IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
MIDLAND/ODESSA DIVISION

RESONANT SYSTEMS, INC., d/b/a RevelHMI,	§	
Plaintiff,	§	
	§	
v.	§	**MO:23-CV-00077-ADA**
	§	
APPLE, INC.,	§	
Defendant.	§	

CLAIM CONSTRUCTION MEMORANDUM AND ORDER

Before the Court are the parties' claim construction briefs. Plaintiff Resonant Systems, Inc., d/b/a Revel HMI submitted its Complaint for Patent Infringement on June 1, 2023 (ECF No. 1). Defendant Apple, Inc. submitted the opening Markman Brief on March 21, 2024 and its Reply Brief on April 25, 2024 (ECF Nos. 75 and 82, respectively). Resonant submitted its Response on April 11, 2024 and its Sur-reply on May 10, 2024 (ECF Nos. 79 and 84, respectively). The Court held a Markman hearing on May 31, 2024. (ECF No. 88). The Court provides this memorandum in support of its Claim Construction Order issued on June 6, 2024 (ECF No. 91), and hereby incorporates-by-reference the claim construction hearing and transcript as well as the demonstrative slides presented by the parties during the hearing. *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1314 (Fed. Cir. 2005) (en banc); *see also Teva Pharm. USA, Inc. v. Sandoz, Inc.*, 135 S. Ct. 831, 841 (2015).

BACKGROUND

Resonant Systems, Inc. asserts that Apple, Inc. infringes claims of United States Patent Nos. 8,093,767, 8,860,337, 9,941,830, and 11,15,882. Resonant asserts claims 1–5 of the '767 patent; claims 2 and 3 of the '337 patent; claims 1–8, 14–17, 19, and 20 of the '830 patent; and claims 1–6, 10, 17, 19, and 20 of the '882 patent.

The asserted patents describe "linear-resonant vibration module[s]," "linear vibration modules and linear-resonant vibration modules," and an "oscillating-resonant-module controller." See ECF No. 1. The parties have agreed that (1) the preambles are limiting in claim 1 of the '767 patent; claims 1 and 20 of the '830 patent; and claims 1 and 10 of the '882 patent; (2) the "control component . . ." limitations in three of the four asserted patents should be construed as means-plus-function terms and given their agreed-upon function, and (3) the "driving component . . ." limitations should be construed as means-plus-function limitations and given their agreed-upon function and corresponding structure. The parties dispute (1) whether the term "control component . . ." in the '767 patent is a means-plus-function term in claim 1, (2) the appropriate corresponding structure for "control component . . ." when claimed as means-plus-function, (3) whether fourteen claims are indefinite, and (4) whether two claims should be rewritten.

LEGAL PRINCIPLES

I. General principles

The general rule is that claim terms are generally given their plain-and-ordinary meaning. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (*en banc*); *Azure Networks, LLC v. CSR PLC*, 771 F.3d 1336, 1347 (Fed. Cir. 2014), *vacated on other grounds*, 575 U.S. 959, 959 (2015) ("There is a heavy presumption that claim terms carry their accustomed meaning in the relevant community at the relevant time.") (internal quotation omitted). The plain-and-ordinary

meaning of a term is the "meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention." *Phillips*, 415 F.3d at 1313.

The "only two exceptions to [the] general rule" that claim terms are construed according to their plain-and-ordinary meaning are when the patentee (1) acts as his/her own lexicographer or (2) disavows the full scope of the claim term either in the specification or during prosecution. *Thorner v. Sony Computer Ent. Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012). The Federal Circuit has counseled that "[t]he standards for finding lexicography and disavowal are exacting." *Hill-Rom Servs., Inc. v. Stryker Corp.*, 755 F.3d 1367, 1371 (Fed. Cir. 2014). To act as his/her own lexicographer, the patentee must "clearly set forth a definition of the disputed claim term" and "'clearly express an intent' to [define] the term." *Thorner,* 669 F.3d at 1365.

"Like the specification, the prosecution history provides evidence of how the PTO and the inventor understood the patent." *Phillips*, 415 F.3d at 1317. "[D]istinguishing the claimed invention over the prior art, an applicant is indicating what a claim does not cover." *Spectrum Int'l, Inc. v. Sterilite Corp.*, 164 F.3d 1372, 1379 (Fed. Cir. 1998). The doctrine of prosecution disclaimer precludes a patentee from recapturing a specific meaning that was previously disclaimed during prosecution. *Omega Eng'g, Inc. v. Raytek Corp.*, 334 F.3d 1314, 1323 (Fed. Cir. 2003). "[F]or prosecution disclaimer to attach, our precedent requires that the alleged disavowing actions or statements made during prosecution be both clear and unmistakable." *Id.* at 1325–26. Accordingly, when "an applicant's statements are amenable to multiple reasonable interpretations, they cannot be deemed clear and unmistakable." *3M Innovative Props. Co. v. Tredegar Corp.*, 725 F.3d 1315, 1326 (Fed. Cir. 2013).

A construction of "plain and ordinary meaning" may be inadequate when a term has more than one "ordinary" meaning or when reliance on a term's "ordinary" meaning does not resolve

the parties' dispute. *O2 Micro Int'l Ltd. v. Beyond Innovation Tech. Co.*, 521 F.3d 1351, 1361 (Fed. Cir. 2008). In that case, the Court must describe what the plain-and-ordinary meaning is. *Id.*

"Although the specification may aid the court in interpreting the meaning of disputed claim language . . . , particular embodiments and examples appearing in the specification will not generally be read into the claims." *Constant v. Advanced Micro-Devices, Inc.*, 848 F.2d 1560, 1571 (Fed. Cir. 1988). "[I]t is improper to read limitations from a preferred embodiment described in the specification—even if it is the only embodiment—into the claims absent a clear indication in the intrinsic record that the patentee intended the claims to be so limited." *Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 913 (Fed. Cir. 2004).

An applicant's statements during the PCT prosecution may also indicate the scope of the invention. *See Caterpillar Tractor Co. v. Berco, S.P.A.*, 714 F.2d 1110, 1116 (Fed. Cir. 1983) (stating that when instructions to foreign counsel or representations to foreign patent offices made by an applicant during prosecution of a corresponding foreign application provide "relevant evidence" with respect to claim interpretation, such information "must be considered."); *see also Gillette Co. v. Energizer Holdings, Inc.*, 405 F.3d 1367, 1374 (Fed. Cir. 2005) (finding that the applicant's own statements made before the European Patent office support the court's holding).

Although extrinsic evidence can be useful, it is "less significant than the intrinsic record in determining 'the legally operative meaning of claim language.'" *Phillips*, 415 F.3d at 1317 (quoting *C.R. Bard, Inc. v. U.S. Surgical Corp.*, 388 F.3d 858, 862 (Fed. Cir. 2004)). Technical dictionaries may be helpful, but they may also provide definitions that are too broad or not indicative of how the term is used in the patent. *Id.* at 1318. Expert testimony may also be helpful, but an expert's conclusory or unsupported assertions as to the meaning of a term are not. *Id.*

II. Claim differentiation

Under the doctrine of claim differentiation, a court presumes that each claim in a patent has a different scope. *Phillips*, 415 F.3d at 1314–15. The presumption is rebutted when, for example, the "construction of an independent claim leads to a clear conclusion inconsistent with a dependent claim." *Id.* The presumption is also rebutted when there is a "contrary construction dictated by the written description or prosecution history." *Seachange Int'l, Inc. v. C-COR, Inc.*, 413 F.3d 1361, 1369 (Fed. Cir. 2005). The presumption does not apply if it serves to broaden the claims beyond their meaning in light of the specification. *Intell. Ventures I LLC v. Motorola Mobility LLC*, 870 F.3d 1320, 1326 (Fed. Cir. 2017).

III. Whether the Preamble is limiting

Courts presume that the preamble does not limit the claims. *Am. Med. Sys., Inc. v. Biolitec, Inc.*, 618 F.3d 1354, 1358 (Fed. Cir. 2010). But "[i]n general, a preamble limits the invention if it recites essential structure or steps, or if it is 'necessary to give life, meaning, and vitality' to the claim." *Catalina Mktg. Int'l, Inc. v. Coolsavings.com, Inc.*, 289 F.3d 801, 808 (Fed. Cir. 2002) (quoting *Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1305 (Fed. Cir. 1999)). "Conversely, a preamble is not limiting 'where a patentee defines a structurally complete invention in the claim body and uses the preamble only to state a purpose or intended use for the invention.'" *Catalina Marketing International, Inc.*, 289 F.3d at 808 (quoting *Rowe v. Dror*, 112 F.3d 473, 478 (Fed. Cir. 1997)). The Federal Circuit has provided some "guideposts" regarding whether the preamble is limiting: (1) preamble provides antecedent basis, (2) preamble is essential to understand limitations or terms in the claim body, (3) preamble recites "additional structure or steps underscored as important by the specification," and (4) "clear reliance on the preamble during prosecution to distinguish the claimed invention from the prior art." *Id.*

IV. Indefiniteness

"[I]ndefiniteness is a question of law and in effect part of claim construction." *ePlus, Inc. v. Lawson Software, Inc.*, 700 F.3d 509, 517 (Fed. Cir. 2012). Patent claims must particularly point out and distinctly claim the subject matter regarded as the invention. 35 U.S.C. § 112, ¶ 2. A claim, when viewed in light of the intrinsic evidence, must "inform those skilled in the art about the scope of the invention with reasonable certainty." *Nautilus Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 910 (2014). If it does not, the claim fails § 112, ¶ 2 and is therefore invalid as indefinite. *Id.* at 901. Whether a claim is indefinite is determined from the perspective of one of ordinary skill in the art as of the time the application was filed. *Id.* at 911.

In the context of a claim governed by § 112, ¶ 6, the claim is indefinite if the claim fails to disclose adequate corresponding structure to perform the claimed functions. *Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1351 (Fed. Cir. 2015)–52. The disclosure is inadequate when one of ordinary skill in the art "would be unable to recognize the structure in the specification and associate it with the corresponding function in the claim." *Id.* at 1352. Computer-implemented means-plus-function claims are indefinite unless the specification discloses an algorithm to perform the function associated with the limitation. *Noah Sys., Inc. v. Intuit Inc.*, 675 F.3d 1302, 1319 (Fed. Cir. 2012).

V. Means-plus-function claiming

A patent claim may be expressed using functional language. *See* 35 U.S.C. § 112, ¶ 6.[1] *Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1347–49 (Fed. Cir. 2015). In particular, § 112, ¶ 6 provides that a structure may be claimed as a "means . . . for performing a specified function"

[1]The America Invents Act of 2011 changed the numbering of the relevant subsection from § 112, ¶ 6 to § 112(f). Because the substance of the subsection did not change, the undersigned will refer to the relevant subsection as § 112, ¶ 6 in keeping with the numeration at the time of the patent filing of three of the four patents—'882 patent has a post-2013 effective filing date.

and that an act may be claimed as a "step for performing a specified function." *Masco Corp. v. United States*, 303 F.3d 1316, 1326 (Fed. Cir. 2002).

The presumption is that terms reciting "means" are subject to § 112, ¶ 6. *Williamson*, 792 F.3d at 1348. But if the term does not use the word "means," then it is presumed not to be subject to § 112, ¶ 6. *Id.* "That presumption can be overcome, but only if the challenger demonstrates that the claim term fails to recite sufficiently definite structure or else recites function without reciting sufficient structure for performing that function." *Samsung Elecs. Am., Inc. v. Prisua Eng'g Corp.*, 948 F.3d 1342 (Fed. Cir. 2020) (internal quotations removed) (citing *Williamson*, 792 F.3d at 1349). "The correct inquiry, when 'means' is absent from a limitation, is whether the limitation, read in light of the remaining claim language, specification, prosecution history, and relevant extrinsic evidence, has sufficiently definite structure to a person of ordinary skill in the art." *Apple Inc. v. Motorola, Inc.*, 757 F.3d 1286, 1298 (Fed. Cir. 2014), *overruled on other grounds by Williamson*, 792 F.3d at 1349.

When § 112, ¶ 6 applies, it limits the scope of the functional term "to only the structure, materials, or acts described in the specification as corresponding to the claimed function and equivalents thereof." *Williamson*, 792 F.3d at 1347. Construing a means-plus-function limitation involves multiple steps. "The first step . . . is a determination of the function of the means-plus-function limitation." *Medtronic, Inc. v. Advanced Cardiovascular Sys., Inc.*, 248 F.3d 1303, 1311 (Fed. Cir. 2001). "[T]he next step is to determine the corresponding structure disclosed in the specification and equivalents thereof." *Id.* A "structure disclosed in the specification is 'corresponding' structure only if the specification or prosecution history clearly links or associates that structure to the function recited in the claim." *Id.* The focus of the "corresponding structure" inquiry is not merely whether a structure is capable of performing the recited function, but rather

whether the corresponding structure is "clearly linked or associated with the [recited] function." *Id.* The corresponding structure "must include all structure that actually performs the recited function." *Default Proof Credit Card Sys. v. Home Depot U.S.A., Inc.*, 412 F.3d 1291, 1298 (Fed. Cir. 2005). However, § 112, ¶ 6 does not permit "incorporation of structure from the written description beyond that necessary to perform the claimed function." *Micro Chem., Inc. v. Great Plains Chem. Co.*, 194 F.3d 1250, 1258 (Fed. Cir. 1999).

For § 112, ¶ 6 limitations implemented by a programmed general-purpose computer or microprocessor, the corresponding structure described in the patent specification must include an algorithm for performing the function, *i.e.*, the corresponding structure is a processor and an algorithm. *WMS Gaming, Inc. v. Int'l Game Tech.*, 184 F.3d 1339, 1349 (Fed. Cir. 1999). In this situation, the corresponding structure is not a general-purpose computer but rather the special purpose computer programmed to perform the disclosed algorithm. *Aristocrat Techs. Australia Pty Ltd. v. Int'l Game Tech.*, 521 F.3d 1328, 1333 (Fed. Cir. 2008). The algorithm may be described in "any understandable terms," such as "as a mathematical formula, in prose, or as a flow chart, or in any other manner that provides sufficient structure." *Function Media, L.L.C. v. Google, Inc.*, 708 F.3d 1310, 1318 (Fed. Cir. 2013). Federal Circuit caselaw does not require that the patent describe an algorithm "if the selection of the algorithm or group of algorithms needed to perform the function in question would be readily apparent to a person of skill in the art." *Aristocrat Techs. Australia Pty Ltd. v. Multimedia Games, Inc.*, 266 F. App'x 942, 947–48 (Fed. Cir. 2008).

Finally, § 112, ¶ 6 does not apply when the claim itself describes the algorithm. *St. Isidore Rsch., LLC v. Comerica Inc.*, No. 2:15-CV-1390-JRG-RSP, 2016 WL 4988246, at *13 (E.D. Tex. Sept. 19, 2016).

VI. Correction of an error

A district court can only correct an error in a claim if "(1) the correction is not subject to reasonable debate based on consideration of the claim language and the specification and (2) the prosecution history does not suggest a different interpretation of the claims." *Novo Indus., L.P. v. Micro Molds Corp.*, 350 F.3d 1348, 1357 (Fed. Cir. 2003).

LEVEL OF ORDINARY SKILL IN THE ART

It is well established that patents are interpreted from the perspective of one of ordinary skill in the art. *See Phillips*, 415 F.3d at 1313 ("[T]he ordinary and customary meaning of a claim term is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application."). The Federal Circuit has advised that the "[f]actors that may be considered in determining the level of skill in the art include: (1) the educational level of the inventors; (2) the type of problems encountered in the art; (3) prior art solutions to those problems; (4) the rapidity with which innovations are made; (5) sophistication of the technology; and (6) education level of active workers in the field." *Env'tl Designs, Ltd. v. Union Oil Co. of California*, 713 F.2d 693, 696 (Fed. Cir. 1983). "These factors are not exhaustive but are merely a guide to determining the level of ordinary skill in the art." *Daiichi Sankyo Co. Ltd. v. Apotex, Inc.*, 501 F.3d 1254, 1256 (Fed. Cir. 2007).

Apple contends that at the time of the claimed invention for the respective Asserted Patents, a person of skill in the art ("POSITA") would have either (1) a Bachelor of Science in Mechanical Engineering, Electrical Engineering, Computer Science, or an equivalent field and at least two years of experience related to electronic consumer product design; or (2) have obtained similar knowledge and experience through other means. Resonant contends that a POSITA at the time of the invention would have a bachelor's degree in electrical engineering, mechanical engineering,

or a comparable field of study, and at least two years of professional experience with electro-mechanical control systems, or other similarly relevant industry experience. Additional relevant industry experience may compensate for lack of formal education or vice versa.

Having considered the parties' proposals, and the factors that may be considered in determining the level of skill in the art, the Court finds that a person of ordinary skill in the art would have either (1) a Bachelor of Science in Mechanical Engineering, Electrical Engineering, or an equivalent field and at least two years of academic or industry experience in electronic consumer product design or electro-mechanical control systems, or (2) at least two years of relevant industry experience that compensates for lack of formal education.

THE PARTIES' AGREED TERMS

Before opening claim construction, the parties agreed that "(1) the preambles are limiting in claim 1 of the '767 patent; claims 1 and 20 of the '830 patent; and claims 1 and 10 of the '882 patent; (2) the "control component …" limitations in three of the four asserted patents should be construed as means-plus-function terms and given their agreed-upon function, and (3) the "driving component …" limitations should be construed as means-plus-function limitations and given their agreed-upon function and corresponding structure." ECF No. 75. The agreed constructions are captured in the following chart.

Term	Agreed Construction
Preambles: "linear resonant vibration module"; "linear vibration module"; "vibration module"; "oscillating resonant module[s]" U.S. Patent No. 8,093,767, Claim 1; U.S. Patent No. 9,941,830, Claims 1 & 19; U.S. Patent No. 11,152,882, Claims 1 & 10	Agreed – Preamble is limiting

"a driving component that drives the moveable component in each of two opposite directions" U.S. Patent No. 8,093,767, Claim 1	Agreed - Subject to 35 U.S.C. § 112(f) **Function**: driving the moveable component in each of two opposite directions **Structures**: coils 420, 514, 626, 1202, 1204, 1302, 1304, 1412, 1414, 1510 (also shown in Figs. 16–17); electromagnets shown in Figs. 10–11; and equivalents thereof
"a driving component that drives the moveable component in each of two opposite directions within the housing" U.S. Patent No. 8,860,337, Claim 2	Agreed - Subject to 35 U.S.C. § 112(f) **Function**: driving the moveable component in each of two opposite directions within the housing **Structures**: coils 420, 514, 626, 1202, 1204, 1302, 1304, 1412, 1414, 1510 (also shown in Figs. 16–17); stator coils of Figs. 24A, 24B, 25; electromagnets shown in Figs. 10–11; and equivalents thereof
"a driving component that drives the moveable component to oscillate within the housing" U.S. Patent No. 9,941,830, Claims 1, 19, & 20	Agreed - Subject to 35 U.S.C. § 112(f) **Function**: driving the moveable component to oscillate within the housing **Structures**: coils 420, 514, 626, 1202, 1204, 1302, 1304, 1412, 1414, 1510 (also shown in Figs. 16–17); stator coils of Figs. 24A, 24B, 25; electromagnets shown in Figs. 10–11; and equivalents thereof

Resonant also withdrew its allegation that Apple is infringing or has infringed claim 7 of the '882 patent and claims 1 and 4 of the '337 patent. ECF No. 75 at 12. Those claims are therefore no longer in dispute or subject to claim construction.

CONSTRUCTION OF DISPUTED TERMS

For purposes of this order, the remaining disputes are divided into the following sections (I) Preambles, (II) "Control component . . .", (III) Indefiniteness, and (IV) Resonant's proposed terms. The disputes are addressed below, but are in essence (1) whether the term "control

component . . ." in the '767 patent is a means-plus-function term in claim 1, (2) the appropriate corresponding structure for "control component . . ." where claimed in means-plus-function format in several patents, (3) whether fourteen claims are indefinite, and (4) whether two claims should be rewritten.

I. Preambles

A. The preamble of Claim 2, U.S. Patent No. '337

Disputed Term	Resonant's Proposal	Apple's Proposal
"Linear vibration module"	Preamble is not limiting; no construction necessary; plain and ordinary meaning	Limiting

Shortly before the start of the May 31, 2024 hearing, the Court provided the parties with the following construction for this term: **Preamble is limiting.**

i. The parties' positions

The parties dispute whether the preamble of '337 patent's claim 2 is limiting. Apple argues primarily that claim 2's preamble should be limiting because Resonant has agreed that other, similar preambles are limiting. ECF No. 75 at 30–31. Along this line of thinking, Apple points out that Resonant's approach (1) contradicts Resonant's use of "vibration module" in other preambles to distinguish its invention from prior art, ECF No. 75 at 30 (citing *Hearing Components, Inc. v. Shure Inc.*, 600 F.3d 1357, 1366 (Fed. Cir. 2010), *abrogated by Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 134 S. Ct. 2120, 189 L. Ed. 2d 37 (2014)), and (2) is incongruent given "[t]he specification is replete with references to the invention as [described in the preamble], including the title of the patent itself and the 'Summary of the Invention.'" *Id.* (quoting *Poly-Am., L.P. v. GSE Lining Tech., Inc.*, 383 F.3d 1303, 1310 (Fed. Cir. 2004).

Resonant argues that claim 2's preamble does not provide antecedent basis for limitations recited in the claim body and does not recite additional structure because each claim body already recites a structurally complete invention. ECF No. 79 at 25 (citing *Acceleration Bay, LLC v. Activision Blizzard Inc.*, 908 F.3d 765, 770 (Fed. Cir. 2018) ("a preamble is not limiting where a patentee defines a structurally complete invention in the claim body and uses the preamble only to state a purpose or intended use for the invention." (quotation marks omitted)). Resonant further argues that the preamble of '337's claim 1—a similar preamble which the parties agree is limiting—provides an explicit antecedent basis for the body of that claim where the preamble in dispute here does not. *Id.*

ii. Analysis

This claim recites:

> 2. A linear vibration module comprising:
>
> a housing;
>
> a moveable component;
>
> a power supply;
>
> user-input features;
>
> a driving component that drives the moveable component in each of two opposite directions within the housing; and
>
> a control component that controls supply of power from the power supply to the driving component to cause the moveable component to oscillate at a frequency and an amplitude specified by user input received from the user input features,
>
> wherein the control component drives simultaneous oscillation of the moveable component at two or more frequencies to generate complex vibration modes.

'337 Patent at 16:1–16.

This preamble is limiting. Looking to the entire patent for understanding of what the inventor "actually invented and intended to encompass in the claim," *Corning Glass Works*, 868 F.2d at 1257, the specification is "replete with references to the invention as a ["linear vibration module"], including the title of the patent itself, "Linear Vibration Modules and Linear-Resonant Vibration Modules." *See Poly-America, L.P.*, 383 F.3d at 1310. Indeed, the specification's Abstract, Summary, and Detailed Description each describe the "current application [as being] directed to various linear vibration modules." *See generally* '337 Patent. The preamble therefore states the "framework of the invention . . . [that] is fundamental to the [] invention." *On Demand Mach. Corp. v. Ingram Indus., Inc.*, 442 F.3d 1331, 1343–44 (Fed. Cir. 2006); *see also UNILOC 2017 LLC v. Verizon Commc'ns, Inc.*, No. 2:18-CV-00536-JRG, 2020 WL 805271, at *11 (E.D. Tex. Feb. 18, 2020), *aff'd*, *Uniloc 2017 LLC v. Verizon Commc'ns, Inc.*, 846 F. App'x 914 (Fed. Cir. 2021) ("Common to these cases is that the preamble is limiting when the preamble tethers the claim to the focus of the described invention—when it provides an important aspect of the invention and that aspect is not understood solely from body of the claim."). While it may be true that the claim body recites a structurally complete invention, as Resonant urges, the preamble does not merely state a purpose or intended use for the invention such that it would disqualify as a claim limitation. *See Boehringer Ingelheim Vetmedica, Inc. v. Schering-Plough Corp.*, 320 F.3d 1339, 1345 (Fed. Cir. 2003); *Rowe*, 112 F.3d at 478.

iii. Court's conclusion

For the reasons described above, the Court construes the preamble of Claim 2, U.S. Patent No. '337 as follows: **Preamble is limiting.**

B. The preamble of Claim 20, U.S. Patent No. '830

Disputed Term	Resonant's Proposal	Apple's Proposal

"Vibration module"	Preamble is not limiting; no construction necessary; plain and ordinary meaning	Limiting

Shortly before the start of the May 31, 2024, hearing, the Court provided the parties with the following construction for this term: **Preamble is limiting.**

i. The parties' positions and the Court's conclusion

The parties dispute whether the preamble of claim 20 is limiting, binding up their arguments with their dispute over claim 2 of U.S. Patent No. '337 above. The Court, having reviewed those arguments in light of "vibration module" in claim 20 of U.S. Patent No. '830, sees no reason to depart from its conclusion above to find that this **preamble is likewise limiting.**

II. "Control Component . . ."

Resonant and Apple's dispute divides into two categories. In the first, whether claim language related to "control component . . ." of '737 patent, claim 1 is subject to § 112, ¶ 6. If so, the parties agree as to function but disagree as to structure—specifically, the construction of an algorithm as implemented by a microprocessor. In the second, the parties agree that the "control component . . ." terms of '337 Patent, Claim 2, '830 Patent, Claims 1, 19, & 20, '882 Patent, Claim 1, and '882 Patent, Claim 10 are subject to 35 U.S.C. § 112, ¶ 6 and likewise agree as to function, but disagree as to structure—again, the construction of an algorithm as implemented by a microprocessor.

A. '767 Patent, Claim 1

Disputed Term	Resonant's Proposal	Apple's Proposal
"a control component that includes a microprocessor and that controls supply of power from the power supply to the driving component to cause the moveable component to linearly oscillate, the control	(1) Plain and ordinary meaning; not subject to 35 U.S.C. § 112 ¶ 6 (2) If subject to 35 U.S.C. § 112 ¶ 6, then:	Subject to 35 U.S.C. § 112(f)

<table>
<tr><td rowspan="3">component including, in addition to the microprocessor,

a control program, stored in one of a separated electronic memory or within the processor, that is executed by the microprocessor to control operation of the linear resonant vibration module, and

a switch that receives a directional signal d from the processor and that selects a corresponding direction of the two opposite directions in which the driving component drives the moveable component,

the control component receiving output signals from sensors within the linear resonant vibration module during operation of the linear resonant vibration module and adjusting one or more operational control outputs of the control component according to the received output signals from the sensors in order that subsequent operation of linear resonant vibration module produces desired outputs from the one or more sensors corresponding to one or more operational control parameters”</td><td></td><td></td></tr>
<tr><td colspan="2"><u>Agreed Function</u>:

controlling supply of power from the power supply to the driving component to cause the movable component to linearly oscillate; controlling operation of the linear resonant vibration module; receiving output signals from sensors within the linear resonant vibration module during operation of the linear resonant vibration module; and adjusting one or more operational control outputs of the control component according to the received output signals from the sensors in order that subsequent operation of linear resonant vibration module produces desired outputs from the one or more sensors corresponding to one or more operational control parameters</td></tr>
<tr><td><u>Structure</u>:

a microprocessor; a switch; electronic memory; a control program that, if an algorithm is required, performs an algorithm comprising the following steps: (a) receive the value of an output signal; (b) compare that value to a different value, which could be a previous value; and/ (c) adjust one or more operational control outputs based on that comparison; and equivalents thereof
See, e.g., ’767 patent at 5:15-48, 6:14-8:3, Figs. 5A-6, 7A-7C</td><td><u>Structure</u>:

a microprocessor; a switch that receives a directional signal d from the processor and that selects a corresponding direction of the two opposite directions in which the driving component drives the moveable component; a control program, stored in one of a separated electronic memory or within the processor, that is executed by the microprocessor wherein the control program performs the algorithm shown in Figs. 7A–C and described at 6:15–8:3; and equivalents thereof</td></tr>
</table>

Shortly before the start of the May 31, 2024 hearing, the Court provided the parties with the following construction for this term: **Plain and ordinary meaning, not subject to means-plus-function treatment.**

i. Whether 35 U.S.C. § 112, ¶ 6 applies

Resonant and Apple agree that the "control component . . ." term is subject to § 112, ¶ 6 for three of the four asserted patents. Resonant is the holdout on '767 Patent, claim 1, believing this claim's "control component . . ." term is distinguishable because it is defined in sufficient structural terms—such as a (1) "microprocessor," a (2) "control program," and a (3) "switch." '767 Patent, Claim 1; ECF No. 79 at 9 (citing *Dyfan, LLC v. Target Corp.*, 28 F.4th 1360, 1365 (Fed. Cir. 2022) (section 112(f) is inapplicable where a claim "recite[s] both a function and a structure for performing that function in the claim."). Apple does not deny their structural nature but argues these are insufficient structures for performing the agreed functions because they are generic computer components. ECF No. 75 at 17. Apple likewise argues that "control component" is a nonce phrase that likewise fails to provide sufficient structure. *Id.* at 15.

The disputed term follows:

> . . . a **control component** that includes a *microprocessor* and that controls supply of power from the power supply to the driving component to cause the moveable component to linearly oscillate, the **control component** including, in addition to the *microprocessor*,
>
> > *a control program*, stored in one of a separated electronic memory or within the processor, that is executed by the microprocessor to control operation of the linear resonant vibration module, and
> >
> > *a switch* that receives a directional signal d from the processor and that selects a corresponding direction of the two opposite directions in which the driving component drives the moveable component,
>
> the **control component** receiving output signals from sensors within the linear resonant vibration module during operation of the linear resonant vibration module and adjusting one or more operational control outputs of the control component according to the received output signals from the sensors in order that subsequent operation of linear resonant vibration module produces desired outputs from the one or more sensors corresponding to one or more operational control parameters.

'767 Patent, Claim 1 (emphases added).

This term does not recite "means" or "step" for performing a function and therefore is rebuttably presumed to not invoke § 112, ¶ 6. Means-plus-function analysis therefore begins at the first step in *Williamson*.

Apple argues that the term is written in means-plus-function format, perceiving that "control component" is a nonce phrase followed largely by functional language. ECF No. 75 at 15–18. Anticipating Resonant's core argument, Apple also argues that the limitations "microprocessor," "control program," and "switch," though structural, fail to connote *sufficient* structure to a POSITA because they are generic computer components where the claims recite a special purpose computer. *Id.* Apple's logic follows: (1) because "control component" is a nonce phrase, § 112, ¶ 6 applies. And the claim term is not saved from § 112, ¶ 6 through the additional disputed limitations because (2) "microprocessor," though structural, fails to recite *sufficient* structure because it is a special purpose computer and lacks an algorithm or description of programming, and (3) neither "control program" nor its surrounding language provides such an algorithm or description. Finally, (4) "switch" lacks detail to rise above a broad category of structures. *Id.*

The Court disagrees. At the outset, Apple confuses the "structure" inquiries of § 112, ¶ 6 analysis.[2] Apple's confusion is evident given its citations that concern determination of corresponding structure reserved for step two, *see e.g. WMS Gaming, Inc.*, 184 F.3d at 1348; *and*

[2] *See Dyfan, LLC v. Target Corp.*, 28 F.4th 1360, 1365 (Fed. Cir. 2022) ("The overall means-plus-function analysis is a two-step process. The **first step** is to determine whether a claim limitation is drafted in means-plus-function format, which requires us to construe the limitation to *determine whether it connotes sufficiently definite structure to a person of ordinary skill in the art*. If the limitation connotes sufficiently definite structure, it is not drafted in means-plus-function format, and § 112, ¶ 6 does not apply. If, however, we conclude that the limitation is in means-plus-function format, we perform the **second step** of *determining "what structure, if any, disclosed in the specification corresponds to the claimed function*.") (internal citations to *Williamson* omitted) (emphases added).

In re Katz Interactive Call Processing Pat. Litig., 639 F.3d 1303, 1315–16 (Fed. Cir. 2011), and its citations to district court cases that cite *Katz* in step one analysis in a favorable manner to Apple, *see e.g. GoDaddy.com, LLC v. RPost Commc'ns Ltd.*, No. CV-14-00126-PHX-JAT, 2016 WL 212676, at *56 (D. Ariz. Jan. 19, 2016), *aff'd*, 685 F. App'x 992 (Fed. Cir. 2017) (citing *Katz*'s step two analysis uncritically during step one analysis); *and Velocity Pat. LLC v. Mercedes-Benz USA, LLC,* No. 13-CV-8413, 2016 WL 5234110, at *6 (N.D. Ill. Sept. 21, 2016) (similarly citing *In re Katz* and also citing to *GoDaddy*). These citations are unpersuasive as briefed and as argued at the hearing, lacking any reasoning to support cross-pollinating *Williamson*'s steps. The *Katz* court "recognized the limitations at issue were subject to § 112, ¶ 6." *G+ Commc'ns, LLC v. Samsung Elecs. Co.*, No. 2:22-CV-00078-JRG, 2023 WL 4534366, at *17 (E.D. Tex. July 13, 2023).[3] So "[t]he *Katz* analysis cited [here] relates to whether there was corresponding structure—the second of *Williamson's* two-step analysis." *Id.*

Turning now to "control component," the parties do not dispute that "control component" is a nonce phrase tantamount to using the word "means."[4] *Dyfan, LLC v. Target Corp.*, 28 F.4th 1360, 1365 (Fed. Cir. 2022). Resonant's expert does not opine on "control component." *See generally* ECF No. 79-1. Apple's expert, on the other hand, states that "a POSITA would understand that "component" is a generic term used to refer to any sub-part of a larger assembly, which could include hardware or software . . . . Adding the word 'control' does not change this.'" ECF No. 75-6 at 36; ECF No. 75 at 15 ("As confirmed by Dr. Visell, the term "component" connotes no structure and rather refers to a generic part (hardware and/or software) of a larger

[3] Apple's counsel made this same argument in the cited case, rejected by a sister court last year.
[4] Apple argues that "control component" does not differ from merely reciting a "means for control" following *Williamson*, 792 F.3d at 1350. Resonant wholly disregards whether "control component" is a nonce phrase, likely because it agreed that similar "control component . . ." terms are subject to means-plus-function treatment in three other patents.

assembly.”). Nevertheless, the essential inquiry remains not on “merely the presence or absence of the word ‘means,’ but whether the words of the claim are understood by persons of ordinary skill in the art to have a sufficiently definite meaning as the name for structure.” *Id.* (quoting *Williamson*, 792 F.3d at 1348).

Indeed, “when the structure-connoting term . . . is coupled with a description of [its] operation, sufficient structural meaning generally will be conveyed to persons of ordinary skill in the art and § 112 ¶ 6 presumptively will not apply.” *Linear Tech. Corp. v. Impala Linear Corp.*, 379 F.3d 1311, 1320 (Fed. Cir. 2004). Apple acknowledges that the claim describes “control component’s” operation via its objectives, inputs, and outputs, but understands these phrases to be purely functional. ECF No. 75 at 16–17 (citing *WSOU Invs. LLC v. Google LLC*, No. 2022-1066, 2023 WL 6210607, at *4 (Fed. Cir. Sept. 25, 2023) (finding the term “unit” is defined only by the function it performs). Resonant understands these objectives, inputs, and outputs to connote structure. ECF No. 79 at 10. Indeed, claim 1 recites an objective: “a control component that includes a microprocessor and *that controls a supply of power from the power supply to the driving component to cause the movable component to linearly oscillate.*” (emphasis added). ’737 patent, claim 1. It also recites inputs: “the control component receive[s] output signals from sensors within the linear resonant vibration module.” *Id.* And it outputs, after adjusting, “one or more operational control outputs.” *Id.* But even if these are indeed merely functional descriptions rather than structural limitations, *Apple Inc.*, 757 F.3d at 1299–303, *rev’d by Williamson*, 792 F.3d 1339 (“The limitation’s operation is more than just its function; it is how the function is achieved in the context of the invention.”); *Linear Tech. Corp. v. Impala Linear Corp.*, 379 F.3d 1311, 1319–21 (Fed. Cir. 2004); c*.f. Egenera, Inc. v. Cisco Sys., Inc.*, 972 F.3d 1367, 1375 (Fed. Cir. 2020)

(warning against *Apple* and *Linear Tech.* as pre-*Williamson* cases), their functionality nevertheless support sufficient structure, discussed below.

Recall that the disputed claim provides additional structural terms in "microprocessor," "control program," and "switch." Focusing first on the relationship between "microprocessor" and "control program," Apple's expert recognizes "microprocessor"[5] as a structure but notes that it "does nothing without programming," understanding that the claim does not detail what algorithm is embodied by the "control program." ECF No. 75-6 at 36. Up to this point, the Court agrees. But Apple then inserts second-step analysis, asking the Court to differentiate between special-purpose computers and general-purpose computers to determine corresponding structure a step too early. This is in error, and Apple therefore fails to meet its burden. Moreover, Apple overlooks that "[u]nlike in the mechanical arts, the specific structure of software code and applications is partly defined by its function." *Dyfan, LLC*, 28 F.4th at 1368 (citing *Apple Inc.*, 757 F.3d at 1298–99).

So, stepping over Apple's stumbling block, "control program" is described in the claim by where it is stored and that it is executed by the microprocessor. A POSITA would understand "control component's" functional or operational language, discussed above, to connote structure to "control program." *See Cypress Lake Software, Inc. v. Samsung Elecs. Am., Inc.*, 382 F. Supp. 3d 586, 643 (E.D. Tex. 2019) ("In other words, whether recitation of "instruction" performing a function is governed by § 112, ¶ 6 depends on whether the stated objectives and operation of the code connote sufficiently definite structure."). As to "switch," Apple waves its hands at its own

[5] Sister courts have held that "processor" "may connote sufficiently definite structure and is not necessarily a "nonce" or "functional" word that is subject to the limitations of § 112, ¶ 6. *Glob. Equity Mgmt. (SA) Pty. Ltd. v. Expedia, Inc.*, No. 216CV00095RWSRSP, 2016 WL 7416132, at *29 (E.D. Tex. Dec. 22, 2016); *see also WSOU Invs. LLC v. Google LLC*, No. 2022-1064, 2023 WL 6531525, at *4 (Fed. Cir. Oct. 6, 2023) ("There is no categorical rule that "processor" is or is not structural.").

expert's acknowledgment that that the term "refers to a broad category of structures," which qualify as a sufficient structure, *Skky, Inc. v. MindGeek, s.a.r.l.*, 859 F.3d 1014, 1019–20 (Fed. Cir. 2017) ("It is sufficient if the claim term is used in common parlance or by persons of skill in the pertinent art to designate structure, even if the term covers a broad class of structures and even if the term identifies the structures by their function."); *see also Flypsi, Inc. v. Dialpad, Inc.*, No. 6:21-CV-00642-ADA, 2022 WL 3593131, at *6 (W.D. Tex. Aug. 22, 2022) (finding "switch" "represent[s a] broad and varied class[] of structure[]" and gave the term its plain and ordinary meaning), favoring instead its expert's opinion that a generic reference is "insufficient to identify a specific structure." ECF No. 75-6 at 37. Indeed, neither expert denies that "switches" are structures. *See generally* ECF No. 75-6 and ECF No. 79-1. Apple merely misapplies law to its expert's conclusions.

ii. Court's construction

For the reasons above, the Court gives "control component . . ." a **plain and ordinary meaning, not subject to means-plus-function treatment.**

C. '337 Patent, Claim 2

<table>
<tr><th>Disputed Term</th><th>Resonant's Proposal</th><th>Apple's Proposal</th></tr>
<tr><td rowspan="2">"a control component that controls supply of power from the power supply to the driving component to cause the moveable component to oscillate at a frequency and an amplitude specified by user input received from the user-input features,

wherein the control component drives simultaneous oscillation of the moveable component at two or more frequencies to generate complex vibration modes."</td><td colspan="2">No Dispute: Subject to 35 U.S.C. § 112(f)

Agreed Function:
controlling supply of power from the power supply to the driving component to cause the moveable component to oscillate at a frequency and an amplitude specified by user input received from the user-input features; driving simultaneous oscillation of the movable component at two or more frequencies to generate complex vibration modes.</td></tr>
<tr><td>Structure: microcontroller with internal or external memory; processor; CPU;</td><td>Structure:
the switches shown in Figures 5A–6 and described at 5:45–65, 6:2–8 with the</td></tr>
</table>

	microprocessor; and equivalents thereof [if an algorithm is required] Where the corresponding structure is a processor, CPU, or microprocessor, the processor / CPU / microprocessor is programmed with an algorithm comprising the following steps: (a) set the mode and strength to values representing selections made by user input to the user input features; (b) provide a corresponding output to the power supply so that the power supply provides a corresponding output to the driving component; and (c) drive simultaneous oscillation of the moveable component at two or more frequencies. *See, e.g.*, '337 patent at 5:43-6:10, 6:43-8:30, 11:43-12:5; Figs. 5A-6, 7A-7C, 13, 22A-23	processor/microprocessor/microcontroller/CPU that performs the algorithm shown in Figures 7A–C and described at 6:43–8:30 and 13:3-41; and equivalents thereof

Shortly before the start of the May 31, 2024 hearing, the Court provided the parties with the following construction for this term: **Subject to 35 U.S.C. § 112, ¶ 6**

<u>Function</u>: controlling supply of power from the power supply to the driving component to cause the moveable component to oscillate at a frequency and an amplitude specified by user input received from the user-input features; driving simultaneous oscillation of the movable component at two or more frequencies to generate complex vibration modes.

<u>Structure</u>: a microcontroller, a processor, a microprocessor, or a CPU that performs the algorithm shown in Figures 7A–C, <u>or</u> the algorithm described in the corresponding text, *See, e.g.,* 6:43–8:30, and/or equivalents thereof.

i. The parties' positions and Court's analysis

Resonant and Apple agree that § 112, ¶ 6 applies to this "control component . . ." term and have likewise agreed to the following function: "controlling supply of power from the power supply to the driving component to cause the moveable component to oscillate at a frequency and an amplitude specified by user input received from the user-input features; driving simultaneous oscillation of the movable component at two or more frequencies to generate complex vibration modes." Section 112, ¶ 6 analysis therefore begins at the parties remaining disputes within *Williamson*'s step two.

Resonant and Apple dispute (1) whether an algorithm is required for the disclosed microcontroller, and (2) the algorithms associated with the "control component . . ." term. (3) Finally, the parties disagree whether "the switches shown in Figures 5A–6 and described at 5:45–65, 6:2–8" is a necessary part of the claimed control component.

a. Microcontroller

Both parties agree that the claim discloses a "microcontroller." They dispute whether the disclosed "microcontroller" requires an algorithm. Resonant argues that an algorithm is unnecessary for a microcontroller, pointing to Apple's expert's acknowledgement that a microcontroller differs from a general-purpose computer and arguing that the "microcontroller" disclosed is not a general-purpose computer but "instead provides more specific functionality sufficient to perform the claimed function without additional special programming." ECF No. 79 at 18. Apple's expert, Dr. Visell, reports that a microcontroller is not different in substance from a microprocessor—the terms are used interchangeably in the specification and, generally speaking, both require programming to operate. ECF No. 76-6 at 34–35. Apple also cites supporting caselaw. ECF No. 75 at 27 (citing *UUSI, LLC v. United States*, 131 Fed. Cl. 244, 271 (Fed. Cl. Apr. 17,

2017) ("When the corresponding structure is a microcontroller or microprocessor, the structure is limited by the disclosed algorithms in the specification."); *Universal Elecs., Inc. v. Roku, Inc.*, No. 2021-1992, 2023 WL 5316526, at *7 (Fed. Cir. Aug. 18, 2023) (where a "microcontroller that performs [an] algorithm" was appropriate means-plus-function construction).

The Court agrees with Apple. "When the corresponding structure is a microcontroller or microprocessor, the structure is limited by the disclosed algorithms in the specification." *UUSI, LLC*, 131 Fed. Cl. at 271. Though Resonant argues that the microcontroller disclosed is described with enough functionality to not require programing, the specification identifies element 602 in Figure 6—labeled "CPU"—as a "processor or microcontroller," '337 patent, col. 11:43–44, and discussed the microprocessor and microcontroller being "programmed," *id.* at col. 13:11–12. ECF No. 75-6 at 35; *see WMS Gaming, Inc.*, 184 F.3d at 1348 ("A general purpose computer, or microprocessor, programmed to carry out an algorithm creates 'a new machine, because a general purpose computer in effect becomes a special purpose computer once it is programed to perform particular functions pursuant to instructions from program software.'") (internal citation omitted).

Understanding that "microcontroller" requires an algorithm, the Court turns now to the parties' proposed algorithms.

b. Algorithm

Apple proposes the control algorithm that controls the operation of the control component shown in Figures 7A–C in the specification:

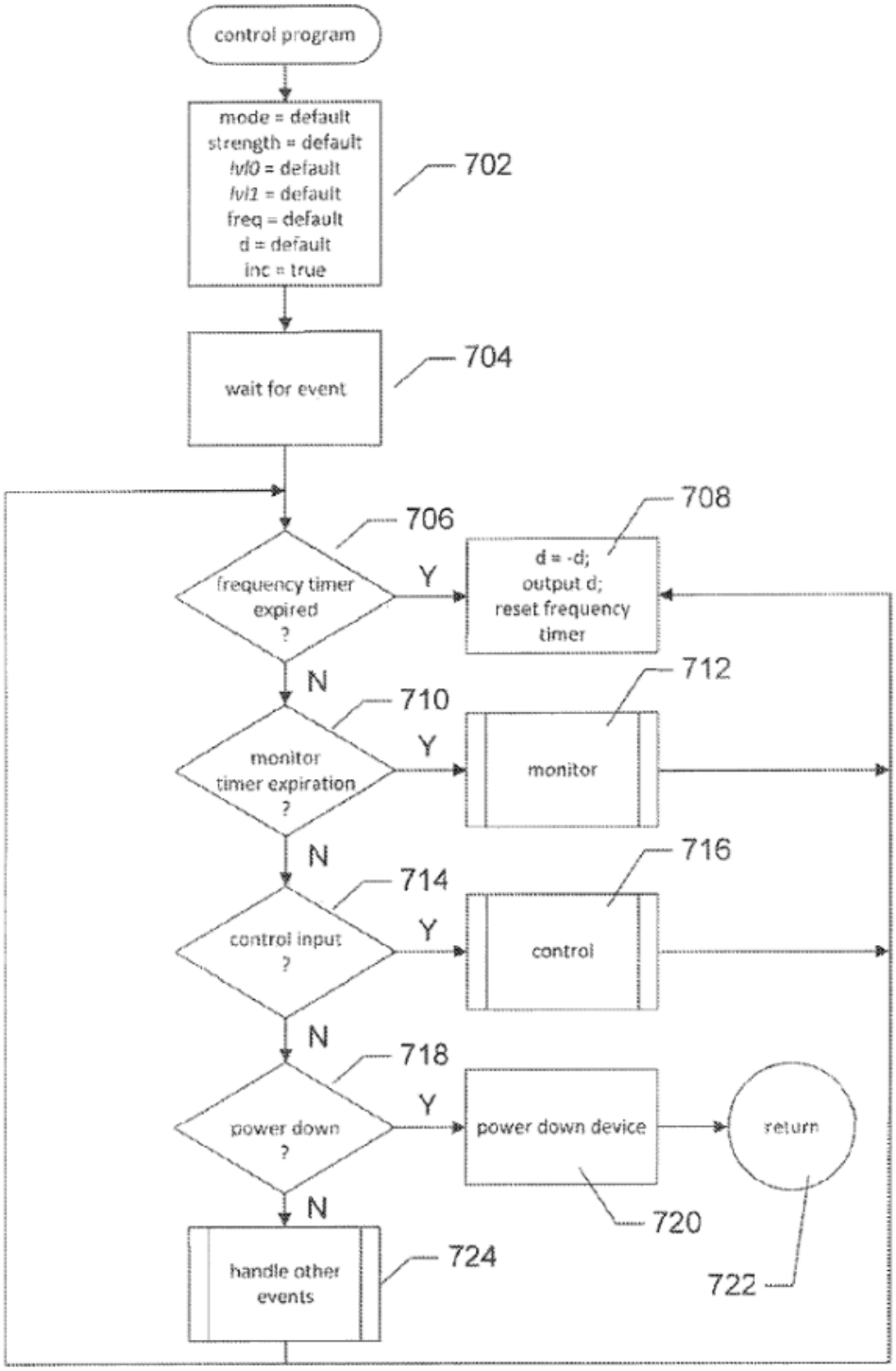

control program
mode = default
strength = default
lvl0 = default
lvl1 = default
freq = default
d = default
inc = true
702
wait for event
704
706
frequency timer expired ?
Y
708
d = -d;
output d;
reset frequency timer
N
710
monitor timer expiration ?
Y
712
monitor
N
714
control input ?
Y
716
control
N
718
power down ?
Y
power down device
return
720
N
handle other events
724
722

FIGURE 7A

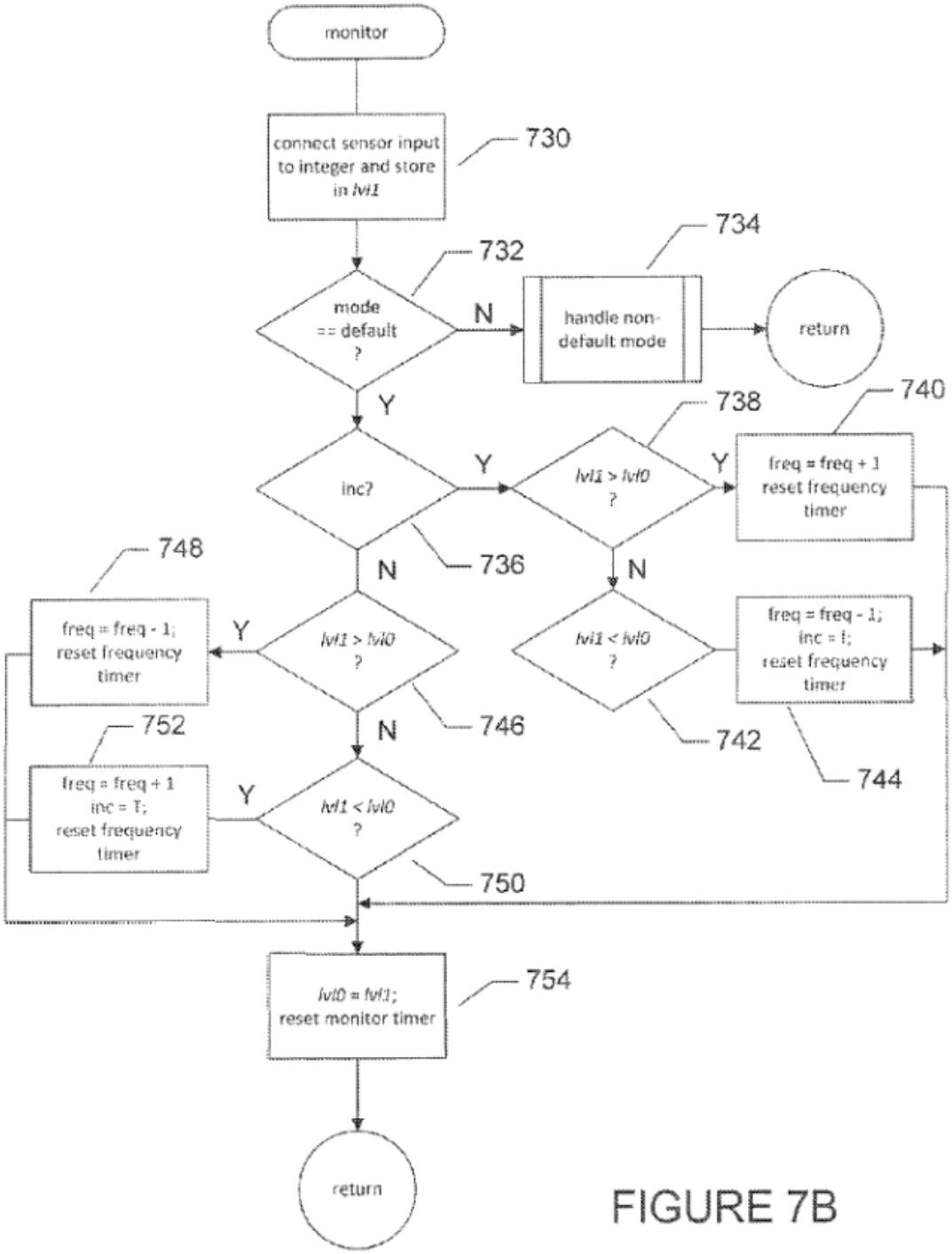

monitor
connect sensor input to integer and store in lvl1
730
mode == default ?
732
N
handle non-default mode
734
return
Y
inc?
736
Y
lvl1 > lvl0 ?
738
Y
freq = freq + 1 reset frequency timer
740
N
N
lvl1 > lvl0 ?
Y
freq = freq - 1; reset frequency timer
748
lvl1 < lvl0 ?
freq = freq - 1; inc = 1; reset frequency timer
742
744
N
746
lvl1 < lvl0 ?
Y
freq = freq + 1 inc = 1; reset frequency timer
752
750
lvl0 = lvl1; reset monitor timer
754
return

FIGURE 7B

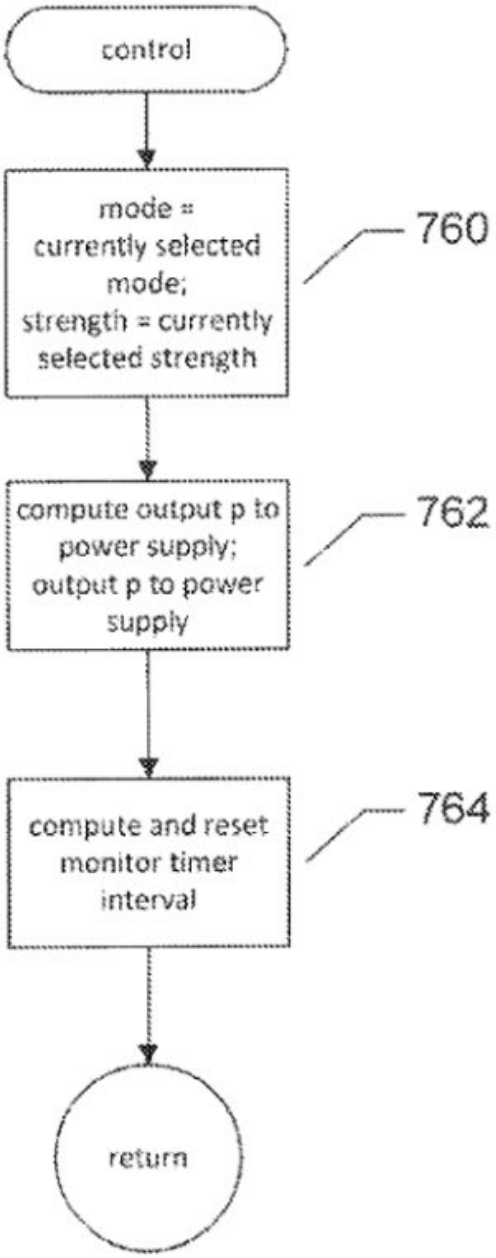

control
mode = currently selected mode; strength = currently selected strength
760
compute output p to power supply; output p to power supply
762
compute and reset monitor timer interval
764
return

FIGURE 7C

Apple likewise points out that the specification supports these figures represent the "only the particular algorithm required to perform the claimed function [that is] faithful to the specification's own description," *Universal Elecs., Inc. v. Roku, Inc.*, No. 2021-1992, 2023 WL 5316526, at *8 (Fed. Cir. Aug. 18, 2023), "'FIGS. 7A-C provide control-flow diagrams that illustrate the control program, executed by the CPU, that controls operation' of the vibration module." ECF No. 75 at 23 (citing '337 patent, 6:43–45 (the description of Figs. 7A–C appears at 6:43–8:30) & ECF No. 75-6 at 40–44).

Apple further argues that these figures describe both "default" and "non-default" modes of operation. ECF No. 75 at 23. As to this latter mode, Apple argues that that algorithm for non-default modes is also discussed in the algorithms shown in Figures 7A, 7B, and 7C. *Id.* Specifically, Figure 7B contains a step for handling a non-default mode, the only disclosed examples of which are "more complex operational modes" that are "handled by various more complex routines" that Apple understands to be additional algorithms, '337 Patent, 7:43–45, described in the specifications, '337 Patent, 13:28–59. Apple acknowledges that these more complex routines are not further described in the control-flow diagrams, *see* '337 patent, 7:45–50, but are instead described in the specification. *See id.* at 13:10–41. Accordingly, the corresponding algorithm must include both default and non-default modes found in the control-flow diagrams in Figures 7A, 7B, and 7C and recited in the specification.

Resonant proposes a set of steps it argues are derived from the intrinsic evidence and can be understood and applied by the jury. ECF No. 79. Resonant's proposed algorithm follows:

> (a) set the mode and strength to values representing selections made by user input to the user input features; (b) provide a corresponding output to the power supply so that the power supply provides a corresponding output to the driving component; and (c) drive simultaneous oscillation of the moveable component at two or more frequencies.

ECF No. 79 at 15–16 (citing '337 Patent at 5:43–6:10, 6:43–8:30, 11:43–12:5; Figs. 5A–B, 6, 7A–7C, 13, 22A–23). Resonant urges that Apple's proposed algorithm includes extraneous steps, such as power-down and power-up steps, '337 Patent at 6:48–50, 7:24–28, and includes Figure 7B's full "monitor" routine and its corresponding specification text even though Apple links the non-default mode to the claimed complex vibration modes. *Id.* Running the numbers, Resonant argues that Apple's proposal seeks to require mapping everything in Figures 7A, 7B, and 7C and 1,471 words contained in 6:43–8:30 and 13:3–41 of the specification. *Id.* at 16. Resonant takes issue with the scope of Apple's proposed construction in two parts. In the first, Resonant argues that Apple's proposed algorithm includes steps that are unnecessary to perform the claimed, agreed-upon function. *See id.*;[6] ECF No. 84 at 8 (citing *Univ. of Pitt. of Commonwealth Sys. of Higher Educ. v. Varian Med. Sys., Inc.*, 561 F. App'x 934, 941 (Fed. Cir. 2014) ("The district court properly located the disclosure of an algorithm that covered what was necessary to perform the claimed function . . . and nothing more . . . . The algorithm need only include what is necessary to perform the claimed function."); and *Northrop Grumman Corp. v. Intel Corp.*, 325 F.3d 1346, 1352 (Fed. Cir. 2003) ("A court may not import into the claim features that are unnecessary to perform the claimed function. Features that do not perform the recited function do not constitute corresponding structure and thus do not serve as claim limitations."); and *Micro Chem., Inc. v. Great Plains Chem. Co.*, 194 F.3d 1250, 1258 (Fed. Cir. 1999) (Section 112, ¶ 6 does not "permit incorporation of structure from the written description beyond that necessary to perform the claimed function"). In the second, Resonant believes that portions of the specification language proposed by Apple strays beyond reciting steps of an algorithm and into needless description. ECF No. 79 at 17.

[6] Resonant cites no supporting caselaw for this argument until its sur-reply. ECF No. 84 at 8.

The Court agrees with Apple's proposed algorithm with some limitation and does not adopt unnecessary specification language. The specification explains that the entire algorithm shown in Figures 7A, 7B, and 7C "is the control program, executed by the CPU, that controls operation of [a linear-resonant vibration module.]" '737 Patent, 6:43–45. 2. *See Ergo Licensing, LLC v. CareFusion 303, Inc.*, 673 F.3d 1361, 1365 (Fed. Cir. 2012) ("The algorithm may be described in "any understandable terms," such as "a mathematical formula, in prose, or as in a flow chart, or in any other manner that provides sufficient structure."). These figures, and the corresponding text, describe power-down and power-up steps, s*ee* '337 patent, col. 6:49–50 (describing Figure 7A), 7:24–28 (describing Figure 7A), as well as a monitor routine, *see* '337 patent, col. 7:42–8:19 (describing Figure 7B and 7C). Apple seeks to also include specification illustrating how different vibrational behaviors can be achieved in '337 patent, col. 13:3–41. This language goes beyond the claimed function of the term and are unnecessary. *See Nokia Sols. & Networks US LLC v. Huawei Techs. Co.*, No. 2:16-CV-0756-JRG-RSP, 2017 WL 2267315, at *8 (E.D. Tex. May 24, 2017). Finally, at the hearing the Court further limited the algorithm described in Figure 7A to Steps 706 through 716 with references to the steps shown in Figures 7B and 7C. This further limits algorithm described in the corresponding text to 7:10–7:24, 7:32– 8:30 and the equivalents thereof.

The Court therefore construes the algorithm component of corresponding structure as: **the algorithm shown in Steps 706 through 716 in Figure 7A, with reference to the steps shown in Figures 7B and 7C, or the algorithm described in the corresponding text, See, e.g. 7:10–7:24, 7:32– 8:30 and/or equivalents thereof.**

Having mapped a control algorithm, the Court turns to whether a switch is likewise corresponding.

c. Switches

Seeing no disclosure where the "control component . . ." term sends a signal received from the power supply to the driving component directly, Apple argues that a "switch" is a necessary corresponding structure. Indeed, Figures 5A-B illustrate an H-bridge switch that can be used in various embodiments to change the direction of current applied to the coil that drives linear oscillation within a linear-response vibration module. *See* '337 Patent 3:35–39; 5:43–65 (reciting operation). An H-bridge can also be used where the microprocessor/controller/CPU is replaced with a simple oscillator circuit to send signals to a control current. *Id.* at 11:34–49. After taking issue with whether Apple proposes a singular "switch" to describe an H-bridge (which itself contains four switches, *see* Figs. 5A-B, and that Apple's proposed specification language includes extraneous material that further limits "control component . . ." (such as "electromechanical buttons"), Resonant argues that the term can perform this function without a switch, such as by "using computer logic to determine appropriate control signals." ECF No. 79 at 18. And whether a switch is or can be used elsewhere in the system is immaterial. *Id.* Resonant finally argues that the specification recites only that an H-bridge *can* be used but is not required. ECF No. 84 at 12. Apple's expert intuits this possibility but sees no disclosure "of a signal being sent directly from (for example) a processor to a power supply to control the supply of power from the power supply to the driving component (coil), without a switch." ECF No. 75-6 at 52; *See also* ECF No. 75 at 28 (citing *Biomedino, LLC v. Waters Techs. Corp.,* 490 F.3d 946, 953 (Fed. Cir. 2007) (the proper "inquiry is whether one of skill in the art would understand the specification itself to disclose a structure, not simply whether that person would be capable of implementing a structure").

The Court notes that of the many embodiments require the H-bridge switch shown in Figures 5A–B and described in '337 Patent 5:43–65, 11:34–49. But the specification also states that these H-bridge switches *can* be used, '337 patent 3:35–39, and can be swapped with different

current-switching devices, *id.* at 14:60–64. Indeed, Apple's expert understands that a signal can be sent directly from a processor to a power supply to control the supply of power from the power supply to the driving component without a switch, he just does not see disclosure of such an alternative identified in the specification. ECF No 75-6 at 52. This accords with Resonant's expert's statement that a switch/H-bridge can be used but is not required. ECF No. 84 at 12. In the end, the structure must be clearly linked to the recited function, *see Medtronic, Inc.*, 248 F.3d at 1311, and must actually perform the recited function, not merely enable it. *Honeywell Int'l, Inc. v. Acer Am. Corp.*, No. CIV A 6:07CV125, 2009 WL 68896, at *13 (E.D. Tex. Jan. 7, 2009), *dismissed sub nom. Honeywell Int'l Inc. v. Chunghwa Picture Tubes, Ltd.*, 370 F. App'x 80 (Fed. Cir. 2009) (citing *Northrop Grumman Corp. v. Intel Corp.,* 325 F.3d 1346, 1352 (Fed.Cir.2003). So contrary to Apple's arguments, the switches it proposes cannot be clearly linked to the functions of the "control component . . ." term in claim 2.

ii. Court's construction

For the reasons above, the Court adopts the parties' understanding that claim 2 of the '337 patent is subject to means-plus-function treatment, adopts the parties agreed function, and construes the corresponding structure as follows: **a microcontroller, a processor, a microprocessor, or a CPU that performs the algorithm shown in Steps 706 through 716 in Figure 7A, with reference to the steps shown in Figures 7B and 7C, or the algorithm described in the corresponding text, See, e.g. 7:10–7:24, 7:32–8:30 and/or equivalents thereof.**

D. '830 Patent, Claims 1 & 19

Disputed Term	Resonant's Proposal	Apple's Proposal

"a control component that controls supply of power from the power supply to the driving component to cause the moveable component to oscillate at a frequency and an amplitude specified by one or more stored values"	**No Dispute:** Subject to 35 U.S.C. § 112(f) **Agreed Function**: controlling supply of power from the power supply to the driving component to cause the movable component to oscillate at a frequency and an amplitude specified by one or more stored values	
	Structure: oscillator circuit; (except as to claim 20); microcontroller with internal or external memory; processor; CPU; microprocessor; and equivalents thereof Where the corresponding structure is a processor, CPU, or microprocessor, the processor / CPU / microprocessor is programmed with an algorithm comprising the following steps: (a) set the mode and strength to default values or values representing selections made by user input to the user input features; and (b) provide a corresponding output to the power supply so that the power supply provides a corresponding output to the driving component. *See, e.g.*, '830 patent at 5:50-6:18, 6:52-8:40, 11:57-12:19; Figs. 5A-6, 7A-7C	**Structure:** the switches shown in Figures 5A–6 and described at 5:52–6:5, 6:9–16 and the processor/microprocessor/microcontroller/CPU that performs the algorithm shown in Figures 7A–C and described at 6:52–8:40; and equivalents thereof

Shortly before the start of the May 31, 2024 hearing, the Court provided the parties with the following construction for this term: **Subject to 35 U.S.C. § 112, ¶ 6**

<u>Function</u>: controlling supply of power from the power supply to the driving component to cause the moveable component to oscillate at a frequency and an amplitude specified by specified by one or more stored values

<u>Structure</u>: a microcontroller, a processor, a microprocessor, or a CPU that performs the algorithm shown in Figures 7A–C, <u>or</u> the algorithm described in the corresponding text, *See, e.g.,* 6:52–8:40, and equivalents thereof.

i. The parties' positions and Court's analysis

Resonant and Apple repeat all but one argument made for the '737 Patent, Claim 1 here for the '830 Patent, Claims 1 and 19—the parties agree that the specifications do not link to the complex vibration mode functionality discussed above.

As to the new argument, Resonant argues that an "oscillator circuit" should be included as an alternative corresponding structure. ECF No 79 at 22. Apple argues that the "oscillator circuit" is not described as using stored values and therefore is incapable of being linked to the claimed function of "controlling supply of power . . . specified by one or more stored values." Apple's expert reports that "stored values" are stored in memory to be used by a processor or similar structure. ECF No. 75-6 at 53. Boiled down, Apple argues that the "oscillator circuit" described in the specification is analog, incapable of retrieving stored values from memory. Resonant responds that the "oscillator circuit" should be included as an alternative corresponding structure because it is sufficient for performing the claimed function in lower-cost linear-vibration modules, replacing the processor or microcontroller. ECF No. 79 at 22 (citing '830 Patent, 11:57–12:19). And as such a replacement, the "oscillator circuit" "'lack[s] the extremely broad range of vibration patterns and modes available to processor or microprocessor-controlled vibration modules' but still provides much greater amplitude variability than a fixed-amplitude vibration module." *Id.* at 23 (citing '830

Patent, 11:67–12:5). In further support, Resonant points to the unasserted dependent Claim 2, "wherein the control component is one of: a[] variable oscillator circuit . . . and a control program. '830 Patent, Claim 2. Resonant also argues that the "oscillator circuit" does not require an algorithm to perform the claimed function because it does not qualify as a general-purpose computer. *Id*. Finally, Resonant argues that the disclosed "oscillator circuit" does not provide corresponding structure in claims reciting complex vibration modes, such as '830 Patent, Claim 20, or '337 Patent, Claim 2, but that '803 Patent, Claims 1 and 19 do not require such a limitation, meaning the disclosed "oscillator circuit" would be sufficient to perform the claimed function for these claims.

Looking first at the words of the claims themselves, both asserted and nonasserted, the Court finds that "oscillator circuit" is not an alternative corresponding structure for Claims 1 and 19. *See Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)("First, we look to the words of the claims themselves, *both asserted and nonasserted*, to define the scope of the patented invention."). As explained, "the presence of a dependent claim that adds particular limitation gives rise to a presumption that the limitation in question is not present in the independent claim." *Phillips*, 415 F.3d at 1314–15 (*en banc*). Resonant asks the Court read in an alternative corresponding structure into Claims 1 and 19 when dependent Claim 2 provides an "oscillator circuit" as alternative structure to the "control component . . ." term in that claim. *SRI Int'l v. Matsushita Elec. Corp. of Am.*, 775 F.2d 1107, 1122 (Fed. Cir. 1985)) ("It is settled law that when a patent claim does not contain a certain limitation and another claim does, that limitation cannot be read into the former claim in determining either validity or infringement.").

At the hearing, the Court made the same modifications to the algorithm, limiting it to the algorithm described in Figure 7A to Steps 706 through 716 with references to the steps shown in

Figures 7B and 7C. The Court also limited the algorithm to not include Step 734, which is the non-default mode and unrequired for the claim to function. These modifications limit the algorithm described in the corresponding text to the algorithm described in the corresponding text, See, e.g., 7:20–7:34, 7:42– 7:52, 7:60–8:40, and equivalents thereof.

ii. Court's construction

For the reasons above, the Court adopts the parties' understanding that claim 1 and 19 of the '830 patent is subject to means-plus-function treatment, adopts the parties agreed function, and construes the corresponding structure as follows: **a microcontroller, a processor, a microprocessor, or a CPU that performs the algorithm shown in Steps 706 through 716 in Figure 7A, with reference to all steps shown in Figure 7B other than Step 734 and all steps shown in Figure 7C, or the algorithm described in the corresponding text, See, e.g., 7:20–7:34, 7:42– 7:52, 7:60–8:40, and equivalents thereof.**

E. '830 Patent, Claim 20

Disputed Term	Resonant's Proposal	Apple's Proposal
"a control component that controls supply of power from the power supply to the driving component to cause the moveable component to oscillate at a frequency and an amplitude specified by one or more stored values, wherein the control component drives simultaneous oscillation of the moveable component at two or more frequencies to generate complex vibration modes."	**No Dispute:** Subject to 35 U.S.C. § 112(f)	
	Function: controlling supply of power from the power supply to the driving component to cause the movable component to oscillate at a frequency and an amplitude specified by one or more stored values	**Function**: controlling supply of power from the power supply to the driving component to cause the moveable component to oscillate at a frequency and an amplitude specified by one or more stored values; and driving simultaneous oscillation of the moveable component at two or more frequencies to generate complex vibration modes

	Structure: microcontroller with internal or external memory; processor; CPU; microprocessor; and equivalents thereof Where the corresponding structure is a processor, CPU, or microprocessor, the processor / CPU / microprocessor is programmed with an algorithm comprising the following steps: (a) set the mode and strength to default values or values representing selections made by user input to the user input features; and (b) provide a corresponding output to the power supply so that the power supply provides a corresponding output to the driving component. For claim 20, the algorithm comprises the following additional step: (c) drive simultaneous oscillation of the moveable component at two or more frequencies. *See, e.g.*, '830 patent at 5:50-6:18, 6:52-8:40, 11:57-12:19; Figs. 5A-6, 7A-7C	**Structure:** the switches shown in Figures 5A–6 and described at 5:52–6:5, 6:9–16 and the processor/microprocessor/microcontroller/CPU that performs the algorithm shown in Figures 7A–C and described at 6:52–8:40 and 13:20–59; and equivalents thereof

Shortly before the start of the May 31, 2024 hearing, the Court provided the parties with the following construction for this term: **Subject to 35 U.S.C. § 112, ¶ 6**

<u>Function:</u> controlling supply of power from the power supply to the driving component to cause the moveable component to oscillate at a frequency and an amplitude specified by one or more stored values; and driving simultaneous oscillation of the moveable component at two or more frequencies to generate complex vibration modes.

<u>Structure</u>: a microcontroller, a processor, a microprocessor, or a CPU that performs the algorithm shown in Figures 7A–C, <u>or</u> the algorithm described in the corresponding text, *See, e.g.,* 6:52–8:40, and equivalents thereof.

i. Court's construction.

Resonant and Apple repeat their arguments made for the '337 Patent, Claim 2 here for '830 Patent's Claim 20, including the complex vibration mode functionality discussed in that section. For the reasons above, the Court adopts the parties' understanding that claim 20 of the '830 patent is subject to means-plus-function treatment, adopts the parties agreed function,[7] and construes the corresponding structure as follows: **a microcontroller, a processor, a microprocessor, or a CPU that performs the algorithm shown in Steps 706 through 716 in Figure 7A, with reference to the steps shown in Figures 7B and 7C, or the algorithm described in the corresponding text, See, e.g. 7:20–7:34, 7:42– 8:40 and/or equivalents thereof.**

F. '882 Patent, Claim 1

<table>
<tr><th>Disputed Term</th><th>Resonant's Proposal</th><th>Apple's Proposal</th></tr>
<tr><td rowspan="2">a control component that

receives control signals input to the oscillating resonant module, receives outputs from the one or more sensors, and

controls oscillation of the mass to produce a vibration response according to the received control signals by generating, using one or more of the received sensor outputs, control outputs to an actuator that drives the mass to oscillate.</td><td colspan="2">No Dispute: Subject to 35 U.S.C. § 112(f)

Agreed Function:
receiving control signals input to the oscillating resonant module; receiving outputs from the one or more sensors; controlling oscillation of the mass to produce a vibration response according to the received control signals by generating, using one or more of the received sensor outputs, control outputs to an actuator that drives the mass to oscillate.</td></tr>
<tr><td>Structure:
oscillator circuit; microcontroller with internal or external memory; processor; CPU;</td><td>Structure:
the processor/logic circuitry that performs the algorithm shown in Fig. 45 and</td></tr>
</table>

[7] While Resonant proposed a differing function, it failed to produce an argument in support. The Court takes Apple's proposed function as unopposed.

	microprocessor; and equivalents thereof Where the corresponding structure is a processor, CPU, or microprocessor, the processor / CPU / microprocessor is programmed with an algorithm comprising the following steps: (a) receive a target frequency; (b) receive sensor outputs indicating (1) position of the mass, or (2) position and velocity of the mass; and (c) generate control outputs based on the target frequency and the current position and velocity of the mass *See, e.g.*, '882 patent at 31:19-32:23, Fig. 45	described at 31:19–32:13; and equivalents thereof

Shortly before the start of the May 31, 2024 hearing, the Court provided the parties with the following construction for this term: **Subject to 35 U.S.C. § 112, ¶ 6.**

<u>Function:</u> receiving control signals input to the oscillating resonant module; receiving outputs from the one or more sensors; controlling oscillation of the mass to produce a vibration response according to the received control signals by generating, using one or more of the received sensor outputs, control outputs to an actuator that drives the mass to oscillate.

<u>Structure</u>: a microcontroller, a processor, a microprocessor, or a CPU that performs the algorithm shown in Figure 45 or the algorithm described in the corresponding text, *See, e.g.,* 31:19–32:13, and equivalents thereof.

i. The parties' positions and analysis

The parties echo many of their same arguments here as posed in the above sections on corresponding structures in the '337 and '830 patents. Apple argues that the specification links the

agreed function with the algorithm depicted in Figure 45 and described in '882 Patent, 31:19–56. ECF No. 75 at 24. Resonant argues that Apple's proposed algorithm includes unnecessary steps and proposes a three-step algorithm from the intrinsic evidence and understandable by the jury. ECF No. 24. Apple argues that Resonant's proposed algorithm omits steps initiating oscillation and initiating sensor input omits a "while loop" described in steps 4518–21 that "continuously receives position and velocity data from the sensor and executes immediate control based on that position and velocity." ECF No. 85 at 13 (citing '882 Patent, 31:34–38). Apple also argues that Resonant's algorithm allows for either monitoring position or monitoring position alone, while the specification discloses only an algorithm that monitors both position and velocity. *Id.* (citing '882 patent, 31:37–38). Finally, Resonant argues that an algorithm is unnecessary if the corresponding structure is a microcontroller. ECF No. 79 at 25.

For the same reasons in the above '337, '830 patents, the Court adopts the parties' understanding that claim 1 of the '882 patent is subject to means-plus-function treatment, adopts the parties agreed function, and construes the corresponding structure as follows: **the algorithm shown in Figure 45 or the algorithm described in the corresponding text, *See, e.g.* 31:19–32:13, and equivalents thereof.**

A. '882 Patent, Claim 10

Disputed Term	Resonant's Proposal	Apple's Proposal

<table>
<tr><td rowspan="2">a control component that
receives control signals input to the oscillating resonant module by the controller,
receives outputs from the one or more sensors, and
controls oscillation of the mass to produce a vibration response according to the received control signals by generating, using one or more of the received sensor outputs, control outputs to an actuator that drives the mass to oscillate.</td><td colspan="2">No Dispute: Subject to 35 U.S.C. § 112(f)

Agreed Function:
receiving control signals input to the oscillating resonant module; receiving outputs from the one or more sensors; controlling oscillation of the mass to produce a vibration response according to the received control signals by generating, using one or more of the received sensor outputs, control outputs to an actuator that drives the mass to oscillate.</td></tr>
<tr><td>Structure:
oscillator circuit; microcontroller with internal or external memory; processor; CPU; microprocessor; and equivalents thereof
Where the corresponding structure is a processor, CPU, or microprocessor, the processor / CPU / microprocessor is programmed with an algorithm comprising the following steps: (a) receive a target frequency; (b) receive sensor outputs indicating (1) position of the mass, or (2) position and velocity of the mass; and (c) generate control outputs based on the target frequency and the current position and velocity of the mass

See, e.g., ’882 patent at 31:19-32:23, Fig. 45</td><td>Structure:
the processor/logic circuitry that performs the algorithm shown in Fig. 45 and described at 31:19–32:13; and equivalents thereof</td></tr>
</table>

Shortly before the start of the May 31, 2024 hearing, the Court provided the parties with the following construction for this term: **Subject to 35 U.S.C. § 112, ¶ 6.**

<u>Function:</u> receiving control signals input to the oscillating resonant module; receiving outputs from the one or more sensors; controlling oscillation of the mass to produce a vibration response according to the received control signals by generating, using one or more of the received sensor outputs, control outputs to an actuator that drives the mass to oscillate.

<u>Structure</u>: a microcontroller, a processor, a microprocessor, or a CPU that performs the algorithm shown in Figure 45 or the algorithm described in the corresponding text, *See, e.g.,* 31:19–32:13, and equivalents thereof.

i. The parties' positions and analysis

The parties bound up their arguments and proposed constructions of '882 patent's claim 10 patent with their arguments and proposed construction of '882 patent's claim 1. So, for the same reasons stated in the above section, the Court adopts the parties' understanding that claim 10 of the '882 patent is subject to means-plus-function treatment, adopts the parties agreed function, and construes the corresponding structure as follows: **the algorithm shown in Figure 45 or the algorithm described in the corresponding text, *See, e.g.* 31:19–32:13, and equivalents thereof.**

III. Indefiniteness

A. "The one or more sensors" in '767 Patent, Claim 1 and '830 Patent, Claim 4

Disputed Term	Resonant's Proposal	Apple's Proposal
"the one or more sensors"	No construction necessary; plain and ordinary meaning Alternatively, to the extent a construction is deemed necessary, "the sensors"	Indefinite

Shortly before the start of the May 31, 2024 hearing, the Court provided the parties with the following construction for this term: **Plain and ordinary meaning.**

i. '767 patent, claim 1 – "the one or more sensors"

Apple argues that '767 patent's claim 1 recites an indefinite term by stating the "one or more sensors" after first reciting "sensors" only in its plural form. ECF No. 75 at 34. Apple understands that "the one or more sensors" term indicates the possibility of a solitary sensor but sees no antecedent basis for a *singular* sensor. Resonant argues that a POSITA would understand

this claim with reasonable certainty; Claim 1's recitation of "the one or more sensors" refers to the same "sensors" recited earlier in the claim and "one or more" reflects that adjustment may only be needed to address one of the sensors at a given time, rather than all of them. ECF No. 79 at 32. Resonant's expert opines that, "[a]s is commonly the case in feedback systems involving multiple sensors, one sensor may already be providing a desired output while another sensor may not be, in which case less than all of the operational control outputs may need to be adjusted in order to obtain desired outputs from the sensor that was not previously producing desired outputs." *Id.* (citing 79-1 at 37). Resonant supports its position by pointing out that the claim language reflects that the linear resonant vibration module "produces desired outputs from the one or more sensors corresponding to one or more operational control parameters." *Id.* (citing '767 patent, cl. 1).

The Court agrees with Resonant. A claim is indefinite only "if its claims, read in light of the patent's specification and prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention." *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 901 (2014). Even if "one or more" did not refer to the earlier "sensors" functioning within a feedback system, "[w]hen the meaning of the claim would reasonably be understood by persons of ordinary skill when read in light of the specification, the claim is not subject to invalidity upon departure from the protocol of "antecedent basis." *Energizer Holdings, Inc. v. Int'l Trade Comm'n*, 435 F.3d 1366 (Fed. Cir. 2006). The Court construes "the one or more sensors" by its **plain and ordinary meaning.**

ii. '830 patent, claim 4 – "the one or more sensors"

For whatever reason, Apple fails to pose an argument as to "the one or more sensors" in '830 patent's claim 4 in its opening brief. Perhaps this is scrivener's error. Though Apple does not explain its error, Apple's reply shows that it intended to make the same arguments as to claim 4 of

the ’830 patent as it did for claim 1 of the ’767. ECF No. 82 at 18.[8] So for the reasons stated in the section above, the Court construes “the one or more sensors” by its **plain and ordinary meaning.**

B. “Desired outputs” in ’767 Patent, Claim 1 and ’830 Patent, Claim 4

Disputed Term	Resonant’s Proposal	Apple’s Proposal
“desired outputs”	No construction necessary; plain and ordinary meaning	Indefinite

Shortly before the start of the May 31, 2024 hearing, the Court provided the parties with the following construction for this term: **Plain and ordinary meaning.**

i. Court’s analysis and construction

Apple argues that “desired outputs” term as recited in claim 1 of the ’767 patent and as recited in claim 4 of the ’830 patent lack objective boundaries, rendering each claim indefinite. ECF No. 75 at 35 (citing *Intell. Ventures I LLC v. T-Mobile USA, Inc.*, 902 F.3d 1372, 1381 (Fed. Cir. 2018) (explaining “a term of degree that is purely subjective and depends on the unpredictable vagaries of any one person’s opinion is indefinite”). Apple argues that the specification does not provide guidance on the scope of “desired output”—“there is no standard by which to ascertain whether an output is desirable, no description as to who or what desires it, no range of desirable output values, or any method of calculating a desired output, etc.” *Id.* Apple echoed these arguments at the hearing. ECF No. 97 23–27. Resonant argues that “desired outputs” is not a subjective term because the claim language recites that the desired outputs “correspond[] to one or more operational control parameters.” ECF No. 79 at 33 (citing ’767 patent at cl. 1; ’830 patent at cl. 4). Resonant also argues that the specifications further explain how “such parameters can be

[8] Resonant argues in a footnote to its sur-reply that Apple should not be permitted on Reply to extend its ’767 claim 1 argument to ’830 claim 4. Because the Court has already construed the former claim under its plain and ordinary meaning, the Court sees no reason to depart from that construction.

varied 'to produce desired vibrational amplitudes and frequencies over a wide region of amplitude/frequency space,' listing numerous examples of such variable parameters." *Id.* (citing '767 patent, 10:9–45, 8:17–24, 4:6–15; and '830 patent at 14:59–15:37, 8:54–62, 4:33–45). Resonant's expert reports that "[t]he term "desired outputs" simply refers to the outputs intended to result from the operational control parameters" ECF No. 79-1 at 39. Apple replies that each portion cited to by Resonant refers to vibrations of desired amplitude and frequency but do not disclose a desired *output* from a sensor. ECF No. 82 at 19. Resonant sur-replies that Apple feigns ignorance: (1) the purpose of the claimed sensors is to feed output signals back to the control component, (2) the claimed inventions produce vibrations of desired amplitude and frequency using this sensor feedback, and (3) the specification describe these relationships. ECF No. 84 at 17.

The "desired outputs" here have a clear objective meaning. As a preliminary point, "desired" does not necessarily render a claim indefinite. *Adaptix, Inc. v. Huawei Techs. Co.*, 74 F. Supp. 3d 832, 845 (E.D. Tex. 2014) (citing *Ormco Corp. v. Align Tech., Inc.,* 498 F.3d 1307, 1316–17 (Fed.Cir.2007)); *see also RevoLaze LLC v. J.C. Penney Co., Inc.*, No. 2:19-CV-00043-JRG, 2020 WL 697891, at *8 (E.D. Tex. Feb. 11, 2020). "While a claim employing a term of degree may be definite where it provides enough certainty to one of skill in the art when read in the context of the invention, a term of degree that is purely subjective and depends on the unpredictable vagaries of any one person's opinion is indefinite." *Intell. Ventures I LLC v. T-Mobile USA, Inc.,* 902 F.3d 1372, 1381 (Fed. Cir. 2018) (cleaned up). Apple's expert offers only conclusory opinions, stating that what is "desired" depends on who is looking, and that the specification provides no guidance as to how to determine whether the output is desired. ECF No.

75-6 at 55. Instead, looking first at the claim language, "desired outputs" correspond directly to one or more operational control parameters:

> the control component receiving output signals from sensors within the linear resonant vibration module during operation of the linear resonant vibration module and adjusting one or more operational control outputs of the control component according to the received output signals from the sensors in order that subsequent operation of linear resonant vibration module *produces desired outputs from the one or more sensors corresponding to one or more operational control parameters.*

A "desired output[]" is therefore one that is bound up and resulting from one or more operational control parameters. Notably, Apple does not challenge the definiteness of "operational control parameters." The Court therefore construes "desired outputs" by its **plain and ordinary meaning.**

C. "The mass" in '882 Patent, Claims 1, 3–6, 10

Disputed Term	Resonant's Proposal	Apple's Proposal
"the mass"	Plain and ordinary meaning, in which all recitations of "a mass" and "the mass" refer to the same mass	Indefinite

Shortly before the start of the May 31, 2024 hearing, the Court provided the parties with the following construction for this term: **Plain and ordinary meaning, where all recitations of "a mass" and "the mass" refer to the same mass.**

i. Court's analysis and construction

Apple argues that because claims 1 and 10 each recite "a mass" twice—and understanding these masses must be distinct from each other—a POSITA could not determine with reasonable certainty which of the two masses the "actuator that drives <u>the</u> mass" refers to. ECF No 75 at 33 (emphasis added). Apple likewise asks the Court to refrain from rewriting claims 1 and 10 so that they recite only one mass. *Id.* at 34. Finally, should claims 1 and 10 be indefinite, dependent claims 3–6 would likewise also fail definiteness. *Id.* at 33.

Resonant argues that Apple manufactures indefiniteness. ECF No. 79 at 31. Resonant argues that neither the specification nor the prosecution history suggest the claimed inventions require two masses. *Id.* Resonant also argues that the first "mass" describes the oscillation path while the second "mass" introduces the term as a structural limitation, *id.*:

> an oscillation path, which represents a segment of a space curve, along which a point within *a mass* moves;
> *a mass* that is driven by energy supplied to the oscillating resonant module to oscillate back and forth along the oscillation path that represents a segment of a space curve.

'882 patent, claims 1 and 10.

Use of "the" indicates antecedent basis where use of "a" "generally introduces a term with no antecedent." *Mobile Telecommunications Techs., LLC v. Leap Wireless Int'l, Inc.*, No. 2:13-CV-885-JRG-RSP, 2015 WL 2250056, at *9 (E.D. Tex. May 13, 2015). Where a term introduced by a definite article follows multiple instances of the antecedent term introduced by an indefinite article, the claim limitation lacks antecedent basis because "it would be unclear as to what element the limitation was making reference." *Baldwin Graphic Sys., Inc. v. Siebert, Inc.*, 512 F.3d 1338 (Fed. Cir. 2008). The Court sees no *Baldwin* problem here. Despite claims 1 and 10 reciting "a mass" twice, a plain reading shows that each "a mass" term refers to the same mass. The first refers to "a mass" which moves along an oscillation path but does not introduce "a mass" as a structural limitation. The second introduces "a mass" as a structural element, which oscillates back and forth along the oscillation path.

For the reasons above, the Court adopts construes "the mass" as recited in '882 patent, claims 1, 3–6, and 10 as follows: **plain and ordinary meaning, where all recitations of "a mass" and "the mass" refer to the same mass.**

IV. Resonant's proposed constructions (and remaining indefiniteness arguments)

Disputed Term	Resonant's Proposal	Apple's Proposal

'830 patent, claim 4 "claim 1"	"claim 3"; not indefinite	Plain and ordinary meaning
'882 patent, claim 17 "claim 1"	"claim 10"	Plain and ordinary meaning

Shortly before the start of the May 31, 2024 hearing, the Court provided the parties with the following construction for these terms: **"claim 1" in the '830 patent, claim 4 refers to "claim 3", and "claim 1" in the '882 patent, claim 17 refers to "claim 10."**

A. The '830 patent, claim 4 – "claim 1"

Resonant asks the Court to rewrite claim 4 of the '830 patent to depend not from claim 1 but from claim 3 to correct a typographical error in claim 4's preamble. ECF No. 79 at 26. Apple argues there is reasonable debate about the intended claim scope when given its plain meaning, impermissibly requiring the court to "guess as to what was intended." ECF No. 82 at 17 (citing *Novo Industries, L.P. v. Micro Molds Corp.*, 350 F.3d 1348, 1357–58 (Fed. Cir. 2003). Resonant disagrees, stating that Apple's reasoning—that it is "equally plausible" that the patentee mistyped a single numeral as it is that the patentee mistakenly introduced four new phrases in claim four, each preceded by the definite article "the," *see* ECF No. 75 at 29—fails credibility. ECF No 79 at 27. Neither party finds the prosecution history suggestive of a different interpretation. *See* ECF No. 79 at 27; ECF No. 75 at 35–36. Apple argues in the alternative that the specification does not limit the location of "sensors" to those "within the vibration module," and proposes a correction that does not place such a limit. ECF No. 75 at 36. Resonant points out that, should the Court adopt its change, Apple's indefiniteness argument fails as to following terms recited in claim 4: "the one or more operational control outputs," "the received output signals," "the sensors" and "the one or more sensors". ECF No. 79 at 27.

Courts may not rewrite claims to preserve validity. *Becton Dickinson & Co. v. C.R. Bard, Inc.*, 922 F.2d 792, 799 n.6 (Fed. Cir. 1990) ("Nothing in any precedent permits judicial redrafting

of claims"). But judicial correction is appropriate "only if (1) the correction is not subject to reasonable debate based on consideration of the claim language and the specification and (2) the prosecution history does not suggest a different interpretation of the claims." *Novo Indus., L.P. v. Micro Molds Corp.*, 350 F.3d 1348, 1354 (Fed. Cir. 2003). This Court agrees with Resonant that claim 4 refers to claim 3 by adding further limitations to the "adjusts" limitation of claim 3:

> 3. The vibration module of claim 1 wherein the *control component* receives output signals from sensors within the linear vibration module during operation of the vibration module and *adjusts one or more operational control outputs of the control component according to the received output signals from the sensors*.
>
> 4. The vibration module of claim 1 wherein the *control component adjusts the one or more operational control outputs of the control component according to the received output signals from the sensors* in order that subsequent operation of the vibration module produces desired outputs from the one or more sensors corresponding to one or more operational control parameters.

'830 patent at cls. 3, 4; see also id. at 6:33-51. Apple's suggestion that the issue is merely a scrivener's error—and to stop analysis there—indeed lacks credibility. It is clear from the surrounding claim language and the specification that claim 4 depends from claim 3. The Court therefore construes the Court provided the parties with the following construction for this term: **"claim 1" in the '830 patent, claim 4 to refer to "claim 3."**

B. The '882 patent, claim 17 – "claim 1"

Resonant likewise asks the Court to rewrite claim 17 of the '882 patent to depend not from claim 1 but from claim 10, this time to correct a one character typographical error. ECF No. 70 at 29. And like claim 4 in the '830 patent, such a correction would cause Apple's indefiniteness

arguments as to the terms "the physical device" in claim 17 the '882 patent and "the one or more oscillating resonant modules" in claims 17, 19, and 20. *Id.* Here, Resonant argues that during prosecution the applicant cancelled pending claims 17–20, provided new claims 21–24 which were issued to replace the pending 17–20 claims. *Id.* In the remarks that accompany this amendment, Resonant argues, the applicant "explicitly states that these new dependent claims were written to depend from independent claim 10." *Id.* (citing '882 FH at 6, 17, and 18). Apple ignores this prosecution history other than to suggest that Resonant's reliance on it is in error because "it is equally likely the file history contains a typo." ECF No. 82 at 17. In a similar line of reasoning, Apple also argues that "claim 1" can be replaced with "claim 11," "claim 12," "claim 13," "claim 14," "claim 15," or "claim 16." ECF No. 75 at 37. Each correction would "fix the alleged error and result in different combinations of features." *Id.* Apple likewise argues for the first time in its reply that "the controller" in claim 10 would lack proper antecedent because claims 10 and 17 each recite a controller. *Id.*

Here, Apple's assertion that it is "equally plausible" that the applicant intended to refer to claim 10 as to claims 12 through 16 ignores prosecution history. Therefore a POSITA Would understand from that history that the applicant intended to refer to claim 10, rather than claim 1. Judicial correction is warranted, given such a correction "must be made from the point of view of one skilled in the art." *Rembrandt Data Techs., LP v. AOL, LLC*, 641 F.3d 1331, 1339 (Fed. Cir. 2011). The Court therefore construes the Court provided the parties with the following construction for this term: **"claim 1" in the '882 patent, claim 17 refers to "claim 10."**

C. "The one or more operational control outputs," "the received output signals," and "the sensors" in '830 Patent, Claim 4

Disputed Term	Resonant's Proposal	Apple's Proposal

"the one or more operational control outputs"	No construction necessary; plain and ordinary meaning	Indefinite
"the received output signals"	No construction necessary; plain and ordinary meaning	Indefinite
"the sensors"	No construction necessary; plain and ordinary meaning	Indefinite

Shortly before the start of the May 31, 2024 hearing, the Court provided the parties with the following construction for these terms: **Plain and ordinary meaning.**

i. Court's analysis and construction

The parties agree that whether these terms are indefinite depend on the Court's construction of "claim 1" in claim 4 of this patent. ECF No. 75 at 33; ECF No. 79 at 27. Because this court found above that the term, "claim 1," in claim 4 of this patent refers to "claim 3," and the parties do not present an argument in the alternative, the Court construes these terms with their **plain and ordinary meaning.**

D. "The oscillating resonant module[s]" / "the one or more oscillating resonant module[s]" in '882 Patent, Claims 10, 17, 19, and 20, and "the physical device" in '882 Patent, Claim 17

Disputed Term	Resonant's Proposal	Apple's Proposal
"the oscillating resonant module[s]" / "the one or more oscillating resonant module[s]"	No construction necessary; plain and ordinary meaning	Indefinite
"the physical device"	No construction necessary; plain and ordinary meaning	Indefinite

Shortly before the start of the May 31, 2024 hearing, the Court provided the parties with the following construction for these term: **Plain and ordinary meaning**

The parties agree that whether these terms are indefinite depend on the Court's construction of the term **"claim 1" in the '882 patent—specifically, whether claim 17 refers to "claim 10."**

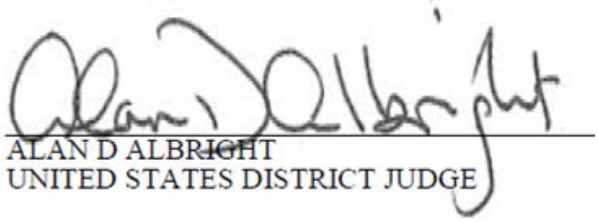
ECF No. 75 at 33; ECF No. 79 at 29. Because this Court found above that the term, "claim 1," in claim 17 of this patent refers to "claim 10," and the parties do not present an argument in the alternative, the Court construes these terms with their **plain and ordinary meaning.**

CONCLUSION

The Court adopts the constructions listed in the Claim Construction Order. ECF No. 91. Furthermore, the Parties should ensure that all testimony that relates to the terms addressed in this memorandum is constrained by the Court's reasoning. However, in the presence of the jury the Parties should not expressly or implicitly refer to each other's claim construction positions and should not expressly refer to any portion of this memorandum that is not an actual construction adopted by the Court. The references to the claim construction process should be limited to informing the jury of the constructions adopted by the Court.

It is so **ORDERED**.

SIGNED this 23rd day of August, 2024.



ALAN D ALBRIGHT
UNITED STATES DISTRICT JUDGE