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File Number: T 454/89 - 3.5.1

Application No.: 81 305 535.7

Publication No.: 0 054 363

Title of invention: Apparatus for gathering data from a plurality of condition responsive optical sensors

Classification: H04B 9/00

D E C I S I O N
of 11 March 1991

Proprietor of the patent: Imperial Chemical Industries PLC

Opponent: GAO Gesellschaft für Automation und
Organisation mbH

Headword:

EPC Articles 56, 84, 113(2)

Keyword: "Lack of inventive step - Obvious replacement (main request) or application of general knowledge (second and third auxiliary requests) or application of plurality of obvious measures solving independent problems (fourth auxiliary request)" - "Lack of clarity - seemingly unfeasible combination of features (first auxiliary request)" - "No discretion to consider and decide upon patent in a text not submitted by Proprietor"

Headnote



((2))

Case Number : T 454/89 - 3.5.1

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

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Decision under appeal : Decision of the Opposition Division of the
European Patent Office announced on
1 February 1989 and posted on 26 May 1989
revoking European patent No. 0 054 363 pursuant
to Article 102(1) EPC.

Composition of the Board :

Chairman : P.K.J. van den Berg
Members : W.B. Oettinger
M.V.E. Lewenton

Summary of Facts and Submissions

- I. The appeal was filed by the proprietor of European patent 54 363 against the Opposition Division's reasoned decision, dispatched on 26 May 1989, to revoke the patent.

The patent had been granted for the subject-matter of European patent application No. 81 305 535.7, filed on 24 November 1981, on the basis of the following statement of claims:

"1. Apparatus for gathering data about a plurality of chemical or physical conditions, comprising

- (a) a plurality of passive optical sensors (1) to modify light supplied to them as a function of changes in physical or chemical conditions applied to them;
- (b) means for providing light for the sensors, comprising a broadband or multiband light source (2) remote from the sensors, an optical fibre (3) to distribute light from the source, and supply means (4) to divide the light carried by the fibre into portions for each sensor and to label each such portion by restricting it to a selected colour which is different from those of the portions supplied to the other sensors;
- (c) an optical fibre data bus (5) connected to receive the portions after interaction with the sensors and to convey them to a place remote from the sensors;
- (d) means (7, 9) to separate the light carried by the data bus into portions each consisting essentially of one of the selected colours or a predetermined fraction thereof; and
- (e) detection means (8) connected to receive the separated colours for measuring or detecting modifications made to each colour by the sensors, characterised in that the supply means (4), comprises a plurality of dichroic

beam splitters (4A, 4B, 4C), mounted to access the light distribution fibre (3) in turn, thereby to enable each splitter to extract a selected colour from the fibre while allowing the remainder of the light to continue along the distribution fibre for access by subsequent beam splitters, the selected colours extracted by the beam splitters being those supplied to the individual sensors."

Claims 2 to 18 are all, directly or indirectly, dependent upon Claim 1. More particularly, Claim 3 refers back to Claim 2, Claim 9 refers back to Claim 8, Claim 16 refers back to Claim 15 which is dependent upon at least Claim 12, Claims 2, 8 and 12 being directly appended to at least Claim 1.

II. The decision under appeal was based, following an admissible opposition citing

D1: Electronics Letters, volume 15, No. 14 (5 July 1979), pages 414 to 415,

in addition to the prior art considered in the pre-grant procedure, on the consideration that the subject-matter of Claim 1 is obvious in the light of D1 and

D2: GB-A-1 540 907

cited in the pre-grant procedure.

Particular attention was given to Figure 5 of D2.

The same conclusion was drawn, taking into consideration the skilled person's general background knowledge, for the subject-matter of Claims 2, 3, 9, 11, 12 and 16 as granted which constituted the proprietor's then auxiliary

requests. In this context, particular attention was given also to Figures 4, 9, 10 and text passages of D2.

- III. The appeal was filed, and the respective fee paid, on 17 July 1989, requesting that the appealed decision be cancelled and the opposition dismissed.

In a statement of grounds filed on 7 August 1989, the Appellant submitted that the decision was not soundly based because the analysis (of what was obvious from the prior art) was superficial and ignored important limitations present in Claim 1. In drawings attached to the statement of grounds, he sketched the result of a possibly valid obviousness objection (Figure 1), the result of the Opposition Division's obviousness objection (Figure 2) and a lay-out in accordance with the invention (Figure 3), the latter corresponding, as to its essential parts (32 to 34), with Figure 3 of the patent.

The Appellant further stated that he maintained his auxiliary requests based on Claims 2, 3, 9, 12 and 16.

- IV. In a counterstatement, the Respondent argued against the Appellants grounds for appeal and sketched, in drawings, what he regarded to be known from Figure 9 of D2 (Figures A and B) and to be obvious from D2 as a whole (Figure C) and what must be considered when judging whether it is obvious to use dichroic beam splitters known from D1 in an apparatus known from D2.

In respect of Claim 9, he cited the following prior art document:

D6: JP-A-53-57 057 (an abstract of which had been cited in the search report).

- V. In a communication, dated 7 March 1990, the Board informed the Appellant of its provisional view that his main request could not be allowed for the reason that the subject-matter of Claim 1 would appear to differ from the nearest prior art, D2, more particularly: either Figure 5 or Figure 9 of this document, only by features which are obvious in the light of D1, taking into account also the skilled person's general knowledge and what he would regard, in D2, as equivalent.

Supplementary to D1, the Board referred to the following pre-grant citations also relating to dichroic beam splitters:

D3: Siemens Forschungs- und Entwicklungsberichte, Vol. 8, No. 3 (June 1979), pages 125 to 129

D4: Siemens Research & Development Reports, Vol. 9, No. 4 (August 1980), pages 217 to 226

D5: Patents Abstracts of Japan, Vol. 3, No. 2 (13 January 1979), page 130 E83 (relating to JP-A-53-130 053).

As to the auxiliary requests, the Board also expressed doubts as to the inventiveness of their subject-matter.

- VI. In response, the Appellant disagreed with the Board's conclusions and submitted arguments in support of his disagreement.

As a further auxiliary request, he requested oral proceedings.

- VII. In a communication accompanying the summons to oral proceedings (Article 11(2) Rules of Procedure of the

Boards of Appeal), the Board provisionally found itself unable to give a more positive opinion than expressed before.

With particular reference to the Appellant's argument that it would be impossible to see how the features of various embodiments of D2 could be combined so as to arrive at an apparatus as claimed in Claim 2, the Board stated that on the basis of a similar argument, this claim must be considered as being unclear (Article 84 EPC).

VIII. In both communications, the Board drew the Appellant's attention to the fact that the claims did not comply with Rule 29(7) EPC.

IX. In response, the Appellant filed, on 1 February 1989, four sets of claims constituting his auxiliary requests, of which the independent claims read as follows (with purely clerical errors corrected):

First auxiliary request (subsequently referred to as Claim 1A):

"1. Apparatus for gathering data about a plurality of chemical or physical conditions, comprising

(a) a plurality of passive optical sensors (1) to modify light supplied to them as function of changes in physical or chemical conditions applied to them;

(b) means for providing light for the sensors, comprising a broadband or multiband light source (2) remote from the sensors, an optical fibre (3) to distribute light from the source, and supply means (4) comprising a plurality of dichroic beam splitters (4A, 4B, 4C) mounted to access the light distribution fibre (3) in turn, thereby to enable each splitter to extract a selected colour from the fibre while allowing the remainder of the light to continue

along the distribution fibre for access by subsequent beam splitters, the selected colours extracted by the beam splitters being those supplied to the individual sensors;

(c) an optical fibre data bus (5) connected to receive the portions after interaction with the sensors and to convey them to a place remote from the sensors;

(d) means (7, 9) to separate the light carried by the data bus into portions each consisting essentially of one of the selected colours or a predetermined fraction thereof; and

(e) detection means (8) connected to receive the separated colours for measuring or detecting modifications made to each colour by the sensors characterised in that the data bus optical fibre and the optical fibre for distributing light from the source are common over at least part of their lengths, with the light source being optically connected to one end of the common fibre and the detection means to the other by lengths of light distribution fibre and data bus respectively extending beyond the ends of the length of fibre common to both purposes."

Second auxiliary request (subsequently referred to as Claim 1B):

"1. ... (precharacterising portion identical with that of first auxiliary request) ... characterised in that the optical fibre interconnecting the source and detection means comprises two fibres of a twin or multi-fibre cable, the source and detection means being connected to different fibres at the same end of the cable, with a bridge at the other end to transfer light from one fibre to the other, the beam splitter combinations being spaced in series along at least one of the two fibres."

Third auxiliary request (subsequently referred to as Claim 1C):

"1. ... (precharacterising portion identical with that of first auxiliary request) ... characterised in that
(a) at least one of the sensors is a device for modifying the intensity of the light supplied to it by the beam splitter as a function of the chemical or physical condition and
(b) the source provides a reference colour for transmission to the detection means in addition to the selected colours, and there is also provided means to compensate the selected colours for errors as measured by changes in the reference colour intensity received by the detection means."

Fourth auxiliary request (subsequently referred to as Claim 1D):

"1. Apparatus for gathering data about a plurality of chemical or physical conditions, comprising
(a) a plurality of passive optical sensors (1) to modify light supplied to them as function of changes in physical or chemical conditions applied to them;

(b) means for providing light for the sensors, comprising a broadband or multiband light source (2) remote from the sensors, an optical fibre (3) to distribute light from the source, and supply means (4) comprising a plurality of dichroic beam splitters (4A, 4B, 4C) mounted to access the light distribution fibre (3) in turn, thereby to enable each splitter to extract a selected colour from the fibre while allowing the remainder of the light to continue along the distribution fibre for access by subsequent beam splitters, the selected colours extracted by the beam splitters being those supplied to the individual sensors;

(c) an optical fibre data bus (5) connected to receive the portions after interaction with the sensors and to convey them to a place remote from the sensors;

(d) means (7, 9) to separate in time the light carried by the data bus into portions each consisting essentially of one of the selected colours or a predetermined fraction thereof, and positioned to separate the selected colours after they have travelled at least part of the way along the data bus, and

(e) detection means (8) for measuring or detecting modifications made to each colour by the sensors, positioned to receive all the selected colours from the data bus singly and in a sequence dictated by the separating means, characterised in that the apparatus further comprises means for removing at least a portion of a reference colour from the data bus before the selected colours are separated in time, and feeding that reference colour to a different detector from that to which the selected colours are fed in sequence, the reference colour being a colour emitted by the source but which is not selected for any of the sensors."

As to substance, the Appellant stated that he would rely on his arguments presented in his earlier submissions.

As to the lack of clarity objection against Claim 2 (main request), i.e. Claim 1 of his first auxiliary request, he submitted that claims need not be enabling. That would only be a requirement for the patent as a whole (Article 83 EPC).

Further, he informed the Board that he would not be attending the oral proceedings.

X. From his written submissions it is clear that the Appellant requests that the decision under appeal be set aside and either the opposition be rejected (main request) or the patent be maintained as amended, i.e. on the basis of

- Claims 1 to 16 (1A to 16A), first auxiliary request, or
- Claims 1 to 16 (1B to 16B), second auxiliary request, or
- Claims 1 to 14 (1C to 14C), third auxiliary request, or
- Claims 1 to 11 and 13 to 16 (1D to 11D and 13D to 16D), fourth auxiliary request,

all filed on 1 February 1991, and a description and drawings with consequential amendments, in particular deletion of embodiments and figures, still to be made.

XI. In the oral proceedings, held in the absence of the Appellant on 11 March 1991, the Respondent requested that the appeal be dismissed.

As an auxiliary request, he requested continuation of the procedure in writing and a decision on costs.

XII. The Respondent's submissions made in the oral proceedings can be summarised as follows:

The subject-matter of Claim 1 (Appellant's main request) lacks an inventive step. It is obvious to replace, for improving the efficiency of the apparatus known from D2, particularly Figure 5, the beam splitter and the filters ($\lambda_1, \lambda_2, \lambda_3$) in that apparatus by the dichroic beam splitter known from D1. The inevitable result will be an apparatus as claimed. With particular reference to the feature that the light distribution fibre is accessed "in

turn", a model for such a feature is to be seen in Figure 9 of D2.

Claims 1 of the Appellant's first to fourth auxiliary requests (1A to 1D) have been broadened inadmissibly in that a part of the feature (b) of Claim 1 as granted (column 15, lines 11 to 15) has been omitted.

As to substance, the gist of the invention claimed in Claim 1A is that a common fibre is used for both the distributing and the data bus fibre. This feature being known from Figure 5 of D2, its application as claimed is obvious, even if the reflection type sensors (R) are replaced by transmission type sensors (T).

Claims 2A, 2B, 3C and 3D are inconsistent with Claim 1A, 1B, 2C or 2D, respectively. Having "two fibres of a twin cable" makes no sense if those fibres are made up of a "common", or single, fibre.

In Claim 1B, the absence of the feature of Claim 2 as granted amounts to another inadmissible amendment.

As to substance, the characterising features of this claim are anticipated by the embodiments of D2.

Claim 1C is directed, for solving quite another problem, to the application of a standard measuring method using a reference signal as known, for instance, from D6.

The gist of the invention claimed in Claim 1D is seen in a sequential evaluation of the measuring signals. This is suggested, however, in D2, page 2, lines 95 to 102. With particular reference to the feature that the separation in time is made only after the selected colours have travelled along the data bus, this is only one of the two

sole possibilities disclosed in Figures 6 and 7 of which the first is known from D2 and the second an obvious alternative.

The reason for the Respondent's auxiliary request that the procedure be continued in writing is that, if the Board considers that for any of the Appellant's auxiliary requests the cited prior art is not sufficient for concluding obviousness, the Respondent should be given an opportunity to cite documents of more pertinence.

In this latter case, a decision on costs would be appropriate (Article 104 EPC).

Reasons for the Decision

1. The appeal is admissible (Articles 106 to 108 and Rule 64 EPC).
2. In the present appeal, formal aspects and substantive issues are involved.

Even though the formal aspects relate primarily to the Appellant's auxiliary requests (A to D), the Board chooses to deal with them first.

3. Amendments

The independent claims of the Appellant's auxiliary requests (A to D) are based on Claims 2, 3, 9 and 16 as granted (Article 123(3) EPC) which, in turn, are based on the original Claims 3, 4, 10 and 17, respectively (Article 123(2) EPC).

- 3.1 Claims 1A, 1B, 1C and 1D have been objected to by the Respondent on the ground that a part of the feature (b) of granted Claim 1 (column 15, lines 11 to 15) has been omitted. It is noted, however, that this part of feature (b) has, in fact, been replaced by the characterising features of Claim 1 in each of the requests, i.e. Claim 1A, 1B, 1C and 1D.

The replacing feature being more specific than the one replaced, it is clear that the replaced feature is still implicit in said claims. Thus, neither Article 123(2) nor 123(3) EPC has been violated by this replacement.

- 3.2 Claim 1B has been objected to on the ground that it constitutes an inadmissible extension of the protection conferred by granted Claim 3, since it does not include the features of granted Claim 2 to which Claim 3 referred back.

However, Claim 1B restricting the protection conferred by granted Claim 1, the protection conferred by the patent has clearly not been extended.

Claim 1B does not, therefore, contravene Article 123(3) EPC.

- 3.3 That claim (1B) has furthermore been objected to on the ground that, by not including the features of granted Claim 2, it introduces subject-matter which extends beyond the content of the application as filed.

Considering only the claims as originally filed, this objection would, prima facie, appear justified. The absence of the features of granted Claim 2 from Claim 1B is not supported by the original Claim 4 because that claim included, by way of its appendancy to the original Claims 3 and 2, the same features.

However, support for Claim 1B can be found in the original description, particularly in the paragraph bridging pages 5 and 6. There, a configuration is disclosed using the features of the original Claim 4 (i.e. granted Claim 3) without necessitating the features of the original Claims 2 and 3 (i.e. granted Claim 2).

Therefore, the Board considers Claim 1B as not contravening Article 123(2) EPC.

4. Clarity of claims

4.1 According to Article 84 EPC, the claims shall define the matter for which protection is sought (first sentence) and for this purpose they shall, inter alia, be clear and supported by the description (second sentence). Claim 1A does not meet this requirement for the following reasons and is, therefore, unallowable:

(i) The first characterising feature concerns "the data bus optical fibre" which is defined in preamble feature (c) as being "connected to receive the portions after interaction with the sensors and to convey them to a place remote from the sensors".

It further concerns "the optical fibre for distributing light from the source" which is defined, with similar words, in preamble feature (b).

In fact the first characterising feature states that these two fibres so defined "are common over at least part of their lengths".

Even though the wording of this feature ("at least") does not exclude the special case that the two fibres are common over their entire lengths, it covers in particular also the more general case that (only) parts of the distributing fibre and of the data bus fibre are common.

It does not, however, specify in any way what parts may or may not be meant; i.e. already on the face of it the first characterising feature is not clear.

- (ii) In an attempt to seek help, in this prima facie lack of clarity situation, in an appropriate interpretation of that feature, the skilled reader can only consider that, in an apparatus as defined in the precharacterising portion of Claim 1A, it is the essential function of the "fibre distributing light from the source" to convey the light from the source to the dichroic beam splitters, and the essential function of the "data bus connected to receive the portions after interaction with the sensors and to convey them to a place remote from the sensors" to convey the collected light from the sensors to the remote receiver. Bearing these essential functions in mind, he will inevitably assume the common fibre parts to be those leading from the source to the dichroic beam splitters, in particular (or at least) to the one of them which is most upstream, and from the sensors, in particular (or at least) from the one which is most downstream, to the receiver site.

Any other interpretation would appear, to the skilled but unbiased (by the description) reader, to be in conflict with the function of the former

fibre as the virtual light source feeding all the dichroic beam splitters and, even more, in conflict with the function of the latter fibre as the "data bus" supplying the receiver with all the light portions collected, and would not therefore come to his mind.

The skilled reader, moreover, knowing the prior art would find the aforementioned interpretation confirmed by the fact that exactly this feature as so interpreted is known from D2, Figure 2 (common fibre 13) and Figures 5, 6, 8, 10 and 11, and that it follows obviously from this document that it is a useful feature worth being applied also to other embodiments, such as those shown in Figures 4 and 9 of D2.

- (iii) The inevitable consequence of this interpretation of the first characterising feature in Claim 1A is that the source and the receiver would be connected to the same end of the common fibre, and this would again be confirmed by D2 (the source Tx and receiver RX being connected to the same end, at 12, of the common fibre 13).

Any other connection is neither derivable from the first characterising feature of Claim 1A nor envisagable when taking the skilled reader's knowledge of the prior art into account.

- (iv) Turning now to the second characterising feature of Claim 1A, this feature concerns the same "common fibre", i.e. to those parts of the fibre "distributing light from the source" and of the fibre "conveying the portions to the remote receiver" which are common.

In essence, it requires that the source and detection means are connected to opposite ends of a common fibre.

- (v) This requirement (iv) is, however, plainly incompatible with the opposite requirement (iii) following from the first characterising feature when being read and interpreted by the skilled but unbiased reader (ii) in an attempt to circumvent the lack of clarity (i) of that feature.

In summary, this situation means that the lack of clarity (i) of the first characterising feature of Claim 1A is not resolved by its interpretation (ii) with common sense but, on the contrary, such an interpretation would even lead to the impression of the two characterising features of that claim not being combinable, i.e. the claimed combination being unfeasible. This impression of unfeasibility is clearly, itself, a case of lack of clarity in the sense of Article 84 EPC, because it means that the "subject-matter for which protection is sought" is not clearly defined.

- (vi) Apparently, in the assumed interpretation (ii), the first characterising feature would not be supported by the description. None of the embodiments described shows this feature as interpreted above.

It can, therefore, be added that the lack of clarity of Claim 1A is accompanied by a lack of support in the sense of the same Article 84 of the EPC.

- (vii) It could be argued that the skilled reader would, in these circumstances, be aware of the fact that something must be wrong with his interpretation (ii) of the first characterising feature.

But even the recognition of this fact would not, without any further information, help him any further. He would not see, either by using his normal skills or by using his knowledge of the prior art, how to resolve the lack of clarity (i) of the first characterising feature, by a different interpretation, in such a way that it would be compatible with the second.

The Board would agree that the skilled person could resolve the problem of clarity of Claim 1A by referring to the description but in the opinion of the Board he is not allowed to do so. The Board is of the view that Article 84 EPC requires that claims are clear in themselves when being read with the normal skills including the knowledge about the prior art, but not including any knowledge derived from the description of the patent application or the amended patent. In Article 84 EPC, the description is only mentioned in the context of the additional requirement that the claims must be supported by it.

It is, therefore, maintained that Claim 1A is not clear in the sense of Article 84 EPC and therefore not allowable.

- (viii) The Appellant's submission that it is the intention of the EPC that the description be referred to (in case a claim lacks clarity) seems to refer to Article 69 EPC (and the protocol on its interpretation).

It is true that Article 69 (and the protocol) would allow the description to be used to interpret the claims.

However, Article 69 EPC is only concerned with the extent of protection conferred as one of the effects of an application or patent (Chapter III of the EPC) whenever that extent is to be determined, particularly for third parties. It is not concerned with the definition proper of the matter sought to be protected by a claim as is Article 84 EPC. In the course of the examination of an application or of an opposition, the applicant or patentee cannot, therefore, rely on Article 69 EPC as a replacement for the Article 84 requirements, i.e. as a substitute for an amendment which would be necessary to remedy a lack of clarity.

The Appellant's first subsidiary request as addressed to the Board is aimed at a decision to maintain the patent as amended. Such a decision would presuppose, according to Article 102(3) EPC, that, taking into consideration the amendments made, the patent meets the requirements of the Convention, and this includes the requirements set out in Article 84 EPC. The non-compliance with these requirements is therefore a statutory bar to the allowance of Claim 1A and thus of the Appellant's first subsidiary request.

- (ix) As is clear from the Board's communication, it did not make a lack of sufficiency objection under Article 100(b) EPC against the patent or under

Article 83 EPC against the application on which the patent is based. Such an objection would be quite distinct from one on lack of clarity of claims within the meaning of Article 84 EPC.

The Board agrees that, as a matter of principle, a lack of sufficiency objection in the sense of Article 83 EPC would not be possible against claims alone, and moreover, in the present case, a lack of sufficiency objection against the patent would not be justified. The disclosure in the application and in the patent as a whole is clearly sufficient for implementing such embodiments as, for instance, shown in Figures 3 and 7.

The Appellant's reference to Article 83 EPC is not, therefore, relevant in the present context.

4.2 The Respondent has objected to Claims 3, 2A, 3C and 3D, mentioning two fibres of a twin or multifibre cable as being inconsistent with the "common fibre" claims they refer back to. A similar objection, but vice versa, was made to Claim 2B.

This objection is also to be understood as an objection under Article 84 EPC. Since, however, the independent claim of each of the Appellant's requests is unallowable (cf. foregoing paragraph 4.1 and subsequent paragraphs 7 and 9 to 11), any deficiencies of the dependent claims are not relevant and it is, therefore, not necessary to investigate this question any further.

5. Other formal points

5.1 The replacement, in Claims 1A, 1B, 1C and 1D, of a part of feature (b) of granted Claim 1 by the characterising feature of granted Claim 1 already mentioned above (paragraph 3.1), would restrict the pre-characterising portion of the independent claim to subject-matter which is not, in combination, part of the prior art, because the dichroic beam splitters are not known from D2 serving as the "starting point" to be acknowledged in the pre-characterising portion of the claims, but only, per se, from other documents such as D1.

The Board mentions this fact not as an objection under Rule 29(1) EPC but only in order to make it clear that, when it comes to the issue of inventive step, it must, and will, be taken into consideration that the use of dichroic beam splitters is not part of the prior art starting point but is, as such, a novel feature.

5.2 The same applies to a particularity contained in feature (d) of Claim 1D.

Even if separation "in time" as claimed in that feature is known from D2 in connection with wavelength multiplexing (page 2, lines 95 to 102) so that reception is "singly and in a sequence" as mentioned in feature (e), there the common features end. Positioning the separating means so that, in accordance with feature (d), separation of the selected colours takes place only "after they have travelled ... along the data bus" is not part of that prior art starting point but must be considered as a new feature when it comes to the issue of inventive step.

6. Turning now to the substantive issues of the present case, the only question to be decided is whether the subject-matter of any of the independent claims of the Appellant's requests involves an inventive step.

7. The Appellant's main request

In the Board's opinion, the subject-matter of Claim 1 as granted is obvious to a person skilled in the art, having regard to the state of the art (Article 56 EPC).

This conclusion is based on the following considerations:

- 7.1 An apparatus of the general kind defined in the opening phrase of Claim 1 and comprising all the features (a) through (e) listed in the pre-characterising portion of that claim (cf. paragraph I above) is known from D2.

A particular example of such an apparatus is shown in Figure 5 of D2. It is noted that this apparatus is described in D2 as one of several embodiments another of which is, for instance, that shown in Figure 2. It is immediately apparent that these two embodiments are - in principle - equivalent, although not in efficiency. They differ from each other only by the manner in which the divided light portions are "labelled" for enabling their distinction at the receiver. In Figure 2, labelling is implemented by giving the light portions different delays (without changing their energy content), in Figure 5 by filtering out different wavelengths (resulting in a reduction of their energy content). On page 2, lines 86 to 89, the principal equivalence of wavelength (frequency) multiplexing (Figure 5) with time division multiplexing (Figure 2) is expressly stated by the terms "similar" and "instead of".

On this basis, the skilled reader would immediately, without any difficulty, be able to sketch a wavelength multiplexing equivalent to the time division multiplexing

embodiment shown in Figure 4, or to that shown in Figure 11 (simply replacing the delay lines d by filters as was done by the authors of D2 when construing the Figure 5 embodiment as an equivalent to the Figure 2 embodiment).

The Board notes that Figure 6 showing a combination of wavelength and time division multiplexing and Figure 8 showing an embodiment with frequency modulation, these two embodiments are less relevant for the present case and can, therefore, be disregarded.

However, whilst all the embodiments mentioned so far are parallel configurations (channels indexed 1, 2, 3 or a, b, c being parallel to each other) the further embodiments shown in Figures 9 and 10 are series configurations, the delay lines being arranged in a series. Even though both Figures 9 and 10 show time division multiplexing embodiments, it lies, in the opinion of the Board, well within the capabilities of a skilled reader of D2 to recognise that in principle analogous or "equivalent" wavelength division multiplexing embodiments exist and D2 was intended, by its authors, to embrace such equivalent embodiments (see also its statement of claims). Clearly, that wavelength multiplexing equivalent of the Figure 9 embodiment would have the configuration as sketched by the Respondent in his Figure C.

The pre-characterising portion of Claim 1 thus not only reflects a prior art as shown in Figure 5 of D2, but can, alternatively, as well be read on the wavelength multiplexing equivalent of the Figure 9 embodiment of D2 (subsequently referred to as the "Figure C equivalent") which should be regarded as being implicit in D2 although not expressly shown in the drawings.

7.2 The fact that the Figure 2 and Figure 5 embodiments in D2 are treated there (page 2, lines 86 to 89) as qualitatively equivalent does not mean that the skilled person will be unaware of the fact that they are not, in effect, quantitatively equivalent. From the very functions of delay lines (d in Figure 2) and of filters (λ in Figure 5) it is evident that the former ones do not, but the latter do, have a power dividing effect on a broadband or multiband signal, i.e. the former embodiment is superior in efficiency as compared with the latter by a factor governed by the number of channels (filters) in the latter.

The same then applies to the delay line embodiment of Figure 9 of D2 and to its filter equivalent ("Figure C equivalent"), respectively; i.e. the skilled person will be aware of the fact that the Figure 9 embodiment is superior in efficiency as compared with the "Figure C equivalent" by a factor governed by the number of filters in the latter.

7.3 From the characterising portion of Claim 1 (cf. paragraph I) it is clear that the claimed invention makes use of a series rather than a parallel configuration.

In these circumstances, it appears reasonable to use the wavelength multiplexing equivalent of Figure 9, i.e. the "Figure C equivalent" having branched off filters instead of the row of delay line portions, rather than the Figure 5 embodiment of D2, as the starting point coming nearest to the claimed invention from which to judge whether an inventive contribution is made by the characterising features of Claim 1.

The Appellant has, in effect, submitted that the lower efficiency figure of this "Figure C equivalent" would deter the skilled person from using it, or developing it further.

The Board agrees that the skilled person would, *prima facie*, be reluctant to do so when considering efficiency figures, but this does not do away with the fact that the "Figure C equivalent" is a real possibility implicit in the overall teaching of D2 (cf. paragraph 7.1) and, therefore, to be considered, particularly when a possibility of undoing the reduction in efficiency by filters is in view (cf. below, paragraph 7.7).

- 7.4 The claimed invention differs from this "starting point" by the characterising features of Claim 1 (cf. paragraph I above).

In essence, these features mean that the separate beam splitters and filters used in the "Figure C equivalent" are replaced by beam splitter/filter combinations called dichroic beam splitters.

- 7.5 The problem objectively solved by this replacement is that the power loss caused by the filters used in D2 is avoided. The dichroic beam splitters separate the selected colour from the rest and leave that rest unaffected in the distribution fibre rather than annihilating it.

- 7.6 From each one of documents D1, D3, D4 and D5 dichroic beam splitters are known and the Appellant has not disputed this fact.

D1 discloses their function including the advantage that the selected colour is separated from the rest and that rest is propagated through a glass plate to the next dichroic beam splitter section.

The dichroic beam splitter of D1 is a compact multichannel combination of several dichroic beam splitters but it is clear that it replaces a series of one channel dichroic beam splitters interconnected by a fibre instead of a glass plate. Apparently, such a series of one channel dichroic beam splitters would be necessitated in case the individual communication sources or receivers are not accessed at one and the same location.

D1 discloses the use of dichroic beam splitters as a wavelength (frequency) division multiplexer or demultiplexer.

D3 discloses a one channel dichroic beam splitter (e.g. in Figure 6) and the use of several such beam splitters connected in series by a distribution fibre as a wavelength division demultiplexer (Figure 9).

D4 discloses similar one channel dichroic beam splitters as a wavelength division demultiplexer (Figures 1c and 5).

D5 discloses the use, as a wavelength multiplexer and demultiplexer, of a light mixer and a branching filter having the properties of splitting the beam and being dichroic.

7.7 From the very function of the dichroic beam splitters of D1, D3, D4 and D5 it follows that no power is lost as is in the filters of a filter bank (D2) when filtering out one wavelength (frequency) out of a broadband or multiband signal and annihilating the rest.

7.8 For this latter reason, the skilled person seeking to avoid the disadvantage of a bank of filters (such as that in Figure 5 of D2) in respect of efficiency would be led

to consider the use of dichroic beam splitters, known to him from D1, D3, D4 and D5 as not having this disadvantage, as the means for providing light of different colours to the individual sensors in any of the wavelength multiplexing apparatus of D2, including the implicit embodiment termed, by the Board, "Figure C equivalent".

This use is, therefore, to be regarded as obvious, having regard to D2, when being read with the common knowledge of a skilled person, and taking into consideration the additional prior art known from D1, D3, D4 or D5.

- 7.9 The Board has carefully considered the Appellant's submissions made on 7 August 1989 and 6 August 1990 in support of his main request.

Those in the statement of grounds deal primarily with the particular kind of argumentation made in the decision under appeal, and do not consider the Figure 9 embodiment of D2 at all.

In the submissions filed on 6 August 1990, this embodiment has been considered but, as the Board has shown in its communication dated 21 December 1990, the Appellant's efficiency considerations (27 February 1984) are partly not acceptable (as to the submitted figures) and partly not convincing (because of the obviousness of the lower efficiency of wavelength multiplexing when using a filter bank).

The Appellant further submitted that the modification made to the Figure 9 embodiment of D2 by the Board in order to arrive at a wavelength multiplexing "equivalent" would require either significant insight or hindsight and not

simple routine modification. In the opinion of the Board, some insight must be expected from a person skilled in the art and for concluding unobviousness it would not be sufficient that the modifications are not of a simple routine kind.

It is true that Figures 9 and 10 of D2 show embodiments which would appear to be particularly useful when immersion in an appropriate medium (page 3, line 11) is to be sensed. But, in the opinion of the Board, these embodiments are applicable more generally, as are the embodiments shown in Figures 1 to 8 and 11.

The Appellant further submitted that if direct substitution of delay lines by filters in the distributing fibre were attempted in Figure 9 of D2, the system would not work. This is, of course, true but this is not what the skilled person would attempt. Rather, he would, as a clearly obvious necessity, position the filters in the branched-off fibres (in this respect there is no difference between a series and a parallel configuration such as that of Figure 5).

The Appellant's reference to a replacement of R type sensor devices in Figure 5 of D2 by C type sensor devices (which the Board agrees with) is not relevant for the question to be decided. The claimed invention is a series configuration (branching off serially rather than in parallel) and insofar the Figure 9 embodiment, or its wavelength multiplexing "equivalent" (Respondent's Figure C), is more relevant than the Figure 5 embodiment.

The fact that in D2 the possibility of using dichroic beam splitters was not considered is no proof for unobviousness, the less so as their existence at the

priority date of D2, or at the date when its author conceived it, was not documented.

The Board has not, for these reasons, been convinced by the Appellant that its conclusion is based on hindsight or is inconsistent with the statement cited from decision T 106/84. Whether or not the incorporation of a known device in a known machine is an obvious step to do is a matter of whether or not the resulting simplification and improved performance can be foreseen, having regard to the properties of the said device as they would appear to the skilled person.

As to the three steps mentioned in the last paragraph on page 3 of the Appellant's submission filed on 6 August 1990, the Board disagrees with the view that modification (i) (replacement of serial by parallel arrangement) must be made as a separate step. It is only agreed that in step (ii) (replacement of delay means by filters) the filters must not be positioned serially in the distributing fibre such as the delay lines are, but, inevitably, in fibres branched off from the distributing fibre. This, however, is clearly an obvious necessity.

The conclusion of obviousness (paragraph 7.8) is not, therefore, rendered doubtful by the Appellant's submissions.

8. The Appellant's first auxiliary request

- 8.1 Claim 1A not being allowable for the reason (cf. paragraph 4.1) that, in its definition of the matter for which protection is sought, it lacks clarity (Article 84 EPC), the question whether that subject-matter involves an inventive step (Article 56 EPC) cannot be posed.

The subject-matter of a claim being the totality of the features it contains, it would not be relevant for the issue of inventive step whether (as appears to be the case) it is obvious to separately incorporate either the first characterising feature (as interpreted in paragraph 4.1) or the second characterising feature in an apparatus as defined in the precharacterising portion of Claim 1A. The only relevant question would be whether it is obvious to incorporate, at the same time, both of the aforementioned features in that apparatus. No decision can, however, be taken on this question because such a combination of features would appear to be an impossible one due to their incompatibility (cf. paragraph 4.1).

8.2 The application of Article 113(2) EPC to the present case means that the Board shall consider and decide upon the first auxiliary request only in the text submitted to it by the Appellant, i.e. with the present wording of Claim 1A.

The Board has no discretion to consider the merits of the first auxiliary request as they would be if the lack of clarity objection (paragraph 4.1) were met by further suitable amendments. For instance, no decision can be taken as to a possible involvement of an inventive step in the embodiments shown in Figures 3 and 7 of the patent in suit where the common parts of the fibres are situated between subsequent beam splitter/sensor combinations, i.e. not as suggested by the wording of Claim 1A as it will be understood by the skilled but unbiased reader (paragraph 4.1).

The Appellant had been given an opportunity to present, either in writing or in oral proceedings, his comments (Article 113(1) EPC) and consider the necessity of subsidiary amendments in case his comments would not

convince the Board, but he has chosen not to make any such amendments before or in the oral proceedings (which he did not attend). The Board has no power to make an amendment of its own motion, i.e. without the consent of the Appellant.

9. Second auxiliary request

9.1 According to the pre-characterising portion of Claim 1B (cf. paragraph IX), this claim would suggest to start from an apparatus having all the features of Claim 1 as granted, i.e. also the dichroic beam splitters feature, even though the use of these elements is novel (cf. paragraph 5.1).

In any case, however, this suggested "starting point" is obvious (cf. paragraph 7).

9.2 The additional feature stemming from granted Claim 3 and introduced in Claim 1B would mean that in the apparatus defined in the pre-characterising portion, the distributing (3) and data bus (5) fibres, running parallel to each other (as shown, for instance, in Figures 1 and 2), are combined to a "twin" or "multi-fibre" cable (the Appellant's reference made on 6 August 1990 to a "common cable" being understood in this sense and not as referring to a "common fibre" in the sense of Claim 1A).

Given that it is clearly (albeit undocumented) common knowledge for the skilled person to combine parallel signal lines such as fibres within a "twin" or "multi-fibre" cable, the inclusion of such a feature in Claim 1B cannot be regarded as rendering its subject-matter unobvious.

9.3 It is true, as the Appellant has pointed out on 6 August 1990, that the bridge at the other end in the "Figure C equivalent" is not one which transfers light from one fibre to the other; however, the purpose of this feature in Claim 1B is left open. A bridge of the said kind is present in the embodiments shown in Figures 4, 5, 6 and 7 but with various purposes, the bridge serving in the Figure 7 embodiment quite another, or additional, purpose than in the Figures 4 to 6 embodiments. Apparently, such a bridge as, for instance, in Figure 6 (82) can also be present in the Figures 1 and 2 embodiments. The addition of such a bridge to the twin cable embodiment as otherwise claimed in Claim 1B is, therefore, to be regarded as a matter of need. If, for instance, it is required to transmit a reference colour from fibre 3 to fibre 5 in Figure 1 or 2, a bridge at the end of the fibres is an obvious necessity. The use of a reference colour is obvious as will be clear from the subsequent paragraph 10, particularly 10.3, dealing with the Appellant's third auxiliary request.

9.4 Claim 1B is, therefore, unallowable for lack of inventive step (Article 56 EPC).

10. Third auxiliary request

10.1 According to the pre-characterising portion of Claim 1C, the suggested starting point is the same as with Claim 1B (cf. paragraph 9.1).

10.2 Claim 1C adds, to that subject-matter, the characterising feature (a) that the parameter modified in a sensor as a function of the condition to be sensed, is the light intensity. This is clearly a feature well known in the art and which is employed also according to D2, be it either

with transmission type sensors (Figure 1b) or with reflection type sensors (Figure 1g); cf. page 1, line 94 to page 2, line 1 and page 2, lines 26 to 29.

- 10.3 Claim 1C further adds the characterising feature (b) that a reference colour is transmitted additionally and means are provided using the reference colour as it is received for compensating any errors in the selected colours.

Referring to the Appellant's submission based on the fact that the reference parameter is "changed" the Board agrees that page 1, lines 29 to 39 of D2 is not particularly relevant for feature (b) of Claim 1C.

However, this feature is to be regarded as the straightforward application of common knowledge. In the field of measuring, it is a well known principle to compensate any extraneous influences on a measuring signal by a reference signal which is subdued to the same external influences but not to the value to be measured.

D6 has been cited as an example of this general knowledge. It may be true that D6 is not the best representative for the relevant general knowledge. However, it is nevertheless to be noted that the reference light 7 in D6 is a reference signal which is changed by any influences which might also change the measuring signal except for those occurring in the light path from half-mirror 5 through the optical fibre 8 to half-mirror 9; or in other words: The reference signal is changed by any influences which might change the measuring signal in all the other parts of the apparatus, particularly in the source (3) or in the fibre part upstream the half-mirror 5 carrying the reference numeral 4 for the optically modulated wave, or in the fibre part downstream half-mirror 9.

10.4 The subject-matter of Claim 1C is, therefore, regarded as obvious to the person skilled in the art (Article 56 EPC).

11. Fourth auxiliary request

11.1 The pre-characterising portion of Claim 1D would again suggest to start out from an apparatus not only having the features known from D2, but in addition thereto certain features which are novel (cf. paragraphs 5.1 and 5.2).

The Board will, however, in order not to draw a wrong conclusion from the incorrect picture given by the pre-characterising portion of Claim 1D, start out from an apparatus which does not have these features.

This is, again, the "Figure C equivalent" as defined in paragraph 7.1.

11.2 The first novel feature in Claim 1D is the "dichroic beam splitter" feature contained in feature (b).

This feature (see also paragraph 7.4) has been found to be obvious (cf. paragraphs 7.5 to 7.9).

11.3 The second novel feature in Claim 1D is the "separation in time" feature contained in features (d) and (e).

D2 proposes to use time separation even when wavelength multiplexing is used as in Figure 5. D2 proposes this as an alternative to using filters ($\lambda_{11}, \lambda_{21}, \lambda_{31}$) as demultiplexer (page 2, lines 95 to 102). It suggests, in particular, to arrange the transmitter to provide a sequence of pulses.

The claimed arrangement differs from this by the feature in (d) that the means performing this separation in time is positioned so that the selected colours are separated after they have travelled along the data bus, i.e. only at the receiver of the apparatus.

This difference is clearly not one which would require inventive ingenuity. In the field of measuring, it lies always within the range of the skilled person to whom a plurality of measuring signals is supplied simultaneously, to choose either one or the other of two possibilities: Use a plurality of measuring devices or measure the individual signals sequentially. The latter possibility requiring only a single measuring device, the skilled person who wishes to use this advantage will certainly consider this one.

The "separation in time" feature is, therefore, to be regarded as obvious from common knowledge even though it differs, as to the location of the "means to separate", from what is specifically proposed in D2 (page 2).

- 11.4 The third novel feature in Claim 1D is the "reference colour" signal as defined in the characterising portion of this claim.

This feature has been found to be obvious (cf. paragraph 10.3).

No inventive particularity can be seen in the feature contained in the characterising portion of Claim 1D that the means for separating the reference colour from the selected colours is positioned so that this separation takes place before the selected colours are separated. For the skilled person, this is only a matter of obvious necessity.

- 11.5 It is still left to be decided whether the combined application of all three novel but individually obvious features in an apparatus of the "Figure C equivalent" kind, implicit in D2, would involve an inventive step.

In the opinion of the Board, this is not the case.

The individual problems objectively solved by the novel features are absolutely independent of each other:

The first of the novel features solves an efficiency problem (cf. paragraph 7.5).

The second solves a simplification of the measuring device problem (paragraph 11.3). Efficiency is not improved or even reduced (if the separation in time is performed by a filter disc such as 97).

The third solves a detection or compensation of measuring errors problem (paragraph 10.3).

No other effect appears to be involved with the combined application of all three features than the achievement, at the same time, of the three results individually achieved by each of these features.

The combined application of all three features in an apparatus of the "Figure C equivalent" kind, implicit in D2, is, therefore, to be regarded as being as obvious as are their separate applications.

- 11.6 The Board has not found any convincing argument in the Appellant's submissions which would appear apt for refuting this view.

With particular reference to the emphasised sentence on page 6 of his submissions filed on 6 August 1990, it is not agreed that positioning the temporal separating means (97) near the receiver "ENABLES a reference colour also to be transmitted along the same optical fibres as the selected colours ...". In the opinion of the Board, the use of a reference colour is independent of the position of the temporal separating means. Apparently, the only requirement is that somehow the reference colour must be separated, in the receiver, from the selected colours.

The Appellant's considerations based on a temporally separated reference colour are not relevant. The skilled person considering temporal separation of selected colours, be it in the transmitter (D2, page 2) or at the receiver (obvious on the basis of general knowledge as considered in paragraph 11.3 above), will not necessarily consider the same temporal separation for the reference colour. Particularly in the case of temporal separation of the selected colours at the receiver, he would not see any reason for temporally separating also the reference colour; on the contrary, for the purpose of relating (comparing) the selected colours with the reference colour, it would appear to him only natural not to separate the reference colour temporally from the selected colours.

It is agreed that Figure 6 of D2, referred to by the Respondent, is by no means of sufficient relevance for concluding obviousness of the subject-matter of Claim 1D but, in the opinion of the Board, its own argumentation (above) is.

11.7 The subject-matter of Claim 1D lacks, therefore, an inventive step (Article 56 EPC).

12. Summarising the above, the Appellant's requests must be rejected for the reason that the subject-matter of the independent claim of the main request lacks an inventive step (paragraph 7), that of the first auxiliary request as it stands (paragraph 8.2) is not clearly defined (paragraph 4.1) and those of the remaining auxiliary requests lack an inventive step (paragraphs 9 to 11).

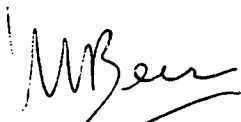
Since, for these reasons, the Respondent's main request is to be allowed, his auxiliary request does not become relevant.

Order

For these reasons, it is decided that:

The appeal is dismissed.

The Registrar:



M. Beer

The Chairman:



P.K.J. van den Berg