

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TOSHIBA CORPORATION,
Petitioner,

v.

OPTICAL DEVICES, LLC,
Patent Owner.

Case IPR2014-01439
Patent RE42,913 E

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

PERRY, *Administrative Patent Judge.*

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

I. INTRODUCTION

In this *inter partes* review trial, instituted pursuant to 35 U.S.C. § 314, Petitioner, Toshiba Corporation (“Toshiba”), challenges the patentability of claims 48–53 of U.S. Patent No. RE42,913 E (Ex. 1001, “the ’913 patent”), owned by Patent Owner, Optical Devices, LLC (“Optical Devices”). This Final Written Decision, issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73, addresses issues and arguments raised during trial. For reasons discussed below, we determine that Toshiba has met its burden to prove, by a preponderance of the evidence, that claims 48–53 of the ’913 patent are unpatentable under 35 U.S.C. § 102 as anticipated by Ando.¹ We also *deny* Optical Devices’ motion to amend its claims.

A. Procedural History

On September 3, 2014, Toshiba filed a Petition (Paper 1, “Pet.”) requesting *inter partes* review of claims 48–53 of the ’913 patent. Optical Devices filed a Patent Owner’s Preliminary Response. Paper 6. On March 9, 2015 we issued a decision instituting an *inter partes* review directed to claims 48–53 of the ’913 patent and limited to the ground of anticipation based on Ando. Paper 7 (“Dec. Inst.”).

After institution of trial, Optical Devices filed a Response to the Petition (Paper 14, “PO Resp.”), and Toshiba replied (Paper 20, “Pet. Reply”). Optical Devices filed a contingent Motion to Amend its claims. Paper 15, “Mot. Amend.” Toshiba opposed. Paper 21, “Opp.” We heard oral argument on January 12, 2016. Paper 37 (“Tr.”).

¹ US Patent 3,506,839 to Ando *et al.*, issued April 14, 1970, Ex. 1007.

B. Real Parties in Interest

Optical Devices states that it is the only real party in interest for the Patent Owner. Paper 5, 1. Toshiba states the Petitioner's real parties-in-interest are Toshiba Corporation and Toshiba America Information Systems, Inc. Pet. 1.

C. Related Proceedings

Toshiba indicates that the '913 patent is related by a common parent to U.S. Patent No. RE40,927 E ("the '927 patent") and to U.S. Patent No. RE43,681 E ("the '681 patent"), which also are asserted in the above identified lawsuits. Pet. 1.

The specifications of the Wild patents challenged in IPR2014-01439 (U.S. Patent No. RE42,913 E), IPR2014-01441 (U.S. Patent No. RE43,681 E), and IPR2014-01443 (U.S. Patent No. RE40,927 E) are substantively identical.

Optical Devices indicates that the following judicial and administrative matters could affect or be affected by a decision in this proceeding:

Inter partes review IPR2014-00302 (not instituted) and IPR2014-01440 (not instituted) (each involving the '913 patent);

Inter partes review IPR2014-01441 (pending) and IPR2014-01442 (pending)² (each involving the '681 patent);

Inter partes review in IPR2014-00303 (instituted), IPR2014-01443 (pending), and IPR2014-01444 (not instituted) (each involving the '927 patent);

² IPR2014-01442 is consolidated with IPR2014-01441.

In the Matter of Certain Optical Disc Drives, Components Thereof, and Products Containing The Same, International Trade Commission, Proceeding No. 337-TA-897;

Optical Devices, LLC v. Toshiba Corp., et. al., Civil Case No. 1:13-cv-01530 (D. Del. 2013);

Optical Devices, LLC v. Panasonic Corp., et. al., Civil Case No. 1:13-cv-00726 (D. Del. 2013);

Optical Devices, LLC v. Lenovo Group, Ltd., et. al., Civil Case No. 1:13-cv-01526 (D. Del. 2013);

Optical Devices, LLC v. Nintendo Co., Ltd., et. al., Civil Case No. 1:13-cv-01528 (D. Del. 2013);

Optical Devices, LLC v. Samsung Electronics Co., Ltd., et. al., Civil Case No. 1:13-cv-01529 (D. Del.); and

Optical Devices, LLC v. LG Electronics, Inc., Civil Case No. 1:13-cv-01033 (D. Del. 2013).

Paper 5, 1–2.

II. THE '913 patent (EX. 1001)

A. Described Invention

The '913 patent is a reissue of U.S. Patent No. 6,603,134 B1 (“the '134 patent”) which issued from U.S. Patent Application No. 04/623,186 (“the '186 application”). The '186 application was filed on March 10, 1967, but remained subject to secrecy order(s) for many years because of its potential military use. Pet. 10. The '913 patent relates to detection of retroreflective optical systems. Ex. 1001, Abstract. Retroreflective optical systems are found in many military surveillance systems including

binoculars, telescopes, periscopes, range finders, cameras, and the like. *Id.* at 1:60–63. Retroreflective characteristics of the human eye are described with respect to Figure 5. *Id.* at 5:26–44.

Retroreflective optical systems are those in which incident rays and reflected rays are parallel for any angle of incidence within a field of view. Ex. 1001, 1:23–26. Retroreflectors are discernible from the background in which they are positioned.

It should be noted that in almost all cases, the retroreflector will be disposed within an environment that produces background radiation in a Lambertian manner. Thus, the radiant intensity of the retroreflector is so much greater than that of a Lambertian radiator that it is easily discernible from the background, even when, (as shown in FIG. 2) a large percentage of the retroreflected radiant flux is lost due to vignetting.

Ex. 1001, 5:1–6

Figure 1 of the '913 patent is reproduced below:

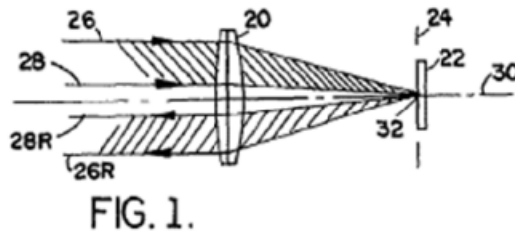
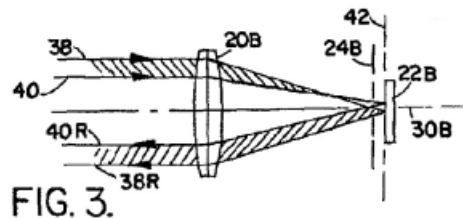


Figure 1 of the '913 patent explains retroreflection. It depicts an optical system including lens 20 and reflective surface 22 (e.g., a mirror) positioned in focal plane 24 of lens 20. Ex. 1001, 3:4–25. Radiation rays 26 and 28 are directed towards lens 20 of the optical system from a radiation (e.g., light) source (not shown). *Id.* at 3:14–16. For purposes of clarity, Figure 1 of the '913 shows the *incident* rays at the top of lens 20 and the *reflected* rays at

the bottom of lens 20. *Id.* at 3:11–14. Incident rays 26 and 28 are refracted by lens 20 and focused at focal point 32 on mirror 22. *Id.* at 3:14–16. The rays are reflected, such that the angle of reflection equals the angle of incidence, and the reflected rays are refracted again by lens 20 and emerge therefrom as retroreflected rays 26R and 28R. *Id.* at 3:21–25.

With reference to Figure 3 of the '913 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.



Mirror 22B of Figure 3 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. 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 3:44–54.

Retroreflected rays 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.” *Id.* at 4:6–10. “In order to obtain a measure of the optical gain we must compare the retroreflector to a standard of reference.” *Id.* at 4:41–42.

Embodiments of systems taking advantage of retroreflection are described with respect to Figures 6–14. The embodiment described with respect to Figure 6 examines spectral and temporal characteristics of the retroreflected beam to determine characteristics of the optical system being investigated. *Id.* at 6:3–8.

The ’913 patent describes an embodiment that directs a laser for identifying and tracking an object based upon retroreflected radiant energy. *Id.* at 8:25–9:32. As shown in Figure 12, reproduced below, radiant energy is transmitted by optical search device 182 at 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).

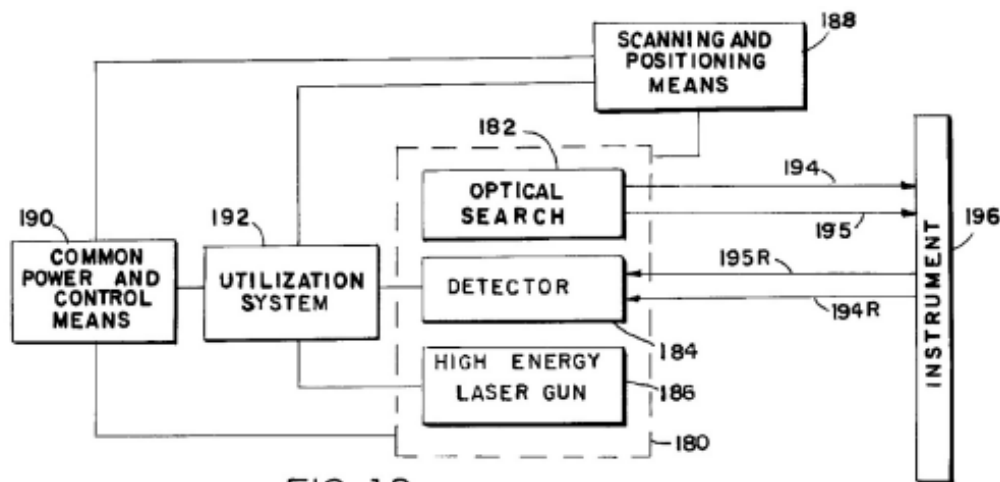


FIG. 12.

Figure 12 is a block diagram of an embodiment of a system for detecting the presence of an optical instrument, for tracking the instrument, and for neutralizing observers utilizing the instrument and/or rendering the

instrument ineffective. Retroreflected radiant energy is detected by detector 184. The output of detector 184 is provided to utilization system 192 that controls either 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. *Id.* at 8:30–40.

The '913 patent also describes, with the aid of Figure 13, an apparatus embodiment for identifying a radar system by scanning an area with a sweep of frequencies and noting retroreflection from a parabolic antenna of the radar system. An attenuated frequency received from the scanning area indicates the presence of a parabolic antenna resonant at a particular frequency that effectively absorbs the frequency appearing to be attenuated. *Id.* at 9:33–65.

B. Illustrative Claim

Toshiba challenges claims 48–53 of the '913 patent. Claims 48 and 51 are independent. Claim 48 is illustrative and is reproduced below:

48. A method of detecting characteristics of an object within an optical system, comprising:
transmitting energy at an object included in an optical system having retroreflective characteristics,
wherein the optical system includes a lens and the object includes a surface exhibiting some degree of reflectivity disposed substantially in a focal plane of the lens;
receiving reflected radiant energy with an optical gain after retroreflection of the radiant energy; and
detecting the reflected radiant energy after retroreflection to determine at least one characteristic of the object.

Ex. 1001, 14:21–31. Claims 49 and 50 depend from claim 48, and claims 52 and 53 depend from claim 51.

III. ANALYSIS

A. Level of Ordinary Skill in the Art

The level of skill in the art is a factual determination that provides a primary guarantee of objectivity in an obviousness analysis. *Al-Site Corp. v. VSI Int'l Inc.*, 174 F.3d 1308, 1324 (Fed. Cir. 1999)(citing *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966); *Ryko Mfg. Co. v. Nu-Star, Inc.*, 950 F.2d 714, 718 (Fed. Cir. 1991)).

Petitioner asserts that one of ordinary skill in the art at the time of the filing of the '913 as having either:

(1) a Bachelor's of Science Degree in Physics, Optics, Electrical Engineering, or a related field with coursework 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. 22 (citing Ex. 1008 ¶ 32).

Patent Owner asserts that one of ordinary skill in the art 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.” PO Resp. 4 (citing Ex. 2104 ¶ 10) (emphasis added).

Based on our consideration of the record, we find that the evidence as a whole supports Petitioner's broader description of the level of ordinary skill in the art. Accordingly, we adopt Petitioner's statement of the ordinary skill in the art.

B. Claim Construction

In an *inter partes* review, the Board interprets claim terms in an unexpired patent according to the broadest reasonable interpretation in light of the specification of the patent in which they appear. 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). Under that standard, and absent any special definitions, we give claim terms their ordinary and customary meaning, as would be understood by one of ordinary skill in the art at the time of the invention. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007).

Any special definitions for claim terms must be set forth with reasonable clarity, deliberateness, and precision. *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994). “In such cases, the inventor’s lexicography governs.” *Phillips v. AWH Corp.*, 415 F.3d 1303, 1316 (Fed. Cir. 2005) (en banc). In the absence of such definitions, limitations are not to be read from the specification into the claims. *In re Van Geuns*, 988 F.2d 1181, 1184 (Fed. Cir. 1993).

Only terms which are in controversy need to be construed, and 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). For this reason, we provide express constructions for only the terms discussed below.

1. “Retroreflection”

Toshiba construes “retroreflection” as “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.” Pet. 13. Optical Devices preliminarily indicated that it did not object to adding to the construction the phrase “within the field-of-view” as proposed by Petitioner. Prelim. Resp. 11. Optical Devices maintained that position in its Patent Owner Response. PO Resp. 5. Optical Devices supports its proposed construction by reference to the ’913 patent. Ex. 1001, 1:20–26, 3:4–4:3, 6:34–46, 7:14–25.

We are persuaded that the broadest reasonable interpretation of “retroreflection,” consistent with the ’913 patent Specification, is “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.”

2. “*Optical System*”

Both Toshiba and Optical Devices propose to construe “optical system” as “a collection of optical elements including at least a lens and a reflective surface.” Pet. 14; Prelim. Resp. 11–12. The ’913 patent supports this construction. Ex. 1001, 2:41–59, 3:14–16, 5:40–43, 8:44–50; Figs. 1–4, 6–12.

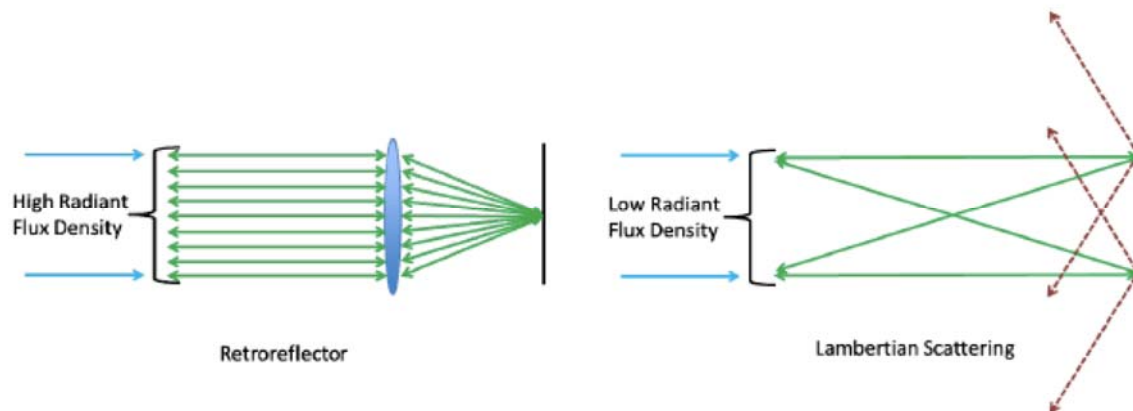
We are persuaded that this construction is the broadest reasonable construction interpretation with the Specification of the ’913 patent and adopt it.

3. “*Optical Gain*”

In the context of a retroreflecting optical system, Toshiba would have us construe “optical gain” as “an actual increase in the radiant flux density of the retroreflected beam due to the narrowing thereof.” Pet. 15. Toshiba argues 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. Pet. 15–21.

In support of its position, Toshiba provides the following image comparing retroreflected light with Lambertian scattered light at Petition page 20 and at Exhibit 1008 ¶¶ 46:



According to Toshiba, 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 flux density of the reflected light. Pet. 20.

Optical Devices argues for a broader construction of “optical gain” that would be consistent with all of the embodiments described in the Specification of the ’913 Patent. PO Resp. 6–18. It proposes that the broadest reasonable interpretation of the term “optical gain” in the context of the ’913 patent is “a change in radiant flux density of reflected radiant energy.” PO Resp. 6 (citing Ex. 2104 ¶¶ 20–21).

James Leger, Ph.D., providing testimony on behalf of Optical Devices, explains that one of ordinary skill would have understood that in certain of the 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. 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. 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). *Id.* 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. *Id.* 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.* 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. Hence, one of ordinary skill would have understood that the concept of “optical gain” as used in the ’913 patent covers both an increase and a decrease in the reflected radiant flux density. *Id.*

Lambertus Hesselink, Ph.D., testifying on behalf of Toshiba, opines that the ’913 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. 1008 ¶ 37. Dr. Hesselink refers to the following passage from the ’913 patent to support his view:

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, 4:4-9.

Optical Devices argues that one of ordinary skill would not have understood this passage to be a definition, but rather would have understood it to be describing “optical gain” in the context of a particular illustrative embodiment. PO Resp. 9 (citing Ex. 2104 ¶ 23). Restricting the construction of “optical gain” 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 ’913 patent. PO Resp. 10.

Optical Devices notes that Dr. Hesselink’s view requires that “optical gain” be measured relative to a Lambertian radiator. *Id.* (citing Ex. 1008 ¶ 16). Dr. Hesselink refers to the following passage from the ’913 patent: “In 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.” *Id.* ¶ 39 (citing Ex. 1001, 4:42–45). However, Dr. Leger interprets this passage differently—namely, it provides a general statement that one must compare the retroreflector to a standard or reference to obtain a measure of optical gain. Ex. 2104 ¶ 24. Following this general statement and in the context of a particular illustrative example, the ’913 patent indicates that the reference has been chosen to be a Lambertian radiator. *Id.* As such, one of ordinary skill would have understood from this language that the ’913 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.*

Optical Devices further notes that Dr. Hesselink relies upon plain meaning in construing “optical gain” as implying a positive change. PO Resp. 10–11 (citing Ex. 1008 ¶ 44). However, according to Optical Devices, Dr. Hesselink neglects to point out that in various fields of science and engineering, the term “gain” is employed to denote both positive and negative change. For example, in the field of microwave antennas, the “gain” of an antenna can be positive or negative. *Id.* at 11 (citing Ex. 2104 ¶ 25). According to Optical Devices, it is noteworthy that the ’913 patent states that its teachings are applicable to the detection of microwave apparatuses, such as antennas. *Id.* (citing Ex. 1001, 9:13–17). Thus, according to Optical Devices, one of ordinary skill would have understood that the concept of “optical gain” as used in the ’913 patent covers both an increase and a decrease in the reflected radiant flux density as compared to a standard or reference. *Id.* (citing Ex. 2104 ¶ 24).

Optical Devices argues that its view is borne out by the cross examination of Dr. Hesselink. *Id.* (citing Ex. 2119, 60:10–61:8, 61:13–16).

Optical Devices’ 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.

See Phillips v. AWH Corp., 415 F.3d 1303, 1320–21 (Fed. Cir. 2005) (the

specification is “the single best guide to the meaning of a disputed term” and “acts as a dictionary when it expressly defines terms used in the claims or when it defines terms by implication”); *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. We give less weight to Optical Devices’ argument that all embodiments should be embraced by the construction. “[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.” *Broadcom Corp. v. Qualcomm Inc.*, 543 F.3d 683,689 (Fed. Cir. 2008) (quoting *Ventana Med. Sys., Inc. v. Biogenex Labs., Inc.*, 473 F.3d 1173, 1181 (Fed. Cir. 2006)). The ’913 patent includes description of a radar system embodiment with respect to Figures 13 and 14. Ex. 1001, 9:34–65. It is described that the radar system is detected by means of the “retroreflection principles” of the invention. However, the term “optical gain” is not used in connection with this embodiment. The term appears in the Specification only in connection with embodiments relying on what has traditionally been referred to as “optical.” WEBSTER’S SEVENTH NEW COLLEGIATE DICTIONARY 592 (1967) (Ex. 3002)³ (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. Challenged claims 48 and 51 are directed a method of or apparatus for “detecting characteristics of an object within an *optical* system.” *E.g.*,

³ This decision does not reference Ex. 3001.

Ex. 1001, 14:21–22 (claim 48; emphasis added). In this context, we conclude that “optical gain” is limited to the optical spectrum and does not apply to other portions of the spectrum, such as other electromagnetic waves used in radar systems. We, therefore, construe “optical gain” to mean “an increase in radiant flux density of reflected optical radiant energy.”

4. Additional terms

In view of our analysis, we do not find it necessary to construe expressly any additional terms.

C. Prior Art Challenge Based on Ando (Ex. 1007)

Toshiba argues that claims 48–53 of the ’913 patent are anticipated by Ando and presents a detailed reading of claims 48–53 on Ando at Petition pages 25–37, supported by the testimony of Dr. Hesselink in the form of a declaration (Ex. 1008). We have reviewed Toshiba’s analysis and adopt it except to the extent clarified below.

Optical Devices challenges certain aspects of Petitioner’s analysis and argues that Ando does not anticipate claims 48–53. PO Resp. 33–36.

“A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *Verdegaal Bros., Inc. v. Union Oil Co. of Cal.*, 814 F.2d 628, 631 (Fed. Cir. 1987).

1. Ando Generally

Ando's Figure 1 is reproduced below.

FIG. 1

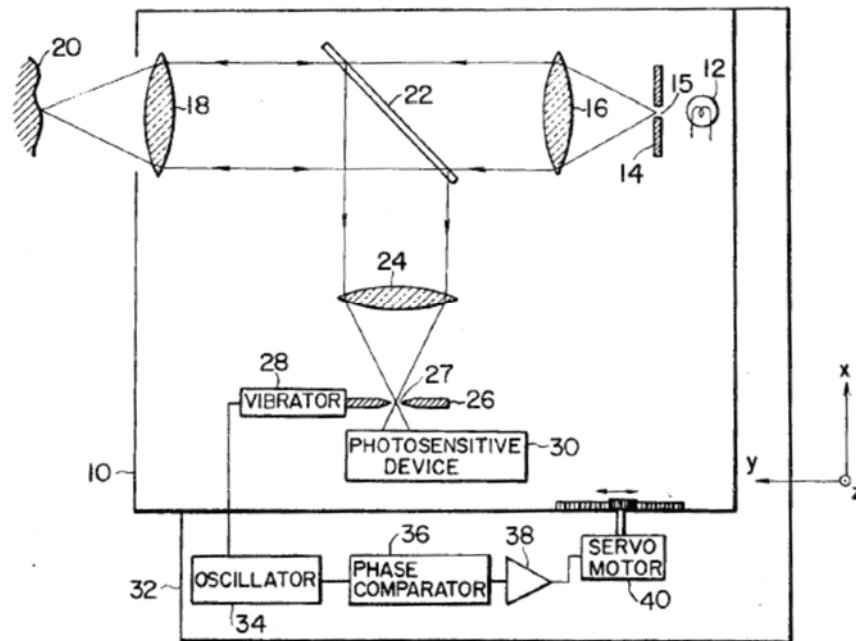
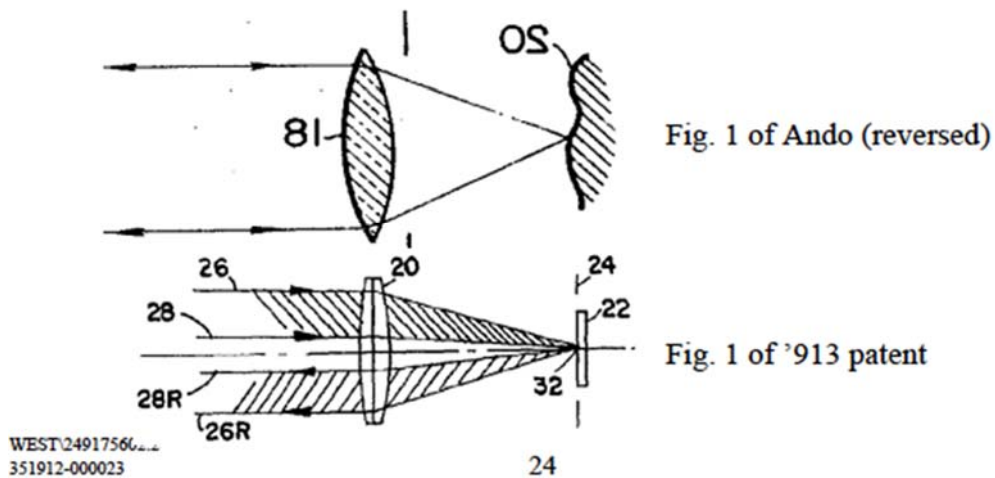


Figure 1 shows an embodiment of a “contactless probe system” that determines the contour of the surface of object 20 without contact. Ex. 1007, 1:15–19. It does so by using servo control to adjust the probe system so as to keep light focused on the surface of the object as it is scanned. Ex. 1007, 2:18–26. Servo control of the probe system is effected by superimposing a frequency on the radiation reflected from object 20 and passing through lens 24 by vibrator 28 vibrating pinhole 27 through which the received radiation passes. The probe system is moved so as to minimize the frequency imposed by vibrator 28. This effectively keeps the surface of

object 20 in focus, thereby mapping the contour of object 20, i.e., a three dimensional configuration.

2. Claim 48-50

Toshiba argues that retroreflection occurs in Ando. Toshiba demonstrates this by reversing a portion of Ando's Figure 1 and juxtaposing it with respect to Figure 1 of the '913 patent (Pet. 24) as follows:



Both figures show incoming collimated light being focused onto a surface in the focal plane of the lens, whereby reflected light is collimated by the lens, so that outbound reflected light rays are parallel to the incoming light rays. Pet. 24–25 (citing to Ex. 1008 ¶ 52).

Light entering lens 18 of Ando is collimated by virtue of light from source 12 passing through slit 15 and lens 16. According to Toshiba, light reflected from object 20 back through lens 18 ultimately is received by photosensitive device 30. A servo system (oscillator 34, vibrator 28, slit 27, photosensitive device 30, phase comparator 36, amplifier 38, and servo motor 40) moves the probe system so as to continuously re-focus light on object 20, thereby mapping its contour.

Toshiba argues that light reflected from object 20 is received with optical gain because retroreflection is occurring and optical gain is “an inherent necessary result from a retroreflector having a lens and a surface disposed in the focal plane of that lens for collimated incoming light.”

Pet. 19. When optical gain is present in the retroreflected light, then the retroreflected light ultimately received by photosensitive device 30 must necessarily have optical gain. *Id.* We find the figure set forth at Petition page 20 and at Exhibit 1008 ¶ 46 to be persuasive and find that retroreflection occurs based upon a the structural arrangement of lens and reflecting surface.

Optical Devices argues that one of ordinary skill would have understood that the “detecting” step of claim 48 requires detecting an optical gain of the retroreflected energy, namely detecting a change in the radiant flux density of the retroreflected energy. PO Resp. 33. Optical Device argues that because Ando does not disclose detecting optical gain, it would not anticipate this limitation. Optical Devices notes that Ando relies upon analyzing the frequency content of an oscillatory output of the photosensitive device 30 rather than comparing flux density of two illuminated spots. *Id.* at 34. Dr. Leger explains that the operation of Ando’s comparator 36 does not depend on the amplitude of the output of the photosensitive device 30 so long as the output of the photosensitive device 30 exhibits sufficient signal-to-noise ratio (SNR) to allow the phase comparator 36 to operate properly in analyzing the frequency and phase content of the oscillatory output of the photosensitive device. *Id.* at 30 (citing Ex. 2104 ¶ 65).

We agree with Optical Devices’ description of Ando, but not with Optical Devices’ conclusion. We do not read into the “detecting” step of

claim 48 a requirement of detecting an optical gain. The '913 patent invention lies in discerning a retroreflector from its background. The retroreflector provides a brighter spot than does its background because of the concentration of flux caused by the retroreflector that makes it appear brighter. However, that key feature is missing from claim 48.

Claim 48 requires “receiving reflected radiation energy with an optical gain after retroreflection of the radiant energy.” However, the “detecting” step that follows simply requires detecting the reflected radiant energy after retroreflection to determine at least one characteristic of the object. Ando does indeed detect reflected radiant energy after retroreflection. It also determines at least one characteristic of the object, namely its contour. Ex. 1007 at Abstract. We “determine that there is no reasoned basis to read into the “detecting” step of claim 48 a requirement of detecting an optical gain. We, therefore, conclude that Ando meets the limitations of claim 48.

Optical Devices does not separately argue dependent claims 49 and 50, each depending from claim 48. PO Resp. 35. We conclude that they are unpatentable as well. Claim 49 further requires that the “characteristic” includes any optically detectable property of the object. The Ando object’s contour is optically detectable. Ex. 1007, Abstract, Fig. 1. Claim 50 further requires that the “characteristic includes a relative position of the object within the optical system.” Ando detects position of the object within its optical system. *See Id.* Fig. 1. Servo motor 40 moves the optical apparatus to maintain focus on the surface of object 20, thereby contouring the surface of object 20.

3. Claim 51

Claim 51 is reproduced below.

51. An apparatus for detecting characteristics of an object within an optical system, the apparatus comprising:
a radiant energy source for transmitting energy at an object included in an optical system having retroreflective characteristics, wherein the optical system includes a lens and the object includes a surface exhibiting some degree of reflectivity disposed substantially in a focal plane of the lens; and
a detector for detecting received reflected radiant energy with an optical gain after retroreflection of the radiant energy to determine at least one characteristic of the object.

Optical Devices makes an argument similar to that made with respect to claim 48, namely that one of ordinary skill would have understood from the language of the claim that the claimed apparatus includes a detector for detecting an optical gain of the retroreflected radiant energy. PO Resp. 36.

We are not persuaded to read into the “detector” limitation of claim 51 a requirement that optical gain is detected. The detector limitation requires the detection of “received radiant energy with an optical gain after retroreflection . . . to determine at least one characteristic of the object.” [Cite] It requires nothing further.

Ando determines a characteristic (contour) of an object based on light reflected from its surface. Ex. 1007, Abstract. Without the benefit of reflected energy, the Ando system could not servo focus on the surface of object 20, thereby mapping the contours of that surface. Ando uses the reflected radiant energy as a carrier on which to impose a modulation by vibrating a slit through which the reflected light passes. *See Id.* Fig. 1. The focus of the system on the object being contoured is adjusted to minimize

the frequency component introduced by the vibrating slit, thus gaining better focus. In this way the position of the measuring device mirrors the contour of the object being characterized. *Id.* at 3:73–4:24. Thus, Ando would not operate without the reflected radiant energy. Based on the preponderance of evidence, we conclude that claim 51 is unpatentable as anticipated by Ando.

Claims 52 and 53 are not argued separately. In view of our evaluation of independent claim 51, we conclude that they are unpatentable as well. Claim 52 depends from claim 51 and further requires that the “characteristic” includes any optically detectable property of the object. The Ando object contour is optically detectable. Ex. 1007, Abstract, Fig. 1. Claim 53 also depends from claim 51 and further requires that the “characteristic includes a relative position of the object within the optical system.” Ando detects position of the object within its optical system. *See Id.* Fig. 1. Servo motor 40 moves the optical apparatus to maintain focus on the surface of object 20, thereby contouring the surface of object 20.

D. Motion to Amend

Having concluded that claims 48–53 are anticipated by Ando, we consider Optical Devices’ contingent Motion to Amend the claims of the ’913 patent. Paper 15 (“Mot. Amend.”). Proposed amended claims are set forth in an Appendix to the Motion, filed as Paper 16. Optical Devices proposes to substitute new claims 54–59 for challenged claims 48–53.

1. Proposed Substitute Claims

Optical Devices proposes to substitute, one-for-one, new claims 54–59 for challenged claims 48–53. Differences between the proposed and challenged claim are shown in the following tables, reproduced from the

Appendix to the Motion to Amend.

'913 Claim	Proposed Substitute Claim
48. A method of detecting characteristics of an object within an optical system, comprising:	54. A method of detecting characteristics of an object within an optical system, comprising:
transmitting energy at an object included in an optical system having retroreflective characteristics, wherein the optical system includes a lens and the object includes a surface exhibiting some degree of reflectivity disposed substantially in a focal plane of the lens;	transmitting energy at an object included in an optical system having retroreflective characteristics, wherein the optical system includes a lens and the object includes a surface exhibiting some degree of reflectivity disposed substantially in a focal plane of the lens;
receiving reflected radiant energy with an optical gain after retroreflection of the radiant energy; and	receiving reflected radiant energy with an optical gain after retroreflection of the radiant energy; ~~and~~
detecting the reflected radiant energy after retroreflection	detecting the reflected radiant energy after retroreflection;
to determine at least one characteristic of the object.	~~to determine~~ <u>determining, from the optical gain, at least one characteristic of the object based on a change in a radiant flux density of the reflected radiant energy over time; and</u>
	<u>tracking the object based on the determined characteristic.</u>

49. The method of claim 48, wherein the at least one characteristic includes any optically detectable property of the object.	55. The method of claim [[48]] 54, wherein the at least one characteristic includes any optically detectable property of the object.
50. The method of claim 48, wherein the at least one characteristic includes a relative position of the object within the optical system.	56. The method of claim [[48]] 54, wherein the at least one characteristic includes a relative position of the object within the optical system.

51. An apparatus for detecting characteristics of an object within an optical system, the apparatus comprising:	57. An apparatus for detecting characteristics of an object within an optical system, the apparatus comprising:
a radiant energy source for transmitting energy at an object included in an optical system having retroreflective characteristics, wherein the optical system includes a lens and the object includes a	a radiant energy source for transmitting energy at an object included in an optical system having retroreflective characteristics, wherein the optical system includes a lens and the object includes a surface
a detector for detecting received reflected radiant energy with an optical gain after retroreflection of the radiant energy	a detector for detecting received reflected radiant energy with an optical gain after retroreflection of the radiant energy; <u>and</u>
to determine at least one characteristic of the object.	~~to determine~~ <u>a utilization system for determining, from the optical gain, at least one characteristic of the object based on a change in a radiant flux density of the reflected radiant energy over time; and for tracking the object based on the determined</u> <u>characteristic.</u>

52. The apparatus of claim 51, wherein the at least one characteristic includes any optically detectable property of the object.	58. The apparatus of claim [[51]] 57, wherein the at least one characteristic includes any optically detectable property of the object.
53. The apparatus of claim 51, wherein the at least one characteristic includes a relative position of the object within the optical system.	59. The apparatus of claim [[51]] 57, wherein the at least one characteristic includes a relative position of the object within the optical system.

As the moving party, Optical Devices 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 demonstrating, by a preponderance of the evidence, the patentability of the proposed substitute claims. *Nike, Inc. v. Adidas AG*, 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.”); *see Idle Free Systems, Inc. v. Bergstrom, Inc.*, IPR2012-00027, slip op. at 7–8 (PTAB June 11, 2013) (Paper 26, “*Idle Free*”) (informative). For the reasons explained below, we conclude that Optical Devices has not met its burden with respect to proposed substitute new claims 54–59.

2. 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 its Motion to Amend, Patent Owner proposes claim 54 as a substitute for claim 48, claim 55 as a substitute for claim 49, claim 56 as a substitute for claim 50, claim 57 as a substitute for claim 51, claim 58 as a

substitute for claim 52, and claim 59 as a substitute for claim 53. Mot. Amend. 1–6. Each claim includes all of the limitations of the corresponding claim for which it is a substitute, and adds additional limitations. No limitations are removed. Toshiba in its Opposition does not dispute Optical Devices’ assertion that the proposed substitute claims do not enlarge the scope of the claims of the ’913 patent. We are persuaded that the proposed substitute claims do not enlarge the scope of the original patent claims.

3. Written Description Support

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 its Motion to Amend, Optical Devices explains how the subject matter of proposed substitute claims 54–59 have written description support in the disclosure of Reissue Application No. 12/471,058 (Ex. 1002) and in its priority document, Utility Application No. 04/623,186 (Ex. 2118), which share the same disclosure.⁴ Mot. Amend. 2–6. Optical Devices further argues that based on the disclosures of these applications, one of ordinary skill in the art would have understood that the inventors had possession of

⁴ The challenged patent (U.S. Patent No. RE42,913 E) is a reissue of a patent issuing from U.S. Patent Application No. 12/471,058, which was a division of U.S. Patent Application No. 11/197,731 (now U.S. Patent No. RE40,927 E). In both instances, the application as filed was a copy of U.S. Patent No. 6,603,134 B1, 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 1967 application as filed (Ex. 2118).

the methods and apparatus of claims 54-57. *Id.*

Toshiba disagrees and argues that there is insufficient support for the added limitations in the substitute claims. Opp. 3–9.

Optical Devices finds support for claim 54 in reissued claim 48 and in the '913 patent Specification. Mot. Amend. 2 (citing Ex. 2118, 3:4–6, 7:20–24, Abstract, 1–6).

Optical Devices argues support for the additional step of “determining, from the optical gain, at least one characteristic of the object based on a change in a radiant flux density of the reflected radiant energy over time” in reissue claim 48, which recited “detecting the reflected radiant energy after retroreflection to determine at least one characteristic of the object,” as well as in the '913 patent specification. *Id.* at 3 (citing Ex. 2118 at 9:10–12, 10:30–31, claim 37, 43).

Optical Devices argues that the additional recitation that an object characteristic is determined based on a change in a radiant flux density of the reflected radiant energy after retroreflection over time also finds support in the '913 patent Specification as filed. *Id.* (citing Ex. 2118, 10:30–31).

Optical Devices argues support for the second additional step in claim 54 is “tracking the object based on the determined characteristic” also is found in the '913 patent Specification. *Id.* at 3 (citing Ex. 2118, 15:7–27).

Optical Devices argues that the Declaration of James Leger, Ph.D., confirms that a person having ordinary skill in the art at the time of the invention would have understood the Specification of the '913 patent to teach that a characteristic of an object can be determined based on a change in a radiant flux density of the reflected radiant energy over time and that the object could thereby be tracked:

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 (quoting Ex. 2104 ¶ 119).

Optical Devices argues that substitute dependent method claims 55 and 56 present the language of reissue claims 49 and 50 verbatim (except for renumbering) and are also supported by the '913 patent specification as filed. See Ex. 2118, 9:10–12, 10:30–31, claim 28 (claim 37), 29 (claim 43).

Optical Devices argues that the first two elements of substitute apparatus claim 57 (radiant energy source and detector) were recited in reissue claim 51 and find support throughout the '913 Patent specification (see Ex. 2118, 15:11–16, Fig. 12). Substitute claim 54 recites a utilization system for determining from the optical gain, at least one characteristic of the object based on a change in a radiant flux density of the reflected radiant energy after retroreflection over time and for tracking the object based on the determined characteristic. Optical Devices argues that this recitation is supported, in part, by reissue claim 51 that recited “a detector for detecting received reflected radiant energy with an optical gain after retroreflection of the radiant energy to determine at least one characteristic of the object.” Mot. Amend. 5 (citing Ex. 2118, 15:11–16, Fig. 12, claims 37, 43).

Optical Devices argues that the additional recitation that the utilization system determines an object characteristic based on a change in a radiant flux density of the reflected radiant energy after retroreflection over time also finds support in the '913 patent specification. *Id.* (citing Ex. 2118, 15:20–29). Optical Devices also argues that the additional recitation that the utilization system performs the additional function of tracking the object based on the determined characteristic is also supported by the '913 patent Specification. *Id.*

Optical Devices argues that the Declaration of Dr. Leger confirms that a person having ordinary skill in the art at the time of the invention would have understood the Specification of the '913 patent to teach that a utilization system can determine an object characteristic based on a change in a radiant flux density of the reflected radiant energy after retroreflection over time and that the utilization system also can track the object based on the determined characteristic. *Id.* (citing Ex. 2104 ¶¶ 120–121).

Optical Devices argues that substitute dependent claims 58 and 59 present the language of reissue claims 52 and 53 verbatim (except for renumbering) and are supported by the '913 patent specification. *Id.* at 6 (citing Ex. 2118, 9:10–12, 10:30–31, claims 37, 43).

Toshiba argues that the passages cited by Optical Devices do not establish written description support for the proposed new claims. *Opp.* 3–11.

Toshiba argues that the '913 patent does not describe determining optical gain or an object characteristic *based on a change in radiant flux density*. *Opp.* 4-6. According to Toshiba, the only reference to “radiant flux density” in the '913 patent Specification 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, 4:4–9). Toshiba argues that aside 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 anywhere else in the specification.⁵ Opp. 6 (citing Ex. 1010 ¶ 32). Toshiba argues that 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). *Id.* at 5 (citing Ex. 1001, 4:10–60; Ex. 1009, 16:19–21; Ex. 1010 ¶ 32).

Toshiba argues (Opp. 6) that Optical Devices’ citation to 10:30–31 of the priority document as purportedly disclosing determinations based on radiant flux density changes (Mot. Amend. 3) is to no avail. That passage, according to Toshiba, only refers to “energy,” not radiant flux density. Toshiba argues (*id.*) that Optical Devices’ citation to of the priority document (Ex. 2118 at 15:20–29) as purportedly disclosing a utilization system that determines object characteristics based on a change in radiant flux density (Mot. Amend. 5) is also

⁵ Toshiba notes that even though the term “radiant flux density” appears in cancelled claims 1, 17, 40, 42, and 43), it was added improperly to these claims during the prosecution of the parent patent, U.S. Patent No. 6,603,134 B1. This term is not in any of the originally filed claims in the priority document. (Ex. 2118, 19–29.) Therefore, Optical Devices can only rely on the ’913 patent Specification in support of the substitute claims.

to no avail. That passage merely states that the utilization system can be programmed to track an optical instrument; there is no mention of radiant flux density let alone making any determination based upon changes thereof.

Toshiba argues that Optical Devices cites several passages identified by its expert. (*Id.* at 3-6.) In particular, Toshiba notes that besides the above quoted paragraph, none of these passages make any reference to radiant flux density, measuring changes in radiant flux density, or making any determinations based thereon. Ex. 1010 ¶32.

Toshiba further argues that Optical Devices relies on Dr. Leger's conclusion that the '913 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. Amend. 4. However, when cross-examined about the foundation of that conclusion, Dr. Leger made a number of admissions that undermine his conclusion and Optical Devices' allegations that the substitute claims are supported by the '913 patent Specification. Dr. Leger's admissions include:

- Making a determination "based on a change in radiant flux density" as recited in claims 54 and 57 requires measuring radiant flux density twice and comparing the measured values. Ex. 1009, 112:11–113:2, 50:5–8.
- Measuring radiant flux density requires measuring radiant flux through a known area, and dividing the radiant flux by the known area. *Id.* at 50:9–51:4.
- Without knowing the area (e.g. spot size hitting detector), radiant flux density cannot be measured or determined. *Id.* at 53:21–54:1.
- Even if the beam completely fills the detector, 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. *Id.* at

84:5–85:4.)

- It is not possible to practice “based on a change in radiant flux density” using only a detector that measures radiant flux. *Id.* at 114:17–21.

- Detector 82 in Figure 6, and detectors 92, 92A and 92B in Figures 7, 7a and 7b, respectively, of the ’913 patent only measure radiant flux. *Id.* at 82:6-10, 85:18–86:6.

- There is no disclosure in the ’913 patent that detector 184 in Fig. 12 measures radiant flux density. *Id.* at 148:22–25.

- The ’913 patent does not disclose a detector that itself compares radiant flux density values. *Id.* at 163:20–25.

- The ’913 patent does not disclose a utilization means that compares radiant flux density values. *Id.* at 164:20–24.

Toshiba argues that these admissions support its view that the ’913 patent does not disclose measuring radiant flux density, changes in radiant flux density, or making any determinations based on changes in radiant flux density. We find this argument to be credible.

Toshiba further argues that while the embodiments of Figures 6, 7, 7a, 7b, and 12 include detectors that detect retroreflected light, none of these embodiments involve or are 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. 1010 ¶ 33).

Toshiba argues furthermore that the specification makes no disclosure of any known area from which the density of the retroreflected light could be calculated, and that no apertures of known size, nor beam size or detector size measurements or capabilities, are disclosed. *Id.* Toshiba also argues that there is no disclosure of providing size information regarding any known area to any of the disclosed utilization means to enable calculation of radiant flux density. *Id.*

The preponderance of the evidence supports Toshiba's position that the substitute claims discussed above do not find adequate written support in the priority document. The portions of the specification of the priority document relied upon by Optical Devices do not mention detecting changes in radiant flux density or comparing these changes in radiant flux density to determine optical gain. *See, e.g.*, PO Resp. 5 (citing Ex. 2118, 7:20–29, 8:15–26, 10:30–11:5). Exhibit 2118, 7:20–29, states that “[t]his increase in radiant flux density is herein termed optical gain.” That seems to support the idea that a change/increase in radiant flux density is “optical gain.” However, Ex. 2118, 8:15–26, teaches that “[i]n order to obtain a measure of optical gain we must compare the retroreflector to a standard or reference” and that “[t]his reference has been taken to be a diffuse surface known in the art as a Lambertian radiator.” Moreover, the priority specification only describes calculating optical gain based on radiant flux, not radiant flux density. Ex. 2118, 8:17–21. Finally, Ex. 2118, 10:30–11:5 states 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.” But neither spectral nor temporal characteristics clearly describe radiant flux density.

Dr. Hesselink opines that the additional limitations of the substitute claims are not taught by the '913 patent. Ex. 1010 ¶¶ 36–37. We find his testimony to be persuasive.

Further, under cross-examination in his deposition Dr. Leger testified that (1) the detectors described in the '913 patent could not detect radiant flux density because they do not know the size of the spot hitting the

detector (Ex. 1009, 50:9–51:4, 53:21–54:1) and measuring radiant flux density cannot be done with detectors that only measure radiant flux like those described in the '913 patent (*Id.* at 82:6–10, 85:18–86:6, 145:14–146:4, 148:22–25) and (2) the '913 patent does not describe a detector or utilization means that compares radiant flux density values to determine a change (*Id.* at 163:20–25, 164:20–24).

4. Conclusions

Considering and weighing the priority document references, the testimony of Dr. Hesselink, and the testimony of Dr. Leger, we conclude that preponderance of evidence compels a determination there is insufficient written description in the specification of the '913 patent to support the proposed claims. We, therefore, deny Optical Device's Motion to Amend.

IV. CONCLUSIONS

For the foregoing reasons, we conclude that claims 48–53 of the '913 patent are unpatentable because they are anticipated by Ando. We further conclude that there is insufficient written description support for the proposed substitute claims.

V. ORDER

In consideration of the foregoing, it is

ORDERED that Toshiba has shown by a preponderance of the evidence that claims 48–53 of the '913 patent are unpatentable;

FURTHER ORDERED that, Optical Devices' Motion to Amend is denied; and

FURTHER ORDERED that, that, because this is a final written decision, parties to the proceeding seeking judicial review of the decision

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must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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