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**Datasheet for the decision
of 9 May 2011**

Case Number: T 2325/08 - 3.5.03

Application Number: 01972836.9

Publication Number: 1325571

IPC: H04B 10/08

Language of the proceedings: EN

Title of invention:

A transmitter-receiver device and a communication system

Applicant:

Transmode Systems AB

Headword:

Transmitter-receiver/TRANSMODE

Relevant legal provisions:

EPC Art. 56

Relevant legal provisions (EPC 1973):

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Keyword:

"Inventive step - main request and first and second auxiliary requests (no)"

"Remittal - auxiliary request 2B (yes)"

Decisions cited:

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Catchword:

-



Case Number: T 2325/08 - 3.5.03

D E C I S I O N
of the Technical Board of Appeal 3.5.03
of 9 May 2011

Appellant: Transmode Systems AB
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Representative: Israelsson, Stefan
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Decision under appeal: Decision of the examining division of the
European Patent Office posted 18 July 2008
refusing European application No. 01972836.9
pursuant to Article 97(2) EPC.

Composition of the Board:

Chairman: A. S. Clelland
Members: F. van der Voort
M.-B. Tardo-Dino

Summary of Facts and Submissions

- I. This appeal is against the decision of the examining division refusing European patent application No. 01972836.9 (publication number EP 1325571), which was originally filed as international application PCT/SE01/02084 (publication number WO 02/27978 A).
- II. The reasons given for the refusal were that the subject-matter of each one of the claims of a main request and first and second auxiliary requests did not involve an inventive step (Articles 52(1) and 56 EPC) having regard to the disclosure of D1 (US 5956168 A) and taking into account the general knowledge of the skilled person.
- III. In the notice of appeal the appellant requested that the decision be cancelled and that a patent be granted on the basis of the claims of the main request or, failing that, on the basis of the claims of one of the first and second auxiliary requests, all as on file.
- IV. With the statement of grounds of appeal the appellant filed further sets of claims of third to fifth auxiliary requests. Arguments in support of all requests on file were also submitted.
- V. In a communication the board raised, without prejudice to its final decision, objections under Articles 84 and 123(2) EPC in respect of claims of the second and fifth auxiliary requests and objections under Article 52(1) in combination with Article 56 EPC in respect of, in particular, claim 1 of each one of the pending requests, having regard to the disclosure of D1 and taking into account the common general knowledge of a person skilled

in the art.

- VI. In response to the board's communication the appellant filed amended second and fifth auxiliary requests, which were to replace the previous second and fifth auxiliary requests, and two further auxiliary requests 2B and 5B and submitted arguments in support. The appellant stated that "Auxiliary request 2B thus comes directly after the second auxiliary request in the order of requests".

The appellant made no explicit requests in the above-mentioned response but the board understands the appellant to be implicitly requesting that the decision under appeal be set aside and that a patent be granted on the basis of the claims of the main request or, failing that, on the basis of the claims of one of the first auxiliary request, the second auxiliary request, auxiliary request 2B, the third auxiliary request, the fourth auxiliary request, the fifth auxiliary request, and auxiliary request 5B, in this order.

- VII. Claim 1 of the **main request** reads as follows:

"A transmitter-receiver device (A,B) comprising a receiver unit (RXA) arranged to via a first optical conduction path (F1) receive light and optical signals and comprising a first output (101) which indicates whether the receiver unit (RXA) receives light,

a transmitter unit (TXA) arranged to on a second optical conduction path (F2) transmit light and optical signals and comprising a first input (103) which controls whether the transmitter unit (TXA) shall transmit light,

a supervising unit (CUA) with a second input (105)

connected to said first output (101) and a second output (107) connected to said first input (103) and arranged to via said second output (107) prevent the transmitter unit (TXA) from continuously transmitting light when the supervising unit (CUA) via the second input (105) detects that the receiver unit (RXA) does not receive light, wherein the supervising unit (CUA) is arranged to, when it detects that the receiver unit (RXA) does not receive light, change to a test mode where the supervising unit (CUA) controls the transmitter unit (TXA) to intermittently transmit short light pulses on said second optical conduction path (F2), and wherein the supervising unit (CUA) is arranged such that when the transmitter-receiver receiver [sic] (A, B) is in said test mode, the time between said light pulses is less than 1 s, **characterised in that** the supervising unit (CUA) is arranged with a third output (109) where a status signal indicates whether the transmitter-receiver device is in said test mode."

Claim 1 of the **first auxiliary request** differs from claim 1 of the main request in that the following features are added:

", wherein the receiver unit (RXA) is arranged with a fourth output (111) which is connected to the supervising unit (CUA), at which fourth output (111) a signal is the case which indicates whether the receiver unit (RXA), via the first optical conduction path (F1), receives an information carrying input signal, wherein the supervising unit (CUA) has a fifth output (113) with a status signal which depends both on the status of the signal of said third output (109) and the status of the signal from said fourth output (111)."

Claim 1 of the **second auxiliary request** reads as follows:

"A communication system comprising:
a first transmitter-receiver device (A) and
a second transmitter-receiver device (B),
wherein each of said transmitter-receiver devices (A, B)
comprises
a receiver unit (RXA) arranged to via a first
optical conduction path (F1) receive light and optical
signals and comprising a first output (101) which
indicates whether the receiver unit (RXA) receives light,
a transmitter unit (TXA) arranged to on a second
optical conduction path (F2) transmit light and optical
signals and comprising a first input (103) which
controls whether the transmitter unit (TXA) shall
transmit light,
a supervising unit (CUA) with a second input (105)
connected to said first output (101) and a second output
(107) connected to said first input (103) and arranged
to via said second output (107) prevent the transmitter
unit (TXA) from continuously transmitting light when the
supervising unit (CUA) via the second input (105)
detects that the receiver unit (RXA) does not receive
light, wherein the supervising unit (CUA) is arranged to,
when it detects that the receiver unit (RXA) does not
receive light, change to a test mode where the
supervising unit (CUA) controls the transmitter unit
(TXA) to intermittently transmit short light pulses on
said second optical conduction path (F2), and wherein
the supervising unit (CUA) is arranged such that when
the transmitter-receiver receiver [sic] (A, B) is in
said test mode, the time between said light pulses is

less than 1 s, **characterised in that** in each one of said transmitter-receiver devices (A, B) the supervising unit (CUA) is arranged with a third output (109) where a status signal indicates whether the transmitter-receiver device is in said test mode, wherein the receiver unit (RXA) is arranged with a fourth output (111) which is connected to the supervising unit (CUA), at which fourth output (111) a signal is the case which indicates whether the receiver unit (RXA), via the first optical conduction path (F1), receives an information carrying input signal, wherein the supervising unit (CUA) has a fifth output (113) with a status signal which depends both on the status of the signal of said third output (109) and the status of the signal from said fourth output (111),

and wherein the communication system also comprises a first and a second optical conduction path (F1, F2) which connect the first and the second transmitter-receiver device (A, B) to each other, wherein the first optical conduction path (F1) is connected to the receiver unit (RXA) of the first transmitter-receiver device (A) and the transmitter unit (TXB) of the second transmitter-receiver device (B), wherein the second optical conduction path (F2) is connected to the receiver unit (RXB) of the second transmitter-receiver device (B) and the transmitter unit (TXA) of the first transmitter-receiver device (A)."

Claim 1 of **auxiliary request 2B** differs from claim 1 of the second auxiliary request in that the following features are added:

"wherein in each one of said transmitter-receiver devices (A, B) the transmitter unit (TXA) is arranged

with a sixth output (115) which is connected to the supervising unit (CUA) at which sixth output (115) a signal is the case which indicates whether the transmitter unit (TXA) receives an electric information carrying input signal, wherein the supervising unit (CUA) has a seventh output (117) with a status signal which depends both on the status of the signal of said third output (109) and the status of the signal from said sixth output (115),

wherein in each one of said transmitter-receiver devices (A, B) the supervising unit (CUA) is arranged such that the status of the signals at said third, fourth, fifth, sixth, and seventh outputs (109, 111, 113, 115, 117) fulfils the following status schedule:

Fourth output	Sixth output	Third output = 0	Third output = 1
0	0	Fifth output = 0 Seventh output = 0	Fifth output = 0 Seventh output = 0
0	1	Fifth output = 0 Seventh output = 0	Fifth output = 0 Seventh output = 1
1	1	Fifth output = 0 Seventh output = 0	Fifth output = 1 Seventh output = 1
1	0	Fifth output = 0 Seventh output = 0	Fifth output = 1 Seventh output = 0

wherein the first column indicates the status of the fourth output, the second column indicates the status of the sixth output, in the third column the third output has status = 0 and in the fourth column the third output has status = 1, and wherein the respective status stands for the following:

Third output = 1, connection works and the transmitter-receiver device is not in said test mode;

Third output = 0, the transmitter-receiver device is in said test mode;

Fourth output = 1, the receiver unit (RXA) receives an

information carrying signal;

Fourth output = 0, the receiver unit (RXA) does not receive an information carrying signal;

Fifth output = 1, indicates that there is a working optical connection with an information carrying signal to the receiver unit (RXA);

Fifth output = 0, indicates that there is no working optical connection with an information carrying signal to the receiver unit (RXA);

Sixth output = 1, the transmitter unit (TXA) receives an electric information carrying input signal;

Sixth output = 0, the transmitter unit (TXA) does not receive an electric information carrying input signal;

Seventh output = 1, indicates that there is a working optical connection with an information carrying signal which is transmitted from the transmitter unit (TXA);

Seventh output = 0, indicates that there is no working optical connection with an information carrying signal which is transmitted from the transmitter unit (TXA)."

In view of the board's conclusion as set out below, it is not necessary to give details of the claims of the lower ranking auxiliary requests.

Reasons for the Decision

1. Main request

- 1.1 D1 discloses, using the language of claim 1 of the main request, a transmitter-receiver device, i.e. dual optical fiber communication module or transceiver 102 (col. 3, lines 52 to 67, col. 4, lines 31 to 33, and Fig. 2), including:

- a receiver unit, i.e. photo diode 114-1 and receiver circuit 116-1, arranged to receive light and optical signals via a first optical conduction path, i.e. optical fiber 106-2, the receiver circuit 116-1 converting the received signal into an output signal which indicates whether the receiver unit receives light (col. 4, lines 15 to 21, and col. 8, lines 50 to 54 ("for detecting the loss of light condition"));
- a transmitter unit, i.e. laser diode 110-1 and laser diode driver circuit 112-1, arranged to transmit light and optical signals on a second optical conduction path, i.e. optical fiber 106-1, the laser diode driver circuit 112-1 including an input which controls whether the transmitter unit shall transmit light; and
- a supervising unit, i.e. controller 120, with an input connected to the output of the receiver unit 114-1, 116-1 and an output connected to the input of the transmitter unit 110-1, 112-1.

A state machine 140, which is included in the supervising unit 120, governs the operation of the module 102 and has four distinct states, i.e. a "Disconnect State" 142, an "Active State" 144, a "Stop State" 146, and a "Reconnect State" 148 (col. 3, lines 33 to 36, col. 4, lines 37 to 65, and Fig. 3).

Further, the state machine 140 maintains a set of internal parameters or variables that determine state transitions between the states of the state machine, including a variable "state 162" which specifies the current state of the state machine (col. 5, lines 13 to 15, 42 and 43, and Fig. 3). Hence, the variable "state 162" is a status signal which indicates, *inter alia*, whether the module 102 is in the "Disconnect State".

The supervising unit 120 is arranged to prevent, via its output, the transmitter unit 110-1, 112-1 from continuously transmitting light when the supervising unit 120 detects, via its input, that the receiver unit 114-1, 116-1 does not receive light (col. 6, lines 13 and 14 and lines 32 to 40 ("Disconnect State 142")). More specifically, when the supervising unit 120 detects that the receiver unit does not receive light it is arranged to change the module 102 to the "Disconnect State" 142 and in this state it controls the transmitter unit to intermittently transmit short light pulses on the second optical conduction path (col. 6, lines 18 to 24 and lines 32 to 40), in which the time between the light pulses may be, e.g., 400 ms depending on the implementation (col. 10, lines 39 to 43 and 49 to 53), i.e. less than 1 s.

D1 further discloses that the supervising unit 120 may be a microcontroller which executes a set of programs which includes a self diagnostic procedure 224 for determining whether the transceiver is functioning properly and host communication procedures 226 for receiving commands and transmitting responses from and to a host device 108-1 (col. 8, lines 38 to 67, Figs 2 and 4). The host device 108-1 is typically a computer and is connected to the supervising unit 120 via a bidirectional communication link (col. 3, lines 57 to 62, Fig. 2). D1 does not however provide any details of the diagnostic and communication procedures.

- 1.2 It follows from the above that the "Disconnect State" 142 referred to in D1 reads on the "test mode" as referred to in claim 1. The subject-matter of claim 1 of

the main request thus differs from the transmitter-receiver device disclosed in D1 in that according to claim 1 the supervising unit is arranged with an output where the status signal indicates whether the transmitter-receiver device is in the test mode.

- 1.3 As mentioned above, D1 does not provide any details of the diagnostic and communication procedures. However, in the board's view, it would have been obvious to a person skilled in the art at the priority date, when faced with the problem of implementing these procedures, to implement the supervising unit 120 such that it outputs, via the above-mentioned bidirectional communication link, the results of the diagnostic procedure carried out by the supervising unit 120 to the host device 108-1, since this would enable an operator of the host device to evaluate the diagnostic results and decide on any further action to be taken.

Further, since in D1 the diagnostic procedure is for determining whether the transceiver is functioning properly, it would be evident that the transceiver's status is a useful parameter to be monitored for that purpose and, hence, to include the "state 162" variable in the diagnostic results as output by the supervising unit 120 to the host device.

In doing so, the skilled person would have arrived at an implementation of the supervising unit 120 which is arranged with an output for diagnostic results, in which these results include a status signal which indicates, *inter alia*, whether the transmitter-receiver device is in the test mode. The skilled person would thereby, without the exercise of inventive skill, have arrived at

a transmitter-receiver device which includes all the features of claim 1 of the main request.

- 1.4 The appellant argued that D1 did not explain the purpose of the variable "state 162" or how it was to be used. Further, since "state 162" was a variable it was difficult to understand how it actually indicated a certain status. In D1 there was no indication whatsoever that certain state parameters, in particular "state 162", were to be transmitted to the host device. Further, in D1 it was not explained how the self diagnostic procedure 224 and the communication procedures 226 were carried out. As to the diagnostic procedure it was only stated that it determined whether the transceiver was functioning properly. This could be done in a number of different manners. The disclosed communication procedures 226 were "for receiving commands and transmitting responses" from and to a host device, without explaining what kind of commands were received. In this context, the transmission of a response could only be understood as a response to a received command.

The board does not find these arguments convincing. D1 states that state 162 "is the variable that specifies the current state of the state machine" (col. 5, lines 42 and 43). Since the state machine has four states (see point 1.1 above), it is implicit that the variable "state 162" indicates one of these four states, in which "state" in this context is synonymous with "status". How the status is indicated by the variable 162 is not relevant, since in claim 1 of the main request this is not further specified either. The board agrees that D1 does not disclose that certain state parameters, in particular "state 162", are to be

transmitted to the host device. However, as set out above, in view of the above-mentioned technical problem, the formulation of which does not involve an inventive step, the skilled person would have arrived at an implementation of the supervising unit in which the transceiver state signal 162 is transmitted to the host device. Whether or not this is specifically implemented as a response to a command received from the host computer is not relevant, since claim 1 does not include features relating to a transmission protocol for the status signal.

1.5 The board therefore concludes that, having regard to the disclosure of D1 and taking into account the common general knowledge of a person skilled in the art, the subject-matter of claim 1 of the main request does not involve an inventive step (Articles 52(1) and 56 EPC).

1.6 The main request is therefore not allowable.

2. *First auxiliary request*

2.1 Claim 1 of the first auxiliary request differs from claim 1 of the main request in that, see point VII above, the following features are added:

i) the receiver unit has a fourth output which is connected to the supervising unit, at which fourth output a signal "is the case which indicates whether" the receiver unit, via the first optical conduction path, receives an information carrying input signal; and

ii) the supervising unit has a fifth output with a status signal which depends both on the status of the

signal of the third output and the status of the signal from the fourth output.

These additional features do not contribute to an inventive step for the following reasons.

2.2 The board notes that in claim 1 the wording "the receiver unit is arranged with a fourth output" does not imply that the receiver unit has four or even more outputs. The claim merely defines that the first and fourth outputs are part of the receiver unit and that the second, third and fifth outputs are part of the supervising unit. Further, it is noted that the claim does not require that the outputs of the receiver unit are separate outputs or that the third and fifth outputs of the supervising unit are separate outputs.

2.3 In D1, the receiver circuit 116-1 converts a data signal which is received at its input via the first optical conduction path 106-2 and the photo diode 114-1 into a data signal and applies it to its output, which is connected to the host device 108-1, which may be a computer (col. 1, lines 17 to 21, col. 3, lines 57 to 62, col. 4, lines 15 to 21, and Fig. 2). It follows that, if the receiver unit receives a data signal at its input, a converted data signal is applied to its output, whereas if it does not receive a data signal, there will be no data signal at its output.

The receiver unit 114-1, 116-1 is thus arranged such that, if a data signal is received, the signal at its output indicates that the receiver unit receives light which includes data, i.e. that an information carrying signal is received. Consequently, the receiver unit's

output reads on both the "first output" and the "fourth output" of the receiver unit as defined in claim 1.

2.4 For the same reasons as set out at point 1.3 above, in the implementation of the supervising unit as referred to at point 1.3, the status signal output of the supervising unit reads on the third output. The board further notes that, if the supervising unit does not receive a signal from the receiver unit, e.g. due to a broken optical fiber, irrespective of whether or not the transmitted signal carries information, this affects the status signal in that it cannot represent the "Active State" 144, since the active state is the normal state for point to point data communications, which requires that there is a working optical connection (col. 4, lines 53 to 56, and col. 8, lines 6 to 13). Hence, the status signal is dependent on the receiver unit's output signal. Further, if the module is in the test mode, which corresponds to the "Disconnect State 142", see point 1.1 above, this also affects the status signal in that it cannot represent the active state. Hence, the status signal is also dependent on whether the module is in the test mode. Consequently, in the above implementation, the supervising unit's status signal output reads on both the "third output" and the "fifth output" of the supervising unit as defined in claim 1.

2.5 In connection with the fifth output as referred to in claim 1, the appellant argued that in D1 the active state 144 was the state of the controller after a communication line with another module had been established and this module's laser diode transmitter was powered on. The active state 144 did not therefore provide any signal that was dependent on whether the

receiver unit received an information carrying signal, i.e. a communication link could be established although no information carrying signal was sent.

The board notes however that in claim 1 the wording "a fifth output (113) with a status signal which depends ... on ... the status of the signal from said fourth output (111)" is not limited to the case in which the status signal at the fifth output is affected by the output signal of the receiver unit when it receives an information carrying signal, but also covers the case in which the status signal at the fifth output is affected by the absence of an information carrying signal, or a signal which does not carry information, at the output of the receiver unit, cf. point 2.4 above.

2.6 In view of the above and the reasons given in respect of claim 1 of the main request, the board concludes that the subject-matter of claim 1 of the first auxiliary request does not involve an inventive step, Articles 52(1) and 56 EPC.

2.7 The first auxiliary request is therefore not allowable.

3. *Second auxiliary request*

3.1 Claim 1 of the second auxiliary request, see point VII, is directed to a communication system which includes first and second transmitter-receiver devices, in which each of these devices includes a receiver unit, a transmitter unit, and a supervising unit as defined in claim 1 of the first auxiliary request.

3.2 For the same reasons as set out above in connection with

the subject-matter of claim 1 of the first auxiliary request, each one of the first and second transmitter-receivers as defined in claim 1 does not involve an inventive step.

The remaining features of claim 1, see the last paragraph of the claim, are known from D1, it being noted that D1 discloses a communication system which includes first and second transmitter-receiver devices 102, 104 (Fig. 2), in which the receiver units 114-1, 116-1; 114-2, 116-2 and transmitter units 110-2, 112-2; 110-1, 112-1 are connected by first and second optical connection paths 106-1, 106-2.

3.3 In view of the above and the reasons given in respect of claim 1 of the first auxiliary request, the board concludes that the subject-matter of claim 1 of the second auxiliary request does not involve an inventive step, Articles 52(1) and 56 EPC.

3.4 The second auxiliary request is therefore not allowable.

4. *Auxiliary request 2B*

4.1 Claim 1 of auxiliary request 2B is based on a combination of all features of claims 1, 2, 5, 7, 9 and 10 as filed. The additional features as defined in the dependent claims 2 to 9 of this request are based on claims 3, 4, 6, 8, and 11 to 14 as filed, respectively.

4.2 The board is therefore satisfied that the claims of auxiliary request 2B comply with the requirement of Article 123(2) EPC.

4.3 The board notes that from the status schedule as specified

in claim 1, see point VII above, it follows that, in some cases, the output signals at two outputs selected from the third, fifth and seventh outputs have different values for one and the same status of the module. This, in turn, implies that the third, fifth and seventh outputs of the supervising unit are separate status signal outputs.

4.4 Whereas, as set out above in respect of claim 1 of the main request and the first and second auxiliary requests, it would have been obvious to the skilled person, when faced with the problem of implementing the diagnostic and host communication procedures disclosed in D1, to provide the supervising unit, i.e. the controller 120 (Fig. 2), of the communication system of D1 with a status signal output corresponding to the variable "state 162", D1 neither discloses nor suggests providing the supervising unit with two additional, separate status signal outputs as defined in claim 1.

4.5 In the decision under appeal, point A.5.(a) of the reasons, the examining division stated that it was well known in the field of communications that "some monitoring or supervising operations are often needed, or at least advisable, in a network and that said operations can be carried out by an operator or by a so-called Network Management System, after a certain status monitor signal is output from the network" and therefore that "the feature of modifying a known optical transceiver (as the one known from D1) and providing it with some output monitor signal/s (which can be simply visual signals from LED indicators) is regarded as a normal design option which comes within the scope of the customary practice followed by persons skilled in the art". Further, in respect of the dependent claims then on file, which

essentially include the features of present claim 1, the examining division stated that "The technical features added by claims 2-13 are merely regarded as normal design options and/or straightforward alternatives that a skilled person would select - according to the circumstances and without the exercise of inventive skill - when confronted with the design of an optical transceiver as the one known from D1. Therefore, these claims do not involve an inventive step in view of D1 and the general knowledge of the skilled person." (point A.6 of the reasons).

4.6 In the board's view, however, if for the sake of argument it were assumed that having regard to the common general knowledge of the skilled person it would have been obvious to provide the supervising unit of the communication system of D1 with a plurality of status signal outputs, the additional features of claim 1 which define a specific status schedule for three specific status signals at outputs of the supervising unit, in which this schedule involves logic "AND"-combinations of two sets of specific status signals, cannot be assumed to be part of the common general knowledge. Nor is the board aware of any evidence which would support that the above additional features, which are not known from D1, are part of the common general knowledge of the person skilled in the art.

4.7 The board therefore concludes that, at least having regard to the disclosure of D1 and taking into account the common general knowledge of a person skilled in the art, the skilled person would not have arrived at a communication system as defined in claim 1 of auxiliary request 2B without the exercise of inventive skill.

5. In view of the above, the decision under appeal is to be

set aside and it has not proved necessary to consider the lower ranking auxiliary requests.

6. *Description and drawings*

6.1 The description does not comply with the requirements of Rule 42(1)(c) EPC in that it is not adapted to the claims of auxiliary request 2B.

7. *Remittal*

7.1 In view of the above and in accordance with Article 111(1) EPC the board considers it appropriate to remit the case to the first instance for further prosecution of the application on the basis of claims 1 to 9 of auxiliary request 2B, which would include a further examination of the question of whether or not the application meets the requirements of the EPC, in particular as to clarity of the claims and novelty and inventive step of the claimed subject-matter.

7.2 Concerning the further prosecution, the board notes that it may be necessary, having regard to the requirement of Article 84 EPC (clarity), that in the last feature of the preamble of claim 1 of auxiliary request 2B, "transmitter-receiver receiver" is replaced by "transmitter-receiver device". Further, it may be necessary to examine whether or not in claim 9 of auxiliary request 2B the wording "except for possibly during a short time delay" is clear in the context of the claimed subject-matter (Article 84 EPC).

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the department of first instance for further prosecution on the basis of claims 1 to 9 of auxiliary request 2B.

The Registrar:

The Chairman:

G. Rauh

A. S. Clelland