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File Number: T 748/90 - 3.5.1

Application No.: 83 106 741.8

Publication No.: 0 098 618

Title of invention: System for the electronical sector scanning of the beam of
a monopulse radar antenna

Classification: H01Q 25/02

DECISION
of 11 February 1991

Applicant: Selenia Industria Elettroniche Associate S.p.A.

Headword:

EPC Art. 56

Keyword: "Inventive step (denied) - obvious implementation"

Headnote



Case Number : T 748/90 - 3.5.1

D E C I S I O N
of the Technical Board of Appeal 3.5.1
of 11 February 1991

Appellant : Selenia Industrie Elettroniche Associate S.p.A.
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Decision under appeal : Decision of Examining Division 046 of the
European Patent Office dated 28 March 1990
refusing European patent application
No. 83 106 741.8 pursuant to Article 97(1) EPC.

Composition of the Board :

Chairman : P.K.J. van den Berg
Members : W.B. Oettinger
E.M.C. Holtz

Summary of Facts and Submissions

- I. European patent application No. 83 106 741.8, claiming a priority of 8 July 1982, filed on 8 July 1983 and published as EP-A-0 098 613, was refused by a decision of Examining Division 2.2.06.046 dated 28 March 1990.

The reason given for the refusal was that the subject-matter of the (single) claim filed on 11 November 1988 lacked an inventive step having regard to the prior art represented by the following documents:

- D1: US-A-3 877 031
D2: US-A-3 525 952
D3: US-A-3 059 192.

The claim reads as follows:

"System for sector scanning of radar antenna monopulse beams, including a first hybrid (1) to which an input power signal is fed, a switch including a phase shifter (A;B) connected to the output of the first hybrid (A1), a second hybrid (A2) receiving the output from the phase shifter (A;B) and delivering a sum signal (Σ) and a difference signal (Δ) to a monopulse comparator (2), a radiating antenna system (3) connected to the output of the monopulse comparator (2), and a control circuit for controlling the phase shift obtained by the phase shifter (A,B) characterised in that the phase shifter comprises a ferrite phase shifter (A,B) which is controlled by the electronic control circuit (DRIVER) to obtain output signals having predetermined phases and controlled amplitudes."

More particularly, the Examining Division considered that the claimed system was an obvious implementation of a

system known from D1 because the claimed implementation of its phase shifter as characterised was, as such, known from D2 and D3 and its use thereby suggested.

- II. On 2 June 1990, the Appellant lodged an appeal against this decision, requesting its being set aside and a patent granted, and paid the appeal fee.

- III. In a statement of grounds, faxed on 6 August 1990 and confirmed on 7 August 1990, the Appellant contested the Examining Division's view, submitting that the absence of any hint in D2 or D3 to fast sector scanning of radar antenna monopulse beams would show that at the priority date of the application (which is 12 to 20 years later) ferrite phase shifters did not form part of the common knowledge in that field and the skilled person seeking to implement the system of D1 would, instead, rely on electromechanical switches such as those known from the following documents (mentioned during the examination procedure):

- D4: US-A-3 906 508
- D5: US-A-4 315 266.

Reasons for the Decision

- 1. The appeal is admissible (Articles 106 to 108 and Rule 64 EPC).

- 2. The Examining Division silently assumed that the amendments made to the claim did not contravene Article 123(2) EPC.

The Board shares this view but notes the following in respect of other formal points:

2.1 From a purely linguistic point of view, the characterising feature of the claim would seem to imply that the amplitudes of the output signals obtained from the ferrite phase shifter are "controlled" as a result of the phase shifter being controlled by the electronic control circuit.

This interpretation would however appear incorrect because the amplitudes of the output signals of the phase shifter (A,B) are still those of its input signals and only their phases have been "controlled" as shown in Table I.

As follows clearly from the description, e.g. page 3, lines 1 to 14, in particular the Cos terms in the formulas, the amplitudes of the output signals of the "microwave scheme of Figure 2", i.e. the electronic switch 1 as a whole, are "controlled".

So, on its proper interpretation, the last subordinate clause in the claim must be understood as referring, at least as far as the "controlled amplitudes" are concerned, to the output signals of the switch (1), or of the second hybrid (A2), but not of the phase shifter (A,B).

2.2 It is further noted that the correct reference sign for the first hybrid as mentioned in the second line of the claim would be A1 rather than 1.

3. The issue to be decided is solely that of lack of inventive step.

The Board has carefully considered the Appellant's counter-arguments submitted with a view to refuting the argumentation set out in the decision under appeal but found that, in effect, that argumentation was convincing and the Appellant's counter-arguments are not.

This conclusion is based, in essence, on the following considerations:

- 3.1 A system as defined in the pre-characterising portion of the claim, represented also in Figure 1 of the application documents with its block 1 specified as shown in Figure 2 and with elements A and B controlled by a driver as shown in Figure 3, is known from D1, for instance Figure 5 in conjunction with the description of Figures 3 to 5 in column 6, line 43 to column 7, line 28.

In particular, it is noted that the arrangement shown in Figure 4 of D1, consisting of the two hybrids 29 and the controlled phase shifter 30, is, in effect, an electronic switch if the phase is shifted by discrete values as may clearly be the case. The result of such phase shifting is that sum and difference monopulse patterns, as represented in Figure 14 of D1, are shifted by discrete values over a space sector similarly as shown in Figure 2 of D1. It is also clear that this result is based on the fact that the effect of said phase shifting is that the output signals of the second hybrid have "predetermined phases and controlled amplitudes".

The Appellant does not seem to dispute these facts.

- 3.2 The issue to be decided reduces therefore to the question whether it is obvious to use, in the electronic switch (1) as the phase shifters A and B (Figure 2), phase shifters of the "ferrite" type.
- 3.3 The Appellant submits that the skilled person seeking to put the system of D1 into effect, would rely on commonly used electromechanical switching systems such as shown in D4 or D5.

This argument is not conclusive.

Taking, for instance, D5, a skilled person seeking to implement a system as shown in Figure 1 of the present application, i.e. comprising switch (1), monopulse comparator (2) and antenna system (3), may well consider using, as switch (1), the relay switch (24) of D5. However, this is not the point. The question to be asked in the present case is, what kind of phase shifter would a skilled person use given that he seeks to implement an electronic switch as shown in Figure 2 of the present application, i.e. presuming that the switch comprises a hybrid, the controllable phase shifter(s), and another hybrid. For this question, D5 would not seem to be of any help as it does not consider at all the use of phase shifters.

- 3.4 The real question remains whether the skilled person would consider to use, as the phase shifter(s) in the (hybrid-phase shifter-hybrid) switch shown in Figure 2 of the application, a phase shifter of the "ferrite" type.

Such ferrite phase shifters have been shown to be known from D2 (20/21) and D3 (15/16) and it is moreover noted that they are used, according to these documents, within an electronic switch (Figures 1 of both documents) comprising a hybrid, the phase shifter(s) and another hybrid with the phase shifter(s) being controlled by drivers (28/29 in D2, 26 in D3).

Therefore, dealing with the question of inventive step and not novelty, it is clearly not necessary that D2 or D3 explicitly states that such a switch can be used in a system for sector scanning of radar antenna monopulse

beams, to render that use obvious. It suffices, for allowing such a conclusion, that D2 and D3 are concerned with the implementation of exactly the same hybrid-phase shifter-hybrid type of switch as is known can be used, according to D1, in such a system.

- 3.5 The Appellant's submission based on the publication dates of the prior art documents is taken to mean that the skilled person dealing with sector scanning of radar antenna monopulse beams did not, during a long period of time, take up the idea of using, as the phase shifters of D1, the ferrite phase shifters of D2 or D3 despite their apparent advantage (speed) and that this would show that he was prejudiced against such a use.

This argument is unconvincing. A technical prejudice would require that the skilled person had a reason to assume that the ferrite phase shifters of D2 or D3 would not be suitable for use as the phase shifters of D1 and that for this reason, despite a long-felt need, he would not have used them. Such a reason has not been substantiated, nor can the Board see one.

On the contrary: the skilled person was at any time after publication of D1 fully free to consider implementing its phase shifter in a way as suggested by D2 and D3. The fact that no document was found showing such an implementation has only for its consequence that no novelty anticipation can be cited but not in itself that the implementation was unobvious.

4. The single claim being, for these reasons, unallowable, the Appellant's request, and thus the appeal, must be rejected.

Order

For these reasons, it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

M. Kiehl

P.K.J. van den Berg