

United States District Court,
D. Delaware.

AMPEX CORPORATION and Ampex International, S.A,
Plaintiffs.

v.

**MITSUBISHI ELECTRIC CORPORATION, Mitsubishi Electric America, Inc., Mitsubishi
Consumer Electronics America, Inc., Mitsubishi Electronics America, Inc., and Mitsubishi Sales
America, Inc,**
Defendants.

Civil Action No. 95-582-RRM

March 14, 1997.

Patentee brought action against television manufacturer, alleging that manufacturer's "picture-in-picture" feature infringed its patent for a television signal time base compensator. On manufacturer's motion for summary judgment, the District Court, McKelvie, J., held that: (1) evidence raised genuine issue of material fact as to whether patent was literally infringed, precluding summary judgment, and (2) fact issue as to whether patentee was barred by prosecution history estoppel from claiming infringement under doctrine of equivalents precluded summary judgment.

Motion denied.

4,075,666, 4,212,027, 4,224,645. Cited.

Josy W. Ingersoll, James P. Hughes, Jr., John W. Shaw, Young, Conaway, Stargatt & Taylor, Wilmington, DE, Robert C. Morgan, Marta E. Gross, Fish & Neave, New York City, Norman H. Beamer, Kevin P.B. Johnson, Fish & Neave, Palo Alto, CA, for plaintiffs.

Jack B. Blumenfeld, Mary B. Graham, Morris, Nichols, Arsht & Tunnell, Wilmington, DE, Les J. Weinstein, Cheryl L. Johnson, Vincent J. Belusko, Graham & James, LLP, Los Angeles, CA, for defendants.

OPINION

McKELVIE, District Judge.

This is a patent case. Plaintiff Ampex Corporation is the owner of U.S. Patent No. 4,212,027 ("the '027 patent"); U.S. Patent No. 4,075,666 ("the '666 patent"); and U.S. Patent No. 4,224,645 ("the '645 patent"). Plaintiff Ampex International, S.A. is Ampex Corporation's wholly owned subsidiary and the exclusive licensee of certain of Ampex Corporation's foreign patents. (Plaintiffs are hereinafter collectively referred to

as "Ampex.") Ampex alleges that defendants Mitsubishi Electric Corporation, Mitsubishi Electric America, Inc., Mitsubishi Consumer Electronics America, Inc., and Mitsubishi Electronics America, Inc. (collectively, "Mitsubishi") are infringing the '027, '666, and '645 patents. A jury trial is scheduled to begin on March 31, 1997.

Mitsubishi has moved for summary judgment of non-infringement with respect to each of the patents-in-suit. In addition, Mitsubishi has moved for summary judgment on the basis of equitable estoppel and laches with respect to the '027 and '645 patents. In accordance with *Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 116 S.Ct. 1384, 134 L.Ed.2d 577 (1996), on January 22-24, 1997, the court held a trial on claim construction of each of the patents-in-suit. This is the court's decision on claim construction of the '027 patent and Mitsubishi's motion for summary judgment of non-infringement with respect to the '027 patent. For the reasons set out below, the court will deny Mitsubishi's motion.

I. Factual and Procedural Background

The following facts are drawn from the parties' briefs, exhibits, and testimony presented at trial.

The '027 patent was issued on July 8, 1980 and is entitled "Time Base Compensator." Claim 83 is the only claim of the '027 patent at issue in this case. Claim 83 is directed to an apparatus for changing the time base of a digital information signal having a time-base synchronization component. As discussed in the '027 patent specification, the '027 invention may be used to correct undesirable timing differences between information signals, as well as introduce desired or wanted changes in an information signal. (*See* col. 2, line 66; col. 5, line 18.)

The '027 invention particularly relates to television signals. Thus, in order to understand the operation of the invention, some understanding of basic television technology is necessary.

A. Basic Television Technology

A television signal is an electrical signal that is created when a video camera captures an image. When a television signal is broadcast, a television receiver picks up and decodes the signal so as to produce pictures on the television screen. A television signal is made up of a series of frames, or still pictures, each one containing an image that varies slightly from the image in the preceding frame. When the frames are displayed by a television in rapid sequence, they create the appearance of smooth, uninterrupted motion to the human eye. A standard American television displays 30 frames per second.

Each frame is made up of 525 horizontal lines. Each set of alternating lines forms two fields: odd and even. A television produces pictures on the screen by using an electronic beam to scan the horizontal lines of a frame across the inside surface of the screen from left to right and top to bottom. To eliminate flicker, the beam first scans the lines that constitute the odd field, and then scans the lines that constitute the even field. A standard American television displays 60 fields per second.

In addition to picture information, a television signal also contains a time-base synchronizing component, which includes both horizontal and vertical synchronizing pulses. A horizontal synchronizing pulse indicates where a horizontal line begins. When a television receiver detects a horizontal synchronizing pulse, it causes the beam to return to the left of the screen and begin scanning the next horizontal line. A vertical synchronizing pulse indicates where a field begins. When the television receiver detects a vertical synchronizing pulse, it causes the beam to return to the top of the screen and begin scanning the horizontal

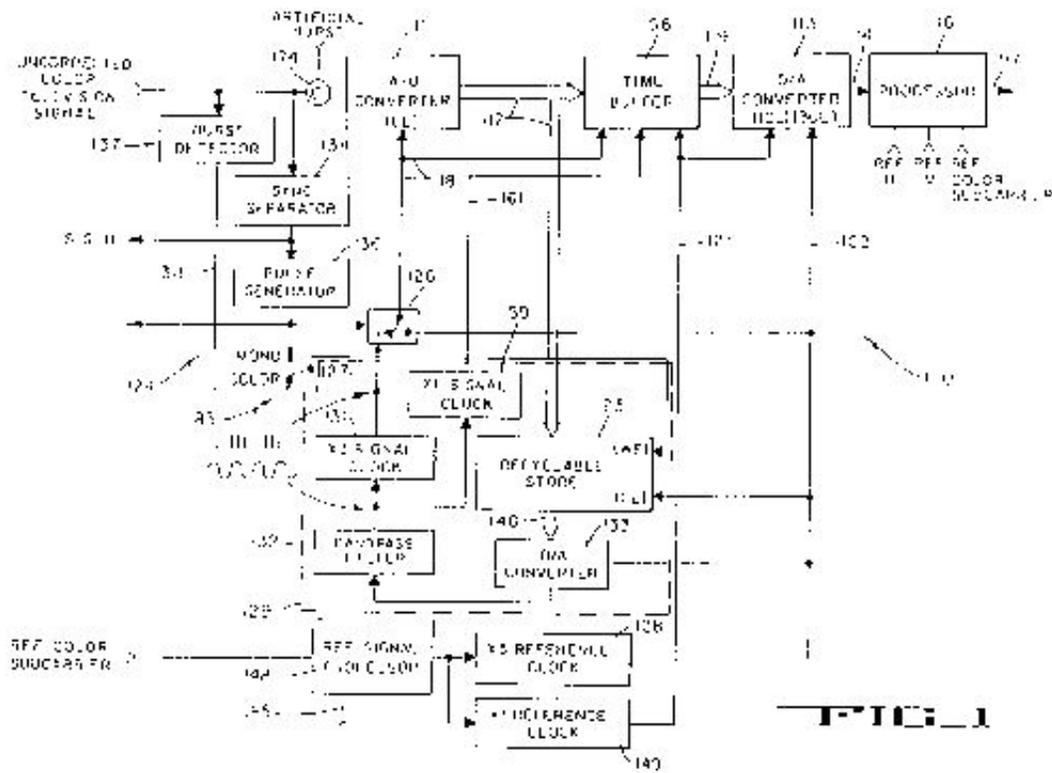
lines of the next field. Both the horizontal and vertical synchronizing pulses must occur at regular intervals so that images are properly displayed on a television screen. When a television signal is broadcast, each portion of the signal is precisely timed and synchronized.

B. Time-Base Correction

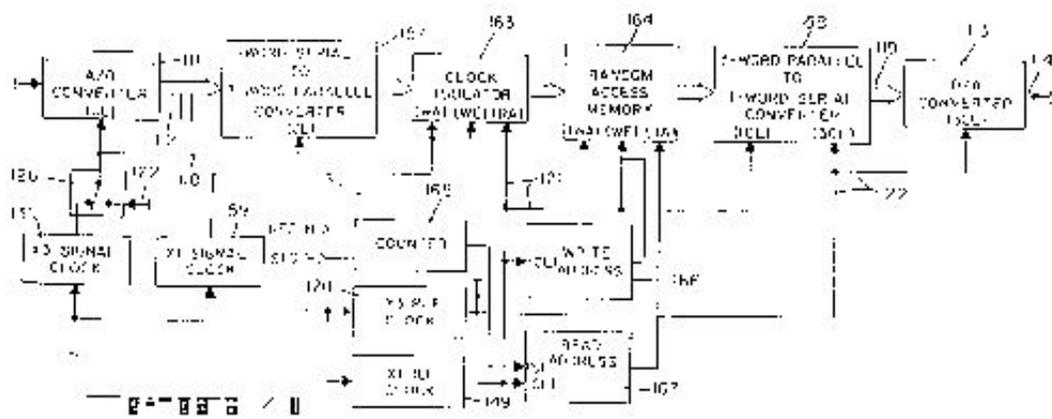
Time-base errors, or irregularities in the timing of a television signal, may occur, for example, when a recorded television signal is played back for broadcast. Such errors may be caused by stretching or shrinking of the videotape, inherent imperfections in the mechanical construction of video tape recorders, or friction along the tape path. Time-base errors may cause a television signal to run faster or slower than desired, thereby creating an unstable or poor-quality picture. Time-base compensators correct such errors by precisely regulating the timing of each portion of a signal. In general, time-base compensators employ an adjustable delay unit which is interposed in the path of the signal between its source and its destination. The amount of delay is varied to compensate for or cancel out errors introduced by speed variations. Early time-base compensators were based on analog technology, but since at least the early 1970's digital technology has dominated the field of time-base correction because it is easier to correct the timing errors of a digital signal. Because a television signal is typically in analog form when it is broadcast or recorded on tape, a television signal must be converted to digital form before it is supplied to a time-base compensator that uses digital technology.

C. The '027 Patent Invention

The invention of the '027 patent uses digital technology to change the time base of an information signal. Thus, as depicted in Figure 1 of the '027 patent, a television signal in analog form is sampled and passed through an analog-to-digital converter, represented by Block 111, before it is supplied to the apparatus described by claim 83.



The '027 invention changes the time base of a digital information signal by storing, or writing, portions of the digital information signal into a random access memory at one time, and retrieving, or reading out, those portions at a later time, as determined by a clock signal generated by a single master clock. In Figure 4 of the '027 patent, the memory is represented by Block 164, and the master clock is represented by Block 149.



Digital information is written into and read from memory in groups of bits, or words. Each location in memory has a unique address into which words are written and from which they are read. The memory addresses are generated by write and read address counters, represented in Figure 4 by Blocks 166 and 167, respectively. Each advance of the address counters causes a new address to be applied to the memory, and that address determines the location in memory of the next word to be written and read.

The change that occurs in the time base of the digital information signal is determined by the time delay between the writing and reading operations. In order to determine when the reading operation occurs, the time-base synchronizing component of the digital information signal, represented in Figure 4 as "SIG. H," is compared with a reference signal, represented in Figure 4 as "REF. H." The write-read delay is determined by the relative times of occurrence of the time-base synchronizing component and the corresponding reference signal. Depending on how much the time-base synchronizing component of the incoming signal leads or lags behind the reference signal, the delay between the writing and reading operations is automatically increased or decreased.

D. *Prosecution History* of the '027 Patent

As discussed above, time-base compensators were well known in the art at the time of the '027 invention. An important distinction of the '027 invention over the prior art was its use of a single clock signal to control the writing and reading operations. The use of a single clock signal makes circuits easier to design and analyze, and increases their reliability.

The original application for the '027 patent was filed on April 25, 1974, and was subsequently abandoned. On March 12, 1975, Ampex filed a continuation application based on the original application. Claim 83 was not included in that application. On October 28, 1975, the Patent and Trademark Office ("PTO") rejected each of the claims included in the application. On March 28, 1976, Ampex filed an amendment in response to that action. In a supplemental amendment filed on April 12, 1976, Ampex added several new claims, including that which would ultimately issue as claim 83, to "cover features characterizing the invention ... but not adequately covered by" the other claims in the application. In that amendment, Ampex distinguished certain prior art references that were cited as of interest by the PTO in its October 28, 1975 Office Action, but that were not applied against the rejected claims, as follows:

The new claims added hereby have been considered with reference to the teachings of the references cited in the 28 October 1975 Office Action and the previous 28 March 1976 Amendment and are distinguishable over the combined teachings of those references.... Nor do any of those references include a randomly addressable digital store that is controlled by a single clock signal to change the time-base of a digital information signal in the manner defined by [the new claims].

On July 28, 1976, the PTO rejected a number of claims in the application, including that which would issue as claim 83, and cited additional prior art references as of interest. In response to that action, Ampex filed another amendment on November 29, 1976. In that amendment, Ampex distinguished U.S. Patent No. 3,909,839 ("the Inaba patent"), one of the prior art references cited in the PTO's July 28, 1976 Office Action, as follows:

With respect to the [Inaba] '839 patent, it concerns a digital time base error corrector. However, it does not contain any teachings regarding the features claimed in this application, particularly those concerning ... controlling the time of storage in a randomly addressable digital store with one clock signal (e.g., see Claim

E. *The Accused Products*

Mitsubishi produces televisions containing a "picture-in-picture" or "PIP" feature. PIP is a television feature that places a small television picture, or sub-picture, within the main picture of a television screen to allow viewers to watch two programs at the same time. Ampex alleges that Mitsubishi's PIP feature uses the '027 invention to alter and correct the time base of the sub-picture signal in order to properly embed it within the main picture.

Mitsubishi's PIP televisions fall into two groups. The PIP televisions in the first group use a set of integrated circuits manufactured by Hitachi Corporation, and were discontinued in 1994. The PIP televisions in the second group use a set of integrated circuits manufactured in part by Mitsubishi and in part by Hitachi and are currently manufactured by Mitsubishi. In its complaint, Ampex alleges that both Mitsubishi's discontinued and currently-manufactured PIP televisions infringe claim 83. Ampex recently informed Mitsubishi that it is foregoing its claims as to Mitsubishi's discontinued PIP televisions. Mitsubishi, however, seeks a declaratory judgment of non-infringement as to both groups of its PIP televisions.

On January 22, 1997, the parties tried claim construction issues relating to claim 83 of the '027 patent. In advance of trial, the parties submitted opening and reply briefs. At trial, the court heard argument from the parties and testimony from two witnesses, Rylan Luke and Bernard J. Lechner. Mr. Luke, who testified on behalf of Ampex, is an electrical engineer and a consultant in the field of digital and analog signal processing with over 16 years experience. Mr. Lechner, who testified on behalf of Mitsubishi, is an engineer and consultant in the field of television and display system electronics with over 35 years experience. Both witnesses professed familiarity with what was known to persons of ordinary skill in the art of the '027 invention at the time of the invention. Following trial, Mitsubishi exercised its option to file a post-trial brief.

II. *Discussion*

A. *Claim Construction*

[1] [2] Claim construction is a matter for the court. *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 979 (Fed.Cir.1995) (*en banc*), *aff'd*, 517 U.S. 370, 116 S.Ct. 1384, 134 L.Ed.2d 577 (1996). Claims are construed from the vantage point of a person of ordinary skill in the art at the time of the invention. *Id.* at 986. In construing a claim, a court looks first to the intrinsic evidence of record, namely, the language of the claim, the specification, and the prosecution history. *Insituform Techs. Inc. v. Cat Contracting, Inc.*, 99 F.3d 1098, 1105 (Fed.Cir.1996). Extrinsic evidence such as expert testimony may be considered if needed to assist the court in understanding the technology at issue or in determining the meaning or scope of technical terms in a claim. *Hoechst Celanese Corp. v. BP Chems. Ltd.*, 78 F.3d 1575, 1579 (Fed.Cir.), *cert. denied*, 519 U.S. 911, 117 S.Ct. 275, 136 L.Ed.2d 198 (1996). A court may require expert testimony in order to understand how a person of ordinary skill in the pertinent art would construe a claim. *See id.* at 1578-79. In this case, the court has relied on such testimony where there is no genuine dispute between the parties as to what one of ordinary skill would have understood or recognized at the time of the '027 invention.

Claim 83 of the '027 patent reads as follows:

83. Apparatus for changing the time-base of a digital information signal having a time-base synchronizing

component, comprising:

a randomly addressable digital store having addressed storage locations for receiving and storing successive intervals of the digital information;

means for effecting the storage of successive portions of each interval of the digital information signal at different addressed storage locations of the digital store at times determined by a clock signal;

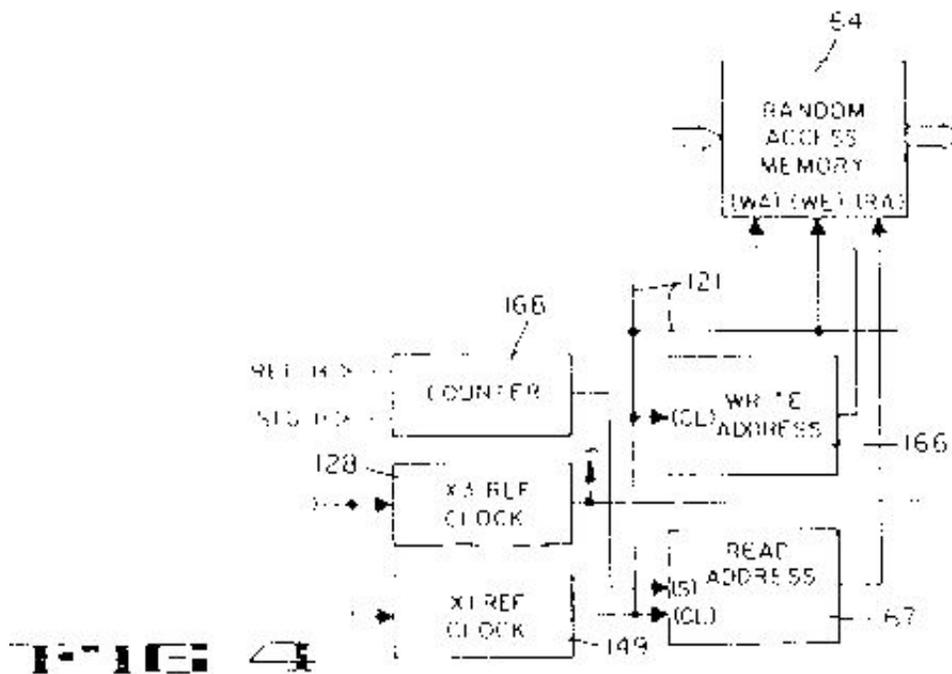
means for effecting retrieval of the stored portions of the information signal from addressed storage locations at the times determined by said clock signal;

and means responsive to the time-base synchronizing component of the information signal and a time-base reference signal for providing a control signal representative of the time difference between the synchronizing component and the reference signal; and means responsive to said control signal for adjusting during each interval of the digital information signal the time between effecting storage of each portion of the digital information signal at an address and effecting retrieval of said portion from said address.

Claim 83 is expressed in so-called "means-plus-function" language as authorized by 35 U.S.C. s. 112(6), which provides:

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

Section 112(6) requires that the court construe means-plus-function claims in view of the structure disclosed in the specification of the patent. *Alpex Computer Corp. v. Nintendo Co. Ltd.*, 102 F.3d 1214, 1220 (Fed.Cir.1996). Here, it is undisputed that the supporting structures of the means-plus-function limitations of claim 83 are found in certain portions of figure 4, reproduced below, and columns 13 and 14 of the '027 patent specification.



The court has not endeavored to construe each and every element of claim 83. Rather, the court has looked to the parties to identify the issues that the court must resolve. After hearing testimony and argument on claim construction and reviewing the parties' submissions in connection with claim construction, the court understands the following issues to be in dispute:

- 1) Whether information must be written into and read out of memory at the same frequency or rate;
- 2) Whether the entire digitized version of an incoming analog signal, including the time-base synchronizing component, must be stored in memory; and
- 3) Whether the counter represented by Block 168 in Figure 4 of the specification is the only structure supporting the means referred to in the fourth element of claim 83, that is, the means responsive to the time-base synchronizing component of the information signal and a time-base reference signal for providing a control signal representative of the time difference between the synchronizing component and the reference signal.

1. Frequency At Which Information is Written Into and Read From Memory

[3] The first issue in dispute concerns the second and third elements of claim 83, which read as follows:

means for effecting the storage of successive portions of each interval of the digital information signal at different addressed storage locations of the digital store at times determined by a clock signal; and

means for effecting retrieval of the stored portions of the information signal from addressed storage locations at the times determined by said clock signal.

Mitsubishi contends that because claim 83 requires that the writing and reading operations occur at times determined by a single clock signal, claim 83 also requires that information be written into and read out of memory at the same frequency or rate.

Ampex does not dispute Mitsubishi's contention that claim 83 requires that a single clock signal determine the times at which the writing and reading operations occur. Ampex, however, disputes Mitsubishi's contention that the writing and reading operations must occur at the same frequency or rate. Ampex argues that it would have been apparent to a person of ordinary skill in the art that a single clock signal could be used to determine writing and reading operations occurring at different rates.

Neither claim 83 nor the corresponding text in the specification mention the frequency at which the writing and reading operations must occur. In Figure 4, the structures that correspond to the means-plus-function limitations of claim 83 are expressed as block diagrams. At trial, both Mr. Luke and Mr. Lechner explained that block diagrams are broad disclosures that do not depict circuitry in detail. To persons of ordinary skill in the art, block diagrams represent a number of different ways of implementing a circuit.

Mr. Luke further testified that the read address, represented by Block 67, could contain a frequency divider such as a "divide-by-two" circuit. He explained that a "divide-by-two" circuit would divide the frequency of the clock signal in half by generating one output pulse for every two input pulses. In this manner, the writing and reading operations would occur at different frequencies or rates. Yet, according to Ampex, the times at which information is read out of memory would still be determined by the clock signal generated by the X1 reference clock represented by Block 149.

Mr. Lechner did not dispute Mr. Luke's testimony that a "divide-by-two" circuit could be placed in the read address that would divide the frequency of the clock signal in half. Mitsubishi argues, nevertheless, that the court should reject the proposition that the read address could contain a "divide-by-two" circuit as Mr. Luke opined. It argues that Ampex should not "be allowed to treat the read address as some sort of 'magic box' " and that "[s]ome constraint must be imposed on what could theoretically be inside the read address to prevent claim 83 from having potentially infinite scope."

The court, however, is mindful of the principle that "a patent need not teach, and preferably omits, what is well known in the art." *Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1384 (Fed.Cir.1986). Because it is undisputed that a person of ordinary skill in the art would have recognized that the read address could contain a "divide-by-two" circuit, the court concludes that the read address could contain such a circuit.

Mitsubishi also disputes Ampex's contention that the read operation would occur "at times determined by" the clock signal generated by the X1 reference clock if a "divide-by-two" circuit were used, arguing that claim 83 requires a *direct* relationship between the clock signal and the writing and reading operations. According to Mitsubishi, if a "divide-by-two" circuit caused the read operation to occur at every other pulse of the X1 reference clock, the read operation would bear an *indirect* relationship to the clock signal.

Mitsubishi's interpretation is not supported by the plain language of claim 83. Claim 83 merely requires that the writing and reading operations occur "at times determined by" a single clock signal, and not, for instance, "at each pulse of the clock signal." A read operation that occurs in response to every other pulse of the clock signal occurs "at times determined by" that clock signal.

Finally, Mitsubishi argues that the prosecution history of claim 83 compels the conclusion that the writing and reading operations must occur at the same frequency. As Mitsubishi points out, in the April 12, 1976 Supplemental Amendment, Ampex distinguished certain prior art references by claiming that none of those references "include a randomly addressable digital store that is controlled by a single clock signal." Likewise, Ampex distinguished the Inaba patent in the November 29, 1976 Amendment by claiming that, unlike the Inaba patent which used two independent clocks to control the writing and reading operations, the '027 invention "control[s] the time of storage in a randomly addressable digital store with one clock signal."

As discussed above, however, Ampex does not dispute Mitsubishi's contention that claim 83 requires that a single clock signal control the times at which information is written into and read out of memory. Rather, Ampex disputes the contention that the use of a single clock signal necessarily means that the writing and reading operations occur at the same frequency or rate. Ampex did not distinguish the '027 invention over the prior art by claiming that the read and write operations occur at the same rate, and there is nothing in the prosecution history to suggest that they must do so.

For the reasons stated above, the court concludes that claim 83 does not require that the reading and writing operations occur at the same frequency or rate. The court observes, however, that, although Ampex appears to suggest that the read address could contain any number of "digital counter chains ... to generate synchronous timing signals of different relative frequencies from a single clock," the only such device that Ampex has identified is a frequency divider such as a "divide-by-two" circuit.

2. Storage of the Digital Information Signal

[4] Mitsubishi next contends that claim 83 requires that the entire digitized version of an incoming analog signal, including the time-based synchronizing component, must be stored in memory. Ampex disputes this contention, arguing that claim 83 requires only that the digital information signal being stored have a time-based synchronizing component associated with it. Ampex also argues that the digital information signal referred to in claim 83 is the signal as it exists at the time it is written into memory, not as it exists immediately after it is converted into digital form.

The preamble of claim 83, "[a]pparatus for changing the time-base of a digital information signal having a time-base synchronizing component," refers to "a digital information signal" without specifying its origin or the information it contains. Likewise, the limitations that follow merely refer to "the digital information" and "the digital information signal." (Emphasis added.) Thus, in order to determine what information must be stored in memory, the court must put claim 83 in context by examining the rest of the '027 patent specification.

As discussed above, the '027 invention converts incoming analog signals into digital signals before supplying them to the apparatus described by claim 83. This analog-to-digital conversion is depicted in Figure 1 of the '027 patent, reproduced above.

The parties do not dispute that, in Figure 1, the time-base synchronizing component of the incoming signal in its original analog form is detected and regenerated by means of a sync separator, represented by Block 134, during the analog-to-digital conversion process. The component, represented as "SIG. H," is then separately made available to other parts of the circuitry. The parties also do not dispute that, in Figure 4, the component, again represented as "SIG. H," is compared to the reference signal, represented as "REF. H," so

that the differences between them may be measured and used to control retrieval of information from memory. It is thus apparent that SIG. H is derived before any portion of the digital information signal is stored in memory.

Ampex concedes that, in the embodiment of the patent shown in Figure 4, the time-base synchronization component is digitized and stored in memory with the rest of the digital information signal. However, Ampex points out, and Mitsubishi does not dispute, that after the digital information signal is read out of memory and is converted back to an analog signal, a processor represented by Block 116 in Figure 1 inserts reference synchronization and color burst components into the information signal in place of the digitized time-base synchronization component, which is discarded. Given this fact and the fact that SIG. H is derived during the analog-to-digital conversion process before any information is stored in memory, it is apparent that the synchronizing component need not be stored in memory along with the rest of the digital information signal. It is also apparent that, much like the separation of the time-base synchronizing component, other types of information could be separated from the signal and discarded before the signal is written into memory. Thus, the "digital information signal" referred to in claim 83 must be the signal as it exists at the time it is written into memory.

Accordingly, the court concludes that claim 83 does not require that the entire digitized version of an incoming analog signal, including the time-base synchronizing component, be stored in memory, and that the "digital information signal" referred to in claim 83 refers to the signal as it exists at the time it is written into memory.

3. Necessity of the Counter Represented By Block 168

[5] The fourth and fifth elements of claim 83 are written in means-plus-function language as follows:

and means responsive to the time-base synchronizing component of the information signal and a time-base reference signal for providing a control signal representative of the time difference between the synchronizing component and the reference signal;

and means responsive to said control signal for adjusting during each interval of the digital information signal the time between effecting storage of each portion of the digital information signal at an address and effecting retrieval of said portion from said address.

Mitsubishi contends that claim 83 requires that the time difference between the digital information signal being stored and the reference signal must be measured and used to control retrieval from memory. Mitsubishi further contends that the only structure supporting the means referred to in the fourth element of claim 83 is the counter represented by Block 168 in Figure 4.

Ampex apparently does not dispute Mitsubishi's contention that claim 83 requires that the time difference between the digital information signal being stored and the reference signal must be measured and used to control retrieval from memory. Ampex, however, disputes Mitsubishi's contention that the only structure supporting the means referred to in the fourth element of claim 83 is the counter represented by Block 168 in Figure 4. Ampex argues that it would have been apparent to one of ordinary skill in the art that the write and read addresses represented in Figure 4 by Blocks 166 and 167, respectively, are alternative structures supporting the means referred to in the fourth element.

At trial, Mr. Luke explained that, in the '027 specification, the memory is described as having the capacity of 256 words, or one scan line. Mr. Luke pointed out, however, that the specification also provides that "[t]he capacity of the memory 164 can be adjusted as desired." (*See* col. 14, line 13.) He testified that if a person of ordinary skill in the art were using a larger memory, such as a video frame memory capable of storing an entire video frame, it would be apparent to that person that the write and read addresses could in combination perform the function of the counter represented by Block 168, thus eliminating the need for that counter. Mr. Luke also testified that, although video frame memories were known in the art in the 1970's, they were prohibitively expensive. He further testified that it was understood at that time that they would become more practical once they became less expensive. Mr. Lechner did not contradict Mr. Luke's testimony in this regard.

Accordingly, the court concludes that the counter represented by Block 168 in Figure 4 is not the only structure supporting the means referred to in the fourth element of claim 83.

B. Infringement

Mitsubishi has moved for summary judgment on the ground that its PIP televisions do not infringe claim 83. On summary judgment, the evidence must be viewed in the light most favorable to the nonmoving party, and all doubts must be resolved in favor of the nonmoving party. *Ekchian v. Home Depot, Inc.*, 104 F.3d 1299, 1302 (Fed.Cir.1997). Because infringement is a fact issue, "a motion for summary judgment of infringement or non-infringement should be approached with a care proportioned to the likelihood of its being inappropriate." *D.M.I., Inc. v. Deere & Co.*, 755 F.2d 1570, 1573 (Fed.Cir.1985).

[6] [7] [8] To prove infringement, a patentee must show that every limitation in an asserted claim is met by the accused product either literally or under the doctrine of equivalents. *American Permahedge, Inc. v. Barcana, Inc.*, 105 F.3d 1441, 1443-44 (Fed.Cir.1997). A means-plus-function limitation reads literally on an accused device if the accused device performs the claimed function by means identical to or the equivalent of the structures described in the specification corresponding to the limitation's means. *Alpex Computer Corp. v. Nintendo Co. Ltd.*, 102 F.3d 1214, 1222 (Fed.Cir.1996); *D.M.I.*, 755 F.2d at 1575. Whether an accused device performs the claimed function by means identical to or the equivalent of the structure described in the specification is a question of fact. *D.M.I.*, 755 F.2d at 1575.

As a threshold matter, Ampex contends that Mitsubishi inappropriately seeks summary judgment of non-infringement as to its discontinued PIP televisions. Although Ampex has informed Mitsubishi that it has decided to forego its claims as to this group of televisions, Ampex has not manifested an unequivocal and unconditional promise that it will never assert the '027 patent against Mitsubishi's discontinued PIP televisions. *See Super Sack Manuf. Corp. v. Chase Packaging Corp.*, 57 F.3d 1054, 1056-59 (Fed.Cir.1995), *cert. denied*, 516 U.S. 1093, 116 S.Ct. 815, 133 L.Ed.2d 760 (1996). Accordingly, the court will continue to retain jurisdiction over Mitsubishi's counterclaim for a declaratory judgment that its discontinued PIP televisions do not infringe the '027 patent.

1. Literal Infringement

[9] Mitsubishi first argues that its PIP televisions do not literally infringe claim 83 because its PIP televisions use two clock signals to control the times at which information is written into and read out of memory, and because the writing and reading operations occur in its PIP televisions at widely different frequencies. In other words, Mitsubishi argues that the second and third elements of claim 83 do not read literally on its PIP televisions.

Ampex argues that, to the contrary, Mitsubishi's PIP televisions use a single clock signal to control the reading and writing operations. In support of its contention, Ampex submits a declaration from Mr. Luke. In his declaration, Mr. Luke identifies a master clock in Mitsubishi's PIP televisions and traces the path of the clock's signal. Mr. Luke demonstrates that the master clock signal is applied as an input to an integrated circuit, and that the write and read timing signals are each output from that circuit and applied as inputs to the memory. He thus concludes that the master clock signal determines both the reading and writing operations of Mitsubishi's PIP televisions.

On the basis of this evidence, the court finds that Ampex has demonstrated that there is a genuine issue of fact as to whether Mitsubishi's PIP televisions use one clock signal or two to control the writing and reading operations.

Mitsubishi also argues that its PIP televisions do not infringe claim 83 because in its PIP televisions the reading and writing operations occur at different frequencies. As discussed above, however, claim 83 does not require that the writing and reading operations occur at the same frequency or rate. Thus, Mitsubishi is not entitled to summary judgment on this ground. The fact that in Mitsubishi's PIP televisions information is read out of memory at a greater frequency than information is written into memory may, however, be significant. As discussed above, the only device that Ampex has identified that would cause the writing and reading operations to occur at different rates is a frequency divider, such as a "divide-by-two" circuit. A frequency divider, however, would cause information to be read out of memory at a *lower* frequency than the rate at which data is written into memory. Thus, claim 83 might not read literally on Mitsubishi's PIP products, where data is read out of memory at a frequency *greater* than that at which it is written into memory. At this time, however, the court lacks sufficient information to determine whether Mitsubishi is entitled to summary judgment on this basis.

Mitsubishi next argues its PIP televisions do not literally infringe claim 83 because the PIP feature discards synchronizing information, *i.e.*, horizontal and vertical synchronizing signals, as well as other portions of the picture information signal, before the signal is stored in memory. Mitsubishi also argues that, unlike the '027 invention, the PIP feature samples and filters the picture information signal after the synchronization information and other portions of the information signal are discarded so that the information signal stored in memory is representative of the original picture information signal, rather than the original picture information signal itself. Thus, Mitsubishi argues that none of the elements of claim 83 that refer to the "digital information signal" read literally on Mitsubishi's PIP televisions.

As discussed above, however, claim 83 does not require that the entire digitized version of an incoming analog signal, including the time-base synchronizing component, be stored in memory with the rest of the digital information signal. In addition, the "digital information signal" referred to in claim 83 is the signal in whatever form it exists at the time it is written into memory. Thus, the fact that in the accused PIP televisions the picture information signal is processed so that it is replaced by a representative signal made up of new composite information before it is written into memory does not prevent a finding of literal infringement.

Finally, Mitsubishi argues that its PIP televisions do not literally infringe claim 83 because the PIP feature does not measure the time difference between the synchronizing component of the information signal being stored and the reference signal, does not use a counter or an equivalent structure to measure such time difference, and does not employ a means for providing a control signal to control retrieval from memory or

a means responsive to such control signal. In other words, Mitsubishi argues that the fourth and fifth elements of claim 83 do not read literally on its PIP televisions.

As discussed above, claim 83 does not require that the counter represented by Block 168 in Figure 4 measure the time difference between the synchronizing component and the reference signal. Therefore, Mitsubishi is not entitled to a finding of non-infringement on the basis that its PIP televisions do not employ a such a counter. With respect to Mitsubishi's other asserted grounds for summary judgment, the court concludes that there are genuine issues of material fact concerning literal infringement that preclude summary judgment.

In his aforementioned declaration, Mr. Luke elaborates on the specification's disclosure of alternative structures supporting the means referred to in the fourth and fifth elements of claim 83. According to Mr. Luke, the functions described in these elements can be accomplished through either relative addressing or absolute addressing schemes. In a relative addressing scheme, a given digitized point of a television picture is stored in one memory location for one scan line or field at one time, and in a different memory location for a scan line or field occurring at a later time. The delay time between writing and reading must be converted into an offset address value, and the write and read counters must be set so as to differ by that offset value. Mr. Luke states that, because the capacity of the memory described in the specification is only one scan line, a relative addressing scheme is disclosed in Figure 4.

An absolute addressing scheme uses a memory large enough to ensure that a given digitized point on a television screen is always stored at the same address. A certain fixed starting address is generated for writing into memory each time the incoming synchronization signal occurs and the same starting address is generated for reading from memory when the reference synchronization signal occurs, or at some fixed time relative to the reference signal. The delay between the incoming synchronization signal and the reference signal causes exactly the same write-to-read offset delay as would be effected in a relative addressing scheme. Mr. Luke states that, because the specification provides that the capacity of the memory "can be adjusted as desired," a person of ordinary skill in the art would have recognized that the specification inherently discloses an absolute addressing scheme for performing the functions described in the fourth and fifth elements of claim 83.

Mr. Luke concludes that Mitsubishi's PIP feature employs the absolute addressing scheme inherently disclosed in the specification. According to Mr. Luke, the means referred to in the fourth element of claim 83 is composed of portions of write and read address circuitry. The address counts of these counters are offset with respect to each other in response to the relative occurrence of the sub-picture synchronization signals (the time-base synchronizing component) and the main picture synchronization signals (the time-base reference signal). The control signal referred to in the fourth and fifth elements of claim 83 is internal to the circuitry itself, as the respective states of the write and read address counters continually manifest the required offset between the write and read operations. Finally, the means referred to in the fifth element of claim 83 is also composed of portions of the write and read address counters, which respond to the control signal to adjust the relative time between storage into and retrieval from memory of the sub-picture information.

Accordingly, the court cannot conclude as a matter of law that the fourth and fifth elements of claim 83 do not read literally on Mitsubishi's PIP products.

For the reasons stated above, the court concludes that Ampex has demonstrated a genuine issue of fact as to

whether Mitsubishi's PIP televisions literally infringe claim 83 of the '027 patent. Thus, the court will deny Mitsubishi's motion for summary judgment on the issue of literal infringement.

2. Doctrine of Equivalents

[10] The doctrine of equivalents prevents a copyist from avoiding infringement claims by making insubstantial changes to an invention. *Valmont Indus., Inc. v. Reinke Manuf. Co., Inc.*, 983 F.2d 1039, 1043 (Fed.Cir.1993). Under the doctrine of equivalents, an accused device that does not literally infringe a patented invention may nonetheless be found to infringe if there is "equivalence" between the elements of the accused device and the claimed elements of the patented invention. *Warner-Jenkinson Co., Inc. v. Hilton Davis Chem. Co.*, --- U.S. ---- - ----, 117 S.Ct. 1040, 1046-47, 137 L.Ed.2d 146 (1997). The doctrine of equivalents must be applied to each individual element of a claim. and not to an invention as a whole. *Id.* at *8. ---- - ----, 117 S.Ct. at 1048-49.

Because the court finds that there are genuine issues of fact as to whether Mitsubishi's PIP televisions literally infringe claim 83, the court concludes that there are genuine issues of fact as to whether these products infringe claim 83 under the doctrine of equivalents. The court, however, will address Mitsubishi's argument that prosecution history estoppel bars Ampex from asserting infringement under the doctrine of equivalents, because the application of prosecution history estoppel is a matter for the court, not the jury. See *Insituform Techs. Inc. v. Cat Contracting, Inc.*, 99 F.3d 1098, 1107 (Fed.Cir.1996).

[11] [12] [13] The doctrine of equivalents is subject to the doctrine of prosecution history estoppel, which acts to limit infringement by otherwise equivalent products or processes. *Id.* Prosecution history estoppel bars a patentee from recapturing subject matter that was surrendered by the patentee during prosecution in order to promote allowance of a patent's claims. *Id.* In order for prosecution history estoppel to apply, a patentee's assertions to the PTO must be unmistakable and clear. See *Athletic Alternatives, Inc. v. Prince Manuf., Inc.*, 73 F.3d 1573, 1582 (Fed.Cir.1996).

Mitsubishi argues that Ampex is estopped by the prosecution history of the '027 patent from asserting infringement under the doctrine of equivalents. As Mitsubishi observes, during the prosecution of the '027 patent, Ampex distinguished the prior art, and specifically the Inaba patent, by representing to the PTO that, unlike the cited prior art references, the '027 invention employs a single clock signal to control the writing and reading operations. Accordingly, prosecution history estoppel would appear to bar Ampex from claiming infringement by devices that employ more than one clock signal for writing to and reading from memory.

Mitsubishi, however, is not entitled to summary judgment on the basis of prosecution history estoppel. As discussed above, a genuine issue of fact exists as to whether Mitsubishi's PIP products use one clock signal or two to control the writing and reading operations. Until this factual issue is resolved, the court cannot determine whether prosecution history estoppel applies to bar Ampex from asserting infringement of claim 83 under the doctrine of equivalents.

III. Conclusion

For the reasons stated above, Mitsubishi's motion for summary judgment of non-infringement is denied. The court will issue an order in accordance with this opinion.

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