

United States District Court,
W.D. Wisconsin.

GENERAL ELECTRIC COMPANY, GE Medical Systems (Norway) as, GE Yokogawa Medical Systems, Ltd., GE Medical Systems Global Technology Company, LLC, GE Medical Systems, Ultrasound & Primary Care Diagnostics LLC and GE Medical Systems, Inc,
Plaintiffs-Counter-Defendants.

v.
SONOSITE, INC,
Defendant-Counter-Plaintiff.

No. 07-cv-00273-bbc

Jan. 8, 2007.

Background: In patent infringement action, parties sought construction of various claim terms for patents relating to diagnostic ultrasound technology, 1990 WL 850015, 2002 WL 493589, 1996 WL 1477921, 2002 WL 1470286, 2000 WL 1149073, 2002 WL 31418642, 2000 WL 1356441.

Holdings: The District Court, Barbara B. Crabb, J., held that:

- (1) limitations that related to a preferred embodiment only could not be applied to the invention as a whole;
- (2) specification and prosecution history for patent describing a system and method for transmitting ultrasound images from an ultrasound system to remote devices supported the understanding that an "open" association between the ultrasound imaging system and the remote device was one that remained open "continuously"; and
- (3) "portable," as used in patent relating to a portable ultrasound device that operates at a reduced power consumption level, was a term that related to units that could be easily moved about by means other than carrying.

Claims construed.

5,690,114, 5,839,422. Cited.

Sara P. Zogg, Cono A. Carrano, Howrey LLP, Robert Ruyak, Howrey LLP, Washington, DC, Jeffrey A. Simmons, Justin Edwin Gray, Allen Arntsen, Foley & Lardner LLP, Madison, WI, Jennifer A. Sklenar, Howrey LLP, Los Angeles, CA, for Plaintiffs-Counter-Defendants.

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OPINION and ORDER

BARBARA B. CRABB, **District Judge.**

Following a hearing on October 19, 2007, this civil case for patent infringement is before the court for construction of certain claim terms in patents owned by plaintiffs and counter-defendants General Electric Company, GE Medical Systems (Norway) AS, GE Yokogawa Medical Systems Ltd., GE Medical System Global Technology Company, LLC, GE Medical Systems, Ultrasound & Primary Care Diagnostics LLC and GE Medical Systems, Inc. and defendant Sonosite, Inc. The patents belonging to plaintiffs include United States Patent Nos. 4,932,415 (the '415 patent), 5,584,294 (the '294 patent), 6,102,859 (the '859 patent), 6,210,327 (the '327 patent), 6,120,447 (the '447 patent) and 6,418,225 (the '225 patent). The patents belonging to defendant include United States Patent Nos. 6,569,101 (the '101 patent), 6,962,566 (the '566 patent), 6,364,839 (the '839 patent) and 6,471,651 (the '651 patent). All ten patents relate to diagnostic ultrasound technology. The parties dispute the meaning of numerous terms included in each patent.

From the parties' arguments at the hearing and their prehearing briefs and from the patent claims, patent specification and prosecution history, I conclude that the jury would benefit from having a judicial construction of the following fifteen terms from plaintiffs' patents: "for increasing bandwidth said first colors are gradually replaced with a single second color until, at large bandwidths, only said single second color is assigned to the display"; "characterized in that the B-mode image is displayed within said blood flow display region while said blood flow display region is moved"; "display means"; "display changing means for displaying the B-mode image within said blood flow display region while said blood flow display region is moved"; "dividing said first image frame of pixel intensity data into a regular grid of kernels forming a plurality of rows"; "all kernels having signal"; "interacting with a graphical user interface to configure said imaging system"; "while maintaining an open association with said first remote device throughout a series of image acquisitions"; "while said association with said first remote device is open"; "before storage"; "option identifier"; "decrypting means"; "validating means"; "means for altering said system configuration as a function of said decrypted option identifier only if said decrypted validation identifier is valid"; and the following eight terms from defendant's patents: "handheld module including a display, manual controls, and system circuitry for processing signals for display"; "electrocardiograph module coupled to a handheld module by a cable"; "operational data for the scanhead"; "operational data unique to the transducer scanhead"; "executable code"; "method of operating the instrument at a reduced power consumption level"; "mode of operation"; and "portable ultrasound diagnostic instrument."

The parties requested construction of numerous other terms, which I have not construed because I conclude that the constructions proposed by the parties would not add clarity or meaning to the terms. This is not to say that there is no construction that would be appropriate for some of the terms, just that I was not persuaded that either parties' proposal was correct. For this reason, the following terms have not been construed: "in accordance with a noise model"; "predicting the mean noise level in each kernel using said noise model"; "first manipulation of a first operator input device"; "a computer connected to control the ultrasound imaging system"; "means for placing said system in a feature key entry mode in response to a predetermined command input via said operator interface"; "feature activation mode"; "a second memory associated with the scanhead and outside of the console and communicating with the console through a second connector, the second memory storing software and data necessary for use of the transducer scanhead in the ultrasound diagnostic instrument"; "the second memory storing software and data necessary

for the use of the transducer scanhead in the ultrasound diagnostic instrument"; "memory"; "operational software for executing unique functions with the transducer scanhead"; and "selectively altering circuitry functions depending on mode of operation of the instrument when a first power limit is reached, thereby reducing power consumption."

OPINION

When construing claims, the starting point is the so-called intrinsic evidence: the claims themselves, the patent specification and the prosecution history. *Teleflex, Inc. v. Ficosa North America Corp.*, 299 F.3d 1313, 1325 (Fed.Cir.2002). Construction of the disputed terms begins with the language of the claims. Claim terms are to receive their ordinary and customary meaning, which is the meaning that a person of ordinary skill in the art would have understood the claim term to have as of the filing date of the patent application. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed.Cir.2005); *Rexnord Corp. v. Laitram Corp.*, 274 F.3d 1336, 1342 (Fed.Cir.2001). Moreover, "unless compelled to do otherwise, a court will give a claim term the full range of its ordinary meaning as understood by an artisan of ordinary skill." *Rexnord*, 274 F.3d at 1342.

In many instances, however, a court must proceed beyond the bare language of the claims and examine the patent specification. The specification serves an important role in arriving at the correct claim construction because it is there that the patentee provides a written description of the invention that allows a person of ordinary skill in the art to make and use the invention. *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 979 (Fed.Cir.1995). It is useful to consult the specification to understand claim terms because "patent law permits the patentee to choose to be his or her own lexicographer by clearly setting forth an explicit definition for a claim term that could differ in scope from that which would be afforded by its ordinary meaning." *Rexnord*, 274 F.3d at 1342; *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed.Cir.1996). Although the patent specification does not broaden or narrow the invention, which is specifically laid out in the patent's claims, the specification may be used to interpret what the patent holder meant by a word or phrase in the claim. *E.I. du Pont de Nemours & Co. v. Phillips Petroleum Co.*, 849 F.2d 1430, 1433 (Fed.Cir.1988); *see also* *Vitronics*, 90 F.3d at 1582 (when term is not specifically defined in claims, it is necessary to review specification to determine whether inventor uses term inconsistently with its ordinary meaning).

After considering the claim language and the specification, a court may consider the final piece of intrinsic evidence, the patent's prosecution history. *Vitronics*, 90 F.3d at 1582. "[S]tatements made during the prosecution of a patent may affect the scope of the invention." *Rexnord*, 274 F.3d at 1343. Generally, the prosecution history is relevant if a particular interpretation of the claim was considered and specifically disclaimed during the prosecution of the patent. *Warner-Jenkinson Co., Inc. v. Hilton Davis Chemical Co.*, 520 U.S. 17, 30, 117 S.Ct. 1040, 137 L.Ed.2d 146 (1997); *Vitronics*, 90 F.3d at 1582-83.

Finally, a court may consult extrinsic evidence, such as dictionaries, treatises and expert testimony for background information and to "shed useful light on relevant art." *Phillips*, 415 F.3d at 1317 (internal citations omitted). However, the Court of Appeals for the Federal Circuit has cautioned that this type of evidence is "less significant" and not as reliable as intrinsic evidence in determining "the legally operative meaning of claim language." *Id.* at 1317-18.

A. The '415 Patent

The '415 patent discloses a method for displaying data collected using "Doppler" ultrasound, which means

that the invention discloses a color display that indicates the speed and direction of blood flow. Different colors are assigned to different directions and speed. The "frequency" of blood flow provides an estimate regarding its velocity. When there are significant disparities in the speed or direction of blood flow in a given region (for example, because there is turbulence) this area is said to have "high bandwidth." Areas of high frequency and those with high bandwidth are difficult to measure and may produce ambiguous results. The invention disclosed in the '415 patent handles this problem by assigning a separate color to these areas of blood flow that are difficult to measure.

[1] The disputed term in the '415 patent appears in claim 1, which discloses:

1. A method for color-coded imaging of blood flow velocities in a field onto a display, comprising the steps of:

scanning an ultrasonic beam pulsed at a pulse repetition frequency across the field to provide a Doppler shifted backscattered signal from a discrete set of range cells in the field;

sampling the backscattered signal from the range cells along the beam;

estimating predetermined parameters from the backscattered signal from each range cell, said parameters comprising the mean frequency, the power and the bandwidth of the backscattered signal;

assigning, on the basis of said parameters, predetermined colors for imaging the blood flow velocities on the display, such that for low bandwidth, the mean frequency is assigned to a range of selected first colors which are predeterminedly varied as the mean frequency varies, in both the positive and negative sense, from zero frequency to the pulse repetition frequency of the beam, and **for increasing bandwidth said first colors are gradually replaced with a single second color until, at large bandwidths, only said single second color is assigned to the display**, said single second color being selected to strongly contrast with said first colors; and

mapping the assigned colors for both positive and negative mean frequencies onto the display, whereby the displayed image presents the full range of blood flow velocities in the field such that different flow conditions may be readily distinguished.

1. " for increasing bandwidth said first colors are gradually replaced with a single second color until, at large bandwidths, only said single second color is assigned to the display "

Plaintiffs' construction: as bandwidth increases continuously or in regular steps, said first colors are replaced continuously or in regular steps, with a single second color until, at large bandwidths, only said single second color is assigned to the display

Defendant's construction: as bandwidth increases, the first colors (*e.g.*, blue, red, and yellow) displayed are gradually replaced with a single second color (*e.g.*, green), until, when bandwidth meets a minimum threshold, only the second color (*e.g.*, green) is displayed, regardless of the mean frequency

The parties' debate about this term boils down to whether the changeover from the first to the second color occurs at "high bandwidths" or when the bandwidth reaches a "minimum threshold." The parties do not dispute that the change occurs at "high bandwidth," but defendant argues that more specific language is

required as well. The term "threshold" does not appear anywhere in the claim language or the patent specification. Rather, defendant suggests that Figures 5a and 5b of the '415 patent indicate that the invention includes the limitation that there is a "minimum threshold" above which only the second color is displayed. Plaintiffs agree that Figures 5a and 5b are instructive, but disagree that either indicates that the patent discloses a specific "minimum threshold" for the display of the second color. Because much of the parties' arguments relate to these figures, I have included them below.

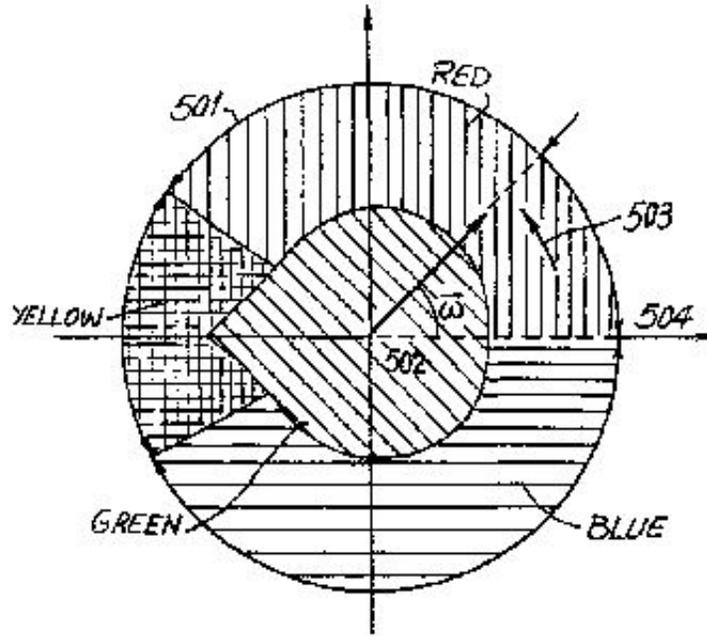


FIG. 5a

*750

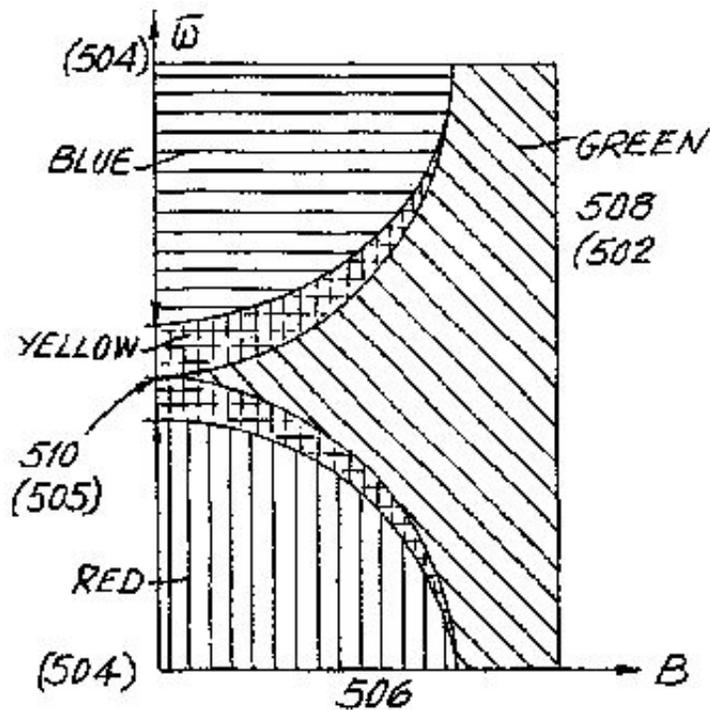


FIG. 5b

In Figure 5a, areas of high bandwidth appear at the center of the circle. The frequency of blood flow is represented by the angle of the arrow. In Figure 5b, the x-axis represents increasing bandwidth. The y-axis represents frequency. Defendant argues that there is a point on both figures, which it calls a "minimum threshold," at which the bandwidth is sufficiently high so that the second color is displayed for all mean frequencies. This is true. It is possible to draw a small circle inside area 502 in Figure 5a; it is possible also to draw a vertical line at a certain bandwidth on Figure 5b. Inside this circle and to the right of the line are areas of sufficiently high bandwidth that only the second color, in this case green, is displayed. However, the fact that it is possible to draw a circle or a vertical line at some point on each chart does not suggest that a reference to this "minimum threshold" line should be imported into the claim language. The term "minimum threshold" is no more definite than the term "at high bandwidths." Therefore, I conclude that it would be improper to read this limitation into claim 1 of '415 patent.

Court's construction: as bandwidth increases continuously or in regular steps, said first colors are replaced continuously or in regular steps, with a single second color until, at large bandwidths, only said single second color is assigned to the display

B. The '294 Patent

The '294 patent relates to a system and method for displaying a color Doppler image of blood flow, together with a grayscale image of tissue (called a "B-mode" image). In the '294 patent, the blood flow image is shown in the "blood flow display region" or "region of interest" and the B-mode image is shown behind and surrounding this region.

[2] The disputed terms in the '294 patent appear in claims 1 and 2 (the only two claims of the patent), which disclose:

1. A method for ultrasonic blood flow display where a blood flow image by power of an ultrasonic Doppler signal is displayed to a blood flow display region movable within a B-mode image display region,

characterized in that the B-mode image is displayed within said blood flow display region while said blood flow display region is moved.

2. An apparatus for ultrasonic blood flow display, comprising:

B-mode image forming means for forming a B-mode image based on an ultrasonic echo signal;

blood flow image forming means for forming a blood flow image based on power of an ultrasonic Doppler signal;

display means for displaying the B-mode image formed by said B-mode image forming means, and for displaying the blood flow image formed by said blood flow image forming means to a blood flow display region formed within a B-mode image display region;

moving means for moving said blood flow display means; and

display changing means for displaying the B-mode image within said blood flow display region while said blood flow display region is moved.

1. " *characterized in that the B-mode image is displayed within said blood flow display region while said blood flow display region is moved* "

Plaintiffs' construction: comprising a B-mode image which is displayed in the blood flow display region while the blood flow display region is moved

Defendant's construction: characterized in that the B-mode image is always displayed in place of the blood flow image within the blood flow display region while the blood flow display region is moved, and the blood flow image is never displayed within the blood flow display region while the region is moved

Plaintiffs' construction of this term is minimal. The only difference between their construction and the term itself is a replacement of the word "characterized" with the word "comprising," an alteration they assert is appropriate given the court of appeals' explanation that "comprising" is synonymous with "including," "containing" and "characterized by." Plts.' Br., dkt. # 52 at 16 (citing *Mars v. H.J. Heinz Co., L.P.*, 377 F.3d 1369, 1376 (Fed.Cir.2004), and *Genentech, Inc. v. Chiron Corp.*, 112 F.3d 495, 501 (Fed.Cir.1997)). However, there is no indication that such a substitution of a less common synonym of "characterized by" is of any value in understanding the meaning of the '294 patent. In effect, plaintiffs are arguing for no construction at all.

On the other hand, defendant seeks to add the limitation to the claim language that, when the blood flow display region is moved, *only* the B-mode or grayscale image is displayed. In support of its position, defendant relies on the patent specification and several types of extrinsic evidence. Defendant starts with the

"Summary of the Invention," which explains that "the B-mode image is displayed in place of the blood flow image while the blood flow display region is moved, and the blood flow image is displayed while the blood flow display region is stopped." '294 pat., col. 1, lns. 61-65. This statement supports defendant's construction that, when the blood flow display region is moving, *only* the B-mode image will be displayed. In fact, it is difficult to imagine a less precise explanation of how the patented invention works.

Plaintiffs attempt to rebut defendant's argument with general statements about the importance of avoiding the importation of a preferred embodiment into the claim language. However, that is not what is happening here. The cited passage from the Summary of the Invention was made in the context of a discussion of "the present invention." Therefore, it is appropriate to apply this limitation to the invention as a whole. *Verizon Services Corp. v. Vonage Holdings Corp.*, 503 F.3d 1295, 1308 (Fed.Cir.2007) ("When a patent thus describes the features of the 'present invention' as a whole, this description limits the scope of the invention."); *Honeywell International, Inc., v. ITT Industries*, 452 F.3d 1312, 1318 (Fed.Cir.2006) (written description discussing "this invention" and "the present invention" may limit claim scope); *C.R. Bard, Inc. v. United States Surgical Corp.*, 388 F.3d 858, 864 (Fed.Cir.2004) ("Statements that describe the invention as a whole are more likely to be found in certain sections of the specification, such as the Summary of the Invention.") Finally, given the unequivocal language of this portion of the specification, it is not necessary to evaluate whether the preferred embodiment or extrinsic evidence support such a limitation as well.

Court's construction: "characterized in that the B-mode image is displayed within said blood flow display region while said blood flow display region is moved" means "characterized in that the B-mode image is always displayed in place of the blood flow image within the blood flow display region while the blood flow display region is moved, and the blood flow image is never displayed within the blood flow display region while the region is moved"

2. " *display means* "

[3] **Plaintiffs' construction:** Function: not disputed. Structure: a circuit and display screen that display the B-mode and the blood flow images, the blood flow images being displayed by color or by tone or by pattern. (Fig. 1 (elements 71, 72, 701, 702, 703, 8); Fig. 2 (elements 7, 8); col. 3: 37-46; col. 7: 50-55; col. 8: 1-3.)

Defendant's construction: Function: not disputed. Structure: circuitry for converting data into color (*e.g.*, red, blue, yellow, and green), monochrome, or patterned signals and an associated image display. (Col. 3: 37-45, col. 7:50-8:3; Fig. 1 (elements 71, 72, 701, 702, 703, 8); Fig. 2 (elements 7, 8).)

[4] This is a "means-plus-function" claim element, governed by 35 U.S.C. s. 112 para. 6. The parties' dispute relates to the structure, not the function described in the claim language. When construing a means-plus-function claim, the court "must identify the corresponding structure in the written description of the patent that performs the element." *Applied Medical Resources Corp. v. U.S. Surgical Corp.*, 448 F.3d 1324, 1332 (Fed.Cir.2006). Both parties identify the same portion of the patent specification when identifying the structure that corresponds to the "display means," but they construe it differently. The relevant portions of the patent specification state:

The image data written in the B-mode image memory 4 and the CFM image memory 6 respectively are read out under control by the controller 9, and converted into a plurality of color element signals for color display, *e.g.*, RGB (Red, Green, Blue) signals by the RGB circuit 7 and supplied to the image display 8 and

displayed as images there. In this embodiment, the RGB circuit 7 and the image display 8 correspond to the display means in the present invention.

'294 pat., col. 3, lns. 37-45.

... the display means is not limited to that where the image is color-displayed by the RGB signal as in the embodiment, but the display means carrying out the color display by other plural color element signals will do. Further even the display means displaying the blood flow not by color but by tone of monochrome or specific pattern ... belongs to the scope of the display means in the present invention.

Id. at col. 7, lns. 50-55, col. 8, lns. 1-3.

Plaintiffs contend that defendant's construction of "display means" improperly imports the limitation "converting" into the corresponding structure. However, the specification itself explains that the data is "converted" for display. *Id.* at col. 3, ln. 39. Moreover, defendant's construction does not, as plaintiffs' contend, limit the format of the display improperly; instead it includes all three varieties of display (color, tone and pattern) that are incorporated in plaintiffs' construction.

In contrast, plaintiffs' construction includes the phrase "a circuit and display screen that display the B-mode and the blood flow images," which imports a substantial amount of "function" into the construction of the structure. I will adopt defendant's proposed construction of the term "display means."

Court's construction: Structure: circuitry for converting data into color (*e.g.*, red, blue, yellow, and green), monochrome, or patterned signals and an associated image display

3. " *display changing means for displaying the B-mode image within said blood flow display region while said blood flow display region is moved* "

[5] **Plaintiffs' construction:** Function: displaying the B-mode image which is displayed in the blood flow display region while the blood flow display region is moved. Structure: a circuit or micro-computer or the like with associated software, *e.g.*, changers and a change controller. (Fig. 1 (elements 74, 75, 76, 77, 78, 79); col. 5: 51-56; col. 8: 10-19.)

Defendant's construction: Function: which always displays the B-mode image in place of the blood flow image within the blood flow display region while the blood flow display is moved and never displays the blood flow image in the blood flow display region while the region is moved. Structure: a circuit or micro-computer or the like with associated software, *e.g.*, changers and a change controller. (No specification citations identified.)

This too is a means-plus-function claim element. The parties agree about the corresponding structure and dispute the function. Their arguments are a retread of those discussed above regarding the proper construction of the phrase "characterized in that the B-mode image is displayed within said blood flow display region while said blood flow display region is moved." I have adopted defendant's construction of that phrase and will therefore adopt defendant's construction of this term as well, for the reasons explained in detail above.

Court's construction: Function: which always displays the B-mode image in place of the blood flow image

within the blood flow display region while the blood flow display is moved and never displays the blood flow image in the blood flow display region while the region is moved. Structure: a circuit or micro-computer or the like with associated software, e.g., changers and a change controller.

C. The '859 Patent

The '859 patent claims a method for improving the quality of grayscale ultrasound images. It allows for simple, automated image improvements.

The disputed terms in the '859 patent appear in claim 1, which discloses:

1. A system for imaging biological tissues, comprising:

an ultrasound transducer array comprising a multiplicity of transducer elements;

a transmit beamformer for pulsing said transducer array to transmit ultrasound beams in first and second scans;

a receive beamformer for forming receive beams of acoustic data derived from echo signals detected by the transducer array subsequent to said transmissions;

a signal processing chain for converting said acoustic data into first and second image frames of pixel intensity data corresponding to said first and second scans respectively, said signal processing chain comprising a gain compensation component for adjusting the gain of the acoustic data as a function of gain adjustments;

a computer programmed to determine said gain adjustments as a function of said first image frame of pixel intensity data and the current settings of all pertinent gain-related system parameters **in accordance with a noise model**, and transmit said gain adjustments to said gain compensation component in time to adjust the gain of the acoustic data acquired from said second scan;

a video processor for converting said image frame of pixel intensity data into an image frame of gray-scale level data; and

a display device for displaying an image representing said image frame of gray-scale level data, wherein said computer is programmed to perform the following steps:

(a) **dividing said first image frame of pixel intensity data into a regular grid of kernels forming a plurality of rows;**

(b) retrieving the current settings of all pertinent gain-related parameters for each kernel;

(c) **predicting the mean noise level in each kernel using said noise model;**

(d) calculating the mean pixel intensity for each kernel;

(e) comparing the predicted mean noise level with the calculated mean pixel intensity for each kernel;

(f) for each row satisfying a predetermined condition, determining a mean pixel intensity of **all kernels having signal** to form a row mean;

(g) based on an optimal mean gray-scale level, determining the gain adjustment for each row which will shift the gray-scale level corresponding to the respective row mean to said optimal gray-scale level; and

(h) sending said gain adjustments to said gain compensation component.

1. " in accordance with a noise model "

Plaintiffs' construction: in accordance with a representation of noise used to predict noise

Defendant's construction: in accordance with a model that predicts noise statistics, including the average noise level and probability distribution of noise

The parties' fundamental dispute about this term relates to the term "noise model." Although they appear to agree that a "model" in this context is a construct that is used for the purpose of prediction and that, in this case, a noise model predicts noise statistics, the parties disagree whether the '859 patent describes a particular method for predicting noise statistics. Defendant contends that the meaning of "noise model" is unclear from the language of the claims and is limited by the patent specification. Not surprisingly, plaintiffs take the position that "noise model" should be construed broadly, if at all. At the claim construction hearing, plaintiffs indicated that they believed no construction was necessary. Transcript, dkt. # 80, at 35, ln. 24 and 36, ln. 1.

In support of its argument that the patent specification limits the definition of the term "noise model," defendant cites several portions of the patent specification: "the noise model can be used to predict the exact noise statistics (mean and probability distribution)" '859 pat. col. 2, lns. 42-43; "A noise model is used to predict the mean noise level in each kernel," *id.* at col. 2, lns. 50-51; "parameter values are input to the noise model to predict the mean noise level in each kernel of the grid," *id.* at col. 6, 34-36.

[6] Defendant's argument has two flaws. First, the portion of the specification on which defendant's construction relies most heavily, column 2 at lines 42 and 43, is included in a discussion of the preferred embodiment of the invention. Nowhere else in the patent is there any indication that this embodiment represents the noise model used in the invention as a whole. As the Court of Appeals for the Federal Circuit has cautioned repeatedly, it is error to apply to the invention as a whole limitations that relate to a preferred embodiment only. *Acumed LLC v. Stryker Corp.*, 483 F.3d 800, 805 (Fed.Cir.2007) (citing *Phillips*, 415 F.3d at 1323 (warning against confining claims to preferred embodiments)).

The second problem with defendant's argument is the absence of any indication that any of these references in the specification were intended to narrow the kind of noise models that might be used as part of the claimed invention. In each instance they describe a type of noise model that may be used, but there is no indication that these references describe the *only* types of noise models. Therefore, it would be incorrect to adopt defendant's limitation when construing the term "noise model."

Although defendant's proposal is unpersuasive, I find plaintiffs' initial construction perplexing and unhelpful at best. I conclude that both proposed constructions are flawed and will decline to adopt either construction.

2. " *dividing said first image frame of pixel intensity data into a regular grid of kernels forming a plurality of rows* "

[7] **Plaintiffs' construction:** dividing the frame of image data acquired during the first scan of the subject into an ordered grid of curved or rectilinear cells arranged in multiple rows

Defendant's construction: dividing the frame of image data acquired during the first scan of the subject into a ordered grid of curved or rectilinear zones arranged in multiple rows and columns, each zone containing multiple pixels of data of varying intensity

At the claim construction hearing, plaintiffs said that they "could live with" defendant's construction, with two modifications. Instead of "multiple rows," the modified construction uses the phrase "one or more rows." In addition, in the modified construction, the adverb "potentially" is inserted before the words "vary intensity." Plaintiffs indicated that defendant agreed that these modifications were appropriate and defendant did not dispute this characterization. Accordingly, I will adopt the modified construction.

Court's construction: dividing the frame of image data acquired during the first scan of the subject into a ordered grid of curved or rectilinear zones arranged in one or more rows and columns, each zone containing multiple pixels of data of potentially varying intensity

3. " *predicting the mean noise level in each kernel using said noise model* "

Plaintiffs' construction: predicting the mean level of noise in each kernel using said representation of noise

Defendant's construction: predicting the mean noise level in each zone using the model that predicts noise statistics, including the average noise level and probability distribution of noise

The construction of this term turns on the construction of the term "noise model." As discussed above, neither party has proposed a construction of the term "noise model" that the court will adopt. Therefore, I will not adopt either parties' construction of this term.

4. " *all kernels having signal* "

Plaintiffs' construction: no construction needed

Defendant's construction: all zones with an average display pixel intensity significantly greater than the average predicted noise level

At the claim construction hearing, plaintiffs indicated that this term was no longer in dispute, and that they agreed that "kernel" may be construed properly as "zone." Transcript, dkt. # 80, at 36, lns. 18-24. I will adopt the agreed-upon construction.

Court's construction: all zones with an average display pixel intensity significantly greater than the average predicted noise level

The '327 patent describes a system and method for transmitting ultrasound images from an ultrasound system to remote devices. Specifically, it claims a system and method for maintaining an "open association" between the ultrasound system and the remote device while images are transferred.

The disputed terms in the '327 patent appear in claim 1, which discloses:

1. A method for sending image frame data from an imaging system to remote devices, comprising the steps of:

interacting with a graphical user interface to configure said imaging system to transfer successive acquired images to a first remote device in a first format compatible with said first remote device **while maintaining an open association with said first remote device throughout a series of image acquisitions;**

acquiring a first frame of image data;

in response to a **first manipulation of a first operator input device**, constructing a first data object incorporating said first frame of image data in said first format, opening an association with said first remote device, and sending said first data object to said first remote device via a network **while said association with said first remote device is open;**

acquiring a second frame of image data; and

in response to a second manipulation of said first operator input device, constructing a second data object incorporating said second frame of image data in said first format, and sending said second data object to said first remote device via said network **while said association with said first remote device is still open.**

1. " *interacting with a graphical user interface to configure said imaging system* "

Plaintiffs' construction: setting up the imaging system via a graphical user interface to control the association with a remote device

Defendant's construction: inputting commands via a graphical user interface to select or activate particular functions of the imaging system to control the association with a first remote device

At the claim construction hearing, the parties agreed that the following construction of this term would be acceptable: "interacting with a graphical user interface to control the association with a first remote device." I will adopt the parties' agreed upon construction.

Court's construction: interacting with a graphical user interface to control the association with a first remote device

2. " *while maintaining an open association with said first remote device throughout a series of image acquisitions* "

[8] **Plaintiffs' construction:** during the time that a series of images is acquired, the association with the first remote device is kept open

Defendant's construction: wherein the imaging system is configured to continuously maintain an association with the first remote device that allows for transmission of multiple images acquired by the imaging system without any re-opening of the association

The crux of the dispute regarding this term, and the '327 patent as a whole, is whether the "open association" claimed in the patent is limited in any way by the claim language, patent specification or prosecution history. Plaintiffs argue that little construction of the term is necessary or appropriate and that defendant's construction results in a "negative limitation" on the claim language that lacks support in the specification or prosecution history. Defendant contends that the specification and prosecution history require the limitations that: the association remain open continuously, the "open association" operates without "reopening," and the "open association" is the result of a particular configuration.

I agree with defendant. Both the patent specification and prosecution history show that the primary advantage of the invention is that it provides for a continuously open association between the imaging system and the remote devices, rather than an association that is opened and closed as individual images are acquired. In fact, in this regard defendant's construction appears to differ only slightly from plaintiffs' construction, which provides that the association is "kept open" while images are acquired.

The Abstract and Summary of the Invention explain that the association between the imaging system and remote devices is "open throughout the course of an examination of a patient." '327 patent, Abstract; id., col. 5, lns. 38-40. In addition, during the patent prosecution, the patentee distinguished the invention disclosed in the '327 patent from prior art by explaining that it allows for "a continuously open association mode." '327 patent prosecution history, Walkenhorst Decl., dkt. # 45, Ex. 15. at 4. Therefore, I agree with defendant that it is proper to construe this term to include the requirement that the association between the ultrasound system and remote device remain open "continuously."

Next, I will consider whether defendant's proposed addition of the phrase "without any re-opening of the association" to the construction is appropriate. As an initial matter, given that both sides state that the association between the imaging system and remote devices is "kept open" or open "continuously" while images are transferred, it is somewhat perplexing why they disagree about whether the connection must be maintained without the need for "re-opening." When a door or a line of communication is "kept open" or is open "continuously," there is little need for it to be "re-opened."

Plaintiffs contend that the addition of the phrase "re-opening" adds unnecessary ambiguity to the patent language. I agree. The patent specification states that the live imaging feature of the patent "allow[s] more efficient image transfer because the association need not be opened and closed for every image sent to a remotedevice." '327 patent, Abstract; id., col. 5, lns. 41-43. In addition, in order to overcome an obviousness rejection during patent prosecution, the patentee explained that the live imaging feature "allows more efficient image transfer because the associate need not be opened and closed for every image sent to a remote device." ' 327 patent prosecution history, Walkenhorst Decl., dkt. # 45, Ex. 15 at 4. Although both of these statements are evidence that the association remains open while images are collected and transferred, the inclusion of the phrase "continuously" conveys this adequately.

Finally, plaintiffs do not appear to dispute defendant's argument that the "open association" is the result of a particular configuration, so I will adopt that portion of defendant's construction with no further discussion.

Court's construction: wherein the imaging system is configured to continuously maintain an association

with the first remote device that allows for transmission of multiple images acquired by the imaging system

3. " *first manipulation of a first operator input device* "

Plaintiffs' construction: a first operation of an operator input device

Defendant's construction: first manipulating a first keyboard, trackball, pushbutton, knob, or other device, such as a "Print/Store" button, which a user manipulates to provide input to the imaging system

Neither parties' proposed construction of the term "first manipulation of a first operator input device" is helpful. Plaintiffs turn immediately to a general dictionary to define the term "manipulation" as "operation." Defendant cites the patent specification, which identifies "a keyboard, a trackball," "pushbuttons" and "knobs" as examples of "operator input devices" '327 pat., col. 6, lns. 64-68. Although I agree with defendant that these are examples of operator input devices, including this list of examples into the claim language is of little value, especially because the patent specification explains that "other input devices" are used as well. Id. at ln. 67. Therefore, I conclude that both parties' proposals are flawed and that the term "first manipulation of a first operator input device" would not benefit from either construction.

4. " *while said association with said first remote device is open* "

[9] **Plaintiffs' construction:** during the time that the association with the first remote device is open

Defendant's construction: while the association between the ultrasound imaging system and the first remote device has remained open continuously

For the reasons discussed in detail above with respect to the term "while maintaining an open association with said first remote device throughout a series of image acquisitions," I will adopt defendant's proposed construction of this term. Again, the specification and prosecution history for the '327 patent support the understanding that an "open" association between the ultrasound imaging system and the remote device is one that remains open "continuously."

Court's construction: while the association between the ultrasound imaging system and the first remote device has remained open continuously

E. The '447 Patent

The '447 patent discloses an ultrasound system in which data is transmitted wirelessly.

The disputed terms included in the '447 patent appear in claims 1 and 9, which disclose:

1. In an ultrasound imaging system for generating image data at a first location in response to scanning of a subject under study, improved apparatus for transmitting the data comprising in combination:

a computer connected to control the ultrasound imaging system;

a network interface connected to receive the image data from the computer;

a network transmit module coupled to the network interface connected to wirelessly transmit the image data

before storage;

a network receive module connected to receive the wirelessly transmitted image data at a second location remote from the first location;

a routing device connected to route the received image data; and

an asynchronous network for transmitting the received data via internet protocol, whereby image data generated by the ultrasound imaging system may be transmitted without wires to a network **before storage**.

.....

9. In an ultrasound imaging system for generating image data at a first location in response to scanning of a subject under study, an improved method of transmitting the data comprising in combination:

generating image data by scanning a subject under study;

transmitting the image data wirelessly using a network protocol from the first location **before storage**;

receiving the wirelessly transmitted image data at a second location different from the first location;

asynchronously transmitting the received image data using internet protocol, whereby the image data may be routed to a network **before storage**.

1. " before storage "

Plaintiffs' construction: prior to entering data into a network storage device

Defendant's construction: prior to entering data into a non-volatile memory to be held and from which to be retrieved at a later time

At the claim construction hearing, the parties agreed that this term may be construed properly as "before data is entered in memory from which it may be retrieved at a later time." Transcript, dkt. # 80 at 90, Ins. 24-25; 91, Ins. 1-5, 8-10; 94, Ins. 8-10, 14-15. Plaintiffs indicated that they were concerned that defendant was trying to put a "gloss" on its construction that was overly limiting; defendant stated that this was not its intent. Id. In any event, defendant's "intent" is irrelevant in determining an appropriate construction. Therefore, I will adopt the compromise construction discussed at the claim construction hearing.

Court's construction: before data is entered in memory from which it may be retrieved at a later time

2. " a computer connected to control the ultrasound imaging system "

Plaintiffs' construction: no construction necessary

Defendant's construction: a remote computer linked to the ultrasound imaging system, used to provide control for the ultrasound imaging system

Plaintiffs argue that this term is clear on its face and requires no further construction. Defendant believes

that the term is vague and does not accurately convey limitations included in the patent specification. I agree with plaintiffs that the term requires no additional construction. The patent specification imposes no explicit limitations on the term. Instead, the specification indicates that data may be sent from the network "to help" control the ultrasound imaging system, '447 pat. at col. 2, lns. 19-28. Moreover, Figure 1 demonstrates that the ultrasound imaging system includes a central processing unit, which, presumably, is what receives this "help."

Court's construction: No construction necessary

F. The '225 Patent

The '225 patent relates to a system and method for activating optional features in an ultrasound imaging system using an encrypted key, which is obtained from the manufacturer.

The disputed terms of the '225 patent appear in claims 7 and 19, which disclose:

7. An ultrasound imaging system comprising:

an ultrasound transmitter for transmitting ultrasound energy into a volume of ultrasound scatterers;

a signal processing chain for acquiring display data representing an image of ultrasound scatterers in said volume in accordance with a system configuration comprising enabled features, said display data being based on ultrasound energy scattered by said ultrasound scatterers;

a monitor for displaying said image in response to receipt of said display data;

a memory for storing a system configuration database representing said enabled features of said system configuration;

an operator interface comprising a plurality of keys for inputting data into said system;

means for placing said system in a feature key entry mode in response to a predetermined command input via said operator interface; and

decrypting means for outputting decrypted data in response to depression of a sequence of keys of said operator representing an encrypted feature key comprising an encrypted validation identifier and an encrypted **option identifier**, said decrypted data comprising a decrypted validation identifier and a decrypted **option identifier**;

validating means for determining if said decrypted validation identifier is valid; and

means for altering said system configuration as a function of said decrypted option identifier only if said decrypted validation identifier is valid.

.....

19. A method for configuring a computerized system, comprising the following steps:

booting said computerized system with a system configuration wherein only those optional computer features which are identified in a list of activated optional computer features listed in a system configuration database stored in system memory are activated;

inputting a command via an operator interface which causes said computerized system to enter a **feature activation mode**;

inputting an encrypted feature key into said computerized system via said operator interface while said computerized system is in said **feature activation mode**, said encrypted feature key comprising an encrypted validation identifier and an encrypted optional computer feature identifier, wherein said encrypted optional computer feature identifier corresponds to an optional computer feature not identified in said list of activated optional computer features;

automatically decrypting said feature key inputted via said operator interface to form decrypted data comprising a decrypted validation identifier and a decrypted optional computer feature identifier;

automatically comparing said decrypted validation identifier with a stored validation identifier in said system configuration database; and

automatically adding said decrypted optional computer feature identifier to said list of activated computer features in said system configuration database if said decrypted validation identifier matches said stored validation identifier.

1. " *option identifier* "

[10] **Plaintiffs' construction:** information that establishes the identity of the option

Defendant's construction: alphanumeric data representing the option to be activated

The parties agree about the purpose of an "option identifier"; it is data that allows specific options to be activated in an ultrasound imaging system. They disagree about what the patent discloses regarding the nature of this data (plaintiffs use the term "information" and defendant uses the term "alphanumeric data"). In their briefs, plaintiffs argue that defendant's original construction was too narrow because it included only "numeric data." In its reply brief, defendant altered its construction slightly, to include "alphanumeric" data. It is not clear whether this resolves the dispute regarding this term because plaintiffs did not have an opportunity to respond.

I presume that it does not, because the alteration does not address plaintiffs' primary argument in their opening brief, that the patent specification anticipates the *verbal* disclosure of information over the telephone. '294 pat., col. 2, lns. 34-39. ("The present invention is a method and apparatus for configuring an ultrasound imaging system at a remote location by obtaining an encrypted feature key from a central location" (*e.g.*, via telephone) and then inputting that feature key into the ultrasound imaging system using an operator interface (*e.g.*, a keyboard)). However, plaintiffs' argument is misplaced. The claim language itself explains that the option identifier is something that is entered by depressing a sequence of keys on a keyboard. Hence, it must be alphanumeric. The relevant language of claim 7 provides "decrypting means for outputting decrypted data in response to depression of a sequence of keys of said operator representing an

encrypted feature key comprising an encrypted validation identifier and an encrypted option identifier." Therefore, I will adopt defendant's modified construction of this term.

Court's construction: alphanumeric data representing the option to be activated

2. " means for placing said system in a feature key entry mode in response to a predetermined command input via said operator interface "

Plaintiffs' construction: Function: placing the system in a mode where the feature key can be inputted. Structure: A computer and associated software comprising a parameter routine. (FIGS. 1-3; col. 3:3-9; col. 4:49-52; col. 5:17-28.)

Defendant's construction: Function: entering a predetermined sequence of alphanumeric characters via an operator interface representing a command that causes the system to exit its previous state and enter a suspended state in which the system is incapable of imaging and is waiting for feature key data to be inputted. Structure: a computer and associated software comprising a parameter routine, which in response to a user entering a predetermined sequence of alphanumeric characters on an operator interface, causes the system to exit its previous state and enter a suspended state in which the system is incapable of imaging and is waiting for feature key data to be inputted. (Col. 2:36-38, 3:3-14, 4:49-52, 5:14-65, FIGS. 1-3, element 20.)

The parties dispute both the function and the corresponding structure associated with this means-plus-function claim element. The flaws in defendant's proposed construction are immediately apparent. First of all, it is extremely difficult to follow. To the extent that the purpose of claim construction is to pin down and explain the meaning of ambiguous claim language, adopting such a construction would be counterproductive. More problematic is the fact that at least some of this excess verbiage limiting the scope of the claim comes not from the patent specification itself, but from broad inferences that defendant draws regarding the operation of the patented invention. *JVW Enterprises v. Interact Accessories, Inc.*, 424 F.3d 1324, 1331 (Fed.Cir.2005) (holding that "a court may not construe a means-plus-function limitation 'by adopting a function different from that explicitly recited in the claim' " and cautioning against adding unclaimed limitations with respect to function) (internal citation omitted). Therefore, I cannot adopt defendant's construction.

Plaintiffs' construction may be better. However, its merits are difficult to assess because plaintiffs' claim construction briefing was devoted almost entirely to pointing out the flaws in defendants' construction. Plaintiffs have succeeded in demonstrating that defendant's construction is wrong, but at the expense of persuading me that their construction is the correct one. Therefore, I will not adopt either proposed construction.

3. " decrypting means "

Plaintiffs' construction: Function: not disputed. Structure: a computer and associated software comprising an encryption engine (Abstract; FIGS. 1-3; col. 2:39-41; col. 3:15-17; col. 6:7-12.)

Defendant's construction: Function: not disputed. Structure: a computer and associated software comprising an encryption engine that uses the inverse of the matrix previously used to encrypt the data to decrypt the data. (Abstract, Col. 2:39-41, 3:15-27, 4:58-60 (and surrounding language), 5:2-6, elements 20 and 40.)

This too is a means-plus-function claim element. The parties agree that the function is "outputting decrypted data" but disagree about one aspect of the corresponding structure. Their constructions are identical, except that defendant seeks to add the limitation that the encryption engine "uses the inverse of the matrix previously used to encrypt the data to decrypt the data." However, the language regarding the use of an "inverted" encryption matrix appears in the patent specification in a discussion about the preferred embodiments and nowhere else. '225 pat., col. 3, ln. 60. Although the patent specification speaks generally about *encrypting* data by multiplying vectors by a "non-singular" matrix, *id.* at col. 2, 63-67, it does not direct that decryption must be achieved with an inverted encryption matrix, except in the preferred embodiment discussed above. Because it would be an error to import this limitation from a preferred embodiment into the claim language, I will adopt plaintiffs' construction.

Court's construction: Structure: a computer and associated software comprising an encryption engine

4. " *validating means* "

Plaintiffs' construction: Function: not disputed. Structure: a computer and associated software comprising a key validator. (Abstract; FIGS. 1-3; col. 3:28-30; col. 4:64-col. 5:2; col. 5:48-65.)

Defendant's construction: Function: not disputed. Structure: a computer and associated software comprising a key validator that determines whether a key is valid by comparing one set of validation information (*e.g.*, a system identifier that uniquely identifies the ultrasound system and a special validation code) with a unique validation standard pre-stored in system memory. (Abstract; Col. 2:39-41, 3:28-30, 4:5-21; 4:64-5:2; 5:48-55, FIGS. 1-3, elements 20 and 42.)

The dispute regarding this means-plus-function claim element is similar to the parties' dispute regarding "decrypting means." As with that term, the parties do not dispute the function of the claim element, but disagree regarding the appropriate level of specificity of the corresponding structure. Plaintiffs' construction is simply "a computer and associated software comprising a key validator." Defendant agrees that this is the corresponding structure, but contends that it is necessary to include a specific description of the "key validator" that determines validity. To this end, defendant proposes a construction regarding the term that draws almost exclusively from the description of preferred embodiments. However, the preferred embodiments describe several methods for determining validity and defendant's construction appears to rely on just one of them. *E.g.*, '225 pat., col. 4, lns. 64-67, *id.* at col. 5, 48-50, *id.* at col. 2, lns. 39-44.

[11] The court of appeals has observed that "[w]hen multiple embodiments in the specification correspond to the claimed function, proper application of s. 112, para. 6 generally reads the claim element to embrace each of those embodiments." *Micro Chemical Inc. v. Great Plains Chemical Co.*, 194 F.3d 1250, 1258 (Fed.Cir.1999). Therefore, a proper construction accounts for structure described in all embodiments. *Callicrate v. Wadsworth Manufacturing*, 427 F.3d 1361, 1369 (Fed.Cir.2005). Defendant has not shown that its construction "embraces" the full scope of the "key validator" disclosed in the '225 patent. Therefore, I will adopt plaintiff's construction, which does not impose such a limitation.

Court's construction: Structure: a computer and associated software comprising a key validator

5. " *means for altering said system configuration as a function of said decrypted option identifier only if said decrypted validation identifier is valid* "

Plaintiffs' construction: Function: not disputed. Structure: a computer 20 and associated software comprising options activator 44 and options handler 48. (FIGS. 1-3; col. 3:29-33; col. 4:65-col. 5:14.)

Defendant's construction: Function: not disputed. Structure: a computer and associated software comprising an option activator, which receives the decrypted option and expiration date and copies that data into respective fields in an options data structure as a function of said decrypted option identifier, and an options handler, which configures the system in accordance with the new data stored in the options data structure upon rebooting, but only if the decrypted system identifier that uniquely identifies the ultrasound system and the special validation code are valid. (Col. 3:29-36, 4:65-14, 5:2-14, Figs. 1-3 (elements 20, 44, and 48).)

This is a means-plus-function claim element. Once again, the parties agree about the function and the basic nature of the corresponding structure ("a computer and associated software comprising an options activator and an options handler"). The disagreement arises over the question whether the patent specification provides direction about the specific nature of the options activator and options handler. To the extent the specification does explain the operation of the options activator and handler, it does so in the context of a discussion of preferred embodiments. '225 pat., col. 5, lns. 2-14. Moreover, the descriptions in the specification do not speak in restrictive terms about the function of these features. Perhaps this is the only way these elements operate, but the patent doesn't support this limitation unambiguously. Therefore, I will adopt plaintiffs' construction of the term, which does not include these limitations.

Court's construction: a computer and associated software comprising an options activator and an options handler

6. "*feature activation mode*"

Plaintiffs' construction: a mode in which aspects of the system can be made active

Defendant's construction: the system has exited its previous state and has entered a suspended state in which the system is incapable of imaging and is waiting for feature key data to be inputted

Plaintiffs argue that this term has an ordinary and customary meaning, which can be gleaned from dictionary definitions. Defendant contends that "feature activation mode" means the same thing as "feature key activation mode," a term used in other claims of the '225 patent. Both approaches leave something to be desired. Although defendant is correct that the two terms are used in somewhat similar ways, this is not sufficient to demonstrate that they mean the same thing. Next, even if plaintiffs are correct and "feature activation mode" has an ordinary and customary meaning, they have not shown that their construction is proper. Rather than presenting the court with a widely accepted technical definition for the term as a whole, plaintiffs attempt to cobble together a construction from dictionary definitions of the individual words. Because both constructions are flawed, I conclude that the term "feature activation mode" would not benefit from either construction.

G. *The '101 and '566 Patents*

The '101 and '566 patents disclose an ultrasound system that is technically advanced (in comparison to prior handheld devices), relatively small in size and easily transported (in comparison to prior large, cart-mounted ultrasound systems). The disputed terms included in claim 8 of the '101 patent and claim 1 of the '566 patent are the same and the parties agree that they should be construed identically. Claim 8 of the '101 patent

discloses:

8. An ultrasound diagnostic instrument comprising:

a) **a handheld module including a display, manual controls, and system circuitry for processing signals for display;**

b) a transducer assembly coupled to the system circuitry for providing electrical signals from ultrasound waves for processing; and

c) **an electrocardiograph (ECG) module coupled to the handheld module by a cable** and including leads for receiving ECG signals from a patient and ECG signal processing circuitry for applying ECG signals to the handheld module through the cable.

Claim 1 of the '566 patent discloses:

1. An ultrasound diagnostic instrument comprising:

a) **a handheld module including a display, manual controls, and system circuitry for processing signals for display;**

b) a transducer assembly coupled to the system circuitry for providing electrical signals from ultrasound waves for processing; and

c) **an electrocardiograph (ECG) module coupled to the handheld module by a cable** and including leads for receiving ECG signals from a patient and ECG signal processing circuitry for applying ECG signals to the handheld module through the cable;

wherein said handheld module further comprises circuitry for performing spectral Doppler analysis and allowing for simultaneous ECG readings to be overlaid on a spectral Doppler display;

wherein the signal processing circuitry of the ECG module includes first amplification and filtering circuitry for signals from the leads and second amplification and filtering circuitry for processing signals from the first amplification and filtering circuitry for application to the handheld module, the first and second amplification and filtering circuitry being electrically isolated whereby a patient is electrically isolated from the handheld unit.

1. " handheld module including a display, manual controls, and system circuitry for processing signals for display "

[12] **Plaintiffs' construction:** a module that by design is operated while its components (i.e. a display, manual controls and system circuitry for processing signals for display) are held in one hand

Defendant's construction: a compact assembly designed to be carried in one hand that includes a display, manual controls, and system circuitry for processing signals for display

The parties' dispute regarding the meaning of this phrase boils down to a dispute about the meaning of

"handheld." Defendant contends that "handheld" means a device that can be *carried* in one hand, while plaintiffs argue that "handheld" devices must be *operable* when held in one hand. In support of its position, defendant contends that the patent specification make clear that the term "handheld" denotes a machine that is easily portable. Plaintiffs rely on dictionary definitions and materials relating to the prosecution of an allegedly related patent in support of their argument that the common understanding of the term "handheld" relates to a user's ability to operate the device while it is held in one hand, not the portability of the device.

The meaning of "handheld" is not readily apparent from the claims themselves, which shed little light on how a user would interact with the device. Therefore, I turn to the patent specification to determine the meaning of the term as it is used in the '101 and '566 patents. The "Background Art" portion of the '566 patent offers persuasive evidence that "handheld" in the context of the '101 and '566 patents refers to a class of devices that are relatively portable in contrast to traditional, cart-mounted devices. This portion of the patent specification explains that "modern ultrasound devices generally fall into two classes of devices." '566 pat., col. 1, lns. 24-25. The first class of devices is described as "large, immobile," *id.* at lns. 26-27, "high-end," *id.* at ln. 40, devices that "are arguably portable" but "are limited by their ability to be transported easily." *id.* at lns. 29-30. The second class of devices is described as "systems designed for handheld use," *id.* at ln. 47, with displays in "specialized modules" or "laptop computers," *id.* at ln. 55. The specification goes on to discuss in detail the advantages of the invention's light weight and easy portability. *Id.* at col. 6, lns. 3-4, 9-10.

Next, the specification of the '566 patent cites U.S. Patent No. 5,839,422 (the "Chiang patent") as representative of the "handheld" devices that use a laptop computer display. *Id.* at 56. The Chiang patent discloses a ultrasound system in which a laptop is connected to a hand-held scanner. It is clear from the Chiang patent that the full device it discloses is not intended to be operated while held in one hand, although it includes a handheld scanhead. Therefore, the reference in the '566 specification to the device disclosed in the Chiang patent also suggests that, in the context of the '566 and '101 patents, "handheld" is the nomenclature given to devices that can be carried in one hand.

In contrast, all of plaintiffs' arguments rely on extrinsic evidence. Plaintiffs' primary argument is that dictionary definitions provide the proper definition of the term "handheld." Although dictionary definitions may be helpful to understanding claim terms in some cases, the Court of Appeals for the Federal Circuit has cautioned explicitly against over-reliance on them. *Phillips*, 415 F.3d at 1319. In this case, the patent specification provides insight into the meaning of the term "handheld" as it is used in the '101 and '566 patents and it is not appropriate to replace these specific definitions with those gleaned from a non-technical dictionary. *Id.* Plaintiffs' other arguments regarding statements included in defendant's internal marketing materials and a narrow reading of the Chiang patent are similarly unpersuasive. Therefore, I will adopt defendant's construction of the term "handheld."

Court's construction: a compact assembly designed to be carried in one hand that includes a display, manual controls, and system circuitry for processing signals for display

2. " electrocardiograph *module coupled to a handheld module by a cable* "

[13] **Plaintiffs' construction:** electrocardiograph (ECG) module that is external to and attached to the handheld module by a cable

Defendant's construction: a module that measures electrical potential difference across the chest and is

attached to the handheld module by a cable

The parties' disagreement with respect to this term is whether the electrocardiograph module must be external to the handheld module. Defendant faces an uphill struggle in promoting its proposed construction. First, the claim language itself distinguishes three separate components, including a handheld module, a transducer assembly and an electrocardiograph module. This strongly suggests that they are separate from each other. However, even if this leaves some room for interpretation, the patent specification does not. The second sentence of the abstract supports plaintiffs' construction squarely and unambiguously: "An *external* electrocardiograph (ECG) unit is also disclosed." '566 pat., Abstract (emphasis added). The Court of Appeals for the Federal Circuit has recognized on multiple occasions the importance of the abstract in construing the scope of a claim term. *Pandrol USA, LP v. Airboss Ry. Products, Inc.*, 320 F.3d 1354, 1363 (Fed.Cir.2003); *SciMed Life Systems, Inc. v. Advanced Cardiovascular Systems, Inc.*, 242 F.3d 1337 (Fed.Cir.2001). Defendant advances no argument for disregarding it in this case.

The same understanding of the invention is repeated in the Summary of the Invention. In describing the invention, the patent states that "ECG capacity is also described using a separate module to preserve weight in the handheld instrument." '566 pat., col. 2, lns. 24-26.

Defendant attempts to dismiss these references in the specification as discussions of embodiments, but its efforts are unconvincing. It argues that the description of a separate electrocardiograph unit is limited to situations where it is necessary to "preserve" the lightweight nature of the device. However, the references in the Summary of the Invention to the "separate" electrocardiograph module are made in the context of discussions of "the present invention." Therefore, this limitation may be properly applied to the invention as a whole. *Verizon Services Corp.*, 503 F.3d at 1308; *C.R. Bard, Inc.*, 388 F.3d at 864.

Court's construction: electrocardiograph (ECG) module that is external to and attached to the handheld module by a cable

H. The '839 Patent

The disputed terms in the '839 patent appear in claims 1, 2, 3 and 4, which disclose:

1. An ultrasound diagnostic instrument comprising

a) a console including display electronic circuitry for processing electrical signals for display including a digital processor, a first memory and a first connector coupled to the processor and first memory,

b) a transducer scanhead for generating ultrasound waves and receiving reflected or scattered ultrasound waves,

c) means for coupling the transducer scanhead to the console for transmitting electrical signals to and from the scanhead, and

d) a second memory associated with the scanhead and outside of the console and communicating with the console through a second connector, the second memory storing software and data necessary for use of the transducer scanhead in the ultrasound diagnostic instrument.

2. The ultrasound diagnostic instrument as defined by claim 1 wherein the software and data stored in the second memory include **operational data unique to the transducer scanhead**.
3. The ultrasound diagnostic instrument as defined by claim 1 wherein the software and data include at least one of physical parameters, **operational data for the scanhead**, and **executable code**.
4. The ultrasound diagnostic instrument as defined by claim 1 wherein the software and data include **operational software for executing unique functions with the transducer scanhead**.

1. *" a second memory associated with the scanhead and outside of the console and communicating with the console through a second connector, the second memory storing software and data necessary for use of the transducer scanhead in the ultrasound diagnostic instrument" or "the second memory storing software and data necessary for the use of the transducer scanhead in the ultrasound diagnostic instrument "*

Plaintiffs' construction: memory that stores system executable code and transducer specific data required for system setup, drive, imaging and optimization, and that obviates manual field upgrade or system swap when a new function, application, or transducer scanhead is introduced

Defendant's construction: No construction of the full phrase. Instead, construction of the phrase "the second memory storing software and data necessary for use of the transducer scanhead in the ultrasound diagnostic instrument" as "the second memory stores portions of software and data that the transducer scanhead in the ultrasound diagnostic instrument needs to function properly"

The parties disagree about several aspects of claim construction with respect to claim 1 of the '839 patent. The most fundamental dispute relates to which terms require construction. Plaintiffs contend that it is necessary to construe the full phrase that appears in part d of claim 1; defendant argues that the phrase need not be construed in its entirety and that if any construction is needed, shorter phrases and terms should be construed instead.

Neither party has persuaded me that its proposed construction is correct. I will start with defendant's proposed construction of the phrase "the second memory storing software and data necessary for the use of the transducer scanhead in the ultrasound diagnostic instrument." Defendant's construction of the phrase is "the second memory stores portions of software and data that the transducer scanhead in the ultrasound diagnostic instrument needs to function properly." However, no intrinsic evidence supports the addition of the terms "portions of software and data" or "function properly." These terms broaden the reach of the claim language impermissibly.

[14] On the other hand, plaintiffs' proposed construction narrows the scope of the claim language impermissibly by importing a requirement that the second memory obviate the need for manual field upgrade or system swap. It is true that the patent specification, in the Summary of the Invention, touts the advantage of using a second memory because it obviates the need to perform "manual field upgrade[s]" or "system swap[s]" when a new "function, application, or transducer scanhead is introduced." '839 pat., col. 2, lns. 9-12. However, it does not follow that this stated advantage must be read into the language of individual claims. *Ventana Medical Systems v. Biogenex Laboratories, Inc.*, 473 F.3d 1173, 1181 (Fed.Cir.2006); *Golight, Inc. v. Wal-Mart Stores, Inc.*, 355 F.3d 1327, 1331 (Fed.Cir.2004) ("[P]atentees [are] not required to include within each of their claims all of [the] advantages or features described as significant or

important in the written description.").

[15] Plaintiffs' argument that the prosecution history requires the importation of this limitation into the claim language is equally unavailing. As noted above, a patentee may limit the meaning of a claim term by making a "clear and unmistakable disavowal of scope during prosecution." *Purdue Pharma L.P. v. Endo Pharmaceuticals, Inc.*, 438 F.3d 1123, 1136 (Fed.Cir.2006). Claim 1 of the '839 patent was rejected initially because of U.S. Pat. No. 5,690,114. '839 file history, dkt. # 64, First Office Action, SONO-GE0059874-78. After the rejection, claim 1 was amended to clarify that the second memory was associated with the scanhead and outside the console. '839 file history, dkt. # 64, Response to First Office Action, SONO-GE0059889-92. In their effort to overcome the rejection, the inventors pointed out that the memory described in U.S. Pat. No. 5,690,114 was not included in the scanhead itself and was instead included in the console. *Id.* at SONO-GE0059891. They noted also that this obviated the need for manual field upgrade and system swap. *Id.* Again, this is a statement of the advantage of including a second memory within the scanhead; it is not an "unambiguous disavowal" of scanheads that include a second memory but do not obviate the need for manual field upgrades and system swaps. *E.g.*, *Omega Engineering, Inc. v. Raytek Corp.*, 334 F.3d 1314, 1324 (Fed.Cir.2003) (declining to apply doctrine of prosecution disclaimer when alleged disavowal is ambiguous).

Because I conclude that both parties have failed to propose an appropriate construction, I will decline to construe "a second memory associated with the scanhead and outside of the console and communicating with the console through a second connector, the second memory storing software and data necessary for use of the transducer scanhead in the ultrasound diagnostic instrument" or "the second memory storing software and data necessary for the use of the transducer scanhead in the ultrasound diagnostic instrument."

2. " *memory* "

Plaintiffs' construction: a chip dedicated to the nonvolatile storage of data for subsequent retrieval

Defendant's construction: a device in which information may be stored and from which the same information may be subsequently retrieved

The parties' primary dispute with respect to this term is whether memory must be nonvolatile in nature. They also disagree whether it is stored on a "chip" or a more general "device." Both parties rely on similar dictionary definitions for the "ordinary" meaning of the term. Apparently the dictionaries disagree about whether memory is something stored on a "chip" or a "device." The parties have offered no reason to believe that one set of dictionaries is more persuasive than the other and I will not speculate independently.

Next, nothing in the claim terms or the specification of the '839 patent provides a definitive answer regarding the volatile or nonvolatile nature of memory used in the patented device. Therefore, the parties rely on dueling expert opinions to support their arguments. The Court of Appeals for the Federal Circuit has held that expert testimony "can be useful to a court" but has cautioned also that it is generally "less reliable" than intrinsic evidence. *Phillips*, 415 F.3d at 1318.

[16] This case presents a clear example of why expert evidence may be of limited value in claim construction. Plaintiffs' expert states that memory "must be non-volatile in order to obviate a manual field upgrade or system swap when a new function, application or transducer scanhead is introduced." *Schafer Decl.*, dkt. # 41, at 16. Defendant's expert takes the opposite position. He asserts that the memory can be

volatile, nonvolatile or a collection of both kinds. Waag Decl., dkt. # 46, at 15. In their claim construction briefs, the parties attempt to discredit each other's expert witnesses but neither has pointed to anything that demonstrates that the experts are correct or incorrect as a matter of law. This is a problem. A court construing patent claims may resolve legal disputes, *Markman*, 52 F.3d at 970-71, but it may not resolve genuine issues of fact.

Therefore, I will decline to adopt either proposed construction of "memory."

3. "*operational data for the scanhead*" and "*operational data unique to the transducer scanhead*"

[17] **Plaintiffs' construction:** data designed for specific applications such as cardiac analysis, neo-natal analysis, gynecology analysis and prostate analysis

Defendant's constructions: "operational data for the scanhead" means data that is used in the operation of the scanhead; "operational data unique to the transducer scanhead" means data that is collectively used in the operation of a particular model of the transducer scanhead

Plaintiffs contend that both terms mean the same thing: data designed for specific applications such as cardiac analysis, neo-natal analysis, gynecology analysis and prostate analysis. They argue that their proposed construction is supported by the patent specification. Not so. The portion of the patent specification on which they rely explains merely that "Memory 135 stores operational data unique to the specific transducer scanhead which *may* be designed for specific applications such as cardiac analysis, neonatal analysis, gynecology analysis and prostate analysis." '839 pat., col. 4, lns. 24-27 (emphasis added). Obviously, "may" does not mean "must."

Defendant's constructions have the advantage of being consistent with the claim terms, patent specification and common sense. *E.g.*, '839 pat., col. 2, lns. 24-32. As discussed above, neither the patent language or the specification indicates that the claim language should be construed narrowly. In addition, it would be contrary to the holdings of the court of appeals to construe the two terms identically, when they use different wording and appear in two separate claims. *Applied Medical Resources v. United States Surgical Corp.*, 448 F.3d 1324, 1333 n. 3 (Fed.Cir.2006) (affirming presumption that different terms have different meanings).

Court's constructions: "operational data for the scanhead" means data that is used in the operation of the scanhead; "operational data unique to the transducer scanhead" means data that is used collectively in the operation of a particular model of the transducer scanhead

4. "*executable code*"

Plaintiffs' construction: no construction proposed

Defendant's construction: a type of software that a processor or hardware device can directly execute

Only defendant has proposed a construction of this term. In support of its construction, defendant cites expert testimony and a technical dictionary. Plaintiffs argue that it is unnecessary to construe the term separately, but they do not argue that defendant's construction is wrong. Therefore, I will adopt defendant's construction of the term "executable code."

Court's construction: a type of software that a processor or hardware device can directly execute

5. " operational software for executing unique functions with the transducer scanhead "

Plaintiffs' construction: system executable code for executing specific applications such as cardiac analysis, neo-natal analysis, gynecology analysis and prostate analysis

Defendant's construction: software that is collectively used to operate functions that a particular model of the transducer scanhead is capable of performing

The parties' dispute regarding the proper construction of this term focuses on two issues: (1) whether the term "software" in the context of the '839 patent means "executable code" and (2) the proper definition of the "unique functions" of the "transducer scanhead." With respect to the second issue, the plaintiffs' arguments appear to be the same as their arguments regarding the terms "operational data for the scanhead" and "operational data unique to the transducer scanhead." As discussed above, I find plaintiffs unpersuasive when they argue that these terms are limited in scope by the patent specification. However, with respect to this term, defendant has not explained why its construction is correct (or even better). On its face, defendant's construction appears to expand the scope of the claim term. Absent some evidence that this expansion is appropriate, I cannot adopt defendants' construction.

The remaining question is whether "software" means "executable code," as plaintiffs contend. (By its inclusion of the term "software" in its proposed construction, defendant appears to take the position that the term software requires no additional construction in the context of this phrase.) The claim language itself provides a clear answer. Claim 7 of the '839 patent discloses: "The ultrasound diagnostic instrument as defined by claim 1 wherein the software and data stored in the second memory includes system executable code for the digital processor." This claim language would make very little sense if "software" meant "system executable code."

[18] At a minimum, the patent's use of both words raises a presumption that they do not mean the same thing. *Applied Medical Resources*, 448 F.3d at 1333 n. 3 ("in the absence of any evidence to the contrary, we must presume that the use of ... different terms in the claims connoted different meanings."). Plaintiffs are unable to overcome this presumption with persuasive evidence. Instead, they attempt to support their position with their expert's broad statement that a person of ordinary skill in the art would understand that software must be system executable code in order for the invention to provide its stated improvement over the prior art, that is that it obviates the need for manual field upgrade or system swap.

Therefore, I conclude that "operational software for executing unique functions with the transducer scanhead" as used in the '839 patent would not benefit from either proposed construction.

I. The '651 Patent

The '651 patent relates to a portable ultrasound device that operates at a reduced power consumption level. The disputed terms in the '651 patent appear in claim 1, which discloses:

1. In a **portable ultrasonic diagnostic instrument** having ultrasound transducers for transmitting and receiving ultrasonic waves and beamforming circuitry for focusing transmitted and received waves, a **method of operating the instrument at a reduced power consumption level** comprising the steps of:

a) providing a battery source of electrical current for circuitry in the instrument, and

b) **selectively altering circuitry functions depending on mode of operation of the instrument when a first power limit is reached, thereby reducing power consumption.**

1. "*method of operating the instrument at a reduced power consumption level*"

[19] **Plaintiffs' construction:** a method of using the portable ultrasonic diagnostic instrument for its intended purpose, including acquiring and/or displaying ultrasonic images, on no more than 25 watts of electrical power

Defendant's construction: a method of operating the instrument by altering the function of selected circuits to reduce power consumption by those circuits

The parties disagree about two aspects of this claim language. First, plaintiffs argue that the phrase "method of operating the instrument" requires construction; defendant does not believe that construction is necessary. Next, the more substantive dispute relates to whether the phrase "reduced power consumption level" means no more than 25 watts of power.

I turn first to the phrase "method of operating the instrument." Plaintiffs contend that it is necessary to import the limitation that "operating the instrument" means "using" it for its "intended purpose." However, this limitation is not supported by the cited portions of the patent specification. Nor is it clear that the phrase "using the portable ultrasonic diagnostic instrument for its intended purpose" is any more clear than the claim language itself. Therefore, I conclude that no construction is necessary.

In contrast, the patent specification provides numerous references to a 25-watt limitation. Throughout the patent specification, the patentee describes an instrument that "operates on no more than 25 watts of electrical power." *e.g.*, '651 pat., Abstract; *Id.* at col. 2, lns. 11-12. In fact, the Summary of the Invention *begins* by explaining "In accordance with the invention a portable ultrasonic instrument is provided ... wherein the instrument *operates on no more than 25 watts of electrical power.*" '651 pat., col. 1, lns. 66-67, col. 2, lns. 5-6 (emphasis added). This is not a reference to a particular embodiment of the invention, but rather the description of "the invention" as a whole.

[20] In the face of this strong evidence that the patent discloses a particular power consumption limitation, defendant argues that limitation applies only to claims 14 through 26 of the '651 patent, which are apparatus claims, and not to claims 1-13, which are method claims. The apparatus claims all include a specific reference to the 25-watt power consumption level, while the method claims do not. However, this argument is not persuasive. As defendant itself argued at other points in its claim construction materials, claim language may be limited by unambiguous statements included in the specification. The court of appeals explained in *Phillips*, 415 F.3d at 1315,

The claims, of course, do not stand alone. Rather, they 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.... [T]he specification is always highly relevant to the claim construction analysis. Usually, it is dispositive; it is the single best guide to the meaning of a disputed term.

(citations and quotations omitted). Given the unambiguous limiting language included in the Abstract and the Summary of the Invention, I conclude that it is proper to read claim 1 of the '651 patent to include a 25-watt power consumption limitation.

Court's construction: method of operating the instrument on no more than 25 watts of electrical power

2. " *mode of operation* "

[21] **Plaintiffs' construction:** a manner of operating an instrument for its intended purpose, including acquiring and/or displaying ultrasonic images

Defendant's construction: manner of operation characterized by a particular range of power conservation or power consumption, for example, full operation or active scanning modes, freeze mode, or power-off mode

Plaintiffs contend that "mode of operation" means the same thing as "method of operation" and that the proper construction for both terms can be gleaned from the patent specification. As discussed above, I do not find plaintiffs' argument persuasive and have not adopted this construction. Defendant's construction is better, to some degree. The patent specification explains unambiguously that "modes" of operation relate to power consumption levels. '651 pat., col. 5, lns. 57-67 (describing modes of operation including "full operation mode," "freeze mode," "sleep mode," and "power-off" modes in relation to power use). Therefore, I will adopt that portion of defendant's construction. However, the list of examples of modes is unnecessary and will not be adopted.

Court's construction: manner of operation characterized by a particular range of power conservation or power consumption

3. " *selectively altering circuitry functions depending on mode of operation of the instrument when a first power limit is reached, thereby reducing power consumption* "

Plaintiffs' construction: the instrument monitors its power consumption and, when a first preselected power consumption limit is reached, it changes selected circuitry functions depending on the mode of operation, thereby reducing power consumption

Defendant's construction: selectively changing the functions of certain circuits based upon mode of operation of the instrument, when a first level of power consumption is reached

Having reviewed the claim construction briefs and the transcript of the claim construction hearing, it remains unclear whether the parties have a live dispute about this term, other than their disagreement regarding the proper construction of the term "mode of operation," which I have considered above. In their reply brief, plaintiffs indicate that the only real dispute relates to the construction of "mode of operation." Plts.' Br. in Reply, dkt. # 71 at 96. In its reply brief, defendant makes a lengthy argument about how "power consumption" and "power limit" should be understood, but proposes no construction for these terms. Dft.'s Br. in Reply, dkt. # 67 at 22-26. Whether or not this is a contested issue, I do not intend to invent constructions that defendant did not propose, especially when this issue was raised first in defendant's reply brief. Accordingly, I conclude that the phrase "selectively altering circuitry functions depending on mode of operation of the instrument when a first power limit is reached, thereby reducing power consumption" cannot be construed further.

4. " *portable ultrasound diagnostic instrument* "

[22] **Plaintiffs' construction:** an ultrasonic diagnostic instrument used to evaluate a patient's condition or state and that by design is carried or moved about

Defendant's construction: an ultrasound instrument used to evaluate a patient's condition or state and that can be easily carried

The parties' proposed constructions of this term differ only with respect to whether the instrument must be "designed to be carried or moved about" or "easily carried." On this front, the parties engage in a battle of dictionary definitions, both contending that their dictionaries prove that their construction is accurate. This is not a winning or productive strategy.

Fortunately, the patent specification helps settle the dispute. The parties agree that the Background Art portion of the patent specification is important. In it, the patentee describes "premium ultrasound systems" that are "mounted in carts for portability." '651 pat., col. 1, lns. 12-13. Defendant argues that this reference was meant as a point of comparison. That is, it should be understood from this passage that the claimed invention was *not* like these examples of prior art in that it could be carried, not just mounted in a cart and moved around. Plaintiffs draw another conclusion, which is more consistent with the use of language in the '651 patent. They contend that by describing the "portability" of systems that weigh several hundred pounds and are cart-mounted in the specification and then using the term "portable" in the claim language, the patentee made clear that in the context of the '651 patent, "portable" is a term that relates to units that can be easily moved about by means other than carrying. I agree. An inventor "may choose to be his own lexicographer and use terms in a manner other than their ordinary meaning." *Bell Atlantic Network Services, Inc. v. Covad Communications Group, Inc.*, 262 F.3d 1258, 1268 (Fed.Cir.2001). The inventor in the '651 patent used the term "portability" to describe ultrasound units that could not be carried. Therefore, there is no reason to believe that the use of the term "portable" in the claim terms should be so limited.

Court's construction: an ultrasonic diagnostic instrument used to evaluate a patient's condition or state and that by design is carried or moved about

ORDER

IT IS ORDERED that the terms disputed by plaintiffs General Electric Company, GE Medical Systems (Norway) AS, GE Yokogawa Medical Systems Ltd., GE Medical System Global Technology Company, LLC, GE Medical Systems, Ultrasound & Primary Care Diagnostics LLC and GE Medical Systems, Inc. and defendant Sonosite, Inc. in U.S. Patent Nos. 4,932,415; 5,584,294; 6,102,859; 6,210,327; 6,120,447; 6,418,225; 6,569,101; 6,962,566; 6,364,839; and 6,471,651 are construed as follows:

-> "for increasing bandwidth said first colors are gradually replaced with a single second color until, at large bandwidths, only said single second color is assigned to the display" means "as bandwidth increases continuously or in regular steps, said first colors are replaced continuously or in regular steps, with a single second color until, at large bandwidths, only said single second color is assigned to the display";

-> "characterized in that the B-mode image is displayed within said blood flow display region while said blood flow display region is moved" means "characterized in that the B-mode image is always displayed in place of the blood flow image within the blood flow display region while the blood flow display region is

moved, and the blood flow image is never displayed within the blood flow display region while the region is moved";

-> "display means" has the following corresponding structure "circuitry for converting data into color (*e.g.*, red, blue, yellow, and green), monochrome, or patterned signals and an associated image display"

-> "display changing means for displaying the B-mode image within said blood flow display region while said blood flow display region is moved" has the following corresponding function "which always displays the B-mode image in place of the blood flow image within the blood flow display region while the blood flow display is moved and never displays the blood flow image in the blood flow display region while the region is moved" and the following corresponding structure "a circuit or micro-computer or the like with associated software, *e.g.*, changers and a change controller"

-> "dividing said first image frame of pixel intensity data into a regular grid of kernels forming a plurality of rows" means "dividing the frame of image data acquired during the first scan of the subject into a ordered grid of curved or rectilinear zones arranged in one or more rows and columns, each zone containing multiple pixels of data of potentially varying intensity";

-> "all kernels having signal" means "all zones with an average display pixel intensity significantly greater than the average predicted noise level";

-> "interacting with a graphical user interface to configure said imaging system" means "interacting with a graphical user interface to control the association with a first remote device";

-> "while maintaining an open association with said first remote device throughout a series of image acquisitions" means "wherein the imaging system is configured to continuously maintain an association with the first remote device that allows for transmission of multiple images acquired by the imaging system without any reopening of the association";

-> "while said association with said first remote device is open" means "while the association between the ultrasound imaging system and the first remote device has remained open continuously";

-> "before storage" means "before data is entered in memory from which it may be retrieved at a later time";

-> "option identifier" means "alphanumeric data representing the option to be activated";

-> "decrypting means" has the following corresponding structure "a computer and associated software comprising an encryption engine";

-> "validating means" has the following corresponding structure "a computer and associated software comprising a key validator";

-> "means for altering said system configuration as a function of said decrypted option identifier only if said decrypted validation identifier is valid" has the following corresponding structure "a computer and associated software comprising options activator and options handler";

-> "handheld module including a display, manual controls, and system circuitry for processing signals for display" means "a compact assembly designed to be carried in one hand that includes a display, manual controls, and system circuitry for processing signals for display";

-> "electrocardiograph module coupled to a handheld module by a cable" means "electrocardiograph (ECG) module that is external to and attached to the handheld module by a cable";

-> "operational data for the scanhead" means "data that is used in the operation of the scanhead";

-> "operational data unique to the transducer scanhead" means "data that is used collectively in the operation of a particular model of the transducer scanhead";

-> "executable code" means "a type of software that a processor or hardware device can directly execute";

-> "method of operating the instrument at a reduced power consumption level" means "method of operating the instrument on no more than 25 watts of electrical power";

-> "mode of operation" means "manner of operation characterized by a particular range of power conservation or power consumption"; and "portable ultrasound diagnostic instrument" means "an ultrasonic diagnostic instrument used to evaluate a patient's condition or state and that by design is carried or moved about."

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