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**Datasheet for the decision
of 4 February 2009**

Case Number: T 0904/07 - 3.2.01

Application Number: 99102901.8

Publication Number: 0936373

IPC: F16D 55/36

Language of the proceedings: EN

Title of invention:

Aircraft brake with electromechanical actuator modules and
method for its servicing

Patentee:

Goodrich Corporation

Opponent:

Honeywell International Inc.

Headword:

-

Relevant legal provisions:

RPBA Art. 12(4)

Relevant legal provisions (EPC 1973):

EPC Art. 56, 114(2)

Keyword:

"Inventive step - general technical knowledge"

"Late submitted material - admitted (no)"

Decisions cited:

T 0890/02

Catchword:

-



Case Number: T 0904/07 - 3.2.01

DECISION
of the Technical Board of Appeal 3.2.01
of 4 February 2009

Appellant: Honeywell International Inc.
(Opponent) 101 Columbia Road
Morristown NJ 07962-2245 (US)

Representative: Haley, Stephen
Gill Jennings & Every LLP
Broadgate House
7 Eldon Street
London EC2M 7LH (GB)

Respondent: Goodrich Corporation
(Patent Proprietor) Four Coliseum Centre
2730 West Tyvola Road
Charlotte
North Carolina 28217 (US)

Representative: Selting, Günther
Patentanwälte
von Kreisler, Selting, Werner
Postfach 10 22 41
D-50462 Köln (DE)

Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 26 March 2007
rejecting the opposition filed against European
patent No. 0936373 pursuant to Article 102(2)
EPC 1973.

Composition of the Board:

Chairman: S. Crane
Members: J. Osborne
G. Weiss

Summary of Facts and Submissions

I. The appeal is directed against the decision posted 26 March 2007 rejecting the opposition against European patent No. 0 936 373.

II. The appellant relied on the following evidence filed during the opposition procedure:

D1: US-A-5 107 967.

The appellant filed the following further evidence with its statement of grounds of appeal:

D9: Declaration of 27 September 2006 by Mr Jeff Arnold of Honeywell International concerning the supply and use of an electro-mechanical actuator by MPC Inc., together with two annexes;

D10: WO-A-97/30294;

D11: WO-A-99/21266;

D12: US-A-4 865 162.

III. At oral proceedings held on 4 February 2009 the appellant requested that the decision under appeal be set aside and the patent revoked. The respondent requested that the appeal be dismissed and the patent maintained in amended form on the basis of claims 1 to 14 filed at the oral proceedings.

IV. The broadest claims according to the respondent's request read as follows:

"1. A aircraft brake (11) for a wheel and brake assembly of an aircraft, comprising a brake disk stack (27), a brake head (20), and at least one actuator mounted to the brake head (20), and a reciprocating ram (35,63) movable into and out of forceful engagement with the brake disk stack (27) for applying and releasing braking force, characterized in that each actuator is an actuator module (36) including a module housing (53), said reciprocating ram (35,63) and a motive device (50), said actuator module (36) being removable as a unit from one side of the brake head (20), and said actuator module (36) comprising said motive device (50) mounted apart from and operatively connected to the reciprocating ram (35,63) for selectively moving the reciprocating ram (35,63), wherein the ram (35,63) is guided in the module housing (53) for movement toward and away from the brake disk stack (27)."

"6. A method for servicing an aircraft brake (11) for a wheel and brake assembly of an aircraft, the brake (11) including a brake disk stack (27) and a brake head (20) to which a plurality of actuator modules (36) are removably mounted, each actuator module (36) being removable as a unit from one side of the brake head (20), and each actuator module (36) comprising said motive device (50) mounted apart from and operatively connected to the reciprocating ram (35,63), for selectively moving the reciprocating ram (35,63) into and out of forceful engagement with the brake disk stack (27) for applying and releasing braking force, wherein the ram (35,63) is

guided in the module housing (53) for movement toward and away from the brake disk stack (27) the method comprising the steps of identifying a brake module to be replaced, and removing and replacing the identified brake module (36) as a unit with another brake module (36) without disassembly of the brake disk stack (27)."

"8. A wheel and brake assembly (10) comprising a rotatable wheel (12) and a brake (11) as set forth in any of the claims 1-5, wherein the brake disk stack (27) is operatively connected to the wheel (12) for applying and releasing braking torque on the rotatable wheel (12)."

"14. An actuator module (36) for the wheel and brake assembly (10) of one of claims 8-13, said actuator module (36) including a module housing (53), a reciprocating ram (35,63) and a motive device (50), said actuator module (36) being removable as a unit from one side of the brake head (20), and said actuator module (36) comprising said motive device (50) mounted apart from and operatively connected to the reciprocating ram (35,63) for selectively moving the reciprocating ram (35,63), wherein the ram (35,63) is guided in the module housing (53) for movement toward and away from the brake disc stack."

Claims 2 to 5, 7 and 9 to 13 specify features additional to the subject-matter of claims 1, 6 and 8 respectively.

V. The appellant's submissions in as far as they are relevant to this decision may be summarised as follows:

In the contested decision the opposition division interpreted in particular the independent claim directed to the actuator module in such a way that it implied an ability of the actuator to reciprocate the ram when the actuator is not mounted on the brake. As a result, the additional evidence D9 to D12 is filed to show that this feature was already known. The evidence is already known to the respondent (patent proprietor), the appellant having cited it on 27 September 2006 in a parallel opposition case.

The subject-matter of claim 14 is obvious in the light of D1 in combination with the general technical knowledge of the skilled person. Taking D1 as the closest state of the art the only novel feature of claim 14 is that the ram is guided in the module housing. Although claim 14 specifies that the actuator module be removable as a unit, this must be understood in the light of the description in which it is stated that it may be necessary to first remove a ram pad. In accordance with the teaching of D1 the ram is guided in the brake head. When the module is removed the bearing elements which are located adjacent to the ram in the bore in the brake head will fall out. Faced with that disadvantage it would be obvious for the skilled person when applying his general technical knowledge to provide a sleeve extending from the actuator housing in order to retain the bearing elements, thereby arriving at the subject-matter of claim 14.

VI. The respondent countered essentially as follows:

The actuator according to D1 is intended for a calliper brake and is not suitable for a brake stack to which the present patent relates. Moreover, in practice, the calliper would be removed from the wheel so that there would be no need to provide for removal of the actuator as a unit. Indeed, in the embodiment shown in the figures removal of the actuator as a unit would not be possible because of lack of access to the upper mounting bolt. Even if that were possible it would only be so after first removing the housing cover in order to expose the bolt. The problem solved by the subject-matter of claim 14 is to provide for easier maintenance of the brake and replacement of the actuator. D1 already addresses that problem and suggests the solution of providing a sub-assembly. However, the problem of loss of the bearing elements when removing the actuator from the brake head is identifiable only with hindsight and would not be apparent to the skilled person presented with D1. The sleeve suggested by the appellant would not solve the problem since it still would not provide guidance in the module housing. Moreover, none of the evidence D9 to D12 renders the feature obvious. Since that late-filed evidence is of no relevance it should not be admitted.

Reasons for the Decision

1. The patent relates to an aircraft brake having discs which rotate together with the wheel and which are inter-layered with stationary discs to form a stack. An actuator located at one side of the stack extends a ram

to urge the rotary and stationary discs into contact, thereby providing braking. It is stated in the patent specification that in previous arrangements of this type the actuator could not be removed without dismantling the brake assembly. As a result, failure of an actuator would result in withdrawal of the aircraft from service for the period necessary to dismantle and re-build the assembly. In accordance with the patent the actuator is mounted as a unit for ease of replacement.

2. Claim 1 specifies an aircraft brake for a wheel and brake assembly, comprising *inter alia* an actuator. The subject-matter of claim 8 is a wheel and brake assembly comprising a wheel and a brake "as set forth in any one of claims 1 to 5" and so includes not only the actuator specified in claim 1 but additionally a wheel and therefore is more restricted than the subject-matter of claim 1. Claim 14, on the other hand, specifies only an actuator module "for the wheel and brake assembly of one of claims 8-13", the actuator having features identical to those set out in claim 1. It follows the subject-matter of claim 14 is broader than that of either of claims 1 and 8. Claim 6 relates to a method of replacing an actuator having the same features as are specified in claim 14. Claim 14 therefore is the broadest definition of subject-matter and the most appropriate starting point for consideration of novelty and inventive step.

3. Of the evidence present in the proceedings prior to the appeal being filed, the appellant has referred to only D1. The board is satisfied that D1 is the most relevant of that evidence and forms the closest state of the art

for judging novelty and inventive step of the subject-matter of claim 14.

3.1 D1 relates to a disc brake system for automotive applications in which an electrical actuator is mounted on the brake calliper. The actuator takes the form of an electric motor mounted with its rotary axis orthogonal to the rotary axis of a rotary-to-linear motion converter which is driven by the motor *via* a worm gear. The motor and worm gear are contained in a housing which is attachable by bolts to the calliper. The rotary-to-linear motion converter takes the form of a ball screw engaged with a nut which forms a piston or, in the terminology of present claim 14, a "ram" located in a bore in the calliper and guided by a series of rollers and balls which react transverse loads and prevent the piston from rotating in the bore. According to column 2, lines 64 to 66 the actuator is provided as a sub-assembly, thereby "making the mass-production and maintenance characteristics favourable", and is illustrated in figures 1, 2 as being mounted by three bolts accessed from one side of the calliper. However, the presence of the series of balls and rollers would render the attachment of the sub-assembly nevertheless a somewhat delicate operation since they would need to be introduced into the bore whilst offering up the actuator.

3.2 In the board's judgement the actuator of D1, although disclosed in combination with a calliper brake is suitable for an aircraft brake comprising a brake disc stack and the respondent has provided no explanation why this would not be so. In the illustrated embodiment of D1 it appears that it may be difficult to access the

illustrated hexagonal socket head of the uppermost bolt for mounting the actuator to the brake head, thereby, in the respondent's view, putting into question whether the actuator may be mounted as a sub-assembly in the manner taught in the description. However, the teaching of the description, even if it were inconsistent with the drawings, is clear in itself such that the skilled person would have no difficulty in putting it into practice. Moreover, as may be seen from figure 2, the socket is only partly obscured and since a hexagonal key of appropriate design need not approach the socket axially, it is not apparent that there is, in fact, any inconsistency between the respective teachings of the description and the drawings. The respondent argues that the actuator illustrated in D1 would not be removable "as a unit" from the brake head because it first would be necessary to remove the cover to provide access to the uppermost bolt. As already explained above in respect of the matter of access to the uppermost bolt details derivable from the figures do not put into question the clear teaching of the description. Moreover, the phrase "as a unit" in claim 14 is to be interpreted in the light of the patent specification taken as a whole. In this respect the board notes that according to the description it is intended that this phrase should not exclude removal of a ram pad from the inboard end of the ram before the actuator is removed from the brake head (column 7, lines 20 to 27).

4. The subject-matter of claim 14 therefore differs from the disclosure of D1 by the feature that the ram is guided in the housing of the actuator module. This has the effect that the actuator is a self-contained unit

whose function could be tested before being fitted to the brake.

- 4.1 The appellant argues that the skilled person faced with the problem of introducing the balls and rollers when assembling the actuator to the brake calliper would, on the basis of his general technical knowledge and without the need for inventive activity, provide a projecting sleeve on the actuator housing to retain the balls and rollers. The board disagrees with that point of view. The general technical knowledge of the skilled person is normally represented by encyclopaedias, textbooks, dictionaries and handbooks (see T 890/02, OJ EPO 2005, 497). In the present technical field it would extend also to knowledge of commonly employed mechanisms and technical equivalents of commonly known elements. None of those definitions of the general technical knowledge of the skilled person lends support to the appellant's view that the subject-matter of present claim 14 is obvious. Indeed, what the appellant argues as being within the normal design freedom of the skilled person would in fact require a radical departure from the teaching of D1 in that the projecting sleeve would need to accurately engage with the brake calliper for transfer of the transverse loads. Considerations of overall size, weight and cost thus would hardly encourage the skilled person to adopt such a change.

5. The appellant also referred in its statement setting out the grounds of appeal to evidence D9 to D12. In accordance with Article 12(4) RPBA (OJ EPO 2007, 537-547) everything presented by an appellant in its statement setting out the grounds of appeal shall be

taken into account by the board "without prejudice to the power of the Board to hold inadmissible facts, evidence or requests which could have been presented ... in the first instance proceedings".

5.1 The appellant argues that it was motivated to search for further evidence by the interpretation given by the opposition division to claim 18 as granted, namely that it implied that the actuator module would operate to reciprocate the ram without being mounted on the brake. This is the effect achieved by the feature which now has been included in the corresponding claim 14 that the ram is guided in the module housing. It was first argued by the respondent (patent proprietor) that claim 18 as granted should be interpreted in this way in a letter received at the EPO on 16 November 2006, which was after the date on which the appellant admits to have become aware of D9 to D12. The appellant nevertheless made no attempt to introduce the evidence D9 to D12 during the subsequent final month of opposition proceedings. The evidence D9 to D12 therefore could have been presented during first instance proceedings and so may be admitted at the board's discretion. It is established case law of the boards that one consideration in deciding how to exercise such discretion is the relevance of the evidence.

5.2 D9 relates to an alleged public prior use of an actuator. However, there is insufficient substantiation regarding its availability to the public. D10 relates to an electrical actuator for a disc brake in which the ram is the reverse construction of that in D1, whereby the nut is formed by the rotor of the motor and the

piston is prevented from rotating relative to the actuator housing by its engagement with the backing plate of the brake pad. D11 was published after the priority date of the present patent and was cited only in respect of novelty in accordance with Article 54(3) EPC 1973 of the claims as granted. The appellant has not suggested that D11 would be detrimental to novelty of the present claims. D12 relates to a conventional braking arrangement in which the actuator is integrated into the brake head and therefore would not be considered relevant by the skilled person seeking to solve the problem addressed by the present patent.

5.3 On the basis of the foregoing the board concludes that none of D9 to D12 is of sufficient relevance to the present procedure to warrant further consideration. The board therefore exercises its discretion in accordance with Article 114(2) EPC 1973 and disregards this evidence.

6. It follows from the above considerations that the subject-matter of claim 14 involves an inventive step (Article 56 EPC 1973). The same conclusion is applicable also as regards claim 6 which relates to a method which requires the existence of an actuator having the same features as are specified in claim 14. Similar considerations apply also in respect of claims 1, 8, see point 2 above, and dependent claims 2-5, 7 and 9-13.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the first instance with the order to maintain the patent on the basis of the following documents:
 - claims 1 to 14 and amended description and drawings, all filed at the oral proceedings.

The Registrar:

The Chairman:

A. Vottner

S. Crane