

I. Background

The '637 patent “relates to exercise equipment, physical training, and the accurate measurement of exertion.” [Doc. [1-3](#) at col. 1, ll. 7-8]. With the system, sensors measure the motion of the user and the system then uses that signal to measure physiological exertion and display that level of exertion. “The system comprises a measuring device, wireless transmission of information, and associated computer hardware and software. The measuring device monitors the motion of the entire individual, or of one or more limbs” to provide an “accurate measurement of physiological exertion with interactive video capabilities, at relatively low cost.” [Doc. [1-3](#) at col. 2, ll. 50-56.]

In particular, the present invention defines a system for conveniently monitoring the exertions of an individual performing exercise such as calisthenics, running or walking in place. A primary objective of the present invention is to provide an accurate, inexpensive, and versatile system for monitoring exercise and estimating exertion, which can in turn be linked to video and multimedia equipment (such as are provided by many desktop computer systems) for simultaneous interactive education, training, entertainment, or other purposes.

The '637 patent makes twenty-two claims. In this action, Plaintiff Impulse Technology alleges that Defendants have violated claims 1, 3, 13, 14, 16 or 17 of United States Patent No. [5,524,637](#). Of these claims, claim 1 is an independent claim while claims 3, 13, 14, 16 and 17 are dependent claims. As dependent claims, these have the limitations described in the independent claim together with additional limitations contained in each dependent claim.

The parties have agreed upon the meaning of a number of claim terms. [Doc. [96](#).] The Court adopts the parties' agreed construction and defines the terms consistent with the parties' agreed upon construction. In their joint claim construction statement, the parties agreed on the interpretation to

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be given six of the terms found in the claims of the patent. [Doc. 161.] The parties concur on the following construction of these terms:

“sensor means for sensing a motion of a user”: Function: sensing a motion of a user
Structure: sensor 10

“converter means for creating a signal indicative of said motion of said user”: Function: creating a signal indicative of said motion of said user. Structure: a voltage-to-frequency converter or encoder (within item 10 in Figure 2)

“display means for displaying an indication of said level of physiological exertion of said user”: Function: displaying an indication of said level of physiological exertion of said user. Structure: video display 20

“means for affixing said sensor means to a limb of said user” Function: affixing said sensor means to a limb of said user. Structure: a strap

“transmitter means for transmitting said signal”: Function: transmitting said signal. Structure: an infrared, acoustic, or radio transmitter

“displaying an indication of said level of physiological exertion of said user”: “displaying an indication of said level of physiological exertion of said user”

“signal”: an electrical quantity, such as voltage, current, or frequency, that conveys information

The parties disagree as to the meaning of seven terms included in the six claims. Against this backdrop, the Court construes the disputed terms.

II. Legal Standard

The construction of a patent, including terms of art within its claims, is a question of law. See [Markman v. Westview Instruments, Inc.](#), 517 U.S. 370, 383-91 (1996). In resolving a claim of patent infringement, a court first determines the meaning and scope of the patent. [Id. at 390.](#)

On September 4, 2012, this Court held a Markman claim construction hearing and a status

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conference in this case. [Doc. [107](#).] The parties have also presented this court with a joint claim construction and pre-hearing statement [Doc. [96](#).], as well as pre- and post-*Markman* hearing briefs on claim construction. [Docs. [97](#), [99](#), [101](#), [110](#), [113](#), [115](#).]

When interpreting an asserted claim, the Court first looks to the intrinsic evidence of record, i.e., the patent itself, including the claims, the specification and, if in evidence, the prosecution history. See *Markman v. Westview Instruments, Inc.*, [52 F.3d 967, 979 \(Fed. Cir. 1995\)](#), *aff'd*, [517 U.S. 370 \(1996\)](#). The intrinsic evidence gives the most significant guidance regarding the interpretation of disputed claim language. *Vitronics Corp. v. Conceptoronic, Inc.* [90 F.3d 1576, 1582 \(Fed. Cir. 1996\)](#).

In *Phillips v. AWH Corp.*, [415 F.3d 1303 \(Fed. Cir. 2005\)](#), the Federal Circuit reiterated the standards used to interpret patent claims. Among these, “the ‘bedrock principle’ of patent law [is] that ‘the claims of a patent define the invention to which the patentee is entitled the right to exclude.’” *Id.* at 1312 (quoting *Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc.*, [381 F.3d 1111, 1115 \(Fed. Cir. 2004\)](#)). Thus, “the claims are ‘of primary importance’ in the effort to ascertain precisely what it is that is patented.” *Phillips*, [415 F.3d at 1312](#) (quoting *Merrill v. Yeomans*, [94 U.S. 568, 570 \(1876\)](#)); see also *Renishaw PLC v. Marposs Societa' per Azioni*, [158 F.3d 1243, 1248 \(Fed. Cir. 1998\)](#) (“The claims define the scope of the right to exclude; the claim construction inquiry, therefore, begins and ends in all cases with the actual words of the claim.”).

The terms of a claim “are generally given their ordinary and customary meaning. . . . that the term[s] would have to a person of ordinary skill in the art in question at the time of the invention” *Phillips*, [415 F.3d at 1312-13](#). Courts thus interpret claims through the eyes of a person having ordinary skill in the art or field of the invention. That person “is deemed to read the

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words used in the patent documents with an understanding of their meaning in the field, and to have knowledge of any special meaning and usage in the field.” [Phillips, 415 F.3d at 1313](#).

This Court may also consider other claims in the patent, both asserted and unasserted claims. [Id. at 1314](#). The usage of a term in one claim may shed light on the meaning of the same term in other claims. The claims “are part of ‘a fully integrated written instrument,’ consisting principally of a specification that concludes with the claims. For that reason, claims ‘must be read in view of the specification of which they are a part.’” [Id. at 1315](#) (quoting [Markman, 52 F.3d at 978-79](#)).

The parties agree that the ‘637 patent is expressed in means-plus-function format under [35 U.S.C. § 112, ¶ 6](#). Paragraph 6, provides that:

An element of a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

[35 U.S.C. § 112, ¶ 6](#). With means-plus-function claims, courts first determine the claim’s function, and then identify the structure necessary to perform that function. [Altiris, Inc. v. Symantec Corp., 318 F.3d 1363, 1375](#) (Fed. Cir. 2003).

Especially with regard to claims expressed in means-plus-function under § 112, ¶ 6, “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 Corp. v. Conceptronic, Inc., 90 F.3d 1576, 1582](#) (Fed. Cir. 1996)). The “quid pro quo for the convenience of employing § 112, ¶ 6” is that the patentee “has a duty to clearly link or associate structure to the claimed function.” [Budde v. Harley-Davidson, Inc., 250 F.3d 1369, 1377](#) (Fed. Cir. [2001](#)). Having chosen to employ § 112, ¶ 6, Plaintiff Impulse Technology was obligated to link

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some designated structures with the claimed function.

If the use of the ordinary or accustomed meaning does not cause the claim to become meaningless, courts will typically find the ordinary or accustomed meaning to be the meaning that should be used. [*W.E. Hall Co., Inc. v. Atlanta Corrugating, LLC*, 370 F.3d 1343, 1350 \(Fed Cir. 2004\)](#) (noting that “[w]e indulge a ‘heavy presumption’ that the claim terms carry their ordinary and customary meaning”); [*SuperGuide Corp. v. DirecTV Enter.*, 358 F.3d 870, 874 \(Fed. Cir. 2004\)](#).

In construing the claims and specification, the court interprets words “as one of skill in the art at the time of the invention would understand them.” [*Eastman Kodak*, 114 F.3d at 1555](#). Claim terms should be construed, when possible, “in a manner that renders the patent internally consistent.” [*Budde v. Harley-Davidson, Inc.*, 250 F.3d 1369, 1379-80 \(Fed. Cir. 2001\)](#).

Reliance upon extrinsic evidence is improper where the public record—the claims, specifications, and file history—unambiguously defines the scope of the claims. [*Vitronics Corp*, 90 F.3d at 1583](#). Thus, the Court looks to extrinsic evidence to assist in construing a patent claim only if the intrinsic evidence is ambiguous.

III. Discussion

Plaintiff Impulse Technology says that Defendants infringe claim 1 of the ‘637 patent. That independent claim teaches an invention for monitoring physiology exertion:

1. A system for measuring physiological exertion, comprising: at least one sensor means for sensing a motion of a user, said sensor means including a converter means for creating a signal indicative of said motion of said user and a transmitter means for transmitting said signal, and a monitor, said monitor including a receiver means for receiving said signal, a correlation means for correlating said signal indicative of said motion of said user with a level of physiological exertion of said user and display means for displaying an indication of said level of physiological exertion of said user.

Because the parties disagree regarding what interpretation should be given certain terms in the '637 patent, the Court interprets them. *Markman*, 517 U.S. at 391.

a. “correlation means for correlating said signal indicative of said motion of said user with a level of physiological exertion of said user”

In perhaps their most important difference, the parties dispute what interpretation should be given “correlation means for correlating said signal indicative of said motion of said user with a level of physiological exertion of said user.” The parties agree that this means-plus-function term should be interpreted to carry out the function of “correlating said signal indicative of said motion of said user with a level of physiological exertion of said user.” They disagree over what structure this claim term implicates.

“When construing the term the court’s task always begins with identifying the function, ‘staying true to the claim language and the limitations expressly recited by the claims.’” [*Harris Corp. v. Ericsson Inc.*, 417 F.3d 1241, 1264 \(Fed. Cir. 2005\)](#) (quoting [*Omega Eng’g, Inc. v. Raytek Corp.*, 334 F.3d 1314, 1321 \(Fed. Cir. 2003\)](#)). Secondly, a court should look to the specification to determine “what structure, material or acts. . . correspond to the function performed.” *Id.*; see also [*Blackboard, Inc. v. Desire2Learn Inc.*, 574 F.3d 1371, 1382 \(Fed. Cir. 2009\)](#); [*Valmont Indus., Inc. v. Reinke Mfg. Co.*, 983 F.2d 1039, 1042 \(Fed. Cir. 1993\)](#) (explaining that the patentee must describe in the specification some structure which performs the specified function). A claim controlled by 35 U.S.C. § 112, ¶ 6 does not adopt every structure that can possibly perform the specified function. Instead, the limitation should be interpreted to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

The parties disagree with regard to what structure the claim describes. Perhaps most central

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to Defendants' position is their contention that the patent claim must specifically describe the algorithm used to carry out the correlation. Relatedly—but regarding an issue not decided here—Defendants say the '637 patent does not sufficiently describe the calculation or algorithm to enable a user to utilize the patent.

In contrast, Plaintiff Impulse Technology seeks an interpretation finding the structure for this term to be a computer implementing a general “algorithm (expressed as a look-up table, matrix, formula, or decision flowchart) to estimate exertion from the acceleration data and pertinent individual information.” [citing Doc. [1-3](#) at col. 8, ll. 10-14.] Through reference to these outside estimates of exertion, Impulse Technology says it describes a general methodology for putting together a measurement of exertion levels.^{2/}

In effect, Impulse Technology seeks a structure where the user would need reference outside materials to create an algorithm that computed the exertion, likely in calories being expended. *See*, Ex. [1-3](#), '637 patent, at 8:10-14.^{3/} Impulse Technology acknowledges that the '637 patent only

^{2/}See, e.g.:

A simpler approach is to calculate the exertion level for an average person at different performance levels in a given activity, and the adjustments or corrections corresponding to deviations from the average in the most significant physiological parameters. The most significant parameters in most cases will be those affecting biomechanical efficiency and energy: in particular: weight, height, age, gender, and conditioning or training.”

[Doc. [1-3](#) at col. 3, ll. 39-37.]

^{3/}The '637 patent describes this general algorithm:

The associated software would comprise an algorithm (*expressed as a look-up table, matrix, formula, or decision flowchart*) to estimate exertion from the acceleration data and pertinent individual information. Additional features might include a means to estimate cardiovascular fitness, a record of past measurements and completed exercises, and a menu of video clips.

[Doc. 1-3 at col. 8, ll. 10-16 (emphasis added).]

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identifies a “general approach to identifying the appropriate algorithm.” [Doc. [1-3](#) at col. 3, ll. 54-55.]

Plaintiff Impulse Technology describes its recommended formula for carrying out the calculation:

The ‘637 patent’s generic-activity algorithm sets forth a three-step process a computer can carry out that will have the effect of correlating said signal indicative of said motion of said user with a level of physiological exertion of said user. First, the computer calculates a performance level using the signal input. Second, the computer determines what the level of exertion would be for an average person at that performance level. Third, the computer adjusts the exertion level based on demographic parameters that distinguish the user from the average person.

[Doc. [113](#), page 4] (citations omitted.)

The Federal Circuit recently described the relevant rule: “a means-plus-function claim element for which the only disclosed structure is a general purpose computer is invalid if the specification fails to disclose an algorithm for performing the claimed function.” *In re Katz Interactive Call Processing Patent Litigation*, [639 F.3d 1303, 1316 \(Fed. Cir. 2011\)](#) (quoting *Net MoneyIN, Inc. v. VeriSign, Inc.*, [545 F.3d 1359, 1367 \(Fed. Cir. 2008\)](#)). Simply described, a general purpose computer is insufficient where that computer needs to be specially programmed to carry out the described function. *Cf. USHIP Intellectual Props, LLC v. United States*, [08-537C, 2011 WL 1632374 \(Fed. Cl. Apr. 28, 2011\)](#) (finding described computer structure sufficient only when it performs functions “performed by a general purpose computer without special programming, such as ‘processing,’ ‘receiving,’ and ‘storing,’ and that these basic functions may not require disclosure of an algorithm.”); *see also In re Katz Interactive Call Processing Patent Litigation*, [639 F.3d at 1316 \(Fed. Cir. 2011\)](#) (where patent did not claim any specific function performed by a special purpose computer other than simply “processing,” “receiving,” and “storing”, and where “those

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functions can be achieved by any general purpose computer without special programming,” “it was not necessary to disclose more structure than the general purpose processor that performs those functions”).

In [*Noah Sys., Inc. v. Intuit Inc.*, 675 F.3d 1302, 1317 \(Fed. Cir. 2012\)](#), the court similarly reviewed 35 U.S.C. § 112, ¶ 6 and considered how specific algorithms need be when a general purpose computing is described:

Section 112, paragraph 6, is intended to prevent such pure functional claiming. In reaching this conclusion, we rejected the argument that no more specificity was needed to support the claimed function because a person skilled in the art could readily fashion a computer-based means for performing the ‘assigning function’ We explained that the *disclosure* must identify the method for performing the function, whether or not a skilled artisan might otherwise be able to glean such a method from other sources or from his own understanding. That various methods might exist to perform a function is precisely why the disclosure of specific programming is required.

Id. (internal quotation marks, citations, and alterations omitted).

In general, Plaintiff Impulse Technology acknowledges that the generic activity algorithm lacks any readily identifiable formula. *See* Doc. [113](#), at 7 (“Impulse acknowledges that the ‘637 patent’s generic-activity algorithm leaves details of the implementation to be determined as appropriate to the particular application of the invention.”). Excepting the rare instances where the processing, receiving, or storing of formulas is obvious, a patent cannot rely upon the skill of one familiar with the field to construct the algorithm. *See* [*Blackboard*, 574 F.3d at 1385](#) (“The question before us is whether the specification contains a sufficiently precise description of the ‘corresponding structure’ to satisfy section 112, ¶ 6, not whether a person of skill in the art could devise some means

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to carry out the recited function.”^{4/}; [Stamps.com Inc. v. Endicia, Inc.](#), 437 F. App’x 897, 911 (Fed. Cir. 2011), reh’g denied (Aug. 1, 2011) (“We must determine whether a skilled artisan would have understood the specification to encompass the necessary program and could have implemented the program—not simply whether he could have written the program.”).

Because Plaintiff Impulse Technology’s ‘637 patent fails to provide a sufficient description of the structure to be used to correlate the motion of the signal with a level of physiological exertion, the Court rejects Impulse Technology’s initially proposed construction of this term.

Impulse Technology, however, offers an alternative construction of the structure needed for correlating said signal indicative of motion of the user with a level of physiological exertion of the user. With this alternative, Impulse Technology says that its specific activity algorithm for walking and running in place is sufficiently specific. In columns 5 and 6 of the ‘637 patent specifications, Impulse Technology more specifically describes a formula for computing the level of physical exertion associated with the motion of a signal. [Doc. [1-3](#) at col. 5, ll. 43 to col. 6, ll. 68.]

Under this specification, the step height is multiplied by a coefficient of 5 to obtain the stride length. The stride length is then divided by the stepping rate to calculate the effective speed. Once

^{4/}In *Blackboard*, the Federal Circuit described the reason why the structure disclosed in the specification of a means-plus-function claim be more than a simple designation of a computer or microprocessor:

Because general purpose computers can be programmed to perform very different tasks in very different ways, simply disclosing a computer as the structure designated to perform a particular function does not limit the scope of the claim to the corresponding structure, material, or acts that perform the function, as required by section 112 ¶ 6. Thus, in a means-plus-function claim in which the disclosed structure is a computer, or microprocessor, programmed to carry out an algorithm, the disclosed structure is not the general purpose computer, but rather the special purpose computer programmed to perform the disclosed algorithm. Consequently, a means-plus-function claim element for which the only disclosed structure is a general purpose computer is invalid if the specification fails to disclose an algorithm for performing the claimed function.

[Blackboard](#), 574 F.3d at 1384.

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the effective rate of speed is established, the user inputs her weight and .56 of the weight is multiplied against the effective speed. The subject then inputs her height to determine if she is obese. If she is obese, the exertion rate is increased 20%. Reasoning that subjects are most exercise efficient at age 44, the alternative specification adds 1% for every year younger or older than 44, up to 30%. [Doc. [1-3](#) at col. 5, ll. 65 to col. 6, ll. 1-2.] Then the specification increases the exertion rate by 10% if the subject is female. [Doc. [1-3](#) at col. 6, ll. 21-23.] The specification applies a conditioning estimation and reduces the exertion rate “by about 25% for someone in good training and about 35% for someone in superb training.” [Doc. [1-3](#) at col. 6, ll. 24-31.] Finally, these specific running/walking specifications provide for adjustments in the exertion rate for various environmental factors such as surface grade, surface slipperiness, and windiness. [Doc. 1-3 at col. 6, ll. 33-68.]^{5/}

Defendants seem to recognize the “activity-specific algorithm” from columns 5 and 6 as more specific than Impulse Technology’s more general attempt at defining the structure for correlating the exertion levels from the signal’s movement. Nonetheless, Defendants argue that the alternative definition remains inadequate. First, Defendants say the activity-specific algorithm applies only to running and walking while the ‘637 patent claims to be capable of also measuring exertion levels for skiing, calisthenics, and other exercise activities. Second, Defendants argue that ‘637 patent provides insufficient information to create the structure—the algorithm—to calculate the step height or the step rate. *See* Doc. [115](#) at 10 (“Impulse cites no case holding that a specification can fail to

^{5/}These environmental factors make no obvious sense. Recall, the ‘637 patent describes an exertion monitor to be used indoors with the subject running or walking in place before a simulating monitor. Unless the invention is used in a home wind tunnel or home ice skating rink it is difficult to see how wind, incline, or slippery surfaces ever come into play.

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provide key portions of algorithmic structure, yet avoid indefiniteness by disclosing a partial algorithm.”) While admitting that a method of calculating step height and rate from signal information was known, Defendants say there are multiple calculation methods and the ‘637 patent failed to sufficiently disclose the structure that would process the signal information.

With this claim construction, however, this Court does not determine whether Defendants should be given judgement upon their argument that claim 1 of the ‘637 patent is indefinite under 35 U.S.C. § 112, ¶ 2. While not reaching a decision on the validity of claim 1, the Court interprets that claim in a fashion more likely to be valid than a construction obviously invalid. [See Phillips, 415 F.3d at 1327](#) (“[W]e have certainly not endorsed a regime in which validity analysis is a regular component of claim construction. Instead, we have limited the maxim to cases in which ‘the court concludes, after applying all the available tools of claim construction, that the claim is still ambiguous.’”) (quoting [Liebel-Flarsheim Co. v. Medrad, Inc., 358 F.3d 898, 911 \(Fed. Cir. 2004\)](#)).

The Court therefore construes “correlation means for correlating said signal indicative of said motion of said user with a level of physiological exertion of said user” for walking and running in place to be a structure involving a computer that implements an algorithm that 1) first computes the rate of locomotion or speed by multiplying the step height by a coefficient of 5 to obtain the stride length, and multiplying that stride length by the stepping rate to obtain the effective speed; 2) then multiplies the effective speed times 0.56 to estimate the rate of exertion; 3) then uses height and weight to calculate whether the user is obese and increases the exertion rate by 20% if so; 4) then adjusts for age by adding 1% for every year younger or older than 44, up to 30%; 5) then adjusts for gender and increases the exertion level by 10% if the subject is female; 6) then adjusts for conditioning by decreasing exertion levels by 25% for a user with good training and decreasing

exertion levels by 35% for someone in superb training.

The Court further finds that the '637 patent specifications give insufficient information to allow interpretation of “correlation means for correlating said signal indicative of said motion of said user with a level of physiological exertion of said user” for calisthenics, swimming, skiing, or a training program.

b. “system for measuring physiological exertion”

The parties dispute what interpretation should be given “system for measuring physiological exertion.” Plaintiff Impulse Technology says no construction is necessary while Defendants say “system for measuring physiological exertion” should be interpreted as a “system that accurately quantifies physiological exertion.”

The '637 patent uses the terms “system for measuring physiological exertion” in its preamble to independent claim 1. [Doc. [1-3](#) at col. 11, ll. 21.]^{6/} Plaintiff Impulse Technology contends that this preamble language “does not need to be construed since it is not a limitation of the claim.” [Doc. [97](#) at 14]. Defendants respond that “measuring physiological exertion” “should be treated as a limitation because it gives ‘life and meaning’ to the claim.” [Doc. [101](#) at 22].

^{6/}Claim 1 of the '637 patent claims:

1. A system for measuring physiological exertion, comprising:

at least one sensor means for sensing a motion of a user, said sensor means including a converter means for creating a signal indicative of said motion of said user and a transmitter means for transmitting said signal,

and a monitor, said monitor including a receiver means for receiving said signal, a correlation means for correlating said signal indicative of said motion of said user with a level of physiological exertion of said user and display means for displaying an indication of said level of physiological exertion of said user.

[Doc. [1-3](#) at col. 11.]

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In general, “when the preamble is essential to understand limitations or terms in the claim body, the preamble limits claim scope.” [*Catalina Mktg. Int’l, Inc. v. Coolsavings.com, Inc.*, 289 F.3d 801, 808 \(Fed. Cir. 2002\)](#) (quoting [*Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1306 \(Fed. Cir. 1999\)](#)); see also [*Bicon, Inc. v. Straumann Co.*, 441 F.3d 945, 952 \(Fed. Cir. 2006\)](#) (“[W]hen the limitations in the body of the claim rely upon and derive antecedent basis from the preamble, then the preamble may act as a necessary component of the claimed invention.”) (quoting [*Eaton Corp. v. Rockwell Int’l Corp.*, 323 F.3d 1332, 1339 \(Fed. Cir. 2003\)](#)).

Also, where the body of the claim does not define the complete invention, and the preamble completes that invention by adding additional limitations, it limits the scope of the claim. [*Poly-Am., L.P. v. GSE Lining Tech., Inc.*, 383 F.3d 1303, 1310 \(Fed. Cir. 2004\)](#). Perhaps most important, claim 1 of the ‘637 patent is expressed in a means-plus-function format. Its preamble sets out the claim’s function: “A system for measuring physiological exertion.” Without the preamble, claim 1 does not sufficiently describe the function of claim 1.

Apart from the preamble, claim 1 of the ‘637 patent describes “a correlation means for correlating said signal indicative of said motion of said user with a level of physiological exertion of said user and display means for displaying an indication of said level of physiological exertion of said user.” [Doc. [1-3](#) at col. 11, ll.27-31.] The preamble gives limitations and elements in addition to the limitations contained in the body of claim 1. The body of claim 1 describes a display of the level of physiological exertion. The preamble to claim 1 adds an additional limitation that requires the system to measure, and not just display, the physiological exertion. Because the preamble adds additional limitations, it acts to give meaning to, and to limit the scope of, the claim.

As might be expected, the parties also disagree on how “system for measuring physiological

exertion” should be construed. Defendants says “the term requires an accurate measurement of physiological exertion” and suggest “a system that accurately quantifies physiological exertion” as the appropriate construction. [Doc. [101](#) at 22.] Responding, Plaintiff Impulse Technology says “a system for measuring physiological exertion’ does not need construction and is understandable by its plain meaning.” [Doc. [97](#) at 15.]

The ‘637 patent is inconsistent regarding how accurate the measured physiological exertion needs to be. Some of the specifications suggest that the measurement of exertion needs to be accurate: “The present invention relates to exercise equipment, physical training, and the *accurate measurement of exertion*”;^{7/} “[a] primary objective of the present invention is to *provide an accurate, inexpensive, and versatile system for monitoring exercise and estimating exertion*”^{8/}; “[t]he present invention is intended to provide a cost-effective, light-weight, *and accurate* system for monitoring physiological exertion.”^{9/}

Somewhat inconsistently, the ‘637 patent frequently refers to the exertion measurement as an estimate: “The present invention concerns a novel design for an interactive exercise system, in which physiological exertion can be conveniently and automatically *estimated* by monitoring a course of exercise such as calisthenics, a training program, or walking or running in place.”^{10/}; “[i]n brief, the motion of a subject (especially in a confined area) is monitored by one or more of several

^{7/}[Doc. [1-3](#) at col.1, ll. 7-8 (emphasis added).]

^{8/}[Doc. [1-3](#) at col.1, ll. 11-13 (emphasis added).]

^{9/}[Doc. [1-3](#) at col.2, ll. 42-45.]

^{10/}[Doc. [1-3](#) at col.1, ll. 19-24 (emphasis added).]

means, and used to *estimate* exertion.”^{11/}; “[w]ithin quite wide boundary conditions, and for most people, the *estimates* of exertion will be quite accurate.”^{12/} See also Doc. [1-3](#) at col. 4, ll. 13-14; col. 5, ll. 49-51. Other obviously inconsistent examples exist, such as when the patent states that the exertion computations will be both accurate and will also be estimates, obviously inconsistent.

Is there a way to accommodate the ‘637 patent’s description of accurate exertion computations with the ‘637 patent’s description of the exertion computations as being estimates? Both “accurate” and “estimated” are imprecise terms. What might be accurate to one person implementing the ‘637 patent could be an estimate to another person implementing the ‘637 patent.

The ‘637 patent, however, offers a description of the level of accuracy required of the exertion measurement: “The algorithm for walking and running place: * * * An estimate that is within 15% accurate for 95% of the population will be acceptable.” [Doc. [1-3](#) at col. 5, ll. 29-33.] The ‘637 patent thus quantifies the degree of accuracy required. Faced with this specification, Plaintiff Impulse Technology argues that this “statement does not impose an accuracy limitation on the claims because it does not clearly show the inventor’s intention to limit the claim.” [Doc. [113](#) at 16.]

But Impulse Technology’s argument runs into the ‘637 patent’s description of the need for the algorithm to be accurate: “Then this calibration algorithm must be validated in practice, to ensure that it is robust and not sensitive to noise or irrelevant information, and that it successfully deals with individual variations for the normal demographic range (95%) in the target population.” [Doc. [1-3](#) at col. 3, ll. 25-29.]

^{11/}[Doc. [1-3](#) at col.1, ll. 24-26 (emphasis added).]

^{12/}[Doc. [1-3](#) at col.7, ll. 8-9 (emphasis added).]

With these claim specifications, the Court finds the patent intends to include an accuracy element with its “system for measuring physiological exertion.” With regard to measuring the exertion levels, the Court finds that the ‘637 patent requires that the measurement of exertion levels for running and walking be within 15% accurate for 95% of the population.

c. “level of physiological exertion”

Independent claim 1 of the ‘637 patent generally describes a system for measuring physiological exertion. The system is comprised of a sensor, a receiver, and “a correlation means for correlating said signal indicative of said motion of said user *with a level of physiological exertion* of said user. [Doc. 1-3 at col. 11, ll. 28-30 (emphasis added).] Regarding this claim term, the parties dispute whether the claim term “level of physiological exertion” is satisfied by a display of the *total* amount of calories burned (Impulse Technology’s position), or whether the term requires a *rate* of energy expenditure or calories burned per unit of time (Defendants’ position). Plaintiff Impulse Technology says no construction of this phrase is necessary. Defendants say this term should be interpreted as “rate of energy expenditure or calories burned per unit of time.”

In support of their position, Defendants say that “level of physiological exertion” itself suggests some ongoing reading of the rate of calorie consumption over a unit of time. Otherwise, they argue, “correlating *** said [exercise] motion with a level of physiological exertion” could have been claimed as “correlating *** said [exercise] motion with physiological exertion.” [Doc. 99 at 14.] In other words, Defendants say Plaintiff Impulse Technology is trying to read “level of” exertion out of the claim.

The ‘637 patent specifications mostly support Defendants’ interpretation. The invention centers around a way to measure exertion levels. Although “the most accurate measurement of

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exertion in terms of calories burned is obtained by monitoring the *rate* of oxygen uptake” the ‘637 patent suggests “a simpler approach” by measuring movements and correlating those movements with calorie consumption. [Doc. [1-3](#) at col. 3, ll. 30-33, 40-42.] But in describing this approach, the ‘637 patent consistently refers to energy consumption over units of time typically calorie consumption per hour. *See* Doc. [1-3](#) at col. 3, ll. 64-67 (“This higher steady state level has an upper limit, so that exertion levels above about 700 kilocalories per hour are not sustainable by most people.”); Doc. [1-3](#) at col. 4, ll. 26-42 (“The functional parameters of motion in walking and running deserve closer scrutiny. * * * The basal metabolism while standing still is about 1.3 kilocalories per minute. * * * From 10-20 mph, exertion levels of 1000-10,000 kcal/hour are required. But most people cannot sustain exertion levels above 700 kcal/hour for long periods of time so these high exertion levels are not considered here.”); Doc. [1-3](#) at col. 7, ll. 64 to col. 8, ll. 2 (“ Other indications of the exertion level [alternative to a display of user heart rate] that might be displayed include the rate of exertion in watts or horsepower or calories burned per minute or per hour.”).

Defendants also say that Impulse Technology should be estopped by representations it made during the application process in securing the ‘637 patent. In that history, the ‘637 patent application was initially rejected as anticipated or obvious in light of the Au reference^{13/} and the Gray reference.^{14/} The United States Patent and Trademark Office initially denied the ‘637 patent as unpatentable as obvious or anticipated. In response and in an effort to distinguish the Gray and Au prior art, the ‘637 patent applicant stated:

“5. Nowhere in Au or Gray et al. is there any suggestion that the devices described

^{13/}United States Patent Number [4,813,436](#), issued March 21, 1989.

^{14/}United States Patent Number [5,357,696](#), issued October 25, 1994.

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can be used for deriving for displaying the physiological exertion, that is, the rate of energy *expenditure or calories burned per unit time*, of the user. Au discloses a system for gait analysis. It monitors and analyzes ‘the limb motion of a patient. However there is no means disclosed for correlating the limb motion with the physiological exertion or the *rate of energy expenditure* of the patient. Gray et al. discloses a system for monitoring the forces applied to the foot of a wearer. An alerting device or alarm is provided for alerting the patient when the force applied to the foot exceeds a predetermined limit. Gray et al. discloses no means for correlating the forces measured with the physiological exertion *or the rate of energy expenditure* of the patient.

[Amendment A](#) in prosecution history of U.S. Patent No. 5,524,637 dated 5/11/1995, at 2.

When patent applicants represent that their patent claims distinguish over prior art, these statements can be important limitations on claim scope. *Phillips*, 415 F.3d at 1317 (“Nonetheless, 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.”).

For patent prosecution statements to affect a claim’s meaning beyond that which would otherwise be gleaned from the claim’s words and the patent specification, the statements must be clear and unmistakably disavow the alternative construction. See [Elbex Video, Ltd. v. Sensormatic Elecs. Corp.](#), 508 F.3d 1366, 1371 (Fed. Cir. 2007). Consequently, if the applicant’s statements are ambiguous, or subject to interpretation, they will not result in surrender of subject matter so as to limit the patent’s claims. [Honeywell Int’l, Inc. v. Universal Avionics Sys. Corp.](#), 493 F.3d 1358, 1365 (Fed. Cir. 2007) (purported disclaiming statement was subject to different interpretations, creating ambiguity and precluding disclaimer); [SanDisk Corp. v. Memorex Prods., Inc.](#), 415 F.3d 1278, 1287 (Fed. Cir. 2005) (“There is no ‘clear and unmistakable’ disclaimer if a prosecution argument is subject to more than one reasonable interpretation, one of which is consistent with a

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proffered meaning of the disputed term.”).

In explaining why its invention was not anticipated or obvious in light of Gray and Au, however, Impulse Technology distinguished its invention solely by reference to its display of “the physiological exertion, that is, the rate of energy *expenditure or calories burned per unit time.*” [Amendment A](#) in prosecution history of U.S. Patent No. 5,524,637 dated 5/11/1995, at 2 (emphasis added). This representation to the Patent and Trademark Office is not ambiguous or subject to differing interpretations. Faced with its clear representation that display of the rate of energy expenditure distinguished the ‘637 patent application, Impulse Technology says that Au and Gray were otherwise distinguishable and “it seems unlikely that the applicant would limit his invention beyond that necessary to distinguish the prior art.” [Doc. [113](#) at 20.] In effect, Impulse Technology says that it did not need to distinguish Au and Gray by its display of energy or calories burned per hour.

Impulse Technology’s argument has some support. Neither Gray nor Au disclosed a system for measuring total energy or calorie expenditure. Impulse Technology therefore did not necessarily need to distinguish itself for its ability to display the calories burned per unit of time. Nevertheless, the applicant’s statement gives strong insight into what the inventor believed the invention claimed. Both the specifications and, to a lesser degree, the patent prosecution history, support an interpretation of “level of physiological exertion” as a rate of expenditure or calories burned over a unit of time.

However, Impulse Technology further argues that dependent claim 18 teaches the system described in independent claim 1 with the further limitation that the system display the metabolic

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rate of the user.^{15/} Under the concept of claim differentiation, Impulse Technology says that independent claim 1 should not be interpreted to require the display of an ongoing metabolic rate when dependent claim 18 is distinguished from claim 1 only by requiring such a display.

But the same argument works against Impulse Technology’s argument that “level of physical exertion” includes a display of the total amount of calories burned. Dependent claim 20 describes the structure described in claim 1 with the additional limitation that the “display means displays an indication of said total energy expended.” [Doc. [1-3](#) at col. 12, ll. 42-46.] Defendants argue that what is good for the goose is good for the gander—that is, that claim differentiation supports neither Plaintiff’s nor Defendant’s position.

The doctrine of “claim differentiation” provides that “each claim in a patent is presumptively different in scope.” [RF Del. Inc. v. Pac. Keystone Techs., Inc.](#), 326 F.3d 1255, 1263 (Fed. Cir. 2003). Under this doctrine, “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.” [Phillips](#), 415 F.3d at 1315 (Fed. Cir. 2005).

Nevertheless, “the written description and prosecution history overcome any presumption arising from the doctrine of claim differentiation.” [Andersen Corp. v. Fiber Composites, LLC](#), 474 F.3d 1361, 1369-70 (Fed. Cir. 2007). Where the patent applicant disclaimed subject matter during prosecution in order to obtain the patent, the patentee cannot attempt to recapture that subject matter

^{15/}Claim 18 of the ‘637 patent provides:

18. The system of claim 1 wherein said correlation means correlates said signal indicative of said motion of said user with a metabolic rate of said user and said display means displays an indication of said metabolic rate of said user.

[Doc. [1-3](#) at col. 12, ll. 33-35.]

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through the doctrine of claim differentiation. See [*Fantasy Sports Prop., Inc. v. Sportsline.com, Inc.*, 287 F.3d 1108, 1115-16 \(Fed. Cir. 2002\)](#).

The construction of means-plus-function claims flows from the specifications, the corresponding structures, and their equivalents under § 112, ¶ 6. Claim differentiation does not have the same import in construing claims in means-plus-function claims, at least when the specifications suggest similar structures in two claims. See, e.g., [*Cross Med. Prods., Inc. v. Medtronic Sofamor Danek, Inc.*, 424 F.3d 1293, 1304 \(Fed. Cir. 2005\)](#) (“[A]lthough the doctrine of claim differentiation suggests that claim 5 should be broader than claim 1, any presumption that the claims differ with respect to this feature may be overcome by a contrary construction mandated by the application of § 112, ¶ 6.”); [*Laitram Corp. v. Rexnord, Inc.*, 939 F.2d 1533, 1538 \(Fed. Cir. 1991\)](#) (“Simply stated, the judicially developed guide to claim interpretation known as ‘claim differentiation’ cannot override the statute. A means-plus-function limitation is not made open-ended by the presence of another claim specifically claiming the disclosed structure which underlies the means clause or an equivalent of that structure.”).

In light of the ‘637 patent specifications and in light of prosecution history, the Court interprets “level of physiological exertion of said user” in claim 1 as requiring the display of the rate that energy is being expended or calories are being burned per unit of time.

d. “pressure sensor”

Dependent claim 3, describes a pressure sensor element:

3. The system of claim 1 wherein said sensor means comprises at least one pressure sensor for sensing a force exerted by said user.

[Doc. [1-3](#) at col. 11, ll. 36-38.] Plaintiff Impulse Technology argues that the term “pressure sensor”

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should be interpreted as “[a] device for measuring the amount of force applied to it.” [Doc. [97](#), at 21.] Defendants say “pressure sensor” should be given its normal meaning. [Doc. [99](#), at 21.]

With regard to this term, Plaintiff seeks an interpretation that includes the measurement of the amount of force. In response, Defendants say that “pressure sensor” should be interpreted to only require some sensing of force but without any quantity measurement of that force. In contrast, Plaintiff says the pressure sensor term should be interpreted to require the amount of force applied to the sensor.

Plaintiff shows support for requiring the pressure sensor to give some quantity of the pressure applied. For example, the ‘637 patent specifications describe:

In the illustrative embodiments, an accelerometer or pressure sensor is usually depicted. These sensors measure the forces exerted by the limb or body, which may result in a change in the velocity of a limb or which may be opposed by an equal and opposite force (e.g. the subject may press both hands against each other).

[Doc. [1-3](#) at col. 2, ll. 59-64.] Plaintiff also shows other specification references that suggest the pressure sensors measure the quantity of force applied.^{16/}

Perhaps more important is the function the pressure sensor serves. The ‘637 patent describes a system for monitoring and measuring physiological exertion, typically through exercises. As Defendants have argued, an accurate measurement requires an approximation of both step frequency together with step height. The pressure sensor described in claim 3 generally serves as an alternative to an accelerometer. The ability to measure the quantity of force applied to the pressure sensor

^{16/}See, e.g., Doc. [1-3](#) at col. 8, ll. 19-20 (“The remote sensor 10 *measures* a parameter, such as acceleration, force, pulse rate, etc.”); Doc. [1-3](#) at col. 1, ll. 55-61 (“A fourth robust and inexpensive means of monitoring exertion would be by means of a low platform made up of two thin steel plates (e.g. 2 feet square and 0.25” thick), separated by pressure gauges (e.g. piezoelectric transducers) which transmit the impact forces on the plates when the subject walks or runs in place on the platform.”).

becomes central to estimating step height.

In reaction to the general ‘637 patent disclosure and in reaction to the ‘637 patent disclosures, this Court interprets “pressure sensor” as a structure for measuring the amount of force applied to it.

e. “receiver means for receiving said signal”

Using a means-plus-function format, claim 1 of the ‘637 patent describes a “receiver means for receiving said signal” element. The parties agree this term should be interpreted to serve the function of “receiving said signal.” They disagree regarding what structure is disclosed to satisfy that function. Plaintiff Impulse Technology says this term means “an infrared, acoustic or radio receiver (such as infrared light receiver depicted in item 14 of Figure 2)” structure. [Doc. [97](#), at 22.] In contrast, Defendants argue that this term is limited to “an infrared receiver” structure. [Doc. [101](#), at 22.] The parties thus disagree whether the receiving means described in claim 1 must be an infrared receiver.

The ‘637 patent fails to set forth specifications that specifically describe the receiving means structure. Defendants generally argue that there is no reference to “receiver” in the specifications, other than in Figure 2, which identifies an “Infrared Light Receiver.” Saying that claims defined in a means-plus-function format are limited to the structures described in the specifications, Defendants argue that the receiver should be required to be an infrared receiver.

As the quid pro quo for using § 112, ¶ 6, Impulse Technology had a duty to clearly and sufficiently link or associate the structures to the claimed function. [Budde, 250 F.3d at 1377](#); [Kemco Sales, Inc. v. Control Papers Co., 208 F.3d 1352, 1360 \(Fed. Cir. 2000\)](#).

The ‘637 patent specifications explicitly describe the “receiving means” only once and only indirectly. Schematic drawing 2 shows that after the acceleration or pressure sensor data is

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converted to a frequency, it uses an infrared transmitter and receiver. [Doc. [1-3](#), sheet 2.] From this, Defendants suggest that the receiver needs to function using an infrared format and structure.

Plaintiff Impulse Technology responds that the ‘637 patent describes three specific wireless transmitter means—infrared, acoustic, and radio transmitter:

“The accelerometer 30 and the pressure sensor 36 convert their measured parameters to a transmission signal which is transmitted to the monitor 14 by way of a wireless communication link 32, such as an infrared, acoustic or radio transmitter.”

[Doc. [1-3](#) at col. 8, ll. 48-53.]

Regarding this term, Plaintiff Impulse Technology has the better argument. Admittedly, figure 2 identifies the receiver as an infrared receiver. But the specifications, especially including figure 3, teaches that there can be an “infrared, radio, or acoustic” link to the receiver. Defendants’ arguments that there could be a radio or acoustic link but only an infrared receiver is not a natural reading. Under § 112, ¶ 6, the Court needs to consider the specifications as one skilled in the art, including whether the user would recognize a particular structural reference as including certain structures. [*Creo Products, Inc. v. Presstek, Inc.*, 305 F.3d 1337, 1347 \(Fed. Cir. 2002\)](#). Adopting Defendants’ interpretation and limiting the receiver to an infrared receiver runs afoul of this requirement.

Given the numerous references indicating that the signal information can be transmitted in infrared, radio, or acoustic formats, the Court finds “receiver means for receiving said signal” should be interpreted to mean “an infrared, acoustic or radio receiver structure.”

f. “means for measuring at least one physiological parameter of said user”

Dependent claims 13 and 14 of the ‘637 patent disclose, in means-plus-function format, a “means for measuring at least one physiological parameter of said user.” [Doc. [1-3](#), col. 12, ll. 18-

22.] The parties agree that the function of this element is “measuring at least one physiological parameter of said user.” They disagree what structure carries out that function. Plaintiff Impulse Technology says this element should involve “a blood pressure sensor or pulse rate detector” structure [doc. [97](#), at 20] while Defendants argue this should include “an accelerometer, a pressure sensor, a blood pressure sensor, [o]r a pulse rate detector” structure,” [doc. [99](#), at 20]

In describing this alternative embodiment, the ‘637 patent specifications describe: “The sensor 10 can include an accelerometer, a pressure sensor, a blood pressure sensor, a 45 pulse rate detector or other types of sensing mechanisms.” [Doc. [1-3](#) at col. 7, ll. 44-46.]

At its essence, the parties disagree whether, under this specification disclosure, an accelerometer or a pressure sensor are methods of measuring physiological parameters. But accelerometers and pressure sensors measure movement and force, respectively, not physiological parameters. Since the accelerometer and pressure sensor do not perform the recited function, they are not part of the corresponding structure for this term. *See, e.g., Med. Instrumentation & Diagnostics Corp. v. Elekta AB*, 344 F.3d 1205, 1216 (Fed. Cir. 2003) (“[W]e have rejected similar attempts to include as additional corresponding structure for a particular function a structure that is disclosed in the specification but is not associated with the particular claimed function.”).

When read in light of all of the specifications, “means for measuring at least one physiological parameter of said user” is interpreted to involve “a blood pressure sensor or pulse rate detector” structure.

g. “memory means for recording said level of physiological exertion of said user”

In means-plus-function format, dependent claims 16 and 17 of the ‘637 patent identify a “memory means for recording said level of physiological exertion of said user.” [Doc. [1-3](#) at col.

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12, ll. 26-32.] Claim 16 describes a memory means while claim 17 describes the same claim with the additional requirement that the memory allows that the “user can monitor the progress of a physical training program over time.” [*Id.*]

Both Plaintiff Impulse Technology and Defendants agree this element carries out the function of “recording said level of physiological exertion of said user.” [Doc. [96](#) at 14.] Plaintiff says that the structure associated with this element is a “software record.” [Doc. [97](#), at 24-25.] Responding, Defendants argue that the associated structure is a “memory internal to monitor 14.” [Doc. [99](#), at 22.] Defendants’ construction requires the memory to be within the monitor.

Defendants suggest support for their interpretation in the schematic diagram included within the ‘637 patent. *See* [Doc. [1-3](#) at figure 2.] Somewhat more persuasive, defendants also argue that Plaintiff’s proposed structure, a “software record”, is the information being recorded, not the structure that houses the data.

In contrast, Plaintiff argues that “software record” is the structure carrying out the function of recording the function of recording the level of physiological exertion. Plaintiff Impulse Technology identifies several incidents in the specifications where the ‘637 patent describes “optional arrangements such as an automated cardiovascular data entry 24, an interactive video system 26, and a personal exercise log 22 which can be kept in a software record.” [Doc. [1-3](#) at col. 9, ll. 3-6.]

The Court, however, questions whether, in the context of the ‘637 patent, “software record” can serve as the structure that must be identified. Defendants suggest too narrow a construction, requiring a memory internal to monitor 14. However, the Court finds that “memory means for recording said level of physiological exertion of said user” should be interpreted to be a software

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memory. The Court does not believe that this memory need be internal to monitor 14.

For these reasons, the Court interprets the disputed '637 patent claim terms as described above.

IT IS SO ORDERED.

Dated: October 9, 2012

s/ *James S. Gwin*
JAMES S. GWIN
UNITED STATES DISTRICT JUDGE