United States District Court,
E.D. Texas, Texarkana Division.

INPUT/OUTPUT, INC. and I/O Sensors, Inc,
Plaintiffs.
v.
SERCEL, INC,
Defendant.

No. 5:06CV236

Dec. 19, 2007.

CLAIM CONSTRUCTION REPORT AND RECOMMENDATION

CAROLINE M. CRAVEN**, United States Magistrate Judge.**

Pursuant to the provisions of 28 U.S.C. s. 636(b)(1) and (3) and the Amended Order for the Adoption of Local Rules for Assignment of Duties to United States Magistrate Judges, the above-entitled and numbered cause of action was referred to the undersigned for pretrial purposes. The Court conducted a claim construction hearing on October 17, 2007. The Court issues the following claim construction report and recommendation.

I.BACKGROUND

On October 20, 2006, the Plaintiffs Input/Output, Inc. and I/O Sensors, Inc. (collectively referred to as "I/O") filed a patent infringement action against Sercel, Inc. ("Sercel") asserting United States Patent No. 5,852,242 ("the ' 242 Patent"). Before the Court are the claim construction briefs regarding the '242 Patent. More particularly, the Plaintiffs' Opening Claim Construction Brief and Sercel, Inc.'s Claim Construction Brief are before the Court. Dkt. Nos. 36 and 39. In addition, Plaintiffs' Reply Claim Construction Brief and Sercel, Inc.'s Sur-Reply Brief in Support of It's Proposed Claim Construction are also under consideration. Dkt. Nos. 43 and 46. The parties have also submitted their Joint Claim Construction Chart. Dkt. No. 53. Oral arguments were presented at a claim construction hearing on October 17, 2007. At the claim construction hearing, I/O also presented the testimony of Dr. Bruce Buckman and Dr. Martin Schmidt.

A total of twenty-four terms are in dispute and each asserted claim has between ten and twenty individual terms in dispute.

II. LEGAL PRINCIPLES OF CLAIM CONSTRUCTION

A determination of patent infringement involves two steps. First, the patent claims are construed, and, second, the claims are compared to the allegedly infringing device. Cybor Corp. v. FAS Techs., Inc., 138 F.3d 1448, 1455 (Fed.Cir.1998) (en banc).

The legal principles of claim construction were reexamined by the Federal Circuit in Phillips v. AWH Corp., 415 F.3d 1303 (Fed.Cir.2005) (en banc). Reversing a summary judgment of non-infringement, an en banc panel specifically identified the question before it as: "the extent to which [the court] should resort to and rely on a patent's specification in seeking to ascertain the proper scope of its claims." Id. at 1312. Addressing this question, the Federal Circuit specifically focused on the confusion that had amassed from its recent decisions on the weight afforded dictionaries and related extrinsic evidence as compared to intrinsic evidence. Ultimately, the court found that the specification, "informed, as needed, by the prosecution history," is the "best source for understanding a technical term." Id. at 1315 (*quoting* Multiform Dessicants, Inc. v. Medzam, Ltd., 133 F.3d 1473, 1478 (Fed.Cir.1998)). However, the court was mindful of its decision and quick to point out that *Phillips* is not the swan song of extrinsic evidence, stating:

[W]e recognized that there is no magic formula or catechism for conducting claim construction. Nor is the court barred from considering any particular sources or required to analyze sources in any specific sequence, as long as those sources are not used to contradict claim meaning that is unambiguous in light of the intrinsic evidence.

Phillips, 415 F.3d at 1324 (citations omitted). Consequently, this Court's reading of *Phillips* is that the Federal Circuit has returned to the state of the law prior to its decision in Texas Digital Sys. v. Telegenix, Inc., 308 F.3d 1193 (Fed.Cir.2002), allotting far greater deference to the intrinsic record than to extrinsic evidence. "[E]xtrinsic evidence cannot be used to vary the meaning of the claims as understood based on a reading of the intrinsic record." Phillips, 415 F.3d at 1319.

Additionally, the Federal Circuit in *Phillips* expressly reaffirmed the principles of claim construction as set forth in Markman v. Westview Instruments, Inc., 52 F.3d 967 (Fed.Cir.1995) (en banc), *aff'd,* 517 U.S. 370 (1996), Vitronics Corp. v.. Conceptronic, Inc., 90 F.3d 1576 (Fed.Cir.1996), and Innova/Pure Water, Inc. v. Safari Water Filtration Systems, Inc., 381 F.3d 1111 (Fed.Cir.2004). Thus, the law of claim construction remains intact. Claim construction is a legal question for the courts. Markman, 52 F.3d at 979. The claims of a patent define that which "the patentee is entitled the right to exclude." Innova, 381 F.3d at 1115. The claims are "generally given their ordinary and customary meaning" as understood by "a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application." Vitronics, 90 F.3d at 1582; *Phillips,* 415 F.3d 1313. However, the Federal Circuit stressed the importance of recognizing that the person of ordinary skill in the art "is deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification." Phillips, 415 F.3d at 1313.

Advancing the emphasis on the intrinsic evidence, the *Phillips* decision explains how each source, the claims, the specification as a whole, and the prosecution history, should be used by courts in determining how a skilled artisan would understand the disputed claim term. *See, generally, id*. at 1314-17. The court noted that the claims themselves can provide substantial guidance, particularly through claim differentiation. Using an example taken from the claim language at issue in *Phillips,* the Federal Circuit observed that "the claim in this case refers to 'steel baffles,' which strongly implies that the term 'baffles' does not inherently mean objects made of steel." *Id*. at 1314. Thus, the "context in which a term is used in the asserted claim can often illuminate the meaning of the same term in other claims." *Id*. Likewise, other claims of the asserted patent can be enlightening, for example, "the presence of a dependent claim that adds a particular limitation gives rise to a presumption that the limitation in question is not present in the independent claim." *Id*. at 1315 (*citing* Liebel-Flarsheim Co. v. Medrad, Inc., 358 F.3d 898, 910 (Fed.Cir.2004)).

Still, the claims "must be read in view of the specification, of which they are part." Markman, 52 F.3d at 978. In *Phillips,* the Federal Circuit reiterated the importance of the specification, noting that "the 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.' " Phillips, 415 F.3d at 1315 (*quoting* Vitronics, 90 F.3d at 1582). To emphasize this position, the court cited extensive case law, as well as "the statutory directive that the inventor provide a 'full' and 'exact' description of the claimed invention." *Id*. at 1316 (*citing* Merck & Co., Inc. v. Teva Pharms. USA, Inc., 347 F.3d 1367, 1371 (Fed.Cir.2003)); *see also* 35 U.S.C. s. 112, para. 1. Consistent with these principles, the court reaffirmed that an inventor's own lexicography and any express disavowal of claim scope is dispositive. *Id*. at 1316. Concluding this point, the court noted the consistency with this approach and the issuance of a patent from the Patent and Trademark Office and found that "[i]t is therefore entirely appropriate for a court, when conducting claim construction, to rely heavily on the written description for guidance as to the meaning of the claims." *Id*. at 1317.

Additionally, the *Phillips* decision provides a terse explanation of the prosecution history's utility in construing claim terms. The court simply reaffirmed that "the prosecution history can often inform the meaning of the claim language by demonstrating how the inventor understood the invention and whether the inventor limited the invention in the course of prosecution, making the claim scope narrower than it would otherwise be." *Id*. (*citing* Vitronics, 90 F.3d at 1582-83). It is a significant source for evidencing how the patent office and the inventor understood the invention. *Id*.

Finally, the Federal Circuit curtailed the role of extrinsic evidence in construing claims. In pointing out the less reliable nature of extrinsic evidence, the court reasoned that such evidence (1) is by definition not part of the patent, (2) does not necessarily reflect the views or understanding of a person of ordinary skill in the relevant art, (3) is often produced specifically for litigation, (4) is far reaching to the extent that it may encompass several views, and (5) may distort the true meaning intended by the inventor. *See id*. at 1318. Consequently, the Federal Circuit expressly disclaimed the approach taken in *Texas Digital*. While noting the *Texas Digital* court's concern with regard to importing limitations from the written description, "one of the cardinal sins of patent law," the Federal Circuit found that "the methodology it adopted placed too much reliance on extrinsic sources such as dictionaries, treatises, and encyclopedias and too little on intrinsic sources, in particular the specification and prosecution history." *Id*. at 1320. Thus, the court renewed its emphasis on the specification's role in claim construction.

Many other principles of claim construction, though not addressed in *Phillips,* remain significant in guiding this Court's charge in claim construction. The Court is mindful that there is a "heavy presumption" in favor of construing claim language as it would be plainly understood by one of ordinary skill in the art. Johnson Worldwide Assocs., Inc. v. Zebco Corp., 175 F.3d 985, 989 (Fed.Cir.1999); *cf. Altiris, Inc., v. Symantec Corp.,* 318 F.3d 1364, 1372 (Fed.Cir.2003) ("[S]imply because a phrase as a whole lacks a common meaning does not compel a court to abandon its quest for a common meaning and disregard the established meaning of the individual words.") The same terms in related patents are presumed to carry the same meaning. *See* Omega Eng'g, Inc. v. Raytek Corp., 334 F.3d 1314, 1334 (Fed.Cir.2003) ("We presume, unless otherwise compelled, that the same claim term in the same patent or related patents carries the same construed meaning.") "Consistent use" of a claim term throughout the specification and prosecution history provides "context" that may be highly probative of meaning and may counsel against "[b]roadening of the ordinary meaning of a term in the absence of support in the intrinsic record indicating that such a broad meaning was intended ...." Nystrom v. TREX Co., 424 F.3d 1136, 1143-46 (Fed.Cir.2005).

Claim construction is not meant to change the scope of the claims but only to clarify their meaning.

Embrex, Inc. v. Serv. Eng'g Corp., 216 F.3d 1343, 1347 (Fed.Cir.2000) ("In claim construction the words of the claims are construed independent of the accused product, in light of the specification, the prosecution history, and the prior art.... The construction of claims is simply a way of elaborating the normally terse claim language[ ] in order to understand and explain, but not to change, the scope of the claims.") (citations and internal quotations omitted). Regarding claim scope, the transitional term "comprising," when used in claims, is inclusive or open-ended and "does not exclude additional, unrecited elements or method steps." CollegeNet, Inc. v. ApplyYourself, Inc., 418 F.3d 1225, 1235 (Fed.Cir.2005) (citations omitted). Claim constructions that would read out the preferred embodiment are rarely, if ever, correct. Vitronics, 90 F.3d at 1583-84.

The Court notes that a patent examiner's "Reasons for Allowance," where merely summarizing a claimed invention and not specifically noting that patentability is based on a particular feature, do not limit the scope of the claim. *See* Apex Inc. v. Raritan Computer, Inc., 325 F.3d 1364, 1375 (Fed.Cir.2003). Similarly, an examiner's unilateral statements in a "Notice of Allowance" do not result in the alteration of claim scope. *See id.; see also* Salazar v. Procter & Gamble Co., 414 F.3d 1342, 1346-47 (Fed.Cir.2005). "[F]or prosecution disclaimer to attach, our precedent requires that the alleged disavowing actions or statements made during prosecution be both clear and unmistakable." Omega Eng'g, 334 F.3d at 1326. The Federal Circuit has "declined to apply the doctrine of prosecution disclaimer where the alleged disavowal of claim scope is ambiguous." Id. at 1324.

The doctrine of claim differentiation is often important in claim construction. Phillips, 415 F.3d at 1315 (*citing* Liebel-Flarsheim, 358 F.3d at 910). "Claim differentiation" refers to the presumption that an independent claim should not be construed as requiring a limitation added by a dependent claim. Curtiss-Wright Flow Control Corp. v. Velan, Inc., 438 F.3d 1374, 1380 (Fed.Cir.2006). This is in part because "reading an additional limitation from a dependent claim into an independent claim would not only make that additional limitation superfluous, it might render the dependent claim invalid." *Id.; see also* SRI Int'l. v. Matsushita Elec. Corp. of Am., 775 F.2d 1107, 1122 (Fed.Cir.1985) ("It is settled law that when a patent claim does not contain a certain limitation and another claim does, that limitation cannot be read into the former claim in determining either validity or infringement.") This doctrine is based in part on the presumption that each claim has a different scope. 35 U.S.C. s. 282; Curtiss-Wright, 438 F.3d at 1380. The difference in meaning and scope between claims is presumed to be significant to the extent that the absence of such difference in meaning and scope would make a claim superfluous. Free Motion Fitness, Inc. v. Cybex Int'l, 423 F.3d 1343, 1351 (Fed.Cir.2005). Although a validity analysis is not a regular component of claim construction, if possible claims should be construed to preserve their validity. Phillips, 415 F .3d at 1327; *see also* Rhine v. Casio, Inc., 183 F.3d 1342, 1345 (Fed.Cir.1999).

A patentee may set out the elements of a claim in a so-called means-plus-function format. 35 U.S.C. s. 112, para. 6. The patentee may recite in the claim a "means for" achieving a certain function. In exchange for this convenience in claim drafting, the patentee must disclose a corresponding structure in the specification. O.I. Corp. v. Tekmar Co., 115 F.3d 1576, 1583 (Fed.Cir.1997). If the patentee fails to provide corresponding structure sufficient to enable a person of ordinary skill in the art to make and use the invention, then the claim is invalid. See 35 U.S.C. s. 112, para. 1. If the patentee provides sufficient corresponding structure, then the claim scope encompasses that structure "and its equivalents." Id. at s. 112, para. 6; *see also* Default Proof Credit Card Sys. v. Home Depot U.S.A., Inc., 412 F.3d 1291, 1298 (Fed.Cir.2005). A corresponding structure need not enable the claimed invention, rather it need only "include all structure that actually performs the recited function." Default Proof Credit Card Sys., 412 F.3d at 1298. A structure disclosed is only a "corresponding structure" if the "specification or prosecution history clearly links or associates that

structure to the function recited in the claim." Med. Instrumentation & Diagnostics Corp. v. Elekta, 344 F.3d 1205, 1210 (Fed.Cir.2003). Accused devices employing the same or equivalent structure will be found to literally infringe the claim. WMS Gaming, Inc. v. Int'l Game Technology, 184 F.3d 1339, 1350 (Fed.Cir.1999) (noting that "to establish literal infringement of a means-plus-function claim, the patentee must establish that the accused device employs structure identical or equivalent to the structure disclosed in the patent and that the accused device performs the identical function specified in the claim").

To respect a patent's presumption of validity, *see* 35 U.S.C. s. 282, a court should hold a claim indefinite only after reasonable efforts at construction prove futile. Exxon Research Research & Eng'g v. United States, 265 F.3d 1371, 1375 (Fed.Cir.2001). A claim is not indefinite merely because it poses a difficult issue of claim construction. Bancorp Services LLC v. Hartford Life Insurance Co., 359 F.3d 1367, 1371 (Fed.Cir.2004). "Only claims not amenable to construction or insolubly ambiguous are indefinite" and thus invalid. Datamize L.L.C. v. Plumtree Software, Inc., 417 F.3d 1342, 1347 (Fed.Cir.2005) (internal quotes omitted). If the claim's meaning is discernable, "even though the task may be formidable and the conclusion may be one over which reasonable persons will disagree," the claim is "sufficiently clear to avoid invalidity on indefiniteness grounds." Exxon Research, 265 F.3d at 1375. A party must show invalidity for indefiniteness by clear and convincing evidence, and close questions of indefiniteness "are properly resolved in favor of the patentee." Datamize, 417 F.3d at 1348; Exxon Research, 265 F.3d at 1380.

III. THE PATENT-IN-SUIT

I/O asserts claims 1-7 of the '242 Patent. The '242 Patent is entitled "Apparatus With Mechanical And Electrical Springs And Method For Its Manufacture" and issued on December 22, 1998. The Abstract reads as follows:

Apparatus for measuring a characteristic of motion and methods for its manufacture are disclosed in which a sensor structure includes a support structure, and a mass suspended from such support structure by a spring connecting arrangement and electrical devices for measuring displacement of the mass which results from a force applied to the support structure. An apparatus is provided where the mechanical spring constant of the connecting arrangement of the sensor structure is provided to be a high value representative of a strong, stiff spring which resists breaking due to high forces applied to it, and where an electric spring constant is provided to yield a small effective sensor spring constant Keff =Km-Ke. Methods are also provided to manufacturing the apparatus by specifying the mechanical spring constant and providing an electric spring constant which will yield a desired effective spring constant which produces a desired characteristic of the sensor structure. Alternatively, the apparatus may be manufactured by specifying the electric spring constant which, with a mechanical spring constant, provides a certain sensor structure characteristic, e.g., natural frequency, and then providing a connecting arrangement characterized by a mechanical spring constant which yields such sensor characteristic. According to another aspect of the invention, the sensing force applied to the mass is adjusted in coordination with the mechanical spring constant and damping factor of the apparatus so that a desired characteristic of the apparatus is achieved.

There are a variety of issues before the Court. Both parties agree that two terms require construction: "electric spring constant" and "mechanical spring constant." Dkt. No. 53 at 5. FN1 There are eight terms which Sercel asserts require construction for which I/O asserts no construction is necessary: "sensor structure," "support structure," "connecting arrangement," "displacement," "predetermined position," "small amplitudes of said displacement signal," "cover plates," and "substantially zero." Dkt. No. 53 at 2-8. There are a number of other terms for which I/O asserts no construction is necessary but which Sercel asserts are

indefinite and incapable of construction under 35 U.S.C. s. 112: "high value of mechanical spring constant," "high mechanical spring constant," "high mechanicals spring constant," "small positive difference," "high sensitivity," "low frequency forces," "less susceptible to breaking," "low mechanical spring constant," "desired mechanical characteristic," and "desired characteristic." Dkt. No. 53 at 5-8.

FN1. As used herein the page numbers generally refer to the page number as internally presented in the cited document except the page numbers of the Joint Claim Construction Chart reference the PACER page number of the docket entry as the Joint Claim Construction Chart did not include internal page numbers.

The parties agree that three terms invoke a means plus function analysis: "means for generating a displacement signal as a function of time," "means responsive to said displacement signal for applying an electromagnetic feedback force as a function of time," and "means for applying a voltage difference between said conductive surfaces of said top and bottom cover plates and applying a reference voltage to said top and bottom conductive surfaces of said mass." Dkt. No. 53 at 3-7. With regard to the "means for applying ...," Sercel asserts that no corresponding structure is disclosed in the specification and thus the claim is invalid, or alternatively if valid, Sercel submits a proposed construction. Dkt. No. 53 at 6-7. Sercel asserts that a fourth term invokes a means plus function analysis: "controller means for applying a reference electric field across said mass during a sensing phase of an operating cycle and for applying a forcing electric field across said mass during a forcing phase of said operating cycle." I/O asserts this term is not covered by 35 U.S.C. s. 112(6) and that no construction is necessary. Dkt. No. 53 at 8. The parties have agreed to constructions for three terms that previously were in dispute: "sensing phase," "forcing phase," and "duty factor." Dkt. No. 53 at 8-9.

IV. CLAIM CONSTRUCTION-TERMS THE PARTIES AGREE NEED CONSTUCTION

A. "mechanical spring constant"-claims 1-7

(1) The Parties' Positions

I/O proposes that this term means: "The mechanical spring constant, denoted as Km, is a measure of how stiff a mechanical spring is. A spring constant is measured in units of force per units of length. The larger the mechanical spring constant, the stiffer the spring." Dkt. No. 53 at 5. Sercel proposes that this term means a "scalar quantity expressing the relationship between force and displacement of the springs which connect the mass to the support structure." *Id*.

I/O asserts that the mechanical spring constant is a well known concept that is mathematically represented in the equation F = -kx, where k is the spring constant, F is force applied to a spring and x is distance the spring deforms. Dkt. No. 36 at 9. I/O cites to a variety of external sources, including university course materials, Sercel's own manuals and one of Sercel's own patents for the proposition that the spring constant relates to the "stiffness" of a spring. *Id*. at 10 and Dkt. No. 43 at 15-16.

Sercel also asserts that the spring constant expresses the relationship between force and the distance in which a spring is displaced. Dkt. No. 39 at 20. In its tutorial to the Court and at the oral argument, Sercel also cites to the equation F=kx as being Hooke's law which governs springs. Hearing Transcript at 180. Sercel cites to testimony of its expert and the testimony of a named inventor to support its assertion that

spring constants are scalar quantities which Sercel asserts are constants that have no associated direction. Dkt. No. 39 at 20 and Dkt. No. 46 at 17. Sercel also asserts that the terms "larger" and "stiffer" in I/O's construction add unnecessary subjective criteria to the construction. Dkt. No. 39 at 21.

At oral argument I/O and Sercel both acknowledged that the parties' basic understanding of the concept of a mechanical spring constant is relatively similar and that their definitions were not that different. Hearing Transcript at 8-10 and 182-183. I/O, however, asserted that the term "scalar" would be a term that is unknown to the jury while "stiffness" would be a concept understood by the jury with reference to springs. *Id*. at 8-10. Sercel in contrast emphasized the scalar nature of the mechanical spring constant. *Id*. at 181-182.

(2) Construction

The parties are in agreement as to the basic principles relating to a mechanical spring constant. The Court is not convinced that the additional language sought by both parties is required by the intrinsic record. Though the terms "scalar" and "stiffness" may provide additional description with regard to a mechanical spring constant, the Court does not see the need to deviate from the basic principles which both parties have described and acknowledged with reference to a mechanical spring constant. Moreover, the additional language may actually generate jury confusion as to the basic principles that govern a spring. The Court construes the term "mechanical spring constant" to mean "a quantity expressing the relationship between mechanical force and the displacement of a spring."

B. "electrical spring constant"-claims 1-7

(1) The Parties' Positions

I/O proposes that this term means: "The electrical spring constant, denoted Ke, is a measure of the feedback force in opposition to the mechanical spring force such that the effective spring constant, denoted as Keff, of the sensor is the difference between the mechanical spring constant and the electric spring constant, which may be written mathematically as Keff=Km-Ke." Dkt. No. 53 at 5. Sercel proposes that this term means a "scalar quantity expressing the relationship between electric force and displacement of the mass." *Id*.

I/O asserts that its definition conforms with specification which states:

According to another aspect of the invention a sensor, a forward displacement signal circuit, and a force balancing feedback arrangement are provided to apply a feedback force to the mass represented by an electric spring constant Ke. Next, the mechanical spring constant of the connecting arrangement, such as springs between the mass and the support, is determined by first determining an effective spring constant Keff = Km-Ke where Km represents the mechanical spring constant of the connecting arrangement, such that a desired characteristic of the sensor structure as a function of Keff results, and then the springs are fabricated so that they are characterized by a mechanical spring constant of Km =Keff Ke. '242 Patent at 3:51-66

I/O asserts that the patentee has thus provided in the specification a clear definition for the term electric spring constant. Dkt. No. 36 at 20. I/O also asserts that one of Sercel's own patents supports I/O definition. Hearing Transcript at 11-12.

Sercel asserts that the definitions of the mechanical spring constant and the electrical spring constant should be internally consistent. In particular, Sercel argues that I/O's construction adds a directional component to

the electric constant such that the spring constant itself is "in opposition to the mechanical spring force" and that I/O's construction has the electric constant being measured in units of force in contrast to the mechanical constant which is force per unit length. Dkt. No. 39 at 20-21 and Dkt. No. 46 at 16-17. Sercel cites portions of the same specification passage as I/O in support of its position. Sercel asserts that the two spring constants should be construed internally consistent and that under I/O's construction Ke cannot be subtracted from Km because the constants have different units. Thus Sercel asserts that the basic equation for the effective spring constant which Sercel asserts is at the heart of the '242 patent disclosure would not be satisfied under I/O's construction. Dkt. No. 46 at 17.

(2) Construction

The specification treats the mechanical spring constant and the electrical spring constant as being similar types of constants that can be subtracted to create an effective constant. Further, the specification teaches that it is an electromagnetic restoring force that operates to move a mass and that it is in a direction opposite the mechanical spring force. '242 Patent at 3:3-10. The description of the electrical and mechanical constants in the specification and the equations recited in the quoted passage above are indicative that these constants characterize the relationship of the corresponding force and distance of displacement. '242 Patent at 3:11-66. In addition, the claims themselves indicate an internal consistency between the two constants. For example, claim 1 recites "said mechanical spring force being characterized by a mechanical spring constant" and "said electromagnetic feedback force being characterized ... by an electric spring constant." Thus, the specification does not teach that the electric spring constant is a measure of the electric feedback force, but rather teaches that the concept of an electric spring constant is somewhat similar to that of a mechanical spring constant in that the constant provides a relation of a force applied to a mass (in this case an electromagnetic force) and a movement of the mass. The language of the specification, the equations of the specification, and the claims themselves indicate that the electric spring constant should be construed consistently with the concept of a mechanical spring constant (a concept to which the parties agreed is generally well known). Similar to as discussed above with regard to mechanical spring constant, the Court is not convinced that the intrinsic record requires the inclusion of the term "scalar." The Court construes "electric spring constant" to mean "a quantity expressing the relationship between an electromagnetic force and the displacement of the spring."

V. CLAIM CONSTRUCTION-TERMS SERCEL CONSTRUES FOR WHICH I/O ASSERTS NO CONSTRUCTION IS NECESSARY

A. "sensor structure"-claims 1-7

(1) The Parties' Positions

I/O asserts that "sensor structure" does not need a construction. Dkt. No. 53 at 2. Sercel asserts that this term should be construed as "a body, including a top cover, bottom cover, a central mass between the top cover and the bottom cover, a generally rectangular frame, and mechanical springs between the mass and the frame." *Id*.

Sercel asserts that the specification supports its construction. In particular, Sercel points to language of the Summary of the Invention which states that a sensor structure "includes a mass carried from a support structure and a connecting arrangement." Dkt. No. 39 at 16 (*citing* '242 Patent at 2:65-3:3). In addition,

Sercel cites to Figures 1 and 2 of the patent and a portion of the specification to assert that I/O characterized "the invention" to require the limitation of the preferred embodiment. Dkt. No. 39 at 16-17. In particular Sercel cites a portion of the specification that states "[f]ig. 1 illustrates the sensor structure of the invention as shown generally at 10" and then continues in the next paragraph:

"[t]he sensor assembly 10 of Fig. 1 has a body including a top cover (or cap) 12, a bottom cover (or cap) 14, a central (or seismic) mass 16 between top cover 12 and bottom cover 14, and a generally rectangular frame 18 receiving such central mass 16 therein between covers 12 and 14."

'242 Patent at 4:31-42. Sercel asserts that when a patent describes in general terms what it deems to be the "invention," the claim terms must be construed to include those limitations. Dkt. No. 39 at 17.

I/O responds that "sensor structure" is a straightforward term that would easily be understood by the jury. I/O asserts that the purpose of claim construction is not to construe every claim term, but rather only to clarify terms whose meaning may not be clear to a jury. Dkt. No. 43 at 13. I/O asserts that Sercel's construction includes the minutia of the particular structure described in the preferred embodiment. *Id*. In addition, I/O asserts that Sercel's construction violates the doctrine of claim differentiation as claim 2 recites that the claimed apparatus includes top and bottom cover plates. Dkt. No. 43 at 14.

(2) Construction

The *Phillips* decision notes that claims themselves can provide substantial guidance for claim construction. *See Phillips* at 1314. Claim 1 (and similarly in the other asserted claims) includes language within the claim itself that provides limitations relating to a sensor structure by stating that "a sensor structure including a mass carried from a support structure by a connecting arrangement." '242 Patent at 15:41-42. Sercel's extended construction of "sensor structure" would render needless portions of the claim that recite certain specific aspects of the sensor structure. In addition, claim 2 further states that "said apparatus includes top and bottom cover plates carried by said support structure." '242 Patent at 16:41-42. The limitations of the claims themselves thus indicate that the term sensor structure does not encompass all the details of the preferred embodiment for which Sercel attempts to read into the term from Figures 1 and 2 and the corresponding portions of the specification. In addition when the specification is read as a whole, the structural elements of Figures 1 and 2 FN2 are not emphasized within the intrinsic record to an extent to rise to what Sercel characterizes as "the invention" such that the particular disclosed embodiment must be read into the claim elements. The intrinsic record as a whole reflects that these structural elements provide a preferred embodiment context to the electric spring constant and corresponding effective spring constant concepts and circuitry.

FN2. These embodiments which are labeled "prior art" are incorporated by reference from prior filed patent applications. '242 Patent at Figures 1 and 2; 4:31-36; 6:1-5.

In light of the claims and specification, the Court will not provide further construction of "sensor structure."

B. "support structure"-claims 1-7

(1) The Parties' Positions

I/O asserts that "support structure" does not need a construction. Dkt. No. 53 at 2. Sercel asserts that this

term should be construed as a "generally rectangular frame." *Id*.

Sercel relies upon much of the same arguments as presented for the term "sensor structure." Citing a passage of the specification that mentions a generally rectangular frame 18, Sercel asserts that "the specification also requires that the 'support structure' be defined as 'a generally rectangular frame.' " FN3 Dkt. No. 39 at 17. I/O asserts that a non-rectangular frame could be used and the patent includes language that "various modifications and alterations" from the preferred embodiments would be apparent to those skilled in the art. Dkt. No. 43 at 14 (*citing* '242 Patent at 15:30-32).

FN3. This is the same passage of the specification cited above by Sercel with regard to the sensor structure.

(2) Construction

The structure that the preferred embodiment is described in relation to illustrates a general rectangular frame 18. However, Sercel provides little support for its argument that the specification requires an interpretation that the claims of the '242 Patent should be limited to the preferred structural embodiment of the frame. Similar to as described above with reference to "sensor structure," when viewed in the context of the intrinsic record as a whole, the record does not support an assertion what one skilled in the art would construe a support structure to be limited to generally rectangular frame. In light of the specification, the Court will not provide further construction of "support structure."

C. "connecting arrangement"-claims 1-7

(1) The Parties' Positions

I/O asserts that "connecting arrangement" does not need a construction. Dkt. No. 53 at 3. Sercel asserts that this term should be construed as an "arrangement of springs or beams that connects the mass to the support structure." *Id*.

Sercel groups "connecting arrangement" with "sensor structure" and "support structure" and relies on the same arguments as described above with regard to sensor structure and support structure. Dkt. No. 39 at 16-17. Sercel further asserts that the "connecting arrangement" described in the '242 patent is not so open ended so as to include any structure such as shoe-laces and zippers. Dkt. No. 46 at 18. I/O asserts that the term "connecting arrangement" does not need construction because it is straightforward and would be easily understood by the jury. Dkt. No. 43 at 14-15. I/O asserts that Sercel is improperly limiting the term to the preferred embodiment. *Id*.

(2) Construction

When viewed as a whole it is clear that the focus of the '242 Patent is directed toward a connecting arrangement that is made from springs or beams. The '242 Patent does not describe any other type of connecting arrangement and consistently refers to a connecting arrangement as "springs or beams" or "springs." '242 Patent at 2:67-3:2; 3:20; 3:61-66; 4:62; 13:54-56. The figures also show spring structures. '242 Patent at 4:13-20, Figure 1, Figure 2. In fact, the bulk of the specification is directed towards the spring constant concept of these springs. Every claim also links the connecting arrangement to springs with references such as "a mechanical spring force of said connecting arrangement." '242 Patent at 15:45-46, 16:10-11, 16:55-56, 18:2-3, 18:33-35, 19:4-6; 20:8-10. Under the guidance of *Phillips,* construing a

connecting arrangement to be springs or beams is not reading a preferred embodiment into the claim but rather interpreting the claim element in light of the context of the intrinsic record as a whole.

The Court construes "connecting arrangement" to be "an arrangement of springs or beams."

D. "displacement"-claims 1-7

(1) The Parties' Positions

I/O asserts that "displacement" does not need a construction. Dkt. No. 53 at 4. Sercel asserts that this term should be construed as "movement of the mass perpendicular to its top and bottom surfaces." *Id*. Sercel argues that the embodiment of the structure disclosed in the specification is limited to a structure in which the displacement of the mass is measured with respect to forces perpendicular to the top and bottom of the mass. Dkt. No. 39 at 17-18; Dkt. No. 46 at 18. Further Sercel asserts that the specification must enable the entire range of the claimed invention and that there is no enablement of displacement in any direction other than perpendicular to the mass. Finally, Sercel argues that the '242 Patent teaches away from lateral movement because small gaps are provided to actually act as stops to prevent lateral movement. Dkt. No. 39 at 18 (*citing* '242 Patent at 6:59-7:14); Dkt. No. 46 at 18. Similar as to other terms described above, I/O argues that the term in question is a straightforward term that has an ordinary meaning that will be clear to the jury. I/O further asserts that Sercel is attempting to limit the term to a preferred embodiment. Dkt. No. 43 at 14-15.

(2) Construction

The embodiments of Figures 1, 2 and 3 suggest a sensor in which movement in a single direction is monitored. In the embodiments shown this direction is an up and down direction (using the Figure 3 frame of reference). When read in context of the specification as a whole, the mechanical, electric and effective spring constant concepts are emphasized. However, these spring constant concepts and their interaction are not distinguished with relation to an up and down motion verses a lateral motion in a manner such that one skilled in the art would anticipate these concepts would be utilized in only an up/down direction. There is no teaching in the specification that the concepts would not be applicable to lateral displacements. With regard to the teaching of small gaps preventing lateral movement, it is noted that these gaps are described in relation to the embodiment of Figure 2 as being reduced in contrast to the gaps of the embodiment of Figure 1, thus implying at least some lateral movement in the embodiment of Figure 1. '242 Patent at 6:49-61. Generally in the context of the '242 Patent as a whole, these passages seem more directed at preventing motion in a second direction from the intended direction of measurement as opposed to indicating that the disclosed concepts would not be relevant to lateral measurement scheme. '242 Patent at 6:1-7:14. In light of the specification as a whole, the Court will not provide further construction of "displacement."

E. "predetermined position"-claims 1-7

(1) The Parties' Positions

I/O asserts that "predetermined position" does not need a construction. Dkt. No. 53 at 4. Sercel asserts that this term should be construed as "rest position." *Id*. Sercel cites to one passage in the '242 Patent which states "linear movement of the springs enables an extremely accurate measurement of a variable related to such input force by measuring the displacement of mass 16 from its rest position." Dkt. No. 39 at 19 (*citing* ' 242 Patent at 5:28-33). I/O asserts the same arguments as with regard to "connecting arrangement" and

"displacement." Dkt. No. 43 at 14-15.

(2) Construction

The specification utilizes the term "predetermined position" in multiple places without limiting such term to a rest position. '242 Patent at 1:15-16; 3:35-38; 4:25. Sercel has not brought forth sufficient evidence to suggest the importance of a rest position such that the specification teaches that the term predetermined position should be limited to a rest position. The Court will not provide further construction of "predetermined position."

F. "small amplitudes of said displacement signal"-claims 1-7

(1) The Parties' Positions

I/O asserts that "small amplitudes of said displacement signal" does not need a construction. Dkt. No. 53 at 4. Sercel asserts that this term should be construed as "amplitudes of less than d/ 1000, where d is the separation between the plate of the top or bottom cover and the corresponding plate on the top or bottom of the mass." *Id*. Sercel argues that the '242 Patent explicitly provides guidance as to small amplitudes of the displacement x by citing a passage of the '242 Patent which states "the feedback compensator forces the absolute value of x ... to be very small, typically less than d/1000." Dkt. No. 39 at 19 (*citing* '242 Patent at 10:19-20). I/O asserts the same arguments as with regard to "connecting arrangement" and "displacement." Dkt. No. 43 at 14-15. In addition, at the oral hearing I/O asserted that Sercel's construction improperly limited movement to an up/down type movement similar to the arguments with relation to "displacement."

(2) Construction

I/O's lack of construction would provide the jury no guidance as to the meaning of "small" in the context of the '242 Patent and one of ordinary skill in the art. Sercel's construction would have small amplitudes be defined in the context of the displacement of the mass from a center position "x" and the separation of the capacitor plates "d." FN4 Sercel cites a passage which references the range over which the feedback compensator forces the value of x to be within: "the feedback compensator forces the absolute value of x ... to be very small, typically less than d/1000." '242 Patent at 10:19-20. However, in the context of the claim language "small" is used in the phrase "said electromagnetic feedback force being characterized for small amplitudes of said displacement signal by an electric spring constant." '242 Patent at 15:57-59. Thus, the claims reference amplitudes over which the feedback force may be characterized by a spring constant. Sercel does not provide linkage between the "very small" range over which the feedback system forces the displacement to fall within and the "small" range over which the electromagnetic feedback force may be characterized with a spring constant.

FN4. In the specification it is noted that "the sense voltage on lead 97 can be approximated as a linear function of displacement x from a center position for |x| "d, which applies under normal operating conditions" and "d" is referred to in standard parallel plate capacitor equations. '242 Patent at 9:1-17.

The '242 Patent does, however, provide a context and frame of reference for "small amplitudes of said displacement" for which force may be characterized by a spring constant. When characterizing the value of the displacement the patent generally references the displacement, x, in the context of the separation, d, of the capacitive plates. For example prior art structures where said to have small displacements over which

linear approximations may be used and the Figure 3 "sense voltage on lead 97 can be approximated as a linear function of displacement x from a center position for |x| "d, which applies under normal operating conditions." '242 Patent at 2:8-14 and 9:14-17. Likewise, as noted by Sercel the patent also includes the passage "the feedback compensator forces the absolute value of x ... to be very small, typically less than d/1000." '242 Patent at 10:19-20. In light of the intrinsic evidence, small displacements are generally characterized in a frame of reference with regard to the capacitor separation, d.

The Court construes "small amplitudes of said displacement signal" to be "amplitudes that are small in the context of the capacitor separation d."

G. "Cover Plates"-claims 2-3

(1) The Parties' Positions

I/O asserts that "cover plates" does not need a construction. Dkt. No. 53 at 6. Sercel asserts that this term should be construed as "conducting surfaces of a capacitor covering portions of the mass and support structure." *Id*. I/O asserts that "cover plate" is a straightforward term which should be given its ordinary meaning. Dkt. No. 43 at 17. I/O further argues that the claims themselves state that "cover plates" have "conductive surfaces." *Id*. I/O asserts that the Sercel's construction would result in the term cover plates having no significance beyond conductive surfaces, rending the words "cover plates" superfluous. *Id*. Sercel asserts that the patent references capacitive measurements and cites a dictionary to assert that a "plate" is known to be one of the conducting surfaces in a capacitor. Dkt. No. 39 at 21-22. In addition Sercel asserts that the specification discloses that the cover plates include the conductive surfaces. *Id*. (*citing* '242 Patent at 5:61-67).

(2) Construction

The language of the specification and claims are instructive as to the parties' arguments. Sercel's construction would have the cover plates be defined as the conducting surfaces of a capacitor. However, the portion of the specification cited by Sercel states that "[a]s illustrated in FIG. 3, conductive regions 50 and 52 are fabricated on the cover plates 12, 14 and on the top and bottom surfaces of mass 16." '242 Patent at 5:61-63. Figure 3 appears to show cover plates that are comprised of more than the conductive regions 50 and 52. Also with regard to Figure 1, the specification refers to "a top cover (or cap) 12, a bottom cover (or cap) 14." '242 Patent at 4:38-39. Thus the specification indicates that the cover plates are more than the conductive surfaces. Further, claims 2 and 3 include "said apparatus includes top and bottom cover plates carried by said support structure and having conductive surfaces which face respective said top and bottom conductive surfaces of said mass." '242 Patent at 16:41-44; 17:18-21. Thus as noted by I/O, the claims themselves indicate that cover plates may have conductive surfaces, indicating that the term "cover plate" is not merely limited to a conductive surface. Thus, the Court shall reject Sercel's definition. Mindful that every term of a claim need not be construed and in light of the written disclosure and the figures of the '242 Patent, the Court is not convinced that a jury construction of cover plate is needed. The Court will not provide further construction of "cover plate."

H. "substantially zero"-claim 5

(1) The Parties' Positions

I/O asserts that "substantially zero" does not need a construction. Dkt. No. 53 at 8. Sercel asserts that this

term should be construed as "no effective difference." *Id.* I/O asserts that this term is straightforward, easily understood by the jury and should take on its ordinary meaning. Dkt. No. 43 at 14-15. Sercel asserts that the '242 Patent teaches the difference between Km and Ke should be caused to be substantially zero. Dkt. No. 39 at 22. Further, Sercel asserts that in prosecution the patentee argued that the spring constants should be equal by stating that claim 5 "requires the mechanical spring constant of the sensor and the electric spring constant to be equal to one another...." *Id.* (*citing* '242 Patent Pros. Hist., Resp. to Office Action, p. 9 (found at Dkt. No. 39, Ex. 15 at I-O 000195)).

(2) Construction

The surrounding language of the claim 5 term in question is "said electromagnetic feedback force is adjusted such that the difference between said mechanical spring constant and said electric spring constant is substantially zero, such that the transfer function of said sensor structure includes a pure integrator." '242 Patent at 18:61-65. The specification includes statements that:

... the electromagnetic sensing and force balancing levels applied to the seismic mass are characterized by an electric spring constant such that the equivalent spring constant of the accelerometer is substantially zero.

* * *

... the step of providing electromagnetic sensing and feedback forces of a level represented by an electric spring constant Ke, so that the difference between the mechanical spring constant and the electric spring constant produces a desired characteristic of the apparatus. According to one aspect of the method, such difference is caused to be substantially zero such that the transfer function of the sensor structure includes a substantially pure integrator.

'242 Patent at 2:47-51 and 3:41-50. As noted by Sercel, during prosecution it was stated that claim 5 "requires the mechanical spring constant of the sensor and the electric spring constant to be equal to one another...." Response to Office Action dated 10/21/97 at 9 (found at Dkt. No. 39, Ex. 15 at I-O 000195).FN5 Later during prosecution, however, it was noted that the Hemrion reference lacked the small effective spring constant of claims 1 and 2 and the "zero effective spring constant" of claims 4 and 5. Response to Office Action dated 5/4/98 at 7 (found at Dkt. No. 43, Ex. C at I-O 000216). With respect to the Kaiser reference, the same response later characterized "the critical limitations of claims 4 and 5" as being "zero effective spring constant" and stated that "Kaiser never mentions or teaches by implication the desirability of designing a sensor system such that the effective spring constant is zero (so that a pure integrator is achieved)." *Id.* at 8 (I-O 000217).

FN5. The full Response to Office Action may be found at Dkt. No. 46, Ex. H at I-O 000187-199.

Thus, the specification and claims include the language "substantially zero." At one point in the prosecution this language was equated to "equal to one another." Yet, at another point during the prosecution this language was referred to as "zero effective." The use of language such as "substantially" and "effective" imply more than only absolutely zero. The Court finds the portion of the prosecution history cited by Sercel ("equal to one another") is not a sufficient disavowal of claim scope when viewed in context of the claims, specification, and the later prosecution history to warrant deviating from the actual claim language. The Court will not provide further construction of "substantially zero."

VI. CLAIM CONSTRUCTION-MEANS PLUS FUNCTION CONSTRUCTIONS

A. "means for generating a displacement signal as a function of time"-claims 1-7

(1) The Parties' Positions

The parties agree that the term in question is a means plus function element. I/O asserts that the means for generating a displacement signal is "a switched capacitor sensing amplifier or its equivalent." Dkt. No. 53 at 3. In the briefing I/O asserted that the claimed function is "generating a displacement signal as a function of time which is representative of distance said mass has moved with respect to said support structure in response to force applied to said support structure." Dkt. No. 36 at 11. Sercel asserts that the structure is "micro computer based switch controller 100; switches S1, S2, S3, S4, S5, S6, S9, S7, S8; top and bottom plates 50; top and bottom plates 52; ground connection; reference voltages VR, -VR; capacitors C1 and C2; operational amplifier OA1." Dkt. No. 53 at 3. Sercel asserts that the claimed function is "generating a displacement signal as a function of time ." *Id*.

I/O asserts that the voltage on lead 97 of Figure 3 is the displacement signal and that the corresponding structure of the means plus function element is the structure that generates the voltage on lead 97. Dkt. No. 36 at 11. I/O further asserts that the circuitry that generates this voltage comprises switches S6, S7, and S8, capacitors C1 and C2 and op-amp OA1. *Id*. I/O asserts that one of skill in the art would recognize this circuitry as a conventional switched capacitor amplifier. *Id*. I/O provides an illustration of a simple switched capacitor amplifier circuit showing an op-amp, switches S1-S3, and capacitors C1 and C2.FN6 *Id*. at 12. I/O states that the sampled capacitance (C1 of I/O's illustration) of the switched capacitor amplifier of the ' 242 Patent corresponds to the capacitance between conductive surfaces 52 and 50 of the sensor of Figure 3. Id. at 11. In support of its assertion that one of skill in the art would recognize the circuitry of the ' 242 Patent as a switched capacitor amplifier circuit, I/O relies upon the declaration of Dr. Bruce Buckman. Id. at 11-14. Dr. Buckman also provided testimony at the oral claim construction hearing, once again asserting that one of skill in the art would recognize the circuitry that performs the claimed function as a switched capacitor amplifier. Hearing Transcript at 16-18. I/O also asserted that Sercel's own expert, Dr. Dean Nieikirk, acknowledged in deposition testimony that the circuitry Dr. Buckman identified is a switched capacitor amplifier. Id. at 19-21. In response to Sercel's positions, I/O asserts that Sercel is improperly including a list of every element upstream from lead 97. Dkt. No. 36 at 14. I/O asserts that these additional elements do not perform the claimed function but rather at most enable the function. *Id*. I/O asserts that Sercel's construction misstates the proper legal standard by including all circuit elements that "cooperate" with the claimed circuit to perform the function, including the reference voltages and the top and bottom capacitor plates. Dkt. No. 43 at 3. I/O asserts that structures that cooperate or enable the claimed function are not, *ipso facto,* part of the means for performing the function. Dkt. No. 43 at 4 (*citing* Asyst Techs. Inc. v. Empak Inc., 268 F.3d 1364, 1370 (Fed.Cir.2001)); *See* Dkt. No. 36 at 14 (*citing* Northrop Grumman Corp. v. Intel Corp., 325 F.3d 1346, 1352 (Fed.Cir.2003)). As such, I/O asserts that even if the Court were inclined to limit the structure to the circuitry shown in Figure 3, it should only include the amplifier OA1, capacitor C1, and switches S6, S7 and S9. Dkt. No. 43 at 5.

FN6. The reference number of the components of I/O's illustration do not match the reference numbers of the patent.

Sercel counters that I/O is not limiting the construction to the structures disclosed in the specification but rather impermissibly generalizing and broadening the structures. Dkt. No. 39 at 10. Sercel asserts that the proper standard is that the structures are limited to those described in the specification. *Id*. (*citing* Medtronic, Inc. v. Advanced Cardiovascular Sys., Inc., 248 F.3d 1303, 1311-13 (Fed.Cir.2001)). Further Sercel asserts that it is error to identify the structure as a broad array of structures not mentioned in the specification. *Id*. at 10-11 (*citing* Texas Digital Systems, Inc., v. Telegenix, Inc., 308 F.3d 1193, 1213 (Fed.Cir.2002)). Sercel asserts that the displacement signal of Figure 3 is generated by the specific structure identified in its construction. Sercel asserts that it is the controller that operates the switches "as a function of time" and that the generated voltage is created by the difference in the capacitance of the top and bottom capacitor plates. *Id*. at 11. Sercel further asserts that there is not a single reference in the '242 Patent to a "switched capacitor amplifier" and that I/O's construction provides no structure that operates "as a function of time." Dkt. No. 46 at 2. At the oral hearing, Sercel further noted deposition testimony of Dr. Buckman in which he stated that the corresponding structure he identified in the patent included switches S6, S9, S7, capacitor C 1 and op amp OA1 and that the switches are controlled by the switch controller 100. Hearing Transcript at 152-154.

(2) Construction

When a patentee chooses to use the means plus function claim drafting form, the means plus function elements are construed such that one looks to the specification to identify the corresponding disclosed structure that performs the claimed function. The parties have not briefed the different functions they assert to be the claimed function. Sercel has a limited function that is a subset of the language I/O presented in its briefing. The Court construes the function to be the full functional language recited in the claim: "generating a displacement signal as a function of time which is representative of distance said mass has moved with respect to said support structure in response to force applied to said support structure."

The specific structure disclosed in the '242 Patent that performs the recited function is a portion of the circuitry of Figure 3. The '242 Patent does not disclose this circuitry as a mere generalized class of circuitry but rather particular elements of Figure 3. The Court looks to the corresponding disclosed structure rather than mere generalizations of the structure. *See* Texas Digital Systems, Inc., v. Telegenix, Inc., 308 F.3d 1193, 1213-15 (Fed.Cir.2002). With regard to I/O's assertions that a generalized switched capacitor sensing amplifier is all that is claimed, it is noted that the specification discloses a specific circuit as shown in Figure 3, without discussion of a generalized circuit. In addition, even I/O's own expert identifies specific circuit elements of Figure 3 as performing the claimed function.

The parties do not dispute some of the specific structure disclosed in the '242 Patent that performs the claimed function including: the amplifier OA 1, capacitor C 1, and switches S6, S7 and S9 of Figure 3. As to the inclusion of the top and bottom capacitor conductive plates 50 and 52 FN7, it is instructive to note the claimed function includes generating a "displacement" signal. The top and bottom regions or plates 50 and 52 are the very mechanisms through which displacement is detected, without which the claimed signal would not be a displacement signal. ' 242 Patent at Figure 3, 5:61-67, 8:22-9:17. It is also noted that even I/O acknowledged that "the capacitance of the sensor between conductive surfaces 52 and 50 in Fig. 3" corresponds to the sampled capacitance in a switched capacitor amplifier. Dkt. No. 36 at 11 and 13. This corresponds to C1 of I/O's simple switched capacitor amplifier circuit that I/O asserted to be the corresponding structure. *See Id*. at 12-13. The corresponding structure therefore includes the top and bottom conductive regions or plates 50 and 52. Further, the sensing of the displacement is accomplished by

switching the plates between reference voltages (VR and -VR) and ground through the use of switches S1, S2, S3, and S4. ' 242 Patent at Figure 3, 8:22-9:17. Once again, it is noted that these elements are similar to the elements Vin, S1 and S2 of I/O's simple switched capacitor amplifier circuit. *See* Dkt. No. 36 at 12. The specification also describes switch S8 and capacitor C2 as part of the structure utilized to accomplish the displacement sensing phase. ' 242 Patent at Col. 8:7-21. Finally the specification states that the "system of FIG. 3 is placed in several states by a micro computer based switch controller 100 opening and closing various switches" and that "a repetitive cycle which includes 32 states is produced by controller 100." '242 Patent at 7:55-63. These states and the control of the switches provide the "function of time" portion of the claimed function, and as such, the switch controller is appropriately included within the corresponding structure that accomplishes the claimed function.

FN7. It is noted that with regard to another of the means elements I/O objects to the use of the term "plate" as opposed to "area" as the specification uses "region," "plates" and "area" with reference to elements 50 and 52. It is noted that with regard to the sensing phase steps the specification uses the term "plate" and the only disclosure within the ' 242 Patent is of a plate-like structure.

The Court construes the term "means for generating a displacement signal as a function of time which is representative of distance said mass has moved with respect to said support structure in response to force applied to said support structure" as a means plus function term having a function of "generating a displacement signal as a function of time which is representative of distance said mass has moved with respect to said support structure in response to force applied to said support structure" and the corresponding structure to be "operational amplifier OA 1; capacitors C1 and C2; switches S1, S2, S3, S4, S5, S6, S7, S8, and S9; top and bottom conductive plates 50 and 52; reference voltages VR and -VR; ground connections; and micro computer based switch controller 100; and equivalents thereof."

B. "Means responsive to said displacement signal for applying an electromagnetic feedback force as a function of time"-claims 1-7

(1) The Parties' Positions

The parties agree that the term in question is a means plus function element. I/O asserts that the means responsive to said displacement signal is "a feedback compensator circuit or its equivalent." Dkt. No. 53 at 3-4. I/O asserts that the claimed function is "applying an electromagnetic feedback force as a function of time on said mass in a direction to move said mass to a predetermined position with respect to said support structure." Dkt. No. 36 at 15. Sercel asserts that the claimed function is "responsive to said displacement signal for applying an electromagnetic feedback force as a function of time." Dkt. No. 53 at 3-4. Sercel asserts that the claimed structure is "controller 100; operational amp OA2, switches S1-S4, S5, S10, S11, S12 and S13; top and bottom plates 50; top and bottom plates 52, reference voltages VR, -VR; feedback compensator circuit 102 including operational amplifier and RC network as shown in Fig. 3." *Id*.

Once again the parties focus on their differences with relation to the corresponding structure. I/O cites a portion of the specification which refers to a "force balancing feedback arrangement." '242 Patent at 3:35-37. I/O notes that the specification indicates that a forcing voltage VF is applied to the conductive areas 52 via a lead 96. '242 Patent at 9:35-36. I/O then indicates that the patent refers to a "feedback compensator circuit 102" as the circuit that performs the forcing function. Dkt. No. 36 at 15-16 (*citing* ' 242 Patent at 10:10-20). I/O provided a declaration of Dr. Buckman and testimony of Dr. Buckman at the oral claim construction hearing for support of the proposition that a "feedback compensator" is known in the art to

refer to a circuit in a feedback loop that compensates for the displacement of the mass and forces it back to the desired position. Dkt. No. 36 at 16; Hearing Transcript at 23. I/O further points to Figure 3 which includes block 102 labeled as "feedback compensator." I/O asserts that because a "feedback compensator circuit" is a generic type of circuit known to those skilled in the art, this circuit is fully disclosed by simply using its name. Dkt. No. 36 at 16-17 (*citing* Apex, Inc. v. Raritan Computer, Inc., 325 F.3d 1364, 1373 (Fed.Cir.2003) and Atmel Corp. v. Information storage Devices, Inc., 198 F.3d 1374, 1382 (Fed.Cir.1999)).

I/O further asserts that Sercel's construction is improper because it is limited to the embodiment of Figure 3. I/O asserts that the '242 Patent also discloses feedback compensator circuits of different configurations. Dkt. No. 36 at 18. In particular, I/O asserts that the '242 Patent discloses a digital accelerometer using sigma-delta technology in the portion of the specification in which U.S. Patent No. 4,922,756 is incorporated by reference. *Id.;* Dkt. No. 43 at 8-9 (*citing* '242 Patent at 12:17-21). I/O points to Dr. Buckman's declaration that such a circuit would have a digital feedback compensator circuit which is a different configuration than the feedback compensator of Figure 3. Dkt. No. 36 at 18. Dr. Buckman also provided testimony at the oral claim construction hearing indicating that the disclosure would be sufficient to disclose a sigma-delta type feedback compensator to one skilled in the art. Hearing Transcript at 25-28. In addition, I/O cites to another portion of the '242 Patent for teaching a feedback compensator other than the analog compensator of Figure 3 in which the feedback of the '756 Patent is discussed further. Dkt. No. 43 at 9 (*citing* '242 Patent at 1:49-56). I/O also notes that other patents disclose such sigma-delta circuits without detailed circuitry descriptions, including one of Sercel's own patents. Dkt. No. 36 at 19. I/O asserts that the corresponding structure must encompass all the embodiments and cannot be limited to Sercel's construction which focuses on elements of Figure 3.

I/O also objects to Sercel's inclusion of structure that is outside the feedback compensator block 102 of the '242 Patent. With regard to the sample and hold circuit, I/O asserts that this circuit provides an input to the feedback compensator circuit and that it is the output of the feedback circuit, the feedback force, that is claimed to be applied as a function of time, not the input to the feedback compensator circuit. Dkt. No. 43 at 5-6. I/O asserts that the claim "simply requires that the output of the feedback compensator be applied at certain time intervals to the seismic mass, for example, through a switch." *Id.* at 6. With regard to Sercel's inclusion of the top and bottom conductive plates 50 and 52, I/O asserts that the feedback compensator circuit is the structure that applies an electromagnetic feedback force and that the '242 patent "makes clear that the conductive plates (or more accurately, the conductive areas) are what the electromagnetic feedback force is applied to." Dkt. No. 43 at 6 (*citing* '242 Patent at 4:22-25, 10:10-21, 10:47-52, 12:17-22). Thus, I/O asserts the claimed means cannot include the plates 50 and 52.

Sercel asserts that the only text describing the feedback compensation circuit is that shown in conjunction with Figure 3, and therefore, the means element is limited to the circuitry of Figure 3. Dkt. No. 39 at 12. Sercel states that this includes the operational amplifier and RC network included in block 102 and the circuitry included in the sample and hold structure 99 shown in Figure 3. Sercel asserts that the claimed function includes the requirement "as a function of time" and that the sample and hold circuit is what holds the displacement signal at a particular level for a particular time. Dkt. No. 39 at 12-13. Sercel cites the declaration of Dr. Neikirk to assert that the sample and hold circuit is required to apply the feedback signal over time. Dkt. No. 46 at 4.

Sercel also asserts that I/O is incorrect with regard to I/O's assertion that a digital feedback compensator of a sigma-delta circuit must also be covered by the claim. In particular, Sercel asserts that no specifics are disclosed as to such a digital compensator, and thus, a digital feedback compensator cannot be

corresponding structure. Dkt. No. 39 at 12. Further, Sercel asserts that the '756 Patent disclosure related to a sigma-delta circuit is not relevant since material that is incorporated by reference can not form the basis of the corresponding structure under a means plus function element. Dkt. No. 46 at 5 (*citing* Default Proof Credit Card System Inc. v. Home Depot U.S.A., Inc., 412 F.3d 1291, 1301 (Fed.Cir.2005)).

(2) Construction

With regard to the function, the claim language in question states "means responsive to said displacement signal for applying an electromagnetic feedback force as a function of time." The claim language itself is indicative that the function is "applying an electromagnetic feedback force as a function of time."

The '242 Patent provides multiple references to a generalized feedback circuit as the circuit that performs the forcing function. '242 Patent at 3:35-37, 3:52-54, 4:24-25, 10:10-13, 10:19-20, Figure 3 element 102. In addition, the '242 Patent includes disclosure that an alternative sigma-delta analog to digital converter based accelerometer may be used in which "a feedback voltage VF is applied in pulse form." '242 Patent at 12:19-21. This alternative is noted with reference to U.S. Patent No. 4,922,756 which is "described above and incorporated herein." '242 Patent at 12:18-19. The earlier reference to the '756 Patent states that a feedback circuit responds to the displacement signal by creating an electromagnetic (e.g., electrostatic) restoring force to return the mass to its reference signal. The '756 Patent itself also states that an analog electromagnetic feedback signal is described in the '756 patent, but an alternative arrangement by the forward circuit converts the displacement signal to an output binary stream. For example, the ' 242 Patent specification states with regard to the '756 Patent:

A feedback circuit, in response to such output binary stream, generates a binary electromagnetic restoring force to the mass so as to return it to its reference position. The output binary stream is representative of a characteristic of position, preferably acceleration of the support structure.

'242 Patent at 1:47-58.

Sercel's argument that the '756 Patent cannot be utilized in a means plus function analysis since the '756 Patent is incorporated by reference fails because even without having to reference the '756 Patent itself, the content of the '242 Patent specification directly teaches that multiple types of feedback circuits may be utilized. The descriptions in the '242 Patent itself provide adequate descriptions to support the disclosure of multiple circuits corresponding to the structure of the means plus function analysis. *See* Atmel Corp. 198 F.3d at 1382. Further, the Court finds that in light of the specification as a whole which includes reference to a general feedback circuit, one skilled in the art would recognize the disclosed structure to be a more general class of feedback circuitry.

With regard to the sample and hold arguments, it is noted that the claim language in question includes "applying an electromagnetic feedback force as a function of time." The claim itself indicates that the "function in time" language more properly applies to the application of the feedback force not to the responsiveness of the input of the feedback compensator circuit to the displacement signal. It is noted that although I/O asserts this "simply requires that the output of the feedback compensator be applied at certain time intervals to the seismic mass, for example, through a switch," I/O does not provide such circuitry in its construction. *See* Dkt. No. 43 at 6. The disclosure provided in the '242 Patent for applying the force as a function of time is the state controlled switch S5 which is controlled by micro computer based switch controller 100. '242 Patent at Figure 3, 7:55-67, 9:35-36. As for inclusion of the plates 50 and 52 in the

means responsive to said displacement for applying an electromagnetic force, I/O assertions are more accurate in that the '242 Patent characterizes the feedback compensator as providing the force to the plates. '242 Patent at 4:22-25, 10:10-21.

The Court construes the term "means responsive to said displacement signal for applying an electromagnetic feedback force as a function of time on said mass in a direction to move said mass to a predetermined position with respect to said support structure" as having a function that is "applying an electromagnetic feedback force as a function of time on said mass in a direction to move said mass to a predetermined position with respect to said support structure" and having a corresponding structure that is "a feedback compensator circuit and a switch S5 controlled by a micro computer based switch controller 100, and equivalents thereof."

C. "Means for applying a voltage difference between said conductive surfaces of said top and bottom cover plates and applying a reference voltage to said top and bottom conductive surfaces of said mass"-claims 2-3

(1) The Parties' Positions

The parties agree that the term in question is a means plus function element. The parties agree that the claimed function states two functions: "applying a voltage difference between said conductive surfaces of said top and bottom cover plates," and "applying a reference voltage to said top and bottom conductive surfaces of said mass." Dkt. No. 36 at 21. Dkt. No. 53 at 7. I/O further asserts that the corresponding structures "are switches that operate at timed intervals to provide electrical communications between a constant voltage source and a conductive surface and between a ground and a conductive surface, or its equivalent." Dkt. No. 53 at 6-7. Sercel asserts that there is no corresponding structure that performs the second part of the claimed function. Dkt. No. 39 at 13-14; Dkt. No. 53 at 6-7. Alternatively, Sercel asserts that if the Court finds a structure, the only structure that could be linked to the claimed function is the structure of Figure 3 which Sercel asserts to be a listing of most of the elements of Figure 3. *See* Dkt. No. 53 at 7.

I/O asserts that the claimed structure that must be the only way in which voltages are applied to any of the conductive surfaces of the switches is (1) switches S1-S4 which apply VR, -VG and ground or (2) switch S5 which applies the forcing signal VF. Dkt. No. 36 at 21. I/O asserts that the claimed structure must therefore be the set of switches S1-S5. *Id*. I/O replies to Sercel's assertions by arguing that Sercel's alternative construction improperly includes almost every element of the accelerometer and that such elements are at most enabling elements. *See* Dkt. No. 43 10. I/O's briefing does not address Sercel's argument regarding the lack of disclosed structure performing the second part of the claimed function. *See* Dkt. No. 36 at 20-22; Dkt. No. 43 at 10. At the oral claim construction hearing, I/O acknowledged that the reference voltage on wire 92 is connected to the conductive surfaces of the plates and "there isn't actually a line going from the reference voltage, per se, to the conductive surface and mass." Hearing Transcript at 98-99. However, I/O asserted that there will be a voltage potential difference between the cover plate conductive surface and the conductive surface of the mass and "that is what the function is referring to [and] the structure that does it is the switches that we've shown." *Id*. at 99.

Sercel counters that the only structure disclosed in the '242 specification for applying a reference voltage applies that reference voltage to the top and bottom cover plates, not to the conductive surfaces of the mass. Dkt. No. 39 at 13-14. Sercel asserts that where no structure is disclosed for performing a recited function of a means plus function element, that claim is invalid. Dkt. No. 39 at 14 (*citing* Atmel Corp., 198 F.3d at

1378-79). Further, Sercel cites Chef America, Inv. v. Lamb-Weston, Inc., 358 F.3d 1371, 1374 (Fed.Cir.2004) for the proposition that the Court may not redraft the function language to sustain validity. Hearing Transcript at 171-173.

(2) Construction

The '242 Patent is clear as to what voltages are applied to elements 50 which are the conductive surfaces of the top and bottom cover plates 12 and 14 and is also clear as to what voltages are applied to the elements 52 which are the top and bottom conductive surfaces of the mass 16'. As shown in Figure 3, reference voltages VR and -VR are applied through switches S1 and S3 to elements 50. '242 Patent at Figure 3. The specification describes this as "the reference voltages VR and -VR are applied to conductive regions 50 of the sensor top and bottom plates respectively, because switches S1 and S3 are closed." Id. at 8:4-6. As shown in Figure 3, the forcing voltage VF is applied through switch S5 to elements 52 of the mass 16'. '242 Patent at Figure 3. The specification describes this as "[d]uring state 0 Switch S5 is opened thereby disconnecting the forcing voltage VF from the center pin or lead 96 from the conductive regions 52 of mass 16'" and "[i]n the forcing phase, voltage VF is applied to the sensor conductive areas 52 via lead 98." Id. at 7:66-8:1, 9:35-36.

I/O's argument that the claimed function is related to a voltage potential difference is more relevant to the first portion of the claimed function which states "applying a voltage difference between said conductive surfaces of said top and bottom cover plates ." However, in the second portion of the claimed function the language then clearly states in contrast to the language of the first portion, "applying a reference voltage to...." The specification makes clear that applying a reference voltage refers to the application of a reference voltage (VR) to the surfaces of the cover plates while applying a forcing voltage refers to the application of a forcing voltage (VF) to the surfaces of the mass. The second part of the claimed function in question, however, conforms to neither. The specification does not provide corresponding structure that applies the reference voltage to the top and bottom conductive surfaces of the mass.

When one "employs means-plus-function language in a claim, one must set forth in the specification an adequate disclosure showing what is meant by that language." In re Donaldson, 16 F.3d 1189, 1195 (Fed.Cir.1994). Further, "in order for a claim to meet the particularity requirement of para. 2 [35 U.S.C s. 112 para. 2], the corresponding structure(s) of a means-plus-function limitation must be disclosed in the written description in such a manner that one skilled in the art will know and understand what structure corresponds to the means limitation." Atmel Corp. v. Info. Storage Devices, Inc., 198 F.3d 1374, 1382 (Fed.Cir.1999). "If there is no structure in the specification corresponding to the means-plus-function limitation in the claims, the claim will be found invalid as indefinite." Biomedino, LLC v. Waters Technologies Corp., 490 F.3d 946, 950 (Fed.Cir.2007).

The Court construes the function to be "applying a voltage difference between said conductive surfaces of said top and bottom cover plates and applying a reference voltage to said top and bottom conductive surfaces of said mass." The patentee has chosen to utilize the means plus function format; however, there is no corresponding structure that matches the claimed function. The Court will not redraft the claim language in question. *See* Chef America, 358 F.3d at 1374. The Court cannot construe the corresponding structure because the '242 Patent does not disclose structure that corresponds to the second part of the claimed function. As such, the Court finds claims 2-3 invalid for being indefinite.

D. "Controller means for applying a reference electric field across said mass during a sensing phase of

an operating cycle and for applying a forcing electric field across said mass during a forcing phase of said operating cycle"-claim 6

(1) The Parties' Positions

I/O asserts the phrase in question is not a means plus function element and that no construction is necessary. Dkt. No. 53 at 8. I/O also asserts that if the Court were to construe this limitation under 35 U.S.C. s. 112 para. 6, it would not be proper to read switches S1-S6 and S9 into the claimed structure. Dkt. No. 43 at 11. Sercel asserts that the limitation is a means plus function limitation having the function "for applying a reference electric field across said mass during a sensing phase of an operating cycle and for applying a forcing electric field across said mass during a forcing phase of said operating cycle." Dkt. No. 53 at 8. Sercel asserts that the corresponding structure is "micro computer based switch controller 100 and switches S1-S6 and S9." *Id*.

Citing Kemco Sales, Inc. v. Control Papers Co., Inc., 208 F.3d 1352, 1361 (Fed.Cir.2000), both parties acknowledge that the use of "means" invokes a presumption that 35 U.S.C. s. 112 para. 6 applies. Dkt. No. 39 at 15; Dkt. No. 43 at 11. I/O asserts that this presumption may be overcome when the term itself conveys sufficiently definite structure that has a reasonably well understood meaning in the art. Dkt. No. 43 at 11 (*citing Apex Inc. v. Raritan Computer,* Inc., 324 F.3d 1364, 1371-73 (Fed.Cir.2003)). I/O argues that the term "controller" is sufficiently definite to one skilled in the art such that it would be understood to be "a microcomputer based switch control." *Id*. At the oral hearing, I/O's expert did not testify on this subject, but I/O's counsel asserted that a "switch controller is a pretty well-known structure." Hearing Transcript at 100.

Sercel counters that *Apex* requires "sufficient evidence" to rebut the presumption relating to the use of "means." Dkt. No. 39 at 15. Sercel argues that I/O's statements are merely conclusory and are not sufficient to overcome the presumption. *Id*. Sercel asserts that the claimed function is performed by the microcomputer based switch controller 100 and switches S1-S6 and S9. Sercel cites to Figure 3 and the specification at 7:54-8:32 for support of its construction. *Id*. Sercel asserts that the switches are integrally combined with the microcomputer-based switch controller to perform the recited means. Dkt. No. 46 at 7.

With regard to the switches, I/O asserts that the switches are not part of the "controller means" but rather are the structure that is controlled by the controller. I/O asserts this is analogous to Northrop Grumman Corp. v. Intel Corp., 325 F.3d 1346, 1352 (Fed.Cir.2003) in which signals that are monitored by a "means for monitoring" are not part of the claimed means structure. Dkt. No. 43 at 11.

(2) Construction

There is no dispute between the parties that the term in question is falls under a presumption that it is a means plus function term. I/O has not pointed to anything in the intrinsic record to overcome the use of "means" language. FN8 Further, though I/O makes assertions that the term controller would be understood to be limited to a "microcomputer-based switch control," I/O has not explained why the term controller would be limited to such a controller as opposed to other controllers. The claim language is drafted in the means plus function format and the particular language is generalized language without the use of specific structural language. Under such circumstances, the Court shall construe the language to be subject to 35 U.S.C. s. 112 para. 6. *See* Apex 325 F.3d at 1372; Kemco, 208 F.3d at 1361. In addition, as described below, the circuitry that performs the functional language described includes more than just a microcomputer-based switch controller.

FN8. I/O also has not pointed to extrinsic evidence.

With regard to the inclusion of switches, I/O's reliance upon *Northrop* is not persuasive. In *Northrop* the claim limitations in question explicitly stated "means for monitoring a plurality of logical signals characterizing the operational status of the bus interface unit." Here the claim language is not controller means "for controlling switches," but rather the claimed functional language relates to applying voltages across the mass during certain phases of the operating cycle. The controller itself does not apply voltages across the mass but rather controls the switches. The switches are used to apply the voltages. The structures shown and disclosed in the specification for applying voltages more properly include switches S1-S6 and S9 and the micro computer based switch controller 100. '242 Patent at Figure 3, Col. 7:54-9:42.

The Court construes "controller means for applying a reference electric field across said mass during a sensing phase of an operating cycle and for applying a forcing electric field across said mass during a forcing phase of said operating cycle" to be a means plus function limitation having a function of "applying a reference electric field across said mass during a sensing phase of an operating cycle and for applying a forcing electric field across said mass during a forcing phase of said operating cycle" and having a corresponding structure of "micro computer based switch controller 100 and switches S1-S6 and S9, and equivalents thereof."

VII. CLAIM CONSTRUCTION-INDEFINITE ISSUES

A. "small positive difference"-claims 1-3

(1) The Parties' Positions

I/O asserts that no construction is needed for the term "small positive difference." Dkt. No. 53 at 5. Sercel asserts that the term is indefinite and incapable of construction under 35 U.S.C. s. 112. *Id*. The dispute between the parties revolves around the use of the word "small." With regard to "small," I/O submitted an expert declaration that states "[a] person of skill in the art would understand that "small" refers to the amount of positive difference necessary to avoid instability while keeping the sensitivity as high as reasonably possible and at least high enough to limit the natural frequency of the accelerometer to the upper end of the frequency band of interest." Dkt. No. 43-Ex H (Declaration of Dr. Martin Schmidt) at para. 15. In its briefing I/O also stated that "a person of ordinary skill in the art would understand in light of the specification of the '242 patent that the small positive difference between Ke and Km should be selected so that the sensitivity is as high as possible without allowing the transfer function to become unstable in view of the tolerances inherent in the manufacturing process." Dkt. No. 43 at 21.

Sercel argues that the bounds of a claim must be objectively identified and that claim language cannot depend solely on subjective opinion but rather some objective standard must be provided to allow the public to determine the scope of the invention. Dkt. No. 39 at 24-25 (*citing* Datamize L.L.C. v. Plumtree Software, Inc., 417 F.3d 1342, 1350 (Fed.Cir.2005) and Halliburton Energy Services, Inc. v. M-1 LLC, 456 F.Supp.2d 811 (E.D. Tex 2006)). Further, Sercel cites *Datamize* for the proposition that when there is no disclosed objective standard, expert testimony is not sufficient. *Id*. at 24-25. Sercel asserts that the patent discloses the general effect that as the difference between Km and Ke decreases the system sensitivity increases. However, Sercel asserts that there is no teaching in the intrinsic record to objectively determine when the

difference (Km-Ke) becomes sufficiently "small." *Id*. at 25. Sercel also cites to inventor testimony to assert that "small positive difference" involves a subjective determination. *Id*. at 25-26; Hearing Transcript at 126-129.

I/O first asserts that "small positive difference" is clear and needs no construction as "[t]he word 'small' is a common and easily understood word that the jury will understand." Dkt. No. 43 at 21. I/O then states that with respect to the difference Km-Ke =Keff, the patent teaches that in theory the maximum sensitivity can be achieved when the effective spring constant Keff is zero (Km=Ke). I/O asserts that the patent also teaches that it is not a practical goal however to obtain Km=Ke and that the patent teaches that the system is unstable if Ke becomes too large. Dkt. No. 43 at 21. I/O further asserts that the patent teaches that a small positive difference is selected to result in high sensitivity at low frequencies. *Id*. (*citing* '242 Patent at 3:22-26). For the construction offered in its briefing with reference to the manufacturing tolerances, I/O offers deposition testimony of two of the inventors. *Id*. at 21-22. I/O asserts that Sercel's argument merely seeks to "put a number" on the term "small" and that such analysis is improper as mathematical precision is not required. *Id*. at 23 (*citing* Modine Mfg. Co. v. U.S. Int'l Trade Comm'n, 75 F.3d 1545, 1557 (Fed.Cir.1996) and Moor USA, Inc. v. Standard Register Co., 229 F.3d 1091, 111 (Fed.Cir.2000)). In contrast to mathematical precision, I/O argues that the inventors indicated that a small positive difference would be "self-explanatory" to one who does "real-world design." *Id*. at 23-24.

Finally, I/O asserts that the difference between Km and Ke has two effects: (1) sensitivity decreases in proportion to the difference and (2) the natural (or resonant) frequency of the accelerometer increases which in turn increases the bandwidth of the sensor. Dkt. No. 43 at 24. I/O states that "increasing the difference between Km and Ke is effectively a trade off of sensitivity for additional bandwidth" and therefore the "term small positive difference can be understood with reference to the natural frequency of the sensor and the frequency band of interest." *Id*. at 24 (*citing* Dr. Schmidt Declaration). Dr. Schmidt also testified at the oral claim construction hearing with regard to both the natural frequency concept and the manufacturing tolerances concept. Hearing Transcript at 62-63, 66-67.

Sercel rebuts I/O's arguments by stating that Sercel does not seek a mathematical term for "small positive difference" but rather Sercel and the public are entitled to some objective understanding of "small" in context of the specification. Dkt. N. 46 at 10. With regard to I/O's silicon processing tolerances based argument, Sercel asserts that I/O has not identified support in the specification mentioning the tolerances of silicon processing or how such tolerances would affect the effective spring constant or relate to "small positive differences." *Id*. With regard to the additional construction based upon Dr. Schmidt's declaration, Sercel asserts that "the frequency band of interest" is entirely subjective and depends only on a designer's interest. In addition, Sercel asserts that the construction of Dr. Schmidt's declaration also is insufficient because the specification fails to give any guidance as to the natural frequency of the structure and the mass of the structure, data needed for an exemplary value of the effective spring constant so as to give context to the "small difference." *Id*. at 11-12.

(2) Construction

The Court agrees with I/O that exact mathematical precision is not needed for the term "small." However, the Court does not believe that "small positive difference" should be provided to the jury without any construction as suggested by I/O. That I/O's own arguments provide a variety of meanings for this term is indicative that some guidance should be given as to the construction of "small positive difference." However, the construction should be supported by the patent specification and "when a word of degree is

used the district court must determine whether the patent's specification provides some standard for measuring that degree." *Exxon Research,* 256 F.3d at 1381.

I/O provides different possible constructions. However, neither is based upon support found in the specification. With regard to I/O's construction that depends upon "the tolerances inherent in any manufacturing process," I/O does not point to disclosure in the specification that links determining whether something is "small" to the manufacturing tolerances concept. At most I/O cites to a portion of the specification that indicates if Ke is too large the system becomes unstable, but this deals with the situation when Ke is too large compared to Km and does not provide any framework to determine when a difference Km-Ke is considered small enough. *See* '242 Patent at 13:27-30; Dkt. No. 43 at 21-22. The intrinsic record provides no further guidance that would direct one skilled in the art to evaluate "small" based upon manufacturing tolerances.

With regard to I/O's assertion that "small positive difference" refers to the "difference necessary to avoid instability while keeping the sensitivity as high as reasonably possible and at least high enough to limit the natural frequency of the accelerometer to the upper end of the frequency band of interest," again I/O does not provide support in the specification. I/O principally relies upon the declaration of Dr. Schmidt for the proposition that "small" can be understood with reference to the natural frequency and band of interest. Dkt. No. 43 at 24. However, the specification does not suggest that "small" should be evaluated from the frame of reference of the natural frequency and the frequency band.FN9 In general, the patent merely teaches that small differences yield high sensitivity. *See* '242 Patent at 3:22-25, 13:50-52. The intrinsic evidence provides no guidance to suggest the construction provided by Dr. Schmidt.

FN9. In the briefing and the hearing Sercel asserted that values for a variety of variables such as the natural frequency which could have provided a frame of reference as to what is "small" were improperly withheld from the specification even though they were known to the inventors at the time of filing. Dkt. No. 46 at 12-13. This Court's recommendation does not rely upon such assertions.

In sum, I/O has offered two different approaches to construe what the degree of difference that one would consider to be "small." However, the specification is devoid of disclosure linking these constructions to the meaning of "small" in the context of the '242 Patent. In the context of the '242 Patent, the Court finds that it cannot reasonably discern what guidance the specification provides to one skilled in the art to construe "small positive difference." For the reasons set forth herein, the Court finds the term "small positive difference" cannot be construed and therefore claims 1-3 are invalid.

B. "high value of mechanical spring constant"-claims 1-3; "high mechanical spring constant"-claims 1-3; "high mechanicals spring constant"-claim 2

(1) The Parties' Positions

The parties have treated these claim terms together in their arguments with the principle issue being the word "high." *See* Dkt. No 39 at 24-27; Dkt. No. 43 at 25-26; Dkt. No. 13-14. I/O asserts that no construction is needed for these terms. Dkt. No. 53 at 5-6. Sercel asserts that the term is indefinite and incapable of construction under 35 U.S.C. s. 112. *Id.*

The parties generally assert some of the same positions regarding indefiniteness as with regard to "small positive difference." Sercel asserts that no objective boundary is provided in the specification for a "high"

spring constant. I/O responds by stating that "the '242 Patent teaches that the spring constant is to be stiff enough so that the sensor will withstand high g-shocks without the springs breaking." Dkt. No. 43 at 25 (*citing* '242 Patent at 3:28-31). Further, I/O asserts that the patent teaches that the spring constant may be adjusted by increasing the thickness of the springs. *Id*. at 25-26 (*citing* '242 Patent at 14:7-12). I/O provided the declaration of Dr. Schmidt to assert that the relationship between the stiffness of the springs and their ability to withstand g forces was well known at the time of the invention and that a person skilled in the art would have known how to design a device with sufficient mechanical spring constant to withstand the type of g shocks expected in a MEMS (Microelectromechanical system) sensor. *Id*. at 25. Dr. Schmidt also offered testimony at the oral hearing stating that for various applications there are industry specifications as to the level of g forces an accelerometer should be able to withstand. Hearing Transcript at 59-62.

Sercel counters that there is no disclosure in the specification as to what level of g force needs to be withstood. Dkt. No. 46 at 13. In addition, Sercel asserts that the '242 Patent specification does not limit the accelerometer application to seismic applications. Sercel also objects to Dr. Schmidt's declaration as being merely conclusory. Sercel asserts that Dr. Schmidt provides no evidence of what size of g shocks would be considered high and no evidence of the expected range of values of g shocks in a MEMs sensor. Id. at 14. Sercel asserts that such testimony is the type noted in *Datamize* when the court stated the claim terms "cannot depend on the undefined views of unnamed persons, even if they are experts, specialists, or academics." Id. at 14; Datamize, 417 F.3d at 1352-53. Sercel also cross-examined Dr. Schmidt to establish that the robustness specifications were not disclosed in the specification. Hearing Transcript at 79.

(2) Construction

As noted by I/O, the specification provides guidance as to the meaning of a "high mechanical spring constant." The specification states:

According to one embodiment of the invention, the sensor structure has a connecting arrangement characterized by a high mechanical spring constant, ... The high mechanical spring constant results in a connecting arrangement of springs or beams which is capable of withstanding large g-force shocks to the sensor.

'242 Patent at 3:11-21. The patent continues "[s]imultaneously, the accelerometer has stiff mechanical springs which allows the sensor to withstand high g shocks without the springs breaking." *Id*. at 3:29-31. The '242 Patent also states "[a]s discussed above, especially by reference to FIG. 2, it is highly desirable to have a connecting arrangement of springs which can withstand high g forces applied to support 18'. A stiff spring arrangement characterized by a high mechanical spring constant Km...." Id. at 13:54-58. The specification itself thus gives guidance that a high spring constant is one that is high enough so that the sensor will withstand large g-shocks without the springs breaking. As Sercel notes, such a construction still leaves open the question of what is a large g-shock. However, the large g shocks that a device would be expected to withstand provides an objective basis for one skilled in the art to evaluate the scope of the term. The Court determines that the language of the specification therefore provides adequately definite disclosure to one skilled in the art. With such guidance, the Court notes that the claim language is "sufficiently clear to avoid invalidity on indefiniteness grounds." *See* Exxon Research, 265 F.3d at 1375.

The Court construes "high value of mechanical spring constant," "high mechanical spring constant," "high mechanicals spring constant" to be "a mechanical spring constant that is high enough so that the sensor will withstand large g-shocks without the springs breaking, large g-shocks being shocks that a device would be

expected to withstand."

C. "high sensitivity"-claims 1-3

(1) The Parties' Positions

I/O asserts that no construction is needed for "high sensitivity ." Dkt. No. 53 at 6. Sercel asserts that the term is indefinite and incapable of construction under 35 U.S.C. s. 112. *Id*.

The parties' arguments mirror their arguments for "small positive difference." I/O asserts that "high sensitivity" is definite because the patent teaches that sensitivity is related to the small positive difference of the spring constants (small differences yield high sensitivities). Dkt. No. 43 at 26-27. I/O asserts that the same boundaries that apply to small positive differences therefore apply to high sensitivity relying on similar arguments and evidence. *Id*. Sercel presents similar arguments as it asserted with regard to small positive differences. Dkt. No. 39 at 26-27; Dkt. No. 46 at 14-15.

(2) Construction

The patent states that high sensitivity results from small positive differences. '242 Patent at 3:22-28. As with small positive differences, the intrinsic record does not provide linkage between the constructions proposed by I/O for "high sensitivity" and the specification. For the reasons described above with regard to "small positive differences," the Court finds the term "high sensitivity" cannot be construed and therefore claims 1-3 are invalid.

D. "low frequency forces"-claims 1-3

(1) The Parties' Positions

I/O asserts that no construction is needed for "low frequency forces." Dkt. No. 53 at 6. Sercel asserts that the term is indefinite and incapable of construction under 35 U.S.C. s. 112. *Id*. The parties provided very little briefing as to "low frequency forces." I/O asserts that the '242 Patent "explicitly teaches low frequencies from 0 to 250 Hz." Dkt. No. 43 at 28 (*citing* '242 Patent col. 15:25-26; 3:19-29). I/O also provided testimony from Dr. Schmidt who stated that the '242 Patent defines low frequencies as the 0 to 250 Hz range. Id. (*citing* Schmidt Declaration at para. 17); Hearing Transcript at 63-65. Sercel argues that the range of 0 to 250 is referred to as one "example" in the patent and other examples are not provided. Dkt. No. 46 at 15.

(2) Construction

The specification makes multiple references to low frequencies. '242 Patent at 3:22-26, 12:29-31, 12:38-40, 13:59-61. The '242 Patent specification also provides an example baseband frequency range that goes up to 250 Hz. '242 Patent at 15:25-26. Thus, the patent provides at least one example of the bounds of what is construed to be low frequencies. In the context of the specification as a whole, it cannot be said that the specification is indefinite as to what is a low frequency. However, as the 0 to 250 Hz range is the only objective standard described in the patent to evaluate what ranges are to be construed as low frequencies, the Court will construe low frequency in accordance with this stated range. The Court construes "low frequency forces" to be "0 to 250 Hz forces."

E. "less susceptible to breaking"-claims 1-3; "low mechanical spring constant"-claims 1-3

(1) The Parties' Positions

These two terms are found in a common whereby phrase: "whereby said sensor structure is characterized by ... and by a connecting arrangement less susceptible to breaking as compared to a connecting arrangement characterized by a low mechanical spring constant." I/O asserts that no construction is needed for the two terms in question. Dkt. No. 53 at 6. Sercel asserts that the terms are indefinite and incapable of construction under 35 U.S.C. s. 112. *Id*.

I/O asserts that the claim terms in question appear in a "whereby" clause which merely states the result of the claim and adds nothing to the patentability or substance of the claim. Dkt. No. 43 at 28 (*citing* Texas Instruments, Inc. v. U.S. Int'l Trade Comm'n, 988 F.2d 1165, 1172 (Fed.Cir.1993). I/O further states that, even if construed, the comparison language of the claim is sufficiently definite. *Id*. I/O asserts that in light of the specification it would be understood that if a spring has a low mechanical spring constant such that it may be sensitive to low frequencies, then the spring would be susceptible to breakage. *Id* . (*citing* '242 Patent at 3:12-31, 13:54-65). In light of the specification, I/O asserts that a low spring constant is one that is low enough such that it is sensitive to low frequencies, or at the least, a spring constant that is not a high spring constant. Dkt. 43 at 28-29.

Sercel argues that the whereby clauses are relevant as patentability was argued in part based upon these limitations in an October 21, 1997 Response to Office Action. Dkt. No. 46 at 15-16; Dkt. No. 46, Ex. H. Sercel relies on the same arguments as presented above in regard to its position that the claims must provide an objective boundary. Sercel further argues that I/O's constructions are circular and do not provide any objective standard. *Id*.

(2) Construction

During prosecution, the concept that the sensor structure is less susceptible to breaking was one of the points argued with reference to claim 1. Dkt. No. 43, Ex. H at 10. As the applicants argued patentability based at least in part on concepts in the whereby clause, the Court shall evaluate this clause.

With regard to "less susceptible to breaking" it is instructive to look to the claim limitation as a whole. In the context of the claims, less susceptible to breaking has a meaning that can be recognized as merely comparative language comparing the connecting arrangement of the claimed sensor structure that has "a high value of mechanical spring constant" and a "connecting arrangement characterized by a low mechanical spring constant." In light of the language of the claims themselves, the Court does not find that "less susceptible to breaking" needs construction.

With regard to "low mechanical spring constant," the Court notes that such term is only found in the claims. However, it is noted that the specification refers to the effective spring constant (resulting from mechanical and electrical spring constants) with regard to the language "to low frequency forces, the accelerometer appears to be one having a spring constant which is very low so that the accelerometer has high sensitivity to such forces." ' 242 Patent at 3:25-28. "Low frequency forces" has been construed above. Further, the content of the claims use the term low spring constant in a manner that indicates a comparison is being made contrasting low spring constants to high spring constants. In light of the intrinsic record as a whole, the Court does not find clear and convincing evidence that low mechanical spring constant is indefinite. The Court shall construe "low mechanical spring constant" as "a mechanical spring constant that is not a high

mechanical spring constant and that is sufficiently low so that sensitivity to low frequency forces is obtained."

F. "desired mechanical characteristic"-claims 4-6; "desired characteristic"-claims 4-7

(1) The Parties' Positions

I/O asserts that no construction is needed for these two terms. Dkt. No. 53 at 7-8. Sercel asserts that the terms are indefinite and incapable of construction under 35 U.S.C. s. 112. *Id*.

Sercel asserts that the plain meaning of the term "characteristic" relates to a "distinguishable feature or attribute." Dkt. No. 39 at 28. Sercel further asserts that there is no indication as to what characteristic is referred to in the claims and as such there are no bounds to the claim and no notice of the scope of the claim is provided to the public. *Id*. Sercel further argues that the inventors acknowledged that a desired characteristic may change from application to application.

I/O asserts that the specification teaches that various characteristics can be manipulated. Dkt. No. 43 at 29. I/O notes that the patent teaches desired characteristics including the critical damping and natural frequency. *Id*. I/O asserts that a person of skill in the art would recognize that other characteristics could also be relevant. *Id*.

(2) Construction

Mindful that not all claim terms require construction, the Court will decline to construe "desired mechanical characteristic," and "desired characteristic." The specification teaches as least two desired characteristics, the natural frequency and critical damping. '242 Patent at 3:66-67; 11:55-12-5. In light of this disclosure in the specification, it cannot be said that a desired characteristic would be indefinite to one skilled in the art. In addition, no evidence has been provided to indicate that in light of the specification as a whole, the desired characteristics should be limited to the examples provided in the specification. The Court declines to construe "desired mechanical characteristic," and "desired characteristic."

VIII. CONCLUSION

Accordingly, the Court hereby **RECOMMENDS** that the disputed claim terms be construed consistent herewith. A chart summarizing these constructions is attached as Exhibit A.

Within ten (10) days after receipt of the magistrate judge's report, any party may serve and file written objections to the findings and recommendations of the magistrate judge. 28 U.S.C.A. 636(b)(1)(C).

Failure to file written objections to the proposed findings and recommendations contained in this report within ten days after service shall bar an aggrieved party from *de novo* review by the district court of the proposed findings and recommendations and from appellate review of factual findings accepted or adopted by the district court except on grounds of plain error or manifest injustice. Thomas v. Arn, 474 U.S. 140, 148 (1985); Rodriguez v. Bowen, 857 F.2d 275, 276-77 (5th Cir.1988).

EXHIBIT A

CLAIM TERM	COURT CONSTRUCTION

"mechanical spring constant"	"a quantity expressing the relationship between mechanical force and the displacement of a spring"
"electrical spring constant"	"a quantity expressing the relationship between an electromagnetic force and the displacement of the spring"
"sensor structure"	No construction necessary.
"support structure"	No construction necessary.
"connecting arrangement"	"an arrangement of springs or beams"
"displacement"	No construction necessary.
"predetermined position"	No construction necessary.
"small amplitudes of said displacement signal"	"amplitudes that are small in the context of the capacitor separation d."
"Cover Plates"	No construction necessary.
"substantially zero"	No construction necessary.
"means for generating a displacement signal as a function of time"	Function: "generating a displacement signal as a function of time which is representative of distance said mass has moved with respect to said support structure in response to force applied to said support structure" Structure: "operational amplifier OA 1; capacitors C 1 and C2; switches S1, S2, S3, S4, S5, S6, S7, S8, and S9; top and bottom conductive plates 50 and 52; reference voltages VR and -VR; ground connections; and micro computer based switch controller 100; and equivalents thereof"
"Means responsive to said displacement signal for applying an electromagnetic feedback force as a function of time"	Function: "applying an electromagnetic feedback force as a function of time on said mass in a direction to move said mass to a predetermined position with respect to said support structure" Structure: "a feedback compensator circuit and a switch S5 controlled by a micro computer based switch controller 100, and equivalents thereof"
"Means for applying a voltage difference between said conductive surfaces of said top and bottom cover plates and applying a reference voltage to said top and bottom conductive surfaces of said mass"	Function: "applying a voltage difference between said conductive

	surfaces of said top and bottom cover plates and applying a reference voltage to said top and bottom conductive surfaces of said mass" Structure:
	Indefinite
"Controller means for applying a referenceFunction: electric field across said mass during a sensing phase of an operating cycle and for applying a forcing electric field across said mass during a forcing phase of said operating cycle"	Function: "applying a reference electric field across said mass during a sensing phase of an operating cycle and for applying a forcing electric field across said mass during a forcing phase of said operating cycle" Structure:
	"micro computer based switch controller 100 and switches S1-S6 and S9, and equivalents thereof."
"small positive difference"	Indefinite
"high value of mechanical spring constant"	"a mechanical spring constant that is high enough so that the sensor will withstand large g-shocks without the springs breaking, large g-shocks being shocks that a device would be expected to withstand"
"high mechanical spring constant"	
"high mechanicals spring constant"	
"high sensitivity"	Indefinite
"low frequency forces"	"0 to 250 Hz forces"
"less susceptible to breaking"	No construction necessary.
"low mechanical spring constant"	"a mechanical spring constant that is not a high mechanical spring constant and that is sufficiently low so that sensitivity to low frequency forces is obtained"
"desired mechanical characteristic"	No construction necessary.
"desired characteristic"	