Trials@uspto.gov
Tel: 571-272-7822

Paper 36
Entered: March 8, 2016

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TOSHIBA CORPORATION,
Petitioner,

v.

OPTICAL DEVICES, LLC,
Patent Owner.

Case IPR2014-01441[1]
Patent RE43,681 E

Before ERICA A. FRANKLIN, GLENN J. PERRY, and JAMES B. ARPIN, *Administrative Patent Judges*.

ARPIN, *Administrative Patent Judge*.

FINAL WRITTEN DECISION
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

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[1] Case IPR2014-01442 has been consolidated with Case IPR2014-01441.

I. INTRODUCTION

A. Background

On September 3, 2014, Toshiba Corporation ("Petitioner") filed a Petition (IPR2014-01441, Paper 1 ("1441 Pet.")) to institute an *inter partes* review of claims 48, 50–54, and 56–69 of Patent No. US RE43,681 E (Ex. 1001, "the '681 patent") pursuant to 35 U.S.C. §§ 311–319. 1441 Pet. 4. Petitioner states the real parties-in-interest are Toshiba Corporation and Toshiba America Information Systems, Inc. 1441 Pet. 1. On December 10, 2014, Optical Devices, LLC ("Patent Owner") filed a Preliminary Response (IPR2014-01441, Paper 7 ("1441 Prelim. Resp.")). On March 9, 2015, we instituted an *inter partes* review of claims 48 and 50–53 of the '681 patent on the grounds of anticipation under 35 U.S.C. § 102(e) by Patent No. US 3,506,839 to Ando *et al*., but denied institution of *inter partes* review of claims 54 and 56–69 of the '681 patent. IPR2014-01441, Paper 8 ("1441 Dec."), 26.

On September 8, 2014, Petitioner filed a second Petition (IPR2014-01442, Paper 1 ("1442 Pet.")) to institute an *inter partes* review of claims 48, 50–54, and 56–69 of the '681 patent pursuant to 35 U.S.C. §§ 311–319. 1442 Pet. 4–5. Again, Petitioner states the real parties-in-interest are Toshiba Corporation and Toshiba America Information Systems, Inc. 1442 Pet. 1. On December 11, 2014, Patent Owner filed a second Preliminary Response (IPR2014-01442, Paper 6). On March 10, 2015, we instituted an *inter partes* review of claims 48, 50–53, and 60–69 of the '681 patent on the grounds of obviousness under 35 U.S.C. § 103(a) over R.F. Lucy, "Precision Laser Automatic Tracking System," Applied Optics Vol. 5, No. 4, April 1966; Patent No. US 3,385,971 to Fertig; and Patent No. US 3,144,926 to

Edelman, but denied institution of *inter partes* review of claims 49 and 54–59 of the ’681 patent. IPR2014-01442, Paper 8 (“1442 Dec.”), 34.

Because each of Case IPR2014-01441 and Case IPR2014-01442 involves claims of the ’681 patent, on March 11, 2015, we issued an order (IPR2014-01441, Paper 9; IPR2014-01442, Paper 8), consolidating these cases as Case IPR2014-01441.[2] Thus, claims 48, 50–53, and 60–69 are the subject of this consolidated *inter partes* review. References in this Final Written Decision to papers and exhibits filed after the consolidation are to the papers and exhibits filed in Case IPR2014-01441. IPR2014-01441, Paper 9, 2–3; IPR2014-01442, Paper 8, 2–3.

Patent Owner did not file a Patent Owner Response, responding to the Petitions, but Patent Owner filed a Motion to Amend (Paper 17, “Mot.”) seeking to cancel claims 48, 50–53, and 60–69 and to replace those claims with substitute claims 70–85. Mot. 1 (“Patent Owner requests that the Board to cancel the original claim(s) and replace them with the proposed substitute corresponding claims 70-8[4].”). Petitioner filed an Opposition (Paper 22, “Opp.”) to the Motion to Amend, and Patent Owner filed a Reply (Paper 31, “Reply”) to Petitioner’s Opposition.

A combined oral hearing for the instant proceeding and related Cases IPR2014-01439 and IPR2014-01443 was held on January 12, 2016. A transcript (Paper 35, “Tr.”) of that hearing is included in the record.

We have jurisdiction under 35 U.S.C. § 6(c). This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73.

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[2] Case IPR2014-01442, as a separate *inter partes* review, has been terminated administratively. IPR2014-01441, Paper 9, 2.

For the reasons that follow, we *grant* Patent Owner's Motion to Amend to the extent it requests to cancel claims 48, 50–53, and 60–69 of the '681 patent and *deny* Patent Owner's Motion to Amend to the extent it requests to enter substitute claims 70–84. The Motion to Amend, therefore, is *granted-in-part*.

B. Related Proceedings

The parties indicate that the '681 patent is the subject of *Optical Devices, LLC v. Toshiba Corporation*, Case No. 1:13-cv-10530 (D. Del. 2013), and of an investigation (complaint filed September 3, 2013), styled *In the Matter of Certain Optical Disc Drives, Components Thereof, and Products Containing the Same*, Investigation No. 337-TA-897, in the U.S. International Trade Commission. *E.g.*, 1441 Pet. 1; *see also, e.g.,* IPR2014-01441, Paper 6, 2 (listing other lawsuits brought by Patent Owner and involving the '681 patent).

Petitioner indicates that the '681 patent is related by a common parent to Patent No. US RE40,927 E ("the '927 patent") and to Patent No. US RE42,913 E ("the '913 patent"), which also are asserted in the above identified lawsuits. 1441 Pet. 1.

We have instituted five related *inter partes* reviews in response to other petitions filed by Petitioner, including IPR2014-01439 (the '913 patent), IPR2014-01443 (the '927 patent), IPR2014-01445 (Patent No. US 7,839,729 B2), IPR2014-01446 (Patent No. US 7,196,979 B2), and IPR2014-01447 (Patent No. US 8,416,651 B2). *Id*. at 2; *see*, *e.g.*, IPR2014-01441, Paper 6, 1. Further, the '913 patent was the subject of IPR2014-00302 (petition denied) filed by a different petitioner, and the '927 patent

was the subject of IPR2014-00303 (petition granted) filed by a different petitioner. 1441 Pet. 2.

C. The '681 Patent

The '681 patent is directed to methods and apparatus for automatically directing a laser at an object or automatically tracking an object in an optical system. Ex. 1001, col. 8, l. 51–col. 9, l. 16. The methods involve transmitting radiant energy at an object included in an optical system having retroreflective characteristics, wherein the optical system includes a lens and the object exhibiting some degree of reflectivity disposed substantially in a focal plane of the lens. *Id.* at Abstract, col. 1, ll. 34–67. The methods further include receiving reflected radiant energy after retroreflection of the radiant energy, and directing automatically a laser at the object based on a characteristic of at least a portion of the object determined from the reflected radiant energy or automatically tracking the at least a portion of the object based on a characteristic of the at least a portion of the object determined from the reflected radiant energy. *Id.* at col. 9, ll. 4–13.

The apparatus may include a radiant energy source, a detector configured to detect a received reflected radiant energy after retroreflection of the radiant energy, and a utilization system configured to track automatically the at least a portion of the object based on a characteristic of the at least a portion of the object determined from the reflected radiant energy. *Id.* at Claim 65.

With reference to Figure 1 of the '681 patent, reproduced below, an optical system is depicted consisting of lens 20 and reflective surface (i.e., mirror 22) positioned in focal plane 24 of lens 20. *Id.* at col. 3, ll. 21–23.

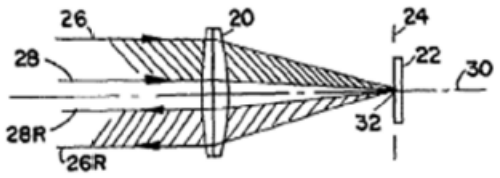

FIG. 1.

In Figure 1, incident rays 26 and 28 are shown as confined to the top half of the lens 20. Incident rays 26 and 28 are refracted by lens 20 and focused at focal point 32 of lens 20, which focal point lies on mirror 22. Incident rays 26 and 28 then are reflected by mirror 22, so that the angle of reflection equals the angle of incidence, and the reflected rays are returned to the lower half of lens 20, where they again are refracted and emerge therefrom as retroreflected rays 26R and 28R. *Id.* at col. 3, ll. 23–36.

With reference to Figure 3 of the '681 patent, which is reproduced below, the radiant flux density at the reflector surface may vary based on characteristics of components of the optical system, such as the position of mirror 22B or an imperfection of lens 20B, or both.

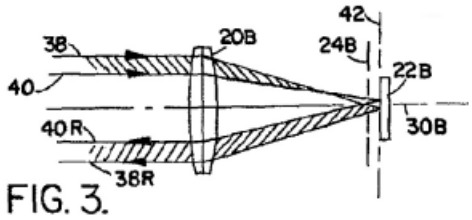

FIG. 3.

In Figure 3, mirror 22B is positioned substantially in focal plane 24B, but not precisely in focal plane 24B. As shown in Figure 3,

> the rays 38 and 40 are parallel to the optical axis 30B but are not focused at a single point on the focal plane 24B, and instead form an image on the mirror 22B, which image is referred to as the circle of confusion. In most practical optical systems there are circles of confusion and the mirror is normally positioned at the plane of least circle of confusion, herein depicted by the reference numeral 42. Thus, the image formed on the mirror by

> means of the rays 38 and 40 can be considered to be a radiant source, and the retroreflected rays 38R and 40R exit from the lens 20B substantially parallel to each other.

Id. at col. 3, l. 59–col. 4, l. 2. As taught by Figure 3, the closer mirror 22B is to being precisely in focal plane 24B, the smaller is the circle of confusion, and the narrower is the retroreflected beam bounded by retroreflected rays 38R and 40R. *E.g.*, 1441 Prelim. Resp. 5. Because the circle of confusion and, therefore, the shape of the returning beam vary based on the position of mirror 22B, the flux density of the returning light varies according to the positioning of mirror 22B. *Id.* This change in flux density is an example of optical gain referenced in the ’681 patent. *Id.* The ’681 patent states that “[i]n order to obtain a measure of the optical gain we must compare the retroreflector to a standard or reference.” Ex. 1001, col. 4, ll. 61–62.

The ’681 patent further discloses embodiments for directing a laser or tracking an object based upon retroreflected radiant energy. *Id.* at col. 8, l. 46–col. 9, l.16. As shown in Figure 12, reproduced below, “the ’681 Patent describes an embodiment in which radiant energy is transmitted at an optical instrument 196 (e.g., an optical system including a lens and an object exhibiting some degree of reflectivity when disposed substantially in a focal plane of the lens).” 1441 Prelim. Resp. 6.

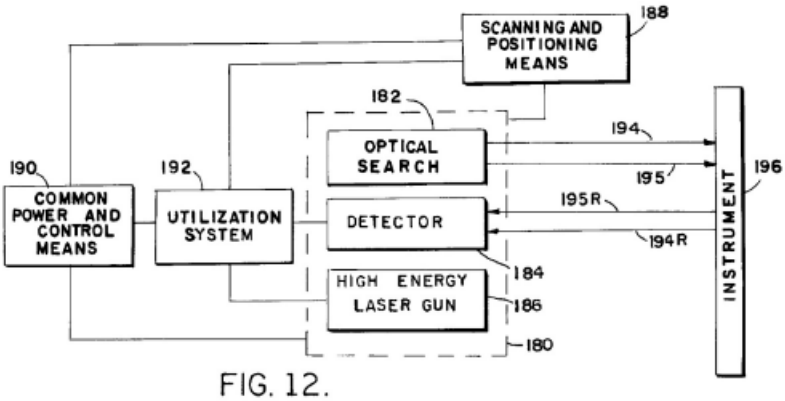

FIG. 12.

In Figure 12, retroreflected radiant energy is detected by detector 184. The output of detector 184 is provided to utilization system 192 that controls scanning and positioning means 188 to track the location of the object *or* high energy laser gun 186 to direct laser gun 186 at the object by means of common power and control means 190. Ex. 1001, col. 9, ll. 4–18.

D. Status of Claims

As noted above, Patent Owner did not file a Patent Owner Response and, thus, chose not to present arguments or evidence challenging Petitioner's grounds, upon which we instituted *inter partes* review of claims 48, 50–53, and 60–69 of the '681 patent. In the Scheduling Order for this review, "[t]he patent owner [was] cautioned that any arguments for patentability not raised in the response will be deemed waived." Paper 10, 3. Although Patent Owner presents no arguments or evidence regarding these challenged claims, in its Motion to Amend, Patent Owner states that it "earnestly requests that this motion be granted *in the event* that one or more of claims 48, 50-53 and 60-69 are found unpatentable." Mot. 25 (emphasis added); *see id*. at 1 (describing the Motion to Amend as "contingent"). In its Reply to Petitioner's Opposition to the Motion to Amend, Patent Owner states that

> the Patent Trial and Appeal Board ("the Board") should, *contingent* on the outcome of the trial, grant Patent Owner's *Contingent* Motion to Amend (paper 17, "the Motion") for U.S. Patent RE43,681 (hereafter "the '681 Patent"). If one or more of original claims 48, 50-53, and 60-69 are found unpatentable, Patent Owner moves to replace such claim(s) with proposed substitute claims 70-84, respectively.

Reply 1 (emphases added). Thus, Patent Owner characterizes its motion as

one that is *contingent* on our patentability determination. In the Motion to Amend, citing 35 U.S.C. §316(d), Patent Owner also "requests that the Board to cancel the original claim(s) and replace them with the proposed substitute corresponding claims 70-8[4]." Mot. 1. These statements are inconsistent. Further, the latter request does not conform with the Board's guidance in *Idle Free Sys., Inc. v. Bergstrom*, Case IPR2012–00027, slip op. at 10 (PTAB June 11, 2013) (Informative)(Paper 26) ("A patent owner should adopt a claim-by-claim approach to specifying the contingency of substitution, *e.g.*, which claim for which claim *and in what circumstance*." (emphasis added)).

At the oral hearing, however, Patent Owner acknowledged that the Motion to Amend is *not* contingent. Tr. 54:7–10; *see id*. at 53:13–16. Thus, we treat Patent Owner's Motion to Amend as non-contingent. Consequently, Patent Owner's request for the cancellation of challenged claims 48, 50–53, and 60–69 is *granted*, and we now consider *only* the patentability of Patent Owner's substitute claims 70–84. *Id*. at 119:15–120:13.

In the Motion to Amend, Patent Owner seeks entry of three independent substitute claims, claim 70, 75, and 80, and substitute claims, claims 71–74, 76–79, and 81–84, dependent therefrom. Mot. 1; *see* Paper 18, 1–12. In support of its Motion, Patent Owner filed a supplemental declaration of James R. Leger, Ph.D. (Ex. 2104).

An *inter partes* review is more adjudicatory than examinational, in nature. *See Abbott Labs. v. Cordis Corp*., 710 F.3d 1318, 1326 (Fed. Cir. 2013). A motion to amend in an *inter partes* review is not itself an amendment. As the moving party, Patent Owner bears the burden of

establishing that it is entitled to the relief requested. 37 C.F.R. § 42.20(c); *see Nike, Inc. v. Adidas AG*, Dkt. No. 2015-1719, 2016 WL 537609, at *3–*5 (Fed. Cir. Feb. 11, 2016) ("[T]he Board did not err by placing the burden on [Patent Owner] to establish patentability over the prior art of [Patent Owner]'s proposed substitute claims."). Thus, Patent Owner's proposed substitute claims are not entered automatically, but may be entered upon Patent Owner's having demonstrated the patentability of the substitute claims. Moreover, because Patent Owner declined to file a Patent Owner Response to the Petition, we accept as unchallenged that Ando discloses each and every element of claims 48 and 50–53 of the '681 patent or Lucy, Fertig, and Edelman teaches or suggests all of the limitations of claims 48, 50–53, and 60–69 of the '681 patent. *See Nike*, 2016 WL 537609, at *6. Consequently, in evaluating the patentability of the substitute claims, we focus particularly on the *added* limitations in substitute claims 70, 75, and 80.

Independent claims 70, 75, and 80 are illustrative and are reproduced below:

> 70. A method of directing a laser at an object within an optical system, comprising:
>
> transmitting radiant energy at an object included in an optical system having retroreflective characteristics, wherein the optical system includes a lens and the object includes at least a portion exhibiting some degree of reflectivity disposed substantially in a focal plane of the lens;
>
> receiving reflected radiant energy after retroreflection of the radiant energy;
>
> <u>detecting an optical gain of the reflected radiant energy based on a change in a radiant flux density of the reflected radiant energy over time;</u> and

directing automatically a laser at the object based on a characteristic of the at least a portion of the object determined from the optical gain of the reflected radiant energy.

75. A method of automatically tracking at least a portion of an object within an optical system, comprising:

transmitting radiant energy at an object included in an optical system having retroreflective characteristics, wherein the optical system includes a lens and the object includes at least a portion exhibiting some degree of reflectivity disposed substantially in a focal plane of the lens;

receiving reflected radiant energy after retroreflection of the radiant energy; ~~and~~

detecting an optical gain of the reflected radiant energy based on a change in a radiant flux density of the reflected radiant energy over time; and

automatically tracking the at least a portion of the object based on a characteristic of the at least a portion of the object determined from the optical gain of the reflected radiant energy.

80. An apparatus for automatically tracking at least a portion of an object within an optical system, comprising:

a radiant energy source configured to transmit radiant energy at an object included in an optical system having retroreflective characteristics, wherein the optical system includes a lens and the object includes at least a portion exhibiting some degree of reflectivity disposed substantially in a focal plane of the lens;

a detector configured to detect an optical gain of received reflected radiant energy after retroreflection of the radiant energy, based on a change in a radiant flux density of the reflected radiant energy over time; and

a utilization system configured to automatically track the at least a portion of the object based on a characteristic of the at least a portion of the object determined from the optical gain of the reflected radiant energy.

Paper 18, 1–2 (claim 70), 4–6 (claim 75), 8–10 (claim 80).[3] Substitute claims 70, 75, and 80 correspond to original challenged claims 48, 60, and 65, respectively; underlined limitations are proposed additions to the original challenged claims.

E. References, Deposition, and Declarations

Petitioner relied upon the following references, deposition transcript, and declarations in opposing entry of substitute claims 70–84:

Exhibit Nos.	References and Declaration
1006	*Panasonic Corp. v. Optical Devices, LLC*, Case IPR2014-00302 (PTAB July 11, 2014) (Paper 9).
1007	Patent No. US 3,506,839 to Ando *et al.*, filed on February 20, 1967, issued on April 14, 1970 ("Ando")
1008	Declaration of Dr. Lambertus Hesselink ("1441 Hesselink Declaration")
1009	R.F. Lucy, "Precision Laser Automatic Tracking System," Applied Optics Vol. 5, No. 4, April 1966 ("Lucy")
1010	Declaration of Dr. Lambertus Hesselink ("1442 Hesselink Declaration")
1011	Patent No. US 3,427,611, filed August 15, 1962, issued February 11, 1969 ("Enenstein")
1012	Patent No. US 3,385,971, filed August 6, 1965, issued May 28, 1968 ("Fertig")
1013	Patent No. US 3,144,926, filed May 17, 1961, issued

[3] Patent Owner included citations to the Patent No. US 6,603,134 B1 (Ex. 1003) and U.S. Patent Application No. 04/623,186 (Ex. 2118) in the claim listing in Appendix A (Paper 18) to its Motion to Amend, and argues that these citations provide support in the Specification and the priority application for each claim limitation. Paper 18, 1 (footnote). This argument and evidence should not have been included in Appendix A without our authorization. *See* 37 C.F.R. §§ 42.24(a)(1)(vi), 42.121(a)(3); *cf.* IPR2014-01439, Paper 16; IPR2014-01443, Paper 17. Nevertheless, because Petitioner has not sought to exclude this argument and evidence, we have considered it in rendering our Final Written Decision.

	August 18, 1964 ("Edelman")
1014	Deposition Transcript for Dr. James Leger
1015	Supplemental Declaration of Dr. Lambertus Hesselink
1016	Patent No. US 3,200,698, filed September 18, 1961, issued August 17, 1965 ("Froome")
1017	F. W. Stroke, *Interferometry with Rotation-Insensitive "Corner-Cube" Systems and Lasers*, J. Optical Society of America 330 (March 1965) ("Stoke")
1018	Patent No. US 3,523,735, filed October 7, 1966, issued August 11, 1970 ("Taylor")
1019	Patent No. US 2,427,528, filed February 5, 1946, issued September 16, 1947 ("Hickok")
2108	Patent No. US 3,504,979, filed October 21, 1965, issued April 7, 1970 ("Stephany")
2115	Patent No. US 3,025,777, filed December 2, 1960, issued March 20, 1962 ("Wilkenson")
2116	Patent No. US 2,933,991, filed April 12, 1957, April 26, 1960 ("Sauer")

F. Claim Construction

Consistent with the statute and the legislative history of the Leahy-Smith America Invents Act,[4] we interpret claims of an unexpired patent using the broadest reasonable construction in light of the specification of the patent. 37 C.F.R. § 42.100(b); *In re Cuozzo Speed Techs., LLC*, 793 F.3d 1268, 1278–79 (Fed. Cir. 2015), *cert. granted sub nom. Cuozzo Speed Techs., LLC v. Lee*, 84 U.S.L.W. 3218 (U.S. Jan. 15, 2016) (No. 15-446). There is a presumption that claim terms are given their ordinary and customary meaning, as would be understood by a person of ordinary skill in the art in the context of the specification. *See In re Translogic Tech. Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). An applicant may rebut that presumption by providing a definition of the term in the specification with

[4] Pub. L. No. 112-29 (2011).

reasonable clarity, deliberateness, and precision. *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994). In the absence of such a definition, limitations are not to be read from the specification into the claims. *In re Van Geuns*, 988 F.2d 1181, 1184 (Fed. Cir. 1993).

1. Person of Ordinary Skill in the Art

Petitioner contends that a person of ordinary skill in the relevant art

> would have had either (1) a Bachelor of Science degree in Physics, Optics, Electrical Engineering, or a related field with coursework in Optics or Photonics *and at least one year of additional experience in Optics technology, Photonics technology, or related technologies, either in industry, academia, or research*, or (2) a Master's degree in Physics, Optics, Electrical Engineering, or a related field with coursework in Optics or Photonics.

Pet. 18–19 (citing Ex. 1008 ¶ 30) (emphasis added). Patent Owner argues that

> a person having ordinary skill in the art at the time of the invention in 1967 would have held a Bachelor of Science and Master of Science Degrees in either Physics or Electrical Engineering with a focus on optics, *and additionally, at least two to three (2-3) years of experience in Physics or Electrical Engineering optics research*.

Mot. 14 (citing Ex. 2104 ¶ 10) (emphasis added). These definitions differ primarily in that Patent Owner proposes that, regardless of the degree held, a person of ordinary skill in the art would have "additionally, at least two to three (2-3) years of experience in Physics or Electrical Engineering optics research." *Id*. Petitioner's definition provides only for "at least one year of additional experience in Optics technology, Photonics technology, or related technologies, either in industry, academia, or research" for persons holding the subordinate degree. Pet. 19.

In its Preliminary Responses, Patent Owner applied Petitioner's definition of a person of ordinary skill in the art, but "reserve[d] its rights to present evidence and arguments in this proceeding or any other proceeding as to Petitioner's above definition or an alternative definition as to the level of ordinary skill in the field." 1441 Prelim Resp. 12; 1442 Prelim Resp. 13. The understanding of a person of ordinary skill in the art may be material to the construction of claim terms, as well as to the determination whether a particular claim limitation is supported by adequate written description. Despite the presentation of an alternative definition for a person of ordinary skill in the art by Patent Owner, neither Patent Owner nor Petitioner presents argument or evidence as to how and why its alternative definition affects the constructions of any disputed term.[5] Mot. 7–12; Opp. 1–3; Reply 1–4. Moreover, neither Patent Owner nor Petitioner challenges the other party's declarant's qualifications to testify regarding what a person of ordinary skill in the art would have understood as of the date of the alleged inventions. Upon review of the declarants' credentials (Ex. 1008 (Exhibit A); Ex. 2104 (Appendix A)), we find that each declarant exceeds either party's definition of a person of ordinary skill in the art, and we are persuaded that each declarant is qualified to testify as to what a person of ordinary skill in the art would have understood (*see*, *e.g.*, Ex. 1008 ¶ 27; Ex. 1015 ¶ 9; Ex. 2104 ¶ 12; Ex. 2125 ¶ 12).

Based on our consideration of the record, we find that the evidence as

[5] Patent Owner waived any arguments for patentability based on the claim constructions presented in the Decisions on Institution, but unchallenged in the Motion to Amend, when it opted not to file a Patent Owner Response. *See supra* Section I.D.

a whole supports Petitioner's broader description of the level of ordinary skill in the art. Therefore, to the extent that it is necessary for us to determine the definition of a person of ordinary skill in the art, we continue to apply Petitioner's definition. *See Trustees of Columbia Univ. v. Illumina, Inc.*, 620 F.App'x. 916, 921–22 (Fed. Cir. 2015) (non-precedential).

2. Confirmation of Previous Constructions

In its Petitions, Petitioner proposed constructions for the following claim terms: (1) "focal plane," (2) "retroreflection," (3) "optical system," (4) "utilization system configured to automatically track," (4) "utilization system configured to direct automatically," and (5) "direct automatically a laser." 1441 Pet. 12–18; 1442 Pet. 13–20. In its Preliminary Responses, Patent Owner proposed constructions for the following claim terms: (1) "focal plane," (2) "retroreflection," (3) "optical gain," (4) "optical system," (5) "An optical system having retroreflective characteristics," (6) "utilization system," (7) "laser," (8) "automatically," and (9) "track/tracking." 1441 Prelim. Resp. 14–22; 1442 Prelim Resp. 13–20. For purposes of our Decisions on Institution, we construed the terms: (1) "focal plane," (2) "retroreflection," (3) "optical gain," (4) "optical system," (5) "laser," (6) "automatically," (7) "track/tracking," and (8) "utilization system configured to direct automatically" and "utilization system configured to automatically track." 1441 Dec. 10–16; 1442 Dec. 10–17. For purposes of those Decisions and on the then-existing record, we determined that no other claim terms required express construction.[6]

[6] In particular, for purposes of those Decisions, we did not construe expressly the terms "direct automatically a laser," recited in claims 48 and 54 (Pet. 17–18), or "an optical system having retroreflective characteristics,"

As noted above, Patent Owner chose not to file a Patent Owner Response contesting these constructions, nor, as discussed below, did Patent Owner contest most of these constructions in its Motion to Amend. Paper 10, 3; Mot. 7–12. To the extent that these terms appeared in the challenged claims and now appear in the substitute claims, Patent Owner has waived arguments for patentability based on the construction of those terms. Consequently, we now confirm our previous constructions of those claim terms: (1) "focal plane," (2) "retroreflection," (3) "optical system," (4) "laser," (5) "automatically," (6) "track/tracking," and (7) "utilization system configured to direct automatically" and "utilization system configured to automatically track," as the broadest reasonable interpretations, consistent with the Specification.[7]

a. "focal plane" (Claims 70, 75, and 80)[8]

"Focal plane" means "a plane through the focus perpendicular to the axis of an optical element." 1441 Dec. 10; 1442 Dec. 10.

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recited in claims 48, 54, 60, and 65 (1441 Prelim. Resp. 18). *See* 1441 Dec. 16 n.5; 1442 Dec. 17 n.5.

[7] Because Patent Owner includes "optical gain" in the claim language added to substitute claims 70, 75, and 80, we will discuss the construction of that term below, together with the other claim terms for which Patent Owner sought construction in the Motion to Amend. Mot. 8–12; *see* Tr. 102:22–105:13.

[8] Because Patent Owner requests cancellation of all of the challenged claims, we have identified the substitute claims containing the terms for which construction was requested. *See* Paper 18 (Appendix A to Motion to Amend).

b. "retroreflection" (Claims 70, 75, and 80)

"Retroreflection" means "reflection of an incident ray in a manner such that the reflected ray is parallel to the incident ray for any angle of incidence within the field of view of the retroreflector." 1441 Dec. 10–11; 1442 Dec. 10–11.

c. "optical system" (Claims 70, 75, and 80)

"Optical system" means "a collection of optical elements including at least a lens and a reflective surface." 1441 Dec. 11–12; 1442 Dec. 11–12.

d. "laser" (Claim 70)

"Laser" means "a device that utilizes the natural oscillations of atoms for amplifying or generating electromagnetic waves in the visible, ultraviolet, and infrared regions of the spectrum." 1441 Dec. 12; 1442 Dec. 12.

e. "automatically" (Claims 70, 75, and 80)

"Automatically" means "by a self-acting or self-regulating mechanism." 1441 Dec. 13; 1442 Dec. 13.

f. "track" (Claim 80) and "tracking" (Claim 75)

"Track" and "tracking" mean "to observe (observing) or plot (plotting) the moving path of (as a target or missile) with an instrument (as a telescope)." 1441 Dec. 14; 1442 Dec. 14.

g. "utilization system configured to automatically track" (Claim 80)

"Utilization system configured to automatically track" means "a control system configured to receive the output of a radiant energy receiver

and [to] generate control signals, e.g., for tracking an object." *See* 1441 Dec. 14–16; 1442 Dec. 14–16.

3. Additional Constructions Proposed in Motion to Amend

In its Motion to Amend, Patent Owner proposed constructions for the following claim terms: (1) "radiant flux density," (2) "optical gain," (3) "based on a change in a radiant flux density of the reflected radiant energy over time," (4) "utilization system," and (5) "track/tracking." Mot. 8–12; *see* Reply 1–4 (discussing construction of "optical gain" and "utilization system"). In its Opposition to the Motion to Amend, Petitioner opposes Patent Owner's proposed constructions only for the claim terms: (1) "optical system" and (2) "utilization system." Opp. 1–3.

As noted above, Patent Owner did not file a Patent Owner Response challenging our previous construction of the terms "utilization system" or "track/tracking." *See supra* Section I.D. Further, neither of these terms appears in the additional limitations introduced by the substitute claims. Paper 18, 1–2 (claim 70), 4–6 (claim 75), 8–10 (claim 80). In addition, Patent Owner argues that "utilization system" does not require express construction (Mot. 11–12; *see* Reply 4 ("Patent owner contends this term does not require construction.")) and that we should maintain our previous construction of "track/tracking" (Mot. 12). Although Patent Owner states that no further construction of the term "utilization system" is necessary, we note that Patent Owner proposes an alternative construction for "utilization system" *if* we deem that further construction is necessary. Mot. 11–12; *see* Opp. 3 (citing Ex. 1014, 75:1–4). We conclude that neither of these terms requires further construction.

We now consider the constructions for the following claim terms: (1) "radiant flux density," (2) "optical gain," and (3) "based on a change in a radiant flux density of the reflected radiant energy over time," each of which appears in the additional limitations introduced by the substitute claims. Tr. 63:24–65:20.

a. "radiant flux density" (Claims 70, 75, and 80)

As noted above, Patent Owner proposes a construction for the term "radiant flux density," but Petitioner does not. Moreover, Petitioner does not oppose Patent Owner's proposed construction. At the time of the invention, the words "radiant flux density" and "irradiance" were synonymous. *See* WEBSTER'S SEVENTH NEW COLLEGIATE DICTIONARY 448 (1967) (Ex. 3002). A relevant dictionary definition of "irradiance" is "radiant flux density on a given surface usu. expressed in watts per square centimeter or square meter." *Id*.

Patent Owner's declarant, Dr. Leger, testified that the construction of the term radiant flux density requires an understanding of the term "radiant flux." Ex. 2104 ¶ 17; *see* Mot. 8. A relevant dictionary definition of "radiant flux" is "the rate of emission or transmission of radiant energy." WEBSTER'S SEVENTH NEW COLLEGIATE DICTIONARY 705 (1967) (Ex. 3002). Further, Dr. Leger testified that radiant flux "is a measure of radiant energy per unit time that is either being received, emitted, transmitted, or reflected, where radiant energy is a fundamental measure of electromagnetic energy. Radiant flux is generally measured in units of joules/sec, known as watts." Ex. 2104 ¶ 17. This testimony is consistent with the dictionary definition of "radiant flux" provided above. Thus, we are persuaded that the ordinary and customary meaning of "radiant flux density" is the power per given unit of

area delivered by radiant energy, such as light.

Dr. Leger also testifies that radiant flux density "is a measure of the differential radiant flux dF that is being received, emitted, transmitted, or reflected by a differential area dA, such that $E = dF/dA$." *Id.*; *see* Mot. 8. Thus, radiant flux density is the power of radiant energy delivered to a given area. Again, this testimony is consistent with the dictionary definition of "radiant flux density" provided above. Petitioner does not contest Patent Owner's construction of this term. *See* Opp. 1–3.

Moreover, the Specification of the '681 patent does not provide an express definition for either the term "flux density" or term "radiant flux density." Nevertheless, neither party contends that the foregoing constructions of these terms are inconsistent with the Specification of the '681 patent. Therefore, we are persuaded that the broadest reasonable interpretation of the term "radiant flux density," consistent with the Specification, is "the power of radiant energy delivered to a given area."

b. "optical gain" (Claim 70, 72, 75, 77, 80, and 82)

In its Preliminary Response, Patent Owner proposed that the term "optical gain" means "a change in radiant flux density of reflected radiant energy." 1441 Prelim. Resp. 16–17. This construction is consistent with the panel's construction in an earlier proceeding, Case IPR2014-00302, which involved a challenge to the same patent (Ex. 1006, 8–9), and Petitioner did not propose a construction for this term in its Petition (*see* 1441 Pet. 11–18; 1442 Pet. 12–20). For purposes of the Decisions on Institution in Case IPR2014-01441 and Case IPR2014-01442 and based on the then-existing record, we were persuaded that the previous panel's construction was the broadest reasonable interpretation consistent with the Specification of the

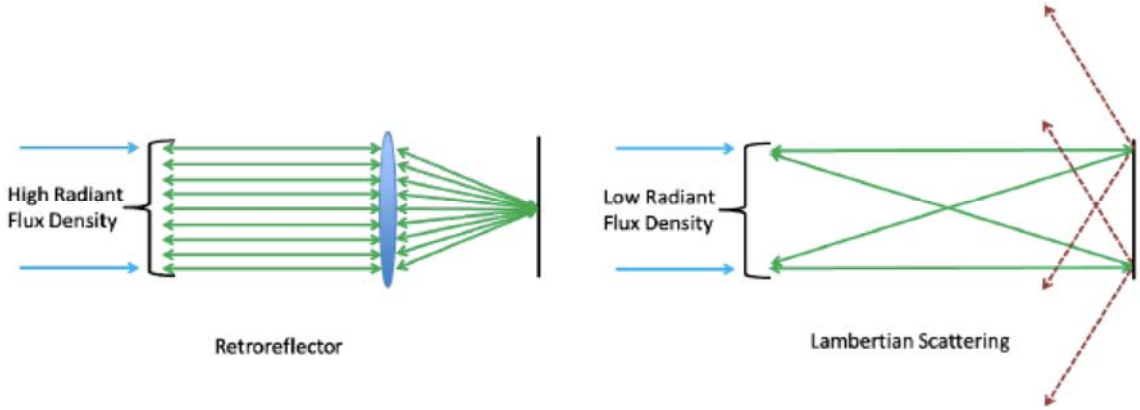
’681 patent. *E.g.*, 1441 Dec. 11 (citing 1441 Prelim. Resp. 16 (citing Ex. 1001, col. 3, l. 9–col. 5, l. 45)). The claim construction for the Decisions on Institution, however, was only a preliminary determination. As the Federal Circuit has noted,

> the Board is not bound by any findings made in its Institution Decision. At that point, the Board is considering the matter *preliminarily* without the benefit of a full record. The Board is free to change its view of the merits after further development of the record, and *should do so* if convinced its initial inclinations were wrong.

Trivascular, Inc. v. Samuels, Dkt. No. 2015-1631, 2016 WL 463539, at *9 (Fed. Cir. Feb. 5, 2016) (emphasis added). Although Patent Owner chose not to file a Patent Owner Response, in view of Petitioner’s proposed claim construction of the term “optical gain” in a related case, Case IPR2014-01443, Patent Owner requests in its Motion to Amend that we confirm our preliminary construction of the term “optical gain.” Mot. 8–11. For purposes of this Final Written Decision, we reconsider our construction of the term “optical gain” in view of the entire record.

In the context of a retroreflecting optical system, Petitioner now requests that we construe “optical gain” as “an actual increase in the radiant flux density of the retroreflected beam due to the narrowing thereof.” Opp. 1. Petitioner contends that retroreflected light inherently has the attribute of optical gain because the lens concentrates rays into a smaller solid angle that otherwise would be reflected into a larger one. *Id*. at 2; Ex. 1015 ¶¶ 6–7; *see* Ex. 1001, col. 9, ll. 36–40 (discussing “inherent retroreflection characteristics”). Further Petitioner contends that the identical claim term should be construed consistently in this *inter partes* review and in the reviews of the related patents. Opp. 2; *see supra* Section I.B.

In support of its proposed construction, Petitioner's declarant, Dr. Hesselink, provides the following image comparing light reflected by a retroreflector with Lambertian surface scattering of light:



Ex. 1015 ¶ 6. According to Petitioner, this comparison demonstrates that light that would otherwise be scattered into a wide angle (right side) is gathered into a smaller angle and collimated (left side), thereby increasing the radiant flux density of the reflected light. Opp. 2; Ex. 1015 ¶ 6; *see* Mot. 11; Reply 3–4; Ex. 2104 ¶ 31.

Patent Owner argues for a broader construction of "optical gain" that would be consistent with the various "embodiments" described in the Specification of the '681 patent. Mot. 9–11. Patent Owner proposes that the broadest reasonable construction of the term "optical gain" in the context of the '681 patent is "a change in radiant flux density of reflected radiant energy." Mot. 8; *see* Ex. 2104 ¶¶ 16, 20–21.

Patent Owner's declarant, Dr. Leger, explains that one of ordinary skill would understand that, in certain of the disclosed embodiments, the radiant flux density of the reflected radiation at one scanned location is compared with the reflected radiant flux density at another scanned location. Mot. 9–11. A change in the detected reflected radiant flux density from one

location to another signals the presence or absence of a retroreflective instrument. Ex. 2104 ¶ 21; *see id*. ¶ 24. According to Dr. Leger, one of ordinary skill would appreciate that a photodetector signal increase would represent an increase in the radiant flux density when a scanner moves from an object having little or no retroreflectivity to an object having a higher degree of retroreflectivity (*e.g.*, a binocular). Ex. 2104 ¶ 21; *see* Mot. 9. On the other hand, a signal decrease would represent a decrease in radiant flux density when the scanning radiation is moved from an object associated with a high level of retroreflectivity to an object associated with little or no retroreflectivity. Ex. 2104 ¶ 21. The fact that the object has a retroreflective characteristic is determined when the scanning radiation moves to an adjacent object that does not exhibit such a characteristic or does so to a lesser degree, thereby resulting in a decrease in the reflected radiant flux density. *Id*.; *see* Ex. 2104 ¶ 25. In another example, in order to track an object associated with some level of retroreflectivity, a decrease in the retroreflectivity is detected when the object moves away from the initially detected location. Ex. 2104 ¶ 21; *see* Mot. 10–11. Hence, Dr. Leger opines that one of ordinary skill would understand that the concept of "optical gain," as used in the '681 patent, covers both an increase and a decrease in the reflected radiant flux density. Ex. 2104 ¶ 21; *see* Reply 2.

Petitioner's declarant, Dr. Hesselink, opines that the '681 patent inventor acted as a lexicographer and provided a special meaning for the term "optical gain" as "an actual increase in the radiant flux density of the retroreflected beam due to the narrowing thereof." Ex. 1015 ¶ 14 (emphasis omitted). As Dr. Hesselink notes, the Specification of the '681 patent states that

> The rays retroreflected by the optical systems depicted in FIGS. 1 to 4 are in the form of a narrow, substantially collimated beam having a high radiant density. It is to be noted that there is an actual increase in the radiant flux density of the retroreflected beam due to the narrowing thereof. *This increase in radiant flux density is herein termed optical gain*.

Ex. 1001, col. 4, ll. 21–26 (emphasis added).

Patent Owner argues that one of ordinary skill would not understand this passage to be a definition, but rather would understand it to be describing "optical gain" in the context of a particular illustrative embodiment. Mot. 9 (citing Ex. 2104 ¶ 23). Restricting the construction of "optical gain" in the context of the '681 patent to an *increase* in radiant flux density would be inconsistent with the use of the term "optical gain" in a number of embodiments of the '681 patent. *Id*.; *see* Ex. 2104 ¶ 25.

Patent Owner notes that Dr. Hesselink's view requires that "optical gain" be measured relative to a Lambertian radiator. *Id*. at 9–10 (citing Ex. 1008 ¶ 40); Ex. 1015 ¶ 15; *see* Tr. 78:17–82.7. In support of his testimony, Dr. Hesselink refers to the Specification of the '681 patent, which states that "[i]n order to obtain a measure of the optical gain we *must compare* the retroreflector to a standard or a reference. This reference has been taken to be a diffuse surface known in the art as a Lambertian radiator." Ex. 1015 ¶ 15 (citing Ex. 1001, col. 4, ll. 61–64) (emphasis added); *see* Tr. 19:14–20:7. However, Dr. Leger interprets this passage differently, namely, that it provides a general statement that one must compare the retroflector to a standard or reference to obtain a measure of optical gain, "and not as a way of determining optical gain in all cases." Mot. 10 (citing Ex. 2104 ¶ 28). Following this general statement and in the context of a particular illustrative example, the '681 patent indicates that the reference has been chosen to be a

Lambertian radiator. *Id.* As such, one of ordinary skill would understand from this language that the ’681 patent has chosen the Lambertian radiator as an illustrative reference only in the context of the particular example, and not as a way of determining optical gain in all cases. *Id.*

Patent Owner further notes that Dr. Hesselink relies upon the plain meaning of “gain” in construing the term “optical *gain*” to imply a positive change. Opp. 2 (citing Ex. 1015 ¶ 19); *see* WEBSTER’S SEVENTH NEW COLLEGIATE DICTIONARY 341 (1967) (Ex. 3002) (the noun “gain” defined as “an increase in amount, magnitude, or degree; *specif* : the ratio of increase in output over input in an amplifier”). Patent Owner argues, however, that, in the field of microwave antennas, for example, the “gain” of an antenna can be positive or negative. Mot. 10; Reply 2 (citing Ex. 2125 ¶¶ 23–24); Ex. 2104 ¶ 25 (citing Ex. 2118, 15:7–16:1 (describing “tracking” optical instruments)). The Specification of the ’681 patent states that its teachings are applicable to the detection of microwave apparatus, such as antennas. Ex. 1001, col. 9, ll. 36–40. Thus, according to Patent Owner, one of ordinary skill would understand that the concept of “optical gain” as used in the ’681 patent covers both an increase and a decrease in the reflected radiant flux density as compared to a standard or reference. Mot. 10; Reply 2; *see* Ex. 2104 ¶ 25; Ex. 2125 ¶¶ 22–23.

Dr. Hesselink acknowledged Patent Owner’s argument that in various fields of science and engineering, the term “gain” may be employed to denote both positive and negative change, but testified that such an interpretation is not appropriate here. Ex. 1015 ¶¶ 19, 24; *see* Ex. 2119, 60:10–61:8. Specifically, Dr. Hesselink testified that

“Gain” in general, unrelated to what is here, *my understanding*

> *of that from physics and optics is that "gain" and "loss" are two words that are opposite of each other*. "Gain" would mean that I would increase the value of something. "Loss" would mean I would have lost the value of something.

Ex. 2119, 60:22–61:3 (emphasis added); *see id*. at 61:13–16; *see also* WEBSTER'S SEVENTH NEW COLLEGIATE DICTIONARY 341 (1967) (Ex. 3002) (the noun "gain" defined as "an increase in amount, magnitude, or degree; *specif* : the ratio of *increase* in output over input in an amplifier" (emphasis added)).

Patent Owner's arguments notwithstanding, we conclude that the strongest evidence for construing the term "optical gain" comes from the Specification itself, which clearly defines the term.

> [The claims] are part of a fully integrated written instrument, consisting principally of a specification that concludes with the claims. For that reason, claims must be read in view of the specification . . . . [T]he specification is always highly relevant to the claim construction analysis. *Usually, it is dispositive; it is the single best guide to the meaning of a disputed term.*

Phillips v. AWH Corp., 415 F.3d 1303, 1315 (Fed. Cir. 2005) (en banc) (citations omitted) (internal quotation marks omitted; emphasis added); *In re Abbott Diabetes Care Inc.*, 696 F.3d 1142, 1149 (Fed. Cir. 2012) (any broadest reasonable construction must be consistent with the specification, and claim language should be read in light of the specification). Given the plain language of the claims, in particular the emphasis on "optical"; the testimony of the parties' declarants, and the clear definition of the Specification, we are not persuaded here by Patent Owner's argument that all disclosed embodiments should be embraced by our construction. "It is not necessary that each claim read on every embodiment." *Baran v. Med. Device Techs., Inc.*, 616 F.3d 1309, 1316 (Fed. Cir. 2010); *Broadcom Corp.*

v. Qualcomm Inc., 543 F.3d 683, 689 (Fed. Cir. 2008) ("'[E]ach claim does not necessarily cover every feature disclosed in the specification. When the claim addresses only some of the features disclosed in the specification, it is improper to limit the claim to other, unclaimed features.'") (quoting *Ventana Med. Sys., Inc. v. Biogenex Labs., Inc.*, 473 F.3d 1173, 1181 (Fed. Cir. 2006)).[9]

The '681 patent includes description of a radar system embodiment with respect to Figures 13 and 14. Ex. 1001, col. 3, ll. 4–8; col. 9, l. 54–col. 10, l. 18. This radar system detects by means of the "retroreflection principles" of the invention. *Id*. at col. 9, ll. 54–56. Nevertheless, the term "optical gain" is not used in connection with the description of this embodiment. *See id*. at col. 10, ll. 14–18. The term appears in the Specification in connection with embodiments relying on what has traditionally been referred to as "optical."[10] *E.g.*, *id*. at col. 5, ll. 27–44; *see*

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[9] In *PPC Broadband, Inc. v. Corning Optical Commc'ns*, the Federal Circuit rejected Corning's argument that "the broadest reasonable interpretation is the interpretation which includes as many of the disclosed embodiments as possible." No. 2015-1364, 2016 WL 692369, at *4 (Fed. Cir. Feb. 22, 2016). Instead, the Court concluded that "[a]bove all, the broadest reasonable interpretation must be *reasonable* in light of the claims and specification. The fact that one construction may cover more embodiments than another does not categorically render that construction reasonable." *Id*. at *5 (emphasis added).

[10] We note that claim 1, cancelled during the reissue examination, refers to "*optical* energy" and claim 5, also cancelled during reissue examination, refers to "the *radiant* energy directed at said optical system is in the nonvisible region." Ex. 1001, col. 10, ll. 34–43 (claim 1), 53–55 (claim 5). The term "radiant energy" of claim 5 lacks antecedent basis in claim 1. We are not persuaded to alter our construction of the term "optical gain" for the substitute claims based on the language of these cancelled claims. *See* Opp.

WEBSTER'S SEVENTH NEW COLLEGIATE DICTIONARY 592 (1967) (Ex. 3002) (the adjective "optic" defined as "of or relating to vision or the eye" and the adjective "optical" defined as "relating to the science of optics" and "relating to vision").

Finally, the claim terms must be construed in the context of the entire claim. *Trivascular*, 2016 WL 463539, at *3 ("Construing individual words of a claim without considering the context in which those words appear is simply not 'reasonable.'"); *see Abbott Diabetes Care*, 696 F.3d at 1148–50 (finding the Patent Office's construction unreasonably broad because it was "unreasonable and inconsistent with the language of the claims and the specification"). Each of substitute claims 70–84 is directed to a method of or apparatus for directing a laser at or automatically tracking at least a portion of "an object within an *optical* system." *E.g.*, Paper 18, 1 (claim 70 (emphasis added)). As noted above, we construe "optical system" to mean "a collection of *optical* elements including at least a lens and a reflective surface." *See supra* Section I.F.2.c. (emphasis added); WEBSTER'S SEVENTH NEW COLLEGIATE DICTIONARY 592 (1967) (Ex. 3002) (the adjective "optical" defined as "relating to the science of optics" and "relating to vision"). In this context and with respect to the substitute claims, we conclude that "optical gain" is limited to the optical spectrum and does not apply to other portions of the electromagnetic spectrum, such as other electromagnetic waves used in radar systems. We, therefore, construe the broadest reasonable interpretation of the term "optical gain" to be "an increase in radiant flux density of reflected optical radiant energy."

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5 n.1.

c. "based on a change in a radiant flux density of the reflected radiant energy over time" (Claims 70, 75, and 80)

Patent Owner argues that the term "based on a change in a radiant flux density of the reflected radiant energy over time" does not require express construction because it readily would be understood by a person of ordinary skill in the art. Mot. 11. Nevertheless, *if* construction is necessary, Patent Owner proposes that the term "should be construed to mean that optical gain can be determined based *on temporal changes* in the radiant flux density of the reflected radiant energy." *Id*. (citing Ex. 2104 ¶ 69) (emphasis added). Petitioner does not propose an alternative construction, nor does Petitioner oppose Patent Owner's proposed construction. *See* Opp. 1–3.

On this record and in view of our preceding construction of the term "optical gain," we are persuaded that Patent Owner's proposed construction of this term reflects its plain meaning, as it would be understood by a person of ordinary skill in the art, and that proposed construction is not inconsistent with the Specification of the '681 patent. Therefore, we construe the broadest reasonable interpretation of the term "based on a change in a radiant flux density of the reflected radiant energy over time" to be "based on temporal changes in the radiant flux density of the reflected optical radiant energy."

d. Other Claim Terms

Neither party offers constructions of other terms in the challenged claims. *See* Mot. 8–12; Opp. 1–3; Reply 1–4. Only terms that are in controversy in this proceeding need to be construed, and then only to the extent necessary to resolve the controversy. *Vivid Techs., Inc. v. Am. Sci. &*

Eng'g, Inc., 200 F.3d 795, 803 (Fed. Cir. 1999). Therefore, no other claim terms require express construction.[11]

II. MOTION TO AMEND

Patent Owner has filed a non-contingent Motion to Amend requesting (1) cancellation of challenged claims 48, 50–53, and 60–69 of the '681 patent and (2) entry of substitute claims 70–84. Mot. 1, 25; *see supra* Section I.D. As the moving party, Patent Owner bears the burden of proof to establish that it is entitled to the relief requested. *See* 37 C.F.R. § 42.20(c). Entry of proposed amendments is not automatic, but occurs only upon the patent owner having met the requirements of 37 C.F.R. § 42.121 and demonstrated, by a preponderance of the evidence, the patentability of the proposed substitute claims. *Nike*, 2016 WL 537609, at *3–*5 ("[T]he Board did not err by placing the burden on [Patent Owner] to establish patentability over the prior art of [Patent Owner]'s proposed substitute claims."); *see Idle Free*, Case IPR2012-00027, slip op. at 7–8 (Paper 26).

Initially, Patent Owner argues that claims 70–84 represent a one-for-one substitution for cancelled claims 48, 50–53, and 60–69 of the '681 patent. Paper 18 (Appendix A); *see Idle Free*, Case IPR2012-00027, slip op. at 3–6 (Paper 26). We agree. Further, Patent Owner argues that the proposed substitute claims only *add* limitations to the original, challenged claims, and, thus, each substitute claims narrows the scope of the claim that it seeks to replace. Mot. 1; *see Idle Free*, Case IPR2012-00027, slip op. at 5

[11] In particular, we do not construe expressly the terms "direct automatically a laser," recited in claim 70 (*see* 1441 Pet. 17–18), or "an optical system having retroreflective characteristics," recited in claims 70, 75, and 80 (*see* 1441 Prelim. Resp. 18). *See* 1441 Dec. 16 n.5; 1442 Dec. 16–17 n.5.

(Paper 26). Again, we agree. Finally, the limitations added to the challenged claims must be supported *individually* by the application from which Patent Owner claims priority, and the substitute claims also must be supported *as a whole* by that application. *Nichia Corp. v. Emcore Corp.*, Case IPR2012-00005, slip op. at 4 (PTAB June 3, 2013) (Paper 27) (Representative). On this record and for the reasons set forth below, Patent Owner fails to demonstrate that there is adequate written description for the substitute claims in the reissue application (Ex. 1001) or the application from which it claims priority (Ex. 2118).[12] *See* Mot. 2–7.

A. Proposed Substitution of Claims

Patent Owner proposes to substitute one-for-one new claims 70–84 for challenged claims 48, 50–53, and 60–69 of the ’681 patent. Paper 18 (Appendix A). The correspondence between the challenged and substitute claims is shown in the table included in Appendix A, accompanying the Motion to Amend. *Id*. As indicated in the table of Appendix A, independent claims 70, 75, and 80 are proposed as substitutes for challenged, independent claims 48, 60, and 65, respectively. Further, claims 71–74 are proposed as substitutes for challenged claims 50–53, respectively; claims 76–79 are proposed as substitutes for challenged claims 61–64, respectively; and claims 81–84 are proposed as substitutes for challenged claims 66–69,

[12] Because of this lack of adequate written description, we *deny* Patent Owner’s Motion to Amend with respect to the requested entry of the substitute claims, without reaching Petitioner’s challenges to those claims based on the references applied in the grounds asserted in the Petition or on the alleged prior art identified by Patent Owner in the Motion to Amend. Opp. 11–24; *see* Mot. 14–25.

respectively. Thus, Patent Owner only proposes one substitute claim for each challenged claim. 37 C.F.R. § 42.121(a)(3).

B. No Broadening of Scope

Proposed substitute claims in an *inter partes* review "may not enlarge the scope of the claims of the patent." 35 U.S.C. § 316(d)(3); *see* 37 C.F.R. § 42.121(a)(2)(ii). In particular,

> A patent owner may not seek to broaden a challenged claim in any respect, in the name of responding to an alleged ground of unpatentability. A proper substitute claim under 37 C.F.R. § 42.121(a)(2)(i) must only narrow the scope of the challenged claim it replaces. Similarly, under 37 C.F.R. § 42.121(a)(2)(ii), a substitute claim may not enlarge the scope of the challenged claim it replaces by eliminating any feature.

Idle Free, Case IPR2012-00027, slip op. at 5 (Paper 26).

As noted above, in its Motion to Amend, Patent Owner proposes independent claim 70 as a substitute for independent claim 48, independent claim 75 as a substitute for independent claim 60, and independent claim 80 as a substitute for claim 65. Mot. 2–7. Each substitute claim includes all of the limitations of the corresponding challenged claim, for which it is a substitute, and only *adds* additional limitations. No limitations are removed. In its Opposition, Petitioner does not dispute Patent Owner's assertion that the proposed substitute claims do not enlarge the scope of the cancelled, challenged claims of the '681 patent. Opp. 1, 11. The substitute dependent claims are similarly narrowed by the limitations added to the independent claims, from which they depend. Consequently, the proposed substitute claims do not enlarge the scope of the challenged claims.

C. Written Description Support

1. Overview

Pursuant to 37 C.F.R. § 42.121(b), a motion to amend in an *inter partes* review must set forth "[t]he support in the original disclosure of the patent for each claim that is added or amended," and "[t]he support in an earlier-filed disclosure for each claim for which benefit of the filing date of the earlier filed disclosure is sought." In *Nichia*, "[t]he Board also explained that merely indicating where each claim limitation *individually* described in the original disclosure may be insufficient to demonstrate support for the claimed subject matter *as a whole*." Case IPR2012-00005, slip op. at 4 (Paper 27) (emphasis in original).

> Moreover, the Board recognized that the proposed substitute claims need not be described "*in haec verba*" in the original disclosure in order to satisfy the written description requirement. However, should the claim language does not appear *in ipsis verbis* in the original disclosure, a mere citation to the original disclosure without any explanation as to why a person of ordinary skill in the art would have recognized that the inventor possessed the claimed subject matter as a whole may be similarly inadequate.

Id. (emphasis in original). Whether a patent claim is supported by an adequate written description is a question of fact. *Ariad Pharm., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1355 (Fed. Cir. 2010) (en banc).

2. Patent Owner's Allegations of Support

In its Motion to Amend, Patent Owner argues that the subject matter of proposed substitute claims 70–84[13] have written description support in the

[13] Because claims 71–74, 76–79, and 81–84 depend from independent

disclosure of Reissue Application No. 12/471,058 (Ex. 1002) and in its priority document, U.S. Patent Application No. 04/623,186 (Ex. 2118), which share the same disclosure.[14] Mot. 2–7; Reply 4–7. Patent Owner further argues that based on the disclosures of these applications, a person of ordinary skill in the art would understand that the inventors had possession of the methods and apparatus of claims 70–84. *Id.*

a. Claims 70–79[15]

Patent Owner finds support for substitute, independent claims 70 and 75 in challenged, independent claims 48 and 60 and in the Specification of the ’681 patent. Mot. 2–5 (citing Ex. 2118, 3:18–22, 4:11–14, 5:14–22, 7:20–29, 10:9–17, 15:7–16:5, Abstract). In particular, Patent Owner argues that support exists

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claims 70, 75, and 80, respectively, if the limitations added to the substitute independent claims are not supported by sufficient written description in the priority application, then the dependent claims also are not supported.

[14] The challenged patent (Patent No. US RE42,681 E) is a reissue of a patent issuing from U.S. Patent Application No. 13/274,627, which was a division of U.S. Patent Application No. 12/471,058 (now Patent No. US RE40,913 E), which was a division of U.S. Patent Application No. 11/197,731 (now Patent No. US RE40,927 E). In both instances, the application as filed was a copy of Patent No. US 6,603,134, which issued from U.S. Patent Application No. 04/623,186, filed March 10, 1967. References are made to page and line numbers of the priority application, as filed (Ex. 2118). Mot. 2 n.1.

[15] Substitute, dependent claims 71–74 present the language of challenged claims 50–53 verbatim (except for renumbering) and also are supported by the priority application for the ’681 patent. Mot. 4 (citing Ex. 2118, 5:14–22, 8:24–9:24, 10:30–11:5; 15:4–6, 17:30–33). Similarly, substitute, dependent claims 76–79 present the language of challenged claims 61–64 verbatim (except for renumbering) and also are supported by the priority application for the ’681 patent. *Id*. at 5 (citing Ex. 2118, 5:17–20, 8:24–9:24, 10:30–11:5; 15:4–6, 17:30–33).

for the additional step, found in both claims 70 and 75, of "detecting an optical gain of the reflected radiant energy based on a change in a radiant flux density of the reflected radiant energy over time" in the priority application for the '681 patent. *Id*. at 3, 5 (citing Ex. 2118, 7:20–29; 8:15–26; 10:30–11:5, Fig. 12).

Patent Owner, however, fails to explain where this additional limitation appears expressly or implicitly in any of the cited portions of the priority application, and we find no express or implicit reference to "detecting" optical gain based on a "change" in radiant flux density in the cited text. On the contrary, because a "change" is broad enough to encompass both an increase *and* a decrease, the cited portions of the priority application refer to optical gain only as reflected by an "increase," rather than a "change," in radiant flux density (Ex. 2118, 7:20–26); and the only comparison used to measure optical gain is achieved by comparing the "*radiant flux*" of a retroreflector to a standard or reference (*id*. at 8:15–26). *See supra* Section I.F.3.b. As the Federal Circuit has explained, "the written description requirement with respect to particularly claimed subject matter is met if the specification shows *that the stated inventor has in fact invented what is claimed*, that he had possession of it." *Abbvie Deutschland GmbH v. Janssen Biotech, Inc.,* 759 F. 3d 1285, 1299 (Fed. Cir. 2014) (emphasis added). Patent Owner fails to explain here how a recitation regarding a "change" is taught by a disclosure regarding an "increase." The general description of the utilization means as useful in obtaining "the spectral and temporal characteristics of the retroreflected beam" and the comparison of these characteristics of the *retroreflected* beam to the *transmitted* beam does not provide clear support for this additional limitation. Ex. 2118, 10:30–11:5. Neither such spectral nor temporal characteristics clearly describe radiant flux density.

Similarly, the other additional limitation recited in substitute claims 70 and 75, namely, that an object characteristic is determined based on a "change in

a radiant flux density of the reflected radiant energy after retroreflection over time" allegedly also finds support in the same portions of the priority application for the '681 patent. Mot. 3 (citing Ex. 2118, 5:14–22; 7:20–29; 16:1–5), 5 (citing Ex. 2118, 7:20–29; 15:7–16:1). Again, as noted above, Patent Owner fails to explain where this additional limitation appears expressly or implicitly in any of the cited portions of the priority application, and we find no express or implicit reference to determining characteristics of the object from the "optical gain" of the reflected radiant energy.

Patent Owner argues that Dr. Leger confirms that a person having ordinary skill in the art at the time of the invention would have understood the priority application for the '681 patent to teach these additional limitations of claims 70 and 75:

> In my opinion, substitute *claims 54 and 57* find support at page 3, lines 5-7; page 5, lines 14-22, page 7, lines 20-24, page 8, lines 15-16, page 15, lines 11-16 of the priority document of *the '913 Patent*. In particular, one of ordinary skill would have understood that the priority document discloses embodiments in which a retroreflective optical system, e.g., binoculars, is detected based on a change in the radiant flux density of reflective radiant energy as an area is scanned. In other words, the retroreflective optical system is detected based on a change in the radiant flux density of the reflected radiant energy over time. The priority document discloses that such a detection of an optical system can be followed by tracking it. See, e.g., page 15, line 27 to page 16, line 1.

Id. at 3–4 (citing Ex. 2104 ¶ 119 (emphasis added)) (discussing claim 70); *see also id*. at 5 (citing Ex. 2104 ¶¶ 128–29) (discussing claim 75). Nevertheless, Patent Owner and Patent Owner's declarant incorrectly refer to claims 54 and 57, which are the substitute claims in the Motion to Amend filed in a related case, Case IPR2014-01439, with respect to the '913 patent. *See supra* Section I.B. Further, Dr. Leger's discussion in Paragraph 128 of his declaration (Ex. 2104) is

unsupported opinion testimony; and, although, in Paragraph 129, Dr. Leger cites to various portions of the priority application (Ex. 2118) as supporting the substitute claims, Dr. Leger fails to explain precisely which limitations these portions support or why. Consequently, we do not find Dr. Leger's testimony to be persuasive in that regard.

b. Claims 80–84[16]

Substitute, independent claim 80 recites an apparatus for automatically tracking at least a portion of an object within an optical system. The recited apparatus comprises a radiant energy source, "a detector configured to detect an optical gain of received reflected radiant energy after retroreflection of the radiant energy, *based on a change in a radiant flux density of the reflected radiant energy over time*"; and a utilization system configured to automatically track the at least a portion of the object "based on a characteristic of the at least a portion of the object determined from *the optical gain of* the reflected radiant energy." Paper 18, 8–10 (emphases added).

Each of the three elements of apparatus claim 80 (a radiant energy source, a detector, and a utilization system) were recited in challenged claim 65 and allegedly find support throughout the priority application for the '681 patent. Mot. 5–7 (citing Ex. 2118, 3:18–22; 4:11–12; 10:9–17; 15:7–10, Abstract). Patent Owner argues that the additional limitations added to challenged claim 65 are supported by the same portions of the priority application, upon which Patent Owner relies to support the additional limitations of substitute claims 70 and 75,

[16] Substitute, dependent claims 81–84 present the language of challenged claims 66–69 verbatim (except for renumbering) and also are supported by the priority application for the '681 patent. Mot. 7 (citing Ex. 2118, 5:17–20, 8:24–9:24, 10:30–11:5; 15:4–6, 17:30–33).

discussed above. *Id*. at 6 (citing Ex. 2118, 7:20–29; 8:15–26; 10:30–11:5, Fig. 12), 7 (citing Ex. 2118, 10:30–11:5; 15:11–16:5). Further, Patent Owner again cites to Dr. Leger's testimony to support the argument that a person of ordinary skill in the art would understand the additional limitations to be supported by written description in the priority application for the '681 patent. *Id*. at 7 (citing Ex. 2104 ¶¶ 128–29). Patent Owner's citations to portions of priority application for the '681 patent and Dr. Leger's testimony suffer from the same deficiencies with respect to substitute claim 80, as they did with respect to substitute claims 70 and 75.

For the foregoing reasons, we find Patent Owner's arguments and evidence deficient.

3. Petitioner's Allegations of Lack of Support

Petitioner contends that there is insufficient support in the priority application for the added limitations of the substitute claims. Opp. 3−9. In particular, Petitioner contends that the priority application for the '681 patent does not describe determining optical gain or an object characteristic *based on a change in radiant flux density*. Opp. 4–6. According to Petitioner, the only reference to "radiant flux density" in priority application for the '681 patent is found in the following single paragraph:

> The rays retroreflected by the optical systems depicted in FIGS. 1 to 4 are in the form of a narrow, substantially collimated beam having a high ***radiant flux density***. It is to be noted that there is an actual increase in the ***radiant flux density*** of the retroreflected beam due to the narrowing thereof. This increase in ***radiant flux density*** is herein termed optical gain.

Opp. 4–5 (citing Ex. 1001, col. 4, ll. 21–26); *see* Ex. 2118, 7:20–24. Petitioner argues that "[a]side from this passage explaining why

retroreflectors direct more light back to the source than background objects, the radiant flux density ***of the retroreflected light*** is not further referenced, explained, utilized, or incorporated elsewhere in the [S]pecification."[17] Opp. 5 (citing Ex. 1015 ¶ 36). Moreover, Petitioner argues that the discussion following this passage describes calculating optical gain based on radiant flux of the retroreflected light *per steradian* (*i.e.*, power per unit *solid angle*), not radiant flux *per unit area* (*i.e.,* radiant flux density). Ex. 2118, 7:25–9:3; Ex. 1015 ¶ 36; *see* Ex. 1014, 16:19–21; *supra* Section I.F.3.a.

Finally, Petitioner also contends (Opp. 6–7) that the priority application's disclosure that "[t]he energy obtained by the utilization means can be used to obtain the spectral and temporal characteristics of the retroreflected beam, and the same may then be compared with the transmitted beam to determine various characteristics of the optical system being investigated" (Ex. 2118, 10:30–11:3) does not disclose determinations based on radiant flux density changes, as recited in substitute claims 70, 75, and 80. *E.g.*, Mot. 3. Instead, that passage only refers to "energy," not radiant flux density; and Petitioner contends that that citation is to no avail.

Moreover, Petitioner contends (Opp. 6–7) that Patent Owner's citation to the priority application as purportedly disclosing a utilization system, as recited in substitute claim 80, that determines object characteristics based on a change in radiant flux density (Mot. 6 (citing Ex. 2118, 15:7–10)) also is to no avail. That passage merely states that the utilization system can be programmed to track an

[17] Petitioner alleges that, even though the term "radiant flux density" appears in cancelled claims 1, 17, 40, 42–43, it was added improperly to these claims during the prosecution of the parent patent, Patent No. US 6,603,134 B1. Petitioner notes that this term is not in any of the originally filed claims in the priority document. Ex. 2118, 19–29.

optical instrument; there is no mention of radiant flux density, let alone making any determination based upon changes thereof. *See* Opp. 6.

Petitioner further contends that, while the embodiments of Figures 6, 7, 7a, 7b, and 12 include detectors that detect retroreflected light, none of these figures depict embodiments that are described as capable of detecting radiant flux density and/or changes in radiant flux density, let alone making any determinations based upon measured changes in radiant flux density. Opp. 8–9 (citing Ex. 1015 ¶¶ 36–37). Moreover, the priority application for the ’681 patent

> makes no disclosure of any known area from which the density of the retroreflected light could be calculated; no apertures of known size, nor beam size or detector size measurements or capabilities, are disclosed. Nor is there any disclosure of providing size information regarding any known area to any of the disclosed utilization means to enable calculation of radiant flux density.

Id. at 9; *see supra* Section I.F.3.a. Dr. Hesselink opines that the additional limitations of the substitute claims are not taught by the priority application for the ’681 patent. Ex. 1015 ¶¶ 36–37; *see Blue Calypso, LLC v. Groupon, Inc.*, Dkt. Nos. 2015-1391, 2015-1393, 2015-1394, slip op. at 21 (Fed. Cir. Mar. 1, 2016) (“To adequately support the claims, the written description ‘must clearly allow persons of ordinary skill in the art to recognize that the inventor invented what is claimed.’”; quoting *Ariad Pharm.*, 598 F.3d at 1351). We find Petitioner’s arguments and evidence persuasive.

4. Dr. Leger’s Statements during Cross-Examination

Finally, as noted above, Patent Owner relies on Dr. Leger’s testimony that a person skilled in the art would understand that the priority application for the ’681 patent discloses embodiments in which retroreflective optical systems are detected based on a change in the radiant flux density of the reflective radiant

energy as an area is scanned. Mot. 3–5, 7; Ex. 2104 ¶¶ 119, 128–29. However, Petitioner notes that, when cross-examined about the foundations of his conclusions, Dr. Leger made a number of statements contradicting or undermining his testimony and Patent Owner's allegations that the substitute claims are supported by the priority application for the '681 patent. Opp. 7–8.

Dr. Leger's contrary testimony during cross-examination is directed to two key issues relating to the written description support for the proposed substitute claims. First, Dr. Leger testified to certain deficiencies in the disclosure of the priority application for the '681 patent with respect to the calculation of radiant flux density. *Id*. Second, Dr. Leger testified to certain deficiencies in the disclosure of the capabilities of the detectors described in the priority application for the '681 patent. *Id*. at 8. This cross-examination testimony weighs heavily against Dr. Leger's assertions in his declarations. *E.g.*, Ex. 2104 ¶¶ 119, 128–29; Ex. 2125 ¶¶ 77–80.

a. Calculation of Radiant Flux Density

During cross-examination, Dr. Leger acknowledged that detecting optical gain "based on a change in the radiant flux density of the reflected radiant energy over time," as recited in substitute claims 70, 75, and 80, requires measuring radiant flux density twice and comparing the measured values. Ex. 1014, 145:4–13, 147:8–13. In particular, Dr. Leger testified that measuring radiant flux density requires measuring radiant flux through a known area and then dividing the radiant flux by the known area. *Id*. at 50:9–51:4.

Nevertheless, Dr. Leger testified that, without knowing the area, *e.g.*, spot size of the retroreflected energy hitting the detector, radiant flux density cannot be measured or determined. *Id*. at 53:21–54:1. Even if the beam

completely fills the detector, Dr. Leger testified that a utilization means connected to the detector, which is not provided with the surface area of the detector, is not capable of detecting or measuring radiant flux density. Opp. 8 (citing Ex. 1014, 84:5–85:4). Because neither Patent Owner nor Dr. Leger shows where the priority application for the ’681 patent discloses determining the area of the reflected energy, Patent Owner fails to demonstrate that the priority application discloses detecting optical gain “based on a change in the radiant flux density of the reflected radiant energy over time.”

b. Detectors Capable of Detection Radiant Flux Density

As discussed above, “radiant flux” is “the rate of emission or transmission of radiant energy,” and “radiant flux density” is “the power of radiant energy delivered to a given area.” *See supra* Section I.F.3.a. During cross-examination, Dr. Leger testified that it is not possible to detect optical gain “based on a change in the radiant flux density of the reflected radiant energy over time” using only a detector that measures radiant flux. Ex. 1014, 145:14–146:4.

Contrary to Patent Owner’s arguments, Dr. Leger testified that there is no disclosure in the ’681 patent (or its priority application) that detector 184 in Figure 12 measures radiant flux density. *Id*. at 148:22–25. Further, Dr. Leger testified that detector 82 in Figure 6 and detectors 92, 92A, and 92B in Figures 7, 7a, and 7b, respectively, of the ’681 patent only measure radiant flux. *Id*. at 82:6–10; 85:18–86:6. In addition, Dr. Leger testified that the ’681 patent does not disclose a detector that itself compares radiant flux density values (*id*. at 163:20–25) and that the ’681 patent (or its priority application) does not disclose a utilization means that compares radiant flux density values (*id*. at 164:20–24).

Petitioner contends that Dr. Leger’s testimony during cross-examination

supports its view that the ’681 patent and its priority application do not disclose measuring radiant flux density, changes in radiant flux density, or making any determinations based on changes in radiant flux density, sufficiently to provide written description supporting the substitute claims. Opp. 7–8. We find this argument persuasive.

Considering and weighing the priority application, the testimony of Dr. Hesselink, and the testimony of Dr. Leger, in view of the parties’ arguments, we conclude that a preponderance of evidence compels a determination there is insufficient written description in the priority application for the ’681 patent to support the additional limitations individually or the substitute claims as a whole. Therefore, we *deny* Patent Owner’s Motion to Amend.

III. CONCLUSION

Based on the record presented in this proceeding, Patent Owner has failed to show by a preponderance of the evidence that proposed substitute claims 70–84 are patentable.

IV. ORDER

For the reasons given, it is

ORDERED that Patent Owner’s Motion to Amend is *granted* to the extent it requests the cancellation of claims 48, 50–53, and 60–69 of the ’681 patent;

FURTHER ORDERED that Patent Owner’s Motion to Amend is *denied* to the extent it requests entry of substitute claims 70–84; and

FURTHER ORDERED that, because this is a final decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

PETITIONER:

Alan A. Limbach
Brent K. Yamashita
DLA PIPER LLP (US)
alan.limbach@dlapiper.com
brent.yamashita@dlapiper.com
OD-Toshiba-DLA-IPR@dlapiper.com

PATENT OWNER:

Theodosios Thomas
Stephen Tytran
OPTICAL DEVICES, LLC
ted.thomas@optical-devices.com
sjt@optical-devices.com