

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

LBT IP I LLC,
Patent Owner.

IPR2020-01190
Patent 8,542,113 B2

Before JOHN A. HUDALLA, SHEILA F. McSHANE, and
JULIET MITCHELL DIRBA, *Administrative Patent Judges*.

HUDALLA, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Claims Unpatentable
Denying Patent Owner's Motion to Amend
35 U.S.C. § 318(a)

Apple Inc. ("Petitioner") filed a Petition (Paper 1, "Pet.") requesting an *inter partes* review of claims 1–20 ("the challenged claims") of U.S. Patent No. 8,542,113 B2 (Ex. 1001, "the '113 patent"). LBT IP I LLC ("Patent Owner") filed a Preliminary Response (Paper 8). Taking into account the arguments presented in Patent Owner's Preliminary Response,

we determined that the information presented in the Petition established that there was a reasonable likelihood that Petitioner would prevail with respect to its unpatentability challenges. Pursuant to 35 U.S.C. § 314, we instituted this proceeding on March 4, 2021, as to all challenged claims and all grounds of unpatentability. Paper 9 (“Dec. on Inst.”).

During the course of trial, Patent Owner filed a Patent Owner Response (Paper 17, “PO Resp.”), and Petitioner filed a Reply to the Patent Owner Response (Paper 25, “Pet. Reply”). Patent Owner also filed a Sur-reply. Paper 31 (“PO Sur-reply”).

In addition, Patent Owner filed a contingent motion to amend (Paper 16, “MTA”) proposing to substitute claims 21–40 for claims 1–20, respectively, if we are to determine claims 1–20 unpatentable. Petitioner filed an opposition to the motion to amend. Paper 26 (“MTA Opp.”). On September 24, 2021, pursuant to Patent Owner’s request (*see* MTA 2), we issued Preliminary Guidance on Patent Owner’s motion to amend. Paper 28 (“PG”). Patent Owner then filed a revised motion to amend in which it proposed revised substitute claims 21–40.¹ Paper 30 (“RMTA”). Petitioner opposed Patent Owner’s revised motion to amend. Paper 34 (“RMTA Opp.”). Patent Owner filed a reply in support of its revised motion to amend (Paper 39 (“RMTA Reply”)), to which Petitioner filed a sur-reply (Paper 40 (“RMTA Sur-reply”)).

An oral hearing was held on January 7, 2022, and a transcript of the hearing is included in the record. Paper 41 (“Tr.”).

¹ Hereinafter, we refer only to the proposed substitute claims in the revised motion to amend unless otherwise noted.

Petitioner filed Declarations of Scott Andrews with its Petition (Ex. 1003), with its Reply and opposition to the motion to amend (Ex. 1080), and with its opposition to the revised motion to amend (Ex. 1081). Both parties filed a transcript of the deposition of Mr. Andrews. Exs. 1068, 2003.

We have jurisdiction under 35 U.S.C. § 6. This decision is a Final Written Decision under 35 U.S.C. § 318(a) as to the patentability of claims 1–20 of the ’113 patent. For the reasons discussed below, Petitioner has demonstrated by a preponderance of the evidence that claims 1–20 of the ’113 patent are unpatentable. We also *deny* Patent Owner’s revised motion to amend.

I. BACKGROUND

A. *Real Parties-in-Interest*

Petitioner identifies Apple Inc. as the real party-in-interest. Pet. 74. Patent Owner identifies LBT IP I LLC as the real party-in-interest. Paper 3, 2; Paper 6, 2.

B. *Related Proceedings*

The parties identify the following proceeding related to the ’113 patent (Pet. 74; Paper 3, 2; Paper 6, 2):

LBT IP I LLC v. Apple Inc., No. 1:19-cv-01245-UNA (D. Del. filed July 1, 2019).

We additionally note that Petitioner has challenged other patents owned by Patent Owner in IPR2020-01189, IPR2020-01191, IPR2020-01192, and IPR2020-01193. We issue final written decisions in

IPR2020-01189, IPR2020-01191, IPR2020-01192, and IPR2020-01193
concurrently with this Decision.

C. The '113 patent

The '113 patent is directed to location and tracking communication systems. Ex. 1001, 1:33–34. Figure 1 of the '113 patent is reproduced below.

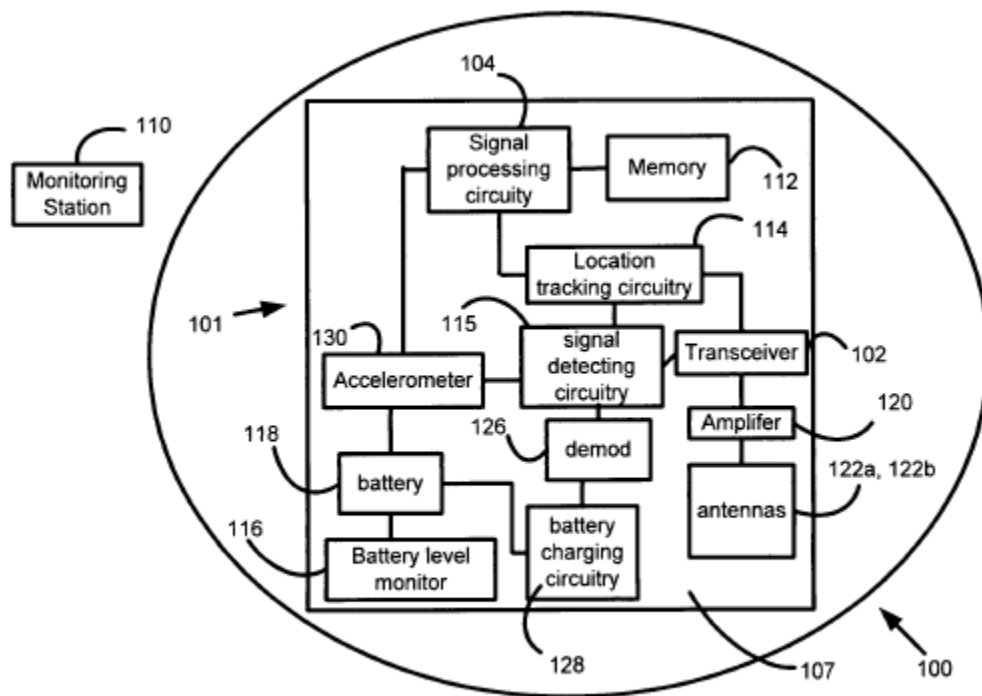


Figure 1

Figure 1 depicts a schematic of tracking device 100, which contains electronic components 101 such as transceiver 102, signal processing circuitry 104 (e.g., a microprocessor or other signal logic circuitry), and accelerometer 130. *Id.* at 4:6–8, 5:53–56. Location tracking circuitry 114 (e.g., global positioning system (GPS) circuitry) calculates location data received and sends the data to signal processing circuitry 104. *Id.* at 6:16–18. Signal detecting circuitry 115 detects and measures signal power level.

Id. at 6:21–22. Battery level monitor 116 detects a battery level of battery 118. *Id.* at 6:24–26.

Tracking device 100 periodically checks availability of a GPS signal by performing a GPS signal acquisition to determine if a receive communication signal is above a first signal level. *Id.* at 7:7–10. Location tracking circuitry 114 or transceiver 102 may be placed in a sleep or standby mode to conserve a battery level of battery 118. *Id.* at 7:4–8. Electronic tracking device 100 may resume GPS signal acquisition using GPS satellites when the acquired receive communication signal level is above the first signal level. *Id.* at 7:10–16.

Accelerometer 130 may also activate if a power level of the receive communication signal (e.g., GPS signal) is insufficient for processing. *Id.* at 9:48–50. In this case, processing unit 104 computes current location coordinates using acceleration measurements. *Id.* at 9:53–54. When the receive communication signal again becomes sufficient for processing, accelerometer 130 is deactivated and location tracking circuitry 114 is activated. *Id.* at 9:58–67. In this case, processing unit 104 resumes the calculation of location coordinates from the receive communication signal. *Id.*

The '113 patent issued from Application No. 13/356,614 (“the '614 application”) filed on January 23, 2012, which is a division of Application No. 11/969,905 (“the '905 application”) filed on January 6, 2008. Ex. 1001, codes (22), (62). As discussed below, Petitioner applies the January 6, 2008, filing date of the '905 application (i.e., the earliest possible effective filing date) for qualifying the asserted references as prior art. *See* Pet. 5, 9–12; MTA Opp. 8–9.

D. Illustrative Claim

Of the challenged claims of the '113 patent, claims 1, 7, and 17 are independent. Claims 2–6 depend from claim 1; claims 8–16 depend from claim 7; and claims 18–20 depend from claim 17. Claim 1 is illustrative of the challenged claims and recites:

1. A method to control power usage comprising:
 - measuring a receive communication signal level by primary location tracking circuitry of an electronic tracking device communicated by a primary location tracking system;
 - reducing applied power level to the primary location tracking circuitry in response to measurement of a receive communication signal level less than a first signal level;
 - increasing applied power level to supplemental location tracking circuitry response to measurement of the receive communication signal less than the first signal level;
 - determining differential positional measurements based in part on acceleration measurements of supplemental location tracking circuitry associated with a secondary location tracking system; and
 - determining positional coordinates of electronic tracking device responsive to a known reference coordinate values and the differential positional measurements.

Ex. 1001, 10:26–44.

E. Prior Art

Petitioner relies on the following prior art:

Japanese Unexamined Patent Application Publication No. JP 2004-37116A, published Feb. 5, 2004 (Ex. 1004, “Sakamoto”);²

² Sakamoto is a Japanese-language publication (Ex. 1004, 36–49, 58) that was filed with an English-language translation (*id.* at 1–19, 21–34, 52–56)

U.S. Patent Application Publication No. 2003/0217070 A1, filed Apr. 11, 2003, published Nov. 20, 2003 (Ex. 1005, “Gotoh”);

U.S. Patent No. 5,583,776, filed Mar. 16, 1995, issued Dec. 10, 1996 (Ex. 1006, “Levi”); and

U.S. Patent Application Publication No. 2007/0208544 A1, filed Mar. 1, 2007, published Sept. 6, 2007 (Ex. 1007, “Kulach”).

F. The Instituted Grounds

We instituted *inter partes* review of claims 1–20 of the ’113 patent on the following grounds (Dec. on Inst. 29), which are all the grounds presented in the Petition (Pet. 7–8):

Claims Challenged	35 U.S.C. §	References/Basis
1–20	103(a) ³	Sakamoto, Gotoh, Levi
1–20	103(a)	Sakamoto, Gotoh, Levi, Kulach

II. ANALYSIS

A. Legal Standards

A claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was

and declarations attesting to the accuracy of the translation (*id.* at 20, 50). Our citations to Sakamoto herein refer to the translation.

³ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. §§ 102, 103, and 112. Because the ’113 patent was filed before March 16, 2013 (the effective date of the relevant amendments), the pre-AIA versions of §§ 102, 103, and 112 apply.

made to a person having ordinary skill in the art to which said subject matter pertains. *See KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007).

The question of obviousness is resolved on the basis of underlying factual determinations, including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) where in evidence, so-called secondary considerations.⁴ *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

We also recognize that prior art references must be “considered together with the knowledge of one of ordinary skill in the pertinent art.” *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994) (citing *In re Samour*, 571 F.2d 559, 562 (CCPA 1978)).

B. Level of Ordinary Skill in the Art

Citing testimony from Mr. Andrews, Petitioner contends a person of ordinary skill in the art (or “POSITA”) “would have had a bachelor’s degree in Electrical Engineering, Mechanical Engineering, Computer Engineering, Computer Science, or an equivalent degree, with at least two years of experience in GPS navigation, dead reckoning, portable tracking devices, or related technologies.” Pet. 5 (citing Ex. 1003 ¶ 30). For purposes of our Decision on Institution, we adopted Petitioner’s definition of the level of ordinary skill in the art without the qualifier “at least.” Dec. on Inst. 7. Patent Owner states that it adopts this definition. PO Resp. 3; MTA 17; RMTA 17–18. Thus, we discern no reason to change the level of ordinary skill in the art applied in this Final Written Decision. Accordingly, a person

⁴ The trial record does not include any evidence of secondary considerations of nonobviousness.

of ordinary skill in the art would have had a bachelor's degree in Electrical Engineering, Mechanical Engineering, Computer Engineering, Computer Science, or an equivalent degree, with two years of experience in GPS navigation, dead reckoning, portable tracking devices, or related technologies. We determine that this definition comports with the level of skill necessary to understand and implement the teachings of the '113 patent and the asserted prior art.

C. Claim Interpretation

In an *inter partes* review, we construe each claim “in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.” 37 C.F.R. § 42.100(b). Accordingly, our claim construction standard is the same as that of a district court. *See id.* Under the standard applied by district courts, claim terms are generally given their plain and ordinary meaning as would have been understood by a person of ordinary skill in the art at the time of the invention and in the context of the entire patent disclosure. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005) (en banc). “There are only two exceptions to this general rule: 1) when a patentee sets out a definition and acts as his own lexicographer, or 2) when the patentee disavows the full scope of a claim term either in the specification or during prosecution.” *Thorner v. Sony Comput. Entm't Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012).

Neither party puts forth any terms for construction. *See* Pet. 8. We determine that no terms require explicit construction. *See, e.g., Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed.

Cir. 2017) (“[W]e need only construe terms ‘that are in controversy, and only to the extent necessary to resolve the controversy’” (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

D. Obviousness Ground Based on Sakamoto, Gotoh, and Levi

Petitioner contends the subject matter of claims 1–20 would have been obvious over the combination of Sakamoto, Gotoh, and Levi. Pet. 12–69; Pet. Reply 1–18. Patent Owner disputes Petitioner’s contentions. PO Resp. 4–16; PO Sur-reply 1–10.

1. Sakamoto

Sakamoto is a Japanese patent application publication directed to the use of a GPS positioning system that includes a portable terminal and remote server. Ex. 1004, code (57), ¶ 18. Figure 1, reproduced below, is a diagram showing a position information communication terminal.

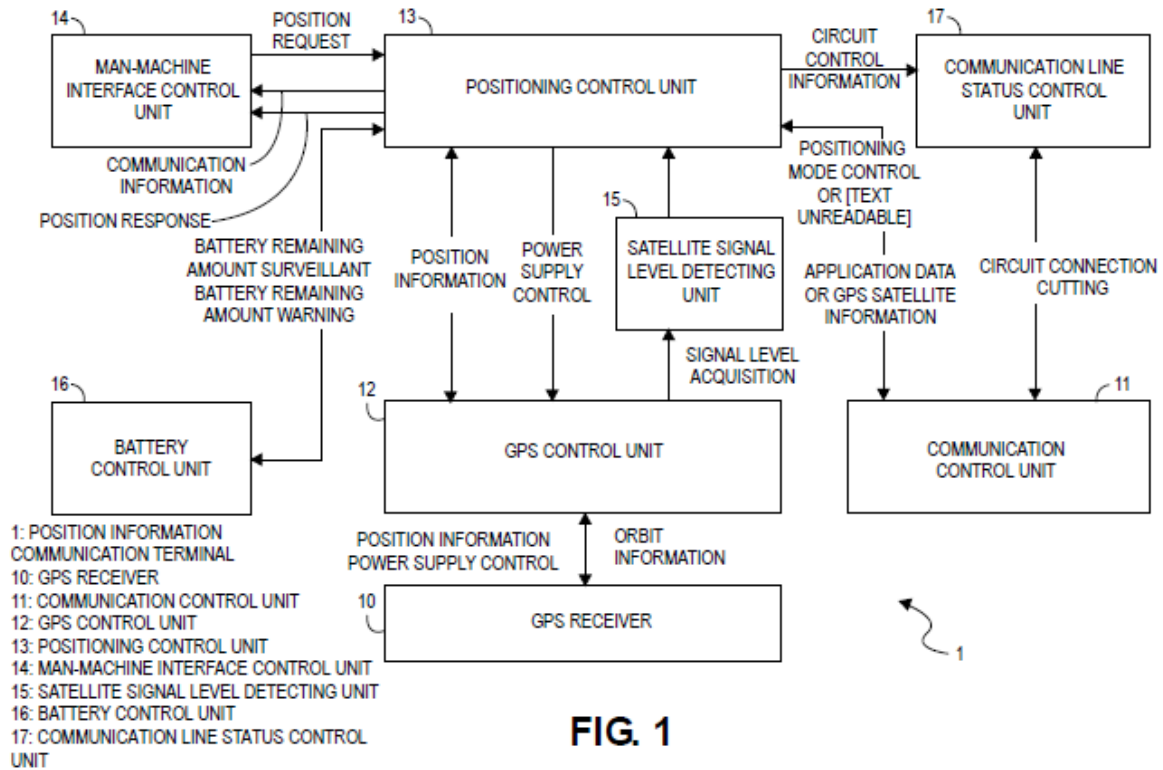


FIG. 1

Figure 1, above, depicts position information communication terminal 1, which includes GPS receiver 10, communication control unit 11 for mobile communications, GPS control unit 12, positioning control unit 13, man-machine interface control unit 14, satellite signal level detection unit 15, battery control unit 16, and communication line status control unit 17. *Id.* ¶ 19. Battery control unit 16 constantly monitors the remaining battery level. *Id.* ¶ 28. Battery control unit 16 provides positioning control unit 13 a remaining battery life warning when the remaining battery amount falls below a preset threshold value. *Id.* ¶ 19.

Satellite signal level detector 15 detects a level of the GPS signal received by GPS receiver 10 via GPS control unit 12. *Id.* When the signal level value is equal to or higher than a predetermined threshold value, positioning mode control unit 22 initiates a normal sensitivity positioning mode. *Id.* ¶ 38. Normal sensitivity positioning mode is a mode in which the

GPS receiver is operated only when necessary. *Id.* ¶¶ 4–5, 19. When the signal level value is equal to or lower than a predetermined threshold value, positioning mode control unit 22 initiates a high sensitivity positioning mode. *Id.* ¶ 38. High sensitivity positioning mode is a mode in which the GPS receiver is operated constantly. *Id.* ¶¶ 4–5, 19. When the signal level value is equal to or lower than a threshold value associated with the inability to perform positioning, positioning mode control unit 22 stops the position search.⁵ *Id.* ¶ 38. A user may select among normal sensitivity positioning mode, high sensitivity positioning mode, and the power-off of terminal 1 via man-machine interface control unit 14. *Id.* ¶¶ 26, 28.

Figure 2 of Sakamoto is reproduced below.

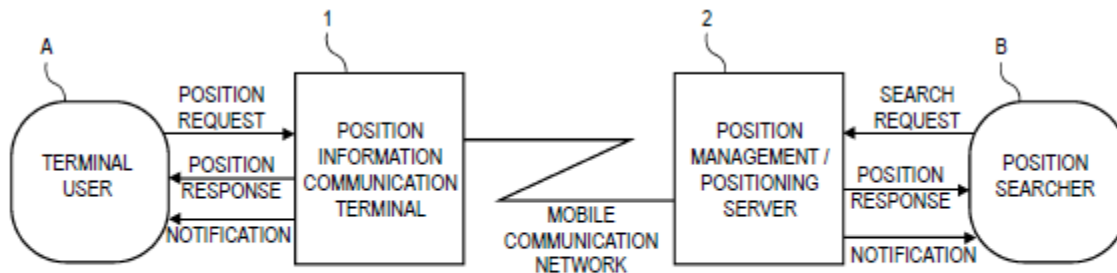


FIG. 2

Figure 2 depicts a GPS positioning system with position management/positioning server 2 connected to position information communication terminal 1 by a mobile communication network. Ex. 1004 ¶ 18. Terminal 1 responds to a position request from terminal user A by showing the position of terminal 1 to terminal user A. *Id.* Server 2 responds to a position search request of terminal 1 from position searcher B with a position response. *Id.* Server 2 may also send a position search request message to terminal 1, and

⁵ The parties refer to this state as “stop-position” mode.

terminal 1 responds by sending a search response message including position information to server 2. *See id.* ¶¶ 31–35, Figs. 4, 5.

Petitioner contends Sakamoto qualifies as prior art under 35 U.S.C. § 102(b) based on its publication date. Pet. 9. Patent Owner does not contest the prior art status of Sakamoto. We determine that Sakamoto qualifies as prior art under 35 U.S.C. § 102(b) because Sakamoto’s publication date of February 5, 2004, is more than one year before the earliest effective filing date of the challenged claims, which is January 6, 2008. Ex. 1001, code (62); Ex. 1004, code (43).

2. *Gotoh*

Gotoh is a U.S. patent application publication directed to a positional information management system and method. Ex. 1005 ¶ 2. Figure 1 of Gotoh is reproduced below.

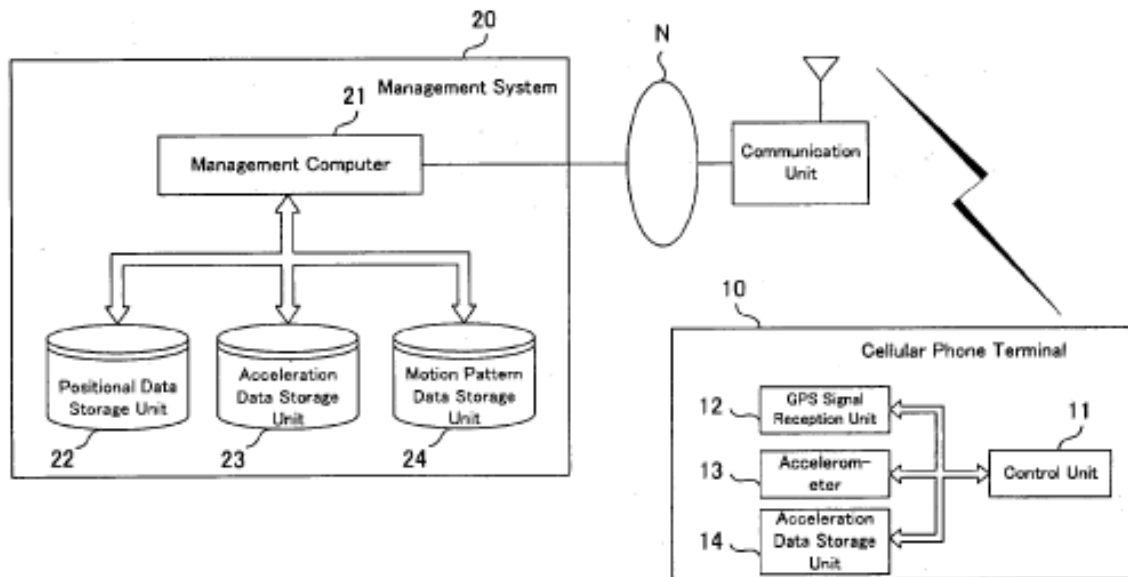


Figure 1, above, depicts an embodiment of a positional management system. *Id.* ¶¶ 43, 50, 51. Cellular phone terminal 10 comprises GPS signal reception unit 12, accelerometer 13, acceleration data storage unit 14, and

control unit 11. *Id.* ¶ 51. GPS signal reception unit 12 receives GPS signals from GPS satellites. *Id.* ¶ 53. Accelerometer 13 measures the acceleration applied to cellular phone terminal 10 and stores acceleration data in acceleration data storage unit 14 in time series. *Id.* Control unit 11 controls GPS signal reception unit 12 and accelerometer 13 and includes a wireless communication function for communicating with communication system 30 (not shown). *Id.* ¶ 52. Management system 20 is a computer system for managing positional information received from cellular phone terminal 10. *Id.* ¶ 56.

Cellular phone terminal 10 starts measuring the acceleration when cellular phone terminal 10 cannot receive GPS signals. *Id.* ¶ 66. Control unit 11 sends the acceleration data (including measurement start time and an acceleration log) stored in acceleration data storage unit 14 to management system 20 through communication system 30. *Id.* ¶ 84. Management system 20 includes management computer 21, which receives the acceleration data and then stores the data in acceleration data storage unit 23. *Id.* ¶ 85. Management computer 21 derives a distance traveled between the acceleration measurement start time and a measurement end time based on the acceleration data. *Id.* ¶ 90.

Petitioner contends Gotoh qualifies as prior art under 35 U.S.C. § 102(b) based on its publication date. Pet. 10. Patent Owner does not contest the prior art status of Gotoh. We determine that Gotoh qualifies as prior art under 35 U.S.C. § 102(b) because Gotoh's publication date of November 20, 2003, is more than one year before the earliest effective filing date of the challenged claims, which is January 6, 2008. Ex. 1001, code (62); Ex. 1005, code (43).

3. *Levi*

Levi is a U.S. patent directed to the use of a portable navigation device that integrates GPS data, dead reckoning (DR) sensors, and digital maps into a self-contained navigation instrument. Ex. 1006, code (57), 1:60–63. The device uses an accelerometer to provide acceleration data indicative of footsteps, and sensed footsteps are converted to distance and velocity. *Id.* at 3:13–14, 3:35–36. A DR software module performs DR navigation by sampling vector velocities for incremental course changes. *Id.* at 7:64–66. The DR software accesses compass, altimeter, pedometer frequency, and calibration table data to obtain velocity magnitude and three-dimensional direction. *Id.* at 8:1–3. DR software normally uses GPS to obtain starting positions, but when GPS data is not valid, DR uses the last fix, whether GPS or manual, for a start point. *Id.* at 8:3–7. DR navigation is automatically used by the navigation module when GPS is unavailable. *Id.* at 8:7–9. The DR system allows users to designate landmarks for navigation. *Id.* at 8:50–9:52.

Petitioner contends Levi qualifies as prior art under 35 U.S.C. § 102(b) based on its issue date. Pet. 10. Patent Owner does not contest the prior art status of Levi. We determine that Levi qualifies as prior art under 35 U.S.C. § 102(b) because Levi's issue date of December 10, 1996, is more than one year before the earliest effective filing date of the challenged claims, which is January 6, 2008. Ex. 1001, code (62); Ex. 1006, code (45).

4. *Claim 1*

a. Preamble and Claim Limitations

The preamble of claim 1 recites “[a] method to control power usage.” Ex. 1001, 10:26. Petitioner relies on Sakamoto’s teachings of stopping a position search based on a satellite signal level equal to or lower than a predetermined threshold, which results in a reduction in power consumption. Pet. 12, 28 (citing Ex. 1003 ¶¶ 132, 146–147; Ex. 1004 ¶¶ 38, 50). Patent Owner does not contest Petitioner’s analysis of the preamble. Neither party addresses whether the preamble is limiting. We are persuaded that Sakamoto’s GPS positioning system switches operating modes and stops position searching when the received GPS signal level is low, which reduces power consumption. *See, e.g.*, Ex. 1003 ¶¶ 132, 146–147; Ex. 1004 ¶¶ 38, 50. Because Petitioner has shown that Sakamoto teaches the preamble, we need not determine whether the preamble is limiting. *See Nidec*, 868 F.3d at 1017.

Claim 1 further recites “measuring a receive communication signal level by primary location tracking circuitry of an electronic tracking device communicated by a primary location tracking system.” Ex. 1001, 10:27–30. For the recited “primary location tracking system,” Petitioner cites Sakamoto’s teaching of GPS satellites from which GPS satellite signals are received. Pet. 21–22 (citing Ex. 1003 ¶ 137; Ex. 1004 ¶¶ 5, 19, code (57)). For the recited “electronic tracking device,” Petitioner cites Sakamoto’s GPS receiver 10, GPS control unit 12, positioning control unit 13, communication control unit 11, satellite signal level detection unit 15, communication line status control unit 17, and battery control unit 16, which Petitioner calls collectively the “*Sakamoto* Electronic Components,” in combination with

Gotoh's accelerometer. *Id.* at 12–13 (citing Ex. 1003 ¶ 133; Ex. 1005 ¶¶ 53, 66, 81, 82), 22–23 (citing Ex. 1003 ¶ 139; Ex. 1004 ¶¶ 19, 37, 38, Figs. 1–3). Petitioner maps the recited “primary location tracking circuitry” to Sakamoto's GPS receiver 10, GPS control unit 12, satellite signal level detecting unit 15, and positioning control unit 13, which Petitioner calls collectively the “*Sakamoto* GPS Components.” *Id.* at 24 (citing Ex. 1003 ¶ 143; Ex. 1004 ¶ 19). According to Petitioner, satellite signal level detection unit 15 detects (i.e., measures) the level of the GPS satellite signal received by the GPS receiver 10 (i.e., the “receive communication signal”) via the GPS control unit 12. *Id.* at 29 (citing Ex. 1003 ¶¶ 152–154; Ex. 1004 ¶¶ 8, 19, 22, 50).

Patent Owner does not contest Petitioner's analysis of the “measuring” limitation. We are persuaded Sakamoto teaches that the “*Sakamoto* GPS Components” measure received signal levels received from GPS satellites. *See, e.g.*, Ex. 1003 ¶¶ 152–154; Ex. 1004 ¶¶ 8, 19, 22, 50.

Claim 1 further recites “reducing applied power level to the primary location tracking circuitry in response to measurement of a receive communication signal level less than a first signal level.” Ex. 1001, 10:31–33. Petitioner cites the following teaching from Sakamoto: “If it is determined that the positioning cannot be performed when the signal level value is equal to or lower than a predetermined threshold value, the position search may be stopped.” Pet. 35 (quoting Ex. 1004 ¶ 38). Petitioner maps the recited “first signal level” to Sakamoto's predetermined threshold value. *Id.* at 35–36. Petitioner further cites Sakamoto's teaching that “power consumption can be reduced by stopping the position search when positioning is not possible.” *Id.* at 36 (quoting Ex. 1004 ¶ 50) (emphasis

omitted). Petitioner contends an ordinarily skilled artisan “would have understood or found obvious [that] power applied to the *Sakamoto* GPS Components (i.e., primary location tracking circuitry) is reduced because position searching is stopped when a GPS signal level value is equal to or lower than a predetermined threshold value.” *Id.* at 36–37 (citing Ex. 1003 ¶ 173).

Patent Owner disputes Petitioner’s analysis of the “reducing” limitation. PO Resp. 4–15; PO Sur-reply 1–6. In particular, Patent Owner argues that “the reduction of power required by claim 1 cannot be read to eliminate the ability of the invention to receive and measure a signal strength level for reactivation as required by claim 3.” PO Resp. 5. Patent Owner notes that power is cut off to Sakamoto’s GPS receiver 10 when it is in stop-position mode. *Id.* at 10–11 (citing Pet. 37). Citing Mr. Andrews’s deposition testimony that “GPS receiver 10 is the only component in Sakamoto that receives the GPS satellite signal,” Patent Owner argues that Sakamoto’s system cannot be reactivated in response to a signal level. *Id.* at 11–12 (citing Ex. 2003, 14:5–16:2).

We do not agree with Patent Owner’s arguments because they are not commensurate with the scope of claim 1. Specifically, claim 1 requires reducing power to the primary location tracking circuitry, not reactivating the primary location tracking circuitry. *Compare* Ex. 1001, claim 1, *with id.* at claim 3. Thus, Patent Owner’s arguments do not undermine Petitioner’s persuasive showing that Sakamoto teaches stopping GPS position searching when the received signal level is below a predetermined threshold value (i.e., “a first signal level”). *See, e.g.,* Ex. 1004 ¶ 38. Sakamoto states expressly that this results in a reduction in power consumption. *See id.* ¶ 50.

Thus, we are persuaded that Sakamoto teaches the “reducing” limitation. And, even if Patent Owner’s arguments regarding “reactivation” were commensurate with the language of claim 1, we would not agree with them for the same reasons discussed with respect to the “reactivating” limitation of claim 3 as discussed below. *See infra* § II.D.6.

Claim 1 further recites “increasing applied power level to supplemental location tracking circuitry response to measurement of the receive communication signal less than the first signal level.” Ex. 1001, 10:34–37. Petitioner maps the recited “supplemental location tracking circuitry” to Gotoh’s accelerometer 13. Pet. 26–27 (citing Ex. 1005 ¶ 51, Fig. 1). Petitioner cites Gotoh’s teaching of cellular phone terminal 10 that “starts measuring the acceleration in a case where the cellular phone terminal 10 can not [sic] receive GPS signals.” *Id.* at 40 (quoting Ex. 1005 ¶ 66) (emphases omitted). In light of Gotoh’s teaching, Petitioner contends an ordinarily skilled artisan would have known “to use accelerometer data in situations where GPS signals cannot be received due to poor GPS signal reception, and thus increase applied power to the accelerometer to start measuring acceleration data only when such functionality was needed.” *Id.* at 41 (citing Ex. 1003 ¶ 184). And, as discussed above, Petitioner maps the “predetermined threshold level” to the satellite signal level at which GPS position searching is stopped, as taught by Sakamoto. *Id.* at 38–39 (citing Ex. 1004 ¶¶ 38, 50).

Patent Owner does not dispute Petitioner’s analysis of the “increasing” limitation. We are persuaded that the combination of Sakamoto and Gotoh teaches increasing power to Gotoh’s accelerometer (i.e., “supplemental location tracking circuitry”) when GPS position searching is

stopped due to poor GPS signal reception. *See, e.g.*, Ex. 1003 ¶ 184; Ex. 1004 ¶ 38; Ex. 1005 ¶¶ 51, 66.

Claim 1 further recites “determining differential positional measurements based in part on acceleration measurements of supplemental location tracking circuitry associated with a secondary location tracking system.” Ex. 1001, 10:38–41. For “determining differential positional measurements,” Petitioner cites Levi’s teachings on “the well-known technique of determining a position based on displacement from a known starting position (i.e., dead reckoning).” Pet. 46. Specifically, Levi teaches that “‘dead reckoning’ (DR) refers to a **position solution** that is obtained by **measuring or deducing displacements** from a known starting point in **accordance with motion** of the user.” *Id.* (quoting Ex. 1006, 1:13–16) (emphases by Petitioner). Petitioner further maps the recited “supplemental location tracking circuitry associated with a secondary location tracking system” to “[t]he *Sakamoto* positioning control unit 13 programmed to perform *Levi*’s DR functionality . . . in combination with an accelerometer as taught by both *Gotoh* and *Levi*.” *Id.* at 27 (citing Ex. 1003 ¶ 145). Citing testimony from Mr. Andrews, Petitioner contends that “*Levi*’s use of acceleration data from the user’s movement (e.g., footsteps) to determine the displacement (through known mathematical techniques) indicates the *Levi* DR system is determining the differential positional measurements and that such measurements are ‘based in part on acceleration measurements.’” *Id.* at 46–47 (citing Ex. 1003 ¶¶ 191–195; Ex. 1006, 1:19–25, 1:49–55, 3:13–16, 7:64–8:3).

Patent Owner does not contest Petitioner’s analysis of this limitation. We are persuaded that an ordinarily skilled artisan would have implemented

Levi's teachings on dead reckoning using Gotoh's accelerometer to obtain differential positional measurements. *See, e.g.*, Ex. 1003 ¶¶ 145, 191–195; Ex. 1005 ¶¶ 51, 66; Ex. 1006, 1:13–16, 1:19–25, 1:49–55, 3:13–16, 7:64–8:3.

Claim 1 further recites “determining positional coordinates of electronic tracking device responsive to a known reference coordinate values and the differential positional measurements.” Ex. 1001, 10:42–44. For “determining positional coordinates,” Petitioner cites Levi's teaching of “continuously displaying the user's position on the navigation device's graphical display.” Pet. 47 (citing Ex. 1006, 2:5–14, 7:39–45, 8:25–26). Petitioner also contends that an ordinarily skilled artisan “would have readily understood that dead reckoning, as taught by *Levi*, determines a position of the user.” *Id.* (citing Ex. 1003 ¶ 198; Ex. 1006, 1:13–17, 1:49–55). Regarding the recited “known reference coordinate values,” Petitioner cites Levi's teaching that “DR calculates an incremental change in position from a known starting point.” *Id.* at 48 (citing Ex. 1006, 7:49–52, 8:42–44) (emphasis omitted). Patent Owner does not contest Petitioner's analysis of this limitation. We are persuaded that Levi teaches determining a user's position based on a known starting point via dead reckoning. *See, e.g.*, Ex. 1003 ¶ 198; Ex. 1006, 1:13–17, 1:49–55, 2:5–14, 7:39–45, 7:49–52, 8:25–26, 8:42–44.

For these reasons, Petitioner has established that the combination of Sakamoto, Gotoh, and Levi teaches all limitations of claim 1.

b. Reasons for the Combination

Petitioner contends an ordinarily skilled artisan

would have found it obvious and been motivated to combine *Gotoh*'s supplemental location tracking in the form of an accelerometer with *Sakamoto*'s system employing GPS for determining a position in order to increase applied power level to the accelerometer when the receive communication signal level is less than a first signal level, as taught by *Sakamoto*.

Pet. 13 (citing Ex. 1003 ¶ 109). Petitioner further contends “[i]t was . . . well-known that an accelerometer was readily available for supplemental position determination when GPS location determination was unavailable (e.g., due to weak signal).” *Id.* at 14 (citing Ex. 1003 ¶¶ 110–111). Petitioner additionally contends “it would have been obvious and simple to add an accelerometer to *Sakamoto*'s terminal, as *Sakamoto* already includes a positioning control unit performing evaluation of the signal strength and other processing steps.” *Id.* at 15 (citing Ex. 1003 ¶ 116). In this way, Petitioner proposes modifying “*Sakamoto*'s positioning control unit 13 such that it would have been capable of receiving signals from the accelerometer of *Gotoh* and performing necessary processing.” *Id.* at 16 (citing Ex. 1003 ¶ 118). Petitioner characterizes this as a desirable and straightforward improvement to *Sakamoto*'s system for computing positioning when a GPS signal is insufficient. *Id.* at 14 (citing Ex. 1003 ¶¶ 114–115). Citing testimony from Mr. Andrews, Petitioner also contends that an ordinarily skilled artisan would have had a reasonable expectation of success in making the combination. *Id.* at 15 (citing Ex. 1003 ¶ 117).

Petitioner also contends an ordinarily skilled artisan would have implemented Levi's DR techniques in *Sakamoto*'s GPS system as modified with *Gotoh*'s accelerometer. Pet. 49 (citing Ex. 1003 ¶ 201). Petitioner

notes that “both *Gotoh* and *Levi* teach employing an accelerometer to supplement the GPS when GPS signals are unavailable.” *Id.* Petitioner further notes that *Gotoh* teaches the use of an accelerometer for determining displacement, whereas *Levi* teaches the use of an accelerometer for determining displacement and position. *Id.* (citing Ex. 1003 ¶ 202). Petitioner contends that modifying the accelerometer in the combined Sakamoto–*Gotoh* system to perform *Levi*’s dead reckoning steps uses a known technique in a similar device to obtain a predictable result, namely, “determining position via acceleration measurements when GPS is unavailable.” *Id.* at 49–50 (citing Ex. 1003 ¶ 202). According to Petitioner, the combination obtains the benefit of local supplemental location determination in the absence of a GPS signal. *Id.* at 50 (citing Ex. 1003 ¶ 202).

Patent Owner does not dispute Petitioner’s rationale for the combination. We are persuaded that an ordinarily skilled artisan would have modified Sakamoto’s terminal to include *Gotoh*’s accelerometer, which is used to record acceleration data when the terminal is unable to receive GPS signals. *See, e.g.,* Ex. 1003 ¶¶ 112–118; Ex. 1005 ¶ 81. We are further persuaded that an ordinarily skilled artisan would have implemented *Levi*’s dead reckoning techniques in the combined system to determine differential position coordinates based on accelerometer data. *See, e.g.,* Ex. 1003 ¶¶ 201–202. We note that the secondary references themselves provide reasons for the combination insofar as *Gotoh* and *Levi* both teach the use of an accelerometer to supplement GPS positioning when a GPS signal is lost. *See* Ex. 1005 ¶ 66; Ex. 1006, 2:10–14. We are also persuaded by Mr. Andrews’s uncontested testimony that an ordinarily skilled artisan

would have reasonably expected success in making the combination. *See, e.g.,* Ex. 1003 ¶¶ 117, 202. For these reasons, Petitioner has established that an ordinarily skilled artisan would have had reasons to combine Gotoh and Levi with Sakamoto.

c. Conclusion Regarding Claim 1

Petitioner has persuasively shown that the combination of Sakamoto, Gotoh, and Levi teaches all limitations of claim 1. Petitioner also has put forth persuasive reasons for combining these references and has established that an ordinarily skilled artisan would have expected success in making the combination. On the entire trial record, we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 1 would have been obvious over the combination of Sakamoto, Gotoh, and Levi.

5. Claim 2

Claim 2 depends from claim 1 and recites that

the receive communication signal less than a first signal level comprises an attenuated receive communication signal less than a first signal level in response to the electronic tracking device moving to at least one of a partially enclosed or substantially enclosed structure at least partially blocked from communication with the primary location tracking system.

Ex. 1001, 10:45–51. Petitioner cites a description in the background section of the '113 patent regarding the problem of GPS signals being attenuated when moving indoors to a partially enclosed or substantially enclosed structure. Pet. 51 (citing Ex. 1001, 2:65–3:21). Petitioner contends that this description serves as an admission that the problem was well-known in the art. *Id.*; *see also* Ex. 1003 ¶¶ 60, 63–67, 206–209 (Mr. Andrews's testimony

regarding the problem of GPS signal attenuation being known in the art). Petitioner also cites Levi's teaching that "GPS data can be either unreliable or unavailable due to antenna shading, jamming, or interference." Pet. 51 (quoting Ex. 1006, 1:59–60). Petitioner additionally cites Sakamoto's teaching that "GPS signals may be unavailable, such that position searching with the GPS receiver is 'not possible.'" *Id.* at 52 (quoting Ex. 1004 ¶ 50). In light of these teachings, Petitioner contends "[i]t would have been obvious to a POSITA [that] the GPS signal disclosed in *Sakamoto* as being below a first signal level is attenuated in response to at least the GPS receiver 10 being moved into a partially enclosed or substantially enclosed structure." *Id.* Petitioner further contends that "it would have been obvious to a POSITA [that] a cause of the attenuated signal, i.e., the signal below a predetermined threshold value taught by *Sakamoto*, was antenna shading or interference, as taught by *Levi*, from being indoors, as described as prior art by the '113 Patent." *Id.* (citing Ex. 1003 ¶¶ 208–209). Patent Owner relies on the same arguments discussed above with respect to claim 1.

Claim 2 is directed to a particular usage scenario wherein the user moves into a structure that at least partially blocks communication with the primary location tracking system. As noted by Petitioner (Pet. 51), the '113 patent describes this scenario in its background section as being known in the art. *See* Ex. 1001, 2:63–3:3 ("[A] minimal GPS signal level may not be detectable when an individual or object is not located in a skyward position. For instance, when an individual or object carrying a GPS transceiver enters a covered structure . . . , GPS satellite communication signals may be obstructed or partially blocked."). That this issue was known in the art is substantiated by Mr. Andrews's unrebutted testimony, where he

surveys numerous contemporaneous references regarding, *inter alia*, GPS signal attenuation due to physical obstacles, such as buildings. Ex. 1003 ¶¶ 60, 63–67. Petitioner also cites Levi’s teaching of GPS “antenna shading” and Sakamoto’s teaching of GPS positioning being impossible when GPS signals are unavailable. Ex. 1003 ¶¶ 207–208; Ex. 1004 ¶¶ 38, 50; Ex. 1006, 1:59–60. In light of these teachings, we are persuaded that an ordinarily skilled artisan would have known to associate an attenuated signal below a predetermined threshold value (as discussed in claim 1) with antenna shading due to being in a partially or substantially enclosed structure. *See, e.g.*, Ex. 1003 ¶¶ 60, 63–67, 206–209. Thus, we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 2 would have been obvious over the combination of Sakamoto, Gotoh, and Levi.

6. *Claim 3*

Claim 3 depends from claim 1 and further recites “reactivating the primary location tracking circuitry in response to measurement of the receive communication signal above the first signal level.” Ex. 1001, 10:53–55. For the recited “reactivating,” Petitioner cites the transition from Sakamoto’s stop-position mode to normal mode. Pet. 52–53. Specifically, Petitioner cites Sakamoto’s teaching that “if it is determined that the normal sensitivity positioning mode is required **when the signal level value is equal to or higher than a predetermined threshold value**,” then the system places the GPS receiver in normal mode. *Id.* (quoting Ex. 1004 ¶ 38) (alteration omitted) (emphases by Petitioner). According to Petitioner, “[a] POSITA would have understood from *Sakamoto* that when position

searching is stopped in stop-position searching mode (GPS receiver power level reduced), and then subsequently, the signal level detected is greater than the predetermined threshold level and normal mode is thereby designated, then GPS receiver is ‘reactivated.’” *Id.* at 53 (citing Ex. 1003 ¶ 212).

In support of its contentions, Petitioner cites Sakamoto’s teaching that the satellite signal level is measured periodically “at the cycle set in advance.” Pet. Reply 1–4 (quoting Ex. 1004 ¶ 37). Petitioner also highlights Mr. Andrews’s testimony that the “process of requesting measurements and measuring a receive communication signal level would have been performed automatically according to the ‘cycle set in advance.’” *Id.* at 5 (quoting Ex. 1003 ¶ 160). Finally, Petitioner notes that it “**does not map** the periodic measurement of the satellite signal level ‘at the cycle set in advance’ as the claimed ‘reactivating the primary location tracking circuitry.’” *Id.* at 9 (citing Pet. 53–54). Petitioner also disavows any mapping of the “reactivating” limitation to Sakamoto’s manual activation. *Id.* at 3, 15 (both citing Ex. 1003 ¶ 161).

Patent Owner argues that power is cut to GPS receiver 10 in Sakamoto’s stop-position mode, and GPS receiver 10 is the only component that receives GPS satellite signals. PO Resp. 11–12 (citing Pet. 37; Ex. 1004 ¶¶ 19, 27). As such, Patent Owner contends that “Sakamoto cannot then reactivate GPS receiver 10 or any component of GPS receiver 10 ‘in response to measurement of the receive communication signal above the first signal level.’” *Id.* Patent Owner explains that “the claimed primary location tracking circuitry cannot both (1) include the only ability to receive GPS signals and (2) be turned off completely when the power is reduced.”

Id. at 10. In support of its contentions, Patent Owner cites Mr. Andrews’s cross-examination testimony that GPS receiver 10 is the only component in Sakamoto that receives GPS satellite signals. *Id.* at 11 (citing Ex. 2003, 14:5–16:2). According to Patent Owner, Mr. Andrews “conceded that Sakamoto does not teach reactivating the GPS receiver 10 from the stop-position mode in response to a signal level.” *Id.* at 12–13 (citing Ex. 2003, 20:1–4, 23:10–11). Patent Owner also argues that Sakamoto only discloses manual activation of GPS receiver 10 after it has been placed in stop-position mode. *Id.* at 14 (citing Ex. 1004 ¶ 20). Finally, Patent Owner characterizes Mr. Andrews’s testimony as being speculative and unsupported by Sakamoto. PO Sur-reply 6–10.

We do not agree with Patent Owner’s arguments. “[T]he test for obviousness is what the combined teachings of the references would have suggested to those having ordinary skill in the art.” *In re Mouttet*, 686 F.3d 1322, 1333 (Fed. Cir. 2012). Here, Petitioner has presented testimony from Mr. Andrews as to how an ordinarily skilled artisan would have interpreted Sakamoto’s monitoring of a satellite signal level “at the cycle set in advance” in conjunction with Sakamoto’s teachings of how and when to move among various positioning modes. *See* Ex. 1003 ¶ 160; Ex. 1004 ¶¶ 37–38; Ex. 1080 ¶¶ 3–4. Based on Sakamoto’s description, we are persuaded that measuring signal levels would have been performed automatically according to a predetermined cycle time. *See* Pet. Reply 1–4; Ex. 1003 ¶ 160; Ex. 1004 ¶¶ 37–38. Petitioner also cites Sakamoto’s express teaching of implementing normal sensitivity positioning mode “when the signal level value is equal to or higher than a predetermined threshold value.” Pet. 52–53 (emphasis omitted) (quoting Ex. 1004 ¶ 38).

In light of this, we are persuaded by Mr. Andrews’s testimony that an ordinarily skilled artisan would have known that Sakamoto’s periodic detection of a satellite signal (Ex. 1004 ¶ 37) showing a signal level above a threshold level associated with normal mode (*id.* ¶ 38) would result in “reactivating” the GPS receiver by transitioning it from stop-position to normal mode. Pet. 52–53; Pet. Reply 8–10; Ex. 1003 ¶ 212.

Against Petitioner’s showing, Patent Owner has only put forth attorney argument. Although Patent Owner purports to find concessions in Mr. Andrews’s cross-examination testimony such that we should discount his testimony (*see* PO Resp. 12–13 (quoting Ex. 2003, 20:1–4)), we do not agree after considering his testimony in context. *See* Pet. Reply 15–18 (quoting Ex. 2003, 19:8–20:22). In particular, Mr. Andrews testified on cross-examination that Sakamoto’s receiver turns on briefly while in stop-position mode to check the level of the GPS signals. Ex. 2003, 19:16–25. We also agree with Petitioner that Mr. Andrews “explained that the reactivation of the GPS receiver occurs when the GPS signal level is measured ‘above that stop-position threshold.’” Pet. Reply 17 (quoting Ex. 2003, 20:12–13, 20:21–22). As such, his testimony is consistent with Sakamoto’s disclosure of (1) cyclically checking satellite signal levels (Ex. 1004 ¶ 37) and (2) moving to normal positioning mode (i.e., “reactivating”) if the signal level is above a predetermined threshold value (*id.* ¶ 38).

Patent Owner also contends that Mr. Andrews’s cross-examination testimony was speculative based on his use of certain conditional words. PO Sur-reply 2, 7–8 (quoting Ex. 2003, 23:10–24:3) (highlighting words such as “possible,” “maybe,” and “presumably”). We do not agree with Patent

Owner that these words undermine Mr. Andrews’s testimony when the substance of his testimony is consistent with his declarations and the teachings of Sakamoto. Although Mr. Andrews acknowledges that Sakamoto does not describe the details of GPS receiver operation for signal checking (Ex. 2003, 21:7–8, 23:1–11), he provides testimony as to how an ordinarily skilled artisan would have interpreted Sakamoto’s teachings related to signal checking (*id.* at 19:8–21:20, 23:10–24:10, 32:16–33:14, 34:12–35:4). His testimony is consistent with Sakamoto’s teaching of checking GPS signals “at the cycle set in advance” (*see* Ex. 1003 ¶ 160; Ex. 1004 ¶ 37; Ex. 1080 ¶¶ 3–4) and of setting the operational mode based on a measured GPS signal level (*see* Ex. 1003 ¶¶ 88, 211–213; Ex. 1004 ¶ 38; Ex. 1080 ¶¶ 5–7).

Nor do we find Sakamoto’s teaching of manual activation (*see* Ex. 1004 ¶ 20) to be inconsistent with Mr. Andrews’s testimony about Sakamoto. Nothing in Sakamoto states that “pressing the button provided on the man-machine interface control unit 14” is the exclusive way to move out of stop-position mode. *Id.* We also are persuaded by Mr. Andrews’s testimony that “a POSITA would have recognized that Sakamoto’s system would have been configured to transition from one of the modes to any other mode (including directly from stop-position searching mode to normal mode and/or vice versa) when appropriate.” Ex. 1003 ¶ 171.

Based on Petitioner’s evidence from Sakamoto and Mr. Andrews’s testimony as to how an ordinarily skilled artisan would have interpreted Sakamoto, we are persuaded that Sakamoto teaches the “reactivating” limitation of claim 3.

Claim 3 further recites that “the primary location tracking system comprises a wireless location tracking system” and that “the supplemental location tracking system comprises an accelerometer.” Ex. 1001, 10:56–59. As discussed in claim 1, Petitioner maps the “primary location tracking system” to Sakamoto’s GPS positioning system. *See* Pet. 54–55; *see also supra* § II.D.4.a. Petitioner contends that an ordinarily skilled artisan would have known GPS signals received from GPS satellites are transmitted wirelessly. Pet. 54 (citing Ex. 1003 ¶ 214; Ex. 1005 ¶ 53). As also discussed in claim 1, Petitioner maps the recited “supplemental location tracking circuitry” to Gotoh’s accelerometer. *See* Pet. 55; *see also supra* § II.D.4.a. (Petitioner’s obviousness analysis for the limitations in claim 1). Petitioner contends this mapping applies equally to the “supplemental location tracking *system*” (emphasis added) of claim 3, which Petitioner contends does not have antecedent basis. Pet. 55 (citing Ex. 1003 ¶ 216). Patent Owner does not dispute Petitioner’s analysis of these limitations. Based on the same analysis discussed above with respect to claim 1 (*see supra* § II.D.4), we are persuaded that Sakamoto’s GPS positioning system teaches the recited “wireless location tracking system” and Gotoh’s accelerometer teaches the recited “supplemental location tracking system.”

Claim 3 further recites that “the known reference coordinate values comprise last known coordinate values of the electronic tracking device.” Ex. 1001, 10:60–62. Petitioner cites Levi’s teaching of “dead reckoning to determine a current position by calculating the displacement from a ‘known starting point’ or ‘a last fix’ (whether GPS or manual) for a start point.” Pet. 55–56 (citing Ex. 1006, 8:3–7, 8:41–44). Patent Owner does not dispute Petitioner’s analysis of this limitation. We are persuaded that Levi’s

“last fix” teaches the recited “last known coordinate values” for dead reckoning. *See, e.g.*, Ex. 1006, 8:3–7, 8:41–44.

Thus, we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 3 would have been obvious over the combination of Sakamoto, Gotoh, and Levi.

7. *Claim 4*

Claim 4 depends from claim 1 and recites “the primary location tracking circuitry is configured to communicate with a satellite based location tracking system.” Ex. 1001, 10:63–65. Petitioner notes that the “*Sakamoto* GPS Components,” which Petitioner maps to the “primary location tracking circuitry” in claim 1 (*see supra* § II.D.4.a), include GPS receiver 10 that “receives GPS satellite signals from GPS satellites.” Pet. 56 (quoting Ex. 1004 ¶ 19). Citing testimony from Mr. Andrews, Petitioner contends an ordinarily skilled artisan would have known “the GPS satellites are part of a satellite based location tracking system.” *Id.* (citing Ex. 1003 ¶ 220). Patent Owner relies on the same arguments discussed above with respect to claim 1. We are persuaded that the “*Sakamoto* GPS Components” communicate with a satellite-based location tracking system. *See, e.g.*, Ex. 1003 ¶ 220; Ex. 1004 ¶ 19. Thus, we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 4 would have been obvious over the combination of Sakamoto, Gotoh, and Levi.

8. *Claim 5*

Claim 5 depends from claim 1 and recites “the primary location tracking circuitry is configured to communicate with at least one of a

portable wireless communication device, another tracking device, or a wireless communication monitoring station.” Ex. 1001, 10:66–11:3. Petitioner cites Sakamoto’s position management/positioning server 2 for teaching the recited “wireless communication monitoring station.” Pet. 57 (citing Ex. 1004 ¶ 30). Petitioner contends position management/positioning server 2 communicates wirelessly with terminal 1 across a mobile communication network. *Id.* (citing Ex. 1004 ¶¶ 11–13, 18, 19, 30). Petitioner also notes that the “*Sakamoto* GPS Components” mapped to the recited “primary location tracking circuitry” for claim 1 are part of terminal 1. *Id.* According to Petitioner, the communication between position management/positioning server 2 and terminal 1 includes position information. *Id.* at 58 (citing Ex. 1004 ¶¶ 30–32, 35, Fig. 2). Patent Owner relies on the same arguments discussed above with respect to claim 1. We are persuaded that Sakamoto’s terminal 1, which includes the “primary location tracking circuitry,” is configured to communicate wirelessly with server 2, including sending position information. *See, e.g.*, Ex. 1004 ¶¶ 11–13, 18, 19, 30–32, 35, Fig. 2. Thus, we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 5 would have been obvious over the combination of Sakamoto, Gotoh, and Levi.

9. *Claim 6*

Claim 6 depends from claim 1 and recites “the supplemental location tracking circuitry is configured to communicate with at least one of a portable wireless communication device, another tracking device, or a wireless communication monitoring station.” Ex. 1001, 11:4–8. Petitioner notes its mapping of claim 1 wherein “*Sakamoto* teaches a position

searcher B searches a position of terminal 1” and “*Levi* teaches performing DR calculations at a portable terminal.” Pet. 59; *see supra* § II.D.4.a. According to Petitioner, “*Gotoh*’s accelerometer and *Levi*’s DR teachings allow for position tracking of terminal 1” in Petitioner’s proposed combination when GPS signals are too weak. Pet. 59; *see supra* § II.D.4.a. As such, and following the same analysis as for claim 5 (*see supra* § II.D.8), Petitioner contends an ordinarily skilled artisan

would have found it obvious and been motivated to modify *Sakamoto*’s system to respond to a position request from searcher B by communicating positioning information (e.g., DR positioning data from an accelerometer) to *Sakamoto*’s server 2 (“wireless communication monitoring station”) when a GPS signal is too weak to perform GPS position searching.

Pet. 59 (citing Ex. 1003 ¶¶ 225–226).

Patent Owner relies on the same arguments discussed above with respect to claim 1. We are persuaded by Petitioner’s analysis, which continues Petitioner’s mapping from claim 5 of the recited “wireless communication monitoring station” to *Sakamoto*’s position management/positioning server 2 and extends the analysis to encompass *Gotoh*’s accelerometer and *Levi*’s DR teachings as they are mapped in claim 1. *See, e.g.,* Ex. 1003 ¶¶ 225–226. Thus, we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 6 would have been obvious over the combination of *Sakamoto*, *Gotoh*, and *Levi*.

10. Claim 7

Like claim 1, independent claim 7 also recites “[a] method to control power usage” and is similar in scope to claim 1. Ex. 1001, 11:10. Rather than reciting separate “reducing” and “increasing” steps as in claim 1,

however, claim 7 recites the following: “adjusting applied power levels to the primary location tracking circuitry and supplemental location tracking circuitry in response to measurement of a receive communication signal level relative to a predetermined signal level.” *Id.* at 11:15–19. Petitioner’s analysis for the “adjusting” step of claim 7 is substantially the same as for the “reducing” and “increasing” steps of claim 1. *See* Pet. 60. Petitioner relies on the same analysis from claim 1 insofar as the adjustment (i.e., reducing applied power to the “*Sakamoto* GPS Components” and increasing applied power to Gotoh’s accelerometer) is made relative to “a predetermined signal level” (i.e., the satellite signal level at which GPS position searching is stopped, per Sakamoto). *Id.* at 32–45, 60 (citing Ex. 1003 ¶ 229).

Patent Owner makes the same arguments discussed above with respect to claim 1 regarding “reactivating” Sakamoto’s GPS receiver when it is placed in stop-position mode. *See* PO Resp. 4–15; PO Sur-reply 2–10. Even if these arguments were commensurate with the scope of the “adjusting” limitation of claim 7—they are not—we would not agree with them for the same reasons mentioned above. *See supra* § II.D.4, 6. Based on the same analysis discussed above (*see supra* § II.D.4), we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 7 would have been obvious over the combination of Sakamoto, Gotoh, and Levi.

11. *Claim 8*

Claim 8 depends from claim 7 and is almost identical to claim 2 except that the “attenuated receive communication signal” is less than “the

predetermined signal level” rather than “a first signal level.” Ex. 1001, 11:27–33. Petitioner relies on the same analysis as for claim 2. Pet. 60. Patent Owner relies on the same arguments discussed above with respect to claim 1. Based on the same analysis discussed above (*see supra* § II.D.5), we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 8 would have been obvious over the combination of Sakamoto, Gotoh, and Levi.

12. Claim 9

Claim 9 depends from claim 7 and recites that “the primary location tracking circuitry is activated in response to a measurement of the receive communication signal being above the predetermined signal level.” Ex. 1001, 11:34–37. Petitioner relies on the same analysis from the “reactivating” step of claim 3 and contends that an ordinarily skilled artisan would have understood that “reactivating” is a type of “activat[ing].” Pet. 60–61 (citing Ex. 1003 ¶ 233). Patent Owner relies on the same arguments discussed above with respect to claims 1 and 3. Based on the same analysis discussed above (*see supra* § II.D.6), we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 9 would have been obvious over the combination of Sakamoto, Gotoh, and Levi.

13. Claim 10

Claim 10 depends from claim 7 and recites that “the primary location tracking circuitry is deactivated in response to a measurement of the receive communication signal being below the predetermined signal level.”

Ex. 1001, 11:38–41. For the recited “deactivat[ing],” Petitioner relies on the same analysis from the “reducing applied power level to the primary location tracking circuitry” step of claim 1. Pet. 61. In particular, Petitioner cites Sakamoto’s teaching of stopping a position search when the GPS signal level value is equal to or lower than a predetermined threshold value. *Id.*; *see also supra* § II.D.4.a. Petitioner contends that an ordinarily skilled artisan would have known the GPS circuitry, including GPS receiver 10, to be powered off in this circumstance. Pet. 61 (citing Ex. 1003 ¶ 234). Patent Owner relies on the same arguments discussed above with respect to claim 1. Based on the same analysis discussed above (*see supra* § II.D.4.a), we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 10 would have been obvious over the combination of Sakamoto, Gotoh, and Levi.

14. Claim 11

Claim 11 depends from claim 7 and recites that “the supplemental location tracking circuitry is activated in response to a measurement of the receive communication signal being below the predetermined signal level.” Ex. 1001, 11:42–45. For the recited “activat[ing],” Petitioner relies on the same analysis from the “increasing applied power level to supplemental locating tracking circuitry” step of claim 1. Pet. 61. In particular, Petitioner cites Gotoh’s teaching of starting to measure acceleration when the terminal cannot receive GPS signals. *Id.*; *see also supra* § II.D.4.a. Petitioner contends that an ordinarily skilled artisan would have known the supplemental location tracking circuitry, i.e., the accelerometer, to be activated in this circumstance. Pet. 61 (citing Ex. 1003 ¶ 236). Patent

Owner relies on the same arguments discussed above with respect to claim 1. Based on the same analysis discussed above (*see supra* § II.D.4.a), we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 11 would have been obvious over the combination of Sakamoto, Gotoh, and Levi.

15. *Claim 12*

Claim 12 depends from claim 7 and recites that “the supplemental location tracking circuitry is deactivated in response to a measurement of the receive communication signal being above the predetermined signal level.” Ex. 1001, 11:42–45. For the recited “deactivat[ing],” Petitioner refers to its analysis for claim 1 and contends that Gotoh teaches “finishing measuring acceleration and recording data.” Pet. 62 (citing Ex. 1003 ¶ 238). Patent Owner relies on the same arguments discussed above with respect to claim 1.

Petitioner refers to Gotoh’s teaching that “cellular phone terminal 10 finishes measuring the acceleration in a case where the cellular phone terminal 10 becomes able to receive GPS signals, and communication with the communication system 30 is recovered.” Ex. 1005 ¶ 67; *see also* Ex. 1003 ¶¶ 94 (quoting same), 238 (partially quoting same). We are persuaded that an ordinarily skilled artisan would have known this to teach that Gotoh’s accelerometer is “deactivated” in Petitioner’s proposed combination when GPS signals are above a predetermined threshold level. *See, e.g.*, Ex. 1003 ¶ 238; Ex. 1005 ¶ 67. We also note that deactivating Gotoh’s accelerometer above this threshold is consistent with Petitioner’s analysis of claims 3 and 9, where Sakamoto’s GPS receiver is activated to

normal mode “when the signal level value is equal to or higher than a predetermined threshold value.” Ex. 1004 ¶ 38; *see also supra* § II.D.6. Thus, we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 12 would have been obvious over the combination of Sakamoto, Gotoh, and Levi.

16. Claim 13

Claim 13 depends from claim 7 and is similar to claim 3 except that claim 13 does not recite a “reactivating” step. Ex. 1001, 11:50–12:3. Petitioner relies on the same analysis for the limitations that are common with claim 3. Pet. 62. Patent Owner relies on the same arguments discussed above with respect to claim 1. Based on the same analysis discussed above (*see supra* § II.D.6), we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 13 would have been obvious over the combination of Sakamoto, Gotoh, and Levi.

17. Claim 14

Claim 14 depends from claim 7 and is identical to claim 4. Ex. 1001, 12:4–6. Petitioner relies on the same analysis from claim 4. Pet. 62–63. Patent Owner relies on the same arguments discussed above with respect to claim 1. Based on the same analysis discussed above (*see supra* § II.D.7), we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 14 would have been obvious over the combination of Sakamoto, Gotoh, and Levi.

18. *Claim 15*

Claim 15 depends from claim 7 and is identical to claim 5. Ex. 1001, 12:7–11. Petitioner relies on the same analysis from claim 5. Pet. 63. Patent Owner relies on the same arguments discussed above with respect to claim 1. Based on the same analysis discussed above (*see supra* § II.D.8), we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 15 would have been obvious over the combination of Sakamoto, Gotoh, and Levi.

19. *Claim 16*

Claim 16 depends from claim 7 and is identical to claim 6. Ex. 1001, 12:11–15. Petitioner relies on the same analysis from claim 6. Pet. 63. Patent Owner relies on the same arguments discussed above with respect to claim 1. Based on the same analysis discussed above (*see supra* § II.D.9), we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 16 would have been obvious over the combination of Sakamoto, Gotoh, and Levi.

20. *Claim 17*

The preamble of independent claim 17 recites “[a] portable electronic tracking device to monitor location coordinates of one or more individuals and objects.” Ex. 1001, 12:16–18. Petitioner refers to its analysis for claim 1 and contends that the “*Sakamoto* Electronic Components” in terminal 1 are provided in a portable mobile terminal. Pet. 63–64 (citing Ex. 1004 ¶¶ 3, 18, 19, 30, 31, 50, 51). For “monitor[ing] location coordinates of one or more individuals and objects,” Petitioner contends that

an ordinarily skilled artisan “would have understood that *Sakamoto*’s terminal 1 comprises GPS location tracking circuitry, such that the location coordinates of terminal 1 itself and an individual carrying or moving terminal 1 would have been monitored by the GPS location tracking circuitry.” *Id.* at 64 (citing Ex. 1003 ¶ 247; Ex. 1004 ¶¶ 18–24).

Patent Owner does not contest Petitioner’s analysis of the preamble. Neither party addresses whether the preamble is limiting. We are persuaded that *Sakamoto*’s terminal 1, which includes GPS receiver 10, GPS control unit 12, positioning control unit 13, communication control unit 11, satellite signal level detection unit 15, communication line status control unit 17, and battery control unit 16, is a “portable electronic tracking device.” *See, e.g.*, Ex. 1004 ¶¶ 3, 18, 19, 30, 31, 50, 51, Fig. 1. We also are persuaded that GPS location tracking components of *Sakamoto*’s terminal 1 monitor the location of terminal 1 or of an individual carrying terminal 1. *See, e.g.*, Ex. 1003 ¶ 247; Ex. 1004 ¶¶ 18–24. Because Petitioner has shown that *Sakamoto* teaches the preamble, we need not determine whether the preamble is limiting. *See Nidec*, 868 F.3d at 1017.

Claim 17 further recites “primary location tracking circuitry to measure a receive communication signal level communicated by a primary location tracking system and received by the electronic tracking device.” Ex. 1001, 12:19–22. For this limitation, Petitioner relies on its analysis from claim 1 regarding the “*Sakamoto* GPS Components.” Pet. 64; *see also supra* § II.D.4.a. Based on the same analysis discussed above (*see supra* § II.D.4.a), we are persuaded that *Sakamoto* teaches the recited “primary location tracking circuitry.”

Claim 17 further recites “supplemental location tracking circuitry to determine positional measurements based in part on measurements associated with a secondary location tracking system.” Ex. 1001, 12:23–25. For this limitation, Petitioner relies on its analysis from claim 1 regarding Gotoh’s accelerometer. Pet. 64; *see also supra* § II.D.4.a. Based on the same analysis discussed above (*see supra* § II.D.4.a), we are persuaded that Gotoh teaches the recited “supplemental location tracking circuitry.”

Claim 17 further recites “a battery power monitor configured to” perform similar steps to those recited in method claim 1. *See* Ex. 1001, 12:27–38. For the “battery power monitor,” Petitioner cites Sakamoto’s teaching of “power management circuitry including a battery control unit 16 that notifies positioning control unit 13 of a remaining battery amount lower than a preset threshold value by sending a remaining battery amount warning.” Pet. 65 (citing Ex. 1004 ¶¶ 10, 29). Petitioner further notes that Sakamoto’s positioning control unit 13 requests GPS control unit 12 to switch among various modes in response to signals from battery control unit 16 or based on satellite signal levels measured by satellite signal level detecting unit 15. *Id.* at 65–66 (citing Ex. 1004, Fig. 1). Accordingly, Petitioner contends an ordinarily skilled artisan would have understood that “*Sakamoto’s* battery control unit 16, positioning control unit 13, GPS control unit 12, and satellite signal level detection unit 15 together are a ‘battery power monitor.’” *Id.* at 66 (citing Ex. 1003 ¶ 252). Patent Owner does not dispute Petitioner’s analysis of the “battery power monitor” limitation. We are persuaded by Petitioner’s analysis that Sakamoto’s battery control unit 16, positioning control unit 13, GPS control unit 12, and satellite signal

level detection unit 15 together teach a battery power monitor. *See, e.g.*, Ex. 1003 ¶ 252; Ex. 1004 ¶¶ 10, 29, Fig. 1.

Claim 17 further recites that the battery power monitor is configured to both “reduce applied power level to the primary location tracking circuitry” and “increase applied power level to supplemental location tracking circuitry” in response to “measurement of a receive communication signal level less than a first signal level.” Ex. 1001, 12:27–34. Petitioner relies on the same analysis of the “reducing” and “increasing” limitations of claim 1 and relates it to the “battery power monitor” components discussed directly above. *See* Pet. 67–69. Citing Mr. Andrews’s testimony, Petitioner contends that positioning control unit 13, GPS control unit 12, satellite signal level detection unit 15, and battery control unit 16 (i.e., the “battery power monitor”) perform switching between positioning modes. *Id.* (citing Ex. 1003 ¶¶ 253, 255).

Patent Owner makes the same arguments discussed above regarding “reactivating” Sakamoto’s GPS receiver when it is placed in stop-position mode. *See* PO Resp. 4–15; PO Sur-reply 2–10. Even if these arguments were commensurate with the scope of the “reduce” and “increase” limitations of claim 17—they are not—we would not agree with them for the same reasons mentioned above. *See supra* § II.D.4, 6. Based on the same analysis discussed above (*see supra* § II.D.4.a), and based on Petitioner’s further analysis that Sakamoto’s “battery power monitor” components perform switching between positioning modes (*see, e.g.*, Ex. 1003 ¶¶ 253, 255), we are persuaded that Sakamoto and Gotoh teach the “reduce” and “increase” limitations of claim 17.

Claim 17 further recites that “the electronic tracking device is configured to determine positional coordinates responsive to a known reference coordinate values and the differential positional measurements.” Ex. 1001, 12:35–38. Petitioner relies on the same analysis regarding Levi’s dead reckoning functionality from the “determining positional coordinates” step of claim 1. Pet. 69. Based on the same analysis discussed above (*see supra* § II.D.4.a), we are persuaded that Levi’s dead reckoning functionality, as implemented with Gotoh’s accelerometer, teaches the “determine positional coordinates” limitation of claim 17.

For these reasons, and based on the same analysis discussed above (*see supra* § II.D.4), we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 17 would have been obvious over the combination of Sakamoto, Gotoh, and Levi.

21. *Claim 18*

Claim 18 depends from claim 17 and is identical to claim 4. Ex. 1001, 12:39–41. Petitioner relies on the same analysis from claim 4. Pet. 69. Patent Owner relies on the same arguments discussed above with respect to claim 1. Based on the same analysis discussed above (*see supra* § II.D.7), we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 18 would have been obvious over the combination of Sakamoto, Gotoh, and Levi.

22. *Claim 19*

Claim 19 depends from claim 17 and is identical to claim 5. Ex. 1001, 12:42–46. Petitioner relies on the same analysis from claim 5.

Pet. 69. Patent Owner relies on the same arguments discussed above with respect to claim 1. Based on the same analysis discussed above (*see supra* § II.D.8), we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 19 would have been obvious over the combination of Sakamoto, Gotoh, and Levi.

23. *Claim 20*

Claim 20 depends from claim 17 and is identical to claim 6.

Ex. 1001, 12:47–51. Petitioner relies on the same analysis from claim 6.

Pet. 69. Patent Owner relies on the same arguments discussed above with respect to claim 1. Based on the same analysis discussed above (*see supra* § II.D.9), we determine Petitioner has shown by a preponderance of the evidence that the subject matter of claim 20 would have been obvious over the combination of Sakamoto, Gotoh, and Levi.

E. Obviousness Ground Based on Sakamoto, Gotoh, Levi, and Kulach

Petitioner contends the subject matter of claims 1–20 would have been obvious over the combination of Sakamoto, Gotoh, Levi, and Kulach.

Pet. 69–73. As discussed above, Petitioner has demonstrated that the subject matter of claims 1–20 would have been obvious over the combination of Sakamoto, Gotoh, and Levi, so we do not reach the ground based on Sakamoto, Gotoh, Levi, and Kulach. *See SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348, 1359 (2018) (holding a petitioner “is entitled to a final written decision addressing all of the claims it has challenged”); *Boston Sci. Scimed, Inc. v. Cook Grp. Inc.*, 809 F. App’x 984, 990 (Fed. Cir. 2020) (non-precedential) (recognizing that the “Board need not address issues that are

not necessary to the resolution of the proceeding” and, thus, agreeing that the Board has “discretion to decline to decide additional instituted grounds once the petitioner has prevailed on all its challenged claims”).

III. PATENT OWNER’S REVISED MOTION TO AMEND

Pursuant to 35 U.S.C. § 316(d)(1) and 37 C.F.R. § 42.121(a), Patent Owner moves to replace claims 1–20 of the ’113 patent with proposed substitute claims 21–40, respectively. RMTA 1. Patent Owner’s revised motion to amend is contingent on our determination as to whether a preponderance of the evidence establishes that claims 1–20 of the ’113 patent are unpatentable. *Id.* As discussed above, we determine that original claims 1–20 of the ’113 patent have been shown to be unpatentable by a preponderance of the evidence. *See supra* § II.D.4–23. Therefore, we proceed to address Patent Owner’s revised motion to amend.

A. *Proposed Substitute Claims*

Independent proposed substitute claims 21, 27, and 37, which are illustrative of the proposed substitute claims, are reproduced below with underlining to indicate added text and strikethrough to indicate deleted text.

21. A method to control power usage comprising:
- measuring a receive communication signal level by primary location tracking circuitry of an electronic tracking device communicated by a primary location tracking system;
 - in response to measurement of a receive communication signal level less than a single predetermined signal level:
 - reducing, to a low power mode in which the primary location tracking circuitry consumes at least reduced power, applied power level to the primary location tracking circuitry ~~in response to measurement of~~

~~a receive communication signal level less than a first signal level; and~~

~~increasing applied power level to supplemental location tracking circuitry response to measurement of the receive communication signal less than the first signal level;~~

determining differential positional measurements based in part on acceleration measurements of supplemental location tracking circuitry associated with a secondary location tracking system; and

determining positional coordinates of electronic tracking device responsive to a known reference coordinate values and the differential positional measurements.

27. A method to control power usage comprising:

measuring a receive communication signal level by primary location tracking circuitry of an electronic tracking device communicated by a primary location tracking system;

adjusting applied power levels to the primary location tracking circuitry and supplemental location tracking circuitry in response to measurement of a receive communication signal level relative to a single predetermined signal level;

determining differential positional measurements based in part on acceleration measurements of supplemental location tracking circuitry associated with a secondary location tracking system; and

determining positional coordinates of electronic tracking device responsive to a known reference coordinate values and the differential positional measurements.

37. A portable electronic tracking device to monitor location coordinates of one or more individuals and objects, the device comprising:

primary location tracking circuitry to measure a receive communication signal level communicated by a primary

location tracking system and received by the electronic tracking device;

supplemental location tracking circuitry to determine positional measurements based in part on measurements associated with a secondary location tracking system; and

a battery power monitor configured to:

in response to measurement of a receive communication signal level less than a single predetermined signal level:

reduce, to a low power mode in which the primary location tracking circuitry consumes at least reduced power, applied power level to the primary location tracking circuitry ~~in response to measurement of a receive communication signal level less than a first signal level;~~ and

increase applied power level to supplemental location tracking circuitry ~~response to measurement of the receive communication signal less than the first signal level;~~

wherein the electronic tracking device is configured to determine positional coordinates responsive to a known reference coordinate values and the differential positional measurements.

RM TA 26, 28, 30–31.

B. Procedural Requirements

“Before considering the patentability of any substitute claims, . . . the Board first must determine whether the motion to amend meets the statutory and regulatory requirements set forth in 35 U.S.C. § 316(d) and 37 C.F.R. § 42.121.” *Lectrosonics, Inc. v. Zaxcom, Inc.*, IPR2018-01129, Paper 15, 4–8 (PTAB Feb. 25, 2019) (precedential). Patent Owner bears the burden of

proving these requirements by a preponderance of the evidence. 37 C.F.R. § 42.121(d)(1).

1. Claim Listing

The revised motion to amend includes a claim listing that clearly shows the changes, as required by 37 C.F.R. § 42.121(b). *See* RMTA 26–31; *Lectrosonics*, Paper 15 at 8.

2. Reasonable Number of Substitute Claims

We now consider whether the motion to amend proposes a reasonable number of substitute claims. 35 U.S.C. § 316(d)(1)(B). “There is a rebuttable presumption that a reasonable number of substitute claims per challenged claim is one (1) substitute claim.” *Lectrosonics*, Paper 15 at 4–5 (citing 37 C.F.R. § 42.121(a)(3)). The Petition challenges twenty claims, and the revised motion to amend proposes twenty substitute claims. RMTA 1, 4. We determine that the number of proposed claims is reasonable.

3. Respond to a Ground of Unpatentability Involved in the Trial

Next, we consider whether the proposed substitute claims respond to a ground of unpatentability involved in this trial. *Lectrosonics*, Paper 15 at 5–6 (citing 37 C.F.R. § 42.121(a)(2)(i)). Patent Owner characterizes its amendments as adding the following limitations to the original claims:

- (1) that reducing, increasing, and adjusting applied power level occurs in relation to a single predetermined signal level in proposed substitute independent claims 21, 27, and 37 and in proposed substitute dependent claims 22, 23, 28, and 30-32;
- (2) that applied power level is reduced to a low power mode in

which the primary location tracking circuitry consumes at least reduced power in proposed substitute independent claims 21 and 37; and (3) that the primary location tracking circuitry is deactivated by placing the primary location tracking circuitry in a low power mode in which the primary location tracking circuitry consumes at least reduced power in proposed substitute dependent claim 30.

RM TA 2–3. Patent Owner highlights these added limitations in asserting that the proposed substitute claims are patentable over the references in the instituted grounds. *See id.* at 3. Petitioner does not argue otherwise. Based on Patent Owner’s showing, we determine that the amended language in the proposed substitute claims is responsive to the grounds of unpatentability involved in this trial.

4. *No Enlargement to the Scope of the Claims*

We also consider the breadth of the proposed substitute claims. “A motion to amend may not present substitute claims that enlarge the scope of the claims of the challenged patent or introduce new subject matter.” *Lectrosonics*, Paper 15 at 6–7 (citing 35 U.S.C. § 316(d)(3); 37 C.F.R. § 41.121(a)(2)(ii)). For the independent proposed substitute claims, Patent Owner’s proposed amendments add several limitations, including the ones highlighted directly above. Based on the added limitations, Patent Owner contends that the proposed substitute claims do not enlarge the scope of any original claim. RM TA 3. Petitioner does not argue otherwise. We determine that the added limitations highlighted above result in claims that are either identical in scope or narrower than the original claims.

5. *No New Matter*

We now consider whether proposed substitute claims 21–40 have introduced new matter. “[T]he Board requires that a motion to amend set forth written description support in the originally filed disclosure of the subject patent for each proposed substitute claim, and also set forth support in an earlier filed disclosure for each claim for which benefit of the filing date of the earlier filed disclosure is sought.” *Lectrosonics*, Paper 15 at 7 (citing 37 C.F.R. § 42.121(b)(1)–(2)). For this requirement, Patent Owner must cite “to the *original disclosure of the application*, as filed, rather than to the patent as issued.” *Id.* at 8 (emphasis added).

In the revised motion to amend, Patent Owner provides a listing indicating where each limitation of the proposed substitute claims is supported in the ’614 application (Ex. 2014) and the ’905 application (Ex. 2015). RMTA 4–17. Petitioner disputes that there is written description support for the proposed substitute claims only to the extent that (1) “adjusting applied power levels . . . in response to measurement of a receive communication signal level relative to a single predetermined signal level” is construed to mean “the adjustment occur[s] only in response to measuring a signal level relative to one and only one predetermined signal level” (RMTA Opp. 2–3; RMTA Sur-reply 1–2; *see infra* § III.C.2); and (2) “a low power mode in which the primary location tracking circuitry consumes at least reduced power” is construed to mean that “power is *constantly* consumed during a low power mode” (RMTA Opp. 13–16).

We find that Patent Owner has put forth adequate support for the “single predetermined signal level” limitations under the plain and ordinary meaning of those limitations. *See, e.g.*, Ex. 2015, 9:30–10:2

(“[A]ccelerometer 130 activates upon one or more designated antenna(s) . . . detecting a first signal level, e.g., a low signal level or threshold value, as specified by, for instance, a user or system administrator.”); *see also* RMTA 5 (quoting same). We also find that Patent Owner has identified support for the “consumes at least reduced power” limitation because the ’905 application states that “during supplemental location coordinates tracking, . . . the transceiver circuitry . . . consumes reduced battery power for GPS circuitry.” Ex. 2015, 11:27–12:2; *see also* RMTA 6 (quoting same). As such, there is explicit disclosure of the primary location tracking circuitry (i.e., GPS circuitry) consuming reduced power in a low power mode. Petitioner does not dispute Patent Owner’s written description showing for any other aspects of the proposed substitute claims. We find that Patent Owner’s listing sufficiently shows that the Specification of the ’113 patent provides written description support as of the filing date of the ’905 application.

6. *Conclusion Regarding Procedural Requirements*

In view of the above, we determine that Patent Owner has shown, by a preponderance of the evidence, that its revised motion to amend meets all of the statutory and regulatory requirements of 35 U.S.C. § 316(d) and 37 C.F.R. § 42.121. We now proceed to consider whether Petitioner has met its burden of persuasion with respect to patentability. 37 C.F.R. § 42.121(d)(2).

C. *Claim Interpretation*

1. *“consumes at least reduced power”*

Proposed substitute claim 21 recites “reducing, to a low power mode in which the primary location tracking circuitry consumes at least reduced power,” and proposed substitute claim 37 recites a similar limitation. RMTA 26, 31. Although the ’905 application explicitly discloses that the primary location circuitry “consumes at least reduced power” in a low power mode (*see supra* § III.B.5), the parties nonetheless disagree on the interpretation and scope of these limitations. Patent Owner contends that these limitations “require[] that the primary location tracking circuitry consumes power while the supplemental location tracking circuitry is active” and that “although applied power level to the primary location tracking circuitry is reduced, applied power level is not eliminated and the primary location tracking circuitry is not shut off.” RMTA 18. Patent Owner asserts that this construction is consistent with the Specification of the ’113 patent. *Id.* at 19 (citing Ex. 1001, 8:5–11).

Petitioner contends that the plain and ordinary meaning of “consumes at least reduced power” should apply. MTA Opp. 6–7; RMTA Opp. 13–14. Petitioner argues that Patent Owner’s proposed construction imports negative limitations, i.e., the limitations that the power “is not shut off” or “not eliminated.” MTA Opp. 6. Petitioner also objects to Patent Owner’s proposed construction to the extent it requires constant or continual power consumption, because Petitioner contends such an interpretation is not supported in the original priority document for the ’113 patent. RMTA Opp. 14–16.

We need not resolve the parties' dispute regarding how to construe the "consumes at least reduced power" limitations because, as discussed below, Petitioner persuasively shows that the challenged claims are unpatentable over the asserted prior art even under Patent Owner's interpretation of these limitations. *See Nidec*, 868 F.3d at 1017; *Vivid*, 200 F.3d at 803.

2. *"single predetermined signal level"*

The proposed substitute claims also recite adjusting, reducing, and/or increasing the applied power level in response to measurement of a receive communication signal level relative to a "single predetermined signal level." RMTA 26, 28, 30–31. Although Patent Owner does not propose a construction for these limitations, its arguments with respect to these limitations seek to distinguish systems that take actions based on more than one signal level/threshold. RMTA 21–22; RMTA Reply 4. Specifically, Patent Owner argues that the '113 patent disclosure "provides clear support for limiting adjustment to only a single level in the claims." RMTA Reply 4.

Petitioner contends that we should apply the plain meaning to these limitations and find the limitations are "satisfied if the adjustment is 'in response to measurement of a receive communication signal level,' and the measurement of the receive signal level is relative to a **single** predetermined signal level **and not multiple predetermined signal levels.**" RMTA Opp. 1–2. Petitioner notes that the proposed substitute claims "do[]" not recite adjusting power levels in response to measuring a signal level relative to *one and only one* predetermined signal level, nor do[] the claim[s] recite the adjustment is *only* responsive to measuring a signal level relative to a

single predetermined signal level.” *Id.* at 2. Petitioner further contends that “[a]djusting power levels responsive to a ‘single’ signal level (applying [Patent Owner’s] implicit construction) is not disclosed in the priority document.” RMTA Sur-reply 1. Rather, according to Petitioner, “[t]he priority document only describes adjusting in response to measuring a signal level relative to a ‘first signal level.’” RMTA Opp. 2–3 (citing Ex. 2015, 5:2–3, 10:1, Fig. 3 (steps 308, 312)).⁶ Petitioner also characterizes Patent Owner’s statement that “the inventors [of the ’113 patent] envisioned more than one signal level at which adjustment may occur” as supporting Petitioner’s view of the proper construction. RMTA Sur-reply 1–2 (quoting RMTA Reply 4).

We agree with Petitioner. The ’905 application only discusses actions taken relative to “a first signal level, e.g., a low signal level or threshold value, as specified by, for instance, a user or system administrator.” Ex. 2015, 9:30–10:2; *see also id.* at 4:30–5:9, 10:13–19, Fig. 3; Ex. 1001, 3:42–57, 6:55–59, 7:7–16, Fig. 3 (same citations in ’113 patent). Nothing in the ’905 application requires this “first signal level” to be the only threshold utilized for processing in a device. Patent Owner also admits that the inventors of the ’113 patent contemplated devices with “more than one signal level at which adjustment may occur.” RMTA Reply 4. Thus, we reject Patent Owner’s suggestion that devices taking actions with respect to more than one threshold are excluded from the scope of the proposed

⁶ For this citation, Petitioner appears to be applying a different page numbering convention for Exhibit 2015 than is used elsewhere in the record. We have transposed the citation to use the page numbers found in the bottom margin of Exhibit 2015.

substitute claims. Instead, we apply the plain and ordinary meaning to the “single predetermined signal level” limitations.

3. *Other Terms*

We determine that no other terms of the proposed substitute claims require explicit construction. *See Nidec*, 868 F.3d at 1017; *Vivid*, 200 F.3d at 803.

D. *Whether the Proposed Substitute Claims Are Unpatentable Under 35 U.S.C. § 112 ¶ 1*

In Petitioner’s opposition to Patent Owner’s initial motion to amend, Petitioner contended that the initial versions of proposed substitute claims 27–40 were unpatentable for failing to comply with the written description requirement. MTA Opp. 1–3. In our Preliminary Guidance, we found that Petitioner’s arguments were reasonably likely to succeed with respect to proposed substitute claims 27–36, but not reasonably likely to succeed with respect to proposed substitute claims 37–40. PG 6–9. Subsequently, in the revised motion to amend, Patent Owner removed the language that formed the basis of Petitioner’s argument with respect to proposed substitute claims 27–36. *Compare* MTA 28, *with* RMTA 28 (removing the limitation “the primary location tracking circuitry continues to consume at least reduced power” from proposed substitute claim 27).

In its opposition to the revised motion to amend, Petitioner does not address our analysis in the Preliminary Guidance (*see* PG 6–7) or otherwise maintain its contention that proposed substitute claims 37–40 lack sufficient written description support. Rather, Petitioner’s only argument under 35 U.S.C. § 112 ¶ 1 (*see* RMTA Opp. 2–3) pertains to a particular

construction of the “single predetermined signal level” limitation that we expressly reject above. *See supra* § III.C.2. Otherwise, Petitioner does not contend that the revised versions of the proposed substitute claims fail to comply with 35 U.S.C. § 112 ¶ 1.

Under these circumstances, we determine that Petitioner has not shown, by a preponderance of the evidence, that the proposed substitute claims are unpatentable for failing to comply with 35 U.S.C. § 112 ¶ 1.

E. Whether the Proposed Substitute Claims Are Unpatentable Under 35 U.S.C. § 112 ¶ 2

Petitioner put forth an indefiniteness argument with respect to proposed substitute claims 27–36 in the initial motion to amend (MTA Opp. 3–4), and we found this argument reasonably likely to succeed in our Preliminary Guidance. PG 9. Subsequently, in the revised motion to amend, Patent Owner removed the language that formed the basis of Petitioner’s argument. *Compare* MTA 28, *with* RMTA 28 (removing the limitation “the primary location tracking circuitry continues to consume at least reduced power” from proposed substitute claim 27). Since that time, Petitioner has not addressed whether the revised versions of the proposed substitute claims fail to comply with 35 U.S.C. § 112 ¶ 2.

Under these circumstances, we determine that Petitioner has not shown, by a preponderance of the evidence, that the proposed substitute claims are unpatentable for failing to comply with 35 U.S.C. § 112 ¶ 2.

F. Patentability of Proposed Substitute Claims 27–29 and 31–36 over Sakamoto, Gotoh, and Levi

Petitioner contends the subject matter of proposed substitute claims 27–29 and 31–36 would have been obvious over the combination of Sakamoto, Gotoh, and Levi. RMTA Opp. 1–3; RMTA Sur-reply 1–5. Patent Owner disputes Petitioner’s contentions. MTA 21–23; RMTA 20–22; RMTA Reply 1–4.

Proposed substitute claims 27–29 and 31–36 are the same as original claims 7–9 and 11–16 discussed above except that various actions taken “in response to measurement of a receive communication signal level relative to a predetermined signal level” are now done “relative to a single predetermined signal level” or “one predetermined signal level.”⁷

RMTA 28–29. Petitioner’s obviousness analysis based on Sakamoto, Gotoh, and Levi is the same as it is for original claims 7–9 and 11–16 insofar as Petitioner cites the following teaching regarding Sakamoto’s GPS receiver: “If it is determined that the positioning cannot be performed when the signal level value is equal to or lower than a predetermined threshold value, the position search may be stopped.” RMTA Opp. 1–2; *see also* Pet. 35 (quoting Ex. 1004 ¶ 38), 60. Petitioner also relies on the same modification of Sakamoto from original claim 7 to include Gotoh’s accelerometer, which Petitioner contends is powered up at the predetermined threshold value from Sakamoto. RMTA Opp. 2; *see also* Pet. 38–39 (citing Ex. 1005 ¶ 66), 60. Petitioner further contends that “placement of the GPS receiver in the stop-position searching mode is performed in response to

⁷ We also note that the claim dependencies for these claims have been updated in the revised motion to amend.

measuring a single GPS signal level below a ‘predetermined threshold value.’”⁸ RMTA Opp. 2 (citing Ex. 1004 ¶ 38).

Patent Owner argues that Sakamoto “discloses three modes of operation and two signal-level related thresholds.” RMTA 21–22 (citing Ex. 1004 ¶¶ 27, 38). According to Patent Owner, Sakamoto cannot disclose “adjusting . . . relative to a single predetermined signal level” because it teaches two predetermined thresholds. *Id.* Yet Petitioner’s mapping for “adjusting applied power levels” relies only on one threshold: Sakamoto’s threshold below which the system enters stop-position searching mode. *See* RMTA Opp. 12–13 (citing Ex. 1004 ¶ 38); *see also* Pet. 35–38. Consistent with our comments on claim interpretation above (*see supra* § III.C.2), the fact that Sakamoto teaches another threshold for moving between normal and high sensitivity position modes does not detract from Petitioner’s persuasive showing that Sakamoto’s threshold for entering stop-position mode is “a single predetermined signal level” under the plain and ordinary meaning of that term. *See, e.g.,* Ex. 1004 ¶ 38.

Patent Owner also embarks upon a new argument in its reply in support of the revised motion to amend: that “*Sakamoto* does not . . . disclose that stopping a position search initiates any change or adjustment to applied power levels.” RMTA Reply 2; *see also id.* at 8 (“*Sakamoto* does

⁸ For proposed substitute claims 29 and 39, which recite the opposite actions “in response to a measurement of the receive communication signal being above the single predetermined signal level,” we note Petitioner’s persuasive showing above based on Sakamoto’s teaching of entering normal mode “when the signal level value is equal to or higher than a predetermined threshold value.” Ex. 1004 ¶ 38; *see also supra* § II.D.6, 12, 15 (Petitioner’s obviousness analysis for similar limitations in original claims 3, 9, and 12).

not provide any disclosure of reducing an applied power level to a GPS receiver when a position search is stopped.”). We agree with Petitioner (RMTA Sur-reply 2) that this is an improper reply argument because it (1) is not discussed in Patent Owner’s revised motion, which expressly alleges patentability over Sakamoto (*see* RMTA 20–22); and (2) does not respond to any portion of Petitioner’s opposition. As such, Patent Owner’s argument contravenes 37 C.F.R. § 42.23(b) because it does not “respond to arguments raised in the corresponding opposition.” *See also* Patent Trial and Appeal Board Consolidated Trial Practice Guide at 85–86 (Nov. 2019) (“Consolidated Trial Practice Guide”), *available at* <https://www.uspto.gov/sites/default/files/documents/tpgnov.pdf> (“‘Respond,’ in the context of 37 C.F.R. § 42.23(b), does not mean proceed in a new direction with a new approach as compared to the positions taken in a prior filing.”). Thus, we will not entertain Patent Owner’s improper new argument.

And, even if we were to consider Patent Owner’s new argument, Sakamoto’s express teachings contradict it. As acknowledged by Patent Owner, “*Sakamoto* discloses [that] ‘power consumption can be reduced by stopping the position search when positioning is not possible.’” RMTA Reply 2 (quoting Ex. 1004 ¶ 50). Thus, consistent with our findings regarding the original claims above, we find that the combination of Sakamoto, Gotoh, and Levi teaches a “single predetermined threshold value” (i.e., Sakamoto’s “predetermined threshold value”) at which Sakamoto’s GPS transitions from normal sensitivity position mode to stop-position mode (thereby reducing power) and Gotoh’s accelerometer is activated (thereby increasing power). This teaches “adjusting applied power levels.”

For these reasons, and for the reasons discussed above with respect to original claims 7–9 and 11–16 (*see supra* § II.D.10–12, 14–19), we determine Petitioner has shown, by a preponderance of the evidence, that the subject matter of proposed substitute claims 27–29 and 31–36 would have been obvious over the combination of Sakamoto, Gotoh, and Levi.

G. Patentability of Proposed Substitute Claims 21–26, 30, and 37–40 over Sakamoto, Gotoh, Levi, and Gronemeyer

Petitioner contends the subject matter of proposed substitute claims 21–26, 30, and 37–40 would have been obvious over the combination of Sakamoto, Gotoh, Levi, and U.S. Patent No. 6,985,811 B2 (Ex. 1077, “Gronemeyer”). MTA Opp. 21–24; RMTA Opp. 1–3, 11–16; RMTA Sur-reply 1–5. Patent Owner disputes Petitioner’s contentions. MTA 21–23; RMTA 20–24; RMTA Reply 7–12.

1. Gronemeyer

Gronemeyer is a U.S. patent describing a low power real time clock (RTC) operated continuously in a Global Positioning System (GPS) receiver unit while some receiver components are powered down. Ex. 1077, code (57). Figure 4 of Gronemeyer is reproduced below.

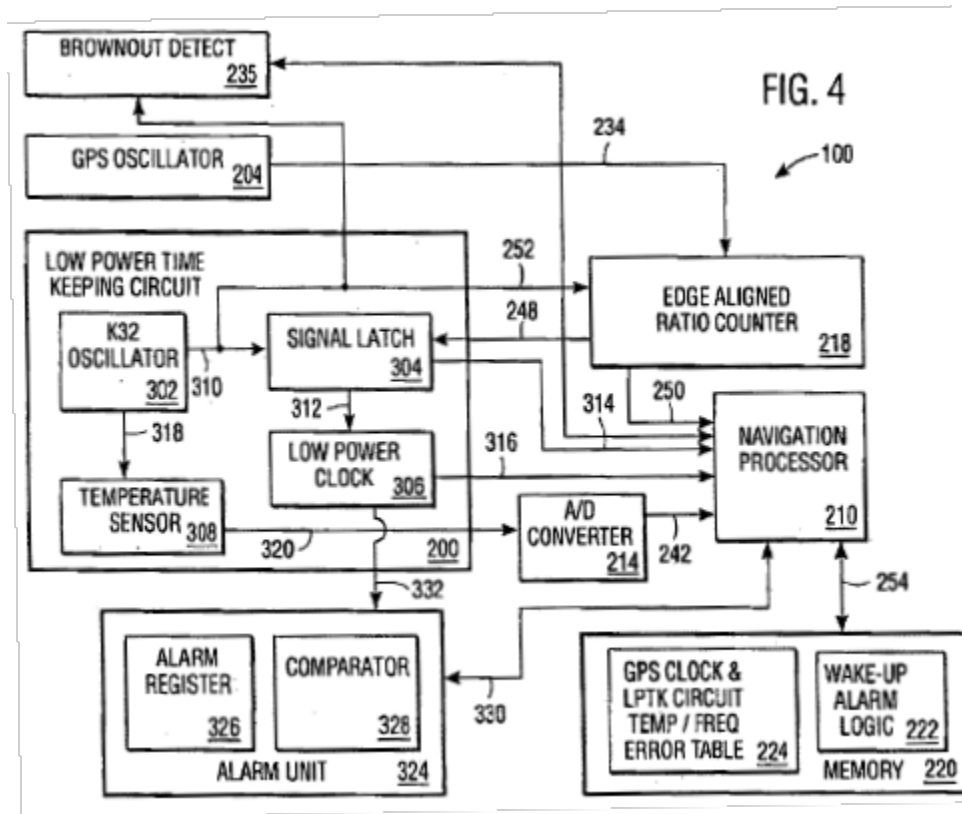


Figure 4 is a block diagram illustrating GPS receiver unit 100, which includes low power time keeping (LPTK) circuit 200. *Id.* at 8:3–5, 12:9–10. Low power time keeping circuit 200 includes K32 oscillator 302, signal latch 304, temperature sensor 308, and low power clock/real time clock (RTC) 306. *Id.* at 12:10–13. K32 oscillator 302 and low power clock 306 are very low-power consuming devices, particularly when compared to other components residing in GPS receiver unit 100 that are powered down in sleep mode. *Id.* at 12:58–62. K32 oscillator 302 and low power clock 306 are commercially available and relatively inexpensive. *Id.* at 12:62–64.

Power is conserved in GPS receiver unit 100 by shutting down selected components, including GPS oscillator 204, during periods when GPS receiver unit 100 is not actively acquiring satellite information used to calculate its location. *Id.* at 6:41–45. Such periods are called the sleeping

period or the sleep mode. *Id.* at 14:3–6. Low power time keeping circuit 200 accurately maintains GPS time during the sleeping period, which enables GPS receiver unit 100 to more quickly reacquire GPS satellite signals when power is reapplied, thereby saving power resources. *Id.* at 14:45–48.

Petitioner contends Gronemeyer qualifies as prior art under 35 U.S.C. § 102(b) based on its issue date. MTA Opp. 8. Patent Owner does not contest the prior art status of Gronemeyer. For purposes of this Decision, we determine that Gronemeyer qualifies as prior art under 35 U.S.C. § 102(b) because Gronemeyer’s issue date of January 10, 2006, is more than one year before the earliest effective filing date of the proposed substitute claims, which is January 6, 2008. Ex. 1001, code (62); Ex. 1077, code (45).

2. *Proposed Substitute Claim 21*

Petitioner’s obviousness analysis for proposed substitute claim 21 builds upon its analysis for original claim 1 in the Sakamoto–Gotoh–Levi ground. We now focus on the amendments in proposed substitute claim 21.

Proposed substitute claim 21 recites “in response to measurement of a receive communication signal level less than a single predetermined signal level: reducing, to a low power mode in which the primary location tracking circuitry consumes at least reduced power.” RMTA 26. At the outset, we note that Sakamoto teaches “a single predetermined signal level” for the same reasons mentioned above. *See supra* § III.F. For the recited “reducing, to a low power mode,” Petitioner cites Gronemeyer’s teachings of conserving power “in GPS receiver unit 100 by shutting down selected components, including the GPS oscillator 204, during periods when the GPS

receiver unit is not actively acquiring satellite information used to calculate the location of the GPS receiver unit.” MTA Opp. 21 (quoting Ex. 1077, 6:41–45). Petitioner notes that Gronemeyer refers to periods when the components are shut off to conserve power as “the sleeping period or the sleep mode.” *Id.* (quoting Ex. 1077, 14:3–5). Petitioner contends an ordinarily skilled artisan would have understood Gronemeyer’s sleep mode to teach the recited “low power mode.” *Id.* (citing Ex. 1080 ¶¶ 31, 33).

For the “primary location tracking circuitry consumes at least reduced power,” Petitioner cites Gronemeyer’s teaching of shutting down certain components during sleep mode, including oscillator 204, radio 202, clocks generator 216, and GPS signal processors 208. MTA Opp. 22 (citing Ex. 1077, 14:13–23). According to Petitioner, Gronemeyer also teaches that at least K32 oscillator 302 and low power clock 306 in low power time keeping circuit 200 remain powered on during sleep mode. *Id.* (citing Ex. 1077, 5:14–17, 6:45–48, 7:8–11, 12:9–13, Figs. 3, 4). Petitioner further notes Gronemeyer’s teaching that K32 oscillator 302 and low power clock 306 are “very low-power consuming devices, particularly when compared to the selected components residing in the GPS receiver unit 100 that are powered down.” *Id.* at 22–23 (quoting Ex. 1077, 12:58–61). Petitioner contends an ordinarily skilled artisan would have found it obvious to further modify the Sakamoto–Gotoh–Levi combination to include Gronemeyer’s low power clock and oscillator powered on at all times in order to achieve the advantages expressly taught by Gronemeyer, including saving power and more quickly reacquiring GPS satellite signals when positioning resumes. *Id.* at 23–24 (citing Ex. 1077, 3:25–28, 14:3–12, 14:45–48, Ex. 1080 ¶¶ 37–38). Petitioner also notes the similarities between

Gronemeyer's GPS receiver unit 100 and Sakamoto's GPS receiver 10 and contends that adding a low power clock and oscillator—which were commercially available—to the existing Sakamoto–Gotoh–Levi combination would have been accomplished with a reasonable expectation of success. *Id.* at 24 (citing Ex. 1077, 12:62–64; Ex. 1080 ¶ 39).

Patent Owner attempts to distinguish Gronemeyer's "GPS circuitry" from an alleged "distinct time circuit" in Gronemeyer that "is utilized to maintain GPS time." RMTA 23 (citing Ex. 1077, 6:36–48, Figs. 3, 4). As such, Patent Owner acknowledges that "the GPS oscillator and K32 oscillator are both located in a GPS receiving unit," but Patent Owner contends "the K32 oscillator is not part of the GPS circuitry." *Id.* Patent Owner also argues that "Petitioner provides no . . . explanation of *how Sakamoto* might be modified to include *Gronemeyer's* low power time keeping circuit." RMTA Reply 11–12. In support of this argument, Patent Owner contends that "*Gronemeyer's* GPS receiver unit 100 is not a direct replacement for *Sakamoto's* GPS receiver 10." *Id.* at 12. Patent Owner additionally attempts to distinguish the recited "low power mode" from a sleep or standby mode. *Id.* at 8–10 (citing, *inter alia*, Ex. 2014 ¶¶ 30, 35; Ex. 2015, 10:2–10, 11:25). According to Patent Owner, Gronemeyer at most discloses "a 'sleep or standby mode' in which GPS receiver power is cycled between on and off." *Id.* at 10.

We do not agree with Patent Owner's arguments. First, the evidence of record contradicts Patent Owner's suggestion that Gronemeyer's K32 oscillator is separate from Gronemeyer's GPS circuitry. As noted by Petitioner, "[t]he *Gronemeyer* GPS receiver unit 100 includes the LPTK circuit 200, which includes the K32 oscillator." RMTA Opp. 21 (citing

Ex. 1077, 6:45–48, 8:3–5, Fig. 4). Indeed, Figures 3 and 4 of Gronemeyer depict LPTK circuit 200 as a part of GPS receiver unit 100. Ex. 1077, Figs. 3, 4; *see also id.* at 8:3–5 (“FIG. 3 is a block diagram illustrating selected components of the GPS receiver unit 100, including a low power time keeping circuit 200.”). In Petitioner’s proposed combination, Petitioner analogizes Gronemeyer’s GPS receiver unit 100 to Sakamoto’s GPS receiver 10 (MTA Opp. 24 (citing Ex. 1080 ¶ 39)), which itself is part of the “*Sakamoto* GPS Components” that Petitioner maps to the “primary location tracking circuitry” in the original claims. *See* Pet. 24. Moreover, Mr. Andrews testifies that “a POSITA would have understood that a combination with *Gronemeyer* would have advantageously allowed *Sakamoto*’s primary location tracking circuitry, including GPS receiver 10, to consume reduced power in a low power mode.” Ex. 1080 ¶ 38. As such, Petitioner maps the recited “primary location tracking circuitry” to Sakamoto’s GPS receiver 10, GPS control unit 12, satellite signal level detecting unit 15, and positioning control unit 13—as modified to include Gronemeyer’s LPTK circuit 200. *See* Pet. 24; MTA Opp. 23–24. Thus, we are persuaded that, in Petitioner’s proposed combination, elements in the low power time keeping circuit “consume[] at least reduced power” even when other portions of the primary location tracking circuitry are powered down (i.e., are placed in a “low power mode”). *See, e.g.*, Ex. 1080 ¶¶ 31–37.

Second, we do not agree with Patent Owner’s argument that Petitioner has failed to explain how and why an ordinarily skilled artisan would have combined the references. Petitioner proposes adding the components of Gronemeyer’s low power time keeping circuit 200 (i.e., K32 oscillator 302

and low power clock 306) to the Sakamoto–Gotoh–Levi combination discussed above. MTA Opp. 23–24; *see also supra* § II.D.4 (Petitioner’s obviousness analysis for original claim 1 in the Sakamoto–Gotoh–Levi ground). We are persuaded that an ordinarily skilled artisan would have expected success in making this modification based on Mr. Andrews’s uncontested testimony and because Gronemeyer itself states that the low power time keeping circuit components were “commercially available and relatively inexpensive.” Ex. 1077, 12:62–64; Ex. 1080 ¶¶ 37–39. Petitioner also notes that Gronemeyer teaches advantages arising from the use of a low power time keeping circuit, such as accurately maintaining GPS time during sleep mode and enabling quicker reacquisition of GPS signals after sleep mode. MTA Opp. 23 (citing Ex. 1077, 3:25–28, 14:3–12, 14:45–48). We are persuaded by Mr. Andrews’s uncontested testimony that an ordinarily skilled artisan would have been motivated to make the modification proposed by Petitioner based on the advantages discussed in Gronemeyer. Ex. 1080 ¶¶ 37–38.

Third, we do not agree with Patent Owner’s arguments (RMTA Reply 8–10) about Petitioner’s cited teachings from Gronemeyer being a “sleep or standby mode” rather than a “low power mode.” Notably, in its motion to amend and revised motion to amend, Patent Owner did not contend that “low power mode” should be accorded a particular construction beyond its inclusion in the fuller limitation that the primary tracking circuitry “consumes at least reduced power.” MTA 18–19; RMTA 18–19. And Gronemeyer teaches the greater limitation including the “low power mode” even under Patent Owner’s construction of that fuller limitation. *See* RMTA 18 (stating that, in low power mode, “although applied power level to the

primary location tracking circuitry is reduced, applied power level is not eliminated and the primary location tracking circuitry is not shut off.”). Specifically, Petitioner establishes that Gronemeyer teaches a sleep mode where “low power time keeping circuit 200 ‘remains on’ even when ‘[s]elected components residing on the GPS receiver unit’ are ‘shut down (deactivated) to conserve power.’” MTA Opp. 22 (quoting Ex. 1077, 7:8–11) (alteration by Petitioner). Petitioner also puts forth uncontested testimony from Mr. Andrews that an ordinarily skilled artisan would have understood Gronemeyer’s sleep mode to be the recited “low power mode.” *Id.* at 21 (citing Ex. 1080 ¶¶ 31, 33). Thus, we are persuaded by Petitioner’s contentions, because power to Gronemeyer’s low power time keeping circuit 200—which is part of the “primary location tracking circuitry” under Petitioner’s mapping—is not eliminated.

Patent Owner also put forth another new argument at the oral hearing in which it attempted to differentiate the words “consumes” and “applied” in the limitation “reducing, to a low power mode in which the primary location tracking circuitry consumes at least reduced power, applied power level.” *See* Tr. 46:4–49:12, 50:17–53:5, 54:16–61:21, 68:4–73:26. In particular, Patent Owner argued that turning off power might reduce overall power consumption, but does not change applied power. *See, e.g., id.* at 46:4–47:8. This argument does not appear in Patent Owner’s briefs.

The oral hearing is limited to “argument on an issue raised in a paper” and is not a vehicle for introducing new argument or evidence to the proceeding. 37 C.F.R. § 42.70(a); *see also* Consolidated Trial Practice Guide at 85–86 (“[A] party . . . may only present arguments relied upon in the papers previously submitted.”). At the oral hearing, the panel gave

Patent Owner's counsel multiple opportunities to point out where Patent Owner made an argument differentiating "consum[ed]" power and "applied" power in its papers, but counsel failed to provide any relevant citations. *See* Tr. 47:10–19, 68:14–74:7. As such, we do not consider Patent Owner's new argument attempting to differentiate consumed power from applied power.

The remaining limitations in proposed substitute claim 21 are the same as in original claim 1. We have discussed these limitations with respect to claim 1 of the Sakamoto–Gotoh–Levi ground above. *See supra* § II.D.4.

Having considered Petitioner's contentions and evidence and Patent Owner's arguments, we find that the combination of Sakamoto, Gotoh, Levi, and Gronemeyer teaches every limitation of proposed substitute claim 21. Petitioner also has provided persuasive reasons why an ordinarily skilled artisan would have further modified the Sakamoto–Gotoh–Levi combination based on Gronemeyer with predictable success. Thus, we determine Petitioner has shown, by a preponderance of the evidence, that the subject matter of proposed substitute claim 21 would have been obvious over the combination of Sakamoto, Gotoh, Levi, and Gronemeyer.

3. *Proposed Substitute Claims 22 and 23*

Proposed substitute claims 22 and 23, which depend from proposed substitute claim 21, differ substantively from original claims 2 and 3 only insofar as the recited "first signal level" of original claims 2 and 3 has been amended to read "a ~~first~~ single predetermined signal level" or "a ~~first~~ one predetermined signal level." RMTA 27. For the same reasons discussed above, Sakamoto teaches a "single predetermined signal level" or "one

predetermined signal level.” *See supra* § III.F and note 8. We have analyzed all other aspects of proposed substitute claims 22 and 23 above. *See supra* § II.D.5, 6. Thus, for the same reasons, we determine Petitioner has shown, by a preponderance of the evidence, that the subject matter of proposed substitute claims 22 and 23 would have been obvious over the combination of Sakamoto, Gotoh, Levi, and Gronemeyer.

4. *Proposed Substitute Claims 24–26*

Proposed substitute claims 24–26 depend from proposed substitute claim 21 and are the same as original claims 4–6 except that the claim dependencies have been updated. We have analyzed all limitations of proposed substitute claims 24–26 above. *See supra* § II.D.7–9. Thus, for the same reasons, we determine Petitioner has shown, by a preponderance of the evidence, that the subject matter of proposed substitute claims 24–26 would have been obvious over the combination of Sakamoto, Gotoh, Levi, and Gronemeyer.

5. *Proposed Substitute Claim 30*

Proposed substitute claim 30 depends from proposed substitute claim 27 and recites that “the primary location tracking circuitry is deactivated by placing the primary location tracking circuitry in a low power mode in which the primary location tracking circuitry consumes at least reduced power in response to a measurement of the receive communication signal being below the single predetermined signal level.” RMTA 29. At the outset, we note that Sakamoto teaches “a single predetermined signal level” for the same reasons mentioned above. *See supra* § III.F. For the

“low power mode in which the primary location tracking circuitry consumes at least reduced power,” Petitioner relies on the same analysis discussed above with respect to proposed substitute claim 21. *See supra* § III.G.2. We have analyzed all other aspects of proposed substitute claim 30 above with respect to original claim 10. *See supra* § II.D.13. Thus, for the same reasons, we determine Petitioner has shown, by a preponderance of the evidence, that the subject matter of proposed substitute claim 30 would have been obvious over the combination of Sakamoto, Gotoh, Levi, and Gronemeyer.

6. *Proposed Substitute Claim 37*

Proposed substitute claim 37 is an independent claim that recites, *inter alia*,

a battery power monitor configured to:

in response to measurement of a receive communication signal level less than a single predetermined signal level:

reduce, to a low power mode in which the primary location tracking circuitry consumes at least reduced power,
applied power level to the primary location tracking circuitry.

RMTA 30–31. At the outset, we note that Sakamoto teaches “a single predetermined signal level” for the same reasons mentioned above. *See supra* § III.F. For the “low power mode in which the primary location tracking circuitry consumes at least reduced power,” Petitioner relies on the same analysis discussed above with respect to proposed substitute claim 21. *See supra* § III.G.2. We have analyzed all other aspects of proposed substitute claim 37 above with respect to original claim 17. *See supra* § II.D.20. Thus, for the same reasons, we determine Petitioner has shown, by a preponderance of the evidence, that the subject matter of proposed

substitute claim 37 would have been obvious over the combination of Sakamoto, Gotoh, Levi, and Gronemeyer.

7. *Proposed Substitute Claims 38–40*

Proposed substitute claims 38–40 depend from proposed substitute claim 17 and are the same as original claims 18–20 except that the claim dependencies have been updated. We have analyzed all limitations of proposed substitute claims 38–40 above. *See supra* § II.D.21–23. Thus, for the same reasons, we determine Petitioner has shown, by a preponderance of the evidence, that the subject matter of proposed substitute claims 38–40 would have been obvious over the combination of Sakamoto, Gotoh, Levi, and Gronemeyer.

H. *Patentability of Proposed Substitute Claims 21–40 on Other Grounds*

Petitioner additionally contends that (1) the subject matter of proposed substitute claim 30 would have been obvious over the combination of Sakamoto, Gotoh, and Levi (RMTA Opp. 1–3; RMTA Sur-reply 1–5); (2) the subject matter of proposed substitute claims 27–29 and 31–36 would have been obvious over the combination of Sakamoto, Gotoh, Levi, and Gronemeyer (MTA Opp. 21–24; RMTA Opp. 1–3; RMTA Sur-reply 1–5); (3) the subject matter of proposed substitute claims 27–36 would have been obvious over the combination of Sakamoto, Gotoh, Levi, and Kulach (RMTA Opp. 1–3; RMTA Sur-reply 1–5); (4) the subject matter of proposed substitute claims 21–40 would have been obvious over the combination of Sakamoto, Gotoh, Levi, and U.S. Patent No. 6,438,381 B2 (Ex. 1076, “Alberth”) (MTA Opp. 8–20; RMTA Opp. 1–3, 11–18; RMTA Sur-reply 1–

5, 8–11); and (5) the subject matter of proposed substitute claims 27–36 would have been obvious over the combination of Alberth, Gotoh, and Levi (RMTA Opp. 3–11; RMTA Sur-reply 6–8). We already have found proposed substitute claims 21–40 to be unpatentable, so we do not reach any of these grounds. *See SAS*, 138 S. Ct. at 1359; *Boston Sci.*, 809 F. App’x at 990.

IV. CONCLUSION⁹

Petitioner has shown, by a preponderance of the evidence, that claims 1–20 of the ’113 patent would have been obvious over the combination of Sakamoto, Gotoh, and Levi. Patent Owner has shown that its revised motion to amend complies with the statutory and regulatory requirements. Nevertheless, Petitioner has shown, by a preponderance of the evidence, that (1) the subject matter of proposed substitute claims 27–29 and 31–36 would have been obvious over the combination of Sakamoto, Gotoh, and Levi; and (2) the subject matter of proposed substitute claims 21–26, 30, and 37–40 would have been obvious over the combination of Sakamoto, Gotoh, Levi, and Gronemeyer. Thus, we *deny* Patent Owner’s revised motion to amend.

⁹ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner’s attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. *See* 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. § 42.8(a)(3), (b)(2).

V. ORDER

Accordingly, it is

ORDERED that claims 1–20 of the '113 patent are held to be unpatentable;

FURTHER ORDERED that Patent Owner's revised motion to amend is *denied*; and

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

In summary:

Claims	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatentable	Claims Not shown Unpatentable
1–20	103(a)	Sakamoto, Gotoh, Levi	1–20	
1–20	103(a) ¹⁰	Sakamoto, Gotoh, Levi, Kulach		
Overall Outcome			1–20	

Motion to Amend Outcome	Claims
Original Claims Cancelled by Amendment	
Substitute Claims Proposed in the Amendment	21–40
Substitute Claims: Motion to Amend Granted	
Substitute Claims: Motion to Amend Denied	21–40
Substitute Claims: Not Reached	

¹⁰ As explained above, we do not reach this ground. *See supra* § II.E.

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