

UNITED STATES PATENT AND TRADEMARK OFFICE

---

BEFORE THE PATENT TRIAL AND APPEAL BOARD

---

SAMSUNG ELECTRONICS CO., LTD.  
Petitioner

v.

UUSI, LLC d/b/a NARTRON  
Patent Owner

---

Case IPR2016-00908  
Patent No. 5,796,183

---

**PATENT OWNER PRELIMINARY RESPONSE**

## TABLE OF CONTENTS

<b>I.</b>	<b>INTRODUCTION .....</b>	<b>1</b>
<b>II.</b>	<b>BACKGROUND .....</b>	<b>3</b>
<b>A.</b>	<b>Patent Owner Has A Long History As An Innovator.....</b>	<b>3</b>
<b>B.</b>	<b>The '183 Patent Is Pioneering. ....</b>	<b>4</b>
<b>III.</b>	<b>PROPER CLAIM CONSTRUCTION .....</b>	<b>7</b>
<b>A.</b>	<b>“closely spaced array of input touch terminals of a keypad” / “small sized input touch terminals of a keypad” .....</b>	<b>9</b>
<b>B.</b>	<b>“oscillator voltage is greater than a supply voltage” / “peak voltage of the [oscillator’s] signal output frequencies is greater than a supply voltage” .....</b>	<b>14</b>
<b>C.</b>	<b>“selectively providing signal output frequencies” .....</b>	<b>17</b>
<b>IV.</b>	<b>REFERENCES RELIED ON BY PETITIONER .....</b>	<b>20</b>
<b>A.</b>	<b><i>Ingraham I</i> and <i>II</i> Teach Away From The '183 Patent.....</b>	<b>20</b>
<b>1.</b>	<b><i>Ingraham I</i> and <i>II</i> Do Not Teach or Disclose the “Input Touch Terminals” Limitation.....</b>	<b>20</b>
<b>2.</b>	<b><i>Ingraham I</i> and <i>II</i> Do Not Teach or Disclose Any Oscillator Circuit. ....</b>	<b>23</b>
<b>B.</b>	<b><i>Caldwell</i> Teaches Away From The '183 Patent.....</b>	<b>25</b>
<b>C.</b>	<b><i>Gerpheide</i> Teaches Away From The '183 Patent. ....</b>	<b>32</b>
<b>V.</b>	<b>GROUND I .....</b>	<b>33</b>
<b>A.</b>	<b>Petitioner Does Not Show That All Elements Exist In The Art....</b>	<b>34</b>
<b>1.</b>	<b>Claim Elements 37(b) and (c) .....</b>	<b>34</b>
<b>2.</b>	<b>Claim Element 37(d) .....</b>	<b>37</b>
<b>a.</b>	<b>“input touch terminals” .....</b>	<b>38</b>
<b>b.</b>	<b>“selectively providing signal output frequencies” .....</b>	<b>41</b>
<b>3.</b>	<b>Claim Element 37(e) .....</b>	<b>45</b>
<b>4.</b>	<b>Claim Elements 37(f), 37(g), and 37(h) .....</b>	<b>46</b>
<b>B.</b>	<b>The Remaining Arguments Also Fail Under Petitioner’s Flawed Analysis of Claim 37.....</b>	<b>51</b>

1.	Independent Claim 40.....	51
a.	Claim Element 40(h).....	52
b.	Claim Element 40(i).....	54
2.	Independent Claim 61.....	55
3.	Independent Claim 83.....	56
4.	Independent Claim 94.....	57
5.	Dependent Claims 41, 43, 45, 64-67, 69, 85, 86, 88, 90, 91, 96, 97, 99, 101, 102.....	57
C.	The <i>Ingraham I-Caldwell-Gerpheide</i> Combination Does Not Render the Claims Obvious.....	58
VI.	GROUND II .....	59
A.	The <i>Ingraham I-Caldwell-Gerpheide-Wheeler</i> Combination Does Not Render Obvious Claims in Ground II.....	59
VII.	PETITIONER DOES NOT MEET THE STANDARD REQUIRED FOR INSTITUTION. ....	60
A.	Petitioner Provides No Rationale Or Motivation To Combine The References And Uses Improper Hindsight. ....	61
B.	The References Could Not Be Combined In Any Event. ....	63
VIII.	PETITIONER IGNORES SECONDARY CONSIDERATIONS OF NON-OBVIOUSNESS.....	63
IX.	THE BOARD SHOULD EXERCISE ITS DISCRETION TO DENY THE PETITION UNDER 35 U.S.C. 325(d).....	64
X.	CONCLUSION .....	65

## **TABLE OF AUTHORITIES**

### **Cases**

<i>Allergan, Inc. v. Sandoz Inc.</i> , 796 F.3d 1293 (Fed. Cir. 2015).....	58
<i>Apple Inc. v. Contentguard Holdings, Inc.</i> , IPR2015-00452, Paper 9 (PTAB July 13, 2015) .....	63
<i>Apple Inc. v. Contentguard Holdings, Inc.</i> , IPR2015-00453, Paper 9 (PTAB July 13, 2015) .....	60
<i>Apple Inc. v. SmartFlash LLC</i> , Case CBM2015-00029, Paper 11 (May 28, 2015) .....	60
<i>Ceramtec Gmbh v. Ceramedic, LLC</i> , IPR2015-00424, Paper 9 (PTAB July 7, 2015).....	64
<i>CIAS, Inc. v. Alliance Gaming Corp.</i> , 504 F.3d 1356 (Fed. Cir. 2007) .....	15
<i>Curtiss–Wright Flow Control Corp. v. Velan, Inc.</i> , 438 F.3d 1374 (Fed. Cir. 2006).....	10
<i>Grain Processing Corp. v. Am.-Maize Prods. Co.</i> , 840 F.2d 902 (Fed. Cir. 1988) .....	61, 63
<i>In re Bulloch</i> , 604 F.2d 1362 (CCPA 1979) .....	52
<i>In re Eric Jasinski</i> , 508 Fed. Appx. 950 (Fed. Cir. 2013) (unreported) .....	53
<i>Kinetic Concepts, Inc. v. Smith &amp; Nephew, Inc.</i> , 688 F.3d 1342 (Fed. Cir. 2012) .....	59, 63, 64
<i>McGinley v. Franklin Sports, Inc.</i> , 262 F.3d 1339 (Fed. Cir. 2001) .....	63
<i>Microboards Tech., LLC d/b/a Afinia v. Stratatsys, Inc.</i> , IPR2015- 00287, Paper 13 (May 28, 2015) .....	61, 64
<i>O.I. Corp. v. Techmar Co.</i> , 115 F.3d 1576 (Fed. Cir. 1997) .....	13
<i>Phillips v. AWH Corp.</i> , 415 F.3d 1303 (Fed. Cir. 2005) .....	7, 8

<i>Plas-Pak Indus., Inc. v. Sulzer Mixpac AG</i> , 600 Fed. Appx. 755 (Fed. Cir. 2015) .....	63
<i>Power Integrations, Inc. v. Fairchild Semiconductor Int’l, Inc.</i> , 711 F.3d 1348 (Fed. Cir. 2013) .....	8
<i>Samsung Elec. Co., Ltd. v. Unifi Scientific Batteries, LLC</i> , IPR2013-00236, Paper 10 (PTAB Sept. 25, 2013) .....	53
<i>SciMed Life Sys., Inc. v. Advanced Cardiovascular Sys., Inc.</i> , 242 F.3d 1337 (Fed. Cir. 2001).....	10, 13
<i>Vitronics Corp. v. Conceptronic</i> , 90 F.3d 1576 (Fed. Cir. 1996).....	7
<i>Vizio, Inc. v. Int’l Trade Comm’n</i> , 605 F.3d 1330 (Fed. Cir. 2010).....	53
 <b><u>Statutes</u></b>	
35 U.S.C. § 312(c) .....	8
 <b><u>Regulations</u></b>	
37 C.F.R. § 42.104(b)(3).....	8

**LIST OF EXHIBITS**

2002	Declaration of Dr. Darran Cairns
2003	Curriculum Vitae of Dr. Darran Cairns
2004	List of Patents and Applications Citing U.S. Patent 5,796,183
2005	Nartron “Industry Firsts”
2006	U.S. Patent 5,572,205 (Caldwell et al.)

## I. INTRODUCTION

Petitioner misapprehends the disclosure and the claims it challenges, ignoring that the '183 Patent paved the way for today's compact, multi touch pad devices. All claims at issue are directed to multi touch terminal devices, just one of the embodiments disclosed in the '183 Patent. Yet, Petitioner exclusively cites only to disclosures of the '183 Patent that relate to single touch pad devices.

Furthermore, Petitioner cherry picks disparate elements from the prior art without explaining how these elements operate or how they meet the claims. Even after cherry picking, Petitioner provides no motivation to combine the prior art and no basis for why a person of ordinary skill in the art would have a reasonable expectation that this disparate art could be combined in the manner taught by the '183 Patent.

Petitioner's challenges are fatally flawed and Patent Owner, UUSI, LLC d/b/a Nartron ("Patent Owner" or "Nartron") respectfully requests that the Board deny the Petition for the following reasons.

**First**, nowhere in Petitioner's prior art is there anything that discloses the claimed "oscillator voltage is greater than a supply voltage" or "peak voltage of the signal output frequencies is greater than a supply voltage" (the "oscillator voltage" limitations). Because none of the prior art references discloses a circuit wherein the voltage of the signal output from the oscillator is greater than the voltage of the

supply signal to the oscillator, Petitioner cobbles together two supply voltages from prior art references that do not show any oscillator circuit at all. Moreover, these references were solving a different problem and operate in many substantially different ways from the circuit claimed in the '183 Patent.

**Second**, Petitioner disregards the claim language and teachings in the specification with respect to the claim limitations “closely spaced array of input touch terminals of a keypad” and “small sized input touch terminals of a keypad” (the “input touch terminals” limitations). The '183 Patent expressly distinguishes the prior art, including that relied on by Petitioner, stating that the input touch terminals of the multi touch pad keyboard at issue here must be *smaller* or in a *more closely spaced array* than those found in that prior art. In stark contrast to Petitioner's prior art, the multi touch pad keyboard of the '183 Patent does not require any physical structure to isolate adjacent touch terminals. The multiple touch pad terminals in Petitioner's references *require* physical structures as part of the terminals themselves to reduce cross talk.

**Third**, Petitioner relies on three references in an attempt to show that the prior art teaches the claim limitation “selectively providing signal output frequencies.” Here, again, Petitioner ignores that the '183 Patent functions in a manner that is wholly distinct from the way that the prior art references operate. The arguments and prior art that Petitioner relies upon with respect to this claim element are



precisely the same as those that were previously presented to the PTO during re-examination and overcome by the addition of this limitation.

**Fourth**, Petitioner has not shown that there could be any motivation to combine the cited references or that any combination would lead to a reasonable expectation of success. Petitioner uses the '183 Patent as a roadmap to cobble together disparate prior art references for an obviousness combination without any regard to how the references would function as a whole.

**Fifth**, the Board should exercise its discretion to deny the petition because all the critical arguments made in the present matter were previously made to the PTO during prosecution and found unavailing. Nothing new can be gleaned by yet another look at the same art.

## **II. BACKGROUND**

### **A. Patent Owner Has A Long History As An Innovator.**

Nartron's success in the marketplace was founded on researching, designing and building individual components of end products to optimize the design of every component and enhance the end product. Nartron became known as an innovator within the automotive and electronic fields and was named one of America's "Innovation 50" companies by INC Magazine. <http://www.nartron.com/offsite-2/About>.

Nartron has been awarded a number of pioneering patents for the electronic products that it successfully developed and commercialized, including the first electrically powered steering system, the first keyless entry system, and a car window system that senses an object in its path. Ex. 2005. Nartron also was the first to develop and produce interactive displays/touchscreens. Nartron invented much of the early touchscreen technology upon which today's smartphone and tablet touchscreens are based. Ex. 1014, at 1. Three of the oldest prior art references cited by Petitioner (i.e., *Ingraham I, II, and III*) are all Nartron's own inventions.

**B. The '183 Patent Is Pioneering.**

The '183 Patent is exemplary of Nartron's efforts as a pioneer in touchscreen technology, and builds upon and provides significant improvements over Petitioner's references. Filed over 20 years ago, the '183 Patent provides the foundation upon which today's touch screen technology is built. Ex. 1014, at 1; Ex. 2002, ¶¶15-29. Numerous patents filed subsequent to the issuance of the '183 Patent cite to the '183 Patent. Ex. 2002, ¶16; Ex. 2004.

The '183 Patent has been through two reexaminations and all but three<sup>1</sup> of the challenged claims were added during the second reexamination. The '183 Patent generally relates to a capacitive responsive electronic switching circuit including an

---

<sup>1</sup> Claims 37, 38, and 39 were added during the first reexamination.

oscillator providing a periodic output signal, an input touch terminal defining an area for an operator to provide an input by proximity and touch, and a detector circuit coupled to the oscillator for receiving the periodic output signal from the oscillator, and coupled to the input touch terminal. Ex. 1001, '183 Patent, Abstract.

At the time of the invention, there was a drive to make capacitive touch keypads smaller while increasing the number of touch terminals on the keypad. A substantial barrier existed; the more densely the touch terminals were spaced and the smaller the touch terminals became, the greater the risk of coupling adjacent touch terminals, resulting in multiple actuations where only a single actuation is desired. Ex. 1001 at 3:64-4:8. At the time, the only known way to put touch pads as closely together as possible was to incorporate physical structures as a part of each touch terminal in an effort to prevent inadvertent actuation of adjacent touch pads. *Id.*; Ex. 2002, ¶¶17-20. However, these structures—guard rings, guard bands, or a combination of electrodes with opposing fields (collectively referred to as “guard rings”)—presented a barrier to developing a truly compact device because they require additional space and limit the proximity and size of the touch terminals. There was no known way to overcome this problem until the invention disclosed in the '183 Patent. Ex. 2002, ¶¶17-20. By eliminating the requirement for guard rings in a multi touch pad configuration, the '183 Patent offers improvements in detection

sensitivity that allow and enable employment of a multiplicity of small-sized touch terminals in a physically close array. Ex. 1001 at 5:53-57.

First, the '183 Patent offers “enhanced sensitivity” because it minimizes “susceptibility to variations in supply voltage and noise” by use of high oscillator frequencies and “a floating common and supply that follow the oscillator signal to power the detection circuit.” *Id.* at 6:1-22; 18:66-19:6. The floating common provides a reference that is 5V away from the high-frequency oscillator output signal, enabling the system to compare the signals that are only 5V apart. This 5V differential minimizes noise that otherwise would be generated due to the presence of contaminants on the touch pad, such as liquids or skin oils. Ex. 1001 at 4:18-20; 5:48-53; 16:12-24; Ex. 2002, ¶25.

Second, the '183 Patent also uses an oscillator that outputs a signal with a voltage that is as high as possible, for example a 26V peak square wave, while at the same time is low enough to obviate the need for expensive components and testing to alleviate safety concerns. Ex. 1001 at 6:6-13; 12:6-23; Ex. 2002, ¶26.

Third, the '183 Patent's detection circuit “operates at a higher frequency than prior art touch sensing circuits” which “is not a benign choice” relative to the prior art circuits. Ex. 1001 at 8:9-14. The '183 Patent discloses extensive testing that was performed in order to determine frequency ranges required to provide a substantial enough “impedance difference between the paths to ground of the touched pad 57

and adjacent pads 59.” *Id.* at 11:1-9; Fig 3A. “This . . . result[s] in a much lower incidence of inadvertent actuation of adjacent touch pads to that of the touched pad.” *Id.*; *see also id.* at 11:19-25; Ex. 2002, ¶27.

Thus, to permit touch terminals to be extremely small and closely spaced, while also avoiding inadvertent actuations, the ’183 Patent discloses a circuit with very high frequencies, a floating common generator, and as high an oscillator voltage as possible without the need for physical structures like guard rings to isolate the touch terminals. Ex. 1001 at 8:9-11:60; Ex. 2002, ¶28.

### **III. PROPER CLAIM CONSTRUCTION**

The ’183 Patent is expired, and therefore, the claim terms should be construed according to *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005). *In re Rambus Inc.*, 694 F.3d 42, 46 (Fed. Cir. 2012). The first step in construing claims is to “look to the words of the claims themselves.” *Vitronics Corp. v. Conceptronic*, 90 F.3d 1576, 1582 (Fed. Cir. 1996). Second, the specification must be considered. “[T]he specification is always highly relevant to the claim construction analysis. Usually, it is dispositive; it is the single best guide to the meaning of a disputed term.” *Id.* Further, the prosecution history may “demonstrat[e] how the inventor understood the invention and whether the inventor limited the invention in the course of prosecution.” *Phillips*, 415 F.3d at 1317.

Here, instead of setting forth a precise statement on how the independent claims are to be construed as required, 35 U.S.C. § 312(c); 37 C.F.R. § 42.104(b)(3), Petitioner asserts that “the Board need not construe” the claim terms and further proposes that, to the extent that any claim terms require construction, the Board should adopt Petitioner’s *Markman* constructions set forth in the related District Court litigation. Petition at 12. Those positions are irrelevant here because, as a party opposing an infringement claim, Petitioner’s litigation-induced constructions are inherently unreliable and can suffer from bias. *Phillips*, 415 F.3d at 1318. Petitioner’s purported constructions are additionally irrelevant because they rely on citations to the ’183 Patent specification that consistently refer to the single touch keypad, not the multi touch version that is the subject of the challenged claims.

Moreover, Petitioner’s expert, Dr. Subramanian, purports to be applying the “plain and ordinary meaning” of the claim terms in his analysis, but he has not identified those meanings, and it is not clear what constructions he is applying. Ex. 2002, ¶30. His analysis must therefore be discounted, if credited at all. *Power Integrations, Inc. v. Fairchild Semiconductor Int’l, Inc.*, 711 F.3d 1348, 1361-62 (Fed. Cir. 2013) (rejecting construing term according to “plain and ordinary meaning” in light of contrary testimony consistent with specification).

Notably, there are three claim limitations that are not found in the prior art, but that appear in each of the challenged claims.

**A. “closely spaced array of input touch terminals of a keypad” /  
“small sized input touch terminals of a keypad”**

These limitations, referred to as the “input touch terminals” limitations, are present in every claim at issue. As explained below, the ’183 Patent strives to achieve compactness and derides the requirement of additional means such as guard rings to adjust the detection sensitivity. Thus, based on the language of the claims, the specification, and the understanding of one of ordinary skill in the art (“PHOSITA”), the “input touch terminals” limitation should be construed to mean touch terminals that are closely-spaced or small-sized without requiring physical structures to isolate the touch terminals.

First, the claim language itself makes clear that input touch terminals are either “small” or in a “closely spaced array.” Claims 37, 83, and 94 (and their dependent claims) recite a “closely spaced array of input touch terminals of a keypad” and claims 40, 61 (and their dependent claims) recite “small sized input touch terminals of a keypad. These limitations appear only in the multi touch pad claims. Ex. 2002, ¶34.

The specification must therefore be considered as to whether the patentee distinguished the prior art on the basis of a particular embodiment, expressly disclaimed subject matter, or described a particular embodiment as important to the invention. *Curtiss–Wright Flow Control Corp. v. Velan, Inc.*, 438 F.3d 1374,

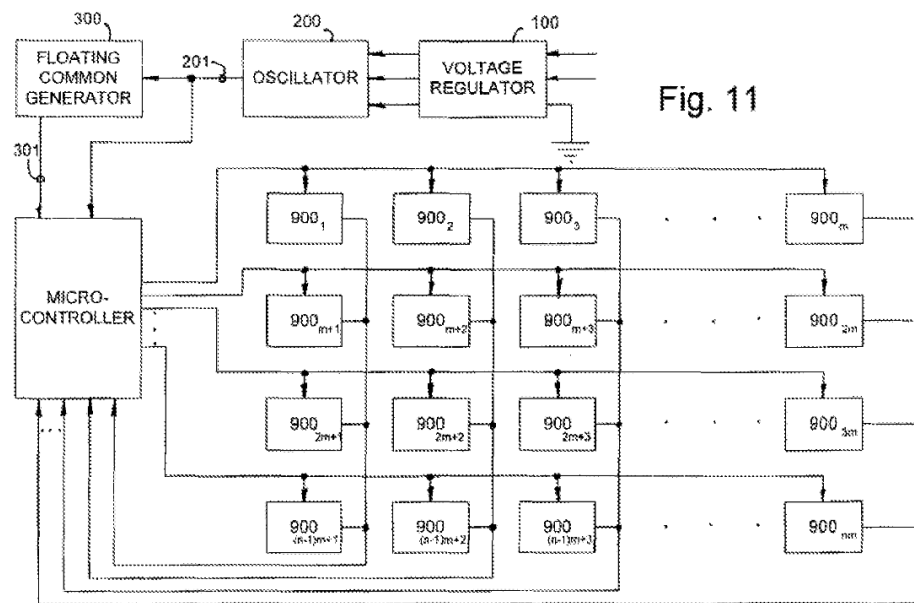
1378 (Fed. Cir. 2006); *SciMed Life Sys., Inc. v. Advanced Cardiovascular Sys., Inc.*, 242 F.3d 1337, 1341 (Fed. Cir. 2001) (“Where the specification makes clear that the invention does not include a particular feature, that feature is deemed to be outside the reach of the claims”).

The '183 Patent teaches both single touch pad and multi touch pad embodiments. The specification is unequivocal that the multi touch pad embodiment is different from the prior art in that it does not require the use of guard rings. Ex. 2002, ¶35. For example, the '183 Patent explains that “[a]n additional consideration in using zero force switches resides in the difficulties that arise in trying to employ dense arrays of such switches.” Ex. 1001 at 3:54-4:3. The '183 Patent further teaches that the prior art *Ingraham I* patent “employs conductive guard rings around the conductive pad of each touch terminal in an effort to decouple adjacent touch pads and prevent multiple actuations where only a single one is desired.” *Id.* at 4:3-8. Thus, where *Ingraham I*'s touch terminals require guard rings in order to function, the '183 Patent discourages guard rings because, in a multi touch embodiment that requires guard rings, the sensitivity of the detection circuits is such that it requires the operator's finger to substantially overlap the touch terminal. *Id.* at 4:10-14. Moreover, even with the use of guard rings, susceptibility to surface contaminants, cross talk, and multiple actuations of adjacent touch pads remains a problem. *Id.* at 4:14-24. The '183 Patent strives to improve upon the prior art by the use of sensitive



detection circuitry, disclosing that “[s]mall touch terminals placed in close proximity by necessity require sensitive detection circuits.” Ex. 1001 at 4:24-25; Ex. 2002, ¶36.

FIG. 11 of the '183 Patent, reproduced below, depicts a multiple touch pad embodiment:



The multiple touch pad circuit of Figure 11 is a variation of the embodiment shown in Figure 4. The specification discloses that “the touch circuit 400 shown in FIGS 4 and 8 and the input touch terminal pad 451 (FIG 4)” are included in the Figure 11 embodiment. Not included is Figure 4’s guard ring 460. Ex. 1001. at 18:39-43.

The multiple touch pad embodiment includes an array of touch detection circuits designated as 900<sub>1</sub> through 900<sub>nm</sub>. *Id.* at 18:34-41; Ex. 2002, ¶37. Figure 8,

reproduced below, depicts the touch detection circuitry that is used for touch circuits 900<sub>1</sub> through 900<sub>nm</sub>.

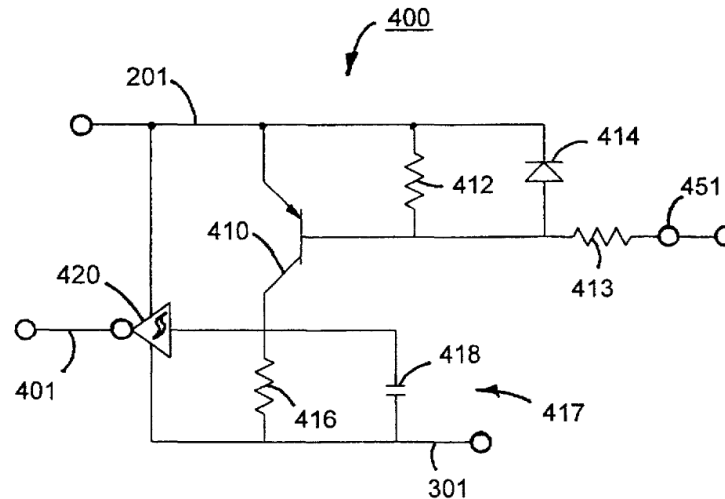


Fig. 8

Ex. 1001, Figure 8. As seen in Figure 8, the touch detection circuit does not include a guard ring. The '183 Patent explains that “[t]ouch circuit 400, as shown in FIG. 8, preferably includes a transistor 410 having a base connected to touch pad 450 via resistor 413 and line 451.” Ex. 1001 at 14:47-49. Thus, in the multi touch pad embodiment, line 451 is connected directly to the touch pad itself, without requiring any extra components such as guard rings. Ex. 2002, ¶38.

The '183 Patent explains that:

The use of high frequency in accordance with the present invention provides distinct advantages for circuits such as the multiple touch pad circuit of the present invention due to the manner in which crosstalk is substantially reduced *without requiring any physical structure to isolate the touch terminals*. Further, the reduction in crosstalk afforded

by the present invention allows the touch terminals in the array to be more closely spaced together.

*Id.* at 18:66-19:6 (emphasis added).

Moreover, after distinguishing the prior art use of guard rings because they prevent touch pads from being small and close, the '183 Patent further explains that the very invention of the multi touch terminal disclosure is that it “offers improvements in detection sensitivity that allow close control of the degree of proximity (ideally very close proximity) that is required for actuation and to enable employment of *a multiplicity of small sized touch terminals in a physically close array* such as a keyboard.” Ex. 1001 at 5:53-57. Thus, guard rings are not required in the multi touch pad configuration. Ex. 2002, ¶39.

Notably, Petitioner not once refers to the multi touch pad embodiment of Figure 11, and focuses solely on a single touch embodiment illustrated by Figure 4. While Figure 4 includes a guard band (460), this feature is not required in the multi touch pad embodiment of Figure 11 so that the input touch terminals can be small sized and closely spaced. Because the specification makes clear that the invention does not require guard rings in the multi touch pad system, that feature should not be a requirement of the claims. *SciMed*, 242 F.3d at 1341; *O.I. Corp. v. Techmar Co.*, 115 F.3d 1576, 1581 (Fed. Cir. 1997) (claim element not encompassed by prior

art where specification repeatedly described characteristics of element and distinguished them from characteristics of the prior art)..

In sum, the specification describes that, to achieve the smallness and closeness of the claimed input touch terminals, the multi touch pad invention does not require guard rings. A PHOSITA would therefore understand that “closely spaced array of input touch terminals of a keypad” / “small sized input touch terminals of a keypad” means touch terminals that are closely-spaced or small-sized without requiring physical structures to isolate the touch terminals. Ex. 2002, ¶40.

**B. “oscillator voltage is greater than a supply voltage” / “peak voltage of the [oscillator’s] signal output frequencies is greater than a supply voltage”**

These limitations, collectively referred to as the “oscillator voltage” limitation, are relevant to all claims at issue except claim 40 and its dependent claims. The “oscillator voltage” limitation should be construed as meaning that the oscillator, and its supply signal and periodic output signal having a predefined frequency, must be within the capacitive responsive electronic switching circuit, not outside of the switching circuit such as an external commercial power supply from the wall.

Turning first to the claim language, all of the claims at issue recite a capacitive responsive electronic switching circuit *comprising* an oscillator that outputs a

periodic output signal having a predefined frequency.<sup>2</sup> “Comprising” in a patent claim means “including, but not limited to.” *CIAS, Inc. v. Alliance Gaming Corp.*, 504 F.3d 1356, 1360 (Fed. Cir. 2007). Accordingly, the claimed oscillator must be included in, not external to, the electronic switching circuit. Ex. 2002, ¶¶41-42.

Claim 37 further recites that the “oscillator voltage is greater than the supply voltage,” whereas claims 61, 83 and 94 recite that the “peak voltage of the [oscillator’s] signal output frequencies is greater than a supply voltage.” Thus, these claims and their dependent claims all require a capacitive responsive electronic switching circuit that includes an oscillator that has an output voltage that is greater than its supply voltage. A PHOSITA would understand that the oscillator of the ’183 Patent, and the signal it outputs, are components included within the responsive electronic switching circuit. Ex. 2002, ¶¶41-44.

The ’183 Patent explains that the voltage of the signal output from its oscillator circuit is sufficiently high to resolve the aforementioned issues related to

---

<sup>2</sup> While claim 40 does not require the oscillator voltage be greater than the supply voltage, it, like the other claims at issue, recites a capacitive responsive electronic switching circuit ***comprising*** an oscillator that outputs a periodic output signal having a predefined frequency.

eliminating the guard rings, yet also sufficiently low that it “obviates the need for expensive . . . construction measures and testing to handle what would otherwise be large enough voltages to cause safety concerns.” Ex. 1001 at 6:1-13 (distinguishing *Ingraham III*). The ’183 Patent discloses one embodiment in which the voltage generated by the oscillator is 26V peak square wave. *Id.* at 6:1-13; 12:6-13; Ex. 2002, ¶45.

Regarding the supply voltage, the ’183 Patent discloses an embodiment in which “a regulated 5V DC power” is supplied to the oscillator. Ex. 1001 at 11:64-12:2. A PHOSITA would understand that this 5V DC power is the supply voltage to the oscillator. In order to reach a higher output signal voltage than the input signal voltage, the disclosed oscillator preferably includes a buffer circuit that boosts the peak output of the oscillator from 5V to 26V, while maintaining the preferred frequency. *Id.* at 13:32-39; Ex. 2002, ¶46.

Because the express language of the claims requires that the oscillator and the signal it outputs is a component within the responsive electronic switching circuit, an external commercial power supply from the wall cannot be the claimed oscillator signal output. The ’183 Patent explains that if the power source to the system is very high, for example, “a 110V AC 60 Hz commercial power line, a transformer may be added to convert the 110V AC power to 24V AC.” Ex. 1001 at 13:23-29. A PHOSITA would understand that neither the 110V AC power supply nor the 24V

AC signal could be construed to be the oscillator voltage since the oscillator voltage is an output voltage and in one example is 26V. Ex. 2002, ¶47.

In addition, the '183 Patent states that using commercial power lines in capacitive touch switches radiates too much noise and is subject to contamination and wear and is particularly problematic when multiple switches are in a dense array. Ex. 1001 at 3:11-33. Thus, the specification discloses an oscillator that is a component of the electronic switching circuit and that has an output signal with a voltage greater than its supply signal. Accordingly, a PHOSITA would not use a commercial wall power supply as a supply voltage to the oscillator circuit disclosed in the '183 Patent. Ex. 2002, ¶48.

In sum, the claimed oscillator, and its supply signal and periodic output signal having a predefined frequency, must be within the capacitive responsive electronic switching circuit.

**C. “selectively providing signal output frequencies”**

This claim limitation is also found in all claims at issue in the Petition, all of which require that the “microcontroller selectively provid[e] signal output frequencies to . . . input touch terminals,” and “selectively provid[e] signal output frequencies,” and should be construed as meaning selectively sending signals

selected from various frequencies from a microcontroller to the input touch terminals.

The '183 Patent selectively provides signal output frequencies to the input touch terminals using a “dedicated microprocessor referenced to the floating supply and floating common of the detection circuit ... used to cost effectively multiplex a number of touch terminal output signals over a two line optical bus to a dedicated microprocessor referenced to a fixed supply and ground.” *Id.* at 6:16-22. The floating common generator receives the oscillator output signal and “outputs a regulated floating common that is 5 volts below the square wave output from the oscillator and has the same phase and frequency as the received square wave.” *Id.* at 12:13-18; Ex. 2002, ¶51.

With reference to Figure 11, the floating common output is, in turn, supplied to both the microcontroller 500 and the touch circuits (labeled as 900<sub>1</sub> to 900<sub>nm</sub> in Figure 11 and labeled as 400 in Figure 4) via line 301. Ex. 1001 at 12:17-22; *see also* 18:39-49. Notably, with reference to the multiple touch pad embodiment of Figure 11 at issue here:

Microcontroller 500 *selects each row* of the touch circuits 900<sub>1</sub> to 900<sub>nm</sub> by providing the signal from oscillator 200 *to selected rows* of touch circuits. In this manner, microcontroller 500 can sequentially activate the touch circuit rows and associate the received inputs from the columns of the array with the activated touch circuit(s).



Ex. 1001 at 18:34-59 (emphasis added). The '183 Patent's ability to provide signal output frequencies to selected rows of the input touch terminals provides an "expanded ability to detect faults" and can "distinguish desired multiple touch pad touches." *Id.* at 6:22-43; Ex. 2002, ¶¶52-53.

The '183 Patent claims also require that the microcontroller selectively provide frequencies, not merely one set frequency, to selected rows of input touch terminals. As explained in the '183 Patent, the oscillator circuit can generate a range of frequencies: "Although the preferred frequency is at or above 100kHz, and more preferably at or above 800 kHz, it is conceivable that frequencies as low as 50 kHz could be used provided the frequency creates a difference in the impedance paths of adjacent pads that is sufficient enough to accurately distinguish between an intended touch and the touch of an adjacent pad." Ex. 1001 at 11:19-25. Because the oscillator can generate a range of frequencies to send to the microcontroller, the microcontroller, in turn can send the selected frequencies to the input touch terminals. Therefore, a PHOSITA would understand that the '183 Patent discloses a microcontroller that can select from various frequencies and selectively send the selected frequency to the input touch terminals. Ex. 2002, ¶¶54-55.

#### IV. REFERENCES RELIED ON BY PETITIONER

##### A. *Ingraham I* and *II* Teach Away From The '183 Patent.

*Ingraham I*, Petitioner's primary reference, as well as *Ingraham II* and *III*, are Nartron inventions that were before the PTO from the initial prosecution in the mid-1990s through the second re-examination in 2014. The '183 Patent distinguishes *Ingraham I* (including *Ingraham II* by reference) and *Ingraham III* numerous times. Ex. 1001, 3:44-50; 4:3-8; 5:43-50; 6:6-16; 8:11-18; 18:1-10.

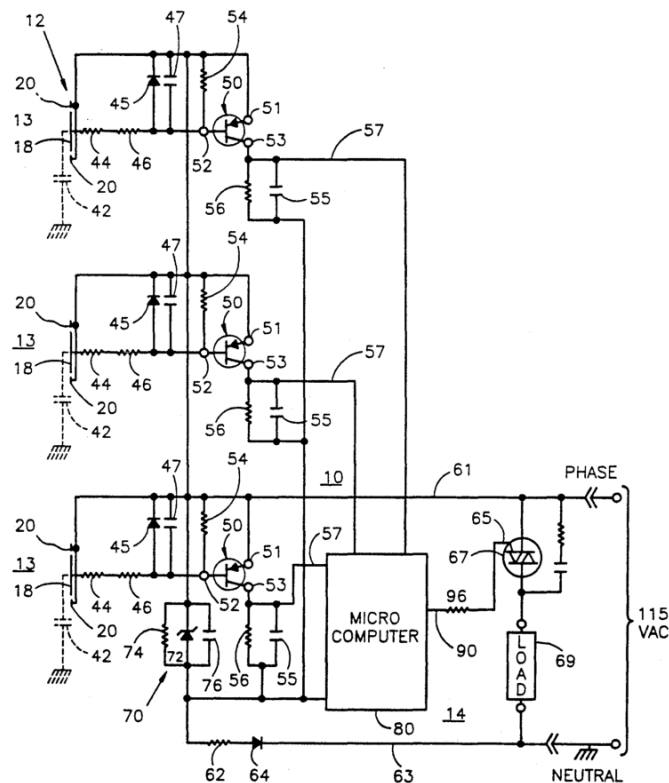
*Ingraham I* differs from the '183 Patent in a number of ways, but most notably in requiring "a guard band to reduce interference between the switches." Ex. 1007 Abstract. Further, Petitioner admits that *Ingraham I* does not teach or disclose an oscillator (Petition at 16) and, in fact, *Ingraham I* teaches away from using an oscillator (Ex. 1007 at 1:35-48) (explaining failures and problems with the use of high frequency oscillators in the prior art it seeks to improve upon). Ex. 2002, ¶57.

##### 1. *Ingraham I* and *II* Do Not Teach or Disclose the "Input Touch Terminals" Limitation.

Remarkably, Petitioner relies exclusively on *Ingraham I* for the proposition that it and it alone discloses the claimed small sized and dense array of "input touch terminals." Petition at 20-22, 26, 39-41. However, in stark contrast to the '183 Patent, *Ingraham I* only discloses a keypad having only 16 input touch points. Moreover, *Ingraham I* physically limits the closeness and size of the touch terminals

that is achievable because it requires a guard band which, by its very nature, prevents touch terminals from being small or close. Ex. 2002, ¶¶55-58.

Petitioner's Demonstrative A, suggesting that Figures 1 and 2 of *Ingraham I* constitute *Ingraham I*'s input portions 13, is misleading because *Ingraham I* explains that the input portions 13 are disclosed in Figure 3, reproduced below. Ex. 1002, ¶52; Ex. 1007 at 2:33-35 (depicting an embodiment with three input portions 13). Figures 1 and 2 show the touch plate assembly 12 (i.e., the capacitive responsive keyboard). *Id.* at 2:19-23. Figure 3, on the other hand, "illustrates a plurality of input portions 13 of touch plate assembly 12."



Ex. 1007, Figure 3; Ex. 2002, ¶ 58-59.

As seen in Figure 3, the input portions 13 include all of touch plate assembly 12, not discrete components of it. Both input portions 13 and touch plate assembly 12 include a guard band 20. Ex. 1007 at 2:41-55. Both input portions 13 and touch plate assembly 12 also include touch plate member 18 which *Ingraham I* explains are separated by spaces 24 and are “spaced apart in order to insulate plates 18 from one another and from ground.” Ex. 1007 at 2:41-53. Accordingly, Petitioner’s attempts to limit *Ingraham I*’s input portions 13 to certain components of the touch plate assembly 12 fail. As also seen in Figure 3, each of the input lines (57) carrying the touch signal are connected directly to the microcomputer. Thus, one line is required per touch input terminal, which additionally prevents close spacing of input touch terminals. Ex. 2002, ¶60.

*Ingraham I* explains that a problem overcome by the use of the guard band is “the tendency of capacity responsive switches that are closely positioned in a keyboard system to inadvertently become actuated even though the user is touching an adjacent switch.” *Id.* at 2:3-11. As seen in the figures, the input portions 13 require a guard ring (20) and spaces (24) that surround each of the touch plates (18). *Id.* at 2:41-55; FIG. 1. Thus, the use of a guard band requires that the input portions be large and prohibits them from being as close as they could be without the use of the guard band. Ex. 2002, ¶¶56-61. And, as set forth in Section III.A., above, the

'183 Patent improves upon *Ingraham I* because it does not require such guard bands and instead, makes touch pads small and placed in a significantly closer array.

**2. *Ingraham I* and *II* Do Not Teach or Disclose Any Oscillator Circuit.**

It is undisputed that *Ingraham I* and *II* do not include any oscillator circuit. Petition at 16; Ex. 1002, ¶44. As such, it is no surprise that they are silent as to the voltage of the signal that is either supplied to or output from any hypothetical oscillator. Accordingly, it cannot reasonably be disputed that *Ingraham I* does not teach or disclose an oscillator voltage being greater than a supply voltage. Ex. 2002, ¶63. Dr. Subramanian's "Demonstrative B" attempts to redefine the *Ingraham I* power supply as an oscillator. Ex. 1002, ¶58. The *Ingraham I* specification, however clearly identifies line 61, Dr. Subramanian's purported oscillator signal, as the power source. Ex. 1007 at 3:20-30; 2:51-56. A PHOSITA would understand that the voltage on the supply line is a supply voltage. Ex. 2002, ¶64.

Nevertheless, Petitioner appears to argue that *Ingraham I* somehow inherently includes an oscillator circuit on the grounds that it derives an "oscillating input signal" from a commercial 115V AC power line. Petition at 10. However, even if that were true, it would mean that, by Petitioner's own characterization, the 115 V

AC “oscillating” signal is the same as, not greater than, the 115V AC power line “input signal,” as required by the claims at issue.<sup>3</sup> Ex. 2002, ¶63.

Because neither *Ingraham I* nor *II* includes any oscillator circuit, they are also silent as to whether any hypothetical oscillator provides output signals to a microcontroller that, in turn, selectively provides signal output frequencies to input touch terminals. Petitioner does not rely on either *Ingraham I* or *Ingraham II* as a reference that purportedly teaches or suggests the claim limitation that the microcontroller is “selectively providing signal output frequencies.”

For all of these reasons, *Ingraham I* does not teach or suggest the invention of the '183 Patent that significantly improves upon the older, more rudimentary Nartron technology of the asserted prior art. To the contrary, *Ingraham I* requires the use of guard rings and, even when using guard rings, requires a comparatively large touch pad size and an extremely high threshold voltage to detect the proximity of a user's touch. Ex. 1001 at 3:64- 4:18 (stating that *Ingraham I* can only obtain “comparatively close proximity” if the detection threshold is increased to the extent

---

<sup>3</sup> Dr. Subramanian makes a passing reference to *Ingraham III*, which Petitioner does not rely on, and again admits that the voltage of the oscillating signal is the same as the DC power supply input signal. Ex. 1002, ¶36; Ex. 2002, ¶64.

that “a finger, has to entirely overlap a touch terminal and come into contact with its dielectric facing plate before actuation occurs”).

**B. Caldwell Teaches Away From The '183 Patent.**

*Caldwell* is exemplary of Petitioner’s cherry picking from the prior art. Although Petitioner’s *Caldwell* reference is not a cited reference, the '183 Patent does cite a different Caldwell patent that is substantially similar in relevant part to *Caldwell*:

United States Patent [19]		Patent Number: 5,796,183	
Hourmand		Date of Patent: Aug. 18, 1998	
[54]	CAPACITIVE RESPONSIVE ELECTRONIC SWITCHING CIRCUIT	4,308,443	12/1981 Tucker et al. .
		4,323,829	4/1982 Witney et al. .
		4,352,141	9/1982 Kent ..... 363/181
[75]	Inventor: Byron Hourmand, Hersey, Mich.	4,360,737	11/1982 Leopold .
		4,374,381	2/1983 Ng et al. .
[73]	Assignee: Nartron Corporation, Reed City, Mich.	4,476,463	10/1984 Ng et al. .
		4,503,294	3/1985 Matsumaru ..... 200/5 A
		4,731,548	3/1988 Ingraham .
		4,758,735	7/1988 Ingraham .
[21]	Appl. No.: 601,268	4,831,279	5/1989 Ingraham .
[22]	Filed: Jan. 31, 1996	4,910,504	3/1990 Eriksson .
		4,939,382	7/1990 Gruodis .
[51]	Int. CL. <sup>6</sup> ..... H01H 35/00	4,942,631	7/1990 Rosa ..... 4/623
[52]	U.S. CL. .... 307/116; 361/181; 307/125; 307/139	5,012,124	4/1991 Hollaway .
		5,066,898	11/1991 Miller et al. .
[58]	Field of Search ..... 307/112, 113, 307/116, 125, 139, 140, 157; 361/181	5,087,825	2/1992 Ingraham .
		5,208,516	5/1993 Saidian .
[56]	References Cited	5,233,231	8/1993 Wieth et al. .
	U.S. PATENT DOCUMENTS	5,235,217	8/1993 Kirton ..... 307/326
	3,549,909 12/1970 Adelson et al. .	5,386,219	1/1995 Greanias et al.
	3,641,410 2/1972 Vogelsberg .	5,453,644	9/1995 Yap et al. .
	3,651,391 3/1972 Vogelsberg .	5,572,205	11/1996 Caldwell et al. .... 341/33
	3,666,988 5/1972 Bellas .		
	3,798,370 3/1974 Hurst .		
	3,879,618 4/1975 Larson ..... 307/116		
	3,899,713 8/1975 Barkan et al. .		
		Primary Examiner—William M. Shoop, Jr. Assistant Examiner—Jonathan Kaplan Attorney, Agent, or Firm—Price, Heneveld, Cooper, DeWitt & Litton	
		[57]	ABSTRACT

Ex. 1001. The '183 Patent cites to U.S. Pat. No. 5,572,205 (the '205 patent), also invented by Caldwell. Ex. 2006. The '205 patent describes the same sequential activation and detection of individual touch pads in an array as described in the *Caldwell* reference. Ex. 2002, ¶65; Ex. 2006 at 6:4-33. Moreover, Petitioner admits

that *Caldwell* adds nothing new to *Ingraham I* and *II* other than it discloses an oscillator circuit. Petition at 16.

Like *Ingraham I*, *Caldwell* does not seek to place input touch terminals in a closer array or make input touch terminals smaller. Instead, *Caldwell* espouses the need for guard rings that, structurally, prevent input touch terminals from being as small as or in as closely-spaced an array as the input touch terminals of the '183 Patent.

*Caldwell* discloses a touch pad system for use in kitchens. (Ex. 1009 at 1:42-44; 2:45-48). *Caldwell* explains that “[e]xisting touch panel designs provide touch pad electrodes attached to both sides of the substrate.” *Id.* at 1:28-30. According to *Caldwell*, the problem with such touch pads is that they have “openings [for mounting the switch], as well as openings in the switch itself, [that] allow dirt, water and other contaminants to pass through the substrate or become trapped within the switch.” Ex. 1009 at 1:18-21; Ex. 2002, ¶66.

To solve this problem, *Caldwell*’s system stresses the need for guard rings, specifying that, “as shown in FIG. 3, a surface mount transistor 26 and a surface mount resistor 28 are electrically connected to the touch pad. Resistor 28 is connected between center electrode 16 and outer electrode 18.” *Id.* at 5:8-11. *Caldwell* explains that the combination of electrodes with opposing electric fields reduces cross talk between adjacent touch pads. *Id.* at 6:18-23. A PHOSITA would



understand that these combination of electrodes constitute guard rings and that the guard rings are integral to the operation of *Caldwell*. Ex. 2002, ¶67.

*Caldwell* explains that “[a]n important feature of the arrangement of electrodes 16 and 18 is the creation of opposing electric fields” that are “needed where an adjacent touch pad exists.” Ex. 1009 at 6:23-28. Further, *Caldwell* emphasizes that its touch terminals must be large enough that guard rings can be placed around them and spaced apart enough to accommodate the guard rings: “[the *Caldwell*] inventive touch sensor has a first conductive electrode pad and a second conductive electrode which ***substantially surrounds the first electrode in a spaced apart relationship.***” *Id.* at 2:23-28 (emphasis added). In *Caldwell*, “[t]he touch pad includes a thin, conductive center electrode pad 16 and a thin, conductive outer electrode 18 which substantially surrounds the center electrode. A channel 20 is located between center electrode 16 and outer electrode.” *Id.* at 4:1-17. Thus, *Caldwell*, like *Ingraham I*, requires guard rings (i.e., inner and outer electrodes) to “reduc[e] the possibility of crosstalk between adjacent pads.” Ex. 1009 at 2:59-66; *id.* at 6:18-23; Ex. 2002, ¶68.

*Caldwell* does not teach or suggest making a touch pad compact or making the touchpads smaller and in a dense array. To the contrary, *Caldwell*’s touch pads are “preferably” significantly larger than those disclosed in the ’183 Patent: “Preferably, center electrode 16 has dimensions such that the electrode is

***substantially covered*** by a user's fingertip or other appendage when touched." Ex. 1009 at 4:20-23 (emphasis added). There is nothing to suggest that the touchpads of *Caldwell* are any more compact or dense than those described in *Ingraham I*. Ex. 2002, ¶69.

As seen in Figures 1 and 12 of *Caldwell*, the strobe lines (22 in Figure 3) are attached only to the guard rails (outer electrode 18 in Figure 3) and can only activate the touch terminals through the guard rails. Thus, if guard rails were removed from *Caldwell* it would be impossible to activate the touch pads since there would be no conductive path from the demultiplexer (34 in Figure 12) to the touch pads (42 in Figure 12). Similarly, as seen in Figures 3 and 12 of *Caldwell*, the surface mount transistor (26) and surface mount resistor (28) are electrically connected to the touch pad. Ex. 1009 at Figures 3, 12; 5:8-14. Without the surface mount resistor there is no path from the demultiplexer (34 in Figure 12) to the touch pads (42 in Figure 12). Further, without the surface mount transistor there would be no electrical path from the touch pads to the sense lines (24 in Figure 1). Thus, *Caldwell* teaches the need for at least four elements that increase the size and spacing of the touch terminals: a touch pad that must be substantially covered by the operator's finger, guard rails as a component of the touch terminals, a surface mount resistor, and a surface mount transistor. Ex. 2002, ¶71.

In contrast, the '183 Patent expressly disfavors and seeks to improve upon prior art structures where “a finger has to entirely overlap a touch terminal and come into contact with its dielectric facing plate before actuation occurs.” Ex. 1001 at 4:10-14. Thus, the '183 Patent distinguishes between the increased sensitivity of the electronics and sensing circuit needed to place touch pads close together from the requirement that the touch pads still be sensitive enough to human body capacitance to detect the touch or proximity of a user without needing the whole finger to overlap. Ex. 2002, ¶70. Moreover, because *Caldwell* requires guard rings, it is not concerned about the oscillator voltage or frequency. The *Caldwell* strobe signal voltage is low. Although the voltage may oscillate within certain ranges, “[i]n the preferred embodiment, the strobe signal is a square wave oscillating between 0 and +5 volts.” Ex. 1009 at 3:34-44. *Caldwell* is silent as to the voltage of the input signal and therefore does not teach, suggest or in any way motivate the use of an oscillator that has a voltage greater than the supply voltage. Further, like *Ingraham I*, *Caldwell* is silent as to whether the strobe signal provides any output signals to a microcontroller that selectively provides signal output frequencies to input touch terminals. Ex. 2002, ¶72.

*Caldwell* does not selectively activate rows with a signal output from the oscillator as in the '183 Patent. Ex. 2002, ¶73. *Caldwell* sequentially “detects” touch from a single touch pad at a time by sending a signal to a single strobe line

and a signal to a single sense line to address it and detect whether the electrostatic field has been interrupted on that pad. Ex. 1009 at 8:13-24. If the electrostatic field is not interrupted, the strobe moves to the next touch pad and repeats (Figure 14a and 14b). Thus, *Caldwell* performs “selective monitoring.” *Id* at 6:59-62. By contrast, the '183 Patent performs continuous monitoring so that when a touch is detected, the microprocessor can determine where the touch took place. Ex. 2002, ¶73.

Dr. Subramanian makes multiple misleading statements regarding what is shown in *Caldwell*. First, he points to Figures 1 and 2, which illustrate an electrode configuration, but misleadingly suggests that those figures represent a complete touch pad, when even the caption for those figures reflects that a critical component of the pad, the surface mount resister (26) and surface mount resistor (28), are removed. Ex. 1002, ¶38; Ex. 2002, ¶74. The complete pad is actually shown in Figures 3 and 4:

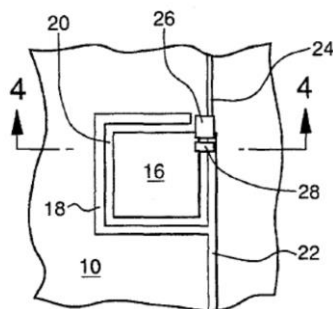


FIG - 3

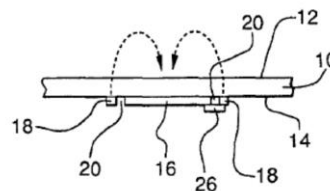


FIG - 4

These figures demonstrate that central electrode 16 is not small since it is significantly larger than surface mount transistor 26. Further, it must be surrounded by outer electrode 18 to produce an electrical field and isolate adjacent touch pads. These components are integral to the operation of the sensor and must be present and connected to the sense lines 24 through the surface mount transistor 26. As shown in *Caldwell*'s Figure 6, the spacing between neighboring central electrodes 16 is increased by the use of the outer electrode and surface mount components. Ex. 2002, ¶76.

Dr. Subramanian is further misleading when he states that "This kind of a scanning mechanism results in a more compact device that allows for tens of touch pads to be accessed by a handful of sense and drive electrodes." Ex. 1002, ¶40. Any space saving resulting from a reduced number of sense and drive electrodes has no effect on the minimum distance between the electrodes. Figure 6 shows that the spacing between central electrodes 16 has been significantly increased by the presence of surrounding outer electrodes 18 and the spacing to the sense lines 24 required by the need for surface mount transistor 26. Ex. 2002, ¶76.

In sum, *Caldwell* does not teach, suggest, or in any way motivate the invention disclosed in the '183 Patent. Dr. Subramanian's characterizations of *Caldwell* are inaccurate, and his attempted obfuscation of *Caldwell*'s stark deficiencies should be disregarded.

**C. *Gerpheide* Teaches Away From The '183 Patent.**

The *Gerpheide* reference, Petitioner's third reference, was presented to the PTO during the second reexamination. Petitioner purports to rely on *Gerpheide* for just one claim element, namely that the "microcontroller selectively provides 'frequencies' to the input touch terminals." Petition at 27-29. This claim element was added during the second reexamination and the PTO found that it overcame *Gerpheide*. Petitioner presents no new arguments here regarding *Gerpheide* that were not previously considered by the PTO.

*Gerpheide* discloses a single touch pad arrangement, not a multi touch pad configuration such as shown in Figure 11 of the '183 Patent. *Gerpheide* discloses a reference frequency generator that "observes position signals to evaluate the extent of interference at some reference frequency. In the event that substantial interference is detected, the generator 16 selects a different frequency for further measurements. The generator 16 seeks to always select a reference frequency away from frequencies which have been found to result in measurement interference. Ex. 1012 at 8:22-38; Fig. 7; Ex. 2002, ¶78.

However, *Gerpheide* does not teach that a microcontroller provides these frequencies selectively to each row of multiple input touch terminals. *See, e.g.*, Ex. 1012 at 8:22-30; Fig. 7. Rather, in *Gerpheide*, "[t]he reference frequency signal is supplied to unit 14 via an AND gate 72 . . . . The AND gate output feeds through

inverter 74 and noninverting buffer 76 to wires RP and RN respectively which are part of a capacitive measurement element 78.” *Id.* at 6:19-26; Fig. 4; Ex. 2002, ¶78.

A PHOSITA would understand that *Gerpheide* would not work with multiple individual touch pads because *Gerpheide* ties all electrodes together to form a single electrode: “All electrodes connected to the CP wire at any one time are considered to form a single ‘positive virtual X electrode.’ Similarly, the electrodes connected to CN, RP, and RN form a ‘negative virtual X electrode’, a ‘positive virtual Y electrode’, and a ‘negative virtual Y electrode’, respectively.” Ex. 1012 at 6:13-18; Ex. 2002, ¶80.

Thus, *Gerpheide* sends the same frequency to all rows or columns of the touch pad at the same time. While the frequency that is sent may vary, *Gerpheide* does not send a selected frequency to a selected row or column because *Gerpheide* is single touch and therefore is concerned about the entire single touch pad, not with interference between multiple touch pads. *Id.*, ¶81.

## V. GROUND I

Petitioner’s arguments rise and fall based on its analysis of claim 37 because every subsequent claim analysis in the Petition refers back to and relies upon the arguments made with respect to claim 37. For the following reasons, Petitioner’s arguments with respect to claim 37 fail.

**A. Petitioner Does Not Show That All Elements Exist In The Art.**

**1. Claim Elements 37(b) and (c)**

*Ingraham I* in combination with *Caldwell* does not teach or disclose an electronic switching circuit comprising “an oscillator providing a periodic output signal having a predefined frequency, wherein an oscillator voltage is greater than a supply voltage.”

With respect to the purported oscillator signal or periodic output from the oscillator, Petitioner admits that *Ingraham I* does not disclose an oscillator circuit and that it instead only discloses a 115V AC power source that is “derived from the power line providing electricity to the unit housing the device.” Petition at 15-16. Petitioner therefore turns to *Caldwell*, arguing that one would “modify the system of *Ingraham I*, based on *Caldwell*, to provide an oscillator that generates a periodic signal (e.g., 115V 60Hz AC signal).” *Id.* at 16. For its “oscillator voltage,” Petitioner argues that the source that supplies power to *Ingraham I* somehow constitutes an oscillator signal with a 115V AC “oscillator voltage.”

Petitioner’s argument fails. To meet the requirement of an oscillator voltage greater than a supply voltage, Petitioner cobbles together two input voltages—one external, from the power source for the system (Petitioner’s “oscillator signal”), and one from an internal DC power supply to the microcomputer (Petitioner’s “input voltage”). The claim requires that the periodic signal be an *output* signal, but all the



signals pointed to by Petitioner, and its expert, are *input* signals. Ex. 2002, ¶83. Moreover, for the reasons explained in Section III.B., above, an external power supply (Petitioner’s “oscillator signal”) teaches away from the electronic switching circuit disclosed in the ’183 Patent that comprises an oscillator that is a component *within* the electronic switching circuit. *Id.* *Ingraham I*’s external power supply signal is not a component of *Ingraham I*’s circuit. Because Petitioner’s “oscillator voltage” is not output by an oscillator that is part of a circuit, or even output by an oscillator circuit at all, but rather by a commercial power line source, *Ingraham I* should be disregarded. In fact, as explained in Section III.B., above, the ’183 Patent is clear that the oscillator voltage is not the input supply voltage and is not the AC voltage from a transformer, but is a voltage selected specifically for the oscillator.

Unable to find any other supply voltage signal in either *Ingraham I* or *Caldwell* (other than *Ingraham I*’s power supply), Petitioner turns to *Ingraham II*, which discloses a 15V DC power supply 70 that provides power to logic circuits 80 (a microcontroller) and 90. Petitioner argues that this 15V DC power equates to the “supply voltage.”

However, in the ’183 Patent, the signal that is sent to the microcontroller is the oscillator signal, not a supply signal. That is, the claims at issue all recite that the microcontroller uses the periodic output signal from the oscillator. Ex. 1001, Claims 37, 40, 61, 83, and 94. Thus, Petitioner’s “supply signal” that is sent to the

microcontroller in *Ingraham I* and *II* is, if anything, more akin to an oscillator signal. Ex. 2002, ¶85.

Accordingly, Petitioner's *Ingraham I-Caldwell* system teaches, if anything, the reverse of what Petitioner argues, i.e., a hypothetical "oscillator" voltage of only 15V that is considerably less than the power supply voltage of 115V. *Id.*

Presumably, Petitioner does not rely exclusively on *Caldwell* for disclosing an oscillator voltage greater than a supply voltage because *Caldwell* does not expressly disclose a supply voltage for its oscillator. *Caldwell* only discloses that its preferred oscillator output voltage is between 0 and +5 volts. Ex. 1009 at 4:42-43. However, a PHOSITA would understand that *Caldwell*'s supply voltage is a wall power supply (e.g., 110V 60Hz AC signal) because the *Caldwell* system is designed to be used on commercial devices that derive their power source from the wall—ovens, cooktops, ranges, fax machines and photocopiers. Ex. 1009 at 2:39-48; Ex. 2002, ¶¶85-86. Moreover, *Caldwell* does not disclose any transformer or voltage regulator to temper the wall supply. Thus, a PHOSITA would understand that *Caldwell*, similar to *Ingraham I*, teaches a supply voltage of 110V 60Hz AC signal. This is greater than *Caldwell*'s oscillator voltage that is preferably between 0 and +5 volts. Ex. 2002, ¶87.

The system disclosed in the '183 Patent is therefore not taught by Petitioner's cited prior art and is in fact an intentional improvement over the prior art. The '183

Patent expressly teaches *against* using an external supply directly to power the system, cautioning that commercial power lines are a drawback because they cause too much noise and thereby cause variations in switch sensitivity. Ex. 1001 at 3:19-24; Ex. 2002, ¶87.

Moreover, the oscillator disclosed in the '183 Patent is unique because the preferred embodiment, shown in Figure 6, includes a buffer circuit that boosts the output of the oscillator to 26V while maintaining the preferred frequency. *Id.* at 13:32-29. The '183 Patent discloses a system that includes a voltage regulator for receiving a 24V AC line voltage that then converts the AC voltage to a DC voltage and “supplies a regulated 5V DC power to an oscillator.” *Id.* at 11:60-12:2. The oscillator then generates a square wave “having an amplitude of 26V peak.” *Id.* at 12:8-13; Ex. 2002, ¶90.

Accordingly, the combined *Ingraham I-Caldwell* system does not teach or disclose a capacitive responsive electronic switching circuit *comprising* “an oscillator providing a periodic output signal having a predefined frequency, wherein an oscillator voltage is greater than a supply voltage.”

## **2. Claim Element 37(d)**

The combined *Ingraham I-Caldwell-Gerpheide* system does not disclose “a microcontroller using the periodic output signal from the oscillator, the microcontroller selectively providing signal output frequencies to a closely spaced

array of input touch terminals of a keypad.” This claim element can be broken down into two components: (a) closely spaced array of input touch terminals of a keypad (e.g., the “input touch terminals” limitation) and (b) the microcontroller selectively providing signal output frequencies to . . . input touch terminals (e.g., the “selectively providing signal output frequencies” limitation).

**a. “input touch terminals”**

Petitioner’s notion that the prior art teaches or discloses the claimed “input touch terminals” limitation is unavailing. It is significant that Petitioner relies on at least four references (five if *Ingraham II* is included) and yet cites ***not one*** reference that teaches or discloses a multi touch pad configuration wherein the input touch terminals do not require physical structures such as guard rings to isolate the touch terminals. Ex. 2002, ¶92. To the contrary, all of the cited references pertaining to multi touch pad embodiments expressly ***require*** the use of guard rings.

Petitioner relies exclusively on *Ingraham I* for the proposition that the claimed “input touch terminals” limitation is met. First, as discussed above in Section IV.A.1., *Ingraham I* only discloses a keypad having only 16 input touch points. Further, even supposing *Ingraham I* discloses any touch terminals, they are not small or in a close array because they require the use of guard rings in order to function properly. Section IV.A., *supra*; Ex. 2002, ¶92. Petitioner provides no analysis or reasoning as to how a PHOSITA might consider *Ingraham I*’s touch terminals to be

in a “closely spaced array” as required by the ’183 Patent claims and specification other than to merely point out that *Ingraham I*’s touch terminals form a keyboard assembly. Petition at 20-21; Ex. 1002 at ¶55.

The ’183 Patent discloses a multi touch pad embodiment that includes a limitless number of input touch terminals. Ex. 1001, Figure 11 (indicating the keypad can have  $n$  times  $m$  number of touch terminals). The ’183 Patent does not require guard rings in a multi touch pad embodiment because it strives to achieve compactness, with touch terminals in very close proximity, without physical structures to isolate the touch terminals, and without compromising performance in detection sensitivity. The ’183 Patent discloses numerous extensive tests that were performed to ascertain the appropriate frequency and voltage that the oscillator must output to provide a novel approach to input touch terminals that do not require guard rings. *See, e.g.*, Ex. 1001 17:11-67 (describing tests to reduce crosstalk and resistance due to contaminants); *id.*, Figure 9 (showing signal to noise ratio versus body capacitance).

Specifically, the multi touch pad embodiment of Figure 11 of the ’183 Patent teaches using any number of input touch terminals, designated as  $900_1$  to  $900_{nm}$ , without specifying a fixed or permanent location for the touch terminals to be placed. Ex. 1001, FIG 11; 18:34-43. As explained in Section II.B., above, the invention of the ’183 Patent achieves compactness without the need for any structure to isolate

the touch terminals such as guard rings because it employs, among other things, a high frequency:

The use of a high frequency in accordance with the present invention provides distinct advantages for circuits such as the multiple touch pad circuit of the present invention due to the manner in which crosstalk is substantially reduced *without requiring any physical structure to isolate the touch terminals. Further, the reduction in crosstalk afforded by the present invention allows the touch terminals in the array to be more closely spaced together.*

*Id.* at 18:66-19:6 (emphasis added); Ex. 2002, ¶¶95-96.

Petitioner does not rely on *Caldwell* for the input touch terminals limitation and, even if it did, for the reasons in Section IV.B., above, *Caldwell*'s input portions require guard rings and, by admission of Petitioner's expert, *Caldwell* only discloses "tens" of touch pads (specifically 20). Ex. 1002, ¶¶40, 60; Ex. 1009, Fig. 6. Moreover, as explained in Section IV.B., above, the outer electrodes in *Caldwell* surround each electrode and space must be provided to connect the touch pads to sense lines by surface mount transistor. The efficiency of *Caldwell* in terms of lines is therefore much less than that of the '183 Patent. Ex. 2002, ¶94.

In sum, no combination of the prior art asserted by Petitioner discloses or teaches "input touch terminals" as claimed and described in the '183 Patent.

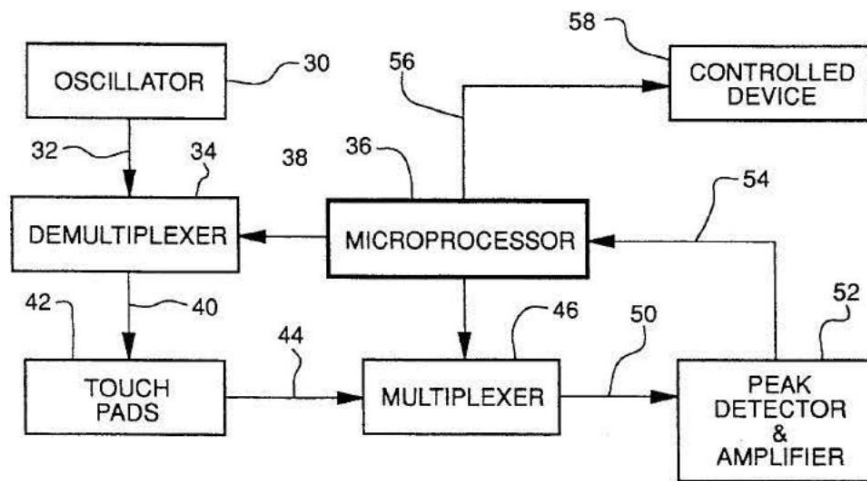
**b. “selectively providing signal output frequencies”**

Petitioner relies on a combination of *Ingraham I*, *Caldwell*, and *Gerpheide* for this claim limitation, and specifically relies predominantly on *Caldwell* for the “selectively providing” portion and on *Gerpheide* for the “output frequencies” portion. For the reasons below, Petitioner’s arguments fail.

First, with respect to the “selectively providing” portion, Petitioner argues that *Caldwell* teaches a circuit wherein the oscillator signal is not directly provided to the matrix of touch pads but rather is sent to a demultiplexer that receives input from a microprocessor. Ex. 1002 at ¶60. The microprocessor then controls a multiplexer that, in turn, sequentially scans the rows or columns of touch pads. *Id.* This is shown in Figure 12 of *Caldwell*, reproduced below, and is described as follows:

When using a matrix of touch pads, a control circuit (as shown in FIG. **12**) is used to selectively monitor each touch pad in the matrix. Microprocessor **36** sequentially selects each strobe line **22** and each sense line **24** by sending the appropriate strobe address and sense address to the demultiplexer and multiplexer, respectively.

FIG - 12



Ex. 1009, Fig. 12; 8:13-19.

This disclosure does not teach or disclose what is claimed and disclosed in the '183 Patent. In contrast to *Caldwell*, the multi touch pad embodiment of the '183 Patent, shown in Figure 11, routes the oscillator signal to both a floating common generator 300 and directly to the microcontroller which then “selectively provid[es] signal output frequencies to a closely spaced array of input touch terminals of a keypad.” Ex. 2002, ¶97.

*Caldwell* does not teach or disclose the enhanced touch detection circuitry of the '183 Patent because, as explained in Section IV.B. above, *Caldwell* uses the following strategies alone to deal with noise: First, it uses a driven guard rail; second, it uses large size pads; and third, it includes a surface mount transistor directly connected between each touch input pad, outer electrode (guard rail) and sense line to amplify the signal at the point of touch input and to provide a conductive



path to the sense lines. A PHOSITA would understand that each of these strategies teaches away from a closely spaced array. An additional problem caused by *Caldwell* is that it requires surface mount resistors due to the very long leads that must surround the *Caldwell* touch input pads. Ex. 1009 at 7:66-8:4; Ex. 2002, ¶98.

In contrast, the '183 Patent increases sensitivity and noise reduction by using an oscillator with a supply voltage less than the oscillator voltage together with a floating common that follows the oscillator voltage, and the oscillator is driven at preferably more than 800khz. Ex. 1001 at 6:3-22; Ex. 2002, ¶97.

Moreover, with respect to the “output frequencies” portion of this claim limitation, Petitioner admits that neither *Ingraham I* nor *Caldwell* provide more than one set frequency to the touch pads and only relies on *Gerpheide* for the proposition that it teaches providing more than one frequency to the touch pads. Ex. 1002, ¶69.

However, while *Gerpheide* teaches that a reference frequency generator 16 “observes position signals to evaluate the extent of interference at some reference frequency” and that in “the event that substantial interference is detected, the generator 16 selects a different frequency for further measurements,” *Gerpheide* does not teach that a microcontroller selects from a variety of frequencies and then provides the selected frequency selectively to each row of input touch terminal(s). Ex. 1012 at 8:22-30; Fig. 7. Rather, in *Gerpheide*, the microprocessor provides value M, i.e., a selected frequency, to a divide-by-(M+N) circuit 104 which then outputs

the reference frequency signal to AND gate 72. *Id.* at 8:31-38; 6:19-26; Figs. 4 and 7. Thereafter, the output of AND gate 72 is sent to electrode array 12 via one of inverter 74 and noninverting buffer 76. *See, e.g., id.* at col. 6:19-26; Fig. 4; Ex. 2002, ¶99.

Thus, as set forth above in Section IV.C., in *Gerpheide*, the output of AND gate 72 is sent to *every row* of the electrode array via one of the inverter and noninverting buffer, and is therefore not “selectively provided” to the input touch terminals. *Gerpheide* discloses only a single touch pad circuit. Therefore, *Gerpheide* does not need to, and does not, disclose the microcontroller selectively providing signal output frequencies to a plurality of small sized input touch terminals of a keypad. Ex. 2002, ¶100. As explained in Section IV.C., above, because *Gerpheide* is single touch and therefore is concerned about sensing the entire single touch pad, it does not sense any individual rows or seek to determine interference between multiple touch pads.<sup>4</sup>

---

<sup>4</sup> Contrary to Dr. Subramanian’s suggestion (Ex. 1002, ¶69), even though there are some features that may be desirable to combine, the principals of operation and the way each of the *Ingraham I*, *Caldwell*, and *Gerpheide* devices is configured to operate means a PHOSITA could not combine them to make working devices. Ex. 2002, ¶101.

Even if *Gerpheide* could be combined with *Caldwell*, the result would be almost identical to *Boie*, a reference that was overcome during reexamination. Ex. 1005 at 24-25; Ex. 1006v3 at 571-580. Both *Boie* and *Gerpheide* teach a system where all components are tied together and driven together by the same signal. In such a system, it would not be possible to sequence through each touch pad and there would be no benefit of using multiple frequencies to differentiate between neighboring touch pads as disclosed in the '183 Patent. Ex. 2002, ¶101.

### **3. Claim Element 37(e)**

Petitioner relies only on *Ingraham I* for claim element 37(e). However, *Ingraham I* does not disclose 37(e) because, for the reasons above in Sections IV.A. and V.A.2.a., it does not disclose the claimed “input touch terminals.” Ex. 2002, ¶104.

Petitioner's expert is also incorrect that “a major advantage of [*Ingraham I*] is that the operator need not come in conductive contact with the touch terminal but rather only in close proximity to it.” Ex. 2002, ¶105. Dr. Subramanian ignores the '183 Patent's teachings that *Ingraham I*'s touch pads cannot be used to form the claimed closely spaced array because guard rails are required:

Above mentioned [*Ingraham I*] employs conductive guard rings around the conductive pad of each touch terminal in an effort to decouple adjacent touch pads and prevent multiple actuations where only a single one is required.

Ex. 1001 at 4:3-18. The '183 Patent discloses that, in *Ingraham I*, to achieve the closest proximity possible, the sensitivity would need to be decreased to the point that it can no longer detect proximity but can only be actuated by contact:

The sensitivity may be adjusted in this manner to a point where the operator's body part, for instance, a finger, has to entirely overlap a touch terminal and come into contact with its dielectric facing plate before actuation occurs.

Ex. 1001 at 4:3-18; Ex. 2002, ¶¶106–107.

And, even using this most optimal implementation of *Ingraham I*, it is still not closely spaced as taught in the '183 Patent, the claims of which recite input terminals that sense proximity and touch. A PHOSITA would understand that this means that the sensitivity of each touch input terminal must be maintained such that proximity can be detected even when the touch input terminals are smaller and closer than *Ingraham I*. Ex. 2002, ¶108.

#### **4. Claim Elements 37(f), 37(g), and 37(h)**

Each of these claim limitations, in combination, recites the operation of the detector circuit disclosed in the '183 Patent. Petitioner inappropriately parses these claim limitations, seeking to deconstruct the claim to manufacture arguments that the limitation is found in the prior art. Together, these claim elements require a detector circuit that is responsive to signals from the oscillator via the

microcontroller, is responsive to a presence of an operator's body capacitance to ground, and generates a control output signal for actuation of the controlled device "when the operator is proximal or touches said second touch terminal after the operator is proximal or touches said first touch terminal." Ex. 1001 at claim 37. Taken as a whole, this claim limitation does not exist in the prior art. Ex. 2002, ¶109.

Petitioner relies primarily on *Ingraham I* regarding claim elements 37(f), (g) and (h), arguing that it discloses the claimed "detector circuit." Petition at 31-36. Petitioner claims that *Ingraham I*'s detector circuit generates the claimed "control output signal" (Petition at 33-35) and that it has the means to do so "when the operator is proximal or touches said second touch terminal after the operator is proximal or touches said first touch terminal" (Petition at 36).

This argument lacks merit. The touch detection circuit in *Ingraham I* will always provide a signal indicative of a change in capacity due to a user's touch. That is, the signal indicative of touch is always either on or off. As described in *Ingraham II*, the touch circuit includes a voltage divider that provides a low level signal when the touch plate is not touched and a high level signal when the touch plate is touched. Ex. 1008 at 3:2-8. *Ingraham I* cannot discriminate between intentional and unintentional touches or to generate the claimed "control output signal" only "when

the operator is proximal or touches said second touch terminal after the operator is proximal or touches said first touch terminal.” Ex. 2002, ¶111.

Moreover, as explained in Section IV.A.1., above, the touch detection system described in *Ingraham I* is not able to detect when an operator is proximal and, at the same time, have the touch pads be closely spaced. The ‘183 Patent distinguishes this aspect of *Ingraham I*. Ex. 1001 at 3:64-4:18 (*Ingraham I* can only obtain “comparatively close proximity” if the detection threshold is increased to the extent that “a finger, has to entirely overlap a touch terminal and come into contact with its dielectric facing plate before actuation occurs”). Ex. 2002, ¶¶112-113 (noting Dr. Subramanian’s erroneous touch sensing analysis).

*Caldwell* also does not teach or disclose means to discriminate between intentional and unintentional touches and to generate the claimed “control output signal” only “when the operator is proximal or touches said second touch terminal after the operator is proximal or touches said first touch terminal.” As explained above in Section IV.B., *Caldwell* uses guard rings (i.e., electrodes with opposing electric fields) to detect when a finger is touching the pad and to provide “a reduced chance of crosstalk between adjacent pads.” Ex. 1009 at 6:18-23; Ex. 2002, ¶114. *Caldwell* does not selectively activate rows with a signal output from the oscillator as in the ‘183 Patent. *Caldwell* instead sequentially “detects” touch by sending a signal to a single strobe line and a signal to a single sense line to address it and detect

whether the electrostatic field has been interrupted on that pad. Ex. 1009 at 6:59-62; 8:13-24; Ex. 2002, ¶114.

The '183 Patent, in contrast, use the operator's body capacitance to ground to trigger the detector circuit and provides a mechanism by which the touch control circuit can discriminate between an intentional touching of the touch terminal and an inadvertent contact by the operator. Specifically, the touch control circuit of the '183 Patent senses variations in body capacitance in the proximity of the touch terminal and thereby determines whether the touch is intentional, at which point a control signal is generated, or whether the touch is inadvertent or unintentional, at which point a control signal is not generated. Ex. 2002, ¶110.

As taught in the specification, a distinct advantage of the invention is the manner in which the enhanced touch terminal detection circuit operates in that it uses a "dedicated microprocessor referenced to the floating supply and floating common" to provide "an expanded ability to detect faults, i.e., a pad that is touched for an excessive amount of time that is known a priori to be an unlikely mode of operation or two or more pads touched at the same time or in an improper order." Ex. 1001 at 6:1-30. As discussed above in Sections II.B. and III and as depicted in Figure 11, the '183 Patent solves this problem by providing an enhanced touch detection circuit that permits the microcontroller to compare signals from the oscillator circuit and the floating common. Ex. 2002, ¶109.

Further, during the original prosecution, certain of the earlier claims were rejected based on prior art, including *Ingraham I*, that showed an oscillator, input touch terminal, a detector circuit, and microcontroller where the detector circuit was responsive to an increase in capacitance when a user touched the input touch terminal. Ex. 1004 at 211-214.

Patent Owner overcame the claim rejections. As for the rejections relating to a single touch pad terminal embodiment, Patent Owner explained that the prior art failed to disclose any way of discriminating between a partial touch and a full touch of the touch terminal and amended the claims accordingly. Ex. 1004 at 189-191. With respect to the multi touch pad embodiment at issue here, Patent Owner explained that “the Kent and Ingraham [I] patents both fail to teach or suggest a capacitive responsive electronic switching circuit comprising a detector circuit that compares the sensed body capacitance proximate an input touch terminal to a threshold level in order to prevent inadvertent generation of a control output signal.” *Id.* at 191. Patent Owner also added a new claim 27 that, similar to claim 37 at issue here, recites a switching circuit for a control device that comprises at least first and second touch terminals and a detector circuit that generates a control output signal for actuation of the control device when an operator is proximal or touches the second touch terminal after the operator is proximal or touches the first touch terminal. *Id.* at 192-193. Because nothing in the prior art, including *Ingraham I* that



Petitioner again relies on here, showed these limitations, the claims were allowed. Ex. 2002, ¶115.

Here, too, neither *Ingraham I* nor *Caldwell* show a detector circuit that generates a control output signal for actuation of the control device when an operator is proximal or touches the second touch terminal after the operator is proximal or touches the first touch terminal. Accordingly, Petitioner's challenge to claim 37 fails on this basis.

**B. The Remaining Arguments Also Fail Under Petitioner's Flawed Analysis of Claim 37.**

**1. Independent Claim 40**

Regarding independent claim 40, Petitioner relies primarily, if not exclusively on its analysis regarding claim 37. Petition at 39-49. Just as with claim 37, Petitioner's arguments regarding obviousness of claim 40 fail. The following chart reflects where Petitioner's arguments regarding claim 40 are found within this Preliminary Response and any additional limitations are addressed below:

Claim 40 Limitation	Addressed <i>Supra</i> in Sections
40(b)	V.A.1
40(c), (d), (e)	IV.A.1., IV.B., V.A.2
40(f), (g)	V.A.4

**a. Claim Element 40(h)**

Petitioner's arguments regarding 40(h) are largely addressed in Sections IV.A.1., IV.B., and V.A.2. above. Ex. 2002, ¶119. Petitioner's residual argument is that the remainder of this claim limitation, i.e., selecting the frequencies "to decrease a first impedance of said dielectric substrate relative to a second impedance of any contaminate that may create an electrical path on said dielectric substrate between said adjacent areas defined by the plurality of small sized input touch terminals," is a mere statement of intended use and should not be given any patentable weight. Petition at 43. This argument is without merit.

The "selecting the frequencies" limitation is not merely a statement of general scope of the invention as a whole, such as an intended use identified in the claim preamble. *Cf. In re Schreiber*, 129 F.3d 1473, 1477 (Fed. Cir. 1997) ("It is well settled that the recitation of a new intended use for an old product does not make a claim to that old product patentable."). Rather, it is a limitation in the body of the claims that is essential to a description of the invention. *In re Bulloch*, 604 F.2d 1362, 1365 (CCPA 1979). Not only does this "selecting the frequencies" limitation refer to one of the "essence[s] of the invention," it also provides the criteria by which the previously-recited limitation of "a microcontroller using the periodic output signal from the oscillator, the microcontroller selectively providing signal out frequencies" is analyzed. *Vizio, Inc. v. Int'l Trade Comm'n*, 605 F.3d 1330, 1341

(Fed. Cir. 2010) (“[T]he ‘for decoding’ language . . . is properly construed as a limitation because ‘decoding’ is the essence or a fundamental characteristic of the claimed invention.”); *In re Eric Jasinski*, 508 Fed. Appx. 950 (Fed. Cir. 2013) (unreported). Even if this limitation describes what the device does, it is not appropriate to disregard the limitation if what it does makes the device what it is. *Samsung Elec. Co., Ltd. v. Unifi Scientific Batteries, LLC*, IPR2013-00236, Paper 10 at 8-10 (PTAB Sept. 25, 2013) (claim term was not merely statement of intended use where recitation of term described “fundamentally what the claimed apparatus is, not merely how it is intended to be used”). Thus, this “selecting the frequency” limitation language is limiting.

Petitioner’s arguments that this limitation is found in the prior art is also without merit. As explained above in Sections III.A., III.C., and V.A., there is nothing in the prior art that selectively provides signal output frequencies or does so between areas that are defined by a plurality of small sized input touch terminals. Ex. 2002, ¶121. The ’183 Patent, however, discloses determining specific predetermined hertz values the oscillator will produce, Ex. 1001 at 8:64-11-58, and gives specific calculations for determining specific frequencies to be used to prevent cross talk, *id.* at 11:30-60. Ex. 2002, ¶120.

**b. Claim Element 40(i)**

Petitioner's arguments regarding 40(i) are largely addressed above in Section V.A.4. Ex. 2002, ¶122. Further, *Ingraham I*, upon which Petitioner relies, does not provide any way to compare a sensed body capacitance change to ground to a threshold level *to prevent inadvertent generation of the control output signal*. Petitioner makes no attempt to show where or how the prior art operates to prevent inadvertent generation of the control output signal. Petitioner admits that the circuit disclosed in *Ingraham I* is either on or off and has no means to prevent inadvertent generation of the control output signal. Petition at 38; 47-48 (“[w]hen the change in  $V_{EB}$  . . . exceeds a threshold value . . . transistor 50 turns ON to output a signal”). By Petitioner's admission, to the extent *Ingraham I* has any value by which to compare a body capacitance to change, it is only the “OFF” value, not a “threshold level to prevent inadvertent generation of the control output signal” as required by claim 40. Compare Ex. 1001, claim 40 with Petition at 48 (explaining that *Ingraham I*'s “threshold value” is the OFF value); Ex. 2002, ¶123.

Moreover, by Petitioner's own admission, *Ingraham I* “requires an operator to actually touch or bring their finger sufficiently close to the input portion 13 to cause a proper touch to be sensed.” Petition at 48. The '183 Patent, however, provides a means—through the use of high voltages, high frequencies and a floating common explained above—that eliminates the need for an operator to actually touch

or come sufficiently close to the input portion and instead permits users to simply be “proximate an input touch terminal” because the means disclosed in the ’183 Patent prevents inadvertent generation of the control output signal. Ex. 2002, ¶124.

Regarding Petitioner’s argument that the limitation “to prevent inadvertent generation of the control output signal” should be given no patentable weight, for the same reasons stated above with respect to 40(h), Petitioner’s argument has no merit and should be rejected.

## **2. Independent Claim 61**

Regarding independent claim 61, Petitioner relies on its analysis regarding claims 37 and 40. Petition at 49-51. For the reasons above, Petitioner’s arguments regarding obviousness of claim 61 also fail. Ex. 2002, ¶125. The following chart reflects where Petitioner’s arguments regarding claim 61 are found within this Preliminary Response:

Claim 61 Limitation	Addressed <i>Supra</i> in Sections
61(b)	V.A.1.
61(c)	V.A.2., V.B.1.b.
61(d)	V.A.1., V.A.2.
61(e)	V.A.2., V.B.1.b.
61(f)	V.A.4.

Claim 61 Limitation	Addressed <i>Supra</i> in Sections
61(g)	V.A.4.
61(h)	V.A.4. V.B.1.d.
61(i)	V.A.4. V.B.1.e.

### 3. Independent Claim 83

Regarding independent claim 83, Petitioner relies on its analysis regarding claim 37. Petition at 51-52. For the reasons above, Petitioner's arguments regarding obviousness of claim 83 also fail. Ex. 2002, ¶126. The following chart reflects where Petitioner's arguments regarding claim 83 are found within this Preliminary Response:

Claim 83 Limitation	Addressed <i>Supra</i> in Sections
83(b)	V.A.1.
83(c)	V.A.2., V.A.3.
83(d)	V.A.1., V.A.2.
83(e)	V.A.3.
83(f)	V.A.4.
83(g)	V.A.4.
83(h)	V.A.4.

#### 4. Independent Claim 94

Regarding independent claim 94, Petitioner again relies primarily on its analysis regarding claim 37. Petition at 52-54. For the reasons above, Petitioner's arguments regarding obviousness of claim 94 also fail. Ex. 2002, ¶127. The following chart reflects where Petitioner's arguments regarding claim 94 are found within this Preliminary Response:

Claim 94 Limitation	Addressed <i>Supra</i> in Sections
94(b)	V.A.1.
94(c)	V.A.2., V.B.1.b.
94(d)	V.A.3.
94(e)	V.A.1., V.A.2.
94(f)	V.A.3.
94(g)	V.A.4.
94(h)	V.A.4.
94(i)	V.A.4.

#### 5. Dependent Claims 41, 43, 45, 64-67, 69, 85, 86, 88, 90, 91, 96, 97, 99, 101, 102

The dependent claims are not obvious over *Ingraham I* in view of *Caldwell* and *Gerpheide* because independent Claims 37, 40, 61, 83, and 94, from which they

depend, are not obvious over *Ingraham I* in view of *Caldwell* and *Gerpheide* and because of the additional features they recite. Ex. 2002, ¶128. Patent Owner is entitled to the presumption that the dependent claims further limit the independent claim, which in fact they do.

**C. The *Ingraham I-Caldwell-Gerpheide* Combination Does Not Render the Claims Obvious.**

For all of the foregoing reasons, the *Ingraham I-Caldwell-Gerpheide* asserted by Petitioner does not and cannot render the challenged claims of the '183 Patent obvious. To summarize:

**First**, multiple limitations that are critical to all the challenged claims are missing from the asserted combination. Petitioner's two primary references are both directed solely to solutions with limitations (e.g., the use of guard rings as part of the terminals themselves) that every challenged claim overcomes. As explained above, employing guard rings teaches away from the solution offered by the '183 Patent's multi touch embodiment, which does not require guard rings to isolate the terminals. This is fatal to the Petition. *Allergan, Inc. v. Sandoz Inc.*, 796 F.3d 1293 (Fed. Cir. 2015) (finding claims not obvious and holding that the prior art teachings that BAK should be minimized teaches away from the patent's use of higher concentrations of BAK).



**Second**, the inventions of the '183 Patent would not operate as intended if constructed from the asserted combination because the combination would still use guard rings incorporated into the terminals themselves, and hence the *Ingraham I-Caldwell-Gerpheide* combination is fatally inadequate.

**Finally**, and as explained further in Section VII. below, a PHOSITA would have no reason to combine *Caldwell* with *Ingraham I* because *Ingraham I* already employs guard rings, and hence, a PHOSITA would have no reason to look for another guard ring design, such as *Caldwell*. *Kinetic Concepts, Inc. v. Smith & Nephew, Inc.*, 688 F.3d 1342, 1361, 1366 (Fed. Cir. 2012) (obviousness not established where limitations critical to all claims were not disclosed in any asserted reference and a PHOSITA had no reason to combine the prior art references to arrive at the claimed invention).

As a result, Petitioner fails to establish that it is likely to prevail on its obviousness assertion.

## **VI. GROUND II**

### **A. The *Ingraham I-Caldwell-Gerpheide-Wheeler* Combination Does Not Render Obvious Claims in Ground II.**

For the reasons above, the combined *Ingraham I-Caldwell-Gerpheide* system does not teach or disclose the elements of independent claims 37, 40, 61, 83, and 94, from which dependent claims 47, 48, 62, 63, and 84 depend. Accordingly, these

dependent claims are not obvious because of the additional features they recite. Ex. 2002, ¶¶129-130.

*Wheeler* does not add to the *Ingraham I-Caldwell-Gerpheide* disclosure. *Wheeler* discloses a machine operator control station circuit. Ex. 1015. A PHOSITA would not look to *Wheeler* and, if they did, Petitioner's arguments regarding *Wheeler* are addressed above in Section V.A.4. Ex. 2002, ¶131. Petitioner's arguments under Ground II fail.

## **VII. PETITIONER DOES NOT MEET THE STANDARD REQUIRED FOR INSTITUTION.**

Petitioner does not provide insight into how or why to combine the many pieces of art. Petitioner makes sweeping remarks about what the combined system shows or how it would purportedly meet the claim limitations without any explanation as to differences between the prior art and the claimed invention. Where the Petitioner does not explain the differences between the prior art and the claimed invention, the Petition should be denied. *Apple Inc. v. Contentguard Holdings, Inc*, IPR2015-00453, Paper 9 at 11 (PTAB July 13, 2015) (denying petition where there was no explanation of the differences between prior art and challenged claims).

Here, there are numerous differences between the prior art and the challenged claim, all of which Petitioner conveniently ignores.

**A. Petitioner Provides No Rationale Or Motivation To Combine The References And Uses Improper Hindsight.**

It is well established that “[c]are must be taken to avoid hindsight reconstruction by using the patent in suit as a guide through the maze of prior art references.” *Grain Processing Corp. v. Am.-Maize Prods. Co.*, 840 F.2d 902, 907 (Fed. Cir. 1988). Thus, “rejections on obviousness grounds cannot be sustained by mere conclusory statements.” *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006); *see also KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007). Failure to provide such reasoning justifies denial of the petition. *See, e.g., Apple Inc.*, IPR2015-00453, Paper 9 at 12-16.

Here, Petitioner argues that the *Ingraham I-Caldwell-Gerpheide* combination demonstrates the existence of all the elements of the independent claims, but Petitioner does not explain why or how the combination would occur. “It is not sufficient to demonstrate that each of the components in a challenged claim is known in the prior art.” *Microboards Tech., LLC d/b/a Afinia v. Stratasys, Inc.*, IPR2015-00287, Paper 13 at 14 (PTAB May 28, 2015). Petitioner lists potential rationales for combination without tying any of the rationales to a factual underpinning.

A PHOSITA would not combine *Caldwell* with *Ingraham I* because they both require guard rings as part of the terminals themselves to avoid cross talk and noise,

whereas the '183 Patent strives to avoid such guard rings to bring the input touch terminals in a tightly compacted array. Ex. 2002, ¶¶132-136.

Moreover, there is also no teaching to suggest that the touch pads of *Caldwell* are any smaller or more closely spaced than *Ingraham I* and there is therefore no motivation to combine *Caldwell* and *Ingraham I* to produce the “input touch terminals” limitation claimed in the '183 Patent. A PHOSITA would not look to combine *Gerpheide* with *Ingraham I* and *Caldwell* because *Gerpheide* teaches a single touch pad configuration, and does not selectively send frequencies to each of the rows or columns of multiple touchpads. Ex. 2002, ¶¶102, 137.

This is not a case of substituting or combining prior art elements according to known methods to yield predictable results, or a case of applying a known technique to improve similar devices in the same way to yield predictable results. The extensive tests that were performed as summarized in the specification belie that notion. Ex. 2002, ¶140. Petitioner has shown no teaching, suggestion, or motivation in the prior art that would have led a PHOSITA to modify or combine the prior art to arrive at the claimed invention.

Petitioner's invitation to combine *Ingraham I*, *Caldwell* and *Gerpheide* to meet the independent claims without identifying specific aspects of these references is a suggestion that the Board should “us[e] the patent in suit as a guide through the maze of prior art references” to reach the claims in suit. *Grain Processing*, 840 F.2d

at 907. This is the quintessential example of “allow[ing] hindsight reconstruction of references to reach the claimed invention,” against the guidance of the Federal Circuit. *Kinetic Concepts*, 688 F.3d at 1374 n.3.

Petitioner has not properly provided a factual basis for any of the rationale and therefore has not shown a substantial likelihood of demonstrating obviousness. *Apple Inc. v. Contentguard Holdings, Inc.*, IPR2015-00452, Paper 9 at 12-17 (PTAB July 13, 2015); *Apple Inc.*, IPR2015-00453, Paper 9 at 12-16.

**B. The References Could Not Be Combined In Any Event.**

Even if the prior art disclosed the missing elements, there is no reasonable expectation of success because the prior art combination would not be a close array with small sized input touch terminals and would therefore render the invention unsatisfactory for its intended purpose. Ex. 2002, ¶139. Combinations that change the “basic principles under which the [prior art] was designed to operate,” or that render the resulting device “inoperable for its intended purpose,” fail to support a conclusion of obviousness. *Plas-Pak Indus., Inc. v. Sulzer Mixpac AG*, 600 F. App’x 755, 758 (Fed. Cir. 2015).

**VIII. PETITIONER IGNORES SECONDARY CONSIDERATIONS OF NON-OBVIOUSNESS.**

Petitioner never addresses secondary considerations of non-obviousness, including Patent Owner’s commercial success practicing the inventions and wide

spread acceptance of the inventions. *Kinetic Concepts, Inc. v. Smith & Nephew, Inc.* 688 F.3d 1342, 1368 (Fed. Cir. 2012). Because Petitioner has not demonstrated a reasonable likelihood of success on any grounds, and to avoid unnecessary burden on the Board, Patent Owner does not submit specific evidence relevant to secondary considerations at this stage.

**IX. THE BOARD SHOULD EXERCISE ITS DISCRETION TO DENY THE PETITION UNDER 35 U.S.C. 325(d).**

The Board has discretion to “reject the petition . . . because . . . the same or substantially the same prior art or arguments previously were presented to the Office.” 35 U.S.C. 325(d). Such is the case here.

*Ingraham I* and *II* were considered during prosecution and *Gerpheide* was considered in reexamination of the ’183 Patent. Sections IV.A. and IV.B., above. The arguments considered during prosecution were substantially similar to those that Petitioner presents today. *Caldwell*, discussed in Section IV. B., above, adds nothing and in fact is more similar to *Ingraham I* than the ’183 Patent. Ex. 2002, ¶¶65-69.

Thus, the prior art presented here is identical or duplicative of that before the PTO in prosecution and reexamination. Institution has been denied in such circumstances. *See, e.g., Ceramtec GmbH v. Ceramedic, LLC*, IPR2015-00424, Paper 9 at 12 (PTAB July 7, 2015); *Microboards*, IPR2015-00287, Paper 13 at 7-12.

**X. CONCLUSION**

For all of the foregoing reasons, the Board should deny institution of the Petition.

Respectfully submitted,

Dated: July 20, 2016

By: /s/ Jay P. Kesan  
Jay P. Kesan  
Reg. No. 37,488  
Counsel for Patent Owner

**CERTIFICATE OF COMPLIANCE**

Pursuant to 37 C.F.R. § 42.24(d), Patent Owner hereby certifies that the foregoing brief contains 13,961 words, excluding those portions exempted pursuant to § 42.24(a)-(b).

Dated: July 20, 2016

/s/ Jay P. Kesan

JAY P. KESAN

Reg. No. 37,488

DiMURO GINSBERG PC/DGKEYIP GROUP

1101 King Street, Suite 610

Alexandria, VA 22314

(703) 684-4333

***Counsel for Patent Owner***



**CERTIFICATE OF SERVICE**

Pursuant to 37 C.F.R. § 42.6(e), the undersigned certifies that on the date indicated below, a complete and entire copy of this submission, including the exhibits hereto, was provided by email to Petitioner's counsel via email, as agreed to by Petitioner's Service Information in the Petition submission, by serving the email address of record as follows:

naveenmodi@paulhastings.com;  
josephpalys@paulhastings.com;  
chetanbansal@paulhastings.com.

Respectfully submitted,

Dated: July 20, 2016

By: /s/ Jay P. Kesan  
Jay P. Kesan  
Reg. No. 37,488  
Counsel for Patent Owner