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Datasheet for the decision of 12 June 2013

Case Number: T 1946/12 - 3.4.02

Application Number: 08252169.1

Publication Number: 2009485

IPC: G02F1/01, H04B10/155

Language of the proceedings: EN

Title of invention:
Continuous optical bias control device and method for an optical switch

Applicant:
Northrop Grumman Guidance and Electronics Company, Inc.

Headword:

Relevant legal provisions:

Keyword:
Sufficiency of disclosure - (yes)
Amendments - added subject-matter (no)

Decisions cited:

Catchword:

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Boards of Appeal
Chambres de recours

European Patent Office
D-80298 MUNICH
GERMANY
Tel. +49 (0) 89 2399-0
Fax +49 (0) 89 2399-4465

Case Number: T 1946/12 - 3.4.02

D E C I S I O N
of Technical Board of Appeal 3.4.02
of 12 June 2013

Appellant: (Applicant)	Northrop Grumman Guidance and Electronics Company, Inc. 21240 Burbank Boulevard Woodland Hills, CA 91367 (US)
Representative:	Maury, Richard Philip Marks & Clerk LLP 90 Long Acre London WC2E 9RA (GB)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 5 April 2012 refusing European patent application No. 08252169.1 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman: A. Klein
Members: H. von Gronau
B. Müller

Summary of Facts and Submissions

I. The appeal is directed against the decision of the examination division to refuse the European patent application in suit. The decision was based on the reasons that independent claims 1 and 7 did not comply with the requirements of Article 123(2) EPC and that the application did not comply with the requirements of Article 83 EPC.

II. The appellant requested that the decision of the examining division be set aside and a patent be granted on the basis of claims 1 to 12 filed with the statement of grounds of appeal.

III. The independent claims 1 and 7 of the present request read as follows:

"1. An apparatus configured to correct a voltage drift of a guided wave electro-optical switch (130), wherein the guided wave electro-optical switch comprises a port configured to receive an applied voltage for actuation of a desired switch state of the guided wave electro-optical switch, the apparatus comprising:
means (140, 150, 160, 170, 180) for monitoring a voltage drift of the guided wave electro-optical switch; and
means (290) for applying a corrective voltage to the port of the guided wave electro-optical switch to adjust the voltage drift in real-time without interrupting an optical data stream of the guided wave electro-optical switch, wherein the corrective voltage is a pulse train;
wherein the means for monitoring is configured to
a) compare a first received voltage output to a second received voltage output, wherein the first and second

received voltage outputs are indicative of an output optical power of the guided wave electro-optical switch at first and second input voltages Va and Vb, respectively, wherein the output optical power of the guided wave electro-optical switch is equal at the first and second input voltages for a predetermined optical bias voltage V_0 of the guided wave electro-optical switch, wherein the first and second input voltages Va and Vb are on opposing sides of a voltage Vmax that provides a maximum output optical power;
b) make a determination as to whether there exists a difference between the first received voltage output and the second received voltage output, wherein the at least one difference is indicative of a voltage drift of the guided wave electro-optical switch;
c) instruct the means for applying a voltage to apply the corrective voltage to the port of the guided wave electro-optical switch when the difference exists;
CHARACTERIZED IN THAT:
the means for monitoring is configured to determine a measured visibility function value based on the first and second received voltage outputs when the difference exists, wherein the corrective voltage is a function of the measured visibility function value, and wherein the measured visibility function value is

"

$$\mathrm{vis}(v_0) = \frac{P(\mathrm{Va},V0) - P(Vb,V0)}{P(Va,V0) + P(Vb,V0)}$$

"7. A method of correcting a voltage drift of a guided wave electro-optical switch, wherein the guided wave electro-optical switch comprises a port configured to receive an applied voltage for actuation of a desired switch state of the guided wave electro-optical switch, the method comprising the steps of:

comparing a first received voltage output to a second received voltage output, wherein the first and second received voltage outputs are indicative of an output optical power of the guided wave electro-optical switch at first and second input voltages Va and Vb, respectively, wherein the output optical power of the guided wave electro-optical switch is equal at the first and second input voltages for a predetermined optical bias voltage V_0 of the guided wave electro-optical switch wherein the first and second input voltages Va and Vb are equidistant from and on opposing sides of a voltage Vmax that provides a maximum output optical power;
making a determination as to whether there exists a difference between the first received voltage output and the second received voltage output, wherein the at least one difference is indicative of a voltage drift of the guided wave electro-optical switch; and
applying a corrective voltage to one port of the guided wave electro-optical switch when the difference exists to adjust for the voltage drift in real-time without interrupting an optical data stream of the guided wave electro-optical switch, wherein the corrective voltage is a pulse train;
CHARACTERIZED BY:
determining a measured visibility function value based on the first and second voltage outputs when the difference exists, wherein the corrective voltage is a function of the measured visibility function value, wherein the measured visibility function value is

"

$$\mathrm{vis}(v_0) = \frac{P(\mathrm{Va},V0) - P(Vb,V0)}{P(Va,V0) + P(Vb,V0)}$$

Reasons for the Decision

1. Added subject-matter (Article 123(2) EPC)

1.1 The examining division had objected that the independent claims 1 and 7 comprised the feature that the corrective voltage was a direct-current voltage. The original application documents however did not disclose this feature. According to the description the corrective voltage should be applied to the RF port.

1.2 With the grounds of appeal, the appellant amended the wording of the independent claims examined in the appealed decision such that "the corrective voltage is a pulse train". As support for this amendment the appellant cited the following paragraphs of the description:

"... processor 380 may determine the corrective voltage needed and instruct voltage generator 290 to apply a voltage, e.g. a pulse train, to adjust the voltage level of the optical switch 130" (paragraph 33 of the description as filed),

"... an applied corrective voltage generated as a pulse train for the optical switch of Fig. 4 may consist of 200 nano second pulses at 5 µsec intervals" (paragraph 44 of the description as filed), and

"... to apply the corrective voltage, e.g., a pulse train, to a single port of optical switch 130 ..." (paragraph 51 of the description as filed).

1.3 The appellant thus has removed the objected feature and replaced it by a feature that characterizes the corrective voltage in line with the description. The

board is therefore of the opinion that the amended independent claims as filed with the grounds of appeal overcome the objection of added subject-matter according to Article 123(2) EPC, as raised in the appealed decision.

2. Lack of disclosure (Article 83 EPC)

2.1 In the appealed decision it is stated that the feature (a) of claim 1 as well as paragraph [47] of the description describe a device and a process which require the sequential application of two specific voltages Va and Vb for the purpose of acquiring "voltage outputs [...] indicative of an optical output power", namely the output powers $P(Va,V_0)$ and $P(Vb,V_0)$. The voltages Va and Vb are not arbitrary: the two voltages must lie "on opposing sides of a voltage Vmax that provides a maximum output optical power of the switch". The description in paragraphs [35] and [49] also indicates that the correction of the bias drift according to the present invention requires that Va and Vb be chosen such that the output powers P(Va) and P(Vb) at the nominal bias voltage be equal, since the detection of a drift is triggered by the inequality of said powers.

2.2 The examining division concluded that the evidence provided by the description entailed that the claimed optical switch could not be operated without interruption, i.e. not "in real time": an operation mode without interruption of the optical data stream implied that the input voltage applied to the optical switch can be changed at will and at any instant. The apparatus defined in claim 1 of the present application, on the contrary, required the sequential application of two specific voltages Va and Vb which

yielded equal output powers in the absence of a drift (point a) of claim 1), in order to acquire the output power samples required to determine whether a drift has occurred (point b) of claim 1), wherein the determination is made by computing a function of said output power samples (see the characterising portion of claim 1). The examining division thus concluded that an arbitrary data stream through the apparatus must be stopped to allow for the application of the two specific voltages and, as a consequence, no real-time correction of a voltage drift could be achieved by the apparatus according to independent claim 1 or by the method according to independent claim 7.

2.3 In the statement of grounds of appeal the appellant explained how a voltage drift can be detected without interruption of the optical data stream: The ON/OFF states are related to selecting the output for the input signal received from the laser source 110 and not the content of a data stream. The input voltages Va and Vb of the optical switch 130 both correspond to ON states that allow the input signal to reach a selected output, and more particularly, to the same selected output. The input voltage thus can be varied between Va and Vb without changing the selected output for the input signal. The appellant cited in this respect paragraph 35 of the original description: "The power at Va, denoted as P(Va), and the power at Vb, denoted as P(Vb) represent two "ON" states of the optical switch with equal output power levels close to the power of the maximum voltage, denoted as P(Vmax)...".

From the above explanation in combination with the description the board reaches the opinion that the subject-matter of independent claims 1 and 7 is sufficiently disclosed: the switch can be operated in

real time, i.e. without interruption of the data stream, while monitoring a voltage drift of the switch and applying a corrective voltage to the drive voltage. Switching of the data stream can be performed by driving the switch into OFF and ON states. When an ON state is required the switch can selectively be driven by Va or Vb. The drive voltages Va and Vb can be freely selected during an ON state of the switch. The "ON" output power of the switch driven by Va is compared to the "ON" output power of the switch is driven by Vb. If there is a difference in the output power a voltage drift has occurred and can be corrected. Only during periods when the switch is in the OFF state the output power at Va and Vb cannot be measured.

The board is therefore of the opinion that the subject-matter of the independent claims 1 and 7 is adequately disclosed in the application, which therefore complies with the requirements of Article 83 EPC.

3. Since the reasons for the refusal no longer hold against the present version of the application and claims, the appealed decision is to be set aside.

4. Further proceedings

The examining division did not reach a final conclusion as to the patentability of the claimed subject-matter and further amendments and clarification of the claims and description might still have to be envisaged.

The board therefore deems it appropriate in the circumstances to make use of its discretion according to Article 111 EPC in remitting the case to the department of first instance for further prosecution.

For the sake of completeness it is noted that the appellant in its statement of the grounds of appeal has requested oral proceedings in the event that the appeal would be dismissed. This not being the case, oral proceedings did not need to be summoned.

Order

For these reasons it is decided that:

The decision under appeal is set aside.

The case is remitted to the department of first instance for further prosecution.

The Registrar: The Chairman:

M. Kiehl A. Klein

Decision electronically authenticated