UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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CAREFUSION CORPORATION,
Petitioner,

v.

BAXTER INTERNATIONAL, INC.,
Patent Owner.

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Case IPR2017-00202
Patent 5,764,034

_____

Before ROBERT J. WEINSCHENK, TIMOTHY J. GOODSON, and
AMANDA F. WIEKER, *Administrative Patent Judges.*

WIEKER, *Administrative Patent Judge.*

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

I. INTRODUCTION

CareFusion Corporation ("Petitioner") filed a Petition (Paper 1, "Pet.") requesting an *inter partes* review of claims 1–4 and 9–12 of U.S. Patent No. 5,764,034 (Ex. 1001, "the '034 patent"). Baxter International, Inc. ("Patent Owner") filed a Preliminary Response (Paper 6, "Prelim. Resp.") to the Petition. We instituted an *inter partes* review of challenged claims 9–12 based on the asserted ground of obviousness under 35 U.S.C. § 103(a)[1] over the combined teachings of Jenkins[2] and Stich[3]. Paper 8 ("Dec. on Inst."), 27.

After institution, Patent Owner filed a Response (Paper 12, "PO Resp.") to the Petition, and Petitioner filed a Reply (Paper 13, "Pet. Reply"). An oral hearing was held on January 8, 2018, and a transcript of the hearing is included in the record. Paper 23 ("Tr.").

We issue this Final Written Decision pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons set forth below, Petitioner has shown by a preponderance of the evidence that challenged claims 9–12 of the '034 patent are unpatentable.

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[1] The Leahy-Smith America Invents Act ("AIA"), Pub. L. No. 112-29, which was enacted on September 16, 2011, made amendments to 35 U.S.C. §§ 102, 103. AIA § 3(b), (c). Those amendments became effective eighteen months later on March 16, 2013. *Id.* at § 3(n). Because the application from which the '034 patent issued was filed before March 16, 2013, any citations herein to 35 U.S.C. § 103 are to its pre-AIA version.

[2] U.S. Patent No. 3,985,133 (issued Oct. 12, 1976) (Ex. 1004).

[3] U.S. Patent No. 5,295,078 (issued Mar. 15, 1994) (Ex. 1005).

A. Related Matters

The '034 patent is at issue in the following proceeding: *Baxter Int'l, Inc. v. CareFusion Corp.*, No. 1:15-cv-9986 (N.D. Ill.). Pet. 2; Paper 5, 1. The '034 patent also is involved in PTAB proceeding IPR2016-01460, in which claims 1–4 were shown to be unpatentable. Pet. 2; Paper 5, 1; *see CareFusion Corp. v. Baxter Int'l, Inc.*, Case IPR2016-01460, slip op. at 29–30 (PTAB Jan. 17, 2018) (Paper 37).

B. The '034 Patent

The '034 patent discloses a battery gauge for an infusion pump that "provides an estimate of the amount of time left on the battery by monitoring not only the voltage . . . but also the amount of current flowing from the battery." Ex. 1001, 2:12–25. Figure 11 is reproduced below.
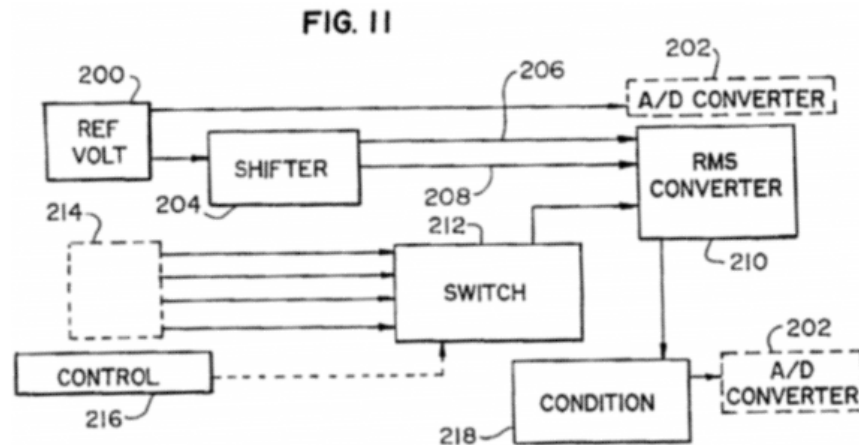

Figure 11 depicts a block diagram of the battery gauge circuit. *Id.* at 2:47–49. Control circuit 216 controls switch 212 to select the voltage or current range 214 to be measured, e.g., high-voltage, low-voltage, high-current, or low-current. *Id.* at 9:38–42, 10:55–56. The selected signal is sent to RMS converter 210 and conditioning circuit 218, before being input to A/D (analog-to-digital) converter 202 of a slave microprocessor for analysis. *Id.* at 9:35–47. Reference voltage 200 is also sent to RMS converter 210 and A/D converter 202. *Id.* at 9:25–28, Fig. 11.

Additionally, a coarse voltage signal (not shown) is supplied to the slave microprocessor. *Id.* at 11:13–23.

These signals are used to generate visual and audible indicators of battery status. *Id.* at 5:12–18, 5:35–37, 8:26–39, 11:39–41. For example, a "Battery Alarm occurs when the battery voltage falls below a critically determined value," e.g., 10.8 volts. *Id.* at 11:46–49; *see also id.* at 13:21–30, Fig. 14 (step 14). A "Battery Alert is generated when less than a predetermined time is left until the Alarm is generated," e.g., 30 minutes. *Id.* at 11:43–46; *see also id.* at 13:36–52, 14:50–56, Fig. 14 (step 17).

C. Illustrative Claim

Challenged claim 9 is independent. Ex. 1001, 16:25–40. Challenged claims 10–12 depend directly from independent claim 9. *Id.* at 16:41–49. Independent claim 9, reproduced below, is illustrative:

> 9. A method of infusing a liquid into a patient comprising:
>
> infusing the liquid into the patient by use of an electrically powered mechanism;
>
> powering the electronically powered mechanism with a battery;
>
> monitoring the voltage of the battery;
>
> monitoring the current from the battery;
>
> determining from the voltage and the current the remaining time of charge in the battery;
>
> alarming when the remaining time of charge in battery is below a predetermined level;
>
> alerting when the remaining time of charge in battery is below a predetermined level but above the battery alarm level; and
>
> displaying the remaining time of charge in the battery.

Id. at 16:25–40.

II. ANALYSIS

A. Claim Interpretation

The parties agree that the '034 patent has expired. Pet. 7; PO Resp. 5. "The Board construes claims of an expired patent in accordance with *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc)." *Wasica Fin. GmbH v. Cont'l Auto. Sys., Inc.*, 853 F.3d 1272, 1279 (Fed. Cir. 2017). Accordingly, the "words of a claim 'are generally given their ordinary and customary meaning'" as understood by a person of ordinary skill in the art at the time of the invention. *Phillips*, 415 F.3d at 1312 (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)).

In our institution decision, we did not construe any terms in challenged claims 9–12. *See* Dec. on Inst. 6–7. In their post-institution papers, neither party proposes an express construction for any term appearing in challenged claims 9–12. PO Resp. 9 ("[A] POSITA would have understood all claim terms to have their ordinary and customary meaning."); Pet. Reply 3 ("The Board need not construe any terms in the instituted claims."). As such, we need not provide express constructions of any claim language for purposes of this Decision. *See Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) (stating that claim terms only need to be construed to the extent necessary to resolve the case).

B. Obviousness over the Combined Teachings of Jenkins and Stich

Petitioner contends that claims 9–12 of the '034 patent are unpatentable under 35 U.S.C. § 103(a) over Jenkins and Stich. Pet. 18–33. Petitioner explains how the combined teachings of Jenkins and Stich purportedly account for the subject matter of the challenged claims, and provides reasoning as to why one of ordinary skill in the art would have found it obvious to combine their respective

teachings. *Id.* Petitioner relies on the Declaration of Dr. Yangming Xu (the "Xu Declaration," Ex. 1003) to support its positions. *Id.*

In its Response, Patent Owner presents arguments with respect to challenged claims 9–11. PO Resp. 10–63. Patent Owner relies upon two Declarations of Mr. Warren Heim (the "First Heim Declaration," Ex. 2001; the "Second Heim Declaration," Ex. 2012) to support its positions. *Id.*

We begin our analysis with the principles of law that generally apply to a ground based on obviousness, followed by an assessment of the level of skill in the art. We then provide a brief overview of Jenkins and Stich, and address the parties' contentions with respect to the challenged claims.

1. Principles of Law

A claim is unpatentable under 35 U.S.C. § 103(a) if "the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." *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) objective evidence of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

"In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable." *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016). The burden of persuasion never shifts to Patent Owner. *Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015).

We analyze this asserted ground with these principles in mind.

2. *Level of Ordinary Skill in the Art*

Petitioner relies on the Xu Declaration and contends that a person of ordinary skill in the art of the '034 patent would have had "education and research/industry experience in biomedical engineering with at least 2 years' experience designing hardware, software, and/or firmware for electrical devices in the biomedical industry." Pet. 10 (citing Ex. 1003 ¶ 5). According to Petitioner, someone with such education and experience would have been familiar with the battery-monitoring features relevant to the '034 patent. Pet. Reply. 2–3 (citing Ex. 2017, 75:3–9, 75:13–16).

Patent Owner relies on the First Heim Declaration and contends that such a person would have had "an engineering degree and at least six years of experience designing medical devices using electronics and electro-mechanical components (*e.g.*, infusion pumps) powered by batteries." PO Resp. 8 (citing Ex. 2001 ¶¶ 43–44).

Primarily, the parties' assessments of the skill level of a person of ordinary skill in the art differ in that Patent Owner contends that such a person would have had six years of experience designing medical devices, instead of two years of experience, and further contends that this experience would relate specifically to medical devices that are powered by batteries. *Compare* PO Resp. 8, *with* Pet. 10. Based on our review of the '034 patent, the types of problems and solutions described therein and in the applied prior art, and the testimony of Dr. Xu and Mr. Heim, we determine that Petitioner's assessment of the skill level of a person of ordinary skill in the art is most consistent with this evidence. Specifically, the '034 patent, the applied primary reference to Jenkins, and several additional cited prior art references (*see, e.g.*, Ex. 1006; Ex. 2013; Ex. 2014; Ex. 2016) relate to various different aspects of infusion pump technology, including processing, power

management (by both external and internal battery sources), device display, and infusion pumping. *See generally* Ex. 1001; Ex. 1004. In light of these broad disclosures, we conclude that the appropriate level of skill in the art is not as narrow or specialized as Patent Owner proposes, and we adopt Petitioner's assessment.

We note that our conclusions herein would not differ under either party's assessment. Moreover, at the oral hearing, counsel for Patent Owner agreed that the parties' differing assessments of skill level do not affect the outcome of this proceeding. Tr. 24:16–17.

3. Overview of Jenkins (Ex. 1004)

Jenkins is a U.S. Patent titled "IV Pump," which discloses a volumetric infusion pump for intravenous administration of fluid to a patient. Ex. 1004, [54], [57]. The disclosed pump includes a low battery detector that "detects when the voltage level of the [pump] battery is below a certain predetermined value." *Id.* at 18:63–19:15. As a result, "an alarm signal [is provided] when there is approximately one hour running time for the pump from the charge remaining on the battery." *Id.* at 3:65–68, 8:22–26. Battery alarm indicator 48, located on the front panel of the pump, provides a visual indication of this alarm signal. *Id.* at 5:45–52, 8:3–7, Fig. 1. When the battery alarm is activated, pump operation is not impacted. *Id.* at 3:68–4:1. "If, however, the pump is operated beyond the [approximately one hour] alarm period without plugging in the battery charger, ultimately the battery is discharged so that there is insufficient power to drive the pump and this activates an occlusion alarm in addition to the battery alarm." *Id.* at 4:1–6. Occlusion indicator 50, located on the front panel of the pump, provides a visual indication of this occlusion status. *Id.* at 5:53, 8:3–7, 8:26–35, Fig. 1.

4. Overview of Stich (Ex. 1005)

Stich is a U.S. Patent titled "Method and Apparatus for Determination of Battery Run-Time in Uninterruptable Power System." Ex. 1005, [54]. Figure 1 of Stich is reproduced below.

FIG. 1

Figure 1 presents a block diagram of uninterruptable power system 30, connected between an AC power source (at inlet plug 31) and a critical load, e.g., a computer (at output terminal 40). *Id.* at 4:56–59, 4:64–67, 5:2–6. Power system 30 includes inverter 46 and battery 47. "When power from the AC power mains fails, an inverter 46 is turned on, and DC power is supplied to the inverter from an auxiliary power supply battery 47 on a DC bus 48." *Id.* at 5:20–23.

Stich explains that "battery monitor 61 is used to monitor the voltage of the battery 47." *Id.* at 5:58–61. Additionally, current transformer 57 is connected to AC output power line 39 to obtain "information indicative of the current being delivered by the back-up power system 30 to the power consuming load equipment (the load current)." *Id.* at 5:49–54. To determine remaining battery runtime, microprocessor 66 executes a formula utilizing monitored voltage and current values, to obtain an accurate determination of runtime. *Id.* at 3:3–5, 6:47–7:8.

5. Claim 9

Petitioner contends that the combined teachings of Jenkins and Stich would have rendered claim 9 obvious to a person of ordinary skill in the art. Pet. 18–33. Patent Owner disagrees. PO Resp. 10–63. We address the parties' contentions below.

a. "A method of infusing a liquid into a patient comprising"

Claim 9 recites "[a] method of infusing a liquid into a patient." Ex. 1001, 16:24. We are persuaded by Petitioner's contention, which Patent Owner does not dispute, that Jenkins discloses the subject matter recited in the preamble. Pet. 31 (citing *id.* at 22). Specifically, Jenkins discloses a "volumetric infusion pump for use in administering fluids intravenously to a patient." Ex. 1004, 1:1–3.

b. "infusing the liquid into the patient by use of an electrically powered mechanism"

Claim 9 recites "infusing the liquid into the patient by use of an electrically powered mechanism." Ex. 1001, 16:25–26. We are persuaded by Petitioner's contention, which Patent Owner does not dispute, that Jenkins discloses this limitation. Pet. 31 (citing Pet. 22–23). Specifically, Jenkins discloses that the volumetric infusion pump includes disposable volumetric cassette 24, through which fluid is conveyed to the patient. Ex. 1004, 5:18–35. The pump is electrically powered. *Id.* at 23:1–2.

c. "powering the electronically powered mechanism with a battery"

Claim 9 recites "powering the electronically powered mechanism with a battery." Ex. 1001, 16:28–29. We are persuaded by Petitioner's contention, which Patent Owner does not dispute, that Jenkins discloses this limitation. Pet. 32 (citing *id.* at 23). Specifically, battery 630 powers the pump. Ex. 1004, 23:1–2.

> d. *"monitoring the voltage of the battery"* and
> *"monitoring the current from the battery"*

    i.   *Jenkins – monitoring voltage*

Claim 1 recites "monitoring the voltage of the battery" and "monitoring the current from the battery." Ex. 1001, 16:30–31. We are persuaded by Petitioner's contention, which Patent Owner does not dispute, that Jenkins discloses "monitoring the voltage of the battery," as claimed. Pet. 32 (citing *id.* at 23–25). Specifically, Jenkins discloses low battery detector block N, which "detects when the voltage level of the battery is below a certain predetermined value." Ex. 1004, 18:63–67; *see also id.* at 19:9–15.

    ii.   *Jenkins – monitoring current*

Petitioner contends that it would have been obvious for Jenkins to also monitor current, however, we are not persuaded by this contention, based on Jenkins alone. *See* Pet. 23 (citing Ex. 1003 ¶ 20). Petitioner's contention in this regard is conclusory. For example, that both voltage and current are "capable of being measured" (Ex. 1003 ¶ 20), "could be used to calculate the run time" (*id.* ¶ 10), and are related by Ohm's law (*id.*) does not provide a reasoned basis for Petitioner's conclusion, based on Jenkins alone, that a person of ordinary skill in the art would have modified Jenkins to monitor current in addition to voltage. *See* 37 C.F.R. § 42.65(a).

    iii.   *Stich – monitoring voltage*

With respect to voltage monitoring, we are persuaded by Petitioner's contention, which Patent Owner does not dispute, that Stich teaches "monitoring the voltage of the battery," as claimed. Pet. 24. Specifically, Stich discloses that "battery monitor 61 is used to monitor the voltage of the battery 47 and to provide a signal to the controller 56 indicating the measured voltage of the battery."

Ex. 1005, 5:58–61; *see also id.* at 6:47–68. Petitioner also contends that it would have been obvious to incorporate Stich's battery monitoring features into Jenkins's pump, a contention we address in Section II.B.5.h *infra*. *See id.* at 21–22.

 iv.   *Stich – monitoring current*

In the Petition, Petitioner relies upon Stich's disclosure of monitoring "output current." Pet. 23–25, 32. In response to arguments advanced by Patent Owner in its Patent Owner Response, Petitioner both maintains its position regarding "output current" and, additionally, relies upon other portions of Stich's disclosure regarding "battery current." Pet. Reply 4–7; *see also* PO Resp. 16–28. We address separately each alternative position below.

 v.   *Stich – monitoring "output current"*

With respect to current monitoring, the Petition contends that Stich discloses "monitoring the current from the battery," as claimed. Pet. 24. Petitioner relies on Stich's disclosure that "[o]utput current supplied to the load is also measured." Pet. 24 (quoting Ex. 1005, 3:16–23). Petitioner identifies Stich's current transformer 57, which monitors current supplied to a load from battery 47. *Id.* at 25 (citing Ex. 1005, 5:49–54, 6:18–22). Petitioner also contends that it would have been obvious to incorporate Stich's battery monitoring features into Jenkins's pump, a contention we address in Section II.B.5.h *infra*. *Id.* at 21–22.

In its Response, Patent Owner argues that Stich fails to teach this limitation because "Stich evaluates the *output current* of the back-up power system delivered to the load, *not* the current from the battery." PO Resp. 23. According to Patent Owner, Stich monitors output current "at the opposite end of the circuit," i.e., at transformer 57, rather than at battery 47, wherein the current originating with battery 47 passes through DC bus line 48, through inverter 46, through main transformer 44, through output filter 38, and through power line 39, before being

monitored by transformer 57. *Id.* at 23–25. Patent Owner contends that monitoring output current at this location "is ***not*** the same as measuring current from the battery" because the output current is "reduced by the current drawn by the housekeeping power supply [95]." *Id.* at 26. Patent Owner also contends that using this output current in determining the remaining time of charge "would result in different and skewed determinations of remaining time of charge in the battery." *Id.* at 27; *see also* Ex. 2001 ¶¶ 63–67; Ex. 2012 ¶¶ 63–67, 69–74, 79, 81, 106.

Patent Owner's argument regarding Stich is premised upon its contention that claim 9 requires monitoring "all of" "the actual current discharged from the battery itself," and precludes monitoring "any . . . current values or portions or derivatives thereof." PO Resp. 16–17. According to Patent Owner,

> [w]ithout a measurement of the actual current flowing from the battery itself, which therefore includes *all of the current flowing from the battery*, the calculations disclosed in the '034 Patent would result in an inaccurate determination of the remaining time of charge and run afoul of the stated purpose of providing "sensitive battery monitoring" capable of "providing an accurate estimate of the amount of time left."

Id. at 17 (emphasis added); *see also id.* at 21 ("[T]he '034 Patent requires measuring the actual battery current from the battery, including all of the battery current flow, in order for the result of the time of charge calculation to be correct."); Tr. 25:12–13, 38:20–26 (arguing that this purported inaccuracy suggests against combining the references).

In support of this contention, Patent Owner argues that "one of the stated purposes of the '034 Patent is providing 'an estimate of the amount of time left on the battery by monitoring . . . the amount of ***current flowing from the battery***.'" *Id.* at 17 (quoting Ex. 1001, 2:20–23). Patent Owner also cites Figure 12 of the '034 patent, which depicts precision sensing resistor R2 at the battery negative, for

monitoring current in that embodiment. *Id.* at 17–19 (citing Ex. 1001, 9:48–49, 9:55–56, 10:50–11:12); *see also id.* at 19–21 (citing Ex. 1001, 13:36–40, Fig. 14 (using CURRENT DRAIN in calculations of remaining time)).

Patent Owner's argument amounts to a request that we re-write claim 9 to require "monitoring all of the current directly discharged from the battery, at the battery itself." We decline to do so. Contrary to Patent Owner's argument, the plain language of claim 9 does not recite "monitoring all of the current directly discharged from the battery"; nor does claim 9 recite monitoring current at the battery itself. Rather, claim 9 simply recites "monitoring the current from the battery." Ex. 1001, 16:31; *see also* PO Resp. 9 ("Patent Owner asserts that a POSITA would have understood all claim terms to have their ordinary and customary meaning.").

We appreciate Patent Owner's citation to portions of the '034 patent specification, including Figures 12 and 14, and their accompanying descriptions. PO Resp. 17–20. However, these disclosures concern certain preferred embodiments of the invention and do not define or restrict the general term "current" to include, necessarily, *all* current discharged from the battery. *See generally id.* Nor do they define a mechanism by which the current must be monitored, or a location at which the monitoring necessarily occurs, e.g., *at* the battery. *Id.* For example, we are not persuaded that claim 9 requires monitoring with precision sensing resistor R2, placed at the battery negative, as shown in Figure 12. *See, e.g.*, *In re Bigio*, 381 F.3d 1320, 1325 (Fed. Cir. 2004) ("Absent claim language carrying a narrow meaning, the PTO should only limit the claim based on the specification or prosecution history when those sources expressly disclaim the broader definition."). Patent Owner has not identified any portion of

the '034 patent specification to demonstrate persuasively that the claims should be limited in the manner proposed by Patent Owner.

We appreciate Patent Owner's additional argument that monitoring anything other than *all* of the current *directly* discharged from the battery may result in inaccurate calculations of the remaining time of charge of the battery, when that current value is used as an input to the calculation. PO Resp. 17, 19, 21. However, claim 9 does not recite any level of accuracy. Moreover, although accuracy is discussed in the '034 patent specification, it is *not* listed as the primary objective of the invention. Rather, the '034 patent first indicates that "cost-effective, sensitive battery monitoring" is desired; it identifies "providing an accurate estimate of the amount of time left on auxiliary power" as a "further advantage[]," but does not disclose any specific level of accuracy required by the claims. *Compare* Ex. 1001, 2:1–2, *with id.* at 1:2–5; *see also id.* at 2:12–16 (same); *see also* Pet. Reply 5 (citing Ex. 1015, 84:4–85:16 (testimony of Patent Owner's declarant that the '034 patent does not disclose data regarding accuracy)); Ex. 1016, 78:8–84:7.

For the foregoing reasons, we decline Patent Owner's invitation to re-write claim 9 to require monitoring *all* current *directly discharged* from the battery, or to require monitoring *at* the battery.

We have considered Patent Owner's argument and evidence regarding Stich's disclosure of monitoring output load current; however, we are persuaded by Petitioner's contentions regarding Stich. There is no dispute that the output load current monitored by Stich's transformer 57 is current that came *from the battery*, even if reduced by the housekeeping power supply. *See* PO Resp. 24 (describing path from battery 47 to current transformer 57), 26 ("[T]he current measured at the load in Stich, at a minimum, is reduced by the current drawn by the housekeeping power supply."); *see also* Ex. 1005, 3:17–18 ("Output current supplied to the load

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is also measured."), 5:49–54. Indeed, Patent Owner does not, and cannot, argue that the current measured at transformer 57 came *from a source other than* battery 47. Tr. 28:16 ("It came from the battery."), 29:1–20. Accordingly, the argument that Stich's output current is not *all* current and is not monitored directly *at* the battery is not commensurate with the proper claim scope, and is unpersuasive.

Furthermore, although the claims do not require a specified level of accuracy, as discussed above, we note that Stich discloses that its calculated runtime, based on the output current monitored at current transformer 57, is "accurately determined." Ex. 1005, [57]; *see also id.* at 3:3–5 ("highly accurate").

For the foregoing reasons, we are persuaded by Petitioner's contention that Stich discloses "monitoring the current from the battery." Ex. 1005, 3:17–18 ("Output current supplied to the load is also measured."), 5:49–54.

  vi.   *Stich – monitoring "battery current" (alternate rationale)*

Petitioner responds to Patent Owner's argument that claim 9 requires monitoring *all* the current directly *at* the battery in two ways. First, Petitioner disputes Patent Owner's construction of the claim language, and contends that Stich's disclosure of monitoring output current is sufficient. Pet. Reply. 4–5. As discussed above, we agree with Petitioner on this point. Second, Petitioner responds that "[r]egardless, Stich teaches the claim limitation even under Baxter's narrow reading." *Id.* at 7. Petitioner identifies Stich's disclosure that "battery current" may be used to calculate remaining runtime on the battery, instead of the output current discussed above, and that battery current and output current "essentially differ from one another by constants." *Id.* at 6 (citing Ex. 1005, 3:18–22, 8:51–61); *see also* Dec. on Inst. 15. Petitioner contends that a person of ordinary skill in the art "would have understood the relationship between the currents at different points in an electrical circuit" because the "rules governing

those relationships are basic principles of electronics, taught in introductory courses." *Id.* at 7 (citing Ex. 1017, 707–713, 840–42; Ex. 1018, 636–37, 791–94; Ex. 1016, 6:1–12:6, 69:2–75:1).

In its Response, Patent Owner addresses Stich's disclosures regarding battery current. PO Resp. 29–30.[4] Patent Owner argues that "any oblique reference in Stich as to using battery current rather than load current I_o(INV) is incomplete." *Id.* at 29. According to Patent Owner, the Petition fails to identify "what the relationship is, if any, between load current and battery current, [or] how a POSITA would utilize battery current . . ., or what the impact . . . would be on the resulting inverter runtime calculations or accuracy." *Id.* at 29–30 (citing Ex. 2012 ¶¶ 71, 105). For example, Patent Owner queries how to account for housekeeping power, and how battery current would be used to produce a value for I_o(INV). *Id.* at 30 (citing Ex. 2012 ¶¶ 70–72, 105–107).

We have considered the parties' positions and cited evidence, and we are persuaded by Petitioner's contentions. First, contrary to Patent Owner's argument, Stich explains "what the relationship is . . . between load current and battery current." *See* PO Resp. 29. Stich explains that the remaining runtime on the battery may be determined using "the *measured output current* (or an *equivalent time such as output power or battery current*)." Ex. 1005, 3:18–22 (emphases added). Stich further explains, "[it] is apparent that . . . output current[] and battery current can be used for this purpose and *essentially differ from one another by constants*." *Id.* at 8:58–61 (emphasis added). Thus, according to Stich, measured

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[4] Patent Owner's arguments regarding battery current are included in Section IV.C of its Response. *See* PO Resp. 28–30 (addressing the limitation of "determining from the voltage and the current the remaining time of charge in the battery'"). We address these arguments here, regarding the limitation of "monitoring the current from the battery," because they are pertinent to both limitations.

output current and battery current are equivalent, differing only by constants, and either may be used to determine runtime. *Id.* at 3:18–22, 8:58–61.

To support the argument that Stich fails to identify "how a [person of ordinary skill in the art] would utilize battery current," Patent Owner relies on Mr. Heim's testimony that "Stich does not disclose to a person of ordinary skill in the art . . . how to use battery current for remaining runtime calculations" or "how battery current could be used to produce a value for I_o(INV)." Ex. 2012 ¶¶ 105, 107; PO Resp. 29. However, contrary to Mr. Heim's testimony, Stich expressly discusses these matters. For example, Stich explains that "[i]t is apparent that . . . *battery current* I_B *may be used* during inverter operation to estimate output current *for use in the expressions above*." Ex. 1005, 8:48–54 (emphases added). Additionally, Stich explains that "the value of I_o(INV) can be determined as . . . an estimate of load current based on battery current." *Id.* at 8:61–65. Therefore, we find that Stich plainly explains that battery current may provide an estimate of output current, for use in the disclosed calculations as the variable I_o(INV). Mr. Heim does not address these portions of Stich's disclosure, which are directly relevant (and contrary) to his testimony. Ex. 2012 ¶¶ 105, 107. Accordingly, we find that Mr. Heim's testimony lacks credibility, in light of Stich's express teachings. *Elbit Sys. of Am., LLC v. Thales Visionix, Inc.*, No. 2017-1355, slip op. at 8 (Fed. Cir. Feb. 6, 2018) ("The PTAB [i]s entitled to weigh the credibility of witnesses.") (quoting *Trs. of Columbia Univ. v. Illumina, Inc.*, 620 F. App'x 916, 922 (Fed. Cir. 2015)).

Patent Owner's arguments in this regard suggest, although do not explicitly state, that Stich's disclosures regarding battery current would have been non-enabling to a person of ordinary skill in the art. PO Resp. 29–30; Tr. 30:11–12, 30:26–6; *see also* Pet. Reply 6. "Under [35 U.S.C.] § 103, however, a reference

need not be enabled; it qualifies as a prior art, regardless, for whatever is disclosed therein." *Amgen Inc. v. Hoechst Marion Roussel, Inc.*, 314 F.3d 1313, 1357 (Fed. Cir. 2003). The focus, therefore, remains on whether a person of ordinary skill in the art would have found the claimed subject matter to have been obvious over the prior art as a whole. In this case, although Petitioner does not provide affirmative testimonial evidence to demonstrate the understanding of a person of ordinary skill in the art with respect to monitoring battery current, we find that Stich's express disclosures, discussed above, bear directly on this question. *Compare* Ex. 1005, 3:18–23, 8:48–54, 8:58–65, *with* Ex. 2012 ¶¶ 105, 107.

Additionally, with respect to Patent Owner's argument that the Petition does not identify "what the impact [of using battery current] . . . would be on the resulting inverter runtime calculations or accuracy," as discussed above, we determine that the claims do not require any specific level of accuracy. PO Resp. 30. Similarly, the claims do not require that the remaining time of charge account for, e.g., housekeeping power. *Id.* Indeed, Patent Owner does not identify any portion of the '034 patent suggesting that all power drawn by all portions of the electrical circuit must be accounted for when determining the remaining time of charge on the battery. Therefore, to the extent Stich fails to explain how use of battery current would impact accuracy, we find this argument not commensurate with the claim scope.

Finally, at the oral hearing, Patent Owner argued that Stich does not "measure the actual battery current." Tr. 31:26–32:1; *see also id.* at 32:18–19. Patent Owner's counsel explained that "monitoring the current from the battery [as claimed] is actually you're taking the measurement and you're using that measurement." *Id.* at 32:25–26. According to Patent Owner's counsel, "[t]he claim language says use the measured current from the battery. It's not a

derivation of that current, it's not a portion of the current. It says use the measured current from the battery." *Id.* at 31:16–18; *see also id.* at 34:23–35:3. In other words, Patent Owner argues that claim 9 requires "measuring" the current from the battery, and Stich's reference to "battery current" is a merely derived, but not measured, current value. *Id.* at 35:8–36:4.

We disagree with Patent Owner's argument that the claim language directed to "monitoring the current from the battery" actually instead requires "*measuring* the current from the battery." Although Patent Owner's counsel suggested that "[a] person of ordinary skill in the art reading the claim would understand that I'm taking a reading or measuring what the current is at the battery," Patent Owner has not identified any intrinsic or extrinsic evidence in the record to support this assertion. *Id.* at 34:26–35:3; *see also id.* at 35:26–36:2 ("I think a person of ordinary skill in the art reading the claim would understand monitoring to be measuring or taking a reading on, something to that effect."). Accordingly, we are not persuaded that "monitoring the current from the battery" requires directly measuring the value of the battery current, rather than mathematically deriving the value of the battery current. Stich clearly states that a battery current value may be used to determine remaining run-time. *See, e.g.*, Ex. 1005, 3:18–23, 8:48–66. As such, Stich discloses "monitoring the current from the battery" for use in this calculation.

Accordingly, we determine that Stich discloses that battery current may be used to determine remaining runtime on the battery, and that battery current is "equivalent" to measured output current, differing therefrom by constants. Ex. 1005, 3:18–22, 8:58–61. Furthermore, we determine that a person of ordinary skill in the art would have understood how to use Stich's battery current, in light of

Stich's disclosure that battery current may provide an "estimate" of output current, which can be used in the disclosed calculations as I_o(INV). Ex. 1005, 8:48–65.

> e. *"determining from the voltage and the current*
> *the remaining time of charge in the battery"*

Claim 1 recites "determining from the voltage and the current the remaining time of charge in the battery." Ex. 1001, 16:32–33. Petitioner identifies teachings of both Jenkins and Stich. Pet. 32 (citing *id.* at 25–26). First, Petitioner identifies Jenkins's disclosure of providing a battery alarm that occurs when the remaining time of charge is below a predetermined level, e.g., "when there is approximately one hour running time remaining on the battery charge." *Id.* at 25 (quoting Ex. 1004, 8:21-23; citing Ex. 1004, 3:65–68). Petitioner *does not* contend, however, that Jenkins "determin[es] the remaining time of charge." *Id.* To that end, Petitioner relies on Stich's disclosure that monitoring and metering circuit 62 provides monitored voltage and current values (*see supra* Section II.B.5.d) to microprocessor 66, which determines the remaining "runtime available." *Id.* at 25–26 (quoting Ex. 1005, 6:47–49; citing Ex. 1005, 5:58–64, 6:18–22, 8:36–37, 3:18–23, 6:55). Petitioner contends that it would have been obvious to incorporate Stich's battery monitoring features into Jenkins's pump. *Id.* at 21–22; *see infra* Section II.B.5.h.

Patent Owner disputes Petitioner's contentions. First, Patent Owner contends that monitoring output current, and using that value to determine remaining runtime, does not constitute "monitoring the current from the battery," under Patent Owner's interpretation of that phrase. PO Resp. 28–29. As discussed above, we are persuaded by Petitioner's contentions regarding monitoring output current. *See supra* Section II.B.5.d. Accordingly, we also are persuaded that Stich discloses the "determining . . ." limitation. Pet. 32 (citing *id.* at 25–26).

Specifically, Stich discloses using monitored output current and monitored voltage to determine the remaining time of charge in the battery. Ex. 1005, 3:14–23 ("[T]he output voltage from the battery is measured directly. Output current supplied to the load is also measured. *The remaining run-time available from the battery is then determined in a procedure which utilizes the measured battery voltage, the measured output current . . .*, and system specifications.") (emphasis added); *see also id.* at 6:47–68 (equation for determining remaining run-time, t_R(INV), utilizing battery terminal voltage, V_B, and root mean square (RMS) inverter output load current, I_o(INV)). Accordingly, we determine that Stich's disclosure of determining remaining run-time on the battery using voltage and output current satisfies this claim limitation.

Patent Owner also argues that Stich's disclosure of using "battery current" to determine the remaining time of charge in the battery is "incomplete," as discussed in detail in Section II.B.5.d, *supra*. For the same reasons set forth in that section, we are unpersuaded by Patent Owner's argument. We are persuaded by Petitioner's contention that Stich discloses using "battery current" to determine the remaining time of charge in the battery, as an alternative to output current. Specifically, Stich explains that "[t]he remaining run-time available from the battery is then determined in a procedure which utilizes the measured battery voltage, the measured output current (or an equivalent . . . such as . . . battery current."). Ex. 1005, 3:18–23; *see also id.* at 8:48–55 (explaining that "battery current I_B may be used . . . to estimate output current for use in the expressions above"), 8:58–65. Accordingly, we determine that Stich's disclosure of determining remaining run-time using voltage and battery current satisfies this claim limitation.

> *f. "alarming when the remaining time of charge in battery is
> below a predetermined level" and
> "alerting when the remaining time of charge in battery is
> below a predetermined level but above the battery alarm level"*

Claim 9 recites "alarming when the remaining time of charge in battery is below a predetermined level" and "alerting when the remaining time of charge in battery is below a predetermined level but above the battery alarm level." Ex. 1001, 16:34–38. With respect to these limitations, Petitioner identifies teachings of both Jenkins and Stich. Pet. 32 (citing Pet. 26–28). According to Petitioner, "Jenkins discloses multiple battery alarm/alert levels that occur when the remaining time of charge in the battery is below a predetermined level." *Id.* at 26. Petitioner identifies Jenkins's battery alarm indicator 48, which "is activated when there is approximately <u>one hour running time remaining</u> on the battery charge," and Jenkins's occlusion alarm indicator 50, which is activated when "the battery discharges and there is insufficient power to drive the pump." *Id.* at 26–27 (quoting Ex. 1004, 8:21–29; citing Ex. 1004, 10:55–11:2). Finally, Petitioner identifies Stich's teaching that the determined run-time can be "utilized to provide a low run-time indication if the run-time falls below a selected minimum." *Id.* at 27 (quoting Ex. 1005, 3:35–38; citing Ex. 1005, 8:36–40), 28; *see supra* Section II.B.5.e.[5] Petitioner contends that it would have been obvious to incorporate Stich's battery monitoring features into Jenkins's pump. Pet. 21–22.

Patent Owner disputes Petitioner's contentions. PO Resp. 30–39. Patent Owner argues that Jenkins's battery alarm indicator 48 and occlusion indicator 50

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[5] We are unpersuaded by Petitioner's conclusory assertions that it would have been obvious "to provide additional alarms or alerts which occur when the remaining time of charge in the battery is below other predetermined levels." Pet. 27, 28 (both citing Ex. 1003 ¶ 14); Pet. Reply. 11. Neither the Petition nor the cited portion of the Xu Declaration provide any reasoning as to why this would have been obvious. *See* 37 C.F.R. § 42.65(a).

are not "based on 'remaining time of charge in the battery,'" as claimed, because Jenkins simply does not determine a remaining time of charge at all. *Id.* at 36–37; *see also id.* at 33, 38. Specifically, Patent Owner contends that occlusion indicator 50 is triggered when optical sensors detect that the pump motor has stalled (*id.* at 31–32), and battery alarm indicator 48 is triggered when the battery voltage falls below a predetermined voltage level, i.e., a "voltage trip point" (*id.* at 32–33, 37–39). Patent Owner acknowledges that battery alarm indicator 48 occurs when "approximately one hour" of battery charge remains (*see* Ex. 1004, 8:21–23); however, Patent Owner argues that this is merely a "happenstance condition . . . necessitated by the fact that an actual calculation of remaining time of charge is never performed." *Id.* at 33–34. Patent Owner describes this "estimation of pump runtime" as "a very rough approximation" that "is not based on any time of charge calculation or determination." *Id.* at 34, 35; *see also id.* at 34–36 (arguing that operating parameters, e.g., infusion rate, would impact the estimated run-time, leading to "wide variations in the elapsed time between when the low battery alarm [48] occurred and the occlusion alarm [50]").

We have reviewed the entirety of the record before us and are persuaded by Petitioner's contentions. Pet. 26–28. First, Petitioner has shown that, when approximately one hour of battery run-time remains, Jenkins's battery alarm indicator 48 is activated. *See id.* at 27; Ex. 1004, 3:65–4:6, 5:52, 8:21–30 ("The battery alarm is activated when there is approximately one hour running time remaining on the battery charge."). Second, Petitioner has shown that, when the pump is operated beyond the one-hour battery alarm period, occlusion alarm 50 is activated. *See* Pet. 26–27; Ex. 1004, 4:1–6, 5:53, 8:25–40 ("If, however, the pump is operated for more than one hour without plugging in the battery charger to recharge the battery, the battery discharges and there is insufficient power to drive

the pump which in turns activates the occlusion alarm."). Therefore, we determine that the cited evidence establishes that activation of battery alarm indicator 48 constitutes "alerting when the remaining time of charge in battery is below a predetermined level," (i.e., when the remaining time of charge is less than approximately one hour), "but above the battery alarm level," (i.e., above the level at which occlusion alarm is activated), as claimed, and that activation of occlusion alarm 50 constitutes "alarming when the remaining time of charge in battery is below a predetermined level," (i.e., when the remaining time is below any discernable amount of time more than zero, e.g., 0.001 seconds), as claimed.

We have considered Patent Owner's arguments that occlusion alarm indicator 50 is triggered based on a stalled motor, and battery alarm indicator 48 is triggered based on low voltage, wherein neither is triggered based on the calculated remaining time of charge in the battery. *See, e.g.*, PO Resp. 30–31 ("Claim 9 of the '034 Patent requires a two-stage battery alarm/alert configuration in which an alarm is triggered when the remaining time of charge in the battery is below a predetermined level, and an alert that is triggered when the remaining time of charge in the battery is below a predetermined level, but above the battery alarm level."), 36–37. We agree with Patent Owner's characterization of what "triggers" Jenkins's indicators 48, 50. *See, e.g.*, Ex. 1005, 6:55–58 (detecting stalled motor), 18:65–67 (detecting low voltage). However, we are not persuaded that claim 9 requires that the alarming and alerting steps be "triggered" by the remaining time of charge, or "based on" the remaining time of charge, as argued by Patent Owner. Indeed, the plain language of claim 9 does not recite what "triggers" these steps. Rather, claim 9 simply recites that these steps occur "*when* the remaining time of charge in battery is below a predetermined level." Ex. 1001, 16:34–38 (emphasis added). In other words, claim 9 defines the temporal relationship between the

steps of alarming/alerting and the predetermined levels of remaining time of charge, i.e., the steps occur "when" the predetermined levels are satisfied. *Id.* But the claim is silent as to what *triggers* those steps. *Id.*

Moreover, Patent Owner has not provided any persuasive reasoning to suggest that we should re-write claim 9 to require a triggering limitation that is not recited by the claim's plain language. *See generally* PO Resp. During the oral hearing, Patent Owner argued that it had not briefed the issue of whether the "alarming when" and "alerting when" language requires that the remaining time of charge *trigger* the claimed alarm and alert. Tr. 41:12–17. Patent Owner's argument is not persuasive. Patent Owner was on notice of the plain language of its claims and had ample opportunity during this proceeding to propose that "when," as used in the "alarming" and "alerting" steps of claim 9, be construed to require a "triggering" component that is absent in its plain verbiage. Patent Owner did not do so. *See* PO Resp. 9 ("[A] POSITA would have understood all claim terms to have their ordinary and customary meaning."). In the Preliminary Response, Patent Owner did not propose this language for construction. *See generally* Prelim. Resp.; *but see id.* at 19–21 (disputing Jenkins's teachings regarding these limitations). Likewise, in the Patent Owner Response, Patent Owner again chose not to propose this claim language for construction. *See generally* PO Resp. As such, we decline to rewrite claim 9 to require a "triggering" component that is not recited. *See, e.g.*, Ex. 1001, 8:30–35, 11:43–52 ("is generated when"; "occurs when"); Ex. 1002, APP0204 (the Examiner's Reasons for Allowance stating, "the [p]rior art of record does not disclose or suggest the battery alarm *when* the time of charge left on a battery is below a predetermined level," but not discussing what triggers the alarm) (emphasis added); *see also Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 906 (Fed.

Cir. 2004) ("Even when the specification describes only a single embodiment, the claims of the patent will not be read restrictively unless the patentee has demonstrated a clear intention to limit the claim scope using 'words or expressions of manifest exclusion or restriction.'"). Accordingly, Patent Owner's argument that Jenkins's indicators 48, 50 are not triggered based on the remaining time of charge is not commensurate with the claim scope and is unpersuasive.

Of relevance to the actual claim scope, Patent Owner does not dispute that Jenkins's battery alarm indicator 48 occurs "when the remaining time of charge in battery is below a predetermined level," i.e., when the remaining time of charge is less than approximately one hour. PO Resp. 33 ("[T]he disclosure relied on in the Petition, merely states that 'approximately' one hour of runtime remains *when* the battery alarm is activated by the voltage trip point.") (original emphasis omitted; emphasis added). We appreciate Patent Owner's argument that indicator 48 is activated based on a remaining time of charge that is only an *estimate*, with wide variation due to pump operating parameters, e.g., infusion rate. PO Resp. 34–36. However, claim 9 does not recite any level of precision or accuracy associated with the steps of alarming or alerting *when* the remaining time of charge is below a predetermined level. *See* Pet. Reply 9 ("Baxter's expert admitted that the claims do not require the delivery of alerts and alarms with any specified degree of accuracy."); Ex. 1016, 47:1–51:21.

Moreover, even if we were to accept Patent Owner's contention that the claims require that the alarming and alerting steps are triggered by the remaining time of charge, rather than simply occur "when" the remaining time of charge is below a predetermined level, Patent Owner's argument improperly attacks the references individually. Petitioner's contentions are premised upon the modification of Jenkins's pump to perform the battery monitoring features of

Stich, including the determination of run-time from voltage and current values. Pet. Reply 9; Pet. 21–22. "Non-obviousness cannot be established by attacking references individually where the rejection is based upon the teachings of a combination of references." *See In re Merck & Co., Inc.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986).

We have considered Patent Owner's additional argument that "Jenkins teaches a mechanically-based occlusion alarm [50] that occurs when the remaining time of charge in the battery is ***at a level*** (in this case zero), not ***below a predetermined level*** (*e.g.*, below 60 seconds), as required by claims 9–12." PO Resp. 37. However, we are unpersuaded by this argument for two reasons. First, claim 9 does not recite a specific "predetermined level," e.g., 60 seconds, at which the "alarming" step occurs. Tr. 47:25 ("The claim doesn't require an exact specific time."). Rather, the claim is non-specific as to the predetermined level, which, under the broadest reasonable interpretation of that phrase, includes any predetermined level, including one associated with any detectable level of time greater than zero. As such, Jenkins's occlusion alarm 50, occurring when the battery is discharged and at "zero" units of time, occurs *when* the remaining time of charge is *below* a predetermined level, e.g., below 0.001 seconds. *See* Pet. Reply. 10–11. Second, the claim language merely requires "alarming when the remaining time of charge is below a predetermined level" but does not require alarming *immediately* when the predetermined level is crossed.

Accordingly, we determine that Jenkins's disclosure of activating battery alarm indicator 48 and occlusion indicator 50 satisfies these claim limitations.

g. *"displaying the remaining time of charge in the battery"*

Claim 1 recites "displaying the remaining time of charge in the battery." Ex. 1001, 16:40. We are persuaded by Petitioner's contention, which Patent

Owner does not dispute, that Stich discloses this limitation. Pet. 32 (citing *id.* at 28). Specifically, Stich discloses that calculated run-time "is made available by the microprocessor 66 for display to the user through the user interface 80." *Id.* at 28 (citing Ex. 1005, 8:36–38.). Petitioner contends that it would have been obvious to incorporate Stich's battery monitoring features into Jenkins's pump. *Id.* at 21–22.

h. Rationale to Combine

Petitioner contends that it would have been obvious to a person of ordinary skill in the art to have "combine[d] the infusion pump system of Jenkins with the battery alarm and alert features of Stich," and to "incorporate the battery monitor[ing] features of Stich into the infusion pump of Jenkins." Pet. 21–22. Petitioner provides several rationales for this modification. First, Petitioner contends that Jenkins and Stich are directed to electronic devices with battery monitoring functionality, wherein both warn a user when the remaining time of battery charge runs low. *Id.* at 21; *see also id.* at 6. According to Petitioner, the proposed combination merely substitutes "one known element for another to obtain predictable results." *Id.* at 22 (citing MPEP § 2143). Additionally, Petitioner contends that the proposed modification "would have been obvious '[u]se of [a] known technique to improve similar devices in the same way.'" *Id.*

In response, Patent Owner argues that the Petition fails to set forth a sufficient rationale for the proposed modification. PO Resp. 42–63. Patent Owner argues that Petitioner cites "general principles from case law and the M.P.E.P.," without citing any evidence and without articulating how the law applies to the proposed combination. *Id.* at 60–63. Moreover, Patent Owner contends that a person of ordinary skill in the art would not have been motivated to combine Jenkins and Stich because the references are non-analogous, and their respective

disclosures preclude their combination. *Id.* at 43–54. Finally, Patent Owner argues that the Petition relies upon conclusory attorney argument. *Id.* at 59–60.[6]

We have considered the parties' positions and the cited evidence, and we are persuaded by Petitioner.

We appreciate Patent Owner's argument that it is insufficient merely to provide general principles of case law as a rationale to combine. PO Resp. 60–63. However, in this case, the Petition and, most persuasively, the evidence cited therein, demonstrate more. Specifically, Jenkins and Stich themselves teach that their respective battery monitoring techniques are similar and interrelated. For example, Jenkins discloses an infusion pump that overcomes difficulties in the prior art by, *inter alia*, providing "a battery alarm" that is based on a monitored voltage level, and which occurs "when there is approximately one hour running time on the battery charge." Ex. 1004, 2:1–14, 8:21–23, 18:63–19:32. Likewise, Stich explains that the "remaining run-time of [a] battery is a highly variable parameter," and "it is important . . . that the available run-time be accurately estimated." Ex. 1005, 2:7–10. To that end, Stich determines the remaining run-time on a battery "in a highly accurate manner," based on both a monitored voltage

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[6] Patent Owner also argues that Petitioner's declarant, Dr. Xu, provides conclusory testimony and is unqualified to testify about battery monitoring and alerts. PO Resp. 54–58 (citing Ex. 1003 ¶ 14). Because we do not rely on Dr. Xu's testimony regarding the proposed combination of Jenkins and Stich, this argument is moot. Nonetheless, we note that Dr. Xu holds a Ph.D. in Robotics and Biomedical Engineering from Massachusetts Institute of Technology, has extensive experience as a Principle Engineer and Software Engineer, and has worked on the design and development of "processor-controlled electronic devices in the biomedical industry," including "the design and development of battery-related functionality and features for electronic devices, particularly as related to CareFusion's products." *See* Ex. 1003 ¶¶ 1–3; Ex. 2017, 53:7–56:4 (discussing experience designing battery monitoring features for small electrical mechanical systems); *see also id.* at 26:6–21, 46:14–47:1, 66:22–67:6; Pet. Reply 19–21.

level *and* a monitored current level, and uses that calculated run-time to provide a "low run-time indication," and a display of run-time, to a user. *Id.* at 3:3–5, 3:14–23, 3:35–38.

Thus, Jenkins and Stich both address the same goal—providing a user with the remaining time of charge on a battery—in similar ways. We recognize that Jenkins achieves this goal by estimating the remaining run-time based on *only* a monitored voltage level. However, the Petition's contention that combining Stich's battery monitoring features into Jenkins's pump "would have been '[u]se of [a] known technique to improve similar devices in the same way'" is supported by Stich's express teaching that calculating the remaining run-time with *both* monitored voltage and current is "highly accurate." Pet. 22; Ex. 1005, 3:3–23. As such, we are not persuaded by Patent Owner's argument that the Petition lacks supporting evidence (PO Resp. 59–60) or fails to articulate how the law applies to the combination (*id.* at 60–63). This is apparent immediately from the references' relevant disclosures.

For essentially the same reason, we are unpersuaded by Patent Owner's argument that Jenkins and Stich are non-analogous references. PO Resp. 43–45. We agree with Petitioner that "Jenkins and Stich are each directed to electronic devices with battery monitoring functionality. . . . [and are] specifically designed to warn the user when the remaining time of charge left on the device ran low." Pet. 21. Given their teachings regarding battery monitoring, we determine that both references reasonably are pertinent to the problem with which the inventor was concerned, namely, providing "the amount of time left on battery power to the health care provider." *Compare* Ex. 1001, 2:15–16, *with* Ex. 1004, 3:65–4:6, Ex. 1005, 3:35–38; *see also In re Oetiker*, 977 F.2d 1443, 1447 (Fed. Cir. 1992) ("[T]he reference must either be in the field of the applicant's endeavor or, if not,

then be *reasonably pertinent to the particular problem with which the inventor was concerned*.") (emphasis added); *In re ICON Health & Fitness, Inc.*, 496 F.3d 1374, 1379–80 (Fed. Cir. 2007) ("A reference is reasonably pertinent if, even though it may be in a different field from that of the inventor's endeavor, it is one which, because of the matter with which it deals, logically would have commended itself to an inventor's attention in considering his problem."). Moreover, regardless of the uses to which Jenkins and Stitch put their respective batteries, *see* PO Resp. 43–45, both references concern technology that monitors the remaining life of those batteries. *See, e.g.*, Ex. 1004, [57]; Ex. 1005, [57].

Patent Owner also argues that a person of ordinary skill in the art would not have been motivated to combine the prior art as proposed because Jenkins lacks the capability to determine battery capacity, determine time operating on battery power, or perform the complex mathematical calculations disclosed by Stich. PO Resp. 43–45 (arguing that a microprocessor, timer, and memory would be needed). According to Patent Owner, "modifying Jenkins to incorporate a microprocessor using digital signals so that remaining runtime could be calculated would require a nearly **complete redesign** of the fixed, discrete logic electronics design disclosed by Jenkins." PO Resp. 45 (citing, e.g., Ex. 2012 ¶¶ 111–115); *see also id.* at 46–49. Patent Owner alleges that neither reference, nor the Petition, provides adequate guidance as to how Jenkins would be modified to incorporate Stich's teachings. *Id.* at 49.

As an initial matter, we find this argument misplaced because it suggests that Jenkins and Stich must be capable of some form of physical combination in order for Petitioner to demonstrate obviousness. However, this is not the test for obviousness. "The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary

reference . . . Rather, the test is what the combined teachings of those references would have suggested to those of ordinary skill in the art." *In re Keller*, 642 F.2d 413, 425 (CCPA 1981); *see also In re Sneed*, 710 F.2d 1544, 1550 (Fed. Cir. 1983) ("[I]t is not necessary that the inventions of the references be physically combinable to render obvious the invention under review."). In this case, therefore, the question to be resolved is whether, in light of the references' respective teachings, a person of ordinary skill in the art would have found it obvious to incorporate Stich's teachings (namely, monitoring current and voltage from the battery, using that to determine run-time, indicating when run-time is below a predetermined level, and displaying the run-time) into Jenkins's infusion pump. As discussed above, we find that Stich readily teaches the benefits of incorporating these teachings into other devices—namely, providing a user with a "highly accurate" determination of run-time—a problem expressly addressed by Jenkins. Ex. 1004, 3:65–68; Ex. 1005, 3:5.

Moreover, Patent Owner has not shown persuasively that, to the extent modifications would have been made to Jenkins's pump to implement Stich's teachings, such changes would have been beyond the level of ordinary skill in the art. For example, although Patent Owner argues that "modifying Jenkins to incorporate a microprocessor . . . would require a nearly ***complete redesign*** of [Jenkins's] fixed, discrete logic electronics," Patent Owner does not suggest that such a "redesign" would have been a task requiring extraordinary skill. PO Resp. 45 (citing, e.g., Ex. 2012 ¶ 115). To the contrary, the cited portion of Mr. Heim's Declaration simply states that such a modification "would replace the discrete logic electronics of Jenkins (which have no calculation capabilities) with programmable electronics (so that the calculations of Stich could occur)." Ex. 2012 ¶ 115. However, Mr. Heim also testified that "[m]icrocontrollers were commonly used in

infusion pumps in the mid[-]1990s." Ex. 1016, 46:5–6; *see also id.* at 38:2–46:6 (regarding Exs. 2013–2016).[7] The Heim Declaration does not explain the basis for the opinion that, despite being "commonly used," modifying Jenkins's pump to include a microprocessor to determine remaining run-time would have "change[d] the principle of operation disclosed by Jenkins." Ex. 2012 ¶ 115. Indeed, neither Patent Owner nor Mr. Heim identify what "principle of operation" would have changed and we are unable to discern such a change independently, given that, as modified, Jenkins's pump still would operate to provide indications of the "running time remaining on the battery charge." Ex. 1004, 8:21–23; *see also id.* at 2:12–14, 18:63–19:32.

Finally, we find unpersuasive Patent Owner's arguments regarding certain obstacles to implementing into Jenkins's pump the specific method of calculating remaining time of charge disclosed by Stich. *See* PO Resp. 43–54. These arguments are not commensurate with the scope of the claims and are not responsive to the combination proposed by Petitioner. For example, the Petition does not contend that Stich's specific equations must be implemented, nor do the claims require that the remaining time of charge be determined in any particular manner. *See id.* at 46–47 (arguing that Jenkins's pump would need to be modified to implement Stich's equation shown at Ex. 1005, 6:55), 47–48 (similar arguments regarding calculation of parameter K_3, shown at Ex. 1005, 7:48).[8] As such, we find these arguments unpersuasive.

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[7] Mr. Heim also confirmed that an infusion pump could be plugged into an uninterruptable power supply, such as that disclosed by Stich, to provide back-up power to the pump, although such an arrangement would have been unwieldy. Ex. 1016, 22:19–25:19.

[8] We find unpersuasive Patent Owner's additional argument that Stich's method is unsuitable for use with an infusion pump because Stich does not adjust for the effects of charge-discharge cycles, and Stich's method may not be accurate when

i. Secondary Considerations

Patent Owner also argues that "a number of available patents filed shortly before the '034 Patent . . . objectively demonstrate that the conventional wisdom at the time of the filing of the '034 Patent was to monitor the battery voltage and to trigger any low battery alarms or alerts in an infusion pump based on a low battery voltage measurement." PO Resp. 11–16 (citing Ex. 2012 ¶¶ 30–35). According to Patent Owner, this shows that the '034 patent proceeded contrary to accepted wisdom and demonstrates non-obviousness. *Id.* at 16.

We are unpersuaded by this argument. As discussed above, Jenkins and Stich, which were filed and issued before the '034 patent, expressly disclose using indicators of remaining battery *run-time* to warn an operator of the impending depletion of battery life. *See, e.g.*, Ex. 1004, 3:65–4:16; Ex. 1005, [57]. Accordingly, we are not persuaded that the '034 patent proceeded contrary to conventional wisdom. *See* Pet. Reply 19 ("Simply pointing to four prior art references that did things differently than the '034 patent does not establish objective indicia of non-obviousness."). Finally, as discussed in Section II.B.5.g *supra*, the challenged claims do not recite what actually triggers the claimed alarms and alerts. As such, Patent Owner's purported evidence showing that conventional wisdom "trigger[ed] any low battery alarms" based on voltage is not commensurate with the scope of the challenged claims, and is unpersuasive. PO Resp. 12.

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subject to deep discharge. PO Resp. 50–53. However, claim 9 does not require accounting for charge-discharge cycles, nor does claim 9 require a specific level of accuracy, let alone a specific level of accuracy during deep discharge. *See supra* Section II.B.5.d.

j. Summary

Accordingly, based on the entirety of the record before us, we determine that Petitioner has shown by a preponderance of the evidence that claim 9 would have been obvious to a person of ordinary skill in the art.

6. Claims 10 and 11

Claim 10 recites that "the step of monitoring the voltage of the battery further includes sampling the voltage of the battery," and claim 11 recites that "the step of monitoring the current of the battery further includes sampling the current of the battery." Ex. 1001, 16:41–46.

Petitioner relies upon Stich to satisfy these claims. Pet. 32–33 (citing *id.* at 28–30). First, Petitioner contends that Stich discloses this limitation, because Stich teaches that battery monitor 61 monitors voltage, and current transformer 57 monitors current, wherein both monitored values are provided to metering and monitoring circuit 62 and then microprocessor 66. *Id.* at 29 (citing Ex. 1005, 5:49–54, 5:58–6:22). According to Petitioner,

> Stich discloses that it was a known prior art technique to "determin[e] available run-time" by performing a "battery test" in which "[t]he power drawn by the load in output watts is calculated as the sum of the instantaneous product of the output voltage and output current over a cycle divided by the number of instantaneous samples acquired for a line cycle." Thus, Stich discloses that it was known for a battery monitor circuit to sample the instantaneous voltage and current.

Id. (citing Ex. 1005, 2:23–36) (emphasis omitted). Petitioner thus asserts,

> A POSITA would have understood this disclosure as teaching that the battery monitor 61 and metering and monitoring circuit 62 convert analog voltage and current signals into digital signals that can be provided to microprocessor 66 on line 63. Converting analog signals to digital values inherently requires sampling the analog signals. At a minimum, it would have been obvious to a POSITA to provide these analog values to the microprocessor by sampling them.

Id. at 30 (citation to Ex. 1009, APP0367, 0371 omitted); *see also id.* at 11–13 (discussing analog-to-digital conversion, and citing Ex. 1009, APP0366–APP0368, APP0371, APP0373–APP0375).

Patent Owner disputes Petitioner's contentions regarding claims 10 and 11. PO Resp. 39–42.[9] Patent Owner argues that the Petition "misinterprets and mischaracterizes" Stich in asserting that sampling voltage and current was known. *Id.* at 39. According to Patent Owner, the cited portion of Stich discusses sampling in the context of operation during *AC line power*, not battery power. *Id.* at 39–40 (citing Ex. 1005, 2:23–36; Ex. 2001 ¶¶ 82–83). Patent Owner also argues that Stich "provides no details" as to whether the monitored voltage and current signals are analog or digital, providing no basis for the "Petition's implication that those signals are inherently sampled." *Id.* at 40 (emphasis omitted). Patent Owner contends these "signals could very well be unsampled analog signals sent directly to the microprocessor." *Id.* at 40–41 (citing Ex. 2001 ¶¶ 71–73).

We are persuaded by Petitioner's obviousness contention. First, we note that Stich discloses that voltage and current signals are measured by voltage monitor 61 and current transformer 57, but does not specify that they are sampled. Ex. 1005, 3:14–18 ("measured"), 5:49–61 ("monitor[ed]"). Nonetheless, we agree with Petitioner that Stich discloses prior art sampling of voltage and current from a battery, in conjunction with determining the remaining time of charge on that battery. Pet. 29. Specifically, Stich explains that "[o]ne approach to determining available run-time . . . [involves calculating the] power drawn by the load . . . as the sum of the instantaneous product of the *output voltage and output current over a cycle divided by the number of instantaneous samples acquired* for a line cycle."

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[9] We need not discuss again Patent Owner's argument that Stich's output current is not current from the battery. PO Resp. 39; *see* Section II.B.5.d.

Ex. 1005, 2:23–37 (emphasis added). We have considered Patent Owner's criticism of Stich's disclosure in this regard, but determine that it is not persuasive. PO Resp. 39–40 (arguing that this disclosure concerns sampling during AC line power). Stich clearly states that this same prior art technique in which voltage and current are sampled "can be used to estimate run-time when the AC power system has failed and the UPS is supplying power from the battery to the load." Ex. 1005, 2:65–68.

The question before us, therefore, is whether, in light of these disclosures, and the knowledge possessed by a person of ordinary skill in the art, "it would have been obvious to a POSITA to provide [Stich's] analog values to the microprocessor by sampling them." Pet. 30. We recognize Patent Owner's argument that Stich "provides no details" as to whether the monitored voltage and current signals are analog or digital. PO Resp. 40. However, the evidence before us leads us to conclude that it would have been obvious to a person of ordinary skill in the art that Stich's voltage and current signals are analog, necessitating conversion into digital form before being utilized by microprocessor 66.

The Petition relies upon a prior art publication entitled "Electronic Analog-to-Digital Converters: Principles, Circuits, Devices, Testing," provided as Exhibit 1009, to establish the state of the art. *See* Pet. 11–13, 28–30; *see also Ariosa Diagnostics v. Verinata Health, Inc.*, 805 F.3d 1359, 1365 (Fed. Cir. 2015) ("Art can legitimately serve to document the knowledge that skilled artisans would bring to bear in reading the prior art identified as producing obviousness."). As this exhibit explains, analog-to-digital ("A/D") converters are utilized to link analog representations to "the domain of discrete numbers and computers" for, e.g., "digital processing." Ex. 1009, APP0367, APP0374. In this way, continuous analog representations, e.g., voltage or current signals, are converted into discrete,

digital form for use by, e.g., a computer. *Id.* at APP0367 (voltage), APP0368 (voltage and current), APP0374 (describing A/D conversion as "conventional or standard"). In order to perform A/D conversion, samples must be taken periodically from the analog input signal, e.g., the voltage or current signal, for quantizing and encoding by the A/D converter, to generate a digital output signal. *Id.* at APP0371; *see also* Pet. 11–13 (citing Ex. 1009, APP0366–APP0368, APP0371, APP0373–APP0375).

With this understanding in mind, we find that Stitch discloses a circuit that monitors voltage and current, for provision to 8-bit microprocessor 66. Ex. 1005, 3:14–18, 5:42–6:22, 8:44–48. Stich also describes prior art sampling of voltage and current signals, when determining the remaining run-time on a battery. *Id.* at 2:23–68. We determine that a person of ordinary skill in the art would have found it obvious, in light of these teachings and the knowledge of those skilled in the art, as evidenced by the cited portions of Exhibit 1009, to convert Stich's voltage and current signals into digital form, for use by the microprocessor. Ex. 1009, APP0367–APP0368. We determine that such an ordinarily skilled artisan would have understood that sampling these values to have been a routine part of the conversion process. *Id.* at APP0371.

Patent Owner contends that Stich's voltage and current "signals could very well be unsampled analog signals sent directly to the microprocessor." PO Resp. 40–41 (citing Ex. 2001 ¶¶ 71–73). In this regard, Patent Owner's declarant testifies that "unsampled analog signals could be directly sent to different input ports on the microprocessor." Ex. 2001 ¶ 71. We find this testimony unpersuasive. This portion of the First Heim Declaration provides no indication of the basis for Mr. Heim's opinion. As such, we find it conclusory and entitled to little weight, especially considered in light of the description of the state of the art

in the Petition and Exhibit 1009, to which Mr. Heim did not respond. 37 C.F.R. § 42.65(a). For example, Mr. Heim does not provide any evidence to suggest that Stich's microprocessor 66 includes multiple input ports, or that any input ports present on microprocessor 66 would have been capable of receiving directly any unsampled analog signals. *See also* Tr. 47:16–20 (unsupported attorney argument contending that the metering and monitoring circuit "time averages input analog signals and provides [them] onto the microprocessor, without ever sampling the actual current"). Moreover, this testimony does not address whether it would have been obvious, nonetheless, to sample the current and voltage monitored by Stich's circuit.

Accordingly, we determine that Petitioner has shown by a preponderance of evidence that these limitations of claims 10 and 11 would have been obvious to a person of ordinary skill in the art, in light of Stich's disclosure of prior art sampling, and the knowledge of a person of ordinary skill in the art, in order to provide voltage and current signals in a form usable by Stich's microprocessor.

7. *Claim 12*

Claim 12 further includes "the step of calculating the remaining minutes of charge left in the battery." Ex. 1001, 16:47–49. We are persuaded by Petitioner's contention, which Patent Owner does not dispute, that it would have been obvious to a person of ordinary skill in the art to calculate the remaining time of charge left on the battery in minutes, in light of the teachings of Jenkins and Stich. Pet. 33. Specifically, Stich calculates run-time, which is "usually expressed in minutes." Ex. 1005, 6:62–63 (defining t_R(INV) as "estimated run-time on inverter, usually expressed in minutes").

8. Summary

For the reasons discussed above, we determine that Petitioner has shown by a preponderance of the evidence that claims 9–12 of the '034 patent would have been obvious over the combined teachings of Jenkins and Stich.

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that claims 9–12 of the '034 patent are shown unpatentable; and

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

PETITIONER:

Kurt J. Niederluecke
Adam R. Steinert
Nikola L. Datzov
FREDRIKSON & BYRON, P.A.
kniederluecke@fredlaw.com
asteinert@fredlaw.com
ndatzov@fredlaw.com

PATENT OWNER:

Denis J. Sullivan
Thomas Hoehner
BARCLAY DAMON, LLP
dsullivan@barclaydamon.com
thoehner@barclaydamon.com