EXHIBIT B

UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

SAN JOSE DIVISION

ELAN MICROELECTRONICS CORPORATION, Plaintiff and Counterclaim Defendant, v. APPLE INC., Defendant and Counterclaim Plaintiff.	Case No. C-09-01531 RS (PVT)

DECLARATION OF BRIAN VON HERZEN, PH.D. REGARDING CLAIM CONSTRUCTION OF U.S. PATENT NOS. 5,825,352, 7,274,353, 5,764,218 AND 7,495,659

I, Brian Von Herzen, hereby declare:

The statements contained in this Declaration are true and correct. If called as a witness, I would testify thereto under oath.

I have been retained by Defendant and Counterclaim Plaintiff Apple Inc. to offer opinions regarding certain claim terms in U.S. Pat. Nos. 5,825,352 ("the '352 patent"), 7,274,353 ("the '353 patent"), 5,764,218 ("the '218 patent"), and 7,495,659 ("the '659 patent"). This declaration summarizes my opinions relating to the claim construction issues addressed below. To the extent I am asked to testify at the Claim Construction hearing, I may provide background on the patents and reserve the right to use visual aides to illustrate my testimony.

I.

QUALIFICATIONS

I have a Ph.D. in Computer Science from Caltech, a Masters Degree in Computer Graphics from Caltech, and a Bachelors Degree in Physics from Princeton University. While at Caltech, I received the Hughes Doctoral Fellowship and the Hertz Foundation Fellowship. I have spent 20 years in industry as a researcher and manager at companies including Synaptics, Inc., Dolby Laboratories and Hewlett-Packard Laboratories, and am currently CEO of Rapid Prototypes, Inc. While at Synaptics, I participated in the development of signal sensing and processing technology including touch sensing, optical character recognition, motion estimation and neural networks. My qualifications to render an expert opinion in the matter are set forth in my Curriculum Vitae, which is attached as Exhibit A. My C.V. also includes a list of my patents, publications and professional activities and achievements.

II.

STATEMENT OF OPINIONS – '352 PATENT

A summary of my opinions regarding certain claim terms in the '352 patent is set forth below. I reserve the right to modify or supplement my opinions as appropriate.

A. ORDINARY SKILL IN THE ART

One of ordinary skill in the art relevant to the '352 patent in January 1996, the date the patent application was filed, would generally have the following education and experience: a

Bachelors Degree in Computer Science, Electrical Engineering or Mathematics and three to five years experience working in the area of signal processing or the design of touch-sensitive input devices, or a Masters Degree or Ph.D and one to three years of experience in those fields.

My opinion is based upon my personal knowledge and experience and my consideration of the following factors: (1) the levels of education and experience of persons of skill working in the field; (2) the sophistication of the technology; (3) prior art; and (4) the rapidity with which innovations are made in this field.

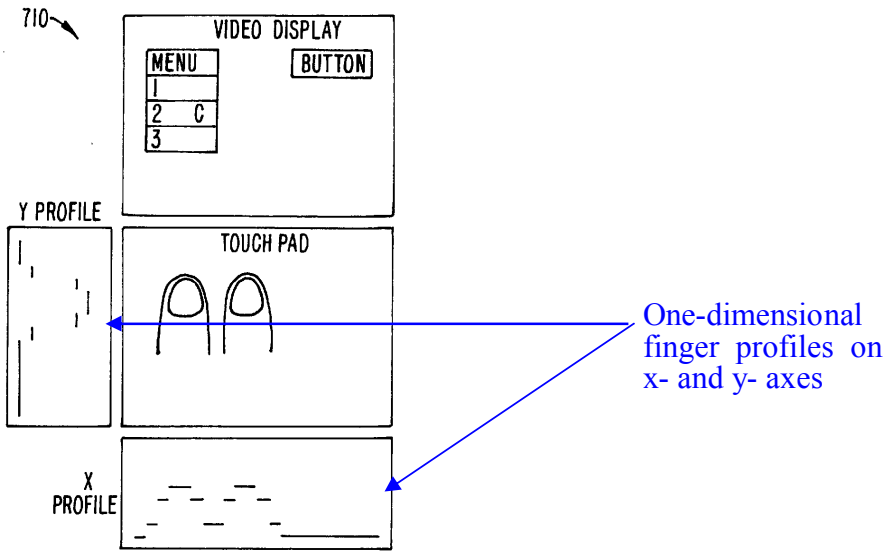
B. THE '352 PATENT

The '352 patent generally relates to a process for detecting multiple simultaneous contacts with a touchpad. *See* '352 patent (Exh. B) at Abstract. The central purpose of detecting the second finger is to perform conventional mouse functions, thus allowing a touchpad to replace a mouse. *See, e.g., id.,* at 2:56-3:15 (noting that "the present invention can be described in most of its applications by establishing one finger as controlling movement of the cursor, and the second finger as controlling functions equivalent to a mouse button or switch"); *see also id.,* at 4:36-39 (noting that a "further object of the present invention is to provide a method for effecting on a touchpad, through the use of multiple finger contacts, a plurality of conventional mouse button functions").

The claims of the '352 patent are directed to detecting two contacts by analyzing a finger profile obtained from scanning a touchpad. *See, e.g., id*., at 6:28-35. The claims cover (1) analyzing a finger profile to identify (a) a first maxima, (b) a minima following the first maxima, and (c) a second maxima following the minima, and (2) then providing an indication of two points of contacts based on the identification of these values. *See, e.g.*, *id*. at Claim 1.

The technique of the '352 patent is based on analyzing a finger profile that was obtained from a scan of a touchpad. *See, e.g., id*. at 5:20-43 (using a capacitive touchpad as the preferred embodiment). For example, capacitive touchpads detect finger contacts by measuring variations in capacitance under and around the location of the finger contact. *Id*. at 1:27-31. At the time of the filing of the '352 patent, variances in capacitance were measured and reported to the touch sensor by a process called projection scanning. In that process, a one-dimensional scan

of a touch sensor renders a finger profile of the capacitances measured in that dimension. The '352 patent discusses scanning the touchpad for capacitance values in the x direction, in the y direction, or in another angular direction. *Id*. at 11:11-15. For example, as shown in Figure 7B from the '352 patent below, a contact with the touchpad (here, two fingers) could cause the touch sensor to generate two one-dimensional profiles, one in the x-direction and one in the y-direction.



Id. at Fig. 7B.

The fact that the '352 patent employs projection scanning that produces a finger profile taken on an axis is critical to the invention of the '352 patent. These profiles create a series of capacitance values along an axis (e.g., a separate series of values for each x- and y-profile above). The '352 patent describes analyzing either series of values to "detect[] a first maxima 85 indicative of a first finger in operative proximity to the touchpad 30, followed by a minima 90 indicative of a space between the fingers, and further followed by another maxima 95 indicative of a second finger operatively coupled to the touchpad 30." *See, e.g., id.,* at 6:28-35.

C. THE DISPUTED TERMS OF THE '352 PATENT

1. "identify a first maxima in a signal corresponding to a first finger" / "identify a minima following the first maxima" / "identify a second maxima in a signal corresponding to a second finger following said minima" (claims 1 and 18)[1]

In January 1996, one of ordinary skill in the art would have understood the term "identify a first maxima in a signal corresponding to a first finger" in the claims of the '352 patent to mean: "identify a first peak value in a finger profile taken on an axis obtained from scanning the touch sensor"; the term "identify a minima following the first maxima" in the claims of the '352 patent to mean: "identify the lowest value in the finger profile taken on said axis that occurs after the first peak value"; and the term "identify a second maxima in a signal corresponding to a second finger following said minima" in the claims of the '352 patent to mean: "after identifying the lowest value in the finger profile taken on said axis, identify a second peak value in the finger profile taken on said axis."

I understand that in prior litigation these limitations were construed as follows:

Limitation	Elan v. Synaptics Construction
"identify a first maxima in a signal corresponding to a first finger"	"identify a first peak value in a finger profile obtained from scanning the touch sensor"
"identify a minima following the first maxima"	"identify the lowest value in the finger profile that occurs after the first peak value"
"identify a second maxima in a signal corresponding to a second finger following said minima"	"after identifying the lowest value in the finger profile, identify a second peak value in the finger profile"

See Elantech Devices Corp. v. Synaptics, Inc., 3:06-cv-01839, Claim Construction Order, April 6, 2007 (Exh. C) at 15. Applying these construction in the context of the '352 patent, a "finger profile" is a "finger profile taken on an axis."[2]

These limitations first appear in claim 1 as follows:

1. A method for detecting the operative coupling of multiple fingers to a

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[1] Reference to claim numbers in this declaration are provided for ease of reference and by example. Unless otherwise noted, my opinions concerning the meaning of a given term applies to every claim that includes that term.

[2] I understand that this was not at issue in the prior case.

touch sensor involving the steps of

scanning the touch sensor to **(a) identify a first maxima in a signal corresponding to a first finger, (b) identify a minima following the first maxima, (c) identify a second maxima in a signal corresponding to a second finger following said minima**, and

providing an indication of the simultaneous presence of two fingers in response to identification of said first and second maxima.

'352 patent (Exh. B) at Claim 1 (emphasis added).

A person of ordinary skill in the art in January 1996 would have been very familiar with the technique of scanning a touch sensor to identify maximas and minimas to determine the number of objects or fingers contacting the touch sensor. *See, e.g.,* Fearing, Tactile Sensing Mechanisms, The Intl Journal of Robotics Research, vol. 9, no. 3, pp. 3-23 (Jun. 1990) (Exh. D), at Fig. 10 (illustrating that two maximums on a finger profile taken on an axis correspond to two points of contacts); Siegal et al., Performance Analysis of a Tactile Sensor, IEEE, pp. 1493-1499 (1987) (Exh. E), at Fig. 8 (illustrating that the maximum on a finger profile taken on an axis corresponds to the point of contact); U.S. Pat. No. 6,008,800 (Exh. F), at 7:64-8:8, 8:32-45, and Fig. 2c (using maximum of a finger profile taken on an axis to identify point of contact); U.S. Pat. No. 4,686,332 (Exh. G), at 7:61-66 and Fig. 5 (identifying finger location by determining a maxima on a finger profile taken on an axis). And one of ordinary skill would have understood that the maximas and minima are identified on a "finger profile taken on an axis." *See id.*

The plain reading of the claims to one skilled in the art supports this interpretation. The claim language indicates that the first maxima, minima, and second maxima are relative to each other along an axis, that is, relative to each other on a finger profile taken along an axis.

The specification also supports this interpretation. First, the touch sensor technology that the '352 patent describes, both generally and in all embodiments, is a touch sensor having traces. *See, e.g.,* '352 patent (Exh. B) at 1:28-40, 5:20-43, and Fig. 2. Such touch sensors produce finger profiles along an axis. *See, e.g., id.,* at 5:44-6:1; Fig. 7B (depicting X profile and Y profile). This finger profile may be along the X, Y, or other one-dimensional axis – but it is along a single axis. *See, e.g., id.,* at 11:11-15 ("While the foregoing example describes identification of minima and maxima in the X and Y directions, it will be apparent that an

analysis along a diagonal or some other angular direction may be preferred in some instances, and is still within the scope of the present invention.").

The specification describes creating the finger profile along an axis to create a series of values that can be analyzed to identify the first maxima, minima, and second maxima. The specification describes creating the finger profile by scanning the traces and storing the values in RAM as values X(1) through X(con) and Y(1) through Y(con). *See, e.g., id.,* at 5:60-65, 8:55-62, Fig. 7B. This produces two finger profiles – one along the X axis and a second along the Y axis. In other words, a series of numbers is created along each axis. The specification then describes that circuitry, software, or firmware scans one of these finger profiles to "detect[] a first maxima 85 indicative of a first finger in operative proximity to the touchpad 30, followed by a minima 90 indicative of a space between the fingers, and further followed by another maxima 95 indicative of a second finger operatively coupled to the touchpad 30." *See, e.g., id.,* at 6:28-35. In this context, the maxima and minima values are identified along the series of values on an axis.

Finally, in evaluating the above terms in the claims of the '352 patent, I also considered the file history of the '352 patent (and those of related applications). The file history supports this interpretation. For example, Applicant amended the claims to specifically add the "signal" language in the claims. The original claims were rejected because the claims did "not clearly state that there is a cooperative relationship between the fingers being put on the touch sensor …. [I]t [was] not clear what causes the maxima and minima to be produced and what the maxima and minima are." April 18, 1997 Office Action (Exh. H), at p. 2. Applicant then amended the claims to address this deficiency, adding the "signal" language, thus specifically pointing out the type of profile that the maximas and minima are detected on. See August 22, 1997 Amendment and Response (Exh. H), at pp. 1-2, 7.

2. "identify" (claims 1 and 18)

One of ordinary skill in the art in January 1996 would have understood the term "identify" in the claims of the '352 patent to mean: "recognize a value to be."

"[I]dentify" first appears in claim 1:

> 1. A method for detecting the operative coupling of multiple fingers to a touch sensor involving the steps of

> scanning the touch sensor to (a) **identify** a first maxima in a signal corresponding to a first finger, (b) **identify** a minima following the first maxima, (c) **identify** a second maxima in a signal corresponding to a second finger following said minima, and
>
> providing an indication of the simultaneous presence of two fingers in response to identification of said first and second maxima.

'352 patent (Exh. B) at Claim 1 (emphasis added).

The language of the claim to one skill in the art supports this interpretation. Claim 1 requires "identify[ing]" the first and second maxima -- and then in response to that indication -- providing a certain indication. *See id*. at Claim 1. One of ordinary skill would have understood in the context of these claims that "identify[ing]" values would typically involve setting corresponding variables (such as "first maxima" variable) to the recognized values. And consistent with this interpretation, as discussed below, the '352 patent describes setting corresponding variables to the recognized values.

The specification further supports this interpretation. The specification sets forth an algorithm that "describes identification of minima and maxima …." *See id.,* at 8:64-11:15. In this algorithm, the minima and maximas are recognized as values corresponding to specific minima and maxima values. The algorithm utilizes the following specified variables to store the identified maximas and minima values:

> Xpeak1 Variable to store the value of the first peak X value.
> Xvalley Variable to store the value of a local minimum (if any) between 2 peaks.
> Xpeak2 Variable to store the value of the second peak X value (if any).

Id. at 8:64-9:5.

The algorithm traverses through values until it finds a first maxima. *See id.,* at 9:39-60 (noting that at step 230, "the peak has been found"). Upon finding this maxima, the algorithm sets the value of Xpeak1 variable to this maxima value. Similarly, the algorithm finds the minima and second maxima, and then sets the corresponding variables to these values. *See id.,* at 9:61-10:30. One of ordinary skill would have understood this algorithm as recognizing the maximas and minima as the respective specific values.

3. "in response to" (claims 1 and 18)

One of ordinary skill in the art in January 1996 would have understood the term "in response to" in the claims of the '352 patent to mean: "after and in reaction to."

"[I]n response to" first appears in claim 1:

> 1. A method for detecting the operative coupling of multiple fingers to a touch sensor involving the steps of
>
> scanning the touch sensor to (a) identify a first maxima in a signal corresponding to a first finger, (b) identify a minima following the first maxima, (c) identify a second maxima in a signal corresponding to a second finger following said minima, and
>
> providing an indication of the simultaneous presence of two fingers **in response to** identification of said first and second maxima.

'352 patent (Exh. B) at Claim 1 (emphasis added).

A person of ordinary skill in the art in 1996 would have understood the "in response to" to be "after and in reaction to." The language of the claim would have told a person of ordinary skill in the art that this ordinary meaning of the term is being used in the '352 patent. Claim 1 states in its preamble that it is a "method for detecting … multiple fingers." '352 patent at Claim 1. It then recites scanning the touch sensor to perform a series of steps, namely, identify a first maxima, identify a minima, and identify a second maxima. *See id.* Immediately following these steps, the claim recites "providing an indication of … two fingers in response to identification of said first and second maxima." Id. In accord with this plain reading, one of ordinary skill in the art would have understood that the method is accomplished by identifying the values and thus an indication is provided thereof. In other words, after and in reaction to identifying these values, an indication is provided that the two fingers were detected. *See also* The Merriam-Webster Dictionary Home and Office Edition, 1995 (Exh. I) (response: "1: an act of responding 2: something constituting a reply or a reaction").

The language of the dependent claims to one skilled in the art also supports this interpretation. Claims 2-5 are exemplary dependent claims that use "in response to" consistent with this interpretation:

> Claim 2: The method of claim 1 further including the step of causing a pointing device click function to occur **in response to** the detection of at least a second maxima.

> Claim 3: The method of claim 1 further including the step of enabling a 'drag' function to occur **in response to** the detection of at least a second maxima.
>
> Claim 4: The method of claim 1 further including the step of enabling a 'select' function **in response to** the detection of at least a second maxima.
>
> Claim 5: The method of claim 1 further including the step of enabling an 'ink' function **in response to** the detection of at least a second maxima.

'352 patent (Exh. B) at Claims 2-5 (emphasis added).

These claims recite that "in response to the detection of at least a second maxima" certain functions are enabled. The specification makes clear that it is this second maxima that would trigger these functions. *See, e.g., id.*, at 11:56-65 (noting that "the ability of the previously described methodology to recognize multiple fingers allows the first finger to serve, essentially, as the 'point' finger, while additional fingers serve as the 'click' finger(s)"); 13:8-12 (noting that "a second finger is detected and then removed, which is defined in an exemplary embodiment as a single finger tap which may be a 'select' function"); 13:16-22 (describing "drag" function); 13:55-58 (describing "ink" function). In other words, after and in reaction to the second finger, these functions are performed.

The specification also supports this interpretation. The below passage -- which tracks the claim language -- makes clear that it is the detection of the second maxima that is "indicative" of a second finger. In other words, after detecting the second maxima, an indication is provided after and in reaction thereto.

> Referring next to FIG. 3, a finger profile is shown indicative of the presence of two fingers, spaced apart from one another. In particular, the circuitry, software or firmware of the touchpad circuitry, such as that shown in FIG. 2, detects a first maxima 85 indicative of a first finger in operative proximity to the touchpad 30, followed by a minima 90 indicative of a space between the fingers, and further followed by another maxima 95 indicative of a second finger operatively coupled to the touchpad 30.

Id. at 6:26-35.

In evaluating the term "in response to" in the claims of the '352 patent, I also considered the file history of the '352 patent (and those of related applications). Based on my review, the terms are used in the file history in a manner consistent with the definition set forth above. For example, Applicant argued that the claims were different from the prior art because in

the claims, it is the detection of the maximas that provides the indication of fingers:

> The remaining claims are independent method and apparatus claims 1 and 35, and claims dependent thereon. **These claims are directed to the feature of the invention which detects multiple fingers by detecting the multiple maxima in the profile on the touchpad.** This distinguishes the prior art, which calculates multiple fingers by detecting a rapid movement in the total centroid. This rapid movement of the prior art is due to the centroid being calculated on the combination of the two fingers, with the result being that the centroid moves rapidly when one finger is lifted.

April 8, 1998 Amendment and Response (Exh. H) at p.3 (emphasis added); *see also id.*, at p. 4 ("The present invention addresses this deficiency of the '591 method by detecting two maxima in the profile information. This allows the detection of two fingers being present even if they are both placed down at the same time. Such a method is not shown or suggested by either of the Synaptics patents, which in fact teach away from this method.").

Lastly, one of ordinary skill in the art would have understood that "in response to" does not cover an indirect reaction. In other words, and in context of Claim 1, the broader limitation does not cover that the indication is provided in response to multiple factors, with identification of the first and second maxima being only one factor and not a determinative factor. Multiple factors can be taken into account before reporting the number of fingers contacting the touchpad. *See, e.g.,* '352 patent (Exh. B) at 10:52-65. As discussed above, however, based on the claim language, specification, and file history, one of ordinary skill in the art would have understood "in response to" to mean that the indication of two fingers is based directly on the identification of the first and second maxima, that is, identification of the first and second maxima is determinative of the indication being provided.

4. "pointing device click function" (claim 2)

One of ordinary skill in the art in January 1996 would have understood the term "pointing device click function" in the claims of the '352 patent to mean: "function that would normally result from a mouse button click."

"[P]ointing device click function" first appears in claim 2:

> 2. The method of claim 1 further including the step of causing a **pointing device click function** to occur in response to the detection of at least a second maxima.

'352 patent (Exh. B) at Claim 2 (emphasis added).

A person of ordinary skill in the art in 1996 would have understood the term "pointing device click function" to mean a "function that would normally result from a mouse button click." *See, e.g.,* 5,757,368 (Exh. J), at 2:52-54 ("In order to be compatible the computer 16, any input device must provide the 'click' and 'drag' functions which are also provided by the mouse 10. The click function entails depressing and releasing one of the mouse buttons 12 or 14.).

The specification supports this interpretation. The '352 patent relates to detecting multiple contacts for the purpose of emulating a mouse – as its Title states: "Multiple fingers contact sensing method for emulating mouse buttons and mouse operations on a touch sensor pad." '352 patent (Exh. B) at Title. The specification teaches that the primary purpose of detecting the second finger was to emulate the mouse button. *See, e.g., id.,* at 2:56-3:15 (noting that "the present invention can be described in most of its applications by establishing one finger as controlling movement of the cursor, and the second finger as controlling functions equivalent to a mouse button or switch"); 4:36-39 (noting that a "further object of the present invention is to provide a method for effecting on a touchpad, through the use of multiple finger contacts, a plurality of conventional mouse button functions"). In other words, the specification teaches that contacting the touch sensor with the second finger will cause the equivalent of pressing a mouse button. *See, e.g., id.,* at 6:50-58 ("As noted previously, the second or additional fingers are typically involved to provide 'button' or control functions, similar to actuation of the buttons or switches on a mouse."); 11:56-12:4 ("In particular, the ability of the previously described methodology to recognize multiple fingers allows the first finger to serve, essentially, as the 'point' finger, while additional fingers serve as the 'click' finger(s).").

One of ordinary skill in the art would have understood that in the context of the specification, that causing a "pointing device click function" to occur in response to the detection of at least a second maxima corresponds to the above teachings of emulating a mouse. Namely, the teachings of emulating a mouse by detecting a second contact on the touch sensor. Accordingly, one of ordinary skill would have understood "pointing device click function" to mean "function that would normally result from a mouse button click."

Finally, in evaluating the term "pointing device click function" in the claims of the '352 patent, I also considered the file history (and file histories of related patents). Based on my review, the terms are used in the file history in a manner consistent with the definition set forth above. For example, Applicant amended the Title to more clearly point out that a primary purpose of the invention was to emulate mouse functions, such as providing a "function that would normally result from a mouse button click." *See* August 22, 1997 Amendment and Response (Exh. H) at p.1 (amending Title from "Multi-Contact Sensing Method and Apparatus" to "A Multiple Fingers Contact Sensing Method for Emulating Mouse Buttons and Mouse Operations on a Touch Sensor Pad").

5. "a 'select' function" (claim 4)

One of ordinary skill in the art in January 1996 would have understood the term "a 'select' function" in the claims of the '352 patent to mean: "a selection of an item."

"[S]elect function" first appears in claim 4:

> 4. The method of claim 1 further including the step of enabling **a 'select' function** in response to the detection of at least a second maxima.

'352 patent (Exh. B) at Claim 4 (emphasis added).

The claim language to one skilled in the art supports this interpretation. Claim 1 relates to detecting contacts on a touch sensor. *See id*. at Claim 1. Touch sensors were well-known input devices for computers and other electronic devices that had graphical user interfaces. A common use of these touch sensors was selecting an item (such as an icon). Accordingly, claim 4 read in light of claim 1, would be understood as providing this well-known function, namely, the selection of an item.

The specification also supports this interpretation. The only description in the specification of a "'select' function" confirms the meaning that the term would have to a person of ordinary skill in the art:

> During the period 710 to 720, a second finger is detected and then removed, which is defined in an exemplary embodiment as a single finger tap which may be **a 'select' function such as selecting one item from a screen menu.**

Id. at 13:8-12.

6. "control function" (claims 14 and 19)

One of ordinary skill in the art in January 1996 would have understood the term "control function" in the claims of the '352 patent to mean: "function that would normally be provided by the actuation of the buttons or switches on a mouse."

"[C]ontrol function" first appears in claim 14:

> 14. The method of claim 1 further comprising the step of:
>
> selecting an appropriate **control function** based on a combination of a number of fingers detected, an amount of time said fingers are detected, and any movement of said fingers.

Id. at Claim 14 (emphasis added).

The claims support this interpretation. For example, claim 11 recites a "drag control function," which is a typical "function that would normally be provided by the actuation of the buttons or switches on a mouse" (in combination with movement of the mouse). *See id*. at Claim 11.

The specification also supports this interpretation. The '352 patent relates to detecting multiple contacts for the purpose of emulating a mouse – as its Title states: "Multiple fingers contact sensing method for emulating mouse buttons and mouse operations on a touch sensor pad." *Id*. at Title. The specification teaches that one of the primary purposes of detecting the second finger (or "multiple fingers") was to emulate the mouse button. *See, e.g., id.,* at 2:56-3:15 (noting that "the present invention can be described in most of its applications by establishing one finger as controlling movement of the cursor, and the second finger as controlling functions equivalent to a mouse button or switch"); *see also id.,* at 4:36-39 (noting that a "further object of the present invention is to provide a method for effecting on a touchpad, through the use of multiple finger contacts, a plurality of conventional mouse button functions"). In other words, the specification teaches that contacting the touch sensor with multiple fingers will cause the equivalent of pressing buttons on a conventional mouse. *See, e.g., id.,* at 6:50-58 ("As noted previously, the second or additional fingers are typically involved to provide 'button' or control functions, similar to actuation of the buttons or switches on a mouse."); 11:19-23 ("A second portion of the invention involves using the previously detection methodology to perform

various cursor movement and control functions similar to those well known to users of electronic mice and trackballs."); 11:56-12:4 ("In particular, the ability of the previously described methodology to recognize multiple fingers allows the first finger to serve, essentially, as the 'point' finger, while additional fingers serve as the 'click' finger(s).").

One of ordinary skill in the art would have understood that in the context of the specification, that causing a "control function" to occur "based on a combination of a number of fingers detected, an amount of time said fingers are detected, and any movement of said fingers" corresponds to the above teachings of emulating a mouse. Accordingly, one of ordinary skill would have understood a "control function" to mean a "function that would normally be provided by the actuation of the buttons or switches on a mouse."

Finally, in evaluating the term "control function" in the claims of the '352 patent, I also considered the file history (and file histories of related patents). Based on my review, the terms are used in the file history in a manner consistent with the definition set forth above. For example, Applicant amended the Title to more clearly point out that a primary purpose of the invention was to emulate mouse functions, such as providing a "function that would normally be provided by the actuation of the buttons or switches on a mouse." *See* August 22, 1997 Amendment and Response (Exh. H), p.1 (amending Title from "Multi-Contact Sensing Method and Apparatus" to "A Multiple Fingers Contact Sensing Method for Emulating Mouse Buttons and Mouse Operations on a Touch Sensor Pad").

Further, in discussing a "control function," Applicant essentially equated it to those well-known conventional functions of a mouse: "In particular, claim 20 specifies a control function, which could be a cursor movement, click, etc. Claim 24 further specifies the control function is in a particular embodiment a cursor movement." *Id.* at p.7-8.

Lastly, Applicant pointed to the exact portion of the specification that describes emulating mouse buttons when telling the Examiner where a "control function" was described. Applicant noted: "The steps of claim 23 relating to using the first finger for cursive movement and a second finger for a control function is discussed, for example, on page 8, lines 31-38." *Id.* at p.8. That excerpt on page 8 provides:

> To operate effectively, the present invention must detect and distinguish the presence of a single finger, and the presence of multiple fingers. **As noted previously, the second or additional fingers are typically involved to provide 'button' or control functions, similar to actuation of the buttons or switches on a mouse.** Although the following example describes in detail the use of only two fingers, one for cursor control and a second as a button, the teachings herein are believed sufficient to permit those skilled in the art to construct apparata using multiple fingers for additional buttons.

'352 Application (Exh. H), at p. 8, lines 31-38 (emphasis added).

7. "means for providing an indication" (claim 18)

One of ordinary skill in the art in January 1996 would have understood the corresponding structure of "means for providing an indication" in the specification of the '352 patent to be: the algorithm found in Fig. 8-1, which sets a Finger value equal to two after determining if a scan in either the X direction or the Y direction has detected two fingers.

"[M]eans for providing an indication" first appears in claim 18:

> 18. A touch sensor for detecting the operative coupling of multiple fingers comprising:
>
> means for scanning the touch sensor to (a) identify a first maxima in a signal corresponding to a first finger, (b) identify a minima following the first maxima, and (c) identify a second maxima in a signal corresponding to a second finger following said minima, and
>
> **means for providing an indication** of the simultaneous presence of two fingers in response to identification of said first and second maxima.

'352 patent (Exh. B) at Claim 18 (emphasis added).

I understand that the parties agree that this is a means-plus-function term.

One of ordinary skill in the art in January 1996 would have understood the function to be "providing an indication of the simultaneous presence of two fingers in response to identification of said first and second maxima."

I understand that Elan takes the position that the function is "providing an indication of the simultaneous presence of two fingers." I disagree with this because one of ordinary skill in the art would not have understood this to be a generic indication of the two fingers, but rather, a specific indication in response to identification of said first and second maxima.

The specification describes algorithms for detecting two fingers. In the following algorithm of Fig. 8.1, the specification sets a "FINGER" variable to indicate the number of fingers contacting the touch sensor:

> At step 850, a determination is made whether two fingers are in contact with the touchpad by evaluating both Xcompute and Ycompute. If neither Xcompute nor Ycompute indicate the presence of two fingers, the answer is NO and the process drops to step 855. However, if either the Xcompute routine or the Ycompute routine indicates the presence of two fingers [i.e., identified a first maxima, minima, and a maxima], the answer at step 850 is YES and the process moves to step 860, where the value of the variable FINGER is set to 2.

'352 patent (Exh. B) at 14:8-17.

In January 1996, setting a variable to a value was a well-known technique for providing an indication in the context of computer programming. One of ordinary skill would have understood this to be the corresponding structure of "means for providing an indication," that is, "the algorithm found in Fig. 8-1, which sets a Finger value equal to two after determining if a scan in either the X direction or the Y direction has detected two fingers."

I understand that Elan takes the position that the corresponding structure of "means for providing an indication" is: Analog multiplexor 45: Capacitance measuring circuit 70: A to D convertor 80, Microcontroller 60 and/or software, firmware or hardware performing the claimed function. This vague and ambiguous recitation does not point to or provide a link to a concrete structure in the specification. For example, under this view of the patent, part of the corresponding structure could be some undefined software, firmware or hardware performing the claimed function. One of ordinary skill in the art would not have been able to ascertain what software, firmware or hardware is intended for performing this function, nor does the specification describe this.

Additionally, Elan's identification of Analog multiplexor 45, Capacitance measuring circuit 70, and A to D convertor 80 does not correspond to the structure for performing the claimed function. The Analog multiplexor 45 selects which trace line or conductor will be read; the Capacitance measuring circuit 70 measures the capacitance on the selected line; and the A to D convertor 80 translates the measured analog value into a digital value. While these elements are necessary to measure capacitance -- and are generally necessary for a capacitance

touch pad to operate -- these elements do not provide an indication of the number of fingers on the touch sensor. These elements are merely the building blocks of a capacitance touch sensor. A structure that would provide an indication of two fingers would be a structure that interprets the measured and converted values, uses an algorithm to make a determination that there are two fingers on the touchpad, and then sets a variable (or some memory element) to reflect the determination.

8. "means for selecting an appropriate control function" (claim 19)

One of ordinary skill in the art in January 1996 would not have been able to identify the corresponding structure of "means for selecting an appropriate control function" in the specification of the '352 patent because the specification fails to disclose the corresponding structure for performing this function.

"[M]eans for selecting an appropriate control function" first appears in claim 19:

> 19. The touch sensor of claim 18 further comprising:
>
> **means for selecting an appropriate control function** based on a combination of a number of fingers detected, an amount of time said fingers are detected, and any movement of said fingers.

'352 patent (Exh. B) at Claim 19 (emphasis added).

I understand that the parties agree that this is a means-plus-function term.

I understand that the parties agree that the claimed function is "selecting an appropriate control function based on a combination of a number of fingers detected, an amount of time said fingers are detected, and any movement of said fingers."

The specification discloses various cursor movement and control functions. Yet the specification fails to disclose a structure or algorithm that would distinguish between them, that is, "select[] an appropriate control function." The following excerpt is exemplary of the specification in that it discloses various functions but fails to describe the structure or hardware that would distinguish between these functions.

> While the foregoing sequence can be programmed to define any number of cursor movement and control functions, an exemplary definition of the functions associated with such sequences can be the following: For the period from 700 through 705 the relative motion of a single finger can be defined to mean cursor movement for that period, from the beginning point until the relative ending point. During the period 710 to 720, a second finger is detected and then removed, which

> is defined in an exemplary embodiment as a single finger tap which may be a 'select' function such as selecting one item from a screen menu. During the period 720 until 730, the single finger again moves the cursor, while at 740 the second finger reappears to enable a different function. The second finger moves across the sensor, together with the first finger, until at 755 both fingers are removed. Again, such sequences--all of which may be regarded as gestures--can be mapped to control functions in numerous ways, but one reasonable definition is that the presence of two fingers engaged in relative motion is a 'drag function,' such as where an entity was selected by the first tap and dragged to a new location, where it is dropped by the removal of both fingers at 750.

Id. at 13:1-23. Nothing in this passage or elsewhere in the specification describes how the patented technique distinguishes between various gestures.

I understand that Elan again takes the position that the corresponding structure of "means for selecting an appropriate control function" is: Analog multiplexor 45: Capacitance measuring circuit 70: A to D convertor 80, Microcontroller 60 and/or software, firmware or hardware performing the claimed function. Once again, this vague and ambiguous recitation does not point to or provide a link to a concrete structure in the specification. As described above, under this view of the patent, part of the corresponding structure could be some undefined software, firmware or hardware performing the claimed function. One of ordinary skill in the art would not have been able to ascertain what software, firmware or hardware is intended for performing this function, nor does the specification describe this.

In addition, Elan's identification of Analog multiplexor 45, Capacitance measuring circuit 70, and A to D convertor 80 does not correspond to the structure for performing the claimed function. As explained above, these elements are merely the building blocks of a capacitance touch sensor. A person of ordinary skill in the art could not use a capacitance touch sensor alone to select an appropriate control function based on a combination of a number of fingers detected, an amount of time said fingers are detected, and any movement of said fingers. That function requires a specific algorithm for using the capacitance touch values generated from the capacitance touch sensor to determine the number of fingers detected, an amount of time said fingers are detected, and any movement of said fingers and then interpret those values to distinguish control functions or gestures. The specification of the '352 patent does not disclose any such algorithm to a person of ordinary skill in the art.

9. "means for detecting a distance between said first and said second maxima" (claim 24)

One of ordinary skill in the art in January 1996 would not have been able to identify the corresponding structure of "means for detecting a distance between said first and said second maxima" in the specification of the '352 patent because the specification fails to disclose the corresponding structure for performing this function.

"[M]eans for detecting a distance between said first and said second maxima" first appears in claim 24:

> 24. The touch sensor of claim 18 further comprising:
> **means for detecting a distance between said first and second maxima.**

'352 patent (Exh. B) at Claim 24 (emphasis added).

I understand that the parties agree that this is a means-plus-function term.

I understand that the parties agree that the claimed function is "detecting a distance between said first and second maxima."

The specification discloses certain purposes of measuring the distance between the first and second maxima. Yet the specification fails to disclose a structure or algorithm that would detect the distance between the maximas. The following excerpt is exemplary of the specification in that it discloses purposes of detecting the distance between the maximas but fails to describe the structure or hardware that would detect this distance.

> To avoid artifacts, a threshold may be applied to the both the maximum and minimum distance between the maxima representative of multiple fingers. For example, a threshold requiring the maxima to be within five centimeters of one another may be used to limit the maximum distance between the fingers; other thresholds may be appropriate in some embodiments. A threshold representative of the minimum distance may be configured by establishing a maximum value of the local minima 100.

Id. at 6:59-67.

One of ordinary skill in the art would not find any disclosure of how the patented technique of the '352 patent would perform this function because no algorithm for detecting the distance between two maxima is provided.

I understand that Elan takes the position that the corresponding structure of

"means for detecting a distance between said first and said second maxima" is: Analog multiplexor 45: Capacitance measuring circuit 70: A to D convertor 80, Microcontroller 60 and/or software, firmware or hardware performing the claimed function. For the same reasons described above, one of ordinary skill in the art would not have been able to ascertain what software, firmware or hardware is intended for performing this function, nor does the specification describe this.

In addition, Elan's identification of Analog multiplexor 45, Capacitance measuring circuit 70, and A to D convertor 80 does not correspond to the structure for performing the claimed function. As explained above, these elements are merely the building blocks of a capacitance touch sensor. A person of ordinary skill in the art could not use a capacitance touch sensor alone to measure the distance between maxima.

10. "means for providing a click function in response to the removal and reappearance of said second maxima within a predetermined period of time" (claim 26)

One of ordinary skill in the art in January 1996 would not have been able to identify the corresponding structure of "means for providing a click function in response to the removal and reappearance of said second maxima within a predetermined period of time" in the specification of the '352 patent because the specification fails to disclose the corresponding structure for performing this function.

"[M]eans for providing a click function in response to the removal and reappearance of said second maxima within a predetermined period of time" first appears in claim 26:

> 26. The touch sensor of claim 18 further comprising:
>
> **means for providing a click function in response to the removal and reappearance of said second maxima within a predetermined period of time.**

'352 patent (Exh. B) at Claim 26 (emphasis added).

I understand that the parties agree that this is a means-plus-function term.

I understand that the parties agree that the claimed function is "providing a click function in response to the removal and reappearance of said second maxima within a

predetermined period of time."

This function is best understood as essentially requiring two structures (though the structure could be the same): (1) a structure to distinguish or identify "a select function in response to the removal and reappearance within a predetermined period of time"; and (2) a structure to "provid[e] a click function." With respect to the structure that would distinguish or identify the "select function" in response to stated conditions, as discussed above, the specification fails to disclose a structure or algorithm that would distinguish between the various cursor and control functions such as the "select function."

With respect to the structure that would "provid[e] a click function," the specification also fails to disclose the structure or algorithm that would perform the click function. One of ordinary skill in the art would have understood in January 1996 that generally a click function has some effect on an application or the operating system, whereas detecting the "click function" on a touch sensor is performed by completely separate hardware and software (such as the touch sensor microprocessor, firmware, and/or a touch sensor driver). Accordingly, to provide the click function, (1) this separate hardware and software must first communicate that a click function was detected to the appropriate application or operating system, and (2) then the appropriate application or operating system must carry out the click function. The specification fails to disclose the structure or algorithm that would accomplish these functions.

I understand that Elan takes the position that the corresponding structure of "means for providing a click function in response to the removal and reappearance of said second maxima within a predetermined period of time" is: Analog multiplexor 45: Capacitance measuring circuit 70: A to D convertor 80, Microcontroller 60 and/or software, firmware or hardware performing the claimed function. For the same reasons described above, one of ordinary skill in the art would not have been able to ascertain what software, firmware or hardware is intended for performing this function, nor does the specification describe this.

In addition, the Analog multiplexor 45, Capacitance measuring circuit 70, and A to D convertor 80 do not correspond to the structure for "providing a click function in response to the removal and reappearance of said second maxima within a predetermined period of time."

The Analog multiplexor 45 selects which trace line or conductor will be read; the Capacitance measuring circuit 70 measures the capacitance on the selected line; and the A to D convertor 80 translates the measured analog value into a digital value. As discussed above, these elements are merely the building blocks of a capacitance touch sensor. In contrast, the structure that would detect the click function based on the stated conditions would analyze a series of scans (each being the measured and converted capacitance values) and recognize the function based on the stated conditions, and the structure that would provide the click function would be high-level software. The specification does not disclose the structure for doing this.

11. "means for calculating first and second centroids corresponding to said first and second fingers" (claim 30)

One of ordinary skill in the art in January 1996 would not have been able to identify the corresponding structure of "means for calculating first and second centroids corresponding to said first and second fingers" in the specification of the '352 patent because the specification fails to disclose the corresponding structure for performing this function.

"[M]eans for calculating first and second centroids corresponding to said first and second fingers" first appears in claim 30:

> 30. The sensor of claim 18 further comprising **means for calculating first and second centroids corresponding to said first and second fingers.**

'352 patent (Exh. B) at Claim 30 (emphasis added).

I understand that the parties agree that this is a means-plus-function term.

I understand that the parties agree that the claimed function is "calculating first and second centroids corresponding to said first and second fingers."

The function is clear – calculating **both** centroids of a first and second finger contact. While the specification discloses an algorithm to calculate a single centroid and recognizes the prior art problem associated with attempting to calculate two centroids simultaneously (a separate centroid for each of two fingers contacting the touch sensor), the specification fails to disclose an algorithm to calculate both centroids. The specification provides:

> In an exemplary embodiment, the Xcompute process then continues by calculating the centroid for the fingers detected, so long as the maxima exceed a threshold value. In accordance with the present invention, two approaches may be used in calculating centroid values. In a first implementation, only a single centroid value is calculated for the combination of one or more fingers. In this arrangement, it will be apparent that, when a second finger contacts the touchpad, the centroid 'jumps' laterally approximately to the midpoint of the two fingers. In a second implementation, a centroid value may be calculated for each maxima, yielding multiple centroid values when multiple fingers interact with the pad. **For purposes of clarity, the following description will be limited to the first implementation.**

Id. at 10:31-45.

Omitting the description of detecting both centroids does not provide "clarity." One of ordinary skill in the art in January 1996 understood that detecting two centroids did not involve simply applying the same algorithm used for detecting a single centroid twice. For example, in certain circumstances when two fingers contact the touch pad, it was difficult to determine whether a capacitance reading should be grouped as part of the first finger's contact area (first centroid) or the second finger's contact area (second centroid). This issue was known in the art as segmentation (the two contact areas had to be segmented). An algorithm was required to segment the two contact areas. And the specification fails to disclose the algorithm that would accomplish this.

I understand that Elan takes the position that the corresponding structure of "means for calculating first and second centroids corresponding to said first and second fingers" is: Analog multiplexor 45: Capacitance measuring circuit 70: A to D convertor 80, Microcontroller 60 and/or software, firmware or hardware performing the claimed function. For the same reasons described above, one of ordinary skill in the art would not have been able to ascertain what software, firmware or hardware is intended for performing this function, nor does the specification describe this.

III.

STATEMENT OF OPINIONS – '353 PATENT

A summary of my opinions regarding certain claim terms in the '353 patent is set forth below. I reserve the right to modify or supplement my opinions as appropriate.

A. ORDINARY SKILL IN THE ART

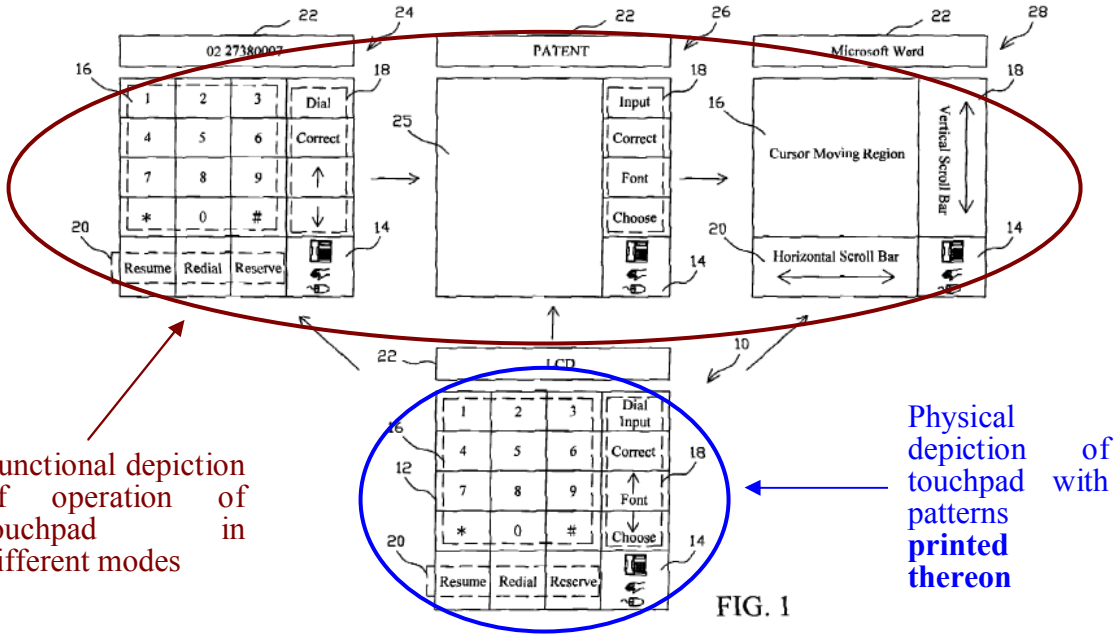
One of ordinary skill in the art relevant to the '353 patent in April 2003, the date the patent application was filed, would generally have the following education and experience: a Bachelors Degree in Computer Science, Electrical Engineering or Mathematics and two to three years experience working in the design of touch-sensitive input devices, or a Masters Degree or Ph.D in those field.

My opinion is based upon my personal knowledge and experience and my consideration of the following factors: (1) the levels of education and experience of persons of skill working in the field; (2) the sophistication of the technology; (3) prior art; and (4) the rapidity with which innovations are made in this field.

B. THE '353 PATENT

The '353 patent describes a capacitive touchpad that can function in two of three different modes: key, handwriting, and mouse modes. '353 patent (Exh. K) at Abstract, 2:1-17, 2: 2:26-28, Fig. 1. The touchpad of the claimed invention comprises "a panel for touch inputting" with patterns printed on the panel that represent a mode switch to switch between different modes and to represent different operations in these modes. *Id.* When the touchpad operates in those modes, certain regions on the touchpad respond to a user's touch differently, depending on which mode is active. *Id.* More specifically, in key mode, "the key patterns among the printed pattern simulate a keyboard," whereas in "handwriting mode, the handwriting region among the defined regions serves to [provide] handwriting input" and in "mouse mode, the defined regions provide a cursor moving region and horizontal and vertical scroll bars for input operation." *Id.*

As shown below, Figure 1 is a schematic diagram of a capacitive touchpad according to the present invention of the '353 patent and its key, handwriting and mouse modes:



Id.

FIG. 1

1. "a first pattern on said panel for representing a mode switch to switch said touchpad between a key mode and a handwriting mode" / "a first pattern on said panel for representing a mode switch to switch said touchpad between a key mode and a mouse mode" / "a first pattern on said panel for representing a mode switch to switch said touchpad between a mouse mode and a handwriting mode" (claims 1, 4, 7, and 10)

Because these claim limitations are similar, and have similar meanings, I will address them together. In short, one of ordinary skill in the art in April 2003 would have understood the term "a first pattern on said panel for representing a mode switch to switch said touchpad between [a first mode] and [a second mode]" to mean "a single graphic printed on said panel representing a mode switch that switches from [a first mode] to [a second mode] and from [a second mode] to [a first mode]."[3]

[3] More specifically, one of ordinary skill in the art in April 2003 would have understood the term "a first pattern on said panel for representing a mode switch to switch said touchpad between a key mode and a handwriting mode" in the claims of the '353 patent to mean: "a single graphic printed on said panel representing a mode switch that switches from key to handwriting mode and from handwriting to key mode"; "a first pattern on said panel for representing a mode switch to switch said touchpad between a key mode and a mouse mode" to mean "a single graphic printed on said panel representing a mode switch that switches from key to mouse mode and from mouse to key mode"; and "a first pattern on said panel for representing a mode switch to switch said touchpad between a mouse mode and a handwriting mode" to mean "a single graphic printed on said panel representing a mode switch that switches from mouse to handwriting mode and from handwriting to mouse mode."

"[A] first pattern on said panel for representing a mode switch to switch said touchpad between a key mode and a handwriting mode" first appears in claim 1:

> 1. A capacitive touchpad integrated with key and handwriting functions, comprising:
>
> a panel for touch inputting;
>
> **a first pattern on said panel for representing a mode switch to switch said touchpad between a key mode and a handwriting mode;**
>
> a plurality of regions defined on said panel; and
>
> a plurality of second patterns on said plurality of regions for operation in said key and handwriting modes;
>
> wherein said panel comprises:
>
> a substrate selected from the group consisting of PCB, membrane and transparent plate;
>
> a conductor wiring on said substrate; and
>
> an insulator covered on said conductor wiring.

'353 patent (Exh. K) at Claim 1 (emphasis added). Parallel limitations appear in Claims 4, 7 and 10.

A person of ordinary skill in the art in 2003 would have understood the term "a first pattern on said panel for representing a mode switch to switch said touchpad between [a first mode] and [a second mode]" to mean "a single graphic printed on said panel representing a mode switch that switches from [a first mode] to [a second mode] and from [a second mode] to [a first mode]" for several reasons. At the outset, the language of the claims themselves confirms that "a first pattern on said panel" is "**on** said panel" for touch inputting, and that in the context of the '353 patent, this "pattern" is a graphic. Moreover, the specification states repeatedly and consistently that the patterns on the panel for touch inputting are printed on it. For example, the Summary of the Invention states that "[t]he panel of the present touchpad is defined into several regions with **plenty of patterns printed thereon** for representing the interfaces corresponding to the operation modes." *Id.* at 2:9-12 (emphasis added). The Abstract describes the regions of the panel as having "several patterns printed thereon for the operation modes thereby." *Id.* at Abstract; *see also id.* at 3:39-41. The specification does not describe or envision any method for patterns to be displayed for touch inputting besides printing those patterns on the touchpad.

Consistent with this, Figure 1 of the '353 patent depicts a schematic diagram of a capactive touchpad according to the claimed invention wherein patterns are printed permanently on the panel for touch inputting. More specifically, a person of ordinary skill in the art in 2003 would have understood the bottom figure of Figure 1 to depict what the panel for touch inputting would look like at all times, with patterns for operation in all three data input modes printed thereon. This is why, for example, the bottom figure shows a defined region with both the word "Dial" and the word "Input" on it. In key mode, a user will use that button to Dial, and in handwriting mode, a person will use that button to Input. Similarly, the bottom figure shows buttons labeled like those of a typical telephone keypad, and also shows a dashed box surrounding all twelve of those buttons. This is because, in key mode, the telephone buttons are operative, while in mouse mode, the dashed box represents that the buttons have become inoperative, and the entire box is a cursor moving region. *See id.* at 2:60-3:13. Thus, the top figures of Figure 1, depict what the user understands him or herself to be interacting with in each of the three modes, while the bottom figure depicts what the panel for touch inputting actually looks like at all times--the patterns that are printed thereon.

The understanding of a person of ordinary skill in the art would be further confirmed by the fact that the specification and claims of the '353 patent specifically define the claimed invention as relating to a "touchpad." For example, the Background of the Invention refers only to touchpads, and describes a touchpad as "a simple, easy and cheap pointing device, such as those in laptop computer systems for mouse function." *Id.* at 1:14-16. The Summary of the Invention states: "An object of the present invention is to propose a capacitive **touchpad** integrated with key and handwriting functions." *Id.* at 2:3-5 (emphasis added). In addition, in providing the detailed description of the invention, the specification explains that the apparatus includes a separate LCD screen for display of the data input to the touch panel—a feature that would make no sense if the panel for touch inputting were a touchscreen.[4] *See id.* at Fig. 1; 2:41-48; 3:1-3; 3:11-13.

[4] This point is fully consistent with the disclosure in the patent of a transparent panel. The '353 patent discloses "a case where the panel 12 of the capacitive touchpad is transparent, such as glass, and a backlight 32 is provided for the panel 12 from the backside of the panel 12 to

One of ordinary skill in the art in 2003 would have understood that in the context of the '353 patent, there was a distinction between touchpads, which receive input in order to display data on a separate screen, and touchscreens, which incorporate a display beneath a touch sensitive area. *See* The New Penguin Dictionary of Computing (2001) (Exh. L) (defining "touchpad" as a "pointing device widely used in place of a mouse on laptop and notebook computers … on which movement of the user's finger causes a corresponding movement of the on-screen pointer," and defining "touch screen" as "[a] computer display screen that doubles as an input device by enabling the user to select displayed items by touching them with a finger"); *see also* U.S. Patent Application, Pub. No. 2004/0119700, filed Dec. 20, 2002 (Exh. M) (describing an invention that comprises a "touch pad or touch screen" and stating that "a touch screen may be used which embodies the touch pad and the display"). Specifically, by reference to a "touchpad" instead of a "touch screen," a person of ordinary skill in the art reading the '353 patent would understand the claim language to require that any pattern associated with operation of the panel for touch inputting must be printed on that panel.

The file history of the '353 patent also confirms this interpretation. The file history highlights Applicant's understanding of the difference between the term "touchpad" and the term "touch screen." In its October 12, 2006 Reply to Office Action (Exh. N, '353 File History), Applicant discusses the disclosure of a "touchpad or screen" in a piece of prior art. *See id.* at 14. However, when referring to the invention of the '353 patent in that document, Applicant only uses the term "touchpad." *See id*. at 13 ("Each of the remaining independent Claims 1, 11, 21, and 31 is also now amended to now more clearly recite among its combination of features a panel for touch input on which a mode switch is represented for switching the touchpad's configuration between various selective modes such as a key mode and a handwriting mode.") Thus, the file history makes clear that Applicant, while aware of the difference between a touchpad and a touch screen, chose to describe the invention as a touchpad. This indicates that,

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improve the words or drawings displayed thereon." *Id*. at 3:32-36. After reviewing this statement and Figure 3, a person of ordinary skill in the art in 2003 would understand this disclosure to mean that a light source may be placed behind a transparent panel for touch inputting, so that the patterns printed on the panel may be better displayed.

since the invention does not involve a screen beneath the panel for touch inputting, patterns on the panel must be printed thereon.

I understand that Elan has proposed a construction of these limitations as any "information on the panel, visible to the user, indicating where the user can touch to change modes." This construction is inconsistent with the understanding of a person of ordinary skill in the art for three reasons. First, it suggests that the first pattern printed on the panel for touch inputting can be any "information on the panel." This is inconsistent with the claim language that requires a "first pattern on said panel for representing a mode switch to switch said touchpad between" modes, and the specification's disclosure that this mode switch is a single graphic (i.e., first pattern) representing this mode switch. *See* '353 patent (Exh. K) at claims 1, 4, 7, and 10; Fig. 1; 2:43-45 ("a mode switch pattern 14 on the panel 12 to switch the capacitive touchpad 10 to key, handwriting or mouse modes"). Second, as discussed above, Elan's proposed construction disregards the understanding of one of ordinary skill in the art that the first pattern representing a mode switch is printed on the panel for touch inputting. Third, Elan's proposed construction disregards the understanding of one of ordinary skill in the art that the first pattern representing a mode switch must switch from one mode to another and back, not just allow a user to change modes once and then remain stuck in that latter mode. *See id.*

2. "a plurality of regions defined on said panel (claims 1, 4, 7, and 10)

One of ordinary skill in the art in April 2003 would have understood the term "a plurality of regions defined on said panel" to mean "two or more specific regions of the touch inputting panel."

"[A] plurality of regions defined on said panel" first appears in claim 1:

> 1. A capacitive touchpad integrated with key and handwriting functions, comprising:
>
> a panel for touch inputting;
>
> a first pattern on said panel for representing a mode switch to switch said touchpad between a key mode and a handwriting mode;
>
> **a plurality of regions defined on said panel;** and
>
> a plurality of second patterns on said plurality of regions for operation in said key and handwriting modes;
>
> wherein said panel comprises:

a substrate selected from the group consisting of PCB, membrane and transparent plate;

a conductor wiring on said substrate; and

an insulator covered on said conductor wiring.

'353 patent (Exh. K) at Claim 1 (emphasis added). The same limitation appears in Claims 4, 7 and 10.

A person of ordinary skill in the art in 2003 would have understood the limitation "a plurality of regions defined on said panel" to mean "two or more specific regions of the touch inputting panel." At the outset, this claim language itself confirms that "a plurality of regions defined on said panel" requires two more regions of the touch inputting panel because "plurality of regions" would be understood to require "two or more regions," and "said panel" would be understood to refer to the panel for touch inputting.

In addition, one of ordinary skill in the art would understanding that "a plurality of regions **defined on** said panel" requires that the regions are "specific regions of" the panel. This meaning is supported by the specification. For example, both Figures 1 and 2 of the '353 patent depict touchpads with a plurality of different region. These regions are "defined" and separated from each other by the lines printed between them. As explained above, these regions do not move or change. Moreover, although these regions, as described by the specification, provide different functionality in different modes, they are present in and operative in each mode. *See id*. at 2:9-12; 2:41-48; 2:60-3:18. Consistent with this, the file history of the '353 patent illustrates that a person of ordinary skill in the art in 2003 would have understood "a plurality of regions defined on said panel" to mean "two or more specific regions of the touch inputting panel," as proposed by Apple. The file history explains that the "defined areas" of the touchpad are "specifically defined area[s] on the panel" or "selectively defined on the panel." *See, e.g.,* March 12, 2007 Reply to Office Action (Exh. N) at 14, 17.

I understand that Elan has proposed a construction of this limitation as any "visual information on the panel that delineates 'virtual regions' to convey to the user where to touch." Although I do not disagree that a person of ordinary skill in the art would understand the "a plurality of regions defined on said panel" limitation to require visual information on the panel to

delineate virtual regions where the user can touch, Elan's proposed construction disregards important aspects of the claim limitation as it would be understood by a person of ordinary skill in the art. Specifically, Elan's proposed construction fails to give meaning to the requirements that the visual information that delineates virtual regions on the touch panel be defined into two or more specific regions, as set forth above.

3. "a plurality of second patterns on said plurality of regions for operation in said key and handwriting modes" / "a plurality of second patterns on said plurality of regions for operation in said key and mouse modes" / "a plurality of second patterns on said plurality of regions for operation in said mouse and handwriting modes" (claims 1, 4, 7, and 10)

Because these claim limitations are similar, and have similar meanings, I will address them together. In short, one of ordinary skill in the art in April 2003 would have understood the term "a plurality of second patterns on said plurality of regions for operation in said [first] and [second] modes" to mean "two or more graphics that are printed on the specific regions and are present in and perform operations in both [first] and [second] modes."[5]

"[A] plurality of second patterns on said plurality of regions for operation in said key and handwriting modes" first appears in claim 1:

> 1. A capacitive touchpad integrated with key and handwriting functions, comprising:
>
> a panel for touch inputting;
>
> a first pattern on said panel for representing a mode switch to switch said touchpad between a key mode and a handwriting mode;
>
> a plurality of regions defined on said panel; and
>
> **a plurality of second patterns on said plurality of regions for operation in said key and handwriting modes;**
>
> wherein said panel comprises:

[5] More specifically, One of ordinary skill in the art in April 2003 would have understood the term "a plurality of second patterns on said plurality of regions for operation in said key and handwriting modes" to mean "two or more graphics that are printed on the specific regions and are present in and perform operations in both key and handwriting modes"; the term "a plurality of second patterns on said plurality of regions for operation in said key and mouse modes" to mean "two or more graphics that are printed on the specific regions and are present in and perform operations in both key and mouse modes"; and the term "a plurality of second patterns on said plurality of regions for operation in said mouse and handwriting modes" to mean "two or more graphics that are printed on the specific regions and are present in and perform operations in both mouse and handwriting modes."

a substrate selected from the group consisting of PCB, membrane and transparent plate;

a conductor wiring on said substrate; and

an insulator covered on said conductor wiring.

'353 patent (Exh. K) at Claim 1 (emphasis added). Parallel limitations appear in Claims 4, 7 and 10.

One of ordinary skill in the art would have understood the limitation "a plurality of second patterns on said plurality of regions for operation in said [first] and [second] modes" to have two basic portions, each reflecting separate and important requirements of the claim: (1) "a plurality of second patterns on said plurality of regions"; and (2) a plurality of second patterns "for operation in said [first] and [second] modes."

As to the first portion of the claim limitation, one of ordinary skill in the art would have understood a "a plurality of second patterns on said plurality of regions" to mean "two or more graphics that are printed on the specific regions." As explained above in the context of the "first pattern" claim limitations, the claim language, the specification, and the file history of the '353 patent would all indicate to one of ordinary skill in the art in 2003 that patterns on the panel for touch inputting were printed on the panel.

As to the second portion, the claim limitation, one of ordinary skill in the art would have understood a plurality of second patterns "for operation in said [first] and [second] modes" to mean "two or more graphics that are present in and perform operations in both [first] and [second] mode." At the outset, the claim language itself suggests to one of ordinary skill in the art that patterns "for operation in said [first] and [second] modes" are patterns that are operable in both the first and second modes. Likewise, the specification makes clear that the claimed second patterns are present in and perform operations in both a first and a second mode. For example, the bottom figure of Figure 1 of the '353 patent discloses a region with the pattern "Dial/Input" printed on it. This pattern is present in both the key and handwriting modes because it is printed on the touch panel and it is operative in both modes. In key mode, the pattern is operative as a "Dial" button, and in handwriting mode, the pattern is operative as an "Input" button. Similarly, Figure 1 depicts a pattern that comprises an up-arrow and the word "Font." That pattern is

present in and operative in both key and handwriting modes. The same can be said for the pattern that comprises a down-arrow and the word "Choose." *See also id*. at 2:60-3:22.

I understand that Elan has proposed a construction of these limitation as any "visual information on the panel that delineates 'virtual regions' to convey to the user where to touch to enter alpha numeric data in key mode or enter mouse data in mouse mode," with corresponding data entry for each of the three possible modes. This construction is inconsistent with the understanding of a person of ordinary skill in the art for several reasons. First, it suggests that the plurality of second patterns on the panel for touch inputting can be any "visual information on the panel," and not one or more graphics printed on specific regions of the panel, as required by the claims, specification, and file history for the reasons set forth above. Second, Elan's proposed construction disregards the understanding of one of ordinary skill in the art that the claimed second patterns are for operation in two modes.

IV.

STATEMENT OF OPINIONS – '218 PATENT

A summary of my opinions regarding certain claim terms in the '218 patent is set forth below. I reserve the right to modify or supplement my opinions as appropriate.

A. ORDINARY SKILL IN THE ART

One of ordinary skill in the art relevant to the '218 patent in 1995, the date the patent application was filed, would generally have the following education and experience: a Bachelors Degree in Computer Science, Electrical Engineering or Mathematics and three to five years experience working in the area of signal processing or the design of touch-sensitive input devices, or a Masters Degree or Ph.D and one to three years of experience in those fields.

My opinion is based upon my personal knowledge and experience and my consideration of the following factors: (1) the levels of education and experience of persons of skill working in the field; (2) the sophistication of the technology; (3) prior art; and (4) the rapidity with which innovations are made in this field.

B. THE '218 PATENT

The '218 patent relates to detecting contacts on a touchpad to generate button

values simulating the button state of a mechanical button switch. '218 patent (Exh. O) at Abstract, 2:44-61. Generally speaking, this allows a user to perform certain operations with only a touchpad, whereas typically these operations would require both a touchpad and a mechanical button (such operations as, for example, a double click and click-and-drag).

To accomplish this, the '218 patent describes detecting both contact and gap intervals. A contact interval refers to the temporal duration of the user's contact with the touchpad, and a gap interval refers to the temporal duration between contact intervals. The '218 patent describes and claims a technique that analyzes these contact and gap intervals to distinguish among various control operations based on the duration and sequence of the intervals. For example, contact and gap intervals can be analyzed to distinguish among a single click, double click, click-and-drag, and multi-click-and-drag operations. *Id*. at Abstract, 2:44-61.

Certain embodiments and claims are directed to detecting a "sticky drag" operation. *Id*. at 5:57-7:13. The '218 patent teaches that a "sticky drag" can be invoked by detecting a shot contact interval, followed by a short gap interval, which is then followed by a long contact interval. *See id.* This enables a user to drag items around on a display without using a mechanical button.

C. THE DISPUTED TERMS OF THE '218 PATENT

1. "contact intervals" and "subsequent contact intervals" (claims 1, 2, 3, and 5)

One of ordinary skill in the art in 1995 would have understood the term "contact intervals" in the claims of the '218 patent to mean "temporal duration of the user's contacts with the touch-sensitive input device."

"[C]ontact intervals" first appears in claim 1:

> 1. A method of operating a touch-sensitive input device of a computer system comprising the steps of:
>
> a) detecting **contact intervals** when a user contacts the touch-sensitive input device;
>
> b) detecting gap intervals between subsequent **contact intervals**; and
>
> c) distinguishing between a first cursor control operation, a second cursor control operation and a third cursor control operation based on the duration of said **contact** and gap **intervals**; and

> d) reporting one of said first, second or third cursor control operations in accordance with said step of distinguishing.

Id. at Claim 1 (emphasis added). The term is used similarly in Claims 2, 3, and 5 of the '218 patent.

One of ordinary skill in the art would look to the patent to understand the meaning of the term "contact intervals." A review of the language of the claims and the specification of the '218 patent would have taught a person of ordinary skill in the art in 1995 that "contact intervals," as used in the '218 patent, mean "temporal duration of the user's contacts with the touch-sensitive input device." The language of the claim itself explains that contact intervals occur "when a user contacts the touch-sensitive input device." *Id*. at Claims 1, 5. Confirming this, the '218 patent also uses the terms "temporal duration of the user's contacts with the touch-sensitive input device" and "duration of the contact intervals" interchangeably in several places throughout the specification. *See, e.g., id.* at 4:33-41 ("[A]n operator can . . . change the value of a ButtonState variable . . . **based on the temporal duration of the user's contacts with this touch-sensitive input device (i.e., based on the duration of the contact intervals)** and the lapse of time between subsequent contact intervals . . . ."") (emphasis added); 5:31-36 (stating that button values are determined **"based on the duration of an operator's contacts with this touch-sensitive input device and the duration of gap intervals** . . . .") (emphasis added); *see also id.* at 7:51-57, 9:66-10:5. Because of the clear statements in the specification about the meaning of the term "contact intervals," one of ordinary skill in the art in 1995 would have understood the term to mean "temporal duration of the user's contacts with the touch-sensitive input device."

I understand that Elan has argued that "contact intervals" means "an amount of time during which there is a continuous user contact with the touch pad." While I do not believe there is a significant substantive difference between the parties' construction, it is my opinion that the construction Apple has proposed is more representative of the meaning that would be attributed to this term by a person of ordinary skill in the art because it is much more closely connected to the patent claims and specification. In addition, Elan's proposed definition appears

to attempt to limit the claims in ways not supported by the claim language or patent disclosure. For example, although both the claims and the specification of the '218 patent repeatedly refer to contact intervals relating to a "touch-sensitive input device," Elan's proposed construction limits the claim to a "touch pad," inconsistent with the understanding of a person of ordinary skill in the art.

2. "cursor control operations" (claims 1 and 5)

One of ordinary skill in the art in January 1995 would have understood the term "cursor control operations" in the claims of the '218 patent to mean "operations by a cursor controller such as a drag, single-click and multiple-click."

"[C]ursor control operations" appears in Claims 1 and 5 or the '218 patent, which are reproduced below:

> 1. A method of operating a touch-sensitive input device of a computer system comprising the steps of:
>
> a) detecting contact intervals when a user contacts the touch-sensitive input device;
>
> b) detecting gap intervals between subsequent contact intervals; and
>
> c) distinguishing between a first **cursor control operation**, a second **cursor control operation** and a third **cursor control operation** based on the duration of said contact and gap intervals; and
>
> d) reporting one of said first, second or third **cursor control operations** in accordance with said step of distinguishing.

'218 patent (Exh. O) at Claim 1 (emphasis added).

> 5. An apparatus for operating a touch-sensitive input device of a computer system comprising:
>
> a) means for detecting contact intervals when a user contacts the touch-sensitive input device;
>
> b) means for detecting gap intervals between subsequent contact intervals; and
>
> c) means for distinguishing between a first **cursor control operation**, a second **cursor control operation** and a third **cursor control operation** based on the duration of said contact and gap intervals and for reporting one of said first second or third **cursor control operations** in accordance therewith.

Id. at Claim 5 (emphasis added).

A person of ordinary skill in the art in 1995 would have understood that the term "cursor control operations," as used in the '218 patent, means cursor controller (mouse) operations such as click, multiple-click, drag, and click-and-drag. It would have been clear to a

person of ordinary skill in the art that the term "cursor control operations" could not be limited solely to cursor tracking, as Elan proposes. This understanding is supported both by the language of the claims and the specification.

Claims 1 and 5 recite distinguishing between three different cursor control operations "based on the duration of . . . contact and gap intervals." Thus, the language of Claims 1 and 5 requires that three different cursor control operations be possible, and that the three different cursor control operations be distinguishable by differences in contact and gap intervals. "Cursor control operations" cannot simply mean a "cursor tracking operation," because the specification does not disclose three different cursor tracking operations that are distinguishable by differences in their contact and gap intervals. Instead, the specification discloses only one cursor tracking operation, which is distinguishable from a click operation because a cursor tracking operation has a longer contact interval than a click operation. *See id.* at 6:9-17. Thus, the language of the claims viewed in the context of the specification makes clear that "cursor control operations" cannot be limited to "cursor tracking operations," and must include other operations of a cursor controller, such as click, multi-click, and drag.

This understanding is supported by the remaining disclosure in the specification. The invention of the '218 patent, as stated in the specification, was "[a] method and an apparatus for contacting a touch-sensitive cursor-controlling input device to generate button values simulating the button state of a mechanical button switch." *Id.* at Abstract. The purpose of this invention was to "enable[] an operator to perform with a single touch-sensitive input device numerous control operations, such as cursor manipulation, click, multi-click, drag, click-and-drag, and multi-click-and-drag operations." *Id.*. In other words, the purpose of the invention was to enable a user of a touch sensitive input device to use it, not only as a cursor tracking device, but also as a mouse button. Moreover, the specification repeatedly provides that that "cursor manipulation, click, multi-click, drag, click-and-drag, and multi-click-and-drag operations" are all "control operations." *See, e.g., id.* at Abstract, 2:56-61; 10:9-13. Thus, cursor manipulation or tracking is only one of several cursor control operations that the invention distinguishes between based on contact and gap intervals.

The file history also directly supports this understanding. In the December 26, 1996 Response to Office Action (Exh. P, '218 File History), Applicant specifically explained the meaning of "cursor control operation" in the context of claim 1 by saying: "claim 1 recites steps of distinguishing between a first cursor control operation (e.g., a drag), a second cursor control operation (e.g., a single-click) and a third cursor control operation (e.g., a multiple-click)." *Id*. at p. 15. Thus, the term "cursor control operation," as explained by Applicant, must include within its scope at least the operations of drag, single-click, and multiple-click—none of which are limited to cursor tracking operations. Accordingly, one of ordinary skill in the art in 1995 would have understood "cursor control operations" to mean "operations by a cursor controller such as a drag, single-click, and multiple-click," and not cursor tracking operations as Elan proposes.

3. "means for detecting contact intervals" and "means for detecting gap intervals" (claim 5)

"[M]eans for detecting contact intervals" and "means for detecting gap intervals" appear in Claim 5 of the '218 patent, which is below. Because the terms are similar, I deal with them together.

> 5. An apparatus for operating a touch-sensitive input device of a computer system comprising:
>
> a) **means for detecting contact intervals** when a user contacts the touch-sensitive input device;
>
> b) **means for detecting gap intervals** between subsequent contact intervals; and
>
> c) means for distinguishing between a first cursor control operation, a second cursor control operation and a third cursor control operation based on the duration of said contact and gap intervals and for reporting one of said first second or third cursor control operations in accordance therewith.

'218 patent (Exh. O) at Claim 5 (emphasis added).

I understand that the parties agree that these terms are means-plus-function terms.

I understand that the parties also agree that the claimed function for the "means for detecting contact intervals" is "detecting contact intervals," and that the claimed function for the "means for detecting gap intervals" is "detecting gap intervals."

One of ordinary skill in the art would have understood that the structure from the specification corresponding to the function "detecting contact intervals" and "detecting gap

intervals" is a count up or count down timer and equivalents thereof. As explained above, "contact intervals," as used in the '218 patent, means "temporal duration of the user's contacts with the touch-sensitive input device." Accordingly the structure disclosed by the specification must perform the function of "detecting the temporal duration of the user's contacts with the touch-sensitive input device." The specification describes count up or count down timers as performing that function. For example, the specification discloses that button values can be generated based on the duration of the contact and gap intervals by "(1) initiating timers at the initiation or termination of a contact interval, and (2) then determining whether the user terminates his contact or initiates another contact prior to the expiration of these timers." *Id.* at 7:51-62. The specification then states that "[t]hese timers can be either count up or count down timers, which respectively expire when they reach a predetermined expiration value by counting up or by counting down." *Id.* at 7:62-67. Thus, it is the count-up or count-down timers that detect the duration of a user's contact with the touch-sensitive input device. *See id.* at 8:17-52 (describing the operations of a tap timer and a latent press timer in response to contact with a touch-sensitive device); 10:50-56 (describing the variable SampleTime, which "is used to determine the time that elapses between the time that the user initiates a contact with the touchpad . . . and the time the user terminates this contact with the touchpad . . . ."). No other structure is disclosed as detecting duration of intervals of user contacts with the touchpad or gaps between such intervals.

I understand that Elan proposes that the corresponding structure for "detecting contact intervals" and "detecting gap intervals" be construed as "electrical balance measurement circuit 215, balance ratio determination circuit 220, microcontroller 225, and firmware or host computer and software." As with Elan's proposed corresponding structure for the '352 patent, Elan's proposed corresponding structure again does not comport with the understanding of one of ordinary skill in the art as to the specification's disclosure of corresponding structure for detecting contact and gap intervals. One of ordinary skill in the art would not have been able to ascertain what firmware or host computer or software is intended for performing this function, nor does the specification describe this. Moreover, Elan's identification of "electrical balance measurement

circuit 215, balance ratio determination circuit 220 and microcontroller 225" as corresponding structure is again tantamount to identification of the hardware that detects touches on the touch pad. While these elements are necessary to measure capacitance -- and are generally necessary for a capacitance touch pad to operate -- these elements do not provide an indication contact and gap intervals for touches to the touch sensor. These elements are merely the building blocks of a capacitance touch sensor. It is the count up and count down timers disclosed in the specification that perform the function of detecting the contact and gap intervals.

4. "means for distinguishing between a first cursor control operation, a second cursor control operation and a third cursor control operation based on the duration of said contact and gap intervals and for reporting one of said first second or third cursor control operations" (claim 5)

"[M]eans for distinguishing between a first cursor control operation, a second cursor control operation and a third cursor control operation based on the duration of said contact and gap intervals and for reporting one of said first second or third cursor control operations" appears in Claim 5 of the '218 patent, which is below.

> 5. An apparatus for operating a touch-sensitive input device of a computer system comprising:
>
> a) means for detecting contact intervals when a user contacts the touch-sensitive input device;
>
> b) means for detecting gap intervals between subsequent contact intervals; and
>
> c) **means for distinguishing between a first cursor control operation, a second cursor control operation and a third cursor control operation based on the duration of said contact and gap intervals and for reporting one of said first second or third cursor control operations** in accordance therewith.

'218 patent (Exh. O) at Claim 5 (emphasis added).

I understand that the parties agree that this term is a mean-plus-function term.

I understand that the parties also agree that the claimed function for the "means for distinguishing between a first cursor control operation, a second cursor control operation and a third cursor control operation based on the duration of said contact and gap intervals and for reporting one of said first second or third cursor control operations" limitation is "distinguishing between a first cursor control operation, a second cursor control operation and a third cursor control operation based on the duration of said contact and gap intervals and for reporting one of

said first second or third cursor control operations."

One of ordinary skill in the art would have understood that the structure described in the specification for performing the function of "distinguishing between a first cursor control operation, a second cursor control operation and a third cursor control operation based on the duration of said contact and gap intervals and for reporting one of said first second or third cursor control operations" is logic implemented in software, firmware, and/or hardware that considers contact and gap intervals to distinguish between cursor control operations, and supplies the data to the computer system as described in Fig. 1, Fig. 4, Fig. 5, Fig. 6, Fig. 7, Fig. 8, Fig. 9, Fig. 11, 4:11-12, 4:24-30, 5:2-5, 5:46-56, 6:14-17, 6:50-55, 6:63-66, 8:23-30, 8:34-37, 9:10-13, 9:63-10:13, 10:31-36, and/or 11:25-29, or equivalents thereof. A person of ordinary skill in the art would understand that the distinguishing and reporting function would be performed in software, hardware, or firmware, according to the specific algorithms described in these passages from the specification. One of ordinary skill in the art would understand that each of these algorithms describes how the patentees contemplated that the recited function be performed.

I understand that Elan has proposed that the corresponding structure is "microcontroller 225 and firmware or host computer and software." As above, one of ordinary skill in the art would not have been able to ascertain what firmware or host computer or software is intended for performing this function, nor does the specification describe this. Also, this corresponding structure would not allow one of ordinary skill in the art to perform the claimed function. A generic microcontroller with some undefined firmware or undisclosed host computer and software would not distinguish between a cursor control movements and report control operations. A person of ordinary skill in the art would understand that it is the specific algorithms described in the specification (implemented as logic in software, firmware, and/or hardware) that would enable persons of ordinary skill to use contact and gap intervals to distinguish between cursor control operations, and supply the data to the computer system as claimed.

V.

STATEMENT OF OPINIONS – '659 PATENT

A summary of my opinions regarding certain claim terms in the '659 patent is set

forth below. I reserve the right to modify or supplement my opinions as appropriate.

A. ORDINARY SKILL IN THE ART

One of ordinary skill in the art relevant to the '659 patent in November 2003, the date the patent application was filed, a Bachelors Degree in Computer Science, Electrical Engineering or Mathematics and three to five years experience working in the area of signal processing or the design of touch-sensitive input devices, or a Masters Degree or Ph.D and one to three years of experience in those fields.

My opinion is based upon my personal knowledge and experience and my consideration of the following factors: (1) the levels of education and experience of persons of skill working in the field; (2) the sophistication of the technology; (3) prior art; and (4) the rapidity with which innovations are made in this field.

B. THE '659 PATENT

The '659 patent generally relates to a touchpad assembly comprising an intelligent controller that performs both a translation and filtering step. *See, e.g.,* '659 patent (Exh. Q) at 3:23-43. These steps can significantly reduce the amount of data that the touchpad assembly sends to the host device and thus enhance performance. *See, e.g., id.* at 6:13-17.

Touchpads are made from many sensors. These sensors are configured into a native coordinate system (the physical sensor coordinates) so that the controller is able to report the coordinates of where a user actuated the touchpad to a host device. *See, e.g., id.* at 5:41-43. Applications that use touchpads for inputs, however, often do not require the level of precision or granularity that these native sensor coordinates provide. Accordingly, the '659 patent teaches translating the native sensor coordinates into "logical device units" that represent areas of the touchpad that can be actuated by a user (e.g., a virtual actuation zone). *See, e.g., id.* at 7:13-21.

The '659 patent further teaches filtering redundant or non-essential data. For example, the '659 patent teaches methods to enable the controller to report only actual events (versus noise). *See, e.g., id.* at 7:59-8:3. These steps work together to reduce the data sent to the host device. For example, when a user's finger is on the touchpad and moving slightly, but is still on the same logical device unit, the controller needn't report a change because the user is still

actuating the same logical device unit. As one would expect, the translation and filtering steps improves system performance and battery life—the system is not constantly bombarded with values that are merely noise.

C. TERMS OF THE '659 PATENT

1. "sensors configured to map the touchpad surface into native sensor coordinates" (claim 1)

One of ordinary skill in the art in November 2003 would have understood the term "sensors configured to map the touchpad surface into native sensor coordinates" in the claims of the '659 patent to mean: "sensors configured to map the touchpad surface into the sensor coordinates of the touchpad."

"[S]ensors configured to map the touchpad surface into native sensor coordinates" first appears in claim 1:

> 1. A touch pad assembly, comprising:
>
> a touch pad having a surface and one or more **sensors configured to map the touch pad surface into native sensor coordinates**; and
>
> a controller configured to
>
> define one or more logical device units associated with the surface of the touch pad,
>
> receive from the one or more sensors native values associated with the native sensor coordinates,
>
> adjust the native values associated with the native sensor coordinates into new values associated with the logical device units and
>
> report the new values to a host device, the logical device units associated with areas of the touch pad that can be actuated by a user,
>
> the controller configured to pass the native values through a filtering process before reporting the new values to the host device, thereby reducing an amount of data sent to the host.

'659 patent (Exh. Q) at Claim 1 (emphasis added).

One of ordinary skill in the art in 2003 would have understood this limitation to define the "touch pad" of claim 1. This "touch pad" has "sensors configured to map the touchpad surface into the native sensor coordinates of the touchpad." '659 patent at Claim 1. One of ordinary skill in the art would have understood that sensors of touch pads generally are configured to map the touch pad into a coordinate system. Here, the claim recites that these

sensors are configured to map the touch pad surface into a specific coordinate system, namely, into "native sensor coordinates." *See id.* To one of ordinary skill in the art, this would have been understood to mean that the sensors are configured to map the touch pad into the physical—or native—coordinates of the sensors. In other words, the sensors are configured to provide the physical coordinates of the sensors, or more simply, "the sensor coordinates of a touchpad." Accordingly, this term would have been understood by one of ordinary skill in the art to mean "sensors configured to map the touchpad surface into the sensor coordinates of the touchpad."

Further support for this interpretation is found in the claim limitations "define one or more logical device units associated with the surface of the touch pad" and "adjust the native values associated with the native sensor coordinates into new values associated with the logical device units." Claim 1 of the '659 Patent. One of ordinary skill in the art would have understood these steps as translating physical coordinates into logical values or coordinates. And these physical coordinates would have been understood by one of ordinary skill in the art as the "sensor coordinates of a touchpad."

The specification also supports this interpretation insofar as it teaches that the touch pads, as claimed in Claim 1, include sensors that map the touch pad into the native or physical sensor coordinates, or more simply put, into the "sensor coordinates of a touchpad":

> "The sensors of the touch pad 36 are configured produce signals associated with the absolute position of an object on or near the touch pad 36. **In most cases, the sensors of the touch pad 36 map the touch pad plane into native or physical sensor coordinates 40."**

5:42-45 (emphasis added).

Likewise, the Background of the Invention provides that touch pads generally include sensors that are configured to map the touch pad into a coordinate system:

> "To elaborate further, touch pads generally include one or more sensors for detecting the proximity of the finger thereto. The sensors are generally dispersed about the touch pad with each sensor representing an x, y position. In most cases, the sensors are arranged in a grid of columns and rows. Distinct x and y position signals, which control the x, y movement of a pointer device on the display screen, are thus generated when a finger is moved across the grid of sensors within the touch pad. For brevity sake, the remaining discussion will be held to the discussion of capacitive sensing technologies. It should be noted, however, that the other technologies have similar features."

Id. at 2:29-40.

Because Claim 1 recites that the touchpad surface "is configured to map the touch pad surface into **native sensor coordinates**," one of ordinary skill in the art would have understood that Claim 1 requires that sensors are configured to map the sensors into a specific coordinate system, namely, "the sensor coordinates of a touchpad."

I understand that Elan proposes that "sensors configured to map the touchpad surface into native sensor coordinates" be construed to mean "sensors configured to produce signals indicating native sensor coordinates." I disagree with this. One of ordinary skill in the art would have understood that sensors generally do not produce signals that "indicate[] native sensor coordinates" or produce signals indicating any coordinate system. In the context of the '659 patent, sensors produce signals indicating whether a user's finger or other object is contacting or is near the touch pad (e.g., capacitance values), and based on the sensor's location, the controller is able to determine where the finger or object is relative to the touch pad. This is why the claim limitation recites that the "sensors [are] configured to map the touchpad surface into native sensor coordinates." The configuration of the sensors allows the controller to determine where the finger or object is. Nothing in the claims, specification, or file history suggests that the sensors actually indicate their coordinates.

2. "native sensor coordinates" (claims 1 and 6)

One of ordinary skill in the art in November 2003 would have understood the term "native sensor coordinates" in the claims of the '659 patent to mean: "the sensor coordinates of a touchpad."

"[N]ative sensor coordinates" first appears in claim 1:

> 1. A touch pad assembly, comprising:
>
> a touch pad having a surface and one or more sensors configured to map the touch pad surface into **native sensor coordinates**; and
>
> a controller configured to
>
> define one or more logical device units associated with the surface of the touch pad,
>
> receive from the one or more sensors native values associated with the **native sensor coordinates**,
>
> adjust the native values associated with the **native sensor coordinates** into new

values associated with the logical device units and

report the new values to a host device, the logical device units associated with areas of the touch pad that can be actuated by a user,

the controller configured to pass the native values through a filtering process before reporting the new values to the host device, thereby reducing an amount of data sent to the host.

'659 patent (Exh. Q) at Claim 1 (emphasis added).

As described above, the term "native sensor coordinates" is first used to describe the "touch pad" of claim 1. That "touch pad" has "a surface and one or more sensors." '659 patent at Claim 1. For the reasons set forth above, one of ordinary skill in the art would have understood the above to teach that the touch pads, as claimed in Claim 1, include sensors that map the touch pad into native or physical sensor coordinates, or more simply put, into the "sensor coordinates of a touchpad."

3. "new values associated with logical device units" (claim 1)

See discussion of logical device unit above.

4. "one or more logical device units" (claims 1, 8, 10, 12, and 13)

One of ordinary skill in the art in November 2003 would have understood the term "one or more logical device units" in the claims of the '659 patent to mean: "one or more actuation zones representing one or more areas of the track pad encompassing native sensor coordinates."

"[O]ne or more logical device units" first appears in claim 1:

1. A touch pad assembly, comprising:

a touch pad having a surface and one or more sensors configured to map the touch pad surface into native sensor coordinates; and

a controller configured to

define **one or more logical device units** associated with the surface of the touch pad,

receive from the one or more sensors native values associated with the native sensor coordinates,

adjust the native values associated with the native sensor coordinates into new values associated with the logical device units and

report the new values to a host device, the logical device units associated with areas of the touch pad that can be actuated by a user,

the controller configured to pass the native values through a filtering process before reporting the new values to the host device, thereby reducing an amount of

data sent to the host.

'659 patent (Exh. Q) at Claim 1 (emphasis added).

One of ordinary skill in the art would have understood the limitation "one or more logical device units" to have three basic portions, each reflecting separate and important requirements of the claim: (1) that there be "one or more" units; (2) that these units be actuation zones; and (3) that these actuation zones represent one or more areas of the track pad encompassing native sensor coordinates.

Turning to the first requirement, one of ordinary skill in the art would understand that the claim language itself makes clear that there can be either a single logical device unit or multiple logical device units. *See id*. at Claim 1 ("one or more logical device units") (emphasis added).[6]

With respect to the second requirement, one or ordinary skill in the art would understand that the claim language itself states that a logical device unit is a zone on the touchpad that can be actuated by a user. *See id.* ("the logical device units associated with areas of the touch pad that can be actuated by a user) (emphasis added). The specification clearly states "one or more logical device units" represent areas of the touchpad that can be actuated by a user, that is, these areas are actuation zones. *See, e.g., id.* at 3:24-33 ("The touch pad assembly also includes a controller that divides the surface of the touch pad into **logical device units that represent areas of the touch pad that can be actuated by a user,** receives the native values of the native sensor coordinates from the sensors, adjusts the native values of the native sensor coordinates into a new value associated with the logical device units and reports the new value of the logical device units to a host device.") (emphasis added).

With respect to the third requirement, the claim language makes it clear that these actuation zones encompass native sensor coordinates. *See id.* (the "logical device units [are] associated with the surface of the touch pad" and the "touch pad … [is] configured to map the

[6] Claim 1 and other dependent claims recite "logical device units" in certain instances rather than "one or more logical device units." One of ordinary skill in the art would have understood these instances to mean "one or more logical device units" because when the term is introduced in the claim for the first time, the claim recites "one or more logical device units." The later use of the term would be understood to be merely a short form for "one or more logical device units."

touch pad surface into native sensor coordinates). Likewise, the specification makes clear that these actuation zones represent one or more areas of the track pad encompassing native sensor coordinates. *See, e.g., id.* at 10:42-45 ("In most cases, the raw number of slices in the form of native sensor coordinates are grouped into a more logical number of slices in the form of logical device units (e.g., virtual actuation zones)."); *id.* at 10:24-25 (in context of describing logical device unit resolution, noting "the clusters of native sensor coordinates that define one logical device unit").

The specification further supports this interpretation in its description of a conversion process that converts values associated with native sensor coordinates into values associated with actuation zones. *See id.* at 6:29-7:48. The specification describes grouping native sensor coordinates into actuation zones as follows:

> The conversion process may include **grouping at least a portion of the native coordinates 40 together to form one or more virtual actuation zones 42.** For example, the controller 38 may separate the surface of the touch pad 36 into virtual actuation zones 42A-D and convert the native values of the native sensor coordinates 40 into a new value associated with the virtual actuation zones 42A-D. The new value may have similar or different units as the native value. The new value is typically stored at the controller 38 and subsequently passed to the host device 24. Generally speaking, the controller 38 outputs a control signal associated with a particular virtual actuation zone 42 when most of the signals are from native sensor coordinates 40 located within the particular virtual actuation zone 42.
>
> **The virtual actuation zones 42 generally represent a more logical range of values than the native sensor coordinates 40 themselves, i.e., the virtual actuation zones 42 represent areas of touch pad 36 that can be better actuated by a user (magnitudes larger).** The ratio of native sensor coordinates 40 to virtual actuation zones 42 may be between about 1024:1 to about 1:1, and more particularly about 8:1. For example, the touch pad may include 128 virtual actuation areas based on 1024 native sensor coordinates.

Id. at 6:65-7:21 (emphasis added).

I understand that Elan argues that "one or more logical device units" means "discrete user actuation zones representing areas of the touch pad encompassing groups of native sensor coordinates." I disagree with this. First, because there may be one user actuation zone, that zone may represent a single area of the touch pad (that is, this single zone need not represent "area**s**"). Second, nothing the claims, specification or file history requires that the zones be discrete. For example, one of ordinary skill in the art would understand that two zones could overlap.

5. "removing redundant or non-essential data" (claim 2)

One of ordinary skill in the art in November 2003 would have understood the term "removing redundant or non-essential data" in the claims of the '659 patent to mean: "eliminating data that is redundant or not essential to the processing of touch inputs."

"[R]emoving redundant or non-essential data" first appears in claim 2:

> 2. The touch pad assembly as recited in claim 1 wherein the filtering process comprises **removing redundant or non-essential data**.

'659 patent (Exh. Q) at Claim 2 (emphasis added).

The specification supports an interpretation of "removing redundant or non-essential data" as "eliminating data that is redundant or not essential to the processing of touch inputs." Specifically, the specification describes that the purpose of removing redundant or non-essential data is, for example, to eliminate jitter or noise so that the controller primarily reports only intentional movement or actual events:

> The filtering process may be implemented to reduce a busy data stream so that the host device 24 is not overloaded with redundant or non-essential data. … In one implementation, the controller 38 is configured to only output a control signal when a significant change in sensor signals is detected. A significant change corresponds to those changes that are significant, as for example, when the user decides to move his/her finger to a new position rather than when the user's finger is simply resting on a spot and moving ever so slightly because of finger balance (toggling back and forth).

Id. at 6:7-26.

> The filtering process generally includes determining if the data is based on noise events or actual events. Noise events are associated with non significant events such as when a user's finger is simply resting on a spot and moving ever so slightly because of finger balance. Actual events are associated with significant events such as when a user decides to move his/her finger to anew position on the touch pad. The noise events are filtered out and the actual events are passed through the controller 38.

Id. at 7:61-8:3. One of ordinary skill in the art would understand this disclosure to mean that data is redundant or not necessary to "the processing of touch inputs" because the user did not intend to cause any movement and that this data can thus be eliminated. And based on this disclosure, one of ordinary skill in the art would understand that the claim requirement that redundant or non-essential data be removed entails the elimination of data that is redundant or not essential to the processing of touch inputs.

I understand that Elan argues that this limitation means "not reporting redundant or

non-essential data to the host device." I disagree. First, Elan is interpreting "removing" to mean "not reporting … to the host device." One of ordinary skill in the art would not interpret "removing" with respect to what is reported to the host. Second, according to Elan's position, all redundant or non-essential data must be removed and not reported to the host. The claim, however, recites only removing "redundant or non-essential data." It does not recite removing all redundant or non-essential data. In other words, according to the plain reading of the claim to one skilled in the art, the controller may remove substantial redundant or non-essential data, while allowing certain redundant or non-essential data to pass through to the host.

VI.

MATERIALS REVIEWED

A list of the materials that I reviewed in preparing this declaration is attached as Exhibit R.

VII.

COMPENSATION

My compensation for consulting on this matter is $575 per hour. My compensation does not depend on the outcome of this dispute.

VIII.

PREVIOUS TESTIMONY

A listing of the testimony I have given in the past 12 years is attached as part of Exhibit A.

I declare under penalty of perjury under the laws of the United States of America and the State of California that the foregoing is true and correct.

Brian Von Herzen