuration being defined as the identity of each software and hardware part used on the aircraft. In practice an aircraft requires regular upgrading of many different pieces of software, and the current parts listing of an aircraft is in a constant state of flux due to maintenance and engineering activities. The computer/server is able to identify certain non-computer based hardware components currently installed on the aircraft by accessing associated electronic part identification placards (EPIPs). To verify the aircraft's configuration the computer/server is sent an authorized aircraft configuration identity file. A configuration management subsystem of the computer/server then establishes the actual aircraft software and hardware configuration identity and reports to the ground based computer system whether the actual identity complies with the authorized one; see figures 3 and 9.

- 2.3 The aircraft's software configuration can be updated by uploading software updates to a data load system on the aircraft, uploading an authorized aircraft configuration identity file and then causing the computer/server to query the actual aircraft software configuration and, safety interlocks allowing, updating those pieces of aircraft software for which an update

- is available from the data load system; see figures 3 and 4.
- 2.4 Each aircraft system can also report its status to an aircraft onboard health manager which consolidates the reports and transmits them to the ground based computer system. The health manager can also cause an aircraft system, safety interlocks allowing, to perform a specific diagnostic test when instructed to do so by the ground based computer system; see figures 10 and 11.
- 2.5 Thus the system allows monitoring, testing, maintenance and management of aircraft hardware, data and software while the aircraft is in flight or on the ground anywhere in the world without maintenance personnel having to board the aircraft.
3. *The prior art*
- 3.1 *Document D4*
- 3.1.1 D4 relates to the wireless upload and download of data between an aircraft and a data communication apparatus, for instance a terminal on the ground; see page 11, lines 1 to 4. In particular, software updates and maps are uploaded to the avionics units, termed line replaceable units (LRUs), on the aircraft, and aircraft data is downloaded to the data communication apparatus.
- 3.1.2 The aircraft data services link (ADSL; see figure 1; 26 and figure 2) links the LRUs via a bidirectional wireless link to the data communication apparatus on the ground. The ADSL contains a network server unit (NSU 41) and a system interface unit/firewall (SIU 46)

containing a firewall which separates the LRUs from the ADSL; see page 13, lines 5 to 8. D4 mentions prior art in which a software update of an avionics unit was made by connecting an onboard data loader with the appropriate avionics unit via a manual rotary switch; see page 6, line 18, to page 7, line 3. According to the invention disclosed in D4, LRUs are however selected by electronic switching, and an onboard server is used instead of a data loader; see page 7, line 16, and page 22, lines 10 to 17. As shown in figure 2, the SIU is linked to some LRUs (24) directly and linked to other avionics units (termed ARINC 615A systems) which are unable to share a data bus via a remotely controllable switch or hub (52) controllable from the SIU; see paragraphs [0032] and [0033].

- 3.1.3 Operation program software (OPS) on the aircraft is updated by uploading updates via the ADSL and storing them in the NSU; see paragraph [0039]. Uploads can be remotely initiated from the data communications apparatus 12; see page 22, lines 9 to 17. Such OPS updates can occur automatically when hardware is replaced, an aircraft configuration management application in the ADSL flagging any unresolved aircraft hardware/software compatibility issues. In the NSU the updates are tested, for instance to establish their compatibility. The LRU being updated can also carry out cyclic redundancy checks (CRC) on a software update; see page 21, lines 7 to 13. The ADSL can cause each LRU to transmit its software part number to the ADSL where these are stored in a database; see page 13, lines 2 to 5, and page 17, lines 19 to 22. In particular, a memory 42 in the NSU contains a database of version identifiers or current part numbers of

software stored in the software-loadable avionics units; see page 13, lines 1 to 5, and page 23, lines 3 to 8.

3.1.4 One LRU, the aircraft condition monitoring system (ACMS 20), gathers aircraft performance data which is communicated via the ADSL to the data communication apparatus; see page 15, lines 16 to 21. Upon aircraft touchdown, performance data may be transmitted to the data communication apparatus, although avionics systems interlocks prevent this from happening while the aircraft is still in the air; see paragraph [0070] and page 15, lines 14 to 16.

3.1.5 According to page 16, lines 8 to 13, D4 discloses configuration management being provided by a database in the memory of the ADSL and in the data communications apparatus on the ground being synchronized, coordinated and tracked with one another. An aircraft configuration management application in the ADSL on the aircraft is configured to perform software updates when required by hardware replacements and to flag any unresolved aircraft/software compatibility issues; see page 17, lines 2 to 5.

3.1.6 The appellant has argued that D4 does not disclose a configuration identity file or the configuration identity including the identity of each hardware part. It is common ground between the appellant and the board that D4 does not mention the identities of hardware parts of the aircraft. It is also common ground that, in the light of paragraphs [0048] and [0054] in D4, in particular the reference to "synchronization" on page 19, line 20, aircraft software configuration data is transferred in both directions between the ground

and the aircraft. Such synchronization is also mentioned in the sentence bridging pages 16 and 17, referred to in the appealed decision. The board regards the disclosure in D4 (see page 13, lines 2 to 5) of storing version identifiers of software stored in software-loadable avionic units in a database as disclosing, in the current context, a configuration identity file, albeit only of software parts of the aircraft which, in view of the synchronization mentioned in D4, is present both in the NSU on the aircraft and in the data communication apparatus on the ground.

3.1.7 Hence the board finds that D4 discloses the following features of claim 1 according to the main request: an aircraft wireless data communication system comprising: an aircraft having a plurality of aircraft systems (see figure 2; LRU 24); each of said aircraft systems having a system actual configuration identity (see paragraph [0041], "avionics LRU configuration information"); each said system actual configuration identity being transferable as a system actual configuration identity file (see paragraph [0041], last sentence); a computer/server (figure 2; "Network Server Unit" (NSU) 41) being adaptable to electronically communicate with each of said plurality of aircraft systems (see paragraph [0031], in particular page 13, lines 5 to 8); each said system actual configuration identity file being combinable in said computer/server to form an aircraft actual configuration identity (see paragraph [0031], in particular, page 13, lines 2 to 5); said aircraft actual configuration identity being transferable as an aircraft actual configuration identity file (see paragraphs [0054] and [0068], in

particular page 27, lines 2 to 9); and said computer/server being in wireless communication with at least one ground-based network of computers (see page 10, line 16, to page 11, line 4, "airport ground service terminals"); wherein any one of said ground-based network of computers is operable to: receive a real-time status of each of said aircraft systems (see paragraph [0040], in particular page 17, lines 6 to 9); and send a data set to said computer/server, wherein said data set includes an authorized aircraft configuration identity transferable as an authorized aircraft configuration identity file (see paragraphs [0054] and [0068], in particular page 27, lines 2 to 9).

3.1.8 D4 refers on page 1, lines 6 to 10, to D3, stating that D3 is "incorporated by reference in its entirety". In the absence of any reference in D4 to a specific part of D3 the board does not understand this expression as adding the entire content of D3 to D4 *verbatim*. Instead the expression is understood as merely drawing the attention of the skilled person reading D4 to the disclosure of D3 as being relevant to that of D4; see Case Law of the Boards of Appeal of the European Patent Office, 6th edition, I.C.3.1.

### 3.2 *Document D3*

D3 concerns the remote initiation of ARINC 615 downloads, software and data being loaded from ground based computer networks (see paragraphs [0020] to [0022] and figure 1; ground access points 42) via a wireless link to an aircraft and routed via a remotely controllable switch (see figure 3) to the aircraft LRUs. Aircraft software is only updated when a trigger

condition is met, for instance by setting a parking brake; see page 9, lines 3 to 5.

4. *The amendments to the claims*

Editorial amendments aside, the independent apparatus claims according to the main request and auxiliary requests I and II to VIII set out the same subject-matter as the corresponding claims received with the statement of grounds of appeal upon which the annex to the summons to oral proceedings was based.

5. *The admittance of the appellant's requests into the procedure*

- 5.1 Each of the appellant's requests, namely the main and auxiliary requests I, I', I'', I''' and II to VIII, constitutes an amendment to the appellant's case after it has filed its grounds of appeal and thus, under Article 13(1) RPBA (Rules of Procedure of the Boards of Appeal of the EPO, OJ EPO 2007, 536), may be admitted and considered at the board's discretion. The discretion shall be exercised in view of *inter alia* the complexity of the new subject-matter submitted, the current state of the proceedings and the need for procedural economy. As all twelve requests were submitted after oral proceedings had been arranged, under Article 13(3) RPBA they shall not be admitted if they raise issues which the board cannot reasonably be expected to deal with without adjournment of the oral proceedings.



5.2 *The main and auxiliary requests I and II to VIII*

These requests were submitted just over a month before the oral proceedings. Although the appellant did not identify the amendments made in the accompanying letter, the board was able to establish within a reasonable time before the oral proceedings that these requests were based on the previous main and auxiliary requests I and II to VIII on file with minor amendments to overcome the clarity objections raised in the annex to the summons to oral proceedings.

5.2.1 *Auxiliary request VIII*

In the oral proceedings the board pointed out for the first time that the claimed subject-matter, primarily the aircraft onboard health manager, related to original claims 36 to 38 which had not been searched. This raised the question of whether, following decision G 2/92, auxiliary request VIII should be admitted into the proceedings.

5.2.2 The appellant argued that the claimed subject-matter differed from that of the unsearched claims. Moreover the aircraft onboard health manager related to system functional testing onboard the aircraft, and this had been searched.

5.2.3 The board accepts the appellant's argument that the aircraft health monitor, set out in the independent claims of this request, is technically related to the system functional testing mentioned in original claim 4. This claim belongs to the first group of inventions identified by the search division as relating to

collecting system data from a plurality of platform systems, and this group of inventions was the subject of a search.

5.2.4 The main and auxiliary requests I and II to VIII were consequently admitted into the procedure, Article 13(1,3) RPBA.

5.3 *Auxiliary request I'*

5.3.1 Whilst the claims according to the main request and auxiliary request I contain independent claims to an aircraft wireless data communication system and a method to communicate in real-time with an aircraft, auxiliary request I', received just over a month before the oral proceedings, while not containing such a method claim, comprises two further independent claims directed to significantly different subject-matter, namely claim 1, which sets out a method for performing a software update for at least one of a plurality of aircraft systems in an aircraft, and claim 15, setting out an information system adapted for use on a mobile platform and for use in the system of any of claims 7 to 13. The claims according to this request are thus not restricted forms of previous claims, which would cause the procedure to converge, but effectively break with the past and take a new starting point. Moreover, contrary to the board's direction in the annex to the summons to oral proceedings, the letter accompanying this request did not identify the disclosure of the amended features in the original application, merely stating that the amended claims clarified the novelty objection of the main request and auxiliary request I. At the oral proceedings the appellant stated that the

amended claims were based on claim 23 and figure 3 as originally filed.

5.3.2 The board takes the view that a month before the oral proceedings it would be contrary to the principle of procedural economy to shift the focus of the proceedings in this way, since the amendments would have required *inter alia* a completely new assessment of the prior art and the adjournment of the oral proceedings. Moreover the appellant did not comply with the direction of the board, to identify the disclosure of the amended features in the original application, in the letter accompanying this request, Article 4(2) RPBA. Furthermore the appellant's explanations given in the oral proceedings regarding the origin of the amendments were insufficiently detailed to allow the board to even judge whether the amendments complied with Article 123(2) EPC without an adjournment of the oral proceedings. Hence the board did not admit this request into the proceedings, Article 13(1,3) RPBA.

#### 5.4 *Auxiliary request I''*

5.4.1 This request was received just over two weeks before the oral proceedings and thus after the deadline set by the board in the annex to the summons to oral proceedings. Like the main request and auxiliary request I, this request comprises an independent claim 1 to an aircraft wireless data communication system. However, like auxiliary request I', this request also contains a further independent claim directed to significantly different subject-matter to that of the independent claims according to the main request and auxiliary request I, namely claim 10 to a

method for performing a software update for at least one of a plurality of aircraft systems in an aircraft. In the accompanying letter the appellant stated that the claims of this request had "been brought further in line with claim 1 of auxiliary request I'", but did not comply with the board's direction in the annex to the summons to oral proceedings to identify the disclosure of the amended features in the original application. In the oral proceedings the appellant stated that the claims were based on claim 1 and the last two paragraphs of page 2 of the application as originally filed.

- 5.4.2 The board finds that just over two weeks before the oral proceedings it would likewise be contrary to the principle of procedural economy to shift the focus of the proceedings in this way, since the addition of independent claim 10 would have required *inter alia* a completely new assessment of the prior art and the adjournment of the oral proceedings. Moreover the appellant did not comply with the direction of the board, to identify the disclosure of the amended features in the original application, in the accompanying letter, nor did it comply with the board's direction to submit any amendments at the latest one month before the oral proceedings, Article 4(2) RPBA. Furthermore the appellant's explanations given in the oral proceedings regarding the origin of the amendments were insufficiently detailed to allow the board to even judge whether the amendments complied with Article 123(2) EPC without an adjournment of the oral proceedings. Hence the board did not admit this request into the proceedings either, Article 13(1,3) RPBA.

5.5 *Auxiliary request I'''*

This request was filed in the oral proceedings in response to doubts expressed by the board concerning auxiliary requests I' and I'' as to whether there was a basis in the application as originally filed for the claimed automatic loading of aircraft software without any mention of loading interlocks, Article 123(2) EPC. As the appellant explained to the board in the oral proceedings, the claims of this request are based on those of auxiliary request I with amendments taken from claim 23 to overcome the board's doubts under Article 123(2) EPC. The board was thus readily able to understand the amendments and their effect in the oral proceedings without delay, and in particular without adjournment of the oral proceedings. Hence the board admitted this request into the proceedings, Article 13(1,3) RPBA.

6. *Claim 1 of the main request*

6.1 Claim 1 is the same as claim 1 of the main request forming the basis of the appealed decision. According to the reasons for the decision, the subject-matter of claim 1 differed from the system known from D4 in that the target aircraft configuration identity was an authorized aircraft configuration identity including the identity of each software and hardware part of the aircraft. Since the term "authorized configuration" referred to an administrative and not to a technical feature, the only technical feature that could be the basis for an inventive step was that the target aircraft configuration identity included the identity of each software and hardware part of the aircraft. D4

(page 17, lines 1 to 2) disclosed that the data set sent from the ground to the aircraft was authorized. Although D4 only disclosed that the target aircraft configuration identity included the identity of software parts (see paragraphs [0041] and [0068]), it would have been obvious for the skilled person that the same wireless communication system could be used for hardware parts too, "if the need arises".

6.2 The board notes that the expression "if the need arises" leaves open the question of whether it would have been obvious for the skilled person to extend the system known from D4 to hardware parts of the aircraft.

6.3 The appellant has argued that there is no evidence on file that a skilled person would have been aware that configuration control was concerned with both the aircraft hardware and software, although replacement of computer hardware usually necessitated a software update. Exchanging information on the identity of hardware parts was not meaningful in the context of D4, as updating hardware parts wirelessly was impossible. The term in the claims "authorized" contributed to technical character. According to the invention, the aircraft configuration included the identity of hardware parts, thus providing an additional safety measure against incompatible combinations of hardware parts and software updates. EPIPs, which were acknowledged in the description of the application as prior art, were used to identify the major components of aircraft non-computer hardware, computer hardware being identifiable by other means. The invention also had the advantages that software updates were checked automatically, which was thus not prone to human error,

and less people were needed in and around the aircraft during maintenance, since this could now be done remotely. The appellant has also argued that, as a result of airlines' regulatory obligation to maintain an authorized aircraft configuration, hardware/software compatibility problems, for instance resulting from upgrades, can result in aircraft being grounded until the compatibility issue is resolved. The appellant has conceded that the claimed computer/server and firewall correspond to the NSU and SIU, respectively, known from D4, and that D4 suggests making a comparison between an expected list and an actual list of installed software parts, although not preventing inappropriate combinations of software from being installed.

6.4 It is common ground between the board and the appellant that references in the claims to the aircraft configuration have to be understood in the light of the statement on page 2 of the description (in the version applicable to the main and auxiliary requests I and II to VIII, in each case in lines 2 to 4) that "An aircraft's configuration is herein defined as the identity of each software and hardware part used on the aircraft".

6.5 The board finds that the term in the claims "authorized" only contributes to technical character and has a limitative effect when it is used as a relative term in contrast to "actual" in setting out the determination of a difference between an authorized aircraft configuration identity and an actual aircraft configuration identity. Thus, contrary to the finding in the appealed decision, it is common ground between the board and the appellant that the expression

"authorized", when used to set out the determination of such a difference, contributes to technical character. However the board does not accept the appellant's argument in the case of claim 1 of the main request. In this case the board comes to the same conclusion as the appealed decision that, since actual and authorized aircraft configuration identities are set out without a difference being determined between them, the term "authorised" is used as an absolute term rather than a relative one. In this case the term "authorized" does not contribute to technical character and is not of limitative effect.

6.6 Hence the board concludes that, as found in the appealed decision, D4 discloses an authorized aircraft configuration identity including the identity of each software part of the aircraft, the subject-matter of claim 1 differing from the disclosure of D4 in that the authorized aircraft configuration identity includes the identity of each software and hardware part of the aircraft.

6.7 As to inventive step, as is clear from D4 (see page 17, lines 2 to 5) that the skilled person was aware before the priority date that hardware replacements on an aircraft could lead to compatibility issues with the aircraft software. It follows directly from the existence of such compatibility issues that, contrary to the appellant's argument, the skilled person would have been aware that configuration control was of concern both for the aircraft hardware and the aircraft software. The objective technical problem is consequently seen as to improve aircraft



hardware/software compatibility, in itself an obvious problem starting from D4.

6.8 The board is not convinced by the argument that it would not have been obvious to exchange information between a ground-based computer and the computer/server on the aircraft regarding hardware components just because hardware components could not be updated wirelessly, since the identity of hardware parts has a bearing on hardware/software compatibility even if the aircraft hardware parts, in contrast to its software parts, cannot be changed remotely via a wireless link. The skilled person, seeking to improve aircraft hardware/software compatibility, would have extended the software configuration control approach known from D4 to also cover hardware, thus modifying the authorized aircraft configuration identity known from D4 to also include the identity of each hardware part of the aircraft, as a matter of usual design, thus arriving at the subject-matter of claim 1.

6.9 Hence the subject-matter of claim 1 does not involve an inventive step, Article 56 EPC 1973, in view of D4.

7. *Claim 1 of auxiliary request I*

7.1 Claim 1 differs from that according to the main request in the following added features:

"the computer/server further comprising a configuration management subsystem (46), said configuration management subsystem (46) being in communication with said aircraft systems (12) and adaptable to retrievably

obtain and report said actual aircraft configuration identity file" and

"and wherein the system further comprises an aircraft data load system wherein a difference determinable by said configuration management subsystem (46) between said authorized aircraft configuration identity file and said actual aircraft configuration identity file is reportable to said aircraft data load system and to said ground-based network of computers."

- 7.2 According to the reasons for the appealed decision, the added features were known from D4 and thus unable to lend inventive step, Article 56 EPC 1973, to claim 1 in view of D4.
- 7.3 The appellant has argued that, as shown in figure 3 of the application (see steps 62 and 64), aircraft software was updated based on differences between the authorized and actual aircraft configuration identity files. D4 did not however disclose an authorized aircraft configuration file.
- 7.4 For the reasons set out at point 3.1.6 above, the board finds that D4 discloses an actual aircraft configuration identity file, albeit only of software parts of the aircraft, and a configuration management subsystem (see point 3.1.5). The board understands D4 to disclose that if an unresolved aircraft/software compatibility issue is flagged then the necessary software update is sent from the ground to the NSU on the aircraft, from where, firewall (SIU) allowing, it is then loaded to the LRU concerned.

7.5 In the light of the board's understanding of D4 set out above, the "difference" set out in claim 1 is the identity of the software part to be updated, and this information is available to both the NSU and the data communication apparatus in D4. Hence the added features set out above are known from D4 with the exception that claim 1 states that the configuration management subsystem in the computer/server on the aircraft identifies the software part to update by determining a difference between an authorized aircraft configuration identity file and the actual aircraft configuration identity file.

7.6 In view of the firewall (SIU) between the NSU and the LRUs on the aircraft in D4, it is implicit that a software update must occur under the control of systems on the aircraft. It is also implicit in D4 that the decision as to which software part to update requires information on the available new updates. This information can either be communicated from the ground to the aircraft in an incremental manner, i.e. only the software parts to be updated are communicated, or integrally, i.e. a complete new authorized aircraft configuration identity file is sent to the aircraft, the latter approach being set out in claim 1. The application does not indicate any particular advantage of the integral approach over the incremental approach. Hence the board finds that the skilled person would have selected the integral approach as a matter of usual design and thus have realized the configuration management subsystem in the computer/server on the aircraft so as to identify the software part to update by determining a difference between an authorized aircraft configuration identity file and the actual

aircraft configuration identity file, as set out in claim 1, in an obvious manner.

7.7 Thus the subject-matter of claim 1 does not involve an inventive step, Article 56 EPC 1973, in view of D4.

8. *Claim 1 of auxiliary request I'''*

8.1 Claim 1 differs from that according to auxiliary request I in the following passage appended at the end:

" , wherein new software parts are loaded automatically from said data load system to said aircraft systems (12) when permitted by loading interlocks".

8.2 The appellant has argued that updating of aircraft software using an authorized aircraft configuration identity file, which was not known from D4, left no possibility for human error.

8.3 As set out in connection with claim 1 according to auxiliary request I, in view of the firewall (SIU) between the NSU and the LRUs on the aircraft in D4, it is implicit that a software update must occur under the control of systems on the aircraft. Moreover, contrary to the appellant's argument, as set out above in connection with auxiliary request I, D4 is considered to disclose an authorized aircraft configuration identity file, albeit for software parts of the aircraft. The skilled person realizing the system known from D4 would have been aware that D4 does not indicate the conditions under which the firewall allows software updating. D4 points to D3 as a relevant document. D3 discloses aircraft software only being updated when a

trigger condition is met, for instance by setting a parking brake; see page 9, lines 3 to 5. Such a trigger condition is regarded as a loading interlock, it being merely a matter of design to have several loading interlocks for added safety. Hence the skilled person applying the teaching of D3 to the disclosure of D4 would have arrived at the subject-matter of claim 1 in an obvious manner.

8.4 For these reasons, and the reasons given above for claim 1 of auxiliary request I, the subject-matter of claim 1 does not involve an inventive step, Article 56 EPC 1973, in the light of the combination of D4 and D3.

9. *Claim 1 of auxiliary request II*

9.1 Editorial and clarifying amendments aside, claim 1 differs from claim 1 of the main request in that the following passage has been added at the end:

"said onboard computer/server adapted to communicate with at least one software based platform system; said onboard computer/server being adaptable to wirelessly communicate with said ground-based network of computers; said ground-based network of computers being linkable with a plurality of users; and each of said plurality of users via said ground-based network of computers and said onboard computer/server being capable of: send [*sic*] a command set to said onboard computer/server."

9.2 According to the appealed decision, these added features were known *inter alia* from D4 and thus unable

to lend inventive step, Article 56 EPC 1973, to claim 1. The appellant has not disputed this point.

9.3 The appellant has argued that the additional features have the effect of allowing users on the ground to assess the real-time status of sensed systems and to determine whether they conform to their basis of certification, or whether repair deferral is possible. All such users could work with the aircraft configuration identity.

9.4 In the light of the analysis of D4 above, in particular section 3.1.3, the board finds that all of the added features set out above are known from D4 with the exception of the feature that the ground-based network of computers is linkable with a plurality of users. This feature is however known from D3 (see figure 1; ground access points 42). The skilled person realizing the system known from D4, in particular the data communication apparatus 12, would have consulted D3 to fill in the gaps in D4 and thus have realized the data communications apparatus as a network of computers linkable to a plurality of users as a usual matter of design.

9.5 For these reasons and those set out above for claim 1 of the main request, the subject-matter of claim 1 does not involve an inventive step, Article 56 EPC 1973, in view of the combination of D4 and D3.

10. *Claim 1 of auxiliary request III*

10.1 Claim 1 differs from claim 1 of the main request in that the authorized aircraft configuration identity is

no longer restricted to include the identity of each software and hardware part of the aircraft and in the following added features:

"the computer/server further comprises a configuration management subsystem (46), said configuration management subsystem (46) being in communication with said aircraft systems (12) and adaptable to retrievably obtain and report said actual aircraft configuration identity file;" and

"wherein the system further comprises an aircraft data load system for automatically loading new software parts from said data load system to said aircraft systems (12) when permitted by loading interlocks."

- 10.2 According to the reasons for the decision, the added features were known from D4 (see paragraphs [0037], [0059] and [0070]) and thus unable to lend inventive step, Article 56 EPC 1973, to claim 1.
- 10.3 In the annex to the summons to oral proceedings the board stated that it had doubts concerning the reasoning given in the appealed decision, since, although D4 (see paragraphs [0059] and [0070]) disclosed automatic loading of software (see page 22, line 10), it was doubtful whether D4 disclosed this being dependent on "loading interlocks". Interlocks were mentioned in paragraph [0070] but in the different context of interlocks preventing flight data from being sent to the ground-based network until the aircraft had landed. D3 however disclosed automatic software loading depended on a variety of conditions, for example the setting of the aircraft parking brake; see page 9,

lines 3 to 5 (cf. the sentence bridging pages 7 and 8 of the description according to this request).

10.4 In the light of the analysis of D4, in particular section 3.1.5, set out above, D4 discloses the first added feature, setting out the configuration management subsystem, and the second added feature, setting out the aircraft data load system, with the exception that automatically loading of new software parts from the data load system to the aircraft systems only occurs if permitted by loading interlocks. This has not been disputed by the appellant.

10.5 The skilled person realizing the system known from D4 would have been aware that D4 does not specify the conditions under which automatic software updating occurs and would have consulted D3 to fill in the gap in the disclosure of D4. D3 discloses carrying out such automatic software updating only if loading interlocks allow; see page 9, lines 3 to 5. By applying the teaching of D3 to D4 the skilled person would have consequently arrived at the subject-matter of claim 1 in an obvious manner.

10.6 For these reasons and those set out above for claim 1 of the main request, the subject-matter of claim 1 does not involve an inventive step, Article 56 EPC 1973, in view of the combination of D4 and D3.

11. *Claim 1 of auxiliary request IV*

11.1 Editorial and clarifying amendments aside, claim 1 sets out the same subject-matter as that of auxiliary request IV forming the basis of the appealed decision



and differs from that of the present main request in that the authorized aircraft configuration identity is no longer restricted to include the identity of each software and hardware part of the aircraft and in the following two added features:

"said onboard computer/server adapted to communicate with at least one software based platform system comprising a system configuration of said aircraft; said system configuration comprising:

- a platform electronic hardware configuration;
- a platform electronic software configuration; and
- a platform hardware configuration

said onboard computer/server being adaptable to wirelessly communicate with said ground-based network of computers; said ground-based network of computers being linkable with a plurality of users;" and

"each of said plurality of users via said ground-based network of computers and said onboard computer/server being capable of: send [*sic*] a command set to said onboard computer/server, wherein said command set further comprises:

- a configuration report command;
- a software loading command;
- a system functional test command;
- a maintenance information command; and
- a system monitoring command."

11.2 According to the appealed decision, the first added feature did not involve an inventive step for the same reasons as given in connection with the main request. Regarding the second added feature, the sending of a software loading command was known *inter alia* from D4

(see paragraph [0059]), and the sending of other management related commands did not involve an inventive step.

- 11.3 In the oral proceedings the board pointed out that D4 disclosed software in aircraft systems being updated in response to ARINC commands sent from the ground to the ADSL; see paragraphs [0054] and [0064]. What was termed the aircraft configuration identity in *inter alia* claim 1 of the main request was termed the "platform configuration" in claim 1 of the present request. The sentence bridging pages 16 and 17 of D4 disclosed testing on the aircraft. The board questioned whether the claimed software loading command from the ground to the aircraft (disclosed in original claim 4) contradicted the rest of the invention leading to a lack of clarity, Article 84 EPC 1973, since the invention related to a comparison in the aircraft of an actual and an authorized aircraft configuration identity, software being loaded if a difference was found.
- 11.4 The appellant has argued that the reasoning in the decision that sending one command was not inventive in the light of sending another command was not sufficient, as different commands required different measures to obtain the intended result. According to the appellant, this request is related to obtaining a real-time status of all aircraft systems and sending an authorized configuration file. In the oral proceedings the appellant argued that the skilled person seemed to be getting smarter with every request. D4 only mentioned a database containing version identifiers of software stored in software-loadable avionics units (see

paragraph [0031]). There was no disclosure of a system configuration comprising a platform hardware configuration and a platform software configuration. The aircraft engines were an example of hardware that would form part of the claimed "platform hardware configuration", which defined the hardware required for air-worthiness, but not part of the claimed "platform electronic hardware configuration", these terms being disclosed in claim 3 as originally filed. According to the description (see sentence bridging pages 12 and 13 of the corresponding description), EPIPs identified aircraft non-computer based hardware. However not all hardware was identified by an EPIP. For example, aircraft tyres had no EPIP. D4 did not disclose the claimed system functional test. Software loading commands were disclosed in the original application; see the sentence bridging pages 4 and 5 and page 5, lines 19 to 22. Moreover the claimed software loading command did not contradict the rest of the invention, since such a command from the ground could override the automatic software updating system.

#### 11.5 *The request for remittal*

The appellant has objected that the clarity, Article 84 EPC 1973, of claim 1 was questioned for the first time in the oral proceedings before the board and requested that the case be remitted so that the first instance could take a position on this issue. The board takes the view that it is unnecessary for the purposes of the present decision to take a final decision on whether claim 1 satisfies the requirements of Article 84 EPC 1973 regarding clarity, since, despite the clarity problem set out above, the board is able to construe

claim 1 in order to decide whether its subject-matter involves an inventive step, Article 56 EPC 1973. Hence the board does not allow the appellant's request that the case be remitted to the first instance, Article 111(1) EPC 1973, since this would not be procedurally efficient.

- 11.6 In the light of the analysis of D4 in section 3.1 above, D4 discloses the onboard computer/server (NSU) adapted to communicate with at least one software based platform system (LRUs 24) comprising a system configuration of said aircraft, albeit for software parts of the aircraft only; see point 3.1.6 above. D4 also discloses the onboard computer/server (NSU) being adaptable to wirelessly communicate with said ground-based network of computers. It is also common ground between the appellant and the board that D4 discloses that the aircraft server may be controlled by commands from a ground station (see page 27, lines 2 to 6) and that D4 discloses all of the claimed commands apart from the system functional test command. In particular, D4 discloses the server/computer producing a configuration report (see page 27, lines 6 to 9), loading software (see page 22, lines 6 to 9), providing maintenance information (see sentence bridging pages 3 and 4, in particular "central maintenance computers") and providing system monitoring information (see page 28, lines 1 to 6, in particular "Aircraft Condition Monitoring System"). In the light of the disclosure that the network server on the aircraft can on request perform compatibility checks between expected software part numbers stored in a resident database and actual part numbers (see page 27, lines 9

to 12), the board finds that D4 also discloses a system functional test command.

11.7 Hence the subject-matter of claim 1 differs from the disclosure of D4 in the following features:

- a. said system configuration comprising:
  - a platform electronic hardware configuration;
  - a platform electronic software configuration and
  - a platform hardware configuration.
  
- b. said ground-based network of computers being linkable with a plurality of users, each of said plurality of users via said ground-based network of computers and said onboard computer/server being capable of sending said command set to the onboard computer/server.

11.8 Difference features "a" and "b" are technically unrelated, there being no synergistic effect, so that their contributions to inventive step must be assessed separately. Contrary to the appellant's argument, this is not a case of the skilled person "getting smarter"; the inventive contribution of each of the difference features "a" and "b", taken alone, is considered from the standpoint of the conventional skilled person.

11.9 Regarding difference feature "a", it is clear from D4 (see page 17, lines 2 to 5) that the skilled person was aware before the priority date that hardware replacements on an aircraft could lead to compatibility issues with the aircraft software. It follows directly from the existence of such compatibility issues that the skilled person would have been aware that

- configuration control was of concern both for the aircraft hardware and the aircraft software. The objective technical problem is consequently seen as to improve aircraft hardware/software compatibility, in itself an obvious problem starting from D4.
- 11.10 The board is not convinced by the argument that it would not have been obvious to exchange information between a ground-based computer and the computer/server on the aircraft regarding hardware components just because hardware components could not be updated wirelessly, since, as set out above in section 6.8 regarding the main request, the identity of hardware parts has a bearing on hardware/software compatibility even if the aircraft hardware parts, in contrast to its software parts, cannot be changed remotely via a wireless link.
- 11.11 As to feature "b", this features is known from D3 (see figure 1; ground access points 42). The skilled person realizing the system known from D4, in particular the data communication apparatus 12, would have consulted D3 to fill in the gaps in the disclosure of D4 and thus have realized the data communications apparatus as a network of computers linkable to a plurality of users as a usual matter of design.
- 11.12 For these reasons and those set out above for claim 1 of the main request, the subject-matter of claim 1 does not involve an inventive step, Article 56 EPC 1973, in view of the combination of D4 and D3.

12. *Claim 1 of auxiliary request V*

12.1 Editorial amendments aside, claim 1 differs from that of the main request in the following feature added at the end:

"wherein an electronic firewall (42) is disposed between the plurality of aircraft systems (12) and the computer/server."

12.2 In the annex to the summons to oral proceedings the board stated that the added feature was known from D4 (see figure 2; SIU 46 and page 13, lines 5 to 8) and was thus unable to lend inventive step, Article 56 EPC 1973, to the subject-matter of claim 1 in view of D4.

12.3 The appellant has argued that the added feature has the effect of temporarily isolating software or data affecting flight systems or operating system controls from the operational systems of the aircraft. The appellant has also argued that D4 does not disclose a firewall between the server (NSU) and the hub (52), implying that the firewall is not disposed between ARINC 615A aircraft systems and the server.

12.4 In the oral proceedings the board pointed out that, in the light of page 13, lines 14 to 16, and figure 2, the firewall (SIU) can be interposed between the hub and the server so that the server is interposed between ARINC 615A aircraft systems and the server.

12.5 The board finds that the added feature is known from D4 (see figure 2; SIU 46 and page 13, lines 5 to 8). Hence, for these reasons and those set out above for claim 1

of the main request, the subject-matter of claim 1 does not involve an inventive step, Article 56 EPC 1973, in view of D4.

13. *Claim 1 of auxiliary request VI*

13.1 Editorial amendments aside, claim 1 sets out the same subject-matter as that of auxiliary request VI forming the basis of the appealed decision and differs from that of the present main request in that the authorized aircraft configuration identity is no longer restricted to include the identity of each software and hardware part of the aircraft and in the following feature added at the end:

"and wherein the computer/server (12) is linked to a plurality of electronic part identification placards, EPIPs, (50) and the collection of information from the plurality of EPIPs (50) forms part of the aircraft's hardware actual configuration identity."

13.2 According to the appealed decision, it would have been obvious, for the reasons given in connection with the main request, to extend the system known from D4 to hardware parts of the aircraft, thus adding hardware information to a system configuration.

13.3 The appellant has argued that D4 does not disclose the configuration identity including the identity of each hardware part and only discloses exchanging information pertaining to software parts. There was no evidence on file that a skilled person would have been aware that configuration control was concerned with both the aircraft software and hardware. The argument that it



would have been obvious to extend the system to hardware parts of the aircraft was based on hindsight and insufficient. Moreover such an extension of the system would have served no purpose, as hardware parts could not be updated wirelessly. If computer hardware was replaced then new software had to be installed. The claimed use of EPIPs in the aircraft's hardware actual configuration identity provided an additional safety measure against incompatible combinations of hardware parts and software updates. The server could also check the aircraft actual and authorized configuration identities to ensure hardware compliance. The system according to the application could automatically identify new non-computer hardware, which was neither suggested nor disclosed in the prior art. Typically someone involved in updating LRU software was a specialist having little knowledge of the overall problems relating to maintenance. In the oral proceedings the appellant argued that EPIPs were not a matter of general knowledge, and that it was not known in the prior art to use them to establish the hardware configuration identity of an aircraft.

- 13.4 As set out above in connection with claim 1 of the main request, it is clear from D4 (see page 17, lines 2 to 5) that the skilled person was aware before the priority date that hardware replacements on an aircraft could lead to compatibility issues with the aircraft software. It follows directly from the existence of such compatibility issues that, contrary to the appellant's argument, the skilled person would have been aware that configuration control was of concern both for the aircraft hardware and the aircraft software. Thus the board does not accept that the skilled person starting

from D4 would have been a specialist solely interested in software parts of the aircraft. The objective technical problem is consequently seen as to improve aircraft hardware/software compatibility, in itself an obvious problem starting from D4.

13.5 The board is also not convinced by the argument that it would not have been obvious to exchange information between a ground-based computer and the computer/server on the aircraft regarding hardware components just because hardware components could not be updated wirelessly, since the identity of hardware parts has a bearing on hardware/software compatibility even if the aircraft hardware parts, in contrast to its software parts, cannot be changed remotely via a wireless link; see points 6.8 and 11.10 above. The board is also not convinced by the appellant's assertion, without supporting evidence, that EPIPs were not a matter of general knowledge and that it was not known in the prior art to use them to establish the hardware configuration identity of an aircraft. In the light of the acknowledgement of EPIPs as prior art in the application, the board finds that the person skilled in the relevant aviation art would have known about them, even if they were not general knowledge outside that art. The board is also not convinced by the appellant's assertion that it was not known to use EPIPs to establish the hardware configuration of an aircraft, since this would contradict the acknowledgement of EPIPs in the application, and the appellant has not argued that this acknowledgement is erroneous.

13.6 The skilled person, seeking to improve aircraft hardware/software compatibility, would have extended

the software configuration control approach known from D4 to also cover hardware, thus modifying the authorized aircraft configuration identity known from D4 to include the aircraft's hardware actual configuration identity as a matter of usual design. In doing so the skilled person would have considered how to acquire information on the aircraft's hardware actual configuration and adopted EPIPs as an obvious and known solution. The description of the application acknowledges (see the paragraph bridging pages 12 and 13) that the use of electronic part identification placards (EPIPs) to identify aircraft non-computer based hardware parts was known in the prior art, stating that "The EPIPs 50 are known in the art and identify via individualized part numbers that specific non-computer based hardware components are installed on the aircraft 11." The skilled person implementing EPIPs on the aircraft would have added not only the EPIPs themselves but also links between the EPIPs and the computer/server on the aircraft to read them, as a usual matter of design, the collection of information from the plurality of EPIPs thus forming part of the aircraft's hardware actual configuration identity.

13.7 For these reasons and those set out above for claim 1 of the main request, the subject-matter of claim 1 does not involve an inventive step, Article 56 EPC 1973, in view of D4.

14. *Claim 1 of auxiliary request VII*

14.1 Editorial amendments aside, claim 1 sets out the same subject-matter as that of auxiliary request VII forming the basis of the appealed decision. Again, editorial

amendments aside, claim 1 of this request differs from that of auxiliary request VI in the following features:

- a. the electronic part identification placards identify via individualized part numbers that specific non-computer based hardware components are installed on the aircraft;
- b. any one of said ground-based network of computers is operable to send a command set to the computer/server and
- c. the authorized aircraft configuration identity includes the identity of each software and hardware part of the aircraft.

14.2 Although the examining division ultimately decided not to admit the then auxiliary request VII into the proceedings, Rule 86(3) EPC 1973, it stated in the reasons for the decision that the computer/server of D4 (see paragraph [0041]) collected part numbers from computer-based components. If the person skilled in the art had sought to make the computer/server also collect part numbers from non-computer based hardware components, the skilled person would have equipped them with an electronic part identification placard (EPIP). Hence the subject-matter of claim 1 did not *prima facie* involve an inventive step, Article 56 EPC 1973.

14.3 In the annex to the summons to oral proceedings the board stated that, since some of the aircraft hardware components would have inevitably been non-computer based and since individualized part numbers would have been usual to distinguish between different hardware

parts, the subject-matter of claim 1 seemed to lack inventive step, Article 56 EPC 1973, in view of D4.

- 14.4 The appellant has argued that extending the aircraft actual configuration from the system disclosed in document D4 to hardware parts would have served no purpose and therefore involved an inventive step. Moreover the skilled person of D4 had no overall view of maintenance and was not interested in the non-computer hardware of the aircraft.
- 14.5 Difference feature "b", set out above, is known from D4 which discloses that the aircraft server may be controlled by commands from a ground station (see page 27, lines 2 to 6). For instance, D4 discloses the server/computer responding to such commands to produce a configuration report (see page 27, lines 6 to 9), load software (see page 22, lines 6 to 9) and provide maintenance information (see sentence bridging pages 3 and 4, in particular "central maintenance computers").
- 14.6 As set out above in connection with the main request, it is clear from D4 (see page 17, lines 2 to 5) that the skilled person was aware before the priority date that hardware replacements on an aircraft could lead to compatibility issues with the aircraft software. It follows directly from the existence of such compatibility issues that, contrary to the appellant's argument, the skilled person would have been aware that configuration control was of concern both for the aircraft hardware and the aircraft software. Thus the board does not accept that the skilled person starting from D4 would have had no overall view of maintenance

and would not have been interested in the non-computer hardware of the aircraft.

- 14.7 Difference features "a" and "c", set out above, are technically unrelated, there being no synergistic effect, indeed this has not been argued by the appellant, so that their contributions to inventive step, Article 56 EPC 1973, must be considered separately.
- 14.8 Feature "c" is an obvious design modification of the system known from D4 for the reasons set out above in connection with the main request. The board is not convinced by the argument that it would not have been obvious to exchange information between a ground-based computer and the computer/server on the aircraft regarding hardware components just because hardware components could not be updated wirelessly, since the identity of hardware parts has a bearing on hardware/software compatibility even if the aircraft hardware parts cannot be changed remotely via a wireless link.
- 14.9 Turning to difference feature "a", the skilled person implementing EPIPs to identify non-computer hardware parts of the aircraft, as set out above in connection with claim 1 of auxiliary request VI, would have used individualized part numbers to distinguish between different hardware parts as a matter of usual design.
- 14.10 For these reasons and those set out above for claim 1 of the main request and auxiliary request VI, the subject-matter of claim 1 does not involve an inventive step, Article 56 EPC 1973, in view of D4.

15. *Claim 7 of auxiliary request VIII*

15.1 Editorial and clarifying amendments aside, claim 7 sets out the same subject-matter as that of auxiliary request VIII forming the basis of the appealed decision and differs from claim 1 of the present main request in the following features:

- a. an aircraft onboard health manager (180) being adaptable to electronically communicate with the onboard computer/server (12) and with each of said plurality of aircraft systems (44) and
- b. wherein any one of said ground-based network of computers is operable to send a command set to said onboard computer/server (12) wherein the command set comprises a request for performance of a specific test wherein the health manager (180) receiving the request, requests a selected aircraft system to perform a test, and wherein the results of the test are transmitted by the health manager (180) to the ground-based network of computers.

15.2 Although the examining division ultimately decided not to admit auxiliary request VIII into the proceedings, Rule 86(3) EPC 1973, it stated in the reasons for the decision that it was well known in the art, and acknowledged in the description of the application, that aircraft comprised on-board health managers. It would have been obvious to use the computer/server known from D4 to remotely control a known aircraft health manager. Hence *prima facie* the subject-matter of

claim 7 did not involve an inventive step, Article 56 EPC 1973, in view of D4.

15.3 The appellant has argued that the effect of the claimed onboard health manager was to allow aircraft systems to be tested wirelessly, possibly in-flight, interlock permitting, by a technician on the ground. In D4 aircraft systems were tested in an offline mode, the health manager consolidating diagnostics data received from the aircraft systems. In the event of a problem with an aircraft system, the aircraft system was shut down (if possible), and the diagnostics information collected by the health manager was analysed afterwards. The claimed health manager was not comparable with the ACMS in D4. In view of the term "selected" in the expression in claim 7 "... the health manager (180) ... requests a selected aircraft system to perform a test ...", the health manager decided which aircraft system to test.

15.4 Feature "a", set out above, is known from D4; see the aircraft condition monitoring system (ACMS) disclosed on page 15, lines 16 to 21, and in figure 1; ACMS 20. The ACMS gathers aircraft performance data from the aircraft's avionics systems and communicates these to the ADSL which sends them via the wireless link to the data communication apparatus 12.

15.5 Turning to feature "b", D4 discloses any one of said ground-based network of computers being operable to send a command set to said onboard computer/server (12), since D4 discloses that the aircraft server may be controlled by commands from a ground station (see page 27, lines 2 to 6). For instance, D4 discloses the



server/computer responding to such commands to produce a configuration report (see page 27, lines 6 to 9), load software (see page 22, lines 6 to 9) and provide maintenance information (see sentence bridging pages 3 and 4, in particular "central maintenance computers"). Hence the only difference between the subject-matter of claim 7 and the disclosure of D4 is that:

"the command set comprises a request for performance of a specific test wherein the health manager (180) receiving the request, requests a selected aircraft system to perform a test, and wherein the results of the test are transmitted by the health manager (180) to the ground-based network of computers."

- 15.6 This difference feature sets out the integration of the ACMS into the system for ground-based monitoring of aircraft systems via the NSU and is unrelated to the issue of the authorized aircraft configuration identity including the identity of each software and hardware part of the aircraft, there being no synergistic effect. Regarding the aircraft onboard health manager, the objective technical problem is seen as to automate the operation of the ACMS, automation of systems being a usual activity of the skilled person.
- 15.7 The claimed addition of a request for performance of a specific test to the command set which any one of said ground-based network of computers can send to said onboard computer/server is seen as a routine solution to the objective technical problem. D4 teaches the use of a command from the ground to elicit a response from an aircraft system and also mentions testing occurring onboard the aircraft in the NSU and in individual LRUs;

see section 3.1.3 above. Adding a command to elicit a response from the ACMS in D4 extends this teaching to the ACMS in an obvious way. Since claim 7 refers to the request from the ground being for performance of a "specific test", the board understands the use of the term in claim 7 "selected aircraft system" (emphasis added by the board) to mean that the health manager addresses one aircraft system at a time, that system being selected from the ground. Hence the board does not agree with the appellant that claim 7 is to be understood as setting out that the aircraft onboard health manager can autonomously decide which aircraft system to test. Such individual addressing of system components is regarded as simpler, and therefore the obvious choice, over the more complex testing of a plurality of aircraft systems simultaneously.

15.8 For these reasons and those set out above for claim 1 of the main request, the subject-matter of claim 7 does not involve an inventive step, Article 56 EPC 1973, in view of D4.

16. *Conclusion on the appellant's requests*

As auxiliary requests I' and I'' were not admitted into the procedure and the subject-matter of the independent apparatus claim according to the main request and auxiliary requests I, I''' and II to VIII does not involve an inventive step, Article 56 EPC 1973, the decision cannot be set aside.

**Order**

**For these reasons it is decided that:**

The appeal is dismissed.

The Registrar:

The Chairman:

B. Atienza Vivancos

D. H. Rees