Commissioner’s Decision #1513

Décision du commissaire #1513

TOPICS:	F00	Novelty
	O00	Obviousness
SUJETS:	F00	Nouveauté
	O00	Évidence

Application No: 2,713,013

Demande no: 2 713 013

IN THE CANADIAN PATENT OFFICE

DECISION OF THE COMMISSIONER OF PATENTS

Patent application number 2,713,013, having been rejected under subsection 30(3) of the *Patent Rules* (SOR/96-423) as they read immediately before October 30, 2019, has consequently been reviewed in accordance with paragraph 199(3)(*c*) of the *Patent Rules* (SOR/2019-251). The recommendation of the Board and the decision of the Commissioner are to refuse the application if the necessary amendments are not made.

Agent for the Applicant

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INTRODUCTION

[1] This recommendation concerns the review of rejected Canadian patent application number 2,713,013 ("the instant application"), which is entitled "DECENTRALIZED ELECTRIC BRAKE SYSTEM" and is owned by MEGGITT AIRCRAFT BRAKING SYSTEMS CORPORATION. ("the Applicant"). A review of the rejected application has been conducted pursuant to paragraph 199(3)(*c*) of the *Patent Rules*. As explained in more detail below, our recommendation is that the Commissioner of Patents refuse the application if the necessary amendments are not made.

BACKGROUND

The Application

[2] The instant application was filed in Canada on August 11, 2010 and was laid open to public inspection on February 12, 2011. The application claims priority from a US patent application dated August 12, 2009, which is the relevant date for assessing novelty and obviousness.

[3] The instant application relates to an electric brake control system for aircraft. Specifically, the system provides inputs to brake actuators at the wheel and brake assemblies through electromechanical control units ("EMCUs"), each of which comprises a pair of electromechanical actuator controllers ("EMACs"). Each wheel assembly is associated with two different EMACs, which are themselves associated with two different EMCUs. This distribution provides for partial control of wheel braking even with the failure of a particular EMAC. Further, each EMAC comprises an antiskid system, so that the failure of any EMAC or EMCU leaves the remaining units capable of providing antiskid control to their associated wheel brake actuators. Figure 2B of the instant application illustrates the arrangement of EMCUs 88, 90, 92 and 94 as well as that of the EMACs 96, 100, 104 and 108:

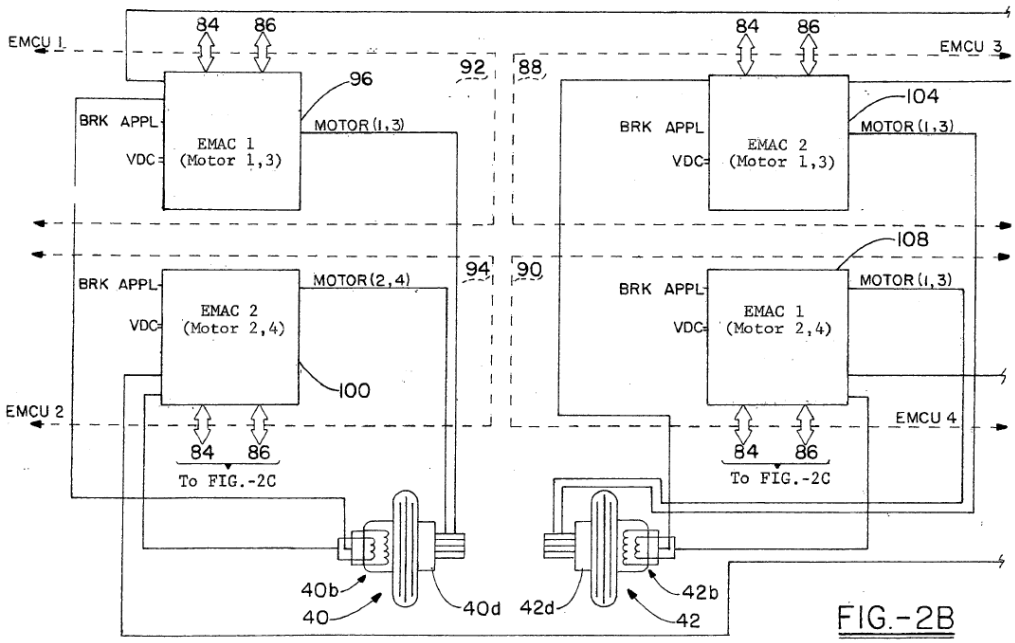

FIG.-2B

[4] As shown in Figure 2B, each EMCU is illustrated by a dotted line that surrounds two EMACs, the other EMACs of the pairs not shown in this particular Figure. Two of four wheel and brake assemblies 40 and 42 are shown, each of which is each connected to two different EMACs (e.g., wheel and brake assembly 40 is connected to EMACs 1 and 2, which are part of EMCUs 92 and 94, respectively), so that, as discussed above, if one EMAC fails, the other continues to provide braking force and antiskid control to the wheel and brake assembly.

Prosecution History

[5] On July 20, 2016, a Final Action ("FA") was written pursuant to subsection 30(4) of the *Patent Rules* as they read immediately before October 30, 2019. The FA stated that the instant application was defective on the grounds that, of the claims on file at the time of FA ("claims on file"), claims 1-8 and 10-16 lacked novelty and are therefore non-compliant with paragraph 28.2(1)(*b*) of the *Patent Act* and claim 9 would have been obvious and is therefore non-compliant with section 28.3 of the *Patent Act*.

[6] In a January 20, 2017 response to the FA ("R-FA"), the Applicant did not propose amendments to the claims on file. Arguments in favor of the patentability of the claims on file were submitted.

[7] As the Examiner considered the application not to comply with the *Patent Act* and *Patent Rules*, the application was forwarded to the Patent Appeal Board ("the Board") for review on March 10, 2017 along with an explanation outlined in a Summary of Reasons ("SOR"). The SOR set out the position that the claims on file were still considered to be defective due to lack of novelty and obviousness.

[8] In a letter dated March 13, 2017, the Board forwarded to the Applicant a copy of the SOR and requested that the Applicant confirm its continued interest in having the application reviewed.

[9] In a letter dated May 23, 2017, the Applicant confirmed its interest in having the review proceed.

[10] The present panel ("the Panel") was formed to review the instant application under paragraph 199(3)(*c*) of the *Patent Rules*.

[11] In a preliminary review letter ("PR letter") dated September 18, 2019, the Panel set out its preliminary analysis of the lack of novelty and obviousness issues with respect to the claims on file. The Panel set out its preliminary view that claims 1-4 on file lacked novelty and are therefore non-compliant with paragraph 28.2(1)(*b*) of the *Patent Act*. The Panel also set out its preliminary view that, with the exception of claims 7-9, 12 and 16 on file, the claims would have been obvious and are therefore non-compliant with section 28.3 of the *Patent Act*. The Panel also provided the Applicant with an opportunity to make oral and/or written submissions.

[12] In a response to the PR letter dated October 17, 2019 ("R-PR"), the Applicant provided arguments in favor of the patentability of the claims on file. No amendments to the claims were proposed.

[13] An oral hearing via teleconference was held on November 1, 2019.

[14] As a result of a detailed discussion at the hearing related to the content of the prior art documents cited in the PR letter and the scope of the claims on file, it was agreed that the Applicant would be given the opportunity to make supplemental written submissions after the hearing, including the submission of proposed claim amendments, in an effort to overcome the lack of novelty and obviousness defects.

[15] In a supplemental response to the PR letter dated November 4, 2019 ("SR-PR"), the Applicant submitted proposed claims 1-16 ("proposed claims") and arguments in favor of their patentability.

ISSUES

[16] In light of the preliminary views expressed in the PR letter, the issues to be addressed by the present review are whether:

- claims 1-4 on file lack novelty; and
- claims 1-16 on file would have been obvious.

[17] If the claims on file are considered to be defective, we may turn to the proposed claims and consider whether they constitute amendments necessary for compliance with the *Patent Act* and *Patent Rules*.

LEGAL PRINCIPLES AND OFFICE PRACTICE

Claim Construction

[18] In accordance with *Free World Trust v Électro Santé Inc*, 2000 SCC 66, essential elements are identified through a purposive construction of the claims done by considering the whole of the disclosure, including the specification and drawings (see also *Whirlpool Corp v Camco Inc*, 2000 SCC 67 at paras 49(f) and (g) and 52). In accordance with the *Manual of Patent Office Practice* §12.02 (revised June 2015), the first step of purposive claim construction is to identify the person skilled in the art and their relevant common general knowledge ("CGK"). The next step is to identify the problem addressed by the inventors and the solution put forth in the application. Essential elements can then be identified as those required to achieve the disclosed solution as claimed.

Novelty

[19] Paragraph 28.2(1)(*b*) of the *Patent Act* sets out the requirement that the subject-matter of a claim must be novel in view of a disclosure by a third party:

> **28.2** (1) The subject-matter defined by a claim in an application for a patent in Canada (the "pending application") must not have been disclosed
> **(b)** before the claim date by a person not mentioned in paragraph (a) in such a manner that the subject-matter became available to the public in Canada or elsewhere.

[20] There are two separate requirements in order to show that a prior art document anticipates a claimed invention: a prior disclosure of the claimed subject-matter; and the prior disclosure must enable the claimed subject-matter to be practised by a person skilled in the art (*Apotex Inc v Sanofi Synthelabo Canada Inc*, 2008 SCC 61 [*Sanofi*] at paragraphs 24-29).

[21] "Prior disclosure" means that the prior art must disclose subject-matter which, if performed, would necessarily result in infringement of the patent. The person skilled in the art looking at the disclosure is "taken to be trying to understand what the author of the description [in the prior patent] meant" (*Sanofi* at paragraph 32). At this stage, there is no room for trial and error or experimentation by the skilled person. The prior art is simply read "for the purposes of understanding it": see *Sanofi*, at paragraph 25, citing *Synthon BV v SmithKline Beecham plc*, [2006] 1 All ER 685, [2005] UKHL 59 (BAILII).

[22] "Enablement" means that the person skilled in the art would have been able to practise the invention without undue burden. The person skilled in the art is assumed to be willing to make trial and error experiments to get it to work: *Sanofi*, at paragraphs 26-27.

Obviousness

[23] The *Patent Act* requires that the subject-matter of a claim not be obvious to a person skilled in the art. Section 28.3 of the *Patent Act* states:

> 28.3 The subject-matter defined by a claim in an application for a patent in Canada must be subject matter that would not have been obvious on the claim date to a person skilled in the art or science to which it pertains, having regard to
>
> (a) information disclosed more than one year before the filing date by the applicant, or by a person who obtained knowledge, directly or indirectly, from the applicant in such a manner that the information became available to the public in Canada or elsewhere; and
>
> (b) information disclosed before the claim date by a person not mentioned in paragraph (a) in such a manner that the information became available to the public in Canada or elsewhere.

[24] In *Sanofi* at paragraph 67, the Supreme Court of Canada stated that it is useful in an obviousness inquiry to use the following four-step approach:

> (1) (a) Identify the notional "person skilled in the art";
>
> (b) Identify the relevant common general knowledge of that person;
>
> (2) Identify the inventive concept of the claim in question or if that cannot readily be done, construe it;
>
> (3) Identify what, if any, differences exist between the matter cited as forming part of the "state of the art" and the inventive concept of the claim or the claim as construed;
>
> (4) Viewed without any knowledge of the alleged invention as claimed, do those differences constitute steps which would have been obvious to the person skilled in the art or do they require any degree of invention?

ANALYSIS

Claim Construction

The person skilled in the art

[25] In the PR letter, as was the case in the FA, the person skilled in the art was characterized as:

> a team comprising a mechanical engineer, an electrical engineer, and an instrumentation engineer, all working in the field of aircraft brake design.

[26] The above characterization was not disputed by the Applicant in the R-FA, R-PR or SR-PR. We apply it in our analysis below.

The relevant common general knowledge

[27] In the PR letter, the relevant CGK was set out as follows:

> In the FA at pages 5-6 under the analysis of obviousness, the relevant CGK of the person skilled in the art was set out in conjunction with each member of the team making up the person skilled in the art as follows:

Mechanical Engineer	-features and mechanical layout of an aircraft braking system control of heating of aircraft braking components
Electrical Engineer	-features and electrical layout of an aircraft braking system -computer systems and algorithms required for controlling braking components
Instrumentation Engineer	-instrumentation requirements of an aircraft braking system.

The above points were not disputed in the R-FA and we adopt them for the purposes of our analysis below.

To the above we add the following points taken from the Background of the Invention section that in our preliminary view form part of the relevant CGK:

- prior art electric brake systems incorporate antiskid technology within a centralized braking control unit;
- the antiskid controller resides hierarchically above and separate from the brake actuators;
- antiskid capabilities are generally limited to normal braking mode only and are not applicable to alternate or emergency braking modes, which limits aircraft dispatchability;
- with centralization of the antiskid system as part of the centralized braking system, a single failure can result in grounding of the aircraft; and
- as a result of the above, there is a need for decentralization of the antiskid function to retain antiskid on all wheels in the event of a single failure, while tolerating further failures.

[28] None of the above was disputed by the Applicant in the R-PR or SR-PR.

Essential Elements

[29] With respect to a determination of essential versus non-essential features, as noted in the PR letter, in the present case, we have considered all the features of the claims to be essential:

> In the present case, there are no issues raised with respect to which of the features in the claims are essential versus non-essential. In the analyses below under lack of novelty and obviousness we have taken into account all the features of the claims on file.

Only a partial loss of functionality…

[30] Independent claim 1 of the instant application is as follows:

> 1. An electric aircraft brake control system, comprising:
>
> a plurality of wheel and brake assemblies, each assembly having a wheel, wheel speed transducer, brake assembly, and a brake actuator;
>
> pairs of electromechanical control units uniquely associated with and connected to certain actuator controllers of said wheel and brake assemblies, said actuator controllers having antiskid systems as a part thereof connected to specific actuators of associated wheel and brake assemblies,
>
> said actuator controllers configured independently of each other, such that a failure of any one or more controllers allows the remaining controllers to continue to operate unimpeded with antiskid capability <u>such that the aircraft brake control system experiences only a partial loss of functionality associated with the failed controller or controllers to thereby ensure aircraft dispatchability</u>; and
>
> at least two brake data concentrators receiving data corresponding to various aircraft operational parameters, including brake pedal position, and providing operational signals to said electromechanical control units as a function thereof. [Emphasis added]

[31] In the PR letter, based on the debate during prosecution up to and including the FA and the R-FA, we identified an issue regarding the construction of the above emphasized portion of the independent claims 1 and 11 on file:

> With respect to the scope of terms used in the claims, in our preliminary view, in the debate between the Applicant and Examiner during prosecution, there is a difference of opinion as to the scope of the feature set out in independent claim 1 on file as "such that the aircraft brake control system experiences only a partial loss of functionality associated with the failed controller or controllers to thereby ensure aircraft dispatchability." This claimed result flows from the previously specified feature that the electromechanical actuator controllers ("EMACs") are independent of each other and that one or more of them may fail, leading to the quoted result above.
>
> Independent claim 11 includes similar language but specifies that the possible failure or failures are linked to the electromechanical control units ("EMCUs"), rather than the actuator controllers, as specified in claim 1. However, since the EMCUs comprise as primary components the actuator controllers, we see no effective difference in the claim language except that with the failure of an EMCU, the effect may be the loss of more than one actuator controller.

[32] We reviewed the Applicant's submission in respect of the above noted features, as well as the specification:

> In the R-FA, in comparing independent claim 1 with the prior art, the Applicant contends that the prior art uses redundant components or "back-up" units that replace those that fail. This is in comparison to the invention claimed in the instant application, which the Applicant describes as one where "a failure of any controller or controllers allows the remaining controllers to continue to operate unimpeded with antiskid capability. Accordingly, the aircraft brake control system experiences only a partial loss of functionality associated with the failed controller or controllers…" (R-FA at page 3). In comparison to the prior art redundant or "back-up" systems, the Applicant contends that in the claimed invention "all of the EMACs are always operating and always contributing to the operation of the brake system. If one EMAC is lost, there is a partial loss of functionality, but only of the functionality associated with what failed."
>
> We are aware that claim construction must not be performed with an eye to the applicable prior art, but it is permissible to focus claim construction "where the shoe pinches" (*Bayer Inc. v Apotex Inc.*, 2014 FC 436 at paras. 46-47).
>
> We review the specification to understand the scope of what is meant by the above noted feature.
>
> In the instant application at page 7, the brake data concentrators 72 and 74 that provide basic brake system functions are described as "redundant." Of these two brake data concentrators, an emergency/park switch controller provides inputs to brake data concentrator 74, as does a rotary variable differential transformer. A normal braking channel is provided via brake data concentrator 72, with an alternate or back-up channel provided via brake data concentrator 74 (page 9).
>
> As specified at page 8, control of an aircraft is primarily achieved by means of the EMCUs, each of which is associated with two different wheel assemblies. Also, each aircraft wheel assembly is associated with two different EMCUs. As specified at page 8 "[the] paired electromechanical control units provide a high degree of redundancy in the control circuit structure and operation."
>
> As specified at page 9, the independent antiskid operation of the brake system "is achieved through the redundantly provided pairs of electromechanical actuator controllers associated with each of the various wheel and brake assemblies 40-46." Further it is specified that "[w]ith the redundancy provided, failure of any particular electromechanical control unit 88-94, or an electromechanical actuator controller 96-110 will not be fatal to operation of the system, but such operation may continue substantially unimpeded."
>
> With respect to the use of multiple EMACs, it is specified at page 9 that "using multiple actuators allows them to be designed to compensate for individual actuators that become inoperative."

> In the response dated March 13, 2015 at page 3, the Applicant described the partial loss of functionality specified in the claims as being "associated with only the functionality of what failed." This view is consistent with the language of the claims and the passages from the specification quoted above. In the same response at page 4, in comparing the claimed invention with the prior art, the Applicant specified that "[u]nlike the cited prior art, the Applicant's invention as claimed requires **NO** backup or alternate system that is switched into place or into operation to replace the failed circuit or element in the brake control system" (emphasis in original).
>
> In the R-FA at page 3, the Applicant contended that unlike the prior art, "all of the EMACs are always operating and always contributing to the operation of the brake system."

[33] In the PR letter, we set out our understanding of the relevant passages:

> In light of the specification of the instant application, it is our preliminary view that the Applicant's position that the claimed invention does not use a backup type arrangement where an alternate system is switched into operation is an accurate reflection of the EMCUs and EMACs as they function in the brake control system. As is evident from the rest of the specification, the EMCUs and EMACs are set up so as to provide for "redundancy" (as described in the specification) in the brake control system, with one unit or controller being able to provide for brake system control with the failure of the other. Each unit or controller appears to be controlling certain of the motors associated with a certain wheel actuator. As data is shared between the "redundant" units, when one fails, the other is able to continue to effect brake control.
>
> With respect to the brake data concentrators, as noted above, these operate in a normal and a backup mode with respect to basic brake system functions.
>
> Further, in light of the redundancy provided in the brake control system of the instant application, it is our preliminary view that the passage "only a partial loss of functionality ... " must be construed as encompassing a loss of functionality associated only with the loss of one actuator controller (EMAC) (or EMCU in claim 11) in which case there may be no loss in functionality of the brake control system as a whole, but merely the loss of the functionality of the particular failed EMAC. The loss of more than one EMAC or EMCU may lead to an overall loss of some brake control function, which is also within the scope of claim 1.
>
> With respect to the phrase "ensure aircraft dispatchability" discussed in the FA at page 5, since there is no specific meaning that is evident from the instant specification, we construe this term in light of the requirement that there be "only a partial loss of functionality", meaning that with a failure of any one or more actuator controllers (or EMCUs in claim 11), there will still be some level of brake control associated with those that remain functional, sufficient that the aircraft may remain useable.

[34] At the hearing, the scope of the above passages was further discussed. To clarify the above understanding of the claim language, we take the passage to indicate, as the Applicant contended at the hearing, that with the failure of an EMCA or EMCU, there will be a partial loss of brake functionality, the loss due to the distributed nature of the brake control system, with each EMAC being associated with a portion of the brake actuators on a particular wheel assembly, and each EMCU comprising a pair of EMACs that are associated with two different wheel assemblies. Thus, with a failure of an EMCA or EMCU, control of some of the brake actuators on the wheel assemblies is lost.

Novelty

[35] In the PR letter, we identified the following prior art documents:

D1:	WO 2008/144378	May	Published: November 27, 2008
D2:	US 6,296,325	Corio et al.	Published: October 2, 2001

[36] We also provided the following table comparing the features of independent claims 1 and 11 with those disclosed in D1 (the most relevant piece of prior art):

Claim 1 and 11	**D1**
An electric aircraft brake control system comprising: a plurality of wheel and brake assemblies,	Plural wheel and brake assemblies are shown in Figure 1 and are denoted by reference characters 12a and 12b.
each assembly having a wheel, wheel speed transducer, brake assembly, and a brake actuator;	Each assembly has a wheel (10a-h), wheel speed transducer (42 in Figure 2), brake assembly (14), and brake actuator (16a-d).
pairs of electromechanical control units uniquely associated with and connected to certain actuator controllers of said wheel and brake assemblies,	An electromechanical control unit is provided with each wheel and brake assembly (12a and 12b), and is connected to actuator controllers (20a-d).
said actuator controllers having antiskid systems as a part thereof connected to specific actuators of associated wheel and brake assemblies,	Each actuator controller is shown to have an antiskid system (30) in figure 3, and this antiskid system is connected to specific actuators (see also page 11, lines 4-14).
said actuator controllers configured independently of each other, such that a failure of any one or more controllers allows the remaining controllers to	The actuator controllers are configured independently of each other in that the controllers are wired independently to certain actuators which are distinct from

continue to operate unimpeded with antiskid capability such that the aircraft brake control system experiences only a partial loss of functionality associated with the failed controller or controllers to thereby ensure aircraft dispatchability; and	the actuators of the other actuator controller (page 8, line 18 to page 9, line 2), such that the failure of a controller allows the other controllers to operate unimpeded with antiskid capability (page 11, lines 4-24). In normal operation each actuator controller is always operating and always contributes to operation of the brake system.
at least two brake data concentrators receiving data corresponding to various aircraft operational parameters, including brake pedal position, and providing operational signals to said electromechanical control units as a function thereof.	The system has two brake data concentrators (22a and 22b) that receive data including brake pedal position, and provide operation signals to the electromechanical control units (page 7, lines 18-23).
(Claim 11 only) -such that a failure of any control unit results in only a partial loss of functionality for the brake control system associated with the failed control unit -a controller for emergency and park braking connected to said electromechanical actuator controllers through one of said brake data concentrators to effect emergency braking action on said brake assemblies, with antiskid control	-as noted under Claim Construction above, since the EMCUs comprise as primary components the actuator controllers, we see no effective difference in the claim language in comparison with claim 1, except that with the failure of an EMCU, the effect may be the loss of more than one actuator controller -The brake data concentrators have a controller for emergency and park braking connected to the actuator controllers (as taught in D2, which is incorporated by reference on page 7, lines 7-9 of D1).*****Panel Note-reference is made to D1 for the purposes of describing the BSCUs, not for any type of emergency or parking braking functions and D1 does not discuss any such systems*****

Independent claim 1 on file

[37] It was our preliminary view that based on our construction of claim 1 above, that claim 1 on file lacked novelty at the relevant date in view of D1.

[38] As noted in the PR letter, the Applicant contended in the R-FA that:

> [u]nlike the brake architecture of the Applicant's invention, in prior art systems such as those of D1 there is no loss of functionality when a controller(s)

> fail(s) because this (are) "back-up" units to replace the failed one(s). Indeed, the brake control systems of the prior art are then just one failure away from catastrophe, because there is no additional standby or alternate unit to replace the one now operating because of the original failure.
> …
> In contrast, the architecture of the Applicant's invention as claimed is such that failure of one controller results in only a partial loss of functionality associated with the failure, meaning that dispatchability of the aircraft is ensured. In other words, the architecture is such that the failed element(s) still accommodate(s) effective and efficient operation of the brake control system without replacement (by a standby or alternative unit) to continue operation. Clearly, the Applicant's architecture is remarkably different from that of D1 and the other cited prior art.

[39] In the R-PR and at the hearing, the Applicant repeated the above position that the invention set out by claim 1 on file distinguishes over D1 in that it does not use a "back-up" arrangement where a redundant/alternate controller is brought into operation with the failure of a particular controller. In the R-PR, the Applicant stated that:

> …the Applicant's invention as claimed is a complete departure from conventional "normal/alternate" or "redundant" systems of the prior art, such as D1. In the Applicant's invention as claimed, the division of functionality is not one of redundancy or backup, nor is it one that requires switching from an inoperative normal system to an operative alternate one. Rather, it is one where the design and distribution of controllers, actuators and concentrators is such that a single failure has such a small impact on the aircraft brake control system that the system is fully capable of operating without a replacement for the failed portion.
>
> In the Applicant's invention as claimed, there is no backup or alternate system that is switched into place or into operation to replace the failed circuit or element in the brake control system. However, that is **exactly** what is required by D1. [Emphasis in original]

[40] The Applicant asserted at the hearing that normally all of the EMACs in the claimed system are always operating and always acting to control the brake actuators on the wheel and brake assemblies, and that if an EMAC fails, some brake control will be sacrificed with the corresponding loss of the associated brake actuator control (each EMAC being linked with a portion of the brake actuators for a particular wheel assembly). In this way, the "partial loss of functionality" (i.e., brake control) is accepted, but is compensated for by the distributed nature of the system, with control of the brake actuators of a particular wheel assembly being divided between two different EMACs.

[41] In the PR letter, it was our preliminary view that "the 'partial loss of functionality …' in the claims on file is equivalent to what is disclosed in prior art document D1, where, similarly, the loss of a particular EMAC results in only the loss of functionality associated with that particular EMAC."

[42] At the hearing, there was a detailed discussion of D1 as to whether the EMACs in D1 were always operating and what happened when one of them failed, the Applicant contending that D1 used a "back-up" arrangement.

[43] As noted by the Panel at the hearing, the D1 system uses paired EMACs (e.g., EMACs 20a and 20b) as discussed at pages 11-12 and shown in Figure 1 therein and set out below.

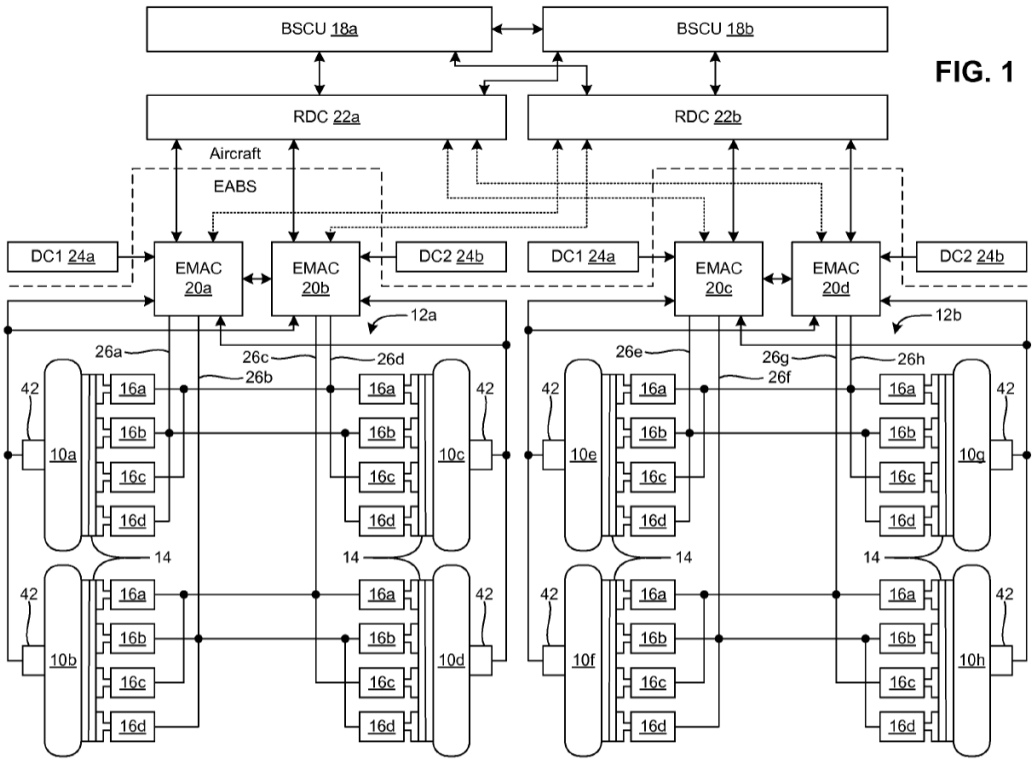

FIG. 1

[44] In the D1 system, each EMAC includes an antiskid controller providing for antiskid control as in claim 1 of the instant application. Normally, one EMAC of the pair (e.g., 20a) has primary responsibility for antiskid control, the other (e.g., 20b) serving as a backup. However, both antiskid controllers independently conduct parallel processing to calculate antiskid control parameters. Since one of the pair has primary responsibility for antiskid control, the output control signals of the primary EMAC are communicated to the backup antiskid controller of the paired EMAC, which then communicates these signals to the corresponding brake controller and from there to the corresponding brake actuators on the wheel assembly. In this way both EMACs (20a and 20b) are always in operation (both of their brake controllers control the brake actuators associated with them). However, only one of the pair (the primary) provides brake drive control signals from its antiskid controller that are used by both EMACs. If the primary antiskid controller fails, the other of the pair then provides the brake drive control signals for both, with no brake control loss.

[45] However, as the Panel noted at the hearing, claim 1 does not specify the failure of the antiskid controller of a particular EMAC. Claim specifies the failure of an EMAC itself. In D1, control of the brake actuators 16 for a particular wheel assembly (e.g., 12a) is split between the EMACs, as shown by the mapping in Figure 1 of D1. Therefore, if an EMAC in D1 fails as a whole, there will be a corresponding partial loss of brake actuator 16 control, just as in claim 1 of the instant application.

[46] In view of above discussion of the system disclosed in D1, we conclude that claim 1 on file lacked novelty at the relevant date and is therefore non-compliant with paragraph 28.2(1)(*b*) of the *Patent Act*.

Independent claim 11 on file

[47] In the PR letter, we set out our preliminary view that independent claim 11 on file was novel in view of D1. Unlike the position taken in the FA, we did not consider the reference to D2 made in D1 to be sufficient to direct the skilled person to incorporate the emergency

and park mode functionality of D2 into D1. In our view, the reference to D2 was only for the purpose of illustrating a configuration of a brake system control unit (BSCU therein, EMCU in the instant application), not for the incorporation of any further material from D2 into D1.

[48] In light of the above, we conclude that claim 11 on file was novel at the relevant date and is therefore compliant with paragraph 28.2(1)(*b*) of the *Patent Act*.

Dependent claims 2-10 and 12-16 on file

[49] In the PR letter we set out our preliminary view that dependent claims 2-4 lacked novelty at the relevant date and are therefore non-compliant with paragraph 28.2(1)(*b*) of the *Patent Act*, while dependent claims 5-10 and 12-16 were novel at the relevant date and are therefore compliant with paragraph 28.2(1)(*b*) of the *Patent Act*, claims 12-16 having been novel as a result of the novelty of claim 11 from which they depend:

> Dependent claim 2 on file specifies that the wheel speed transducers provide wheel speed signals to the EMCUs. Such features are evident from the discussion at page 11, lines 15-24 of Dl, where the wheel speed transducers provide wheel speed signals to the EMACs. In accordance with our preliminary view of the construction of the claims on file, the EMCUs are primarily composed of the EMACs.
>
> Dependent claim 3 on file specifies that each EMCU comprises an EMAC connected and providing drive signals to an associated brake actuator. As noted above under Claim Construction, since the EMCUs comprise as primary components the actuator controllers, we see no effective difference with respect to Dl. While Dl does discloses separate control units (e.g., BSCU 18a and 18b shown in Figure 1), the scope of claim 3 does not exclude such additional components beyond the EMCA associated with each EMCU.
>
> Dependent claim 4 on file specifies that various EMACs are connected to and share wheel speed data with each other. This feature is disclosed in Dl at page 11, lines 15-24.
>
> Dependent claim 5 on file specifies that the brake control system further comprises a controller for emergency and park braking. As was the case for independent claim 11 on file, Dl does not itself discuss the provision of any emergency or park braking functionality. Further, as reference is made in Dl to D2 only for the purposes of the EMCUs, in our preliminary view, the person skilled in the art would not have been directed by such a reference to

> incorporate the emergency and park mode functionality disclosed in D2 into the system of D1. Therefore dependent claim 5 on file is novel with respect to prior art document D1.
>
> Dependent claims 6-10 all refer directly or indirectly to claim 5 on file. As such, since dependent claim 5 is novel, dependent claims 6-10 are also novel.

[50] The Applicant's submissions in the R-PR and SR-PR, as well as at the oral hearing, were focussed on the independent claims, particularly claim 1, no specific arguments having been made in respect of the dependent claims.

[51] Therefore, in light of the above we conclude that claims 2-4 on file lacked novelty at the relevant date and are therefore non-compliant with paragraph 28.2(1)(*b*) of the *Patent Act*. Further we conclude that claims 5-10 and 12-16 were novel at the relevant date and are therefore compliant with paragraph 28.2(1)(*b*) of the *Patent Act*.

Obviousness

(1)(a) Identify the notional "person skilled in the art"

[52] The person skilled in the art has been set out above under Claim Construction at paragraph [25].

(1)(b) Identify the relevant common general knowledge of that person

[53] The relevant CGK has also been identified above under Claim Construction at paragraph [27].

(2) Identify the inventive concept of the claim in question or if that cannot readily be done, construe it

[54] As noted in the PR letter, we have taken all the features of the claims on file to be essential and consider them in our analysis below.

(3) Identify what if any differences exist between the matter cited as forming part of the "state of the art" and the inventive concept of the claim or the claim as construed

[55] In the PR letter, in light of the assessment of novelty, we expressed the preliminary view that there are no differences between D1 and the subject-matter of claims 1-4. In light of our conclusions above with respect to the lack of novelty of claims 1-4 on file, we conclude that there are no differences between D1 and claims 1-4 on file.

[56] Further, in light of the novelty assessment of claims 5 and 11, these claims differ from D1 in that D1 does not disclose the provision of any emergency or park braking functionality.

[57] We will address the features of the remaining dependent claims at step (4) below.

(4) Viewed without any knowledge of the alleged invention as claimed, do those differences constitute steps which would have been obvious to the person skilled in the art or do they require any degree of invention?

Claims 1-4

[58] In the PR letter, it was our preliminary view that claims 1-4 on file would have been obvious at the relevant date:

> In the R-FA, the Applicant's arguments in respect of obviousness focussed on the same aspects as those with respect to Lack of Novelty, only adding that D3, cited in the FA (US Patent Application no. 2008/0154443 to Godo, published June 26, 2008), would not remedy the alleged deficiencies of D1 (R-FA at page 5-6).
>
> In light of our assessment under Lack of Novelty and the lack of differences between claims 1-4 on file and prior art document D1, it is our preliminary view that claims 1-4 on file would have been obvious and therefore are non-compliant with paragraph 28.3(b) of the *Patent Act*.

[59] D3, while cited in the FA, was not considered applicable against the claims on file.

[60] In the R-PR and SR-PR, as well as at the oral hearing, the Applicant's submissions with respect to obviousness were focussed on the same points addressed above under the assessment of novelty, namely why independent claim 1 on file is distinguishable from the prior art in light of the independent nature of the EMACs.

[61] As the Panel's views with respect to the applicability of D1 have already been expressed above under the assessment of novelty, and there being no differences between D1 and the and claims 1-4 on file, we conclude that claims 1-4 on file would have been obvious at the relevant date and are therefore non-compliant with paragraph 28.2(*b*) of the *Patent Act*.

Claims 5, 6 and 11

[62] In the PR letter we expressed the preliminary view that claims 5, 6 and 11 would have been obvious at the relevant date:

> With respect to dependent claims 5 and 6 (which depends on claim 5 and specifies additional details of the emergency and park braking), and independent claim 11 on file, in our preliminary view, the provision of emergency and park braking through one of the brake data concentrators, with antiskid control, would have been obvious to the person skilled in the art in view of D1 taken with D2 and the relevant CGK.
>
> D2 discloses an electromechanical braking system, similar to that of D1, with multiple BSCUs (1, 2 in Figure 2) and EMACs (1, 2, left and right in Figure 2) providing for system redundancy in the event of an individual failure. The BSCUs each perform brake control and contain an antiskid algorithm processing function (D2 at col. 4, lines 34-43). D2 also discloses emergency and park braking modes where input is provided to certain of the EMACs (D2 at col. 7, line 61 to col. 8, line 58).
>
> Although in D2 the antiskid function is centralized in the BSCUs, given that D1 already disclosed localized antiskid control at the EMACs, the person skilled in the art, in incorporating a parking and emergency brake mode such as that disclosed in D2 into D1, would have done so such that the parking and emergency control modes would possess the antiskid function. The provision of alternate or emergency braking modes was already part of the relevant CGK in such systems and therefore the person skilled in the art would have been motivated to include such modes in a system such as that of D1.

[63] As has been noted above, the Applicant's submissions were focussed on the patentability of claim 1, with no specific arguments being made with respect to the other claims.

[64] In accordance with the reasons set out above, we conclude that dependent claims 5 and 6 on file and independent claim 11 on file would have been obvious at the relevant date and are therefore non-compliant with paragraph 28.2(*b*) of the *Patent Act*.

Claims 7-10 and 12-16

[65] In the PR letter, we provided our preliminary views on the obviousness of claims 7-10 and 12-16:

> With respect to dependent claims 7 and 12, which specify a differential or variable transformer for providing a pilot-controlled output signal as part of the emergency and park braking system, it is our preliminary view that there is no suggestion in any of D1, D2 and D3 to include as an additional system input, a pilot-controlled variable differential transformer signal. Therefore it is our preliminary view that dependent claims 7 and 12 on file would not have been obvious and are therefore compliant with paragraph 28.3(*b*) of the *Patent Act*.
>
> With respect to dependent claim 8, it is our preliminary view that there is no suggestion in any of D1, D2 and D3 of any type of automatic braking control. Therefore it is our preliminary view that dependent claim 8 on file would not have been obvious and is therefore compliant with paragraph 28.3(*b*) of the *Patent Act*.
>
> Since dependent claim 9 on file depends on claim 8, this claim would also not have been obvious.
>
> Claim 10 depends on any of claims 5 to 9 and specifies that the EMCUs are in closer proximity to the wheel and brake assemblies than the brake data concentrators. This feature is clearly shown in Figure 1 of D1 and is discussed at page 7, line 24 to page 8, line 5. Therefore, in our preliminary view, claim 10, when it depends on any one of claims 5-6 would have been obvious and is therefore non-compliant with paragraph 28.3(*b*) of the *Patent Act*.
>
> Claim 13 depends on any one of claims 11 to 12 and specifies that the first brake data concentrator functions during normal operation, with the second data concentrator functioning upon failure of the first and upon need for emergency and park braking. As discussed at page 9, lines 17-21 of D1, each EMAC has a backup interface with a second remote data concentrator 22 in case of failure of the first interface. In this manner a backup remote data concentrator (or brake data concentrator in the instant application) is provided in case of failure of the

> primary one. Since we have already set out our preliminary view that the incorporation of emergency and parking brake functionality in D1 would have been obvious as well, it is our preliminary view that the subject matter of claim 13, when it depends on claim 11, would have been obvious and is therefore non-compliant with paragraph 28.3(*b*) of the *Patent Act*.
>
> Claim 14 depends on any one of claims 11 to 13 and specifies that the EMCUs contain redundant circuits and provide redundant connections to the wheel and brake assemblies. Since in the instant application the EMCUs may comprise one or more of the EMACs to provide for such redundancy, in our preliminary view, D1 discloses the same functionality. D1, at page 11, lines 15-20, discusses the pairing of the EMACs 20a and 20b and parallel control links with the wheel assemblies. Therefore it is our preliminary view that claim 14, when it depends on any one of 11 or 13 would have been obvious and is therefore non-compliant with paragraph 28.3(*b*) of the *Patent Act*.
>
> Claim 15 depends on any one of claims 11 to 14 and specifies that each EMCU comprises a power generation circuit connected between the aircraft power supply and an associated pair of motors of a brake actuator. D1, as discussed at page 10 and illustrated in Figure 3, discloses the provision of local power supplies at each EMAC. Since the EMCUs of the instant application include the EMACs, in our preliminary view, the provision of local power supplies would have been obvious and therefore claim 15, when it depends on any one of 11, 13 or 14 is non-compliant with paragraph 28.3(*b*) of the *Patent Act*.
>
> Claim 16 depends on claim 15 and specifies that each power generation circuit of claim 15 comprises a pair of power supplies connected in series to the pair of motors. In our preliminary view, none of the prior art references suggest the provision of a pair of power supplies connected in series in each EMCU or EMAC. Therefore, in our preliminary view, the subject-matter of claim 16 would not have been obvious and is therefore compliant with paragraph 28.3(*b*) of the *Patent Act*.

[66] Again, the Applicant's submissions in the R-PR and SR-PR, as well as at the oral hearing, focussed on the patentability of claim 1 on file, with no specific submissions in respect of the dependent claims.

[67] Having already considered the obviousness of the independent claims, in light of the above, we conclude that claim 10 (when dependent on 5 or 6), 13 (when dependent on 11), 14 (when not directly or indirectly dependent on 12) and 15 (when not directly or indirectly dependent on 12) on file would have been obvious at the relevant date and are therefore non-compliant with paragraph 28.3(*b*) of the *Patent Act*.

Summary of obviousness conclusions

[68] Set out below is a table summarizing our conclusions with respect to the obviousness of claims 1-16 on file:

Obvious	**Non-obvious**
1-6, 11	7-9, 12, 16
10 (when dependent on 5 or 6)	10 (when dependent on 7, 8, or 9)
13 (when dependent on 11)	13 (when dependent on 12)
14 (when not dependent directly or indirectly on 12)	14 (when dependent directly or indirectly on 12)
15 (when not dependent directly or indirectly on 12)	15 (when dependent directly or indirectly on 12)

Proposed Claims

[69] In the SR-PR, as a result of the discussion at the oral hearing and the further appreciation of the disclosed system in D1 in comparison with the claims on file, the Applicant submitted proposed claims 1-16. Independent claims 1 and 11 were amended to specify:

> each actuator controller having an antiskid system as a part thereof directly connected to specific actuators of associated wheel and brake assemblies, each antiskid system providing antiskid capability to said specific actuators to which it is directly connected. [Emphasis added]

[70] The "direct" nature of the connection and provision of antiskid control between a particular antiskid system of an EMAC and certain actuators of the wheel and brake assemblies was added in an effort to distinguish over the system disclosed in D1. As discussed under the assessment of novelty above, the EMACs in D1 contain independent antiskid systems that perform parallel processing and each EMAC provides brake drive control signals to their respective brake actuators. However, in a pair of EMACs, only the primary antiskid controller of the pair provides brake drive control signals that are used by both EMACs in normal operation. Under normal operation, the control signals from the primary antiskid controller are fed to the backup antiskid controller and from there routed to the corresponding brake actuators.

[71] In the SR-PR, the Applicant emphasized that "[c]learly in D1, each antiskid controller does **not** provide antiskid capability only to the specific actuators to which it is directly connected. [Emphasis in original]" The Applicant also pointed to page 10, lines 7 and 8 of the instant application as supporting the proposed changes to claims 1 and 11. These passages specify that there could be a cross-channel data link between EMACs sharing the same wheel for further antiskid protection, the implication being that normally there would not be a data link between EMACs.

[72] In light of the proposed "direct" connection of each antiskid system to certain brake actuators and the provision by each antiskid system of antiskid control to the "directly" connected actuators, we conclude that proposed claim 1 would be novel in view of D1. In contrast to the proposed amendments, under normal operation of the D1 system, only the primary antiskid controller of a pair provides the brake drive control signals that are eventually used by both EMACs. We note that claim 11 on file was already determined to have been novel in view of D1.

[73] However, we conclude that the language added in proposed claim 1 and 11 would not change our conclusions with respect to obviousness.

[74] While the D1 system specifies a primary antiskid controller that normally provides drive signals for both EMACs, D1 also considers the possibility of more than one EMAC and antiskid controller providing control signals to a specific wheel assembly comprising multiple brake actuators. This is also the case in the instant application, in which the brake actuators for a wheel assembly are divided between two different EMACs and corresponding antiskid controllers. At page 11, lines 25-30 of D1 it is explained that the primary/backup antiskid controller embodiment is used to avoid competing drive signals being sent to different brake actuators of the same wheel assembly:

> For the pair of EMACs 20 for each truck 12, one of the antiskid controllers 30 from one of the EMACs has primary responsibility for antiskid control of all of the associated wheels and the other serves as a backup. In this

> manner, the first and second EMACs 20a and 20b and the third and fourth EMACs 20c and 20d perform antiskid control in such a manner so as to avoid competing antiskid control for a given wheel. [Emphasis added]

[75] As is evident from the above passage from D1, the issues associated with more than one antiskid controller providing control signals to the same wheel assembly were foreseen by the inventors in D1. These inventors chose to avoid this potential problem by using control signals from one antiskid controller at a time. While the Applicant in the instant application has decided to nevertheless proceed with the use of two EMACs and thus two antiskid controllers providing control signals to the same wheel assembly (e.g., the two EMACs 1 and 2 used to control the actuators for wheel assembly 40 of Figure 2B), the instant application does not explain in any way how the potential issues associated with such a decision, as previously recognized in D1, have been overcome, or potentially why they needed not be overcome.

[76] As a result, in our view, the Applicant proposes to claim an embodiment that was already conceived of in the prior art, but avoided for known reasons, with the Applicant providing no discussion as to why its choice to proceed in such a manner would not have been obvious. The instant application provides no information that would address the known issues or why the Applicant has chosen to accept them, with the known potential consequences of such a choice. In our view, simply choosing to do what the prior art sought to avoid without further explanation is an obvious step to the skilled person. This is not a case where the prior art taught away from taking a step and the inventors later realized, through significant effort, that the taking of that step was not actually an issue or that it even provided further benefits (*Tensar Technologies Ltd v Enviro-Pro Geosynthetics Ltd*, 2019 FC 277 at paras 159-160). There is no evidence of such effort or realization disclosed in this case. Here, it appears that the Applicant is attempting to patent an old idea thought not to work or to be practical, without explaining how or why, contrary to the prejudice, it does work or is practical (*Pozzoli SpA v BDMO SA & Anor*, [2007] EWCA Civ 588 at para 28 (BAILII)).

[77] As the only proposed amendments to the claims on file were the addition to claims 1 and 11 of the above noted language specifying that the antiskid systems are "directly" connected to specific actuators and that each antiskid system provides antiskid capability to the actuators to which it is "directly" connected, the patentability of which has been addressed above, there is nothing further in the proposed claims that would alter our conclusions in respect of the obviousness of the claims on file.

[78] In light of the above, we conclude that the subject-matter of proposed claims 1-16 does not overcome the defect under obviousness for the claims on file and therefore the proposed amendments are not "necessary" for compliance with the *Patent Act* and *Patent Rules* as required by subsection 86(11) of the *Patent Rules*.

CONCLUSIONS

[79] We have determined that claims 1-4 on file lacked novelty at the relevant date and are therefore non-compliant with paragraph 28.2(1)(*b*) of the *Patent Act*.

[80] We have also determined that claims 1-6, 10 (when dependent on 5 or 6), 11, 13 (when dependent on 11), 14 (when not directly or indirectly dependent on 12) and 15 (when not directly or indirectly dependent on 12) on file would have been obvious at the relevant date and are therefore non-compliant with paragraph 28.3(*b*) of the *Patent Act*.

RECOMMENDATION OF THE BOARD

[81] In view of the above, the Panel recommends that the Applicant be notified, in accordance with subsection 86(11) of the *Patent Rules*, that specific amendments are "necessary" for compliance with the *Patent Act* and *Patent Rules*, namely:

- Delete claims 1-6, 10 (when dependent on 5 or 6), 11, 13 (when dependent on 11), 14 (when not directly or indirectly dependent on 12) and 15 (when not directly or indirectly dependent on 12) on file; and
- Rewrite the remaining claims in independent form, as required, with claim dependencies adjusted accordingly.

Stephen MacNeil	Paul Fitzner
Member	Member

DECISION

[82] I concur with the conclusions and recommendation of the Board. In accordance with subsection 86(11) of the *Patent Rules*, I hereby notify the Applicant that the following amendments, and only these amendments, must be made in accordance with paragraph 200(b) of the *Patent Rules* within (3) months of the date of this decision, failing which I intend to refuse the application:

- Delete claims 1-6, 10 (when dependent on 5 or 6), 11, 13 (when dependent on 11), 14 (when not directly or indirectly dependent on 12) and 15 (when not directly or indirectly dependent on 12) on file; and
- Rewrite the remaining claims in independent form, as required, with claim dependencies adjusted accordingly.

Johanne Bélisle
Commissioner of Patents

Dated at Gatineau, Quebec,
this 7th day of January 2020