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# D E C I S I O N
# of 9 October 1997

**Case Number:** T 0697/97 - 3.5.1

**Application Number:** 93105585.9

**Publication Number:** 0565016

**IPC:** H01Q 21/24

**Language of the proceedings:** EN

**Title of invention:**
Low profile eliptically polarised antenna

**Applicant:**
ALCATEL N.V.

**Opponent:**
-

**Headword:**
-

**Relevant legal provisions:**
EPC Art. 54, 56

**Keyword:**
"Novelty (yes)"
"Inventive step (yes)"

**Decisions cited:**
-

**Catchword:**
-

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**Case Number:** T 0697/97 - 3.5.1

# D E C I S I O N
## of the Technical Board of Appeal 3.5.1
## of 9 October 1997

**Appellant:** ALCATEL N.V.
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**Representative:** Pohl, Herbert, Dipl.-Ing.
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**Decision under appeal:** **Decision of the Examining Division of the European Patent Office posted 5 May 1997 refusing European patent application No. 93 105 585.9 pursuant to Article 97(1) EPC.**

**Composition of the Board:**

**Chairman:** P. K. J. van den Berg
**Members:** A. S. Clelland
C. Holtz

## Summary of Facts and Submissions

I. This appeal is against the decision of the examining division to refuse the application on the grounds that the subject-matter of claims 1 to 8 and 10 to 15 was not new (Articles 52(1), 54(1) and (2) EPC) and that claim 9 lacked an inventive step (Articles 52(1) and 56 EPC). The following document was cited in the decision:

D1: US-A-4 160 978

II. The appellant (applicant) lodged an appeal against the decision on 28 May 1997 and paid the prescribed fee. On 14 June 1997 a statement of grounds of appeal was filed. A request for oral proceedings was also filed, together with a request for reimbursement of the appeal fee on the ground of a substantial procedural violation by the examining division.

III. In a communication the rapporteur, on behalf of the Board, cited the following document to establish the common technical knowledge in the field of antennas:

D2: Rothammel: "Antennenbuch", 7th edition, Telekosmos-Verlag, Stuttgart 1981.

Oral proceedings were appointed.

IV. In response, the appellant filed four sets of claims of main and auxiliary requests.

V. At the oral proceedings on 9 October 1997, the Board referred to the following document, cited in the European Search Report, to elucidate further the common technical knowledge in this field:

D3: Electronics and Communications in Japan Part I: Communications, vol. 74, no. 2, February 1991, New York, US, pages 108 to 115; KUMON et al.: "An Analysis of the Crossed Twin Delta Loop Antennas with Circular Polarization".

VI. In the course of the oral proceedings the appellant withdrew his request for reimbursement of the appeal fee and replaced the four sets of claims on file with a single set. He requested that the decision under appeal be set aside and a patent be granted on the basis of the following documents:

**Claims:** 1 to 14, submitted during the oral proceedings;

**Description:** pages 1 to 3, submitted during the oral proceedings;
pages 4 and 5, as originally filed;

**Drawings:** sheets 1 to 3, as originally filed.

VII. Claim 1 reads as follows:

"An antenna array for transmitting or receiving a radio signal of a given wavelength, said array comprising a predetermined plurality of planar loops (1, ..., 4, 8, ..., 13) serially interconnected by connecting sections (5, 6, 7), wherein each said loop is substantially symmetrical about an axis of symmetry joining the centre of said loop to a point where said loop is interconnected to a connecting section and has an arc length of approximately one said given wavelength, characterised in that
said antenna array forms a chess-board like arrangement, with each loop within one square of said chess-board and with two adjacent loops separated by one intermediate square,

in that connecting sections between adjacent loops have a length of approximately one-quarter wavelength and connect said loops between adjacent corners of such squares, whereby the electrical length from one point of a loop to a point of an adjacent loop connected therewith is one full wavelength, for points which have the same orientation with respect to the centers of the respective loops,
and in that all loops and connecting sections lie within the same plane."

VIII. The appellant argued as follows:

The invention involved a combination of electrical, mechanical and geometrical features of an antenna. The finding of lack of novelty over D1 had not taken the latter two considerations into account. The invention was clearly novel because D1 disclosed neither connecting sections of one-quarter wavelength, nor that the loops and connecting sections lay in the same plane.

## Reasons for the Decision

1. The appeal is admissible.

2. *Added subject-matter*

The revised claim 1 no longer includes a feature of claim 1 as originally filed, namely that respective axes of symmetry of adjacent loops are normal. This feature is however implicit in the present formulation, which states that connection sections connect adjacent loops between adjacent corners of (notional) squares within which the loops are located and that each loop is symmetrical about an axis joining the centre of the

loop to a point where the loop is interconnected to the connecting section. In other words, the axes of adjacent loops pass through the adjacent corners of their squares, implying that they are normal to one another. Claim 1 is accordingly considered to comply with Article 123(2) EPC.

3. *Novelty and Inventive Step*

3.1 Transportable antennas for use in mobile satellite-based systems need to be as compact as possible. The present application proposes a more compact antenna in the form of a planar array in which the individual antenna elements constitute one-wavelength loops arranged in a pattern analogous to a chessboard, adjacent loops being spaced apart by one square and joined by a quarter-wave connecting section. As noted above each loop is symmetrical about an axis joining the centre of the loop and the feed point.

3.2 The only document mentioned in the impugned decision is D1, which discloses at Figure 13 an antenna in the form of a loop array in which the two loops nearest the feed point are substantially symmetrical and with their axes normal to one another. None of the features of the characterising part of the present claim 1 can be identified in D1. Another document showing two loops having the features of the preamble of claim 1 is D3, which discloses a pair of crossed twin delta loop antennas with one pair fed with a quarter-wavelength delay, see Figure 1. Again, none of the features of the characterising part of claim 1 can be identified.

3.3 Claim 1 is thus novel with respect to the disclosure of both D1 and D3.

3.4 It is observed that the Board has been unable to follow the examining division's reasoning concerning the connection section between the two loops in D1, explained at paragraph 5 of the contested decision. The Board can find no example in D1 where this section has a length of one-quarter wavelength. According to column 4, lines 6 to 11, a length of one wavelength is implied. Furthermore, in the Figure 13 embodiment, by virtue of the offset feed point the phase shift between the two central loops may be one-quarter wavelength, but the connecting section is at least one wavelength long; the length between similar points on the loops is an integral number of wavelengths as described at column 9, lines 6 to 9. It is not necessary however to consider this point further in the light of the other differences between the present claim 1 and D1.

3.5 As regards inventive step, in the Board's view neither D1 nor D3 is relevant to the subject-matter now claimed. Although in the limit claim 1 includes the special case of two loops, neither document contains any teaching which would lead the skilled person to the claimed geometrical layout. Nor can any other prior art be identified which would lead the skilled person in the claimed direction.

## 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 grant a patent according to the appellant's request.

The Registrar: The Chairman:

N. Maslin P. K. J. van den Berg