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**D E C I S I O N**  
of 10 December 1997

**Case Number:** T 0905/95 - 3.5.2

**Application Number:** 87105148.8

**Publication Number:** 0241849

**IPC:** G11B 27/10

**Language of the proceedings:** EN

**Title of invention:**

Apparatus for detecting the position of a tape when recording  
or reproducing signals thereon

**Patentee:**

Sony Corporation

**Opponent:**

Interessengemeinschaft für Rundfunkschutzrechte E.V.

**Headword:**

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**Relevant legal provisions:**

EPC Art. 56, 100(b)

**Keyword:**

"Sufficiency of disclosure - yes"  
"Inventive step - yes"

**Decisions cited:**

T 0435/91, T 0208/84

**Catchword:**

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## Summary of Facts and Submissions

- I. This appeal is against the rejection of the opposition to European patent No. 241 849.
- II. In the notice of opposition the opponent requested revocation of the patent in its entirety on the grounds that the patent did not disclose the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art (Article 100(b) EPC); and that the subject-matter of the claims of the patent did not involve an inventive step (Article 100(a) EPC) having regard to the following prior art:

D1: DE-C-2 730 134 (corresponding to GB-A-1 555 059, cited in the examination procedure)

D2: DE-B-2 650 665.

These documents were in effect taken to define the relevant prior art in the decision under appeal and were also relied on on appeal, albeit both the impugned decision and the grounds of appeal erroneously refer to the corresponding "A" documents.

- III. The patent has not been amended. Independent claims 1 and 2 read as follows:

"1. A tape position detecting device for an apparatus for recording and/or reproducing signals on a tape (13) running between a supply reel (14) and a take-up reel (15), said device comprising:

- a first means (4-12) for determining, when said tape is loaded into said apparatus, the radius  $r_{sp}$  of the outer turn of said supply reel and the radius  $r_{tp}$  of the outer turn of said take-up reel;

- a second means (8,9) for counting the revolutions  $n_s$  of said supply reel and the revolutions  $n_T$  of said take-up reel from the load position of the tape to the actual arbitrary position; and
- a third means (11,12; 16,18) for calculating data related to the actual arbitrary position from the radii  $r_{SP}$  and  $r_{TP}$  and from the revolutions  $n_s$  and  $n_T$ , said data being the length  $l$  of the transported tape, which length  $l$  is calculated as:

$$l = 2 \cdot n_T \cdot n_S \cdot (n_T \cdot r_{SP} + n_S \cdot r_{TP}) / (n_T^2 + n_S^2) . "$$

"2. A tape position detecting device for an apparatus for recording and/or reproducing signals on a tape (13) running between a supply reel (14) and a take-up reel (15), said device comprising:

- a first means (4-12) for determining, when said tape is loaded into said apparatus, the radius  $r_{SP}$  of the outer turn of said supply reel and the radius  $r_{TP}$  of the outer turn of said take-up reel;
- a second means (8,9) for counting the revolutions  $n_s$  of said supply reel and the revolutions  $n_T$  of said take-up reel from the load position of the tape to the actual arbitrary position; and
- a third means (11,12; 16,18) for calculating data related to the actual arbitrary position from the radii  $r_{SP}$  and  $r_{TP}$  and from the revolutions  $n_s$  and  $n_T$ , said data being at least one of the radii  $r_s$  and  $r_T$  of the outer turn of the tape (13) on said supply reel (14) and said take-up reel (15), respectively, said radii  $r_s$  and  $r_T$  being calculated as:

$$r_s = [2 \cdot n_T \cdot n_S \cdot r_{TP} + (n_S^2 - n_T^2) \cdot r_{SP}] / (n_T^2 + n_S^2) ,$$

$$r_T = [2 \cdot n_T \cdot n_S \cdot r_{SP} + (n_S^2 - n_T^2) \cdot r_{TP}] / (n_T^2 + n_S^2) . "$$

Claims 3 to 6 are dependent on claims 1 or 2.

- IV. The appellant requested that the decision under appeal be set aside and that the patent be revoked.
- V. The respondent requested that the appeal be dismissed.
- VI. The appellant (opponent) argued essentially as follows:

**Sufficiency of disclosure (Article 100(b) EPC)**

Claim 1 related to a tape position detecting device in general. No feature was specifically directed to the detection of a relative as opposed to an absolute tape position. According to the description of the opposed patent the claimed device detected the tape position only relative to the load position (cf also the decision under appeal at page 4, last paragraph and page 5, lines 6 to 16). Should the load position be the beginning-of-tape, only an absolute tape position could be determined. Since the wording of claim 1 also encompassed the detection of an absolute tape position, the patent failed to disclose any technical concept fit for generalisation, that would enable the skilled person to achieve the envisaged result within the whole ambit of the claim. The claimed invention was therefore not sufficiently disclosed (Article 100(b) EPC); cf decision T 435/91, OJ EPO 1995, 188 (headnote).

**Inventive step**

If a tape was loaded at the beginning-of-tape position according to D1 or D2, the tape position detecting device of D1 or D2 would determine the actual position using the relationship that the radii of the reels were inversely proportional to their rotational speed (cf D1, column 8, lines 1 and 2 and D2, column 3,

lines 50 to 51). The wording of claim 1 of the opposed patent also covered the situation where the load position was the beginning-of-tape. This, however, meant that the "first means" of claim 1 was known from D1 or D2.

The wording of the first feature of claim 1, namely " ...when said tape is loaded into said apparatus ..." could define a repetitive determination of the radii of the reels, as provided by D1 or D2. The radii of the reels could hence be determined at any arbitrary position to assist the detection of the tape position.

The second feature of claim 1 was also known from D1 or D2, since the tape could be loaded at the beginning-of-tape position. It was implemented according to D1, cf Figure 2, by counters 42 and 44 and according to D2, see claim 3, by counters  $Z_1$  and  $Z_2$ .

The third feature of claim 1 comprised a formula, which was indeed different from the formulae given in D1 or D2. This formula did not, however, provide any technical contribution over D1 and D2, as would be required by a computer-related invention, since D1 and D2 taught how the tape position could be determined from the ratio of the rotational speeds of the two tape reels. Specifically, the formula (I) in column 8 of D1 was explained by the text from column 7, line 42 to column 8, line 50 and comprised constants which did not include any information about the tape thickness. These predetermined constants did not need to be changed for tapes of the same type.

Moreover, the tape position detecting device of the opposed patent also required a predetermined tape constant, namely the radius of the capstan.

The subject-matter of claim 1 was therefore not inventive in view of D1 or D2. This reasoning applied mutatis mutandis to claim 2 also.

VII. The respondent's arguments can be summarized as follows:

**Sufficiency of disclosure**

As clearly stated in the specification, it was the object of this invention to provide for "tape position related data" which was not necessarily data related to the beginning-of-tape. In like manner, conventional mechanical tape counters known from audio tape recorders did not provide for tape positions relative to the beginning-of-tape. The definitions in claim 1 "when said tape is loaded" (page 6, line 22 of the patent specification), "from the load position of the tape to the actual arbitrary position" (ditto, line 25) and "the length l of the transported tape" (ditto, line 27) implicitly restricted claim 1 to relative tape position detection and indicated, that the radii of the reels should be determined at the load position only. Decision T 435/91 was not applicable to the present case.

**Inventive step**

D1 did not disclose means for determining the web radii of any of the reels, but taught only the calculation of the ratio  $P1/P2$  of the pulses generated by angular speed detectors 30 and 34, i.e. the radius was not determined but only a value proportional to the ratio of the two radii.

Neither did D2 disclose means for determining the web radii of any of the reels, but taught only the calculation of the ratio  $n_c/n_a$ , wherein  $n_c$  denoted the rotational speed of the capstan and  $n_a$  denoted the rotational speed of the take-up reel.

Consequently, neither D1 nor D2 suggested that the radius  $r_{sp}$  of the outer turn of the supply reel and the radius  $r_{tp}$  of the outer turn of the take-up reel should be determined as specified in the first feature of claims 1 and 2, respectively.

This basic idea, i.e. to refer all data back to data acquired when the tape was loaded so that "tape position related data can be calculated irrespective of the tape thickness" could not be obvious over D1 and D2, because these citations necessarily required the tape thickness or an equivalent parameter for any calculation, whereas in the opposed patent the tape thickness 't' disappeared from the equations 5, 6 and 7. In the device of the opposed patent no pre-stored tape parameters were required, which was the opposite of the mechanisms employed in D1 and D2. Thus D1 specifically needed empirically determined parameters A and B, see D1, column 2, line 5, which referred to an individual tape.

Neither D1 nor D2 taught counting the respective revolutions  $n_s$  and  $n_t$  of the reels; the detectors of D1 instead generated pulse trains which represented the angular speeds of each of the reels (cf D1, column 11, lines 54 to 60), whereas D2 taught determination of the ratio of the rotational speeds of the capstan and the take-up reel (cf D2, column 4, lines 29 to 30).



Therefore neither D1 nor D2 suggested determining the radii  $r_{sp}$  and  $r_{Tp}$  and the revolutions  $n_s$  and  $n_T$ . Consequently, even the "third means" of claims 1 and 2, considered in isolation, could not be obvious in view of D1 and D2.

The radius  $r_c$  of the capstan was a constant of the tape recorder and could not reasonably be regarded as being a tape constant.

### Reasons for the Decision

1. The appeal is admissible.
2. Sufficiency of disclosure (Article 100(b) EPC)
  - 2.1 Since it is common ground that the description of the opposed patent does not purport to **disclose** a device for detecting absolute tape position (ie measured from the beginning-of-tape) - other than in the degenerate case where the load position is the beginning-of-tape position - the opponent's success or failure on the Article 100(b) ground hinges on the interpretation of claim 1, ie on whether or not an absolute position device is **claimed**.
  - 2.2 Reading the claim as a whole, the "**length l of the transported tape**" is to be interpreted as *the length transported from the load position of the tape to the actual arbitrary position*, since, having regard to the syntax and sense, the tape transport referred to can only be that which is physically caused by the revolutions  $n_s$  and  $n_T$  which are mentioned in the immediately preceding phrase and which are specifically defined as being "from the load position of the tape to the actual arbitrary position". This is confirmed by the formula in the last line of the claim which calculates a quantity  $l$  which (apart from a scale factor  $\pi$ ) is in physical and

mathematical fact the relative position, starting with zero transported tape length at the load position. Claim 1 cannot therefore be interpreted as encompassing a device for detecting absolute rather than relative tape position; the existence of the singular degenerate case of coincidence between absolute and relative positions (when the 'load position' happens to be the start of the tape) does not mean that the claim covers the determination of the absolute tape position, starting from **any** load position. It follows that the rule enunciated in decision T 435/91, cited by the appellant, (cf headnote of that decision), relating to the standard of disclosure required in the case of a claim comprising a broad functional definition is not applicable to the present case. Thus the appellant's arguments on this point are not convincing.

2.3 Similar reasoning applies mutatis mutandis to claim 2.

2.4 The board therefore concludes that the invention to which the opposed patent relates is sufficiently clearly and completely disclosed and the ground of opposition pursuant to Article 100(b) EPC does not prejudice the maintenance of the patent.

### 3. *Novelty*

Novelty is not in dispute.

### 4. *Inventive step*

4.1 The appellant's main argument was based on D1 as the closest prior art. It is common ground that D1 relates to a device which detects absolute tape position, ie position relative to the beginning-of-tape. The rotational speeds of the take-up reel and the supply reel are sensed and the absolute tape position is determined using pre-stored tape related parameters.

4.2 Starting from D1, the relevant technical problem solved by the devices claimed in the respective independent claims of the opposed patent is to design a tape position detecting device not requiring any pre-stored tape related parameters. Although this is something which is with hindsight clearly desirable there is no suggestion in the prior art documents on file of any attempt to formulate this problem.

4.3 This problem is solved in accordance with the teaching of the opposed patent by determining, on loading the tape, the radii  $r_{SR}$  and  $r_{TP}$  of the outer turns of the supply reel and the take-up reel, respectively, by counting the revolutions  $n_s$  of the supply reel and  $n_T$  of the take-up reel from the load position and by calculating either the length of the transported tape from the load position (claim 1) or the actual radii of the outer turns of the reels (claim 2) from the radii  $r_{SR}$ ,  $r_{TP}$  on loading and the revolutions  $n_s$ ,  $n_T$  in accordance with the formulae specified in the respective claims, it being a notable feature of these formulae that they do not involve the thickness 't' of the tape or an equivalent parameter, which would have to be pre-stored.

4.4 The question which therefore falls to be decided by the board is whether it would be obvious to the skilled person, starting from D1, to determine  $r_{SR}$  and  $r_{TP}$ , to count  $n_s$  and  $n_T$  and to calculate data relative to the load position and related to the actual arbitrary position from  $r_{SR}$ ,  $r_{TP}$ ,  $n_s$  and  $n_T$ .

4.5 D1 discloses a set of equations, see column 7, lines 60 to 65, which are mathematically equivalent to the equations at page 3, lines 45 to 55 of the opposed patent. D1, however, relates these equations to the

beginning-of-tape and then derives tape-related parameters A, B from these equations, see column 8, lines 1 to 28.

D1 makes use of the fact that the ratio of the web radii of the reels is inversely proportional to the ratio of the angular speed, see column 8, line 1. Pulse generators 30 and 34, see Figure 1 and column 7, lines 19 to 28, therefore generate pulse sequences with frequencies  $p_1$  and  $p_2$  representative of the angular speeds of the take-up reel and the supply reel. The pulses are counted by counters 42 and 44, see paragraph bridging columns 9 and 10, to determine the actual ratio  $p_1/p_2$  from counted pulses C1, C2. D1 calculates the absolute tape position from this ratio and the parameters A and B; it further teaches that these tape related parameters A, B, which are derived from the total tape length L and the ratio  $p_1/p_2$  at the beginning-of-tape, see column 8, equation 1 and lines 16 to 28, should be statistically evaluated to take account of small manufacturing differences between different tape cartridges of same type, see column 9, lines 17 to 27.

- 4.6 A suggestion cannot, however, be found in D1 to detect tape positions relative to the load position, and to count revolutions of the reels from the load position; it does not teach determination of the web radii of the reels, but only determination of the **ratio** of the web radii. Most significantly there is no suggestion in D1 that predetermined tape related parameters could be dispensed with and hence no pointer towards a formulation of the problem referred to at point 4.2 above, much less a pointer towards the solution specified in the claims of the opposed patent.

4.7 The appellant pointed out that the determination of the radii at the load position as specified in claim 6 of the opposed patent required a pre-stored parameter, namely the radius  $r_c$  of the capstan. It is indeed true, that  $r_c$  is a pre-stored parameter; however, this parameter characterises the tape recorder and not the tape which happens to be loaded;  $r_c$  can therefore be factory set and will be valid for any arbitrary type of tape.

4.8 Given the significant previously unenvisaged advantage, relative to the prior art device known from D1, of being able to dispense with pre-stored tape-specific parameters, requiring to be read from corresponding code marks on the tape or requiring to be determined by a preliminary measurement, it does not appear to the board that the device specified in claims 1 or 2 of the opposed patent, which incorporates these advantages, was obvious to the skilled person. In particular, the board is not persuaded by the appellant's arguments seeking to minimise this difference between the present invention and the prior art and the advantages which accrue therefrom.

4.9 Turning now to D2, this calculates an absolute tape position using tape thickness  $\mu$ , the diameter of the capstan and one of the diameter of the take-up reel or of the supply reel (cf column 3, lines 36 to 68); ie pre-stored tape-related parameters are required (cf column 4, lines 25 to 28), which could be coded on the cartridges (cf column 4, lines 46 to 56) - and automatically pre-loaded. Hence D2 is no more relevant than D1 in the assessment of inventive step.

4.10 For completeness it should be mentioned that the appellant's contention that the mathematical formulae in claims 1 and 2 of the opposed patent should be discounted in assessing inventive step as not

representing a technical contribution is not persuasive. In decision T 208/84 OJ EPO 1987, 014 at point 6, Technical Board of Appeal 3.5.1 expressed the view that "even if the idea underlying an invention may be considered to reside in a mathematical method a claim directed to a technical process in which the method is used does not seek protection for the mathematical method as such". By the same token, in the judgement of the present board, the fact that a mathematical idea (here, the elimination of the term 't' in the equations 5 to 7) could be regarded as the conceptual basis for the invention claimed does not mean that inventive step has to be assessed in respect only of the residual subject matter of the claim. Provided, as is true in the present case, the mathematical idea finds expression in a technical apparatus (or method), it is appropriate and necessary to give weight to that idea as representing the rationale without which the claim would be an arbitrary collocation of technical elements.

5. The board thus concludes that the subject-matter of each of claims 1 and 2 as granted involves an inventive step within the meaning of Article 56 EPC and that the ground of opposition pursuant to Article 100(a) EPC does not prejudice the maintenance of the opposed patent.

**Order**

**For these reasons it is decided that:**

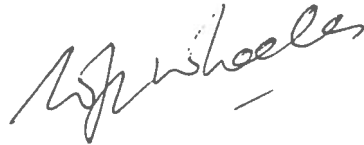
The appeal is dismissed.

The Registrar:



M. Kiehl

The Chairman:



W. J. L. Wheeler

