UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

BUTTERFLY NETWORK, INC.,

Petitioner,

v.

FUJIFILM SONOSITE, INC.,

Patent Owner.

Case No. IPR2022-01575
U.S. Patent 7,867,168 B2

PATENT OWNER RESPONSE

TABLE OF CONTENTS

TABLE OF AUTHORITIES

Page(s)

Federal Cases

Federal Statutes

Regulations

EXHIBIT LIST

Exhibit No.	Description
2001	Transcript of Deposition of Dr. Christopher Mark William Daft
2002	Declaration of Dr. Mark E. Schafer
2003	Curriculum Vitae of Dr. Mark E. Schafer

I. INTRODUCTION

Patent Owner, FUJIFILM Sonosite, Inc., ("Patent Owner"), respectfully submits this Response to the Petition (Paper 1, "Petition").

The '168 Patent explains that Patent Owner's advances in the "miniaturization and integration" of ultrasound system components provided "markedly reduced" size and weight properties as compared to legacy ultrasound systems. EX1001, 4:51-55. However, the inventors of the '168 Patent came to the "counterintuitive[]" discovery that *lighter* is not always *better* when it comes to design of ultrasound transducers.[1] *Id*. at 4:56-61. Specifically, they found that if a transducer is too light, "a user may feel the effects of torque, such as may result from a cable connecting the ultra-sound and the transducer held by the user hanging down next to the user's hand." EX1001, 4:64-5:1. This is problematic because sonographers are often required to administer sonography daily for hours on end. The meticulous, repetitive hand motions required to operate the transducer of ultrasound systems was known to cause musculoskeletal conditions, which were prevalent among sonographers at the time of the '168 Patent. *See* EX1055, 219, 224, 226-227.

[1] The ultrasound systems of the '168 Patent are generally comprised of two components connected by a cable: (1) a "transducer" and (2) a "processing unit."

The '168 Patent claims solutions for addressing these problems. Specifically, the '168 Patent teaches that transducer system electronics and battery power sources can be distributed between the transducer and main processing unit to provide a transducer that "counterbalances" the "torque forces felt by a user of said transducer assembly" (the "Counterbalance" limitations of Claims 2 and 15). *Id.* at 5:1-7, cls. 2, 15. Doing so "provide[s] additional mass [and weight] within the transducer assembly" and thus "provide[s] better feel in operation," among other benefits. EX1001, 4:48-5:8.

Petitioner contends that the advances claimed by the Counterbalance limitations of Claims 2 and 15 of the '168 Patent are unpatentable in eight separate Grounds.[2] ***First***, Petitioner contends that the Counterbalance limitations should not be given patentable weight because they allegedly claim the "intended result" of implementing the limitations of the independent claims (Grounds 1-3, 8, and 9). But Petitioner ignores the strong "presumption" in favor of finding claim terms limiting. Contrary to Petitioner's argument, the Counterbalance limitations "state specific requirements rather than a general purpose or aspirational result" and are therefore "limiting." *See L'Oreal USA, Inc. v. Olaplex, Inc.*, 844 F. App'x 308, 324 (Fed. Cir. 2021). Having admittedly failed to identify any prior art teachings that disclose,

[2] Petitioner challenges Claims 2 and 15 under Grounds 1-5 and 8-10.

suggest, or otherwise render obvious the Counterbalance limitations (which are indeed, "limiting"), Grounds 1-3, 8, and 9 should be rejected as to Claims 2 and 15.

Second, Petitioner contends in Grounds 4, 5, and 10 that the Counterbalance limitations are rendered obvious by the teachings of Walston (EX1006) in combination with one or more other base references. But Petitioner and its declarant confuse the concept of ***balancing*** an ultrasound system around a user's neck while transporting the system, as disclosed by Walston, with the ***Counterbalance*** limitations, which require a design that "counterbalance[s] torque forces felt by a user of said transducer assembly" during operation, such as from a "cable … hanging down next to a user's hand." Walston does not teach or suggest the Counterbalance limitations.

Third, Petitioner draws on the alleged "common knowledge of a POSA" to supply the missing Counterbalance limitations. This is improper under Federal Circuit precedent. *Arendi S.A.R.L. v. Apple Inc.*, 832 F.3d 1355, 1362 (Fed. Cir. 2016). Moreover, Petitioner's reliance on a POSITA's alleged familiarity with ultrasound system design factors to stitch together the particular transducer design implementation articulated in Claims 2 and 15 is improper hindsight analysis. *Merck Sharp & Dohme B.V. v. Warner Chilcott Co.*, LLC, 711 F. App'x 633, 637 (Fed. Cir. 2017). Grounds 4, 5, and 10 also fail as to Claims 2 and 15.

Claims 2 and 15 are novel and non-obvious and Petitioner has failed to show otherwise for at least the reasons discussed below.[3] Additionally, Petitioner has failed to carry its burden on Claim 5 as it has not shown that the prior art discloses a digital signal processor coupled to a beam former in a transducer assembly.

II. OVERVIEW OF THE '168 Patent

A. Specification

The '168 Patent is directed to ultrasound systems with signal processing components, system electronics components, and battery power sources being distributed between a transducer assembly and a main processing unit. EX1001, Abstract, 2:18-32. The '168 Patent discloses that advances in the "miniaturization and integration" of ultrasound system components provided "markedly reduced" size and weight properties as compared to legacy ultrasound systems. EX1001, 4:51-55. The benefits of these advances were twofold. First, the smaller components led to "lighter, more portable" ultrasound systems. EX1001, 4:41-42, 51-55, 5:1-7.

[3] For the avoidance of doubt, Patent Owner does not concede Petitioner has carried its burden on any claim. *Fanduel, Inc. v. Interactive Games LLC*, 966 F. 3d 1334 (Fed. Cir. 2020) ("the 'sole issue' throughout the Board proceedings was whether [Petitioner] proved its theory as to how [the prior art rendered the claims obvious]. This central question remained, regardless what aspects of that issue the patent owner and the Board chose to address in their respective response and initial decision.").

Second, the integration advances could be "leveraged to facilitate a redistribution of the various functional blocks within transducer assembly [] and main processing unit," thereby increasing flexibility in system design and leading to "performance gains." EX1001, 4:13-18.

However, the inventors of the '168 Patent came to a "counterintuitive[]" discovery:

> The present inventors have discovered that, somewhat counter-intuitively, transducer assemblies with at least some threshold weight may be preferred by users, such as to give a better feel in operation, to provide a more positive interface with a scanned object, to provide better balance in the hand, etcetera. As the transducer becomes lighter, other design factors become more important, such as the shape, size and cable. These other design factors may influence the minimum acceptable weight. For example, ***a user may feel the effects of torque. Such as may result from a cable connecting the ultrasound and the transducer held by the user hanging down next to the user's hand, with a lighter transducer having a larger cable***.

EX1001 4:64-5:1.

The '168 Patent discloses distributing "signal processing circuitry" and/or battery "power sources" among the transducer and main processing unit to increase mass of the transducer assembly:

> According to one embodiment, ***signal processing circuitry and/or other circuitry is disposed in the transducer assembly, rather than the processing unit assembly, in order to provide a transducer assembly***

> ***having a desired weight or a weight more typical of historical transducer assemblies*** while eliminating weight from the processing unit assembly thereby resulting in a lighter, more portable processing unit.
> Components which may be distributed or redistributed between a transducer assembly and main processing unit according to embodiments of the invention is not limited to signal processing circuitry. For example, where ultrasound system 20 comprises a portable configuration one or more power sources may be included therein for powering the circuitry thereof. ***Embodiments of the present invention distribute power sources among the transducer assembly and main processing unit assembly as shown in FIG. 2 to provide a desired weight balance***.

EX1001, 5:1-17.

B. Claims 2 and 15

Independent Claims 1 and 12 are directed to an ultrasound system and method for providing an ultrasound system, respectively. Claim 1 is a system claim that recites an ultrasound transducer assembly, a main processing unit, and a digital data cable, "wherein said system is powered by a battery power source, wherein portions of the battery power source are distributed between the ultrasound transducer assembly and the main processing unit." Claim 12 is a method claim that similarly claims "providing" an ultrasound transducer, a main processing unit, and digital data cable, and further recites "distributing battery capacity between said ultrasound transducer assembly and said main processing unit to provide a desired distribution of weight between said ultrasound transducer assembly and said main processing

unit." Thus, both Claims 1 and 12 recite battery distribution limitations that require distributing battery between the "transducer assembly" and "main processing unit."

Claims 2 and 15 are drawn to a specific "configuration" of the battery distribution limitations of Claims 1 and 12, respectively. Claim 2 is reproduced below in context with Claim 1, from which it depends, with relevant portions emphasized:

Claim 1	A system comprising: an ultrasound transducer assembly including an ultrasound transducer array and signal processing circuitry coupled to said transducer array operable to process analog signals from said transducer array and provide digital information there from; a main processing unit separate from said ultrasound transducer assembly and in communication therewith operable to receive said digital information from said ultrasound transducer assembly; and a digital data cable coupled between said ultrasound transducer assembly and said main processing unit carrying said digital information there between; wherein said system is powered by a battery power source, ***wherein portions of the battery power source are distributed between the ultrasound transducer assembly and the main processing unit***.
Claim 2	The system of claim 1, ***wherein said distribution of said battery source is configured at least in part to result in a desired total weight of said ultrasound transducer assembly, wherein said desired total minimum weight is configured to counterbalance torque forces felt by a user of said transducer assembly***.

Claim 2 thus limits the "ultrasound transducer assembly" of Claim 1 by requiring that it be configured to have a specific "weight" that counterbalances torque forces felt by a user.

Claim 15 recites similar limitations to Claim 2 in the context of independent method Claim 12 from which it depends. Claim 15 is reproduced below in context with Claim 12, with relevant portions emphasized:

Claim 12	A method comprising: providing an ultrasound transducer assembly having a transducer array and signal processing circuitry coupled to said transducer array; providing a main processing unit having signal processing circuitry in communication with said signal processing circuitry of said ultrasound transducer assembly via digital data communication wherein said ultrasound transducer assembly is connected to said main processing unit with a digital data cable configured to carry said digital information there between; and ***distributing battery capacity between said ultrasound transducer assembly and said main processing unit to provide a desired distribution of weight between said ultrasound transducer assembly and said main processing unit***.
Claim 15	The method of claim 12 ***wherein said desired total distribution of weight is configured to provide sufficient weight to said transducer assembly to counterbalance torque forces felt by a user of said transducer assembly***.

Collectively, the limitations of Claims 2 and 15 emphasized above are referred to herein as the "Counterbalance" limitations, because each is directed to a transducer of an ultrasound system where a battery power source is distributed

between a main processing unit and the transducer such that the transducer has a weight that will "counterbalance torque forces felt by a user of said transducer assembly."

III. CLAIM CONSTRUCTION

Patent Owner interprets the claims "in accordance with the ordinary and customary meaning … as understood by one of ordinary skill in the art." 37 C.F.R. § 42.100(b).

While the Petition does not expressly identify any terms for construction (Pet. at 10), Petitioner's arguments pertaining to Claims 2 and 15 under Grounds 1-3, 8, and 9 rely on interpreting the limitations of Claims 2 and 15 (*i.e.*, the "Counterbalance" limitations) as "non-limiting."[4] *See, e.g.,* Pet., 35 ("The remaining 'desired' element [of Claim 2] is ***non-limiting*** because it does not require any additional required structure or condition for the claims") (internal citations and quotations omitted) (emphasis added). In essence, Petitioner argues that the Counterbalance limitations should be given no patentable weight. Patent Owner disagrees.

[4] Petitioner also alleges that Claims 2 and 15 are invalid in Grounds 4, 5, and 10, but appears to treat the Counterbalance limitations as limiting in those Grounds by alleging that those limitations are rendered obvious in view of Walston (EX1006).

A. The Counterbalance Limitations are "Limiting"

The Board may resolve the issue of whether to give patentable weight to a claim limitation through claim construction. *See, e.g., Arctic Cat Inc. v. GEP Power Prod., Inc.*, 919 F.3d 1320, 1327 (Fed. Cir. 2019) ("We have treated the [limiting] effect of preamble language as a claim-construction issue."). Patent Owner therefore identifies the following terms from Claims 2 and 15 for construction.

Claim Term (*i.e.*, "Counterbalance" limitations)	**Petitioner's Construction**	**Patent Owner's Construction**
"wherein said distribution of said battery source is configured at least in part to result in a desired total weight of said ultrasound transducer assembly, wherein said desired total minimum weight is configured to counterbalance torque forces felt by a user of said transducer assembly" (Claim 2)	Non-limiting	Limiting / Plain and Ordinary Meaning
"wherein said desired total distribution of weight is configured to provide sufficient weight to said transducer assembly to counterbalance torque forces felt by a user of said transducer assembly" (Claim 15)	Non-limiting	Limiting / Plain and Ordinary Meaning

"While not an absolute rule, all claim terms are presumed to have meaning in a claim." *Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc*., 381 F.3d 1111, 1119 (Fed. Cir. 2004); *see also Application of Wilson*, 424 F.2d 1382, 1385 (C.C.P.A. 1970) ("All words in a claim must be considered in judging the patentability of that claim against the prior art."). Petitioner ignores this canon of

claim construction and otherwise fails to meet its burden to unseat the "presumption" that the Counterbalance limitations have meaning and are "limiting."

1. The Counterbalance Limitation of Claim 2 is "Limiting"

Petitioner contends that the Counterbalance limitation of Claim 2 "is non-limiting because it does not 'require any additional required structure or condition for the claims'" beyond what is already recited for Claim 1. Pet., 35[5] (citing *Teva Pharms. USA, Inc. v. Sandoz Inc.,* 906 F.3d 1013, 1023 (Fed. Cir. 2018)). Petitioner's argument is incorrect and should be rejected.

a. Case Law Requires Interpreting the Counterbalance Limitations to Be "Limiting"

Petitioner is incorrect in its argument that Claim 2 fails to impose any further "structure or condition" on the system of Claim 1. Instead, the Counterbalance limitation of Claim 2 requires that battery power sources be distributed to the transducer in an amount that achieves a "weight [that] is configured to

[5] While the Petition asserts the alleged "non-limiting" nature of the Counterbalance limitations in each of Grounds 1-3, 8, and 9, Petitioner's only analysis for this assertion is under Grounds 1 and 2, while the remaining Grounds 3, 8, and 9 merely cross-reference back to the same argument in Grounds 1 and 2. Pet., 46 (Ground 3 analysis of Claim 2 citing primarily to "§ VIII.B", which is the Grounds 1 and 2 analysis of Claim 2), 69-70 (Grounds 8 and 9 analysis of Claim 2 citing primarily to "§ VIII.B", which is the Grounds 1 and 2 analysis of Claim 2).

counterbalance torque forces felt by a user." The Counterbalance limitation therefore imposes a *specific requirement* for the distribution of battery power sources recited in Claim 1, thus further limiting Claim 2 to a system configured in accordance with a concretely *specified result*.

Such limitations are properly interpreted as "limiting" and should be given patentable weight. In *L'Oreal* (844 F. App'x 308), the Federal Circuit rejected an argument that limitations reciting specific decreases in hair breakage (*e.g.,* 5% reduction in breakage) compared to hair treated with another formulation were "of no legal effect" (*i.e.,* non-limiting). *L'Oreal USA, Inc. v. Olaplex, Inc.*, 844 F. App'x 308, 324 (Fed. Cir. 2021). Instead, the court interpreted the limitations in question to be limiting because they "state specific requirements rather than a general purpose or aspirational result" and "limit … the claims on which they depend to options that produce the concretely specified results." *L'Oreal* at 324. Similarly, the Counterbalance limitation of Claim 2 recites a "specific requirement" because it defines a specific criterion for the weight of the transducer assembly (*i.e.*, a "weight [that] is configured to counterbalance torque forces felt by a user"). The "concretely specified result" of Claim 2 is a transducer with battery sources distributed to it such that it has a weight that counterbalances torque forces felt by a user. This is a further

structural limitation imposed by the Counterbalance limitation of Claim 2 that is not present in Claim 1.[6]

Petitioner's reliance on *Teva* (906 F.3d 1013) is misplaced. In *Teva*, the language at issue identified a property in only very general terms and appeared in the very same claim that stated additional, more concrete requirements with the same effect. The language at issue in *Teva* added the phrase "the regimen being sufficient so as to thereby alleviate the symptom of the patient" after the claim already required "a therapeutically effective regimen." *Teva* at 1024. The *Teva* court found the additional language to be "superfluous" because it "d[id] not change the claimed method or require any additional required structure or condition for the claims," *Id.* at 1023.

Unlike in *Teva*, there are no "superfluous" limitations here. The Counterbalance limitation imposes additional and specific requirements that are structurally distinct from other claim limitations recited in Claim 1. *See L'Oreal* at

[6] The *L'Oreal* court also cautioned against interpreting entire dependent claims as non-limiting because doing so renders "each … as entirely a nullity." *Id.* Petitioner's "non-limiting" construction of the Counterbalance limitation would have precisely such an effect. Petitioner's construction should be rejected under *L'Oreal* for this additional reason.

324 (distinguishing from *Teva* on same basis). The Counterbalance limitations are not "superfluous" and therefore limit the claims.

The fact that terms such as "counterbalance torque forces felt by a user," which may be argued to be functional language, are used to define the structural limitations of Claim 2 is of no moment. "[S]tructural terms are sometimes defined … by the functions they are designed to perform [but that] does not somehow convert those structural terms into 'an intended use' stripped of any patentable weight." *Matthews Int'l Corp. v. Vandor Corp.*, 725 F. App'x 1002, 1003 (Fed. Cir. 2018). Thus, even if the Counterbalance limitations were determined to use functional language to describe the recited structure, they would still be limiting.

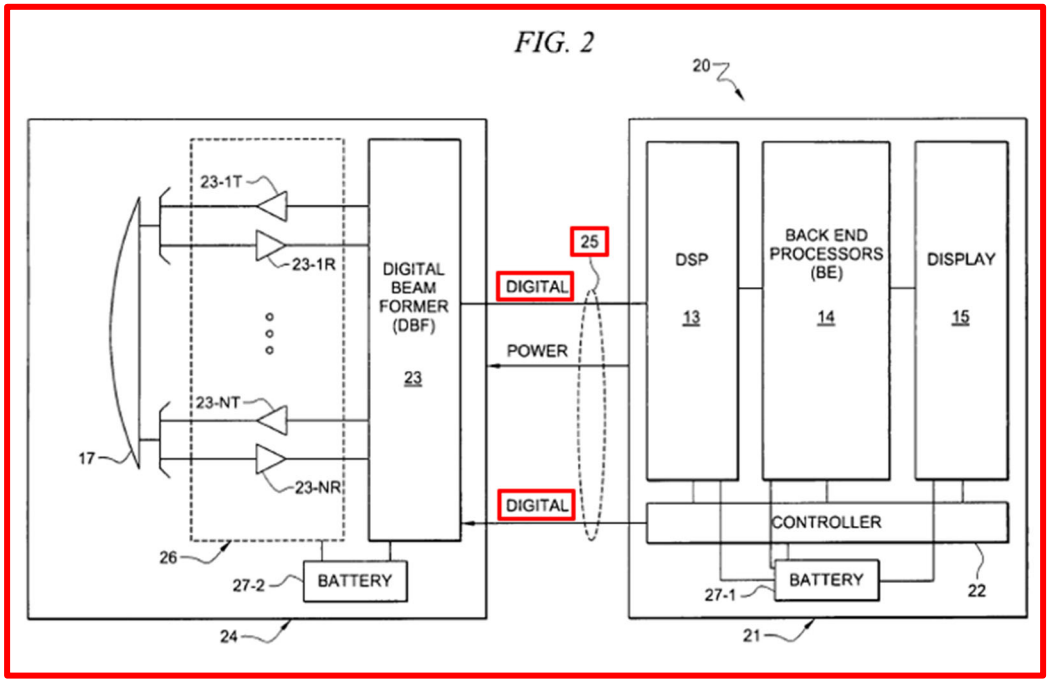
Petitioner also cites to *Bristol-Myers* (246 F.3d 1368 (Fed. Cir. 2001)) in alleging that "nothing in the intrinsic record [] suggests this element was central to patentability or used to meaningfully distinguish the prior art." Pet., 35. But *Bristol-Myers* is also distinguishable. In *Bristol-Myers*, the court declined to "blindly apply the doctrine" of claim differentiation to ascertain a further limitation from language of dependent claims that "essentially duplicates the dosage amounts recited in the claims." *Bristol-Myers Squibb Co. v. Ben Venue Lab'ys, Inc.*, 246 F.3d 1368, 1375-76 (Fed. Cir. 2001). Patent Owner is not asking the Board to "blindly follow" any doctrine or to derive a distinction between "duplicative" claim terms. *Bristol-Myers* is also inapposite.

Petitioner next contends that "[t]he 'desired … weight' [recited in Claim 2] results from the manufacturer distributing portions of the battery power source between the ultrasound transducer assembly and the main processing unit, as recited in claim 1." *Id.* Pet., 35. But the fact that Claim 1's battery distribution limitation would "result" in a transducer having ***some*** "desired weight" does not somehow render Claim 2's articulation of ***a specific*** "desired … weight" structurally equivalent to Claim 1. Petitioner's argument here should also be rejected.

b. Petitioner Misinterprets the Specification of the '168 Patent

Petitioner next argues that the '168 Patent specification supports interpreting the Counterbalance limitation as non-limiting. According to Petitioner, the '168 Patent specification discloses that any "torque forces felt by a user," as recited by the Counterbalance limitation of Claim 2, would ***already*** be entirely "counterbalanced" by a transducer having the structural limitations set forth in Claim 1. Pet., 35-36. Specifically, Petitioner identifies the limitations of Claim 1 that recite (a) using a digital—as opposed to an analog—data cable and (b) distributing portions of signal processing circuitry and battery sources to the transducer assembly, as being redundant of the only structural implementation of the Counterbalance limitation of Claim 2 disclosed in the '168 Patent. Petitioner misreads the specification.

First, Petitioner is incorrect that the '168 Patent discloses that "torque effects" from cabling only arise in the context of analog cables. Pet., 35-36. Instead, the '168 Patent discloses that "torque force" mitigation is desirable in the context of an embodiment where ***digital***—not analog—cabling is used. Specifically, the '168 Patent states that aspects of the invention depicted in Fig. 2 move ultrasound electronics, such as beam former 23 and DSP 13, to the transducer assembly 24. EX1001. "This arrangement ***eliminates analog cable 18*** (FIG. 1) ***replacing it with digital cable 25***." EX1001 4:35-38 (emphasis added).



EX1001, Fig. 2. It is beyond dispute that Fig. 2 is directed to an ultrasound system with digital cabling. EX2002 ¶67.

The'168 Patent then recognizes that "miniaturization" of the system electronics in this Fig. 2 embodiment led to an increase in the "effects of torque" from cabling. EX1001 4:51-5:1, 5:14-17. In order to overcome these undesirable torque effects, the '168 Patent discloses "provid[ing] a transducer assembly having a desired weight or a weight more typical of historical transducer assemblies." *Id*. Critically, the '168 Patent discloses both the problem (*i.e.,* torque effects from a cable hanging down next to the user's hand) and the solution (*i.e.,* distributing ***additional*** system electronic and battery power sources to the transducer) in the context of Fig. 2—an embodiment that already discloses use of ***digital cabling***.[7]

If, as Petitioner alleges, the digital cable of Fig. 2 was alone sufficient to achieve a "desired weight balance" that would mitigate torque forces, there would be no need to distribute power sources in the digital cabling embodiment of Fig. 2 as the '168 Patent specification discloses. EX1001 5:14-17 ("Embodiments of the present invention ***distribute power sources among the transducer assembly and***

[7] Indeed, Petitioner's expert admitted the same in deposition in stating that the '168 Patent's discussion of problematic torque forces from cabling arises in the context of the digital cabling embodiment of Fig. 2. EX2001 (Daft. Tr.), 52:1-4 (A. "Yes. Excuse me. The references in columns 4 and 5, I guess starting at line 28 of column 4 [of the '168 Patent] and going down through line 16 of column 5 -- ***I believe these are all referring to figure 2***.").

main processing unit assembly as shown in FIG. 2 to provide a desired weight balance.”). Petitioner is incorrect that the torque forces recited in Claim 2 can be fully addressed simply by using the digital cabling recited in Claim 1.

While the ’168 Patent discloses that use of digital cabling did lead to a general reduction in cable size as compared to analog cables, a POSITA would have understood digital cabling to still impose torque effects on the transducer, particularly when the cabling is “hanging down next to the user’s hand” as acknowledged by the ’168 Patent. EX2002 ¶¶70-72. For example, an ultrasound system may require numerous individual digital connections—each in “twisted pairs” of wires, and each twisted pair in an insulated sheathing—within a single protective outer jacket to provide the requisite bandwidth for real-time image reproduction at a connected display.[8] Digital cabling in these systems is thus non-

[8] Indeed, Petitioner’s declarant agrees that the ’168 Patent’s Fig. 2 shows numerous individual digital cable wires within the single cable sheathing, or “jacket” of digital cable 25. EX2001 (Daft Tr.) 46:5-18 (**Question**: Would a POSA have understood figure 2 to show multiple digital cables? [] **Dr. Daft**: So I see that there is an ellipse drawn in figure 2 that the label 25 is attached to. This would make a POSA think that the implication here is that that ellipse is the cable jacket. ***So I would say there's an implication here that you have got one or more power connections and one or more digital connections***. But when I just look at figure 2, I get the impression that

(continued…)

trivial in terms of size and weight and was therefore known to have impacts on operator comfort, including by introducing torque forces on the transducer. EX2002 ¶¶70-72. Use of digital cabling as recited in Claim 1 would not alone alleviate the torque effects recited in the Counterbalance limitation of Claim 2. *Id.* As the '168 Patent confirms, "additional mass within the transducer assembly" is also necessary.

Second, Petitioner incorrectly treats the distribution of system electronics and battery power sources recited in Claim 1 as a ***binary*** design choice. Pet., 36. In other words, Petitioner claims that battery and electronics components are either ***distributed*** or ***not***. If they are distributed as recited in Claim 1, then they address torque forces as recited in Claim 2, according to Petitioner. The '168 Patent and both parties' experts belie Petitioner's argument here.

The evidence instead demonstrates that designing the distribution of system electronics and battery power sources in an ultrasound transducer is a complex endeavor with interrelated factors affecting each decision—mere distribution of components alone does not address torque forces as Petitioner alleges. EX2002 ¶¶73-78.

---

these are contained within the one cable jacket. That's how I interpret the presence of this ellipse marked 25.).

For example, the '168 Patent discloses distributing system components according to numerous "design factors":

> It should be appreciated that, in addition to providing additional signal processing functionality within transducer assembly 24, ***embodiments of the invention also provide additional mass within the transducer assembly. The present inventors have discovered that, somewhat counter intuitively, transducer assemblies with at least some threshold weight may be preferred by users, such as to give a better feel in operation, to provide a more positive interface with a scanned object, to provide better balance in the hand, etcetera. As the transducer becomes lighter, other design factors become more important, such as the shape, size and cable.*** These other design factors may influence the minimum acceptable weight.

EX1001 4:56-64. The '168 Patent thus discloses numerous interdependent variables that must be accounted for in system design.

The '168 Patent further discloses a variety of design levers that can each be leveraged to varying degrees in order to "provide additional mass within the transducer assembly" and address torque forces felt by a user:

> According to one embodiment, ***signal processing circuitry and/or other circuitry is disposed in the transducer assembly, rather than the processing unit assembly, in order to provide a transducer assembly having a desired weight or a weight more typical of historical transducer assemblies*** while eliminating weight from the processing unit assembly thereby resulting in a lighter, more portable processing unit. Components which may be distributed or redistributed between a transducer assembly and main processing unit

> according to embodiments of the invention ***is not limited to signal processing circuitry***. For example, where ultrasound system 20 comprises a portable configuration one or more power sources may be included therein for powering the circuitry thereof. ***Embodiments of the present invention distribute power sources among the transducer assembly and main processing unit assembly as shown in FIG. 2 to provide a desired weight balance***.

EX100 1:5:1-17. The '168 Patent teaches that distribution of electronics and battery sources to address torque forces is highly complex—not a binary choice (*i.e.,* distribute or not).

Petitioner's declarant has also recognized the high degree of engineering design required in "partitioning" system electronics and battery components between a transducer and other ultrasound system components. EX1008 ¶196 ("Specifically, based on my own experience researching and designing portable ultrasound systems before 2004, ***determining how to partition circuitry, processing capability, and systems components—including battery capacity/weight—were fundamental questions in ultrasound system design*** …. Criteria used for determining how to partition included component miniaturization, power consumption, cable weight and thickness, cable bandwidth, and processing power of suitable components."); *see generally* EX2001 (Daft Tr.) 37:9-41:1 (discussing wide array of design considerations and battery options available for meeting design needs). Patent Owner's expert, Dr. Schafer, agrees. EX2002 ¶¶76-78.

The Counterbalance limitation of Claim 2 specifies one aspect of the design equation (*i.e.*, counterbalancing of torque forces) which is addressed by optimizing the distribution of the power source variable. *Id.* Thus, the requirement of Claim 1 for a transducer with a digital data cable and distributed system electronics and battery sources is by no means redundant with the transducer design recited by Claim 2, which requires designing a transducer by distributing battery sources to "counterbalance torque forces felt by a user." Petitioner's implied claim construction argument to that effect should be rejected.

2. The Counterbalance Limitation of Claim 15 is "Limiting"

As discussed above in §II.B, dependent Claim 15 is similar in nature to dependent Claim 2 in that each claim recites limitations involving a transducer of an ultrasound system where a battery power source is distributed between a main processing unit and the transducer such that the transducer has a weight that will "counterbalance torque forces felt by a user of said transducer assembly" (*i.e.,* the Counterbalance limitation). Petitioner does not appear to dispute this. *See* Pet., 44 ("Halmann disclosed and rendered obvious claim 15 ***for the same reasons*** as claim 2."). Indeed, in addressing Claim 15 under Grounds 1-3, 8, and 9, the Petition exclusively cross-references back to the Claim 2 analysis for each respective Ground, without any further analysis. *See* Pet., 44, 48, 74.

As discussed above in §III.A.1, Petitioner's Claim 2 analysis relies on interpreting the Counterbalance limitation as "non-limiting." *See, e.g.,* Pet., 35. Because Petitioner's Claim 15 analysis under Grounds 1-3, 8, and 9 simply cross-references back to the Claim 2 analysis in each respective ground, the Claim 15 analysis therefore also depends on the same flawed "non-limiting" construction. Patent Owner therefore submits that the Counterbalance limitation of Claim 15 is limiting for at least the same reasons discussed above in connection with Claim 2. *See* §III.A.1.

IV. OVERVIEW OF CITED ART

A. Overview of *Halmann*

U.S. Patent Application Publication No. 2003/0097071 by Halmann et al. is titled "Method and System for PDA-Based Ultrasound System." EX1003, Title. Halmann discloses a portable, PDA-based ultrasound system comprising a PDA, internal PDA battery, and hand-held probe. *Id.* ¶19. The hand-held probe includes a "beamforming module" with various ultrasound system electronics. *Id.* ¶¶18-20. Halmann further discloses that an "external battery" can also "be integrated into the beamforming module 40, becoming an internal battery." *Id.* ¶23.

B. Overview of *Barnes*

U.S. Patent Application Publication No. 2003/0013966 by Barnes et al. is titled "Balance Body Ultrasound System." EX1004, Title. Barnes discloses a hand-

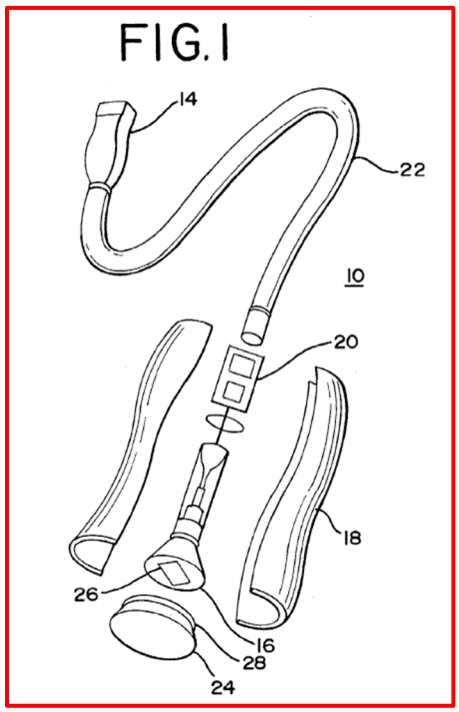
held ultrasound system with a "balance body" design "wherein the center of gravity for the device is positioned close to the strength of a user's hand" such that "a user may hold the system and operate at least one of the control elements with the same hand." *Id*. ¶¶[Abstract], 020. The ultrasound system includes at least two components—a "balance body" including a user interface in the form of a "D-controller," a transducer assembly. *Id.* ¶¶23-26.

C. Overview of *Honda*

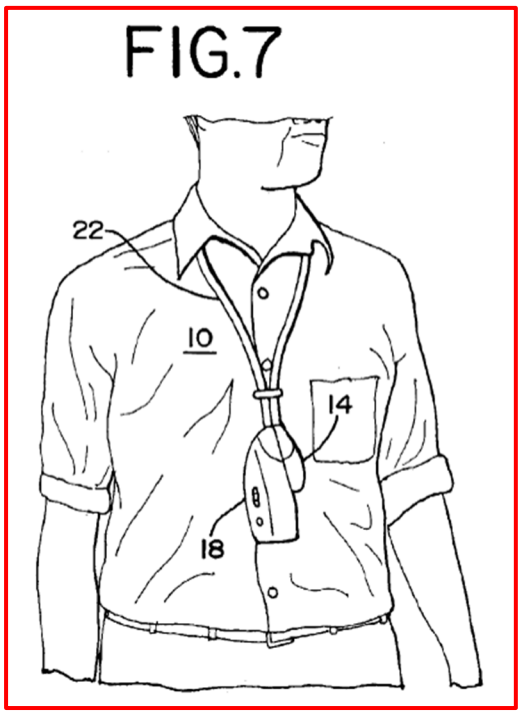
Japanese Patent Application Publication No. 2003-33350A by Honda et al. is titled "Medical Diagnostic Adapter, Portable Medical Diagnostic Device, and Curved Ultrasonic Diagnostic Device." EX1005, Title. Honda discloses a portable ultrasonic diagnostic device that includes a PDA and "medical diagnostic adapter" for hosting a "medical expansion module" that drives an "ultrasonic probe." *Id.* ¶23, Fig. 6.

D. Overview of *Walston*

U.S. Patent Application Publication No. 2003/0139671 by Walston et al. is titled "Immersive Portable Ultrasound System and Method." EX1006, Title. Walston discloses a lightweight, portable ultrasound system with a scope that includes a transducer 14, housing 18, and display 16 for "immersive" viewing "close to the eye of the user." *Id.* [Abstract], ¶47.



Walston teaches that the ultrasound system is "easily carried" such as by being "worn around the neck of the user 12, similar to a stethoscope as shown in Fig. 7." *Id.* ¶47.



Walston teaches that transducer 14 may be sized to be small for increased portability, "such as using more closely-spaced elements adapted for higher ultrasound frequencies or using fewer elements within the array." *Id.* ¶19. In alternative embodiments, Walston teaches that "the transducer 14 is larger, such as being sized to be generally similar to the size of the housing 18 or larger. The weight is also similar but may be less or more." *Id.* "The equal balancing allows the portable ultrasound system 10 to remain draped around the user's neck without further clipping or attachment." *Id.* ¶47.

E. Overview of Smith

U.S. Patent Application Publication No. 2004/0179332 by Smith et al. is titled "Portable Ultrasound Unit and Docking Station." Smith discloses a portable

ultrasound unit that can convert into a cart-based system with enhanced features when docked to an associated docking cart. EX1007, ¶4.

V. CHALLENGED CLAIMS 2 AND 15 ARE NOVEL AND NOT OBVIOUS.

The Petition fails to show by a preponderance of the evidence that Challenged Claims 2 and 15 are unpatentable. The Petition challenges the validity of Claims 2 and 15 in eight of the eleven[9] total Grounds. The table below summarizes Petitioner's Grounds relevant to Claims 2 and 15:

Ground Relevant to Claims and 15	Claims	Basis
1	1-6, 12-13, 15	Anticipated by Halmann
2	1-6, 12-13, 15	Obvious over Halmann

[9] The Petition challenges nine claims of the '168 Patent (Claims 1-6, 12-13, and 15) in eleven grounds. Grounds 1 and 2 allege that Claims 1-6, 12-13 and 15 are anticipated and rendered obvious by *Halmann*. Ground 3 alleges that Claims 1-6, 12-13 and 15 are obvious over *Halmann* and *Honda*. Grounds 4-5 allege that Claims 2-3, 5, 12-13 and 15 are obvious over *Halmann*, alone or with *Honda*, and *Walston*. Grounds 6 and 7 allege that Claim 6 is obvious over *Halmann*, alone or with *Honda*, and *Smith*. Grounds 8 and 9 allege that Claims 1-6, 12-13 and 15 are anticipated and/or rendered obvious by *Barnes*. Ground 10 alleges that Claims 2-3, 5, 12-13 and 15 are obvious over *Barnes* and *Walston*. And Ground 11 alleges that Claim 6 is obvious over *Barnes* and *Smith*.

3	1-6, 12-13, 15	Obvious over Halmann and Honda
4	2-3, 5, 12-13, 15	Obvious over Halmann and Walston
5	2-3, 5, 12-13, 15	Obvious over Halmann, Honda, and Walston
8	1-4, 6, 12-13, 15	Anticipated by Barnes
9	1-6, 12-13, 15	Obvious over Barnes
10	2-3, 5, 12-13, 15	Obvious over Barnes and Walston

Each of these Grounds fails to show that Claims 2 and 15 are unpatentable for one of two primary reasons. ***First***, Grounds 1-3, 8, and 9 of the Petition rely on an incorrect claim construction of the Counterbalance limitations as "non-limiting." These Grounds must fail under the proper, limiting, construction of the Counterbalance limitations because the Petition fails to identify any teaching or disclosure of those limitations in the prior art, and otherwise fails to articulate an obviousness rationale.

Second, Grounds 4, 5, and 10 rely on Walston (EX1006) to allegedly render the Counterbalance limitations obvious. However, Petitioner confuses Walston's disclosure of "balancing" a transducer and main processor of an ultrasound system while transporting the system with the "***counter***balancing" of torque forces during operation of the system recited by the Counterbalance limitations. Petitioner

otherwise improperly relies on the common knowledge of a POSITA to supply the missing Counterbalance limitations.

Accordingly, Claims 2 and 15 are novel and non-obvious and their validity should be upheld.

A. Petitioner's Failure to Address The Counterbalance Limitations of Claims 2 and 15 is Fatal (Grounds 1-3, 8, and 9)

Petitioner contends that Claims 2 and 15 are allegedly anticipated or rendered obvious by Halmann (EX1003) (Grounds 1 and 2), rendered obvious by Halmann in view of Honda (EX1004) (Ground 3), or anticipated or rendered obvious by Barnes (EX1005) (Grounds 8 and 9). However, Petitioner fails to identify even a single corresponding teaching or disclosure of the Counterbalance limitations in any of these references.[10] Nor does Petitioner contend that the combination of these references would have rendered the Counterbalance limitations obvious.

[10] Petitioner's declarant unilaterally determined that it was entirely "unnecessary" to apply the disclosures of these references to the Counterbalance limitations, despite concluding that Claims 2 and 15 are anticipated and obviousness by the reference teachings. EX2001 (Daft Tr.), 61:13, 62:13, 62:23, 63:7 (examples of the 27 times that Dr. Daft stated it was unnecessary to analyze or apply prior art to the Counterbalance limitations in regard to Grounds 1-3, 8 and 9).

Instead, Petitioner argues in each of these Grounds that it need not address the Counterbalance limitations because they are allegedly "non-limiting." Pet., 35-36 (regarding Claim 2 under Grounds 1 and 2).[11] Petitioner is wrong. Controlling precedent requires that the Counterbalance limitations be given patentable weight as discussed *supra* in §III.A.

Having failed to identify ***any*** express or inherent disclosure of the Counterbalance limitations when properly construed as "limiting," Petitioner's anticipation grounds (Grounds 1 and 8) for Claims 2 and 15 must be rejected. *See* Pet. 35-36 (); *TF3 Ltd. v. Tre Milano, LLC*, 894 F.3d 1366, 1374 (Fed. Cir. 2018) (reversing PTAB anticipation finding; "Invalidity for anticipation requires that the identical invention must be shown in as complete detail as contained in the patent claim.") (internal quotations omitted). And Petitioner's obviousness grounds

[11] Petitioner's analysis of Claims 2 and 15 under the remaining grounds add nothing beyond the general allegation that the Counterbalance limitations are "non-limiting" as set forth under Grounds 1 and 2. *See* Pet., 44 (regarding Claim 15 under Grounds 1 and 2; cross-referencing to Claim 2 analysis), 46 (regarding Claim 2 under Ground 3; cross-referencing to Claim 2 Grounds 1 and 2 analysis), 48 (regarding Claim 15 under Ground 3; cross-referencing to Claim 2 Ground 3 analysis), 70 (regarding Claim 2 under Grounds 8 and 9; cross-referencing to Claim 2 Grounds 1 and 2 analysis), 74 (regarding Claim 15 under Grounds 8 and 9; cross-referencing to Claim 2 Grounds 8 and 9 analysis)

(Grounds 2, 3, and 9) must also be rejected because the Petition fails to even allege that the Counterbalance limitations would have been obvious. *See* Pet. 35-36; *contra Pre-AIA* 35 U.S.C. §103(a).

Accordingly, Petitioner fails to meet its burden under Grounds 1-3, 8, and 9 to show that Claims 2 and 15 are unpatentable.

B. Walston Fails to Disclose or Suggest the Counterbalance Limitations (Grounds 4, 5, and 10)

Petitioner contends in Grounds 4, 5, and 10 (the "Walston-based grounds") that the Counterbalance limitations of Claims 2 and 15 are rendered obvious by the teachings of Walston (EX1006) in combination with one or more other references. Specifically, Ground 4 relies on a combination of Halmann and Walston; Ground 5 relies on a combination of Halmann, Honda, and Walston; and Ground 10 relies on a combination of Barnes and Walston. Walston is the only reference across all *eleven* Petition grounds that Petitioner contends discloses or suggests the Counterbalance limitations.

Despite the fact that each Walston-based ground utilizes different base references, the analysis in the Petition remains the same between grounds.[12]

[12] The Petition alleges that "[t]he Barnes system is substantially the same as the Halmann and Halmann-Honda systems [of Grounds 4 and 5, respectively]" such that (continued…)

Petitioner contends that Walston's disclosure of a transducer designed to have a "balanced electronic weight distribution" renders obvious the Counterbalance limitations[13] of Claims 2 and 15. *See* Pet. 50, 55 (Grounds 4 and 5 analysis of Claims 2 and 15), 75, 77 (Ground 10 analysis of Claims 2 and 15, relying primarily on Grounds 4 and 5 analysis). However, the Petition fails to show that Claims 2 and 15 would have been obvious under any Walston-based ground.

The Petition makes three arguments. ***First***, the Petition alleges that "a POSA would have been motivated to configure the distribution of the battery source in the Halmann or Halmann-Honda system to result in [the Counterbalance limitations because] … Walston disclosed sizing the assembly and internal electronics, which includes the battery, to provide a 'balanced electronic weight distribution.'" Pet., 49-50. ***Second***, the Petition alleges that "it would have been common sense and common knowledge for a POSA designing a portable assembly to configure" it

"Barnes would have been modified … in substantially the same way as the Halmann and Halmann-Honda systems." Pet., 74-75.

[13] As discussed above, the "Counterbalance" limitations recite distribution of battery power sources to configure a transducer to have a weight that "counterbalance[s] torque forces felt by a user of said transducer assembly," such as torque forces that "may result from a cable connecting the ultrasound and the transducer held by the user handing down next to the user's hand." EX1001, 4:64-5:1, cls. 2, 15.

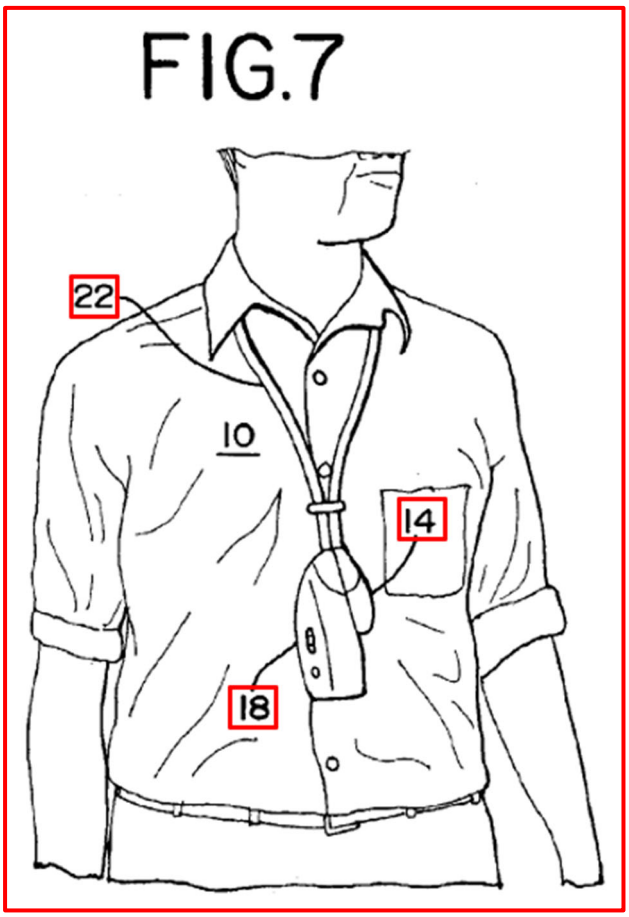
according to the Counterbalance limitations. Pet., 50. ***Third***, the Petition relies on the '168 Patent's articulation of the problem solved by the Counterbalance limitations as the motivating factor for rendering those limitations obvious. Pet., 51. Each argument fails.

1. Walston's "Balanced Electronic Weight" Does Not Disclose or Suggest the Counterbalance Limitations

Petitioner's Walston-based grounds rely almost exclusively on Walston's disclosure of a "balanced electronic weight distribution" to meet the Counterbalance limitations. Pet., 49-50 (citing Walston (EX1006) ¶47). But the context of Walston shows it is not referring to "counterbalancing," or otherwise mitigating, any torque forces. Instead, Walston is describing "***balancing***" a portable ultrasound unit "***to remain draped around the user's neck***."

> The portable ultrasound system 10 is easily carried in a pocket, attached to the belt with a clip or worn around the neck of the user 12 similar to a stethoscope as shown in FIG. 7. The cord 22 is draped around the user's neck. The transducer 14 and housing 18 are equally balanced in one embodiment. The size of the transducer 14 may be increased to provide more balanced electronic weight distribution. ***The equal balancing allows the portable ultrasound System 10 to remain draped around the user's neck*** without further clipping or attachment.

EX1006 ¶47. Fig. 7, as referenced in the excerpt of Walston above, is reproduced below.



As disclosed in Walston and shown in Fig. 7,[14] the "balanced electronic weight distribution" of Walston's transducer 14 and housing 18 enables a user to transport Walston's ultrasound system in a manner "similar to a stethoscope." *Id.*

[14] Walston's Fig. 7 shows that, even with a "balanced electronic weight distribution," the transducer and housing still require an "expandable loop or other connection … [to] hold[] two portions of the cord 22 together" to remain around the neck. EX1006 ¶[0047]. Accordingly, to the extent Petitioner alleges that the balanced weight distribution of Walston's transducer 14 and housing 18 counterbalance torque forces while the system is being carried around the neck, it is actually the depicted "loop"

(continued…)

Petitioner's declarant confirmed that the portions of Walston relied on in the Petition and his declaration are limited to Walston's "stethoscope" embodiment where the ultrasound is "balanced" around a user's neck.

> **Question**: When you say "similar" there [in paragraph 189 of your declaration EX1008], what is "similar" referring to?[15]
> **Dr. Daft**: I'm reading paragraph 19 of Walston, and it says about three quarters down paragraph 19, "In alternative embodiments, the transducer 14 is larger, such as being sized to be generally similar to the size of the housing 18 or larger. The weight is also similar, but may be less or more." ***I believe that one of the concerns that Walston is addressing can be seen in figure 7 of Walston, which is where the transducer assembly and the system unit are being carried like a stethoscope. And so in that situation it would be advantageous for the transducer assembly and the system unit to have, you know, similar weights, because then the -- it would hang naturally around 1 the neck like a stethoscope***. And so I think this is what Walston -- which is at least one goal of Walston. And he talks in paragraph 47 about "more balanced electronic weight distribution."

EX2001 (Daft Tr.), 94:8-95:6.

---

that is mitigating such forces, rather than any distribution of power sources or weight of the transducer.

[15] Counsel for Petitioner objected as a matter of course after nearly every question during Dr. Daft's deposition. Petitioner's indiscriminate spoken objections are omitted from the excerpts of Dr. Daft's testimony reproduced herein unless otherwise noted.

A POSITA would have understood that Walston addresses an entirely different concern than the '168 Patent's Counterbalance limitations. EX2002 ¶¶95-97. Specifically, Walston addresses mobility and portability in ***transporting*** an ultrasound system (*i.e.,* around a user's neck). EX1006 ¶47 ("The portable ultrasound system 10 is easily ***carried*** in a pocket … or worn around the neck of the user 12."). By contrast, the '168 Patent addresses comfort in ***operating*** an ultrasound system. EX1001, 4:56-61 ("The present inventors have discovered that [] transducer assemblies with at least some threshold weight may … give a ***better feel in operation***, to provide a more positive ***interface with a scanned object***, to provide a better ***balance in the hand***, etcetera.").

Far from motivating a POSITA to arrive at the Counterbalance limitations, Walston instead actively teaches away from them. A primary aspect of the invention described in the '168 Patent is to provide "***additional mass***" within the transducer. EX1001, 4: 48-51. ("in addition to providing additional signal processing functionality within transducer assembly 24, embodiments of the invention also provide additional mass within the transducer assembly.") "The present inventors [of the '168 Patent] discovered that, somewhat counter intuitively, transducer assemblies with at least some threshold weight may be preferred by users." EX1001, 4:56-61. Walston teaches away from enhancing transducer comfort in the "counterintuitive[]" way recited by the Counterbalance limitations because Walston

teaches the portability benefits of a "***small, lightweight***" transducer. EX1006 [Abstract], ¶6 ("A ***small***, ***lightweight*** scope includes a ***transducer and a display***."). Indeed, the entire system disclosed in Walston—including a transducer, scope, display, and cabling—"weighs 10-12 ounces." EX1006, ¶47. The transducer of such a system would necessarily be extremely lightweight. EX2002 ¶98. And Walston teaches that the entire system could be even "***lighter***." *Id.*

Petitioner makes no attempt to tie Walston's general teaching to provide a "balanced electronic weight distribution" to any particular aspect of the Counterbalance limitations. Pet., 50. At best, Petitioner argues that "[t]he size of the [transducer] assembly [of Walston] can be the same size as the housing or larger, which would be substantially more than any 'minimum weight' to 'counterbalance torque forces felt by a user.'" Pet., 50. This is not so. A transducer being sized equal relative to a housing bears no relationship to the effects of torque forces exhibited through use of the transducer. Nowhere is this more clear than in the context of Walston's "lightweight" ultrasound system, where the included components (*i.e.*, transducer, housing, and cable) "weigh[] 10-12 ounces" in total. EX1006 ¶47. Even allocating just four ounces for cabling, a "balanced electronic weight distribution" between Walston's transducer and housing would produce a transducer of four ounces—about the weight of a wristwatch. Digital cabling would exhibit noticeable torque forces on such a transducer. EX2002 ¶99. The lightweight transducer of

Walston does not weigh "substantially more than any 'minimum weight'" required to counterbalance torque forces, as Petitioner alleges. *Id.*

Moreover, Petitioner's conclusory assertion that a transducer that weighs as much as the housing would necessarily counterbalance torque forces from cabling entirely ignores the properties of the cable itself. For example, digital cables used in professional ultrasound systems are often wrapped in thick, ruggedized, conductively insulated jackets, which increase durability of the sensitive digital wires contained inside and prevent snags, crimping, bunching, or tearing which can deteriorate or impede signal quality. EX2002 ¶100. Cable jacketing can also provide chemical or temperature protection, water and UV resistance, and other benefits for ultrasound systems in clinical or field use. *Id.,* ¶¶76-78, 100. However, cable jacketing often introduces significant weight and rigidity to the cables they protect. *Id*. Thus, while conductive wires used for digital communications may be lighter than coaxial equivalents (*i.e.,* the "analog" cables that the '168 Patent associates with prior art systems), the type and number of wires would have had less of an effect on the overall propensity of the cabling (including the protective outer-jacket) to induce torque on the transducer while in operation. *Id*. Petitioner fails to consider these aspects of ultrasound system design, which would have a large impact on torque forces felt by a user regardless of whether the transducer and housing have a "balanced" weight.

2. Petitioner Improperly Relies on "Common Sense" To Supply the Missing Counterbalance Limitations

Petitioner next argues that it would have been "common sense" to distribute battery power sources to a transducer to counterbalance torque forces. Pet., 50 (citing EX1008 (Daft Dec.) ¶193). But "common sense" cannot be relied on to supply this missing limitation under Federal Circuit precedent.

The Federal Circuit clarified appropriate uses of "common sense" in an obviousness analysis in *Arendi S.A.R.L. v. Apple Inc.*, 832 F.3d 1355, 1361 (Fed. Cir. 2016). Critically, the court stated that "common sense" has its place in an obviousness, analysis, but should be reserved primarily for supplying a motivation to combine reference teachings. *Id.* at 1362. While in rare instances "common sense" may be invoked to supply a missing limitation, it should be "the exception, rather than the rule." *Id*. A POSITA's "common sense" may only be relied on to supply a missing limitation where the limitation is "unusually simple and the technology particularly straightforward." *Id.*

The *Arendi* court used the "particularly straightforward" technology at issue in *Perfect Web* (587 F.3d 1324) as an example. In *Perfect Web*, the claims involved "comparing the number of successfully delivered e-mail messages in a delivery against a predetermined desired quantity, and if the delivery does not reach the desired quantity, repeating the process of selecting and e-mailing a group of

customers until the desired number of delivered messages has been achieved." *Perfect Web Techs., Inc. v. InfoUSA, Inc.,* 587 F.3d 1324, 1326 (Fed. Cir. 2009). There, the missing claim limitation was nothing more than an instruction to ***repeat*** steps A, B, and C until a particular quantity of email was sent. *Arendi* at 1362 (distinguishing from *Perfect Web* at 1326).

By contrast, the Counterbalance limitations at issue here involve distributing battery power sources in a transducer for the specific purpose of counterbalancing torque forces felt by a user, in a manner that would not have been "common sense" to a POSITA at the relevant time. EX2002 ¶¶101-104. The claims recite a complex design constraint, requiring consideration of battery size, type, capacity, system electronics integration, and impacts of cabling on users of the device to address a specific problem (*i.e.*, torque forces in operating a transducer). The Counterbalance limitations are clearly distinguishable from the simple, straightforward limitation of merely "repeating" prior claim steps in *Perfect Web*. Petitioner's "common sense" rationale to supply a limitation missing from the prior art should be rejected.

The *Arendi* court further explained that "record evidence" must support any "reasoned basis for resort to common sense," and that the inquiry into the evidentiary basis must be "searching … particularly [] where the missing limitation goes to the heart of an invention." *Arendi* at 1363. Here, the '168 Patent directly describes the Counterbalance limitations as, at least part of, "the present invention." *See, e.g.,*

EX1001, 5:14-17 ("Embodiments of the present invention distribute power source among the transducer assembly and main processing unit assembly as shown in FIG. 2 to provide a desired weight balance."). Petitioner's "common sense" based invalidity theory for these limitations therefore requires heightened scrutiny.

Outside of Walston, Petitioner relies primarily on the testimony of its declarant, Dr. Daft, to support the proposition that it would have been "common sense" to configure a transducer according to the Counterbalance limitation. *See* Pet., 50 (citing EX1008 ¶193). But questions about the credibility of Dr. Daft's testimony on this critical point were raised at his deposition.

Specifically, Dr. Daft grounds his claims about the "common sense and common knowledge" of a POSITA in his own alleged "experience researching and designing portable ultrasound systems ***before 2004***," including by "***partition[ing] … battery capacity/weight***."

> Specifically, ***based on my own experience researching and designing portable ultrasound systems before 2004***, ***determining how to partition*** circuitry, processing capability, and systems components—***including battery capacity/weight***—were fundamental questions in ultrasound system design, and these design choices, and how to implement them, would have been well known to a POSA.

EX1008 (Daft Dec.) ¶195. However, during his deposition, Dr. Daft admitted he did not have any professional experience with designing battery-powered, portable

ultrasound systems until ***2005***—a year after he claimed to have already garnered extensive experience in that particular field:

> **Question**: I'm sorry to turn back to the system at GE, but if we could do so: Did the ultrasound systems that you worked on at GE [from 1990 – 2000] have any battery components?
> [Objection]
> **Dr. Daft**: ***I don't recall working on a battery-powered system at GE***.
> **Question**: What about at Sensant [from 2000 – 2005]? I understand it was a different type of application. But did that system have any -- involve any design using battery components?
> **Dr. Daft**: That was not the goal of the Sensant system. We were focused on increasing performance rather than making a battery-operated system.
> **Question**: So no batteries at Sensant?
> **Dr. Daft**: ***That's correct***.

EX2001 (Daft Tr.), 25:20-26:13. According to Dr. Daft, it was not until his time at Siemens in 2005 that he worked professionally on a battery-powered, portable ultrasound system. *Id.* at 26:13-16.

Dr. Daft's testimony that distributing battery power sources to mitigate torque forces would have been "common sense" expressly relies on alleged personal experience performing aspects of the Counterbalance limitations at the relevant time. Appearing to lack the particular experience relied on, his testimony as to the obviousness of the Counterbalance limitations should be given less weight.

3. Petitioner's Conclusion of Obviousness Is Rooted in Improper Hindsight Bias

Petitioner's obviousness analysis alleges that a POSITA would have been motivated to apply the general knowledge of a POSITA in order to counterbalance torque forces felt by a user. Pet., 49-51. This is improper because Petitioner uses the '168 Patent's own statement of the ***problem*** as the ***motivation*** to produce the claimed structure. Petitioner was instead required to demonstrate that the "problem was known in the art or that [Petitioner's] formulation of the problem was derived directly from the prior art, rather than from the challenged claims." *Purdue Pharma L.P. v. Depomed, Inc.*, 643 F. App'x 960, 966 (Fed. Cir. 2016) (affirming board determination of non-obviousness in finding that Petitioner improperly relied on hindsight in formulating the problem to be solved.) As the Federal Circuit has explained

> ***Often the inventive contribution lies in defining the problem in a new revelatory way***. In other words, when someone is presented with the identical problem and told to make the patented invention, it often becomes virtually certain that the artisan will succeed in making the invention. Instead, PCM must prove by clear and convincing evidence that a person of ordinary skill in the meat encasement arts at the time of the invention ***would have recognized the adherence problem recognized by the inventors and found it obvious to produce the meat encasement structure disclosed in the '148 patent to solve that problem***.

Mintz v. Dietz & Watson, Inc., 679 F.3d 1372, 1377–78 (Fed. Cir. 2012). Petitioner has simply repurposed the "inventive contribution" of the inventors of the '168 Patent—addressing torque forces arising from use of an ultrasound transducer by redistributing battery sources—and improperly uses it to stitch together various elements of a POSITA's general knowledge to arrive at the challenged claims.

None of Petitioner's evidence establishes that the challenges of combating torque forces expressly addressed by the '168 Patent were known at the relevant time. EX2002 ¶¶105-107. For example, the Petition asserts that a POSITA would have known to configure the "size, shape, and weight" of a transducer "to maximize functionality, ease of use, and comfort for the user." Pet., 50. But, even if accepted as true, a POSITA's generic desire to maximize comfort does not alone establish that torque forces were a known problem, or otherwise establish a motivation to configure a transducer for the purpose of mitigating torque forces as claimed. EX2002 ¶107. Similarly, the Petition observes that larger batteries had the benefit of increased capacity for prolonged use. Pet., 50. While there may be some benefits to increasing capacity of the power sources in the overall system, that benefit has little to do with configuring the size of the battery in the transducer assembly—which may siphon power from the main processing unit and thus may be independently sized—to mitigate torque forces. EX1001, 5:31-37 ("It should be appreciated that power may continue to be provided through cable 25 in

embodiments with distributed power source configurations as described above. For example, a conductor carrying power within cable 25 may be utilized to 'trickle' charge battery 27-2 and/or provide power to circuitry of the transducer assembly while the circuitry of transducer assembly 24 is substantially idle."); *see also* EX2002 ¶108.

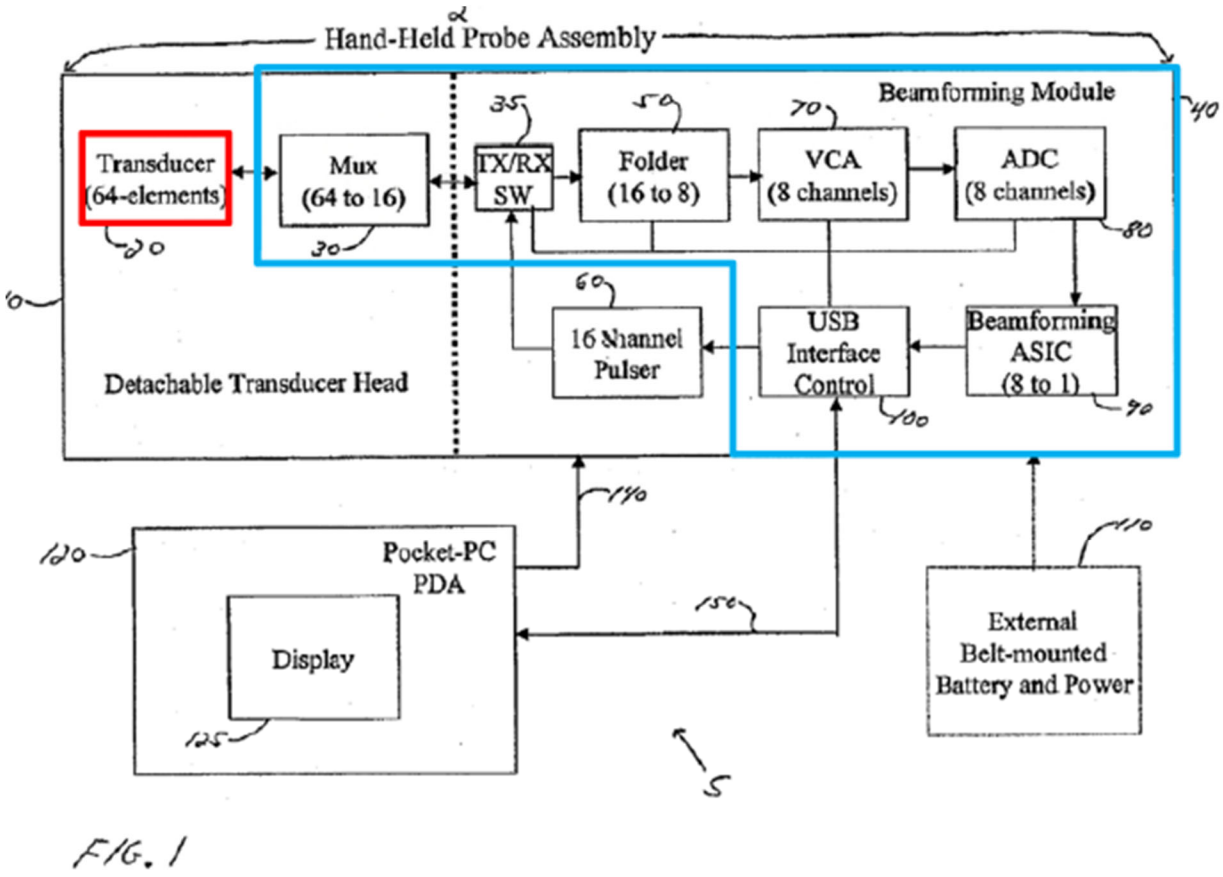
Taken together, none of the allegations in the Petition establish a motivation to distribute battery power sources in the specific manner claimed. *Id*. ¶109. The mere fact that a POSITA may have been familiar with ultrasound system design factors, as Petitioner alleges, does not render the particular implementation articulated in Claims 2 and 15 obvious. To hold otherwise would sanction impermissible hindsight analysis. *Merck Sharp & Dohme B.V. v. Warner Chilcott Co.*, LLC, 711 F. App'x 633, 637 (Fed. Cir. 2017).

Petitioner's reliance on the general knowledge of a POSITA to render the Counterbalance limitations obvious should be rejected.

VI. PETITIONER HAS NOT CARRIED ITS BURDEN AS TO CLAIM 5

Claim 5 requires that the processing circuitry of the ultrasound transducer include a digital signal processor (DSP) coupled to a digital beam former. EX1001, cl. 5. The Petition fails to show that any of the prior art discloses or renders the feature obvious.

Ground 1 fails because the Petition never explains what in Halmann's disclosure maps to the claimed "digital beam former." In its analysis of claim 5, Petitioner vaguely asserts that "module 40 *includes* a digital beamformer" (Pet. at 38), but in support of that assertion merely cites to other portions of the Petition (§§ VIII.A.1 and VIII.D), which themselves offer no clarity. Petitioner includes the following annotated figure, without specifying which portion corresponds to the beamformer.



Halmann itself characterizes all of the portion to the right of the dotted line (including pulser 60) in Figure 1 as a "Beamforming Module." EX1003, Fig. 1, ¶¶[0018], [0025], [0028]. Petitioner relies on Halmann's disclosure that "module 40 may comprise custom hardware elements such as a small circuit board with digital signal processors.". Pet. at 38 (*citing* EX1003, ¶37). However, this is merely a suggestion to use a DSP to implement the "Beamforming Module" in Halmann. It does not disclose the use of a separate DSP, coupled to the beamforming circuitry. Notably, the '168 Patent explains the benefits of separating the beamforming circuity from the DSP. *See* EX1001 6:29-44. Nothing in Halmann discloses or even suggests an advantage to having a separate DSP apart from the beamforming circuity. Thus, Petitioner has failed to carry its burden as to Grounds 1-2.

Petitioner's addition of Honda and Walston in Grounds 3-5 does not fill the gaps in its argument. Petitioner does not use Honda to address claims 4-5 (Pet. at 47), and Petitioner never provides a non-hindsight-based reason as to why Walston's generalized teaching that "part of all of the ultrasound circuity" may be included in the transducer (EX1006, ¶[0037]) would provide motivation to a POSITA to modify Halmann's disclosure (which already includes ultrasound circuitry in a transducer) to ***add*** a digital signal processor to the transducer, as the claim requires.

As to Grounds 9-10, Petitioner admits that the Barnes embodiment mapped to the claims does not disclose a digital signal processor coupled to a digital beam former in the transducer, as Claim 5 requires. Pet. at p. 70-71. Instead, Petitioner seems to concede it discloses the opposite (*i.e.* a DSP ***in the main body***, separate from the transducer). Pet. at 71. Petitioner provides no justification for moving the digital signal processor from Barnes's "main body" to the transducer, as all of the purported "advantages" the Petition discusses are achieved by having the digital signal processor in the main body rather than the transducer, exactly as Barnes describes. *Cf.* Pet. at 71. Nor does Petitioner show that a POSITA would expect success in moving Barnes's DSP from the main body to the transducer, as it fails to show that the DSP could perform all the same functions if it were moved to the transducer, as opposed to the main body. The combination of Barnes and Walston does not solve the deficiencies in the Petition for the reasons explained above.

VII. CONCLUSION

For the foregoing reasons, Patent Owner respectfully requests that the Board uphold the validity of the Challenged Claims.

Respectfully submitted,

BAKER BOTTS L.L.P.
Attorneys for Patent Owner

/ Eliot D. Williams /
Dated: August 11, 2023

Eliot D. Williams, Reg. No. 50,822
BAKER BOTTS L.L.P.
700 K Street NW
Washington, DC 20001
Tel: (202) 639-7700
eliot.williams@bakerbotts.com

Lead Counsel for Patent Owner
FUJIFILM SONOSITE, INC.

CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. § 42.24(a)(1)(i), the undersigned hereby certifies that the foregoing **PATENT OWNER RESPONSE** contains 9,559 words, excluding a table of contents, a table of authorities, mandatory notices under 37 C.F.R. § 42.8, a certificate of service or word count, or appendix of exhibits or claim listing, as measured by the word-processing system used to prepare this paper.

BAKER BOTTS L.L.P.
Attorneys for Patent Owner

/ Eliot D. Williams /
Dated: August 11, 2023
Eliot D. Williams, Reg. No. 50,822
BAKER BOTTS L.L.P.
700 K Street NW
Washington, DC 20001
Tel: (202) 639-7700
eliot.williams@bakerbotts.com

Lead Counsel for Patent Owner
FUJIFILM SONOSITE, INC.

CERTIFICATE OF SERVICE

The undersigned hereby certifies that a copy of the foregoing **PATENT OWNER RESPONSE** and Exhibits 2001 - 2003 were served electronically on counsel of record for the Petitioner as follows:

C. Brandon Rash (Reg. No. 59,121)
Paul D. Tripodi II (Reg. No. 40,847)
Clark Gordon (Reg. No. 74,706)
AKIN GUMP STRAUSS HAUER & FELD LLP
Email: AG-BFLY-FUJI-IPR@akingump.com

BAKER BOTTS L.L.P.
Attorneys for Patent Owner

/ Eliot D. Williams /
Dated: August 11, 2023
Eliot D. Williams, Reg. No. 50,822
BAKER BOTTS L.L.P.
700 K Street NW
Washington, DC 20001
Tel: (202) 639-7700
eliot.williams@bakerbotts.com

Lead Counsel for Patent Owner
FUJIFILM SONOSITE, INC.