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**Datasheet for the decision
of 24 March 2026**

Case Number: T 1165/24 - 3.4.01

Application Number: 18797378.9

Publication Number: 3698166

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G01S13/76, H01Q1/28, H01Q21/28

Language of the proceedings: EN

Title of invention:

SYSTEMS AND METHODS FOR PROVIDING L-BAND RF ARCHITECTURES

Applicant:

Aviation Communication & Surveillance Systems, LLC

Headword:

TCAS and mode-S functionalities / Aviation Communication

Relevant legal provisions:

EPC Art. 56, 100(c)
RPBA 2020 Art. 12(4)

Keyword:

Main request, Auxiliary requests Ia, II - Inventive step - (no)
Auxiliary requests Ib, III - Amendments - intermediate
generalisation - allowable (no)
Auxiliary requests IV, V - Amendments suitable to overcome
objection (no)

Decisions cited:

T 2201/10, T 0119/82, T 0155/85



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Case Number: T 1165/24 - 3.4.01

D E C I S I O N
of Technical Board of Appeal 3.4.01
of 24 March 2026

Appellant: Aviation Communication & Surveillance Systems,
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Decision under appeal: **Decision of the Examining Division of the
European Patent Office posted/electronically
transmitted on 16 April 2024 refusing European
patent application No. 18797378.9 pursuant to
Article 97(2) EPC.**

Composition of the Board:

Chairwoman A. Medeiros Gaspar
Members: P. Fontenay
B. Müller

Summary of Facts and Submissions

I. The applicant filed an appeal against the Examining Division's decision to refuse the application.

II. The contested decision refers, *inter alia*, to the following prior art documents:

D1: US-A-5 321 406,
D2: EP-A-1 826 913, and
D4: WO-A-01/11389.

III. The application was refused for the reasons that the subject-matter of claim 1 of each of the requests did not involve an inventive step within the meaning of Article 56 EPC: claim 1 of the main request in view of D4; claim 1 of each of auxiliary requests Ia, Ib, II and III in view of D2.

In an *obiter dictum*, the Examining Division noted that claim 1 of auxiliary request II also lacked inventive step in view of D4. Furthermore, it was observed that the subject-matter of claim 1 of auxiliary requests Ib and III constituted an unallowable intermediate generalisation of the originally disclosed subject-matter (Article 123(2) EPC).

IV. With their statement of grounds of appeal the applicant requested that the contested decision be set aside and that a patent be granted on the basis of the main request. In the alternative, they requested that a patent be granted on the basis of auxiliary requests

Ia, Ib, II, III, IV or V. The main request and auxiliary requests Ia, Ib, II and III are identical to the respective requests underlying the impugned decision. Auxiliary requests IV and V are new requests filed on appeal. Oral proceedings were also conditionally requested.

- V. The applicant objected to the Examining Division's selection of document D4 as starting point for assessing inventive step. This also applied to the selection of document D2 for assessing the inventive merits of the subject-matter of claim 1 of auxiliary request Ia, Ib, II and III.

The applicant submitted that document D1 provided a better starting point than D4 for assessing the inventive merits of the claimed subject-matter, as it disclosed a central aspect of the invention, namely the integration of a mode-s transponder and a Traffic Collision Avoidance System (TCAS). Neither the combination of D1 with D2, nor the combination of D1 with D4 led to the subject-matter defined in claim 1 of each of the requests on file, which was therefore inventive.

The applicant further argued in favour of the admissibility of auxiliary requests IV and V into appeal proceedings, emphasising that these new requests addressed the objection of added subject-matter. This objection had not been raised in the annex to the summons to oral proceedings before the Examining Division, nor discussed at the oral proceedings. It was merely mentioned as an *obiter dictum* in the contested decision. The amendments introduced in new auxiliary requests IV and V were not arbitrary, but directly

addressed those objections and further contributed to clarify the scope of the claims.

- VI. A summons to attend oral proceedings was issued in accordance with the applicant's request.

- VII. In the accompanying communication pursuant to Article 15(1) RPBA, the Board set out its preliminary opinion on the matter.

In essence, the Board concurred with the Examining Division's view that document D4 constituted a suitable starting point for deciding on the inventive merits of the subject-matter defined in claim 1 of each of the requests. This applied both to the invention disclosed in D4 and to the prior art described in that document. It was noted that the advantages of the invention referred to by the applicant did not apply to the subject-matter of claim 1 of the main request, which did not include the corresponding limitations. The subject-matter of claim 1 of auxiliary request Ia was distinguished from the prior art described in D4 in that it included only one omnidirectional antenna, which apparently constituted a disadvantage over the prior art. The features added to claim 1 of auxiliary request II related to known features defined in existing standards and did not contribute to inventive step.

The Board further concurred with the Examining Division's view that claim 1 of auxiliary requests Ib and III contained added subject-matter.

Concerning auxiliary requests IV and V, the Board noted that even if the amendments introduced into claim 1 of each of these requests were a direct reaction to the added-matter issues noted in the *obiter dictum* of the Examining Division's decision, the amendments did not appear to resolve the inventive-step issue identified in relation to the higher-ranking requests. The Board was therefore minded not to admit these requests.

- VIII. In the submissions filed in response to the Board's preliminary opinion, the applicant stressed, with regard to claim 1 of auxiliary request Ia, that the subject-matter defined represented a deliberate simplification compared to the dual omnidirectional antennas known from the prior art described in D4. This was reiterated during the oral proceedings. The claimed system required less hardware. It therefore consumed less power and generated less heat. This increased the reliability of the entire system. The absence of a second omnidirectional antenna was compensated for by the appropriate positioning of the single omnidirectional antenna within the aircraft structure. Without hindsight the skilled person would not abandon the "dual-antenna diversity" concept of the prior art of D4. The subject-matter of claim 1 of auxiliary request Ia also differed significantly from the invention described in D4. In the system according to that invention the TCAS antenna was also used for the mode-s functionality. Such a complex system required intensive phase adjustments, and thus differed fundamentally from the system claimed.

- IX. Oral proceedings took place before the Board, at the end of which the appellant confirmed their requests to

be as submitted with the statement of grounds of appeal.

X. Claim 1 of the main request reads:

*A system, comprising:
a mode-s transponder function;
a traffic alert and collision avoidance system function separate from the mode-s transponder function;
a directional antenna in reception and transmission connection with the traffic alert and collision avoidance system function; and
an omni-directional antenna in reception and transmission connection with the mode-s transponder function;
characterized by
the mode-s transponder function with only one mode-s transmitter and receiver and with a switching network using the omnidirectional antenna.*

XI. Claim 1 of auxiliary request Ia differs from claim 1 of the main request in that it specifies that the system comprises

exactly one mode-s omni-directional antenna in reception and transmission connection with the mode-s transponder function.

XII. Claim 1 of auxiliary request Ib differs from claim 1 of the main request in that it further specifies that the system

also comprises a distance measuring equipment function.

- XIII. Claim 1 of auxiliary request II differs from claim 1 of the main request in that it specifies that

the one mode-s transmitter comprises a 1090 MHz transmitter, and wherein the one mode-s receiver comprises a 1030 MHz receiver.

- XIV. Claim 1 of auxiliary request III differs from claim 1 of the main request in that it specifies that

the mode-s function also comprises a distance measuring equipment function, and wherein the one mode-s transmitter comprises a 1090 MHz transmitter, and wherein the one mode-s receiver comprises a 1030 MHz receiver.

- XV. Claim 1 of auxiliary request IV differs from claim 1 of the main request in that it further defines that

the Mode-S function includes a distance measuring equipment function.

- XVI. Claim 1 of auxiliary request V adds to claim 1 of auxiliary request IV the same specification that claim 1 of auxiliary request II adds to claim 1 of the main request.

Reasons for the Decision

Main request - inventive step

1. In the applicant's view, D4 leads away from a system with a mode-s function with omnidirectional antenna in connection with the mode-s transducer separated from a traffic alert and collision avoidance system function, as defined in the claim, since it disclosed a system sharing a common antenna for both functions. D4 is therefore unsuitable as starting point for the problem/solution approach to be used when deciding on the inventive merits of the claimed invention.
2. The argument is, however, insufficient to exclude D4 *a priori* as a suitable starting point for assessing the inventive character of the claimed invention. Even the finding that other items of prior art might define a more promising starting point of the problem/solution approach is not sufficient to exclude D4.
3. Indeed, D4 relates to the same technical field as the invention and discloses systems comprising the same essential functionalities with the system claimed. Concretely, it discloses, as the present application, systems comprising a traffic collision avoidance transponder and a mode-s system. D4 is therefore a suitable prior art for assessing inventive step.
4. This is all the more true since the content of D4 is not limited to the subject-matter of the invention described therein (from page 9, line 12 to page 11, line 16, and further detailed from page 21 line 11 onwards, by reference to figures 7 to 13). It also includes a background section (page 1, line 12 to page

9, line 4), providing an overview of the various collision avoidance systems that were then known from the prior art. Those prior art systems are described in greater detail in the passages extending from page 13 line 10 to page 21 line 9 of D4, by reference to figures 1 to 6.

5. Both the invention disclosed in D4 and the prior art systems described in D4 represent suitable starting points for assessing inventive step of the system claimed.
6. An essential aspect of the invention disclosed in D4 is that TCAS and the mode-s transponder section share a common antenna. This implies that the transmitters used for the mode-s functionality must maintain the same RF phase for omni-directional communication, which requires constant phase adjustment.
7. The system of claim 1 differs thus fundamentally from the system according to Figures 7 and 8 of D4, which illustrates an embodiment of the invention disclosed in D4, in that the Traffic Collision Avoidance System is separate from the mode-s transponder function, the latter comprising an omnidirectional antenna for receiving and transmitting communication as well as a mode-s transmitter and receiver.
8. Starting from the prior art systems described in its background section, which comprised separate TCAS and ATCRBS/mode-S systems, each with its own dedicated antenna (D4, page 8, line 22 - page 9 line 4), D4 discloses a system with a common antenna. Such a common antenna or, in other words, the absence of a separate omnidirectional antenna, represents the core teaching of D4. It is presented as providing advantages over the

prior art, since it limits the transmission power required for the mode-s functionality and reduces RF spectrum overload and the resulting degradation of the RF environment (page 9, lines 2-4).

9. The finding that a claim differs from a prior-art disclosure in that it modifies a feature presented in that prior art as essential and defining the core of that invention is, in itself, considered an indication that the claimed subject-matter is not obvious in the light of that prior art. In this context, the rationale of decision T 2201/10, (section 5.1.3), is convincing. It means, under the present circumstances, that it would not have been obvious to a person skilled in the art, starting from the invention of D4, to renounce to the shared antenna configuration and its intended effects in terms of reduced power transmission and RF overload, to return to the starting point of that invention.
10. It follows that the subject-matter of claim 1 does not result in an obvious manner from the invention disclosed in D4.
11. However, the content of D4 is not limited to the disclosure of the invention but also includes, as already mentioned, a detailed description of the prior art. That prior art also represents itself a suitable starting point for assessing the inventive merits of the present invention.
12. Specifically, page 8, lines 22 to 26 and page 14, line 1 to page 18, line 2 and figure 2 of D4, describe and depict a prior-art system using a mode-s transponder function and a separate TCAS function with dedicated antennas. Directional antennas are used by the TCAS

function (page 7, line 7 - page 8, line 10, page 16, line 1 - page 17, line 18) and omni-directional antennas are used in reception and transmission connection with the mode-s transponder function (page 3, line 24 - page 4, line 6, page 14, line 1 - page 15, line 31).

13. The system claimed differs from the prior art system depicted in Figure 2 of D4 merely in that the mode-s transponder function relies on only one mode-s transmitter and receiver with a switching network connected to the omnidirectional antenna, whereas in D4, the number of transmitters or receivers of the mode-s transponder function of the system of figure 2 is not specified.

14. The presence of two omnidirectional antennas in the prior art system of D4 allows both for the presence of a transmitter and a receiver per antenna, or for the presence of a common (single) transmitter and receiver for both antennas. The fact that, as disclosed in D4, in the listening mode, messages are received simultaneously from the two omnidirectional antennas does not exclude the possibility of the system comprising only one mode-s transmitter and receiver, and thus does not affect this finding. This is also the case if it is assumed, in favour of the applicant, that the statement on page 14, lines 4-6 of D4, that the system of figure 2, comprises a primary transponder and a secondary (back-up) transponder, with the dedicated antennas 14A and 14B coupled to them, is ambiguous as to the number of antennas connected to each of the transponders.

15. The applicant also argued that the system claimed further differs from the prior-art system of figure 2

of D4 in that it comprised a single omnidirectional antenna in reception and transmission connection with the mode-s transponder function.

16. However, the claim language does not reflect this. Even though the claim defines an omni-directional antenna in reception and transmission connection with the mode-s transponder function, it does not restrict the number of omnidirectional antennas to only one. It merely defines a mode-s transponder function with only one mode-s transmitter and receiver with a switching means using the omnidirectional antenna defined. Consequently, the claim does not exclude systems comprising an additional omnidirectional antenna, as for example illustrated in figure 2 of D4, as long as both antennas are connected to the single mode-s transmitter and receiver defined.
17. Concerning, thus, the sole distinguishing feature identified above, that the mode-s transponder function relies on only one mode-s transmitter and receiver with a switching network connected to the omnidirectional antenna, the skilled person entrusted with the implementation of the mode-s function of the system of figure 2 of D4 would have opted, in the absence of any indication regarding the number of transmitters and receivers, for the simplest implementation. This would have resulted in a solution connecting both omnidirectional antennas to a transponder with only one mode-s transmitter and receiver.
18. This is all the more true since the alternative of providing a multiplicity of transmitters and receivers would entail disadvantages due to the unnecessary increase in complexity and costs.

19. Therefore, the subject-matter of claim 1 of the main request results in an obvious manner from the disclosure of the prior art system of figure 2, described in D4. It is thus not inventive in the meaning of Article 56 EPC.

Auxiliary request Ia

20. Claim 1 of auxiliary request Ia differs from claim 1 of the main request in that it defines a system comprising a mode-S transponder to which exactly one omnidirectional antenna is assigned.
21. The claimed subject matter differs then from the disclosure of the prior art system of figure 2 of D4 in that exactly one omnidirectional antenna with its transmitter and receiver and with a switching network is used for the mode-S transponder function.
22. In the applicant's view, this results in the system claimed being simpler and requiring less power than the system of figure 2 of D4, with its two omnidirectional antennas, and contributing to a reduction in heat dissipation and improving the reliability of the system.
23. This reflects the problems mentioned in paragraph [0012] of the application. Although those statements concern state-of-the-art configurations where the TCAS and mode-S functionalities share a common antenna, the Board agrees that these effects also exist, to a lesser extent, when moving from a system employing two omnidirectional antennas to a system using a single omnidirectional antenna to implement the mode-S function. The limitation to a single omnidirectional

antenna reduces the needs for hardware and the associated power requirements. The reliability of the system is also improved, because the amount of hardware components that can cause malfunctions is limited.

24. The appellant argued that the use of two omnidirectional antennas was disclosed in D4 as essential to avoid the problem of shadowing due to the airframe itself, which would alter the transmission and reception of electromagnetic signals.
25. Referring, once again, to decision T 2201/10 the applicant argued that, in view of this disclosure in D4, it would then not have been obvious to the person skilled in the art, willing to simplify the system of figure 2 of D4, to remove one of the two omnidirectional antennas, since both were described as needed. That the skilled person would not remove a feature presented as essential in the prior art had been recognised and followed by the Board for claim 1 of the main request. The situation was essentially the same for claim 1 of auxiliary request Ia.
26. This argument is, however, not persuasive for the following reasons.
27. The shadowing problem referred to by the applicant is mentioned on page 9, lines 31 and 32, of D4, as the "attenuation of the received transponder signals by the airframe blocking the antenna from the SSR ground station transmitter when a single antenna is used". That problem is solved in that coverage of the volume surrounding the airframe is achieved by providing a second omnidirectional antenna at a position that allows to cover the "blind" volume resulting from shadowing.

28. Although such a statement highlights the disadvantages associated with employing only one omnidirectional antenna, thus providing an incentive for keeping the second antenna, it also confirms that the absence of a second antenna is not in itself rendering the communication system inoperable. This is certainly true for the mode-s function which is mainly intended to identify neighbouring planes, for which communication with ground stations is not essential.
29. This implies that the skilled person would have recognised that the use of a single antenna, although detrimental in those regards, would nevertheless have been advantageous in other regards. The skilled person seeking simplification of processing and hardware or lower power requirements would have privileged that over the need for a full coverage of the surrounding area.
30. No inventive merit is recognised in the trade-off decision made by the inventors, which consists in ignoring the shadowing problem in favour of reducing the number of omnidirectional antennas, thereby simplifying the hardware and processing involved in the mode-s function, as well as the associated energy needs, heat production and reliability.
31. This situation, concerning claim 1 of auxiliary request Ia, differs from the situation of the system of claim 1 of the main request vis-à-vis the invention disclosed in D4, or the situation underlying case T 2201/10. Concretely, in the case of claim 1 of auxiliary request Ia, the modification implemented in the prior art system does not remove a key functionality of that prior art system but merely abandons a feature

disclosed as advantageous for certain purposes, but not as essential for the functionality described. It takes into account that other advantageous are achieved by such abandonment.

32. Specifically, the invention underlying case T 2201/10, addressed the problem of vibrations of guide tubes within nuclear plants which resulted from the flow of coolant around the tubes. It was solved by providing reinforcement mesh structures for the guide tubes. It was an object of the invention to avoid interfering structures which would have generated pressure losses and hindered the free circulation of the coolant. The claim thus explicitly referred to a reinforcing mesh structure devoid of mixing means. A document of the prior art addressed an unrelated problem resulting from inhomogeneous temperatures in the coolant medium within a nuclear reactor, which contributed to increase mechanical stress in the guide tubes. This was solved by the provision of a mesh structure incorporating mixing fins. The mixing fins were essential in the context of that prior art in that they created turbulences that contributed to the homogenisation of the temperature of the circulating coolant medium. The Board (in a different composition) held that it would not have been obvious, on the basis of a prior art document in which the mixing fins were essential in view of the problem to be solved, to modify this structure in a way that would have been contrary to its primary purpose in the context of said prior art.
33. This reflects a general teaching of the case law according to which a foreseeable worsening of the prior art does not on its own involve an inventive step if it is not accompanied by an unexpected technical advantage (T 119/82, point 16; T 155/85, Headword, point 16).

34. Therefore the subject-matter of claim 1 of auxiliary request Ia is not inventive in view of system of figure 2 of D4 (Article 56 EPC).

Auxiliary request Ib

35. Claim 1 of auxiliary request Ib includes the additional limitation that the system also comprises a distance measuring equipment system (DME).

36. The Board agrees with the Examining Division in that the reference to the system comprising a distance measuring equipment system (DME) constitutes an unallowable generalisation of the embodiments disclosed in Figure 2 and defined in original dependent claim 2. In those passages of the application as filed, the DME system was a part of the mode-s functionality.

37. However, Claim 1 of auxiliary request Ib does not incorporate the corresponding limitation.

38. Therefore claim 1 of auxiliary request Ib contains added subject-matter (Article 123(2) EPC).

Auxiliary request II

39. Claim 1 of auxiliary request II adds to claim 1 of the main request the features that the one mode-s transmitter operates at 1090 MHz transmitter and the one receiver operates at 1030 MHz.

40. These additional features relate to features inherent to the mode-s functionality in the field of avionics,

reflected in the specifications defined in relevant technical standards, which are, furthermore, also disclosed in D4 (page 14, lines 20-23, page 16, lines 11, 12).

41. The use of frequencies for the transmitter and receiver that comply with the relevant standards in the field of the invention cannot contribute to the existence of an inventive step.

42. Therefore, claim 1 of auxiliary request II also lacks inventive step in view of the prior art system of figure 2 of D4 (Article 56 EPC).

Auxiliary request III

43. Claim 1 of auxiliary request III comprises the same unallowable amendment as claim 1 of auxiliary request Ib and the further features present in claim 1 of auxiliary request II.

44. It, therefore, suffers from the issue of added subject-matter identified above with requests to auxiliary request Ib (Article 123(2) EPC).

Auxiliary requests IV and V - Consideration

45. Auxiliary request IV and V are amendments in the meaning of Article 12(4) RPBA. Their admission into the proceedings is at the discretion of the Board, which shall base its decision on the complexity of the amendments, the suitability of the amendments to address the issues which lead to the decision under appeal, and the need for procedural economy.

46. These new requests are a reaction to the opinion expressed in the *obiter dictum* of the decision of the Examining Division, that claim 1 of each of auxiliary request Ib and III comprised added subject-matter.
47. Indeed claim 1 of each of these requests defines that it is the mode-s function that includes the distance measuring system, as disclosed in claim 2 of the application as filed.
48. However, even if the amendments are suitable to address the issue of added subject-matter mentioned in the contested decision, and identified above, with regard to claim 1 of auxiliary requests Ib and III, they are not suitable to address the lack of inventive activity identified above with regard to claim 1 of the main request and auxiliary requests Ia and II.
49. This is because distance measuring systems were well known in avionics. Their integration in the prior art system of figure 2 of D4 only extends its functionality in a well-known way. No effect extending beyond the foreseeable ones can be recognised in the subject-matter of claim 1 of auxiliary request IV. In particular, the integration of a distance measuring system to the mode-s functionality does not result in any synergy. Furthermore, this known functionality is also mentioned in the background section of D4 (page 2 lines 20 to 25, page 6 lines 31 to page 7 line 6), as well as in the context of the prior art system of figure 2 of D4 (page 16, lines 19,20).
50. A synergy also does not arise from the combination of the distance measuring system defined in claim 1 of auxiliary request IV with the limitations regarding the

frequencies used for the emitting and receiving modes defined in claim 1 of auxiliary requests II, as set out in claim 1 of auxiliary request V.

51. The amendments introduced into claim 1 of auxiliary requests IV and V are, therefore, regarded as unsuitable to address the issue of lack of inventive step in view of D4 identified above with regards to the main request and auxiliary requests Ia and II.
52. The Board sees, therefore, no reason to admit auxiliary requests IV and V into the proceedings (Article 12(4) RPBA).

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairwoman:



D. Meyfarth

A. Medeiros Gaspar

Decision electronically authenticated