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D E C I S I O N
of 16 December 1994

Case Number: T 0026/93 - 3.5.2

Application Number: 80400464.6

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Language of the proceedings: EN

Title of invention:
Magnetic recording method and apparatus

Patentee:
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11 FUJI PHOTO FILM CO. LTD.
12 BSG Technische Beratungs-Gesellschaft mbH
13 PIONEER ELECTRONIC CORPORATION

Headword:
Magnetic recording method and apparatus/KODAK

Relevant legal provisions:
EPC Art. 52, 54, 56, 88, 100, 111, 123

Keyword:
"Novelty (yes)"
"Inventive step (main request: no)"
"Remittal of auxiliary requests"

Decisions cited:
T 0016/87, T 0068/85, T 0081/87, T 0153/85, T 0514/88

Catchword:

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0026/93 - 3.5.2

D E C I S I O N
of the Technical Board of Appeal 3.5.2
of 16 December 1994

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Decision under appeal: **Decision of the Opposition Division of the European Patent Office dated 2 December 1992 revoking European patent No. 0 018 267 pursuant to Article 102(1) EPC.**

Composition of the Board:

Chairman: R. E. Persson
Members: A. G. Hagenbucher
M. Chomentowski
A. Clelland
B. Schachenmann

Summary of Facts and Submissions

I. The present case before the Board concerns European patent No. 18 267 which is directed to a method for short wavelength recording of information signals onto a magnetic medium and an apparatus for such recording. The patent is based on application No. 80 400 464.6 which was filed on 9 April 1980 claiming priority from US 29 095 of 11 April 1979.

II. The patent was granted pursuant to a decision of the Board of Appeal 3.5.1 of 13 February 1989 in case T 194/83, setting aside a previous decision of the Examining Division to refuse the above application for lack of inventive step.

III. The patent as granted contains 7 claims which read as set out in **Annex I**.

IV. In its above decision the Board of Appeal 3.5.1 considered that the application as amended in the course of the appeal proceedings did not contravene the provisions of Articles 83 and 123(2) EPC. Furthermore, in the Board's judgement, the claimed use of a magnetic gap length of less than 0.38 µm for recording purposes did not form part of the state of the art and was therefore to be considered as novel. As to the question of inventive step, the Board arrived at the conclusion that an inventive step was present due to "a surprisingly good recording result" achieved by making use of the short magnetic gap length, the Board having found no suggestion in the prior art documents available to it that such a result could be obtained in this way.

V. The patent was opposed by 13 opponents, all of them requesting that the patent be revoked under Article 100(a) EPC for lack of novelty and/or inventive step. Some oppositions were also based on the grounds for revocation contained in Article 100(b) and (c) EPC. The patentee requested that the oppositions be rejected (main request) or that the patent be maintained in amended form pursuant to Article 102(3) EPC on the basis of new Claims 1 and 5 (auxiliary request).

VI. In the reasons for its decision of 2 December 1992, the Opposition Division first considered the objections raised under Article 100(b) and (c) EPC in respect of the patent as granted. The Opposition Division took the view, that, since on these points the facts were the same as those on which the Board of Appeal 3.5.1 had taken its above decision, the Opposition Division was bound under Article 111(b) EPC [sic] by that decision. It therefore adopted the conclusion of the Board of Appeal 3.5.1, that no objections arose under Article 100(b) or (c) EPC with regard to the patent as granted. No such objections were raised with regard to the claims covered by the patentee's auxiliary request either.

VII. The Opposition Division then considered the issue of novelty and inventive step with regard to the patent as granted and arrived at the conclusion that the subject-matter of the independent Claims 1 and 5 was novel but did not involve an inventive step. The same applied to the subject-matter of the claims according to the patentee's auxiliary request. The Opposition Division therefore decided to revoke the patent.

VIII. The patentee appealed against the above decision of the Opposition Division and made the following requests:

Main request
The decision under appeal to be set aside, the oppositions to be rejected and the patent consequently to be maintained as granted (see **Annex I**).

Auxiliary request I
The decision under appeal to be set aside and the patent to be maintained in amended form on the basis of independent Claims 1 and 5 as set out in **Annex II** and dependent Claims 2 to 4 and 6 to 7 as granted.

Auxiliary request II
The decision under appeal to be set aside and the patent to be maintained in amended form on the basis of independent Claims 1 and 5 as set out in **Annex III** and independent Claims 2 to 4 and 6 to 7 as granted.

At oral proceedings before the Board, which took place on 12 to 14 October 1994, the Appellant submitted some amendments to Claims 1 and 5 of auxiliary request II and proposed an amendment also to Claims 1 and 5 of the main request. However, the Board did not admit such amended claims, none of which appeared to be clearly allowable, into the proceedings at this late stage.

IX. All Respondents except No. 12 (BSG), who withdrew the opposition during the appeal proceedings, requested that the appeal be dismissed.

X. The main issues dealt with in the appeal proceedings concerned novelty and inventive step with regard to the claimed method and apparatus. Some Respondents also raised objections under Article 100(b) and (c) EPC and contested the clarity of Claims 1 and 5 of the auxiliary requests. Furthermore, objections were raised under Article 123 (2) and (3) EPC in respect of Claims 1 and 5 of auxiliary request I.

XI. In the course of the appeal proceedings, reference was made to a large number of prior art documents and other evidence of which the most relevant are listed in **Annex IV.**

XII. At the end of the oral proceedings, it was announced that the Board's decision would be given in writing.

Reasons for the Decision

1. The appeal is admissible.

2. *Procedural matters*

2.1 As appears from paragraph VI above, the Opposition Division did not consider the objections raised under Article 100(b) and (c) EPC (lack of sufficient disclosure, added subject-matter) in substance, since it felt bound by the previous decision of the Board of Appeal 3.5.1 with regard to these issues. As submitted by some of the Respondents, the Opposition Division was incorrect on this point. According to Article 111(2) EPC, if a Board of Appeal remits the case for further prosecution to the department whose decision was appealed, **that** department shall be bound by the **ratio decidendi** of the Board, insofar as the facts are the same. However, if, as in the present context, the case is remitted to the **Examining Division** with the order to grant a European patent and the patent is then opposed after grant, the **Opposition Division** is in no way legally bound by the previous decision of the Board of Appeal, even in so far as the facts are the same. Otherwise, the right to oppose a European patent under the EPC could obviously be rendered, wholly or

partially, nugatory. On the other hand, it goes without saying that the Opposition Division, which is a department of the first instance of the EPO, should not deviate from a previous decision of a Board of Appeal, which is a department of the second instance, on a point where the facts are the same, unless there appear to be very clear reasons for doing so. In any case, the Opposition Division's misconception was not decisive for the outcome of the opposition proceedings, since the patent was revoked on another ground than those covered by Article 100(b) and (c) EPC.

2.2 The submissions of the parties in the present case on the substantive issues involved were to a large extent based on contrary views on the content of the subject-matter of independent Claims 1 and 5 of the patent as granted. In particular, it was disputed whether the claimed magnetic gap length is maintained below 0.38 µm **during recording** or whether the claims rather refer to the use of a magnetic head with a certain magnetic gap length determined by the null method **during playback**, leaving it open what actually is the magnetic gap length during recording. The Board will, before considering whether any of the grounds for opposition under Article 100 EPC prejudices the maintenance of the patent, clarify how in its view these claims are to be interpreted, such interpretation being based on the wording of the claims in the light of the description and the drawings (cf. T 16/87, OJ EPO 1992, 212).

2.3 Up to and including paragraph 7 below, the Board's reasons are directed to the patent as granted, the maintenance of which corresponds to the Appellant's main request. The subsequent considerations under paragraphs 8 and 9 concern the auxiliary requests.

3. *Interpretation of Claims 1 and 5*

3.1 There are two features in Claims 1 and 5 which in the Board's view need to be interpreted in the light of the description and drawings, namely the references to "**short wavelength recording** of information signals onto a magnetic medium" and to "the **magnetic length of the recording gap**" being "less than 0.38 µm as related to the permeability of the magnetic medium".

3.2 Short wavelength recording

3.2.1 Although not explicitly mentioned in the claims the patent is concerned with broad-band recording, see page 2, line 56 to page 3, line 46. By "broad-band" a frequency range of greater than one octave is apparently to be understood, see page 3, lines 9 and 10, 24 to 28 and 62, page 6, lines 38 to 49, and Claim 2. In this context reference is made to **relatively** short wavelength recording of narrow band signals using a **relatively** short record gap, the latter being said to give rise to difficulties if also used for long wavelength recording (page 2 lines 56 to 59). It is uncontested that there is a direct relationship between the shortest wavelength which can be played back and the head gap. At lines 61 to 64 of page 2 a textbook by Mee is quoted to show that the skilled man would not use a narrow head gap for wide-band recording. Thus, although shorter head gaps are used for shorter wavelength recording/playback and similarly larger head gaps for larger wavelengths, the skilled man would have understood that a combination of both wavelengths - i.e. a wide bandwidth - is best served by recording with a longer head gap. In referring to short wavelength recording with a short recording gap the claims must in the context be understood as directed to recording a broader band of relatively "short wavelength signals", the claimed head gap indicating to

the skilled man what is to be understood by the relative term "short". This limitation to broad-band recording has been imported into the claims in the following discussion.

3.3 Magnetic length of the recording gap

3.3.1 It was argued by the Appellant that this feature limited the claim to the presence during the **recording** operation of the specific magnetic gap length. The description consistently referred to the magnetic **record** gap or to the magnetic gap during **recording**, see for example page 4, lines 37 and 38, and line 51. The wording of the claim implied therefore that the head was operated during recording without pole tip saturation, the effect of saturation being to reduce the permeability of the magnetic material adjacent the gap and thus, as the reduced permeability approached that of air, to give the effect of an increased gap. The skilled man would know whether he was operating with a head falling within the claimed range by the improved amplitude of the playback signal over the greater part of the recording band after recording with such a head, as could be seen from Figure 1 of the patent. The claims thus imply limitations as to the head material and recording current.

3.3.2 Several of the Respondents on the other hand argued that at the priority date there was no known method of determining a magnetic recording gap other than the so-called first null method as described in the patent at page 2, lines 32 to 43, so that the recording gap was by definition the same as the playback gap.

3.3.3 The Appellant's arguments amount to an assertion that Claims 1 and 5 specify a result to be achieved. It is the established jurisprudence of the Boards that a claim

may in appropriate circumstances be limited by a result to be achieved if accompanied by a detailed description of how to carry out the claimed invention so as to allow what is claimed to be achieved without undue burden (cf. T 68/85, OJ EPO 1987, 228). Such a claim is considered appropriate if the feature cannot be defined more precisely without restricting the scope of the invention, the Patentee being entitled to couch the invention in the most general terms possible in order to secure adequate and reasonable protection.

3.3.4 On a first reading of the description it appears that the only interpretation consistent both with the disclosure of the originally filed application and with the need to provide instructions which the skilled man can reduce to practice without undue burden is that the magnetic recording gap referred to in the claims is measured by the first null method. This is the interpretation adopted by Board of Appeal 3.5.1 in the pre-grant proceedings, see T 194/83 at paragraph 16, which states:

"The value of the magnetic gaplength for any particular magnetic head has to be assessed by a measuring method in which the null frequency of a reproduced signal is determined... The Board considers this as a necessary and sufficient specification for the purpose of assessing the magnetic gaplength".

3.3.5 However, in addition to the references to the first null method, the patent refers in Claim 1 to **recording** gap and in the description consistently distinguishes this from the playback gap measured by the first null method. For example, it is stated at page 4, lines 37 and 38 that "if recording takes place with a magnetic **record** gap length less than 0.38 µm, meaningful playback is not only possible, it is better" (Board's emphasis). It is

therefore apparent that even if no method is disclosed for measuring recording (as opposed to playback) gap, the skilled man is required to keep this gap less than 0.38 µm. It is also apparent from the patent, in particular from Figures 1 and 3, that there is a measurable increase in performance with such a head, so that for any given head the skilled man could ascertain, eg by ex situ testing, whether or not the recording head gap condition is satisfied by an analysis of the wide band recording results.

3.3.6 The Board therefore on balance accepts the Appellant's argument that the skilled man would know whether he was operating with a head falling within the claimed range by the improved amplitude of the playback signal over the greater part of the recording bandwidth after recording with such a head. In the following discussion the claims are interpreted as limited to a magnetic length of the **recording** gap of less than 0.38 µm.

4. *Added subject-matter*

4.1 It was alleged both in the opposition proceedings and in the present appeal that the reference in the amended claims to the "magnetic length of the recording gap" was not based on the originally filed disclosure, which consistently referred to a "magnetic record gap length" which was measured during playback by the first null method (see paragraph 3.3 et seq. above). The suggestion that the gap was measured during recording was said not to be derivable from the originally filed application.

4.2 In view of the discussion at paragraph 3.3 above, in particular 3.3.5, it will be appreciated that the Board takes the view that the Appellant's interpretation is derivable from the originally filed application. No objection of added subject-matter accordingly arises.

5. *Sufficiency of disclosure*

5.1 Various Respondents took the view that if the interpretation of Claim 1 made at paragraph 3.3.6 were to be adopted, objection would then arise that the patent does not disclose the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art.

5.2 It is noted that the originally filed application makes no mention of many of the standard parameters of a recording head which might have been expected to be specified in order to achieve the improved recording efficiency on which the Appellant relies. In particular, the application is silent as to such factors as pole tip saturation, head material, recording current and head/medium spacing (the discussion of the Kobayashi (D17) prior art at page 3, lines 47 to 57 of the patent was added during the pre-grant proceedings). The recording medium is only given secondary importance and there is no consideration of the relationship between the medium and head material.

5.3 On the other hand, as noted above, the improved recording efficiency is said to result solely from the small recording head gap. It has not been suggested by any of the parties that the head need have any property which would not form part of the common general knowledge of the skilled man. The Board accordingly concludes that given the specified recording head gap the skilled man would be able to carry out the invention.

6. *Novelty*

6.1.1 The Respondents, when discussing the issue of novelty, mainly relied on Seehawer (D12). In their opinion the

Seehawer document, which was published in 1974, clearly destroyed the novelty of Claims 1 and 5. Some of the Respondents additionally referred to the documents Nakamura (D43), Muramatsu (D13), Kobayashi (D17) and Yagi (D18) as also being novelty destroying.

6.1.2 The decision under appeal dealt thoroughly with the Seehawer document, which was also the document most comprehensively discussed in the course of the oral proceedings before the Board. In the judgement of the Opposition Division, Seehawer did not necessarily and unequivocally disclose the claimed invention to a person skilled in the art. It was accordingly held that the document was not novelty destroying; the same conclusion was reached with respect to all other cited documents. This finding was contested by most of the Respondents in the appeal proceedings; the Board therefore has to reconsider this issue taking account of the parties' further submissions.

6.2 Seehawer (D12)

6.2.1 Seehawer is one of a number of publications drawing attention to a magnetic video disc recording system, hereinafter referred to as the "MDR" system, developed by Wolfgang Bogen GmbH and demonstrated at an exhibition held in Berlin in September 1973. None of these publications can be described as learned journals but rather appear to be directed at the technically informed general reader. In addition to Seehawer, documents RME (D2), Kihara (D3) and Berchatski (Tab 36I) all disclose aspects of the same system. Other documents are also known to exist but add little to those already mentioned. The Board accordingly considers it appropriate to consider initially the system as disclosed by prior use before considering the individual

documents, in particular Seehawer; it is noted that the various documents closely agree on what was disclosed at the exhibition.

6.2.2 The MDR system is based on an audio record deck adapted to take a magnetically coated disk, with a magnetic pick-up serving both for recording and playback. By means of a spiral groove the head is tracked mechanically, a magnetic layer adjacent the groove containing the recording medium. The pick-up is stated in Seehawer at page 312, right hand column to have an "extremely small gap" ("mit extrem schmalem Spalt") and to have an "effective gap" ("eff. Spaltbreite") of 0.3µm. According to Seehawer the difference between the geometric (in the context, optical) gap and the effective gap is 0.1 µm, giving an optical gap of 0.2 µm. RME (D2) refers at page 433, central column to a mechanical (again, optical) gap ("mechanische Breite") of 0.2 µm and an effective gap ("effectiver Spalt") of 0.35 µm. Kihara (D3) also uses these figures at Table 1 on page 273 and refers in one translation to a "supernarrow gap" of 0.2 µm. Although Berchatski (Tab 36I) shows at Figure 3 on page 404 elevation and side view of a pole piece having a gap of 0.3 µm ("entrefer est de 0.3 µm"), neither the drawings nor the description are sufficiently detailed to determine whether optical or magnetic gap is meant.

6.2.3 It is common ground that the MDR player discloses the features of the preamble of both Claim 1 and Claim 5. It is observed that video recording implies a bandwidth of greater than one octave, so that the implied feature of broad band recording is also disclosed. Nor is it contested that the MDR player has a pick-up with a magnetic or effective gap width of 0.3 µm, Seehawer alone disclosing that this is measured by the known null method, i.e. on playback. The Appellant argues, however,

that this effective gap applies only to playback and that the head material used, as well as the evidence of the performance obtained, suggests that saturation took place on recording, leading to a broadening of the effective gap to a value necessarily greater than 0.38 µm.

6.2.4 In support of his contention the Appellant draws attention to doubts as to the performance of the MDR system expressed in the above-cited documents. Seehawer explicitly states at page 313 that a wider head gap would have been better for recording ("Obwohl für die Aufnahme ein breiterer Kopfspalt günstiger wäre...") and goes on to describe the results as "durchaus zufriedenstellend"; although there was considerable discussion in the course of the oral proceedings on the meaning to be attached to this expression the Board has no difficulty in concluding that "zufriedenstellend" should be given the same meaning as in its most usual context, that of a school or staff report grade: an acceptable but unexceptional performance; the qualifier "durchaus" merely serves to indicate that the performance is squarely within this grade. Thus, even a disclosure originating from the manufacturer (Seehawer is described in his publication as head of research and development at Wolfgang Bogen GmbH) raises a question mark as to performance. RME (D2) also raises doubts as to performance and states at page 433, central column that the frequency response was unsatisfactory ("...blieb am Frequenzgang noch einiges zu wünschen übrig"), and in the right hand column that only monochrome reproduction with a poor signal-to-noise ratio was feasible. Kihara (D3) describes the reproduced image as "noisy with many jitters" and considers it "quite interesting to see how the MDR meets the

difficulty of recording and reproducing by the head of the narrow gap of 0.2µm", the passage as a whole indicating that this has not yet been disclosed.

6.2.5 These observations lead the Board to the conclusion that the MDR system as demonstrated in Berlin in 1973 was not yet technically satisfactory. As regards the question of what caused the system to be unsatisfactory, the Board notes from RME, page 433, right hand column that a thinner and smoother magnetic medium was being tried, although there is no subsequent disclosure which suggests that this solved the problems. None of the other disclosures suggest a cause for the difficulties which arose. It therefore appears probable that the Appellant is correct in his assertion that because of saturation effects the MDR system did not provide for an effective magnetic recording gap of less than 0.38 µm.

6.2.6 Various of the Respondents sought to convince the Board by means of tests and semi-empirical formulas with assumed physical conditions that the MDR head would not saturate, whilst the Appellant similarly sought to show that it would. These tests and calculated assessments cannot be verified by the Board. The parties' conclusions are based on many assumptions the applicability of which cannot be judged by the Board. They do not alter the fact that at the date of the Berlin exhibition the MDR system was technically immature.

6.2.7 The established jurisprudence of the Boards of Appeal is that any document cited under Article 54 EPC as forming part of the state of the art must have an enabling disclosure, that is, it must disclose the invention in a manner sufficiently clear and complete for it to be carried out by the man skilled in the art (cf T 81/87, OJ EPO 1990,250). The Board concludes that this is not

the case for the MDR system, since it would not have taught the skilled man how to perform recording with a magnetic recording gap of less than 0.38 µm. The subject-matter of Claims 1 and 5 is accordingly novel with respect to the prior use represented by this system.

6.2.8 There now arises the separate question of whether, given any one of the documents describing the MDR system, the skilled man would have derived the claimed subject-matter. This presupposes that the skilled man is not aware of the system as demonstrated but merely of a single publication disclosing it. The Board concurs with the majority of the parties that Seehawer is the single most relevant document in this respect in that it is the only document explicitly concerned with the magnetic head construction.

6.2.9 The Board has therefore additionally considered Seehawer in isolation from the remaining documents concerning the MDR system. Its conclusion does not differ from that above for the system as exhibited; reference is additionally made to the reasons given by the Opposition Division at paragraphs 13 to 18 of their Decision of 2 December 1992. In particular, as stated by the Opposition Division,

"Thus, the skilled person would not interpret D12 [Seehawer] as disclosing a recording method wherein a **magnetic** gap length smaller than 0.38µm is used for **recording**, too, because, when interpreting the document, he will do this taking into account the recognition that the particular head material (Ni-Zn-ferrite) in combination with the medium material makes it impossible to realise such a gap."

6.2.10 Some of the Respondents alleged lack of novelty in view of a combined consideration of Seehawer and Itho (D52), which is mentioned in a footnote with the heading "Literature" at the end of Seehawer but not referred to in the article itself. Since Itho was published in the same journal it was suggested by the Appellant that this is because the reference was added editorially. The Board considers its provenance irrelevant: the question to be answered is simply how the skilled man would understand the reference to Itho. In the absence of any direct reference to it in the Seehawer text it cannot be considered as an incorporated reference (cf. T 153/85, OJ EPO 1988, 1) for the purposes of novelty but rather as a document to be read in addition to, rather than with, Seehawer. Since it only discloses heads having effective gap widths between 0.5 and 1.35 µm it is not relevant as regards novelty. It will however be considered further below as regards inventive step.

6.2.11 Finally, the Board notes that in the course of the Opposition proceedings various affidavits, inter alia from former employees of Wolfgang Bogen GmbH, were filed by the Patentee (Appellant) casting doubt on the disclosure of Seehawer. Of relevance however is not what a writer **meant** to say or even whether what he said was correctly based on the facts known within his company, but how the skilled man would interpret what was said. If at the publication date the skilled man were able to carry out the instructions given, then the disclosure is enabling and should be taken into account. Conversely, if the skilled man were **at the publication date** unable to carry out the instructions, for example because the technology was not sufficiently advanced to permit him to do so, the disclosure is not enabling and can be disregarded as regards novelty. This does not however mean that the disclosure can be disregarded completely;

it may be that the technology was moving in a direction such that at a later date the disclosure became enabling and of relevance as regards inventive step.

6.3 Nakamura (D43)

6.3.1 Nakamura is a Japanese patent application concerned with video recording heads for use with high coercivity tapes, the object being the provision of high-density magnetic recordings, particularly at higher tape speeds. The bandwidth required by video recording is, as noted above, relatively broad. A single head is used for both recording and playback. Nakamura is clearly aware of the problems involved in the design of broad band recording heads:

"However, the conventional magnetic heads ... have problems when in use for high-density magnetic recording ... These problems include low saturation magnetic flux density, gap loss in short-wavelength recording and low magnetic permeability in the long-wavelength region..."

Nakamura gives as its object:
"...to provide new magnetic recording free of the above-described defects and capable of efficient and consistent high-density magnetic recording on magnetic recording media."

This object is said to be achieved by magnetic recording using a head having specified material properties (an alloy having a permeability at 5MHz of 25) and by an optical head gap "in a range from 0.1 to 0.5 μ, preferably from 0.15 to 0.45 μ" in combination with a specific tape material. It is observed that in accordance with Japanese practice SI units of measurement are standard, so that "μ" is to be interpreted as "μm".

6.3.2 Turning first to the choice of head material, Nakamura recognises that a monocrystalline ferrite head cannot fully magnetise a high-coercivity tape because of magnetic saturation during recording. Materials having a suitable permeability for use in high-density video recording, a frequency of 5MHz being mentioned, are then discussed. An advantage of the head disclosed in the patent application is said to be that it has a "high saturation flux density" and "no danger of magnetic saturation". The skilled man is thus taught what materials to use to achieve a "narrow gap magnetic head". Table 3 compares the performance of Sendust and monocrystalline ferrite, the former clearly being more efficient; for a Sendust head playing back a 1µm recording wavelength the optimum output is obtained with an (optical) head gap in the range 0.15 to 0.3 µm. This improvement is apparently due to the absence of saturation, so that in Nakamura the magnetic recording and playback gaps can be treated as equal.

6.3.3 However, Nakamura does not disclose any **magnetic** head gap and makes no mention of the first zero method of measuring magnetic gap. All head gap dimensions are optical. The Appellant furthermore argued that the results of Table 3 are misleading in that no correction is made for the influence of gap length on playback loss.

6.3.4 The Board follows the reasoning of Board 3.5.1 at paragraphs 6 to 8 of Decision T 194/83 in calculating the relationship between optical and magnetic gap length. As pointed out in that Decision,

"This literature provides ample evidence that at the time of publication of document 1 [1978] it belonged to the normal knowledge of the person skilled in the art that ...transition layers will develop leading to a

wider gap than is optically measured and that great care has to be taken to avoid this as much as possible".

6.3.5 The only remaining question to be decided is whether an optical gap in the lower part of the quoted range, i.e. 0.1 or 0.15 µm, would lead directly and unambiguously to a magnetic gap of less than 0.38 µm. The Appellant argued that because of the Beilby layer and measurement difficulties the final result would inevitably be a magnetic gap falling outside of the claimed range. It was also argued that Nakamura refers to a Sendust head, implying a solid head construction, this being said to be standard in VHS heads at that time. Such a head construction was said to require the head gap to be brazed using a silver alloy in the interest of pole tip stability, resulting in diffusion into the magnetic material and thus inevitably widening the effective magnetic recording gap. Reference was directed to Sugaya (D16).

6.3.6 The Board has some difficulty in following this argument. Sugaya is dated some 9 years before Nakamura and nowhere refers explicitly to any widely-accepted technique for ensuring pole tip stability. Nakamura itself makes no direct reference to head construction but states on page 9 that the head material "can be shaped into a thin layer to make an alloy head having an enhanced magnetic permeability"; in the context "alloy" refers to sendust as opposed to ferrite. This passage if anything has some relevance to the arrangement which the Appellant asserts is used in the patent, namely sendust-tipped heads, although the patent itself is wholly silent about head construction.

6.3.7 Nevertheless, for Claims 1 and 5 to lack novelty it is necessary for the skilled man to derive **directly** and **unambiguously** from Nakamura a magnetic recording gap of

less than 0.38 µm. As noted above, Nakamura does not mention the first null method of measuring magnetic gap and instead relies exclusively on optical measurement. In view of the well-known difficulties in securing a small magnetic gap, in particular the presence of Beilby and other layers which tend to increase the effective gap, the Board accepts that there is no proportional relationship between optical and magnetic head gap which would lead the skilled man to the conclusion that an optical gap of 0.1 µm **necessarily** leads to a magnetic gap of less than 0.38 µm. Moreover, in showing in Table 3 that for one example the optimum performance at a wavelength of 1 µm is obtained in the range of 0.15-0.3 µm optical head gap Nakamura implies a magnetic gap for the example of about 0.5 µm, i.e. half the wavelength (see paragraphs 6.4.3 and 7.1.8 below).

6.3.8 The Board therefore concludes that the skilled man reading Nakamura at its publication date would not directly and unambiguously derive from it a method of recording, or apparatus for recording, falling within Claims 1 and 5 respectively.

6.4 Other Documents

6.4.1 Some Respondents alleged lack of novelty in view of one of Muramatsu (D13), Kobayashi(D17) and Yagi (D18).

6.4.2 Muramatsu (D13) is a largely theoretical paper which shows in Figure 3 the qualitative frequency dependency of various losses. In Example C at point 5.2 Muramatsu refers to "high performance narrow-gap heads" and indicates a gap length of 0.35 micron (µm being understood). Example C is based on many of the same parameters - in particular coercive force H_c and remanence B_r - as Example B, which has double the gap length but specifically states "assuming unsaturated

recording head". Although head gap is discussed in several places and the advantages of a small gap can, on careful consideration of the document, be derived, the single example of a gap length of 0.35 µm is given only in the context of a mathematical assessment of distance loss, so that this document does not directly and unambiguously lead to a magnetic **recording** head gap of less than 0.38 µm.

6.4.3 Kobayashi (D17) is concerned with video recording and refers to the use, at a recording wavelength of 1 µm, of a gap of about 0.3 to 0.4 µm ± 0.03 µm, but does not make clear whether magnetic recording gap is meant. Since the head gap is optimally half the shortest recordable wavelength (see for example Robinson (D20), page 32) a recording wavelength of 1µm implies a magnetic head gap of 0.5 µm. This suggests that the gap measurements, which are smaller than this, are optical.

6.4.4 According to its summary, Yagi (D18) concerns video recorder heads suitable for short wavelength recording and refers to a head "having the electrical gap of about 0,3 µm" as being "producible". The preceding passage refers to "scarce difference between the optical gap and the electrical equivalent gap", so that the "electrical gap" is apparently to be understood as the magnetic gap. Table 4 lists optical gap and "effective gap", for various gap spacer materials but does not disclose an effective gap of less than 0.5 µm. It is not clear that the "producible" gap of 0.3 µm was in fact ever produced or that this gap applies to recording. Yagi bears the very early date of 1970 and nowhere mentions the problems arising from saturation effects; it is primarily concerned with gap spacer materials in Mn-Zn ferrites. The Board accordingly concludes that Yagi, although pointing the way towards small magnetic gaps,

was not at its publication date an enabling disclosure since it does not disclose how a magnetic recording gap of under 0.38 µm is to be achieved.

6.5 It follows that, in the Board's view, the claims of the patent are not open to objection for lack of novelty.

7. *Inventive Step*

7.1 The state of the art at the priority date

7.1.1 It was stated by Lemke (D14) see page 171, as early as 1972:

"The design of a magnetic recording head is very straightforward and has been treated extensively in the literature. The design usually starts with the specification of a gap, after which very few decisions remain to be made. The gap length is dictated by the shortest wavelength to be recorded ... the gap depth is selected for the minimum value that will yield an acceptable mechanical strength or an acceptable wear life without saturating in the record mode."

The Board accepts that this statement accurately reflects the common general knowledge in the art. It is moreover clear from, for example, Kihara (D3), (1975: introduction and paragraph 1), Kobayashi (D17), (1978: Figure 1, paragraphs I and IV), Sugaya (D16), (1978: Figure 1, paragraphs 1 and 2) and Jeffers (D60), (1986: page 1540, Introduction) that from well before to well after the priority date of the patent the trend in the field of video recording was for a progressive increase in recording density, requiring a progressive decrease in tape speed and thus in recorded wavelength, as well as in track width; indeed, this trend had been established from the very earliest days of magnetic

recording and constituted a prime goal in the art. Potter (D44) (1974, see Chapter VII, in particular the first two paragraphs and Table I) shows the relationship between head gap and recording density. Indeed, Table I, which refers to "predictions" for increasing density, gives an example with a recording gap length of 0.25 µm.

7.1.2 As noted by Lemke (D14) the gap length is dictated by the shortest wavelength to be recorded, i.e., by the recording density. A progressive increase in recording density will accordingly require a corresponding decrease in gap length, at least for playback; for video recording, in which a common head is almost always used, a similar decrease in recording gap is implied. As previously noted, the patent itself states that it was known to record a narrow band of relatively short wavelength signals with a relatively short record gap but refers to the alleged prejudice of using wider gaps for wide band recording including also longer wavelengths.

7.1.3 Despite this trend to shorter record gaps the Appellant has produced evidence that at least some experts in the art considered that, for recording, a wider head gap than for playback was desirable. This was because on the one hand a wider head gap was thought to give a higher recording efficiency because of deeper flux penetration into the recording medium and was not as susceptible to saturation problems and on the other hand because of a recording theory which suggested that the actual recording was not effected by the gap as a whole but by the trailing gap edge. In 1966 Athey (D11) noted (page 68):

"It is generally accepted that the factor which determines the recording resolution of the record gap is not the gap length but the sharpness of the gap trailing edge ... The gap length has a secondary effect on the recording phenomenon. ... the record gap is always considerably longer than the reproduce gap."

7.1.4 Other references to this theory are given in the patent in suit in the passage bridging pages 2 and 3. Seehawer also explicitly states in the context of a narrow head gap that a wider gap would have been advantageous (page 313, first full paragraph: "Obwohl für die Aufnahme ein breiterer Kopfspalt günstiger wäre..."). German patent application DE-A-1 956 192 (D54), in which Seehawer is named as inventor, similarly states that it is usual and desirable for a magnetic recording head to have a wider gap than the corresponding playback head. In further support of this argument the Appellant drew attention to Morio (D61), a late published document in which separate recording and playback heads are used in a camcorder; the Board notes however that the prior published documents concerning video recording on file make use of a single head.

7.1.5 Thus, the Appellant's position is that at the priority date a small record head gap for broad band recording such as video recording was a necessary evil, tolerated because of the other advantages of using a single head. The skilled man would have had no good reason to reduce the recording gap as opposed to the playback gap and would have considered some saturation during recording, as was alleged to take place in Seehawer, acceptable. In consequence, even if the playback gap as measured by the first zero method was under 0.38 µm, this would never be true for the record gap.

7.1.6 On the other hand, the Board notes that the recording theory presented by the Appellant was empirical and was not universally accepted. Mallinson (D5) states (page 199, left hand column, part V) that "Despite the attentions of numerous investigators, a satisfactory understanding of the WRITE process has not yet been achieved ... New theories or models are urgently needed". Mallinson also refers (page 199, right hand column, third full paragraph) to a disadvantage of a wide recording gap which becomes particularly acute at short wavelengths, namely recording demagnetisation loss. This phenomenon is referred to in the patent at page 2, lines 53 to 56, where it is stated that the length of the record gap affects the dimensions of the recording zone within the magnetic medium: the shorter the record gap length, the smaller the recording zone for the same recording current. A detailed discussion is found at page 5, lines 3 to 33 in connection with Figure 2.

7.1.7 Although the impression is given in the patent that this was the patentee's discovery, the cited passage from Mallinson shows that the problem of demagnetisation loss was well known before the priority date. As long ago as 1963 Nakamura-2 (D58) (see Chapter 3 "Experimental Results", particularly parts (2) and (3)) stated that "the recording demagnetisation loss becomes larger as the recording wavelength λ becomes shorter against the gap length g".

Athey (D11), in 1966, (see Figure 5.8 at page 72) appreciated that demagnetization loss was a function of, inter alia, recording gap size.

Muramatsu (D13), in 1976, states in Chapter 2.1, first paragraph:

"A reproduce output peak appears at a recording current in a short-wavelength region ... output increases as tape is magnetized from the surface towards the depth direction with increasing recording current ... further recording-current increasing causes the output to be lowered by increase in self demagnetization and in magnetization phase difference...".

Reference is also directed to Chapters 3.2 and 3.4, and to Figure 2 of this document, as well as to Hersener (D55), 1973, (Figure 12 and page 23, line 30 until page 4, last sentence).

7.1.8 These documents teach the skilled man that tape demagnetization loss can be ameliorated by reducing the record gap. Hersener (D55) shows this clearly at Figure 12(a): the lower the record gap in relation to wavelength the lower the losses. Similarly, Muramatsu (D13) teaches at Chapter 3.4, "Spacing Loss in Recording", that gap loss due to demagnetization is extremely low - only 0.5 dB - when $g_r/\lambda < 0,5$ and is 2 or 3 dB when $g_r/\lambda = 1$, where g_r is the effective head gap during recording. This can be compared with Figure 1 of the present patent where for a wavelength of 0.66 µm (the lowest wavelength for the wider head gap in Figure 1) and a g_r of 1.93 µm, $g_r/\lambda = 2.92$ (which indicates a high attenuation), whereas for g_r = 0.3 µm, $g_r/\lambda = 0.045$ (attenuation ca. 0.5 Db).

Although the Appellant contested that Muramatsu is concerned with wide band recording it is clear from the frequency of 5 Mhz underlying the Examples A to C at part 5.2, the frequent references to video recording and the frequency range shown in Figure 3 that this is indeed the case.

7.1.9 The Board also notes from these documents that recording current and head-tape spacing loss are important factors in head design, even though neither is mentioned in the patent in suit.

7.1.10 It is thus clear that at the priority date of the patent the need for a high recording density combined with the problem of demagnetization loss was pushing the skilled man in the direction of a smaller **recording** gap. Any prejudice which may previously have existed against a recording gap of the same size as the playback gap was subjugated to the need to increase recording density.

7.1.11 One well known difficulty resulting from the use of a smaller recording gap is the problem of head saturation. Contrary to the Appellant's assertion there is no evidence that the man skilled in the art would have been satisfied with a head which had a small playback gap but saturated on recording. The documents referred to at paragraphs 7.1.7 and 7.1.8 above are concerned with **recording** head gap. Mallinson states at page 198 that "The principal effect of increasing pole-tip saturation is simply a progressive reduction in the head efficiency." Any such reduction in efficiency would be reflected in the experimental results. It is accordingly clear that the skilled man, desiring to construct a head having a small recording gap for use in short-wavelength recording, is faced with the problem of preventing head saturation, a problem which can only be overcome by careful selection of head and recording medium materials and of head current.

7.1.12 The Board will accordingly consider the relevant prior art in chronological order in the light of the background as set forth above.

7.2 Seehawer (D12, 1974)

7.2.1 The Board has noted at paragraph 7.1.4 above that Seehawer explicitly points to the benefits of using a larger recording gap. Although in view of paragraph 7.1.11 above it could be argued that the skilled man could be expected to seek to avoid saturation effects, it follows from the finding of the Opposition Division referred to at paragraph 6.2.9 above that this would probably not be possible using a head constructed of an Ni-Zn ferrite.

7.2.2 The skilled man, given the disclosure of Seehawer at the priority date claimed by the patent in suit, would be faced with the need to avoid saturation during recording. He would infer that saturation effects would be likely to arise (and, according to the reports on the MDR system - see paragraphs 6.2.4 and 6.2.5 above - probably did arise) and in the light of his common general knowledge would be aware that these could be overcome by the use of a different head material. Various respondents have referred to Itho (see paragraph 6.2.10 above) as disclosing a suitable head material. It is noted that at paragraphs 23 to 30 of the impugned Decision the Opposition Division has set out detailed arguments as to why, on the basis of a combination of Seehawer and Itho, the skilled man would arrive at the claimed subject-matter without the exercise of inventive skill.

7.2.3 However, despite the Opposition Division's careful reasoning the Board is unable to arrive at the same conclusion. It was noted above at paragraph 6.2.7 that at its publication date Seehawer was not an **enabling** disclosure; the skilled man would not learn from it how to perform recording with a magnetic recording gap of less than 0.38 µm. He would avoid saturation by

increasing the recording head gap or reducing the current; alternatively he might tolerate an increase in gap caused by saturation. Although the skilled man had an alternative to a deliberate or involuntary increase in head gap, namely a change in head material, the main tenor of Seehawer is that the correct approach is to increase the head gap. The skilled man would require to appreciate that he must instead use a small head gap and that different materials, for example those disclosed by Itho, are needed to achieve this without saturation.

7.2.4 The Board considers that by the priority date of the patent there was still a school of thought that preferred wider head gaps. The path the skilled man is required to follow in order to arrive at the invention requires that a changed philosophy be imposed on Seehawer. Such an imposition cannot, in the Board's view, be justified; it can only be based on an ex post facto analysis. Seehawer, even if read in conjunction with Itho, would not lead the skilled man to the invention as claimed.

7.3 Muramatsu (D13, 1976)

7.3.1 Reference is directed to the observations of paragraphs 7.1.7 and 7.1.8 supra as regards the disclosure of Muramatsu.

7.3.2 In Example C, Muramatsu (see paragraph 6.4.2 supra) discloses a recording gap length g_r of 0.35 µm. As noted by the Appellant, in the Examples A, B and C the gap loss coefficient $L_g=g/\lambda$ is kept constant (-1.4dB) in order to investigate distance loss. To this end different recording speeds of v= 11m/s and 5.5m/s are provided, giving different recorded wavelengths for a frequency of 5MHz with corresponding gap lengths. This is done in order to demonstrate the dominant effect of

B_r and wavelength on spacing loss L_{sp}. It is observed that in the patent in suit in contrast only gap loss is investigated, by keeping parameters relevant to distance loss other than wavelength constant (the value of B_r is not given however).

7.3.3 Muramatsu points to the reduction of demagnetisation loss which can be achieved by the use of a smaller recording gap. The skilled man is taught that a wide recording gap, giving a deeply penetrating magnetisation, is unnecessary and best results are obtainable with a small magnetic recording gap, which in theory can be infinitesimally small. Such a gap in combination with small spacing between head and medium is optimal for high density recording.

7.3.4 As noted at paragraph 7.1.8 supra, Muramatsu teaches that gap loss due to demagnetization is particularly low when $g_r/\lambda < 0,5$. Meant is clearly the recording gap, taking account of any broadening due to saturation. Thus, if the skilled man wishes to carry out broad-band high density recording, taking as an example the recording wavelength of 0.66µm (cf. page 5, line 47 and Figure 1 of the patent in suit) he is taught by Muramatsu to use a magnetic recording gap of less than 0.33 µm.

7.4 Nakamura (D43, 1977)

7.4.1 Reference is directed to paragraph 6.3 et seq. as regards the disclosure of Nakamura.

7.4.2 None of the literature at the Board's disposal suggests that in gapped heads an optical gap of less than 0.1 µm has been achieved, Nakamura describing the manufacture of a smaller gap as being very difficult technologically.

7.4.3 Nakamura, however, explicitly instructs the skilled man to make use of a small optical gap. The difficulty of manufacturing such a gap would make the exercise pointless unless the magnetic gap were held small as well. The Board is thus led to the conclusion that if the skilled man were to construct a head in accordance with Nakamura he could be expected to seek to avoid those effects which cause the magnetic gap to diverge substantially from the optical gap. That being so, if he were to construct such a head having an optical gap of 0.1µm it appears overwhelmingly probable that he would arrive at a magnetic gap of less than 0.38 µm. This is supported by the reference to the new heads being used with magnetic alloy powder video tapes, these tapes being said to "show video sensitivity at a recording wavelength in a range from about 0.5 to 4µ", substantially greater than existing tape media. Since the skilled man is constantly seeking to increase recording density, he would seek to make use of the recording wavelength of 0.5 µm. Nakamura teaches him to use the same head for recording and playback and to avoid saturation by choice of a suitable head material. As explained at paragraph 6.4.3 above the head gap is optimally half the shortest wavelength to be recorded, implying a head gap of 0.25 µm for the tape specified.

7.5 The Board accordingly considers that the skilled man in the art, desiring at the claimed priority date to provide a combined record/playback video head for high-density broad-band recording and aware of the trend in the art towards increasingly short recording wavelengths, would be encouraged both by Muramatsu and Nakamura to provide a head with a magnetic gap under 0.38 µm. He would additionally be taught by both documents the importance of avoiding saturation effects on recording. Hence, it would be obvious for him to seek to provide for a magnetic gap of under 0.38 µm during

recording. The subject-matter of each of Claims 1 and 5 of the patent in suit accordingly lacks an inventive step. It follows that the main request cannot be allowed.

8. *Auxiliary request I*

8.1 Claims 1 and 5 of auxiliary request I differ from the above discussed Claims 1 and 5 of the main request in that they additionally define the magnetic recording medium as "being such that the recording flux, although effective along orthogonal axes, is most effective in inducing remanence along the geometric axes of the magnetizable particles which form the medium".

It is asserted by the Appellant that the combination of a small recording gap and a recording medium having such characteristics results in an improvement in playback performance over a wide band (cf. page 5, lines 34 et seq. and Figure 3 of the granted patent).

8.2 Admissibility of the amendments

8.2.1 Added subject-matter

The admissibility of the amendments resulting in the claims of auxiliary request I was contested by various Respondents on the ground that the additionally claimed features were generalisations of the originally disclosed specific example of a magnetic medium defined as having - amongst other properties - particles with acicular shape and cubic crystalline anisotropies. For this reason, the subject-matter of Claims 1 and 5 was said to extend beyond the content of the application as filed (Article 123(2) EPC).

According to the practice of the EPO the content of an application comprises the whole disclosure that is directly and unambiguously derivable from the application as filed (cf. T 514/88, OJ EPO 1992, 570).

The originally filed application, in the present case, proposed a magnetic medium of specified properties for practising wideband narrow head gap recording. The medium was not defined in detail in the application but reference was made to a Research Disclosure published after the priority date but before the filing date of the application at the European Patent Office. According to the originally filed description (unchanged in this respect in the patent), the medium comprises particles "having acicular shape and cubic crystalline anisotropies". It is also stated that "Recording flux in such a medium, although effective along orthogonal axes, is most effective in inducing remanence along the geometric axes of the magnetizable particles which form the medium" (cf. patent at page 5 lines 39 to 42). This statement obviously refers to the properties of the medium which are considered to be important for magnetic recording if improved performance is to be obtained with the recording head of the patent. The definition of the properties of the recording medium contained in Claims 1 and 5 is accordingly based on the content of the original application; the subject-matter of these claims does not, therefore, extend beyond the content of the application as filed.

8.2.2 Extension of protection

Claims 1 and 5 were further objected to by some Respondents under Article 123(3) EPC. In particular, it was argued that the extent of protection conferred by Claim 1 was broader than that of a (hypothetical) claim resulting from a combination of granted Claims 1 and 4.

However, when comparing the technical features of the invention as defined in Claim 1 as granted with those of Claim 1 of auxiliary request I, it is clear that no features have been omitted and that the additional technical features concerning the recording medium lead to a narrower definition of the invention. The same is true for independent Claim 5. The Board is therefore satisfied that Claims 1 and 5 of auxiliary request I do not extend the protection conferred by the patent as granted.

8.3 Priority

8.3.1 It was further submitted by some of the Respondents that the features contained in Claims 1 and 5 of auxiliary request I were not disclosed in US application No. 29 095 from which the patent under appeal derives its priority. The relevant date for these claims should be the filing date of the European application, i.e. 9 April 1980.

8.3.2 According to Article 88(4) EPC priority may be granted even if certain elements of the invention for which priority is claimed do not appear among the claims formulated in the previous application, provided that the documents of the previous application as a whole specifically disclose such elements.

8.3.3 In the present case the disclosures of the US priority application and the granted patent are substantially the same as regards the magnetic medium (cf. page 5, lines 34 to 51 of the granted patent; page 8, line 35 to page 9 line 28 of the priority document). Even if the previous application did not contain a reference to the "Research Disclosure publication", it instead referred to US patent application No. 775 118 disclosing the same magnetic media as in the Research Disclosure publication

(D50). US patent No. 4 163 823, based on this earlier US application, was issued on 7 August 1979. It was therefore available to the public on the filing date of the patent in suit.

8.3.4 The Board is therefore satisfied that the documents of the previous application as a whole specifically disclose the features now contained in the claims of auxiliary request I and that these claims are entitled to the claimed priority.

8.4 Clarity of the claims

8.4.1 Various Respondents alleged a lack of clarity of Claims 1 and 5. In particular, it was maintained that the functional definition of the recording medium, specifying only certain of its properties, was insufficient for the skilled man to ascertain which media were in fact included in the claims and which were not.

8.4.2 The Board is satisfied that at the priority date it was common general knowledge in the magnetic recording art that the magnetic properties of a medium are closely related to the shape and the structure of the magnetizable particles (cf Bate, (D9), page 823 et seq.). One of the claimed properties - the recording flux being effective along orthogonal axes - is apparently related to the crystalline structure of the particles whilst the other property - the recording flux being most effective in inducing magnetic remanence along the geometric axes of the particles - apparently refers to their shape. The question which therefore arises is whether the man skilled in the art would be sufficiently aware of the material properties of recording media to appreciate which magnetic particles fall within the claimed definition.

8.4.3 The Research Disclosure publication (D50) referred to in the granted patent is largely concerned with the preparation of a suitable tape coating rather than with the structure or particle shape of the magnetic materials themselves. Although the disclosure consistently requires the use of acicular particles, their composition is described only in general terms. This publication shows that acicularity is important and indicate a preference for cobalt-doped iron oxides. There is some evidence that cobalt-doped γ-Fe_2O_3 is a material having the requisite properties. The document does not however permit exhaustive conclusions to be drawn as to which materials have the claimed properties. Nor does it give the skilled man any clear guidance as to the relationship between remanence and particle geometry. The reference to doped particles exhibiting "increased magnetic vectors within the plane of the magnetic recording medium and at right angles to the direction of particle alignment in comparison to comparable prior art magnetic recording elements" (Board's emphasis) suggests that undoped particles possess the same property, but to a lesser extent. It is therefore unclear how wide is the class of materials which satisfies the claims.

8.5 Novelty and inventive step

8.5.1 Novelty

Novelty of Claims 1 and 5 as granted was already discussed above. It was concluded that the invention as defined by these claims is novel over the cited prior art. Since Claims 1 and 5 of auxiliary request I, in addition to the features of the claims as granted, contain further technical features, the same conclusion can also be drawn for the invention as defined by these claims which, therefore, is considered novel.

8.5.2 Inventive step

Without a clarification of which media do fall within the definition in Claims 1 and 5 (cf paragraph 8.4.3, supra), it is difficult to draw any conclusion in respect of inventive step with regard to these claims. Such clarification requires further substantive examination of auxiliary request I. This request has not yet been considered by the Opposition Division and the Board, in order not to deprive the parties from being able to argue before two instances, therefore considers it appropriate to make use of its power under Article 111(1) EPC to remit the case to the Opposition Division for further prosecution on the basis of auxiliary request I. In carrying out this task, it is within the discretion of the Opposition Division to consider any amendment to the claims which may be proposed during the further proceedings and its compatibility with the requirements of the EPC.

Once the Opposition Division has determined which recording media are covered by the claims, it will have to consider whether the skilled man, concerned with broad band high density recording, would find it obvious to use such media in combination with the method and the apparatus as defined in Claims 1 and 5.

9. *Auxiliary request II*

Pending the outcome of the consideration of auxiliary request I, there is no need to deal with auxiliary request II, which is subsidiary to auxiliary request I. Should the Opposition Division refuse auxiliary request I, it will have to deal with auxiliary request II.

Order

For these reasons it is decided that:

1. The Appellant's main request is rejected.

2. The decision under appeal is set aside and the case is remitted to the Opposition Division for further prosecution on the basis of auxiliary request I and, if necessary, of auxiliary request II.

The Registrar: The Chairman:

M. Kiehl **E. Persson**

Annex I

Claims 1 to 7 of European patent No. 18 267 as granted, corresponding to **the Appellant's main request:**

1. A method for short wavelength recording of information signals onto a magnetic medium composed of magnetic particles, comprising applying the signals to a gapped magnetic recording head and providing relative motion between the head and the medium, the length of the magnetic recording gap extending in the direction of relative motion, characterised in that the magnetic length of the recording gap is less than 0.38 µm as related to the permeability of the magnetic medium.

2. The method according to Claim 1, wherein said information signals have a bandwidth in excess of one full octave.

3. The method according to Claim 1, further comprising the step of pre-emphasizing the high frequency components of said information signals prior to the recording thereof on said magnetic medium.

4. The method according to Claim 1, wherein said magnetic medium is comprised of magnetic particles having both cubic crystalline and acicular shape anisotropies.

5. Apparatus for short wavelength recording of information signals onto a magnetic medium composed of magnetic particles, comprising means for applying the signals to a gapped magnetic recording head and means for providing relative motion between the head and the medium, in which the magnetic length of the recording

gap which extends in the direction of relative motion is characterized in that said magnetic length of the recording gap is less than 0.38 µm as related to the permeability of the magnetic medium.

6. The apparatus according to Claim 5, characterised in that said head comprises a plurality of gapped magnetic cores adapted to record information signals in respective tracks of a multitrack magnetic medium and in that the magnetic gap length of each of said plurality of cores is less than 0.38 µmeters.

7. The apparatus according to Claim 5, characterised in that said means for applying information signals to said head is adapted to pre-emphasize the high frequency components of information signals.

Annex II

Claims 1 and 5 according to **the Appellant's auxiliary request I:**

1. A method for short wavelength recording of information signals onto a magnetic medium composed of magnetic particles, comprising applying the signals to a gapped magnetic recording head and providing relative motion between the head and the medium, the length of the magnetic recording gap extending in the direction of relative motion, characterized in that the magnetic length of the recording gap is less than 0.38 µm as related to the permeability of the magnetic medium, said medium being such that the recording flux, although effective along orthogonal axes, is most effective in inducing remanence along the geometric axes of the magnetizable particles which form the medium.

5. Apparatus for short wavelength recording of information signals onto a magnetic medium composed of magnetic particles, comprising means for applying the signals to a gapped magnetic recording head and means for providing relative motion between the head and the medium, in which the magnetic length of the recording gap which extends in the direction of relative motion is characterized in that said magnetic length of the recording gap is less than 0.38 µm as related to the permeability of the magnetic medium, said medium being such that the recording flux, although effective along orthogonal axes, is most effective in inducing remanence along the geometric axes of the magnetizable particles which form the medium.

Annex III

Claims 1 and 5 according to **the Appellant's auxiliary request II:**

1. A method for short wavelength recording of information signals onto a magnetic medium composed of magnetic particles, comprising applying the signals to a gapped magnetic recording head and providing relative motion between the head and the medium, the length of the magnetic recording gap extending in the direction of relative motion, characterized in that the magnetic length of the recording gap is less than 0.38 µm as related to the permeability of the magnetic medium, said medium being not chromium dioxide (CrO_2) and having a coercivity of at least 800 oersteads, and said head not being made of Ni-Zn-ferrite.

5. Apparatus for short wavelength recording of information signals onto a magnetic medium composed of magnetic particles, comprising means for applying the signals to a gapped magnetic recording head and means for providing relative motion between the head and the medium, in which the magnetic length of the recording gap which extends in the direction of relative motion is characterized in that said magnetic length of the recording gap is less than 0.38 µm as related to the permeability of the magnetic medium, said medium being not chromium dioxide (CrO_2) and having a coercivity of at least 800 oersteads, and said head not being made of Ni-Zn-ferrite.

Annex IV

List of documents referred to in the decision of the Board:

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D11: **"Athey"**: S. W. Athey: "Magnetic Tape Recording", NASA SP-5038, January 1966, pages 57-76

D12: **"Seehawer"**: E. Seehawer: "Miniaturtechnik für Wandler", Radio Mentor Electronic, no. 8, 1974, pages 312-313

D13: **"Muramatsu"**: S. Muramatsu: "A Short Wavelength Response Analysis of Unbiased Recording", Technical Research Report MR 75-28 Institute of Electronics and Communication Engineers of Japan, vol. 75, no. 240, 26 February 1976, translation pages 1-15

D14: **"Lemke"**: J. U. Lemke: "Ferrite Transducers" and "Discussion", Annals of the New York Accademy of Sciences, vol. 189, 3 January 1972, pages 171-189 and 207-213

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D17: **"Kobayashi"**: F. Kobayashi: "New Video Head", Collection of Drafts of Lectures for the National Meeting of the Television Society, pages 343-346, July, 1978 with translation of pages 345 and 346

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D44: **"Potter"**: R. I. Potter: "Digital Magnetic Recording Theory", Transactions on Magnetics, September 1974, vol. MAG-10, no. 3, pages 502-508

D50: Journal Research Disclosure, Vol. 164, item 16476. December 1977, pages 68-72

D52: **"Itho"**: S. Itho: "Magnetköpfe mit Einkristallferritkern", Radio Mentor Electronic 1972, no. 6, pages 279-283

D54: DE-A-1 956 192

D55: **"Hersener"**: J. Hersener: "Modelluntersuchungen zur Magnetisierungsverteilung im Magnetband bei sinusförmigen Signalen", Wissenschaftliche Berichte AEG-Telefunken 46, 1973, pages 15-24

D58: **"Nakamura-2"**: Y. Nakamura et al.: "Some Considerations on Magnetizing Process in Short Wavelength Recording", Tohoku University Meeting report, vol. 32 , no. 4, December 1963, pages 82-87

D60: **"Jeffers"**: F. Jeffers: "High-Density Magnetic Recording Heads", Proceedings of the IEEE, vol. 74, no. 11, November 1986, pages 1540-1556

D61: **"Morio"**: M. Morio et al.: "Development of an Extremely Small Video Tape Recorder", IEEE 1981,pages 331-339

*Tab 36I **"Berchatsky"**: J. Berchatsky: "Le Disque MDR", HI-FI et VIDEO, no. 1530, 1975, pages 403-405

*Cited by the Appellant in the opposition proceedings("blue book")