Paper No. 27

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

RESONANT SYSTEMS, INC.,
Patent Owner.

Case No. IPR2024-00807
U.S. Patent No. 8,860,337

PATENT OWNER'S SUR-REPLY

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PATENT OWNER'S EXHIBIT LIST

Exhibit No	*Description*
2001	Defendant Apple Inc.'s Proposed Claim Constructions, (*Resonant Systems, Inc. v. Apple Inc.*, Case No. 23-cv-00077-ADA (W.D. Tex.))
2002	Court's Claim Construction Order (*Resonant Systems, Inc. v. Apple Inc.*, Case No. 23-cv-00077-ADA (W.D. Tex.), Dkt. 91)
2003	Defendant Apple Inc.'s Opening Claim Construction Brief (*Resonant Systems, Inc. v. Apple Inc.*, Case No. 23-cv-00077-ADA (W.D. Tex.), Dkt. 75)
2004	Order Modifying Scheduling Order (*Resonant Systems, Inc. v. Apple Inc.*, Case No. 23-cv-00077-ADA (W.D. Tex.), Dkt. 57)
2005	Federal Court Management Statistics, Western District of Texas, 2018-2023
2006	Excerpt of Plaintiff's Infringement Contentions (*Resonant Systems, Inc. v. Apple Inc.*, Case No. 23-cv-00077-ADA (W.D. Tex.))
2007	Excerpt of Defendant's Final Invalidity Contentions (*Resonant Systems, Inc. v. Apple Inc.*, Case No. 23-cv-00077-ADA (W.D. Tex.))
2008	Statutory Disclaimer of U.S. Patent No. 8,860,337 claims 1, 4, and 5
2009	Declaration of Keith W. Goossen, Ph.D.
2010	Curriculum Vitae of Keith W. Goossen, Ph.D.
2011	Transcript of Deposition of Blake Hannaford, Ph.D., Jan. 27, 2025
2012	Transcript of Deposition of Blake Hannaford, Ph.D., Jan. 28, 2025
2013	Transcript of Deposition of Blake Hannaford, Ph.D., Jan. 29, 2025
2014	Excerpt of CRC Handbook of Chemistry and Physics (52nd Ed. 1964)
2015	"Why do ferromagnetic materials channel magnetic field lines?," Physics Stack Exchange, *available at* https://physics.stackexchange.com/questions/129782/why-do-ferromagnetic-materials-channel-magnetic-field-lines

Exhibit No	*Description*
2016	"Quality Factor (Q)" in Smith, J.O., *Introduction to Digital Filters with Audio Applications*, *available at* http://ccrma.stanford.edu/~jos/filters/Partial_Fraction_Expansion.htm
2017	Texas Instruments Precision Designs: Verified Design SLAU508, "Analog Pulse Width Modulation," by John Caldwell
2018	Declaration of Paul A. Kroeger in Support of *Pro Hac Vice* Recognition on Behalf of Patent Owner Resonant Systems, Inc.
2019	Declaration of Christian W. Conkle in Support of *Pro Hac Vice* Recognition on Behalf of Patent Owner Resonant Systems, Inc.
2020	Transcript of Deposition of Blake Hannaford, Ph.D., June 23, 2025
2021	Transcript of Deposition of Blake Hannaford, Ph.D., June 24, 2025

I. INTRODUCTION

Apple successfully argued in district court for a means-plus-function construction of the term "control component" that requires an algorithm including numerous specific steps from Figures 7A–C of the '337 patent. In its Institution Decision, the Board adopted the district court's construction. The Petition failed to show that its prior art combinations—either those based upon Wakuda as a base reference, or those based upon Gregorio—satisfied each of the steps required by this construction, including but not limited to the "output d" of step 708 and the "output p" of step 762.

While the Reply changes the prior art mapping and cites to new teachings never mentioned in the Petition, it still fails to remedy this error. Again, it fails to show that the prior art combinations satisfy each of the required algorithm steps, including both steps 708 and 762. In particular, it fails to show that the "output d" and "output p" occur separately, on different iterations of the Figure 7A loop, as required by the algorithm of the Board's construction. Accordingly, all grounds of this IPR should be rejected and the validity of the challenged claims affirmed.

II. ARGUMENT

A. Grounds 1–2

As the Response explained, the means-plus-function construction of the "control component" term requires both a directional output d and a separate output p to the power supply. (Response at 19.) This is expressly required by the means-plus-function construction that Apple advanced in the Petition:

> This Petition treats "control component" in claims 1 and 4 as including one of the switches shown in Figures 5A-6 and described at 5:45-65, 6:2-8 and the processor (also referred to as microprocessor, microcontroller, or CPU) that performs the algorithm shown in Figures 7A-7C and described at 6:43-8:30, and equivalents of this structure.

(Petition at 4.) It is also expressly required by the similar construction adopted by the district court in the Apple Litigation and by the Board in its institution decision:

> **Structure:** 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.

(Paper 10 at 13.)

These constructions each require step 708 of Figure 7A, which sets "d = –d" and outputs d. ('337 patent, Fig. 7A.) These constructions also each require step 762 of Figure 7C, which is labeled "compute output p to power supply; output p to power supply." ('337 patent, Fig. 7C, 8:16–20 ("Next, in step **762**, the routine "control" computes an output value p corresponding to the currently selected strength, stored in the variable strength, and outputs the value p to the power supply so that the power supply outputs an appropriate current to the coil.") Importantly, the "output p" of step 762 is a part of Figure 7C, which in turn is called in step 716 of Figure 7A. ('337 patent at 8:10–11.) Accordingly, step 762 only occurs if the result of steps 706 and 710 are both "N" and the result of step 715 is "Y," while the "output d" of step 708 only occurs if the result of step 706 is "N":

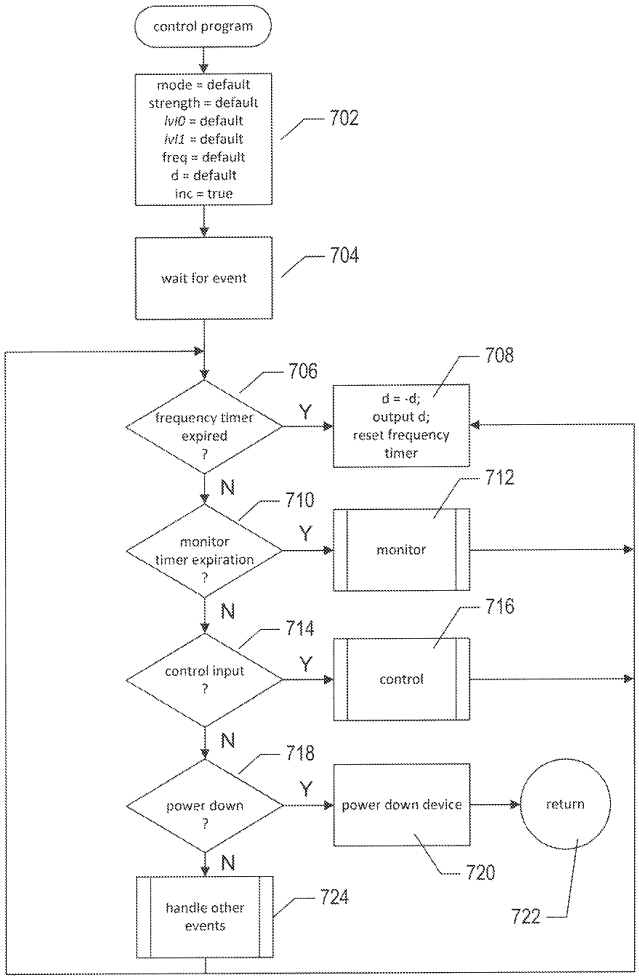


FIG. 7A

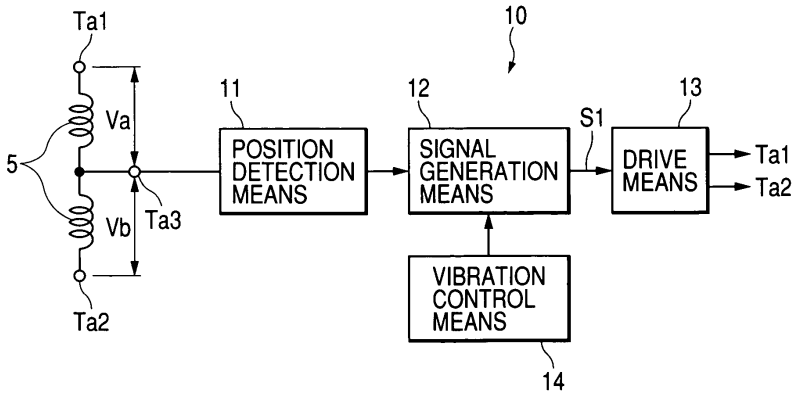
('337 patent, Fig. 7A.) Accordingly, the "output d" and "output p" steps must occur at different iterations of the Figure 7A loop, not simultaneously in a single output.

The Petition lacks any express mapping of the art in Grounds 1 or 2 to either step 708 or 762—let alone all of the other steps of Apple's or the Board's construction of "control component"—which fact alone should be sufficient to reject these grounds under those constructions. (Petition at 40–

47.) The Reply addresses step 762, but continues Apple's silent on step 708 and other steps, which is again a reason to reject these grounds. (Reply at 8–10.)

However, to the extent that Apple provides a mapping for steps 708 and 762, it relies upon the same drive signal S1 of Wakuda Figure 3 for both:

FIG. 3



(Ex. 1005, Fig. 3.) For example, the Reply states that the Wakuda-Ramsay-Rossi-Aldrich combination "implements the processor in the resulting system as outputting the drive signal (including outputs 'p' and 'd') to the drive means 13." (Reply at 9.) As support for this position, the Reply points to "drive signals having a time-varying current level, such as a drive signal S1 having 'a triangular wave or the like.'" (Reply at 7; citing Ex. 1006 at 6:63–66.)

At most, Wakuda's disclosures concerning drive signal S1 teach a single step of outputting a signal. Nowhere does it teach separately outputting d and p signals at separate steps of the algorithm as required by the means-plus-function corresponding structures proposed by Apple and adopted in the Board's Institution Decision.

The Response also explained how the Petition's arguments concerning Ground 2 failed to show any disclosures outside of Wakuda that allegedly teach the claimed output of p to the power supply for the combination of Wakuda-Ramsay-Rossi-Aldrich. (Response at 20–21.) The Reply fails to address this point, instead focusing entirely on Wakuda's drive signal S1 as purportedly teaching the step.

For at least these reasons and those set forth in the Response, Grounds 1 and 2 fail to show unpatentability of any claim.

B. Grounds 3A–B and 4A–B

Grounds 3A–B and 4A–B similarly fail to show obviousness of the two steps, including "output d" and "output p" respectively, required by Apple's and the Board's constructions of "control component."

The Reply abandons certain positions taken in the Petition. For example, the Petition stated that "a POSITA would have understood that actuator drive circuit 16 corresponds to, or is coupled to, a power supply." (Petition at 60.)

The Reply abandons the "coupled to" theory, instead saying that "the Petition identifies Gregorio's "actuator drive circuit" ***as the claimed power supply***." (Reply at 11 (emphasis added).)

The Petition also offered an alternative theory for the power supply, pointing to "current generator 422" and saying "Gregorio also describes "current generator 422" as a power supply to convert a pulse to current that flows into LRA 18." (Petition at 60.) The Response explained that current generator 422 and its associated alternative embodiment failed to satisfy the challenged claim limitations. (Response at 24–25.) The Reply fails to address these arguments and is utterly silent on the "current generator 422" theory of the power supply limitation.

For Grounds 3A and 3B, the Petition did not allege that the combination satisfied a means-plus-function construction requiring multiple steps of '337 patent Figures 7A-C, and it did not map any of those steps onto the prior art combination. (Petition at 62–64, 70.) For Grounds 4A and 4B, the Petition purports to address Apple's means-plus-function construction, but in doing so, it simply states:

> Given the similarity between Gregorio-Ramsay-Wakuda-Rossi-Aldrich's system (§IV.E.1.(b)) and Wakuda-Ramsay-Rossi-Aldrich's system (§IV.B.3.(b)), the analysis of Ground 2 ([1f], [2f]-

> [2g], [4f]) based on Rossi, Aldrich, and supporting evidence similarly applies for Gregorio-Ramsay-Wakuda-Rossi-Aldrich.

(Petition at 79.) In other words, it relies on the deficient analysis of Wakuda's drive signal S1 discussed with respect to Grounds 1 and 2 above. For the same reasons that Grounds 1 and 2 fail to demonstrate an obvious combination that satisfies the "control component" limitation under either Apple's or the Board's means-plus-function constructions, The Petition's analysis of Grounds 4A and 4B (and of Grounds 3A and 3B) likewise fails to show that the combinations in those grounds satisfy both steps 708 and 762, along with all of the other required steps of '337 patent Figures 7A–C, under either Apple's or the Board's constructions of "control component." These grounds should also be rejected under either of those constructions.

The Reply switches tack, pointing to teachings in Gregorio, instead of alleged similarity to the combination of Wakuda-Ramsay-Rossi-Aldrich, as satisfying the "control component" algorithm steps. For example, the Reply states that "Gregorio's control component outputs both the desired direction 'd' and the desired power 'p.'" (Reply at 17.) Further, the Reply points to "Gregario's drive signal 504" as purportedly satisfying claim limitations. (Reply at 14–15.) Signal 504 was never cited in the Petition.

These new theories, set forth for the first time in the Reply, cannot form the basis for invalidating claims. Rather, the petitioner has the burden to clearly set forth the basis for its challenges in the petition. *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) as "requiring IPR petitions to identify 'with particularity ... the evidence that supports the grounds for the challenge to each claim'"); *Ariosa Diagnostics v. Verinata Health, Inc.*, 805 F.3d 1359, 1367 (Fed. Cir. 2015) ("We see no error in the Board's rejection of [petitioner's] reliance, in its Reply submissions, on previously unidentified portions of a prior-art reference to make a meaningfully distinct contention."); *Wasica Finance GMBH v. Continental Auto. Systems*, 853 F.3d 1272, 1286 (Fed. Cir. 2017) (holding that new arguments in a reply brief are "foreclosed by statute, our precedent, and Board guidelines").

These new arguments are a "meaningfully distinct contention" from those made in the petition raised for the first time in a reply, which the Federal Circuit has repeatedly held the Board has properly refused to consider. *Yita LLC v. MacNeil IP LLC*, 69 F.4th 1356, 1367 (Fed. Cir. 2023) (affirming rejection of argument in reply about "what a relevant artisan would have found obvious to modify," where the petition only argued about what the reference

actually teaches); *Intelligent Bio-Systems, Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1370 (Fed. Cir. 2016) (same).

Even if these untimely new theories were to be considered, however, they fail to demonstrate obviousness. The Reply fails to show that the combinations in those grounds satisfy both steps 708 and 762, along with all of the other required steps of '337 patent Figures 7A–C. Nowhere does Gregario teach separately outputting d and p signals at separate steps of the algorithm as required by the means-plus-function corresponding structures proposed by Apple and adopted in the Board's Institution Decision. To the contrary, the Reply points to the output of a single drive signal 504 of Gregario, which control both direction and current. (Reply at 14–15.)

III. CONCLUSION

For the reasons set forth above, Resonant Systems respectfully requests that the Board affirm the validity of all challenged claims.

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CERTIFICATE OF WORD COUNT

I certify that there are 1,737 words in this paper, excluding the portions exempted under 37 C.F.R. § 42.24(a)(1), according to the word count tool in Microsoft Word.

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CERTIFICATE OF SERVICE

I hereby certify that "Patent Owner's Sur-Reply" was served on July 8, 2025 by email sent to:

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