United States District Court,
E.D. California.

LECTROLARM CUSTOM SYSTEMS, INC,
Plaintiff.
v.
PELCO, Pelco Sales, Inc., Freedom Acquisitions, Inc., and Security Sales, LLC,
Defendants.

No. CIV-F-01-6171 OWW DLB

Oct. 21, 2002.

Deanna Allen, Gabriel Assaad, Gary M. Hoffman, Gianni Minutoli, John Charles Snodgrass, Kenneth W. Brothers, Laurence E. Fisher, Paul R. Lucey, Dickstein, Shapiro, Morin and Oshinsky, Washington, DC, William Thomas McLaughlin, II, McLaughlin, Sullivan, Fresno, CA, for Plaintiff.

Alan Weisberg, Christopher, Weisberg and Crush, PA, Ft. Lauderdale, FL, Daniel Thomas, David R. Atkinson, George S. Lemieux, Nicole K. Atkinson, Robert S. Hackleman, Gunster, Yoakley and Stewart, West Palm Beach, FL, Jeffery I. Frey, Howrey, Simon, Arnold & White, Washington, DC, Jennifer B. Ramach, Scott W. Dangler, Gunster, Yoakley and Stewart, Fort Lauderdale, FL, Steven E. Paganetti, Wild, Carter and Tipton, Fresno, CA, for Defendants.

AMENDED MEMORANDUM DECISION AND ORDER RE: CLAIM INTERPRETATION AFTER MARKMAN HEARING

OLIVER W. WANGER**, District Judge.**

I. *INTRODUCTION*

Before the court are the parties' motions for a Markman claim interpretation of United States Letters Patent No. 4,974,088 (the " '088 Patent" or the "Patent"). *See* Lectrolarm's Markman Hearing Brief ("Pl.Brief"); Memorandum of Law in Support of Defendant Pelco's Motion Regarding Claim Interpretation of the '088 Patent ("Def.Brief"). Oral argument was heard on December 14, 2001, and January 22, 30, and 31, 2002.

At the conclusion of the Markman hearing on January 31, 2002, Pelco was granted leave to file a supplemental memorandum addressing 1) the extent to which an acknowledged scrivener's error in the specification of the '088 Patent (col.4, lines 56-63) can be corrected or interpreted during claim interpretation; and 2) the issue of modulation as it relates to the interpretation of terms in claim 1 of the '088 Patent in light of expert testimony provided by Lectrolarm at the Markman hearing. *See* Reporter's Transcript of Proceedings ("RT"), pp. 493-501. FN1 On February 13, 2002, Pelco filed a Supplemental Markman Brief ("Def.Supp.Brief"). Lectrolarm filed a supplemental response on February 20, 2002 ("Pl.Supp.Resp."). *See* Doc.111. On March 4, 2002, Lectrolarm lodged Proposed Markman Findings of Fact

and Conclusions of Law ("Pl.Interp."). On March 5, 2002, Pelco filed a Proposed Memorandum on Construction of Claims ("Def.Interp."). *See* Doc.121.

FN1. The Reporter's Transcript from all four days of the Markman hearing is consecutively paginated as follows:

Day 1, December 14, 2001:	pp. 1-88;
Day 2, January 22, 2002:	pp. 90-215;
Day 3, January 30, 2002:	pp. 216-315;
Day 4, January 31, 2002:	pp. 316-501.

For convenience, references herein to the Reporter's Transcript will refer to page numbers only, not dates which may be derived from this footnote.

One additional portion of the proceedings over the noon hour on January 22, 2002, was transcribed using electronic sound recording ("ESR"). This transcript is separately paginated and will be referred to as "ESR" followed by a page reference.

II. *BACKGROUND AND PROCEDURAL HISTORY*

Lectrolarm Custom Systems, Inc. ("Plaintiff" or "Lectrolarm"), sues Pelco, Pelco Sales, Inc., Freedom Acquisitions, Inc., and Security Sales, LLC (together, "Defendants" or "Pelco"), for patent infringement, federal unfair competition under the Lanham Act, trademark cancellation, state statutory dilution, common law trademark infringement, and common law unfair competition. *See* Complaint. Defendants filed an action for a declaration of invalidity of Plaintiff's patent and for non-infringement. *See* CIV-F-01-5772 and CIV-F-00-7109, consolidated under CIV-F-01-6171; Doc.16.

A. *Origin of Litigation*

Plaintiff is a manufacturer and distributor of electronic security products and related equipment. *See* CIV-F-00-7109 Doc.7, Dec. of William V. Smith, para. 3. Pelco is a privately held general partnership in Fresno, California. *See* CIV-F-00-7109 Doc. 11, Dec. of Carrie Migliore, para. 4.

The patented Spector pan and tilt security camera systems involved in this lawsuit are used at retail, industrial, military, correctional, and other sites that require remote visual monitoring. *See* id. at para.para. 5-6. These security cameras are mounted in a way that they may be rotated in a horizontal di rection ("panned") or rotated in a vertical direction ("tilted"). *See* id. at para. 6. Spector security cameras are controlled by digital signals making installation easy and manufacturing economical. *See* id. at para. 7. Prior to the patented invention, the pan and tilt operations were controlled through the use of servo motors using analog feedback signals. *See* CIV-F-00-7109 Doc.6 at p. 4. The analog operating signals were sent through

many different signal lines making installation complicated, and operation susceptible to noise. *See* CIV-F-00-7109 Doc.7 at para. 7.

Plaintiff contends that after its introduction of the Spector system, Defendants began making, selling, offering for sale, and using remote control camera systems having the technology disclosed and claimed in Plaintiff's Patent. *See* id. at para. 9. Defendants identify their remote control camera systems under the marks SPECTRA, SPECTRA II, and SPECTRA LITE. *See* id.. Plaintiff contends that Defendants' infringing activities have forced Plaintiff to cede the California market to Defendants and discontinue participation in various security-related trade shows in California and elsewhere on the West Coast. *See* id. at para. 10.

In response to the alleged infringing activity, Plaintiff mailed two cease-and-desist letters to Pelco. *See* id. at para. 12. On July 24, 2000, Plaintiff filed *Lectrolarm Custom System, Inc. v. Pelco,* Civil Action No. 00-2650 GA, ("Lectrolarm I") in the Western District of Tennessee for alleged patent and trademark infringement. Supplemental claims for dilution and injury to business reputation were asserted under state unfair competition law. *See* CIV-F-00-7109 Doc.8 at Exh. D. On December 11, 2000, Plaintiff dismissed Lectrolarm I and on the same day filed *Lectrolarm Custom System, Inc. v. Pelco Sales, Inc.,* Civil Action No. 00-3172 GV (W.D.Tenn.) ("Lectrolarm II"), against the three individual partners of Pelco: Pelco Sales, Inc., Freedom Acquisitions, Inc., and Security Sales, LLC. *See id.* at Exh. E. Plaintiff later amended its complaint to add Pelco as a defendant. On June 5, 2001, the Tennessee court dismissed the Pelco partners from Lectrolarm II, finding no personal jurisdiction. On September 17, 2001, Lectrolarm II was transferred to this court. *See* Doc.1. Lectrolarm II was later consolidated for all purposes with the current action, CIV-F-01-6171.

On December 12, 2000, Defendants filed a declaratory-judgment action in this court, CIV-F-00-7109 ("Pelco I"), against Plaintiff in response to accusations that Defendants infringed a patent that Plaintiff owns under an assignment. FN2 *See id.* at Exh. D. Defendants seek a court declaration that the ' 088 Patent is invalid, and in the alternative, seek a declaration of noninfringement or patent misuse. *See* id. Defendants filed an Amended Complaint in Pelco I on April 12, 2001. On June 18, 2001, the Pelco partners filed a declaratory judgment action against Plaintiff in the Eastern District of California, CIV-F-01-5772 ("Pelco II"). Pelco II and Pelco I were consolidated for all purposes with the transferred Tennessee case into a single case, CIV-F-01-6171, on October 19, 2001. *See* Doc.16.

FN2. Defendants' motion for partial summary judgment on the ground Plaintiff lacks standing by virtue of an incomplete assignment was denied. *See* Doc. 39, filed November 16, 2001.

B. *Overview of the* '088 Patent

The '088 Patent claims a remote control apparatus for regulating the horizontal and vertical rotation of a television camera. The invention calls out a remote control box with a computer intelligence that is used to input and send position data to a second computerized unit at the camera base. The computer units control the operation of the camera according to pre-programmed instructions inputted through an operating panel connected to the remote control box. The movement of the camera base is driven by a drive circuit and stepper motors. The invention allows automatic operation of the remote camera without a monitoring person. *See* Patent at col.1:63-64. It also provides for detection of abnormal conditions by external signals attached to the camera base by rotating the camera to pre-determined locations or sending a visual alert

signal to the operating panel. Electronic "noise" is reduced, in part, because instead of a plurality of signal lines connecting the control box to the camera base, only two signal lines (three wires including the ground wire) are required. *See* Patent at col.1; col.6:51-55.

The remote control box contains a modulating circuit that modulates the digital signal from the control box's central processing unit ("CPU") before it travels to the camera base over the signal lines. Modulating the signal provides a hardier, more noise-resistant signal that requires only two wires and can travel over greater distances than previously available. A demodulating circuit within the camera base recovers the digital signal for processing by the CPU in the camera base. The recovered digital signal is processed, and further digital signals are generated from the camera base CPU and sent to drive circuit and motors that control the rotation of the camera.

A significant difference between the parties in interpretation of the claims involves the type of modulation of the digital signal disclosed. Lectrolarm argues the '088 Patent teaches no particular type of modulation. According to Lectrolarm, pulse-width modulation or modulation using an analog wave may be used. Pelco argues the '088 Patent limits modulation to an analog sinusoid carrier wave and teaches digital-to-analog conversion for transmission over the signal lines, without utilizing digital modulation or pulse-width modulation.

A second central dispute involves the location of the data storage structure and the means of controlling the camera base. Lectrolarm contends that once the instructions have been programmed, the computerized camera base operates independently of the control box. Lectrolarm maintains the data needed to position the camera according to user-inputted instructions are stored in memory at the camera base. According to Lectrolarm, the presence of the separate computer intelligence and memory at the camera base reduces the signal traffic required over the lines connecting the remote control box to the camera base and furthers the objective of noise reduction. Defendants contend the invention claims only the control box and does not claim any part of the camera, camera base, or any independent computer intelligence in the camera base. According to Defendants, all "operating" and "home position" data is stored in memory located in the control box and all signals in furtherance of automatic operation originate in the transmitting side CPU in the control box.

C. *Markman Hearing Expert Testimony*

During the Markman hearing on December 14, 2001, and January 22, 30, and 31, 2002, the parties offered evidence including testimony of expert witnesses to explain the patented technology and how terms in the patent are understood by people of ordinary skill in the relevant art. Lectrolarm offered the expert testimony of two experts, Dr. Enrique Barbieri and Dr. Bernard Sklar. Dr. Enrique Barbieri was qualified as an expert in the fields of electrical engineering and control systems. *See* RT at 11:19-22. Dr. Bernard Sklar was qualified as an expert in the field of digital communications and, specifically, in the design, definition, and evaluation of digital communication systems and their performance. *See* RT at p. 446:14-18. Pelco offered the expert testimony of Dr. James Adams, who was qualified as an expert in the fields of electrical engineering, hardware design, and computer memories. *See* RT at p. 17 9:13-15.

III. *LEGAL STANDARD*

Sextant Avionigue, S.A. v. Analog Devices, Inc., 172 F.3d 817 (Fed.Cir.1999), explains:

An infringement analysis entails two steps. The first step is determining the meaning and scope of the patent

claims asserted to be infringed. The second step is comparing the properly construed claims to the device accused of infringing." Markman v. Westview Instruments, Inc., 52 F.3d 967, 976 (Fed.Cir.1995) (en banc), *aff'd,* 517 U.S. 370, 116 S.Ct. 1384, 134 L.Ed.2d 577 (1996). The first step, claim construction, is a question of law.... *See* Cybor Corp. v. FAS Techs., Inc., 138 F.3d 1448, 1456 (Fed.Cir.1998) (*en banc*). The second step is factual. *See Worth* Am. Vaccine, Inc. v. American Cyanamid Co., 7 F.3d 1571, 1574 (Fed.Cir.1993). When construing a claim, a court principally consults the evidence intrinsic to the patent, *viz.,* the claims themselves, the written description portion of the specification, and the prosecution history. *See* Vitronics Corp. v. Conceptronic, Inc., 90 F.3d 1576, 1582-83 (Fed.Cir.1996).

Sextant Avionigue, 172 F.3d at 825 (citations altered).

A patent is a fully integrated document. It must set out a written description of the invention "in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains" to practice the invention. 35 U.S.C. s. 112. "A patent must describe the exact scope of an invention and its manufacture to secure to [the patentee] all to which he [or she] is entitled, [and] to apprise [sic] the public of what is still open to them." Markman, 517 U.S. at 373 (citation omitted). In interpreting the meaning of an asserted claim, a court should first refer to the following sources of intrinsic evidence: the patent claims, the specification, and the prosecution history. *See* Phillips Petroleum Co. v. Huntsman Polymers Corp., 157 F.3d 866, 870 (Fed.Cir.1998); Vitronics, 90 F.3d at 1582. Intrinsic evidence alone will usually be sufficient to resolve any ambiguities in disputed claim terms. *See* Vitronics, 90 F.3d at 1583. In such cases, extrinsic evidence should not be considered. *See id*.

A. ***Patent Language***

In construing the meaning of disputed claim terms, the court first looks to the words (both asserted and nonasserted) of the claims themselves. *See id*. at 1582. "[T]he language of the claim defines the scope of the protected invention." Bell Comm. Research, Inc. v. Vitalink Comm., Corp., 55 F.3d 615, 619 (Fed.Cir.1995); *see also* Vitronics, 90 F.3d at 1582. Words are generally given their ordinary and plain meaning, although a patentee may choose to be a lexicographer and define a word in a way other than its ordinary meaning. *See id*. (citing Hoechst Celanese Corp. v. BP Chems. Ltd., 78 F.3d 1575, 1578 (Fed.Cir.1996) ("A technical term used in a patent document is interpreted as having the meaning that it would be given by persons experienced in the field of the invention, unless it is apparent from the patent and the prosecution history that the inventor used the term with a different meaning."). The words of the claim are interpreted in accordance with their ordinary meaning, as understood by a person reasonably skilled in the art. *See* Quantum Corp. v. Rodime, PLC, 65 F.3d 1577, 1580 (Fed.Cir.1995); Vitronics, 90 F.3d at 1582; Intellicall, Inc. v. Phonometrics, Inc., 952 F.2d 1384, 1387 (Fed.Cir.1992). Technical terms should be construed from the perspective of a person experienced in the field of the invention. *See* CVI/Beta Ventures, Inc. v. Tura LP, 112 F.3d 1146, 1153 (Fed.Cir.1997). In order to ascribe a special definition to a claim term, the definition must be clearly stated in the patent specification or the file history. Vitronics, 90 F.3d at 1582 (citing Hoechst, 78 F.3d at 1578). A claim should not be construed in a manner that renders the claim language meaningless or superfluous. Texas Instruments, Inc. v. United States Int'l Trade Comm'n, 988 F.2d 1165, 1171 (Fed.Cir.1993).

B. ***Specification***

The claims "must be read in view of the specification, of which they are a part." Markman, 52 F.3d at 979. Section 112 provides:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

35 U.S.C. s. 112, para.para. 1-2.

The specification is reviewed "to determine whether the inventor has used any terms in a manner inconsistent with their ordinary meaning." Vitronics, 90 F.3d at 1582; CVI/Beta Ventures, 112 F.3d at 1153. If the inventor uses a term in a manner other than its ordinary meaning, that meaning is given effect because the inventor is free to be his or her own lexicographer. *See* Vitronics, 90 F.3d at 1582 (citing Hoechst, 78 F.3d at 1578). In this regard, the specification "may act as a sort of dictionary ." Markman, 52 F.3d at 979. The specification can define terms either explicitly or by implication. *See* Vitronics, 90 F.3d at 1582 (citing Markman, 52 F.3d at 979).

The specification "is always highly relevant to the claim construction analysis. Usually, it is dispositive; it is the single best guide to the meaning of a disputed term." Vitronics, 90 F.3d at 1582. Though claims should always be read in view of the specification, the Federal Circuit cautions that the scope of a claim should not be limited to specific embodiments disclosed in the specification. *See, e.g.,* Ekchian v. Home Depot, Inc., 104 F.3d 1299, 1303 (Fed.Cir.1997); Intervet America, Inc. v. Kee-Vet Labs., Inc., 887 F.2d 1050, 1053 (Fed.Cir.1989).

This cautionary instruction has an exception for so-called "means-plus-function" claims. Since 1952, the Patent Act has allowed claim elements to be expressed in functional language. *See Robert P. Merges et al., Intellectual Property in the New Technological Age,* 261-62 (1997). The Patent Act 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.FN3

FN3. The "and equivalents thereof" language is a source of confusion. "For means-plus-function claim language, the 'literal' scope of the claim itself includes the means described in the specification and equivalents to the specification. In addition to this literal scope, the patentee may also receive broader protection under the doctrine of equivalents." Merges at 263-64. For claim construction purposes, the important point is that a means-plus-function claim includes not only the structure described in the specification, but also equivalents to that structure.

35 U.S.C. s. 112, para. 6.

Claims written under Section 112, para. 6, are known as "means-plus-function" claims. A means-plus-function claim does not capture all means for accomplishing the function; instead it captures only those means actually discussed in the specification. *See* Merges at 262; Kahn v. Gen'l Motors Corp., 135 F.3d

1472, 1476 (Fed.Cir.1998) ("Unlike the ordinary situation in which claims may not be limited by functions or elements disclosed in the specification, but not included in the claims themselves, in writing a claim in means-plus-function form, a party is limited to the corresponding structure disclosed in the specification and its equivalents."). "The plain and unambiguous meaning of paragraph six is that one construing means-plus-function language in a claim must look to the specification and interpret that language in light of the corresponding structure, material, or acts described therein, and equivalents thereof, to the extent that the specification provides such disclosure." In Re Donaldson Co., 16 F.3d 1189, 1193 (Fed.Cir.1994). "[S]tructure supporting a means-plus-function claim under s. 112, para. 6 must appear in the specification." Atmel Corp. v. Info. Storage Devices, 198 F.3d 1374, 1381 (Fed.Cir.1999). Section 112, para. 6, "represents a quid pro quo by permitting inventors to use a generic means expression for a claim limitation provided that the specification indicates what structure(s) constitute(s) the means.... Fulfillment of the s. 112, para. 6 tradeoff cannot be satisfied when there is a total omission of structure. There must be structure in the specification ." Id. at 1381-82. "[S]tructure disclosed in the specification is 'corresponding' structure only if the specification or prosecution history clearly links or associates that structure to the function recited in the claim." B. Braun Med., Inc. v. Abbott Labs., 124 F.3d 1419, 1424 (Fed.Cir.1997).

To qualify as a claim under Section 112, para. 6, "the alleged means-plus-function claim element [can]not recite a definite structure which performs the described function. Patent drafters conventionally [use] the words 'means for' followed by a recitation of the function performed. Merely because a named element of a patent claim is followed by the word 'means,' however, does not automatically make that element a 'means-plus-function' element under 35 U.S.C. s. 112, para. 6." Cole v. Kimberly-Clark Corp., 102 F.3d 524, 531 (Fed.Cir.1996). "An element with ... detailed recitation of its structure, as opposed to its function, cannot meet the requirements of the statute." *Id*. Whether a claim is a means-plus-function claim is a matter of law to be determined element-by-element by the court. *See id*.

C. *Prosecution History*

When construing the language of a claim, the prosecution history of the patent should be considered, provided that it is in evidence. Southwall Tech., Inc. v. Cardinal IG Co., 54 F.3d 1570, 1576 (Fed.Cir.1995); Markman, 52 F.3d at 980; Vitronics, 90 F.3d at 1582 (citing Graham v. John Deere, 383 U.S. 1, 86 S.Ct. 684, 15 L.Ed.2d 545 (1966)); CVI/Beta Ventures, 112 F.3d at 1155. The prosecution history, or file wrapper, of the patent provides a complete record of all proceedings, including all express representations made by the patent applicant regarding the scope of the claims, before the Patent and Trademark Office ("PTO"). *See* Vitronics, 90 F.3d at 1583. The file wrapper limits the scope of a claim term so as to exclude any interpretation disclaimed during prosecution of the patent. *See* id. at 1583 (citing Southwall Tech., 54 F.3d at 1576); CVI/Beta Ventures, 112 F.3d at 1155. In addition, any prior art cited during the prosecution history may indicate what the patent claims do not cover. *See* Vitronics, 90 F.3d at 1583 (citing Autogiro Co. of America v. United States, 181 Ct.Cl. 55, 384 F.2d 391, 399 (Ct.Cl.1967)). However, the prosecution history "cannot enlarge, diminish, or 'vary' the limitations in the claims." Markman, 52 F.3d at 980 (quoting Goodyear Dental Vulcanite Co. v. Davis, 102 U.S. 222, 227, 26 L.Ed. 149 (1880)).

D. *Extrinsic Evidence*

Extrinsic evidence may be resorted to only for interpretation of terms used in the claim and specification when their meaning is in dispute or ambiguous. *See* Vitronics, 90 F.3d at 1584-85. Extrinsic evidence is "all evidence external to the patent, including expert and inventor testimony, dictionaries, and learned treatises." Markman, 52 F.3d at 979, 980. Extrinsic evidence may be consulted during construction of a claim to assist with the understanding of "scientific principles, the meaning of technical terms, and terms of art that appear

in the patent and prosecuti on history." Markman, 52 F.3d at 980; *see* Vitronics, 90 F.3d at 1584. Extrinsic evidence may be received to aid in " 'coming to a correct conclusion' as to the true meaning of the language employed in the patent." Markman, 52 F.3d at 979 (citations omitted). After consideration of all available intrinsic evidence, if there still is some genuine ambiguity in the claims, extrinsic evidence may be consulted to interpret the meaning of the language used in the claim. *See* Vitronics, 90 F.3d at 1584. Extrinsic evidence cannot be used, however, for the purpose of varying or contradicting the terms of the claims. *See id*.

IV. *ANALYSIS*

The Patent contains seven claims. Only the interpretation of claims one through five are at issue in this case.

A. *Claim 1*

Claim 1 reads:

A remote control apparatus for a rotating camera base that supports a television camera such that it FN4 is rotatable in the horizontal and vertical directions, said remote control apparatus for a rotating camera comprising:
FN4. The parties do not dispute that the word "it" in the preambles to claims 1 and 2 refer to the "camera base," not the "television camera."

a first controlling means that outputs a digital signal for driving and controlling said rotating camera base, a modem for receiving and transmitting said digital signal outputted from said first controlling means for driving and controlling said rotating camera base, said modem including a modulating circuit and a demodulating circuit;

a control box including said modulating circuit that outputs the modulated version of the digital signal from said first controlling means with a prescribed carrier wave, said modulating circuit being electrically connected to said first controlling means,

said demodulating circuit that recovers the digital signal from the modulated input from said modulating circuit being provided in said rotating camera base and electrically connected to said modulating circuit, and

a second controlling means that drives and controls said rotating camera base based on the digital signal from said demodulating circuit, said second controlling means being electrically connected to said demodulating circuit of said modem.

Patent, attached as Exh. A to Def. Brief, at col:10:10-37.

1. *First Paragraph: Preamble*

Lectrolarm argues the preamble to claim 1 (i.e., the first paragraph of claim 1, beginning, "A remote control apparatus ...") is not a limitation of the claim because the main body of claim 1 provides a "structurally complete" invention. *See* Pl. Brief at pp. 22-23. Defendants argue the preamble does limit the claim "because without the preamble the claim is severely incomplete." *See* Def. Opp. at p. 6:22. Generally a preamble does not limit the claim. *See* Bell Comm. Research, Inc., 55 F.3d at 621. Where a preamble is "deemed essential to point out the invention defined by the claim," the preamble functions as a limitation

which breathes life into the claim. *See* id. at 621; Perkin-Elmer Corp. v. Computervision Corp., 732 F.2d 888, 896 (Fed.Cir.1984).

Lectrolarm concedes that "the preamble encompasses a remote control apparatus including elements in a control box and at a remotely located camera base." Pl. Reply at p. 2:2-4. Lectrolarm contends that any preamble "limitations should refer to the remote location and the support and range of motion afforded by the rotating camera base." Pl. Brief. at p. 23:19-21. The words, "remote control apparatus," "breathe life" into claim 1. The preamble limits the claim to a remote control apparatus for "a rotating camera base that supports a television camera ... rotatable in the horizontal and vertical directions." Patent at col.10:10-12. These words indicate the remote control apparatus only functions to operate a camera base capable of rotating a television camera in the horizontal and vertical directions. These words provide meaning to the rest of the claim, especially references to "said rotating camera base." The preamble limits the claim and is interpreted as:

A remote control apparatus that operates a television camera base rotatable in the horizontal (pan) and vertical (tilt) directions, said remote control apparatus comprising ....

2. ***Second Paragraph***

The interpretation of the second paragraph of claim 1 ("a first controlling means ...") is not disputed. *See* Pl. Interp. at p. 53:5-7; Def. Interp. at p. 14:11-12. The second paragraph is a means-plus-function limitation. "In construing means-plus-function claim limitations, a court must first define the particular function claimed. Thereafter, the court must identify 'the corresponding structure, material, or acts described in the specification.' It is not until the structure corresponding to the claimed function in a means-plus-function limitation is identified and considered that the scope of coverage of the limitation can be measured." Budde v. Harley-Davidson, Inc., 250 F.3d 1369, 1376 (Fed.Cir.2001) (quoting 35 U.S.C. s. 112, para. 6). For purposes of indefiniteness under 35 U.S.C. s. 112, para. 2, the adequacy of the structure disclosed in the specification is measured from the perspective of one "skilled in the [relevant] art." *Id*.

The function of this means-plus-function limitation is to output a digital signal consisting of instructions to position the camera base. The structure accomplishing the function is the transmitting side CPU, or digital electronic processor, of the control box (e.g., CPU (28) FN5 in the first embodiment depicted in Figure 1), and equivalents thereof.

FN5. Numbers in parentheses refer to numbers on the figures in the Patent. Parentheses are added for clarity.

3. ***Third Paragraph***

In their initial Markman briefs, the parties did not dispute the interpretation of the third paragraph of claim 1 ("a modem for receiving ..."). Both parties agreed that the third paragraph's limitation is a modem consisting of a modulator for converting the CPU's digital signal into an analog signal and a demodulator for converting the analog signal back into a digital signal. *See* Pl. Brief at p. 26; Def. Brief at pp. 23-24.

During the Markman hearing, a dispute arose about the proper interpretation of the third paragraph, particularly the terms "modem," "modulating circuit," and "demodulating circuit." This dispute includes the proper interpretation of the term, "carrier wave," mentioned in paragraph four. The parties presented expert

testimony and filed supplemental briefs addressing the meaning of these four terms.

Lectrolarm argues: 1) "modem" means "a modulating and a demodulating circuit;" 2) "modulating circuit" means "a circuit that outputs a modulated version of a digital signal received from the first controlling means with a prescribed carrier wave. The modulating circuit can use analog or digital modulation techniques. The modulating circuit must be part of the electrical structure of the control box;" 3) "demodulating circuit" means "a circuit that converts the modulated signal received from the modulating circuit back into a digital signal. The demodulating circuit can use analog or digital modulation techniques. The demodulating circuit must be part of the electrical structure of the camera base;" 4) "carrier wave" means "a wave having at least one characteristic that may be varied from a known reference value by modulation. The carrier wave may be a sine wave or a series of pulses." Pl. Interp. at p. 55:6-7; p.58:16-24.

Pelco argues: 1) "modem" means "a device which modulates a digital signal onto an analog carrier wave and demodulates the signal to recover the digital control signal from the modulated carrier wave;" 2) "modulating circuit" means "a circuit which performs modulation. Modulation is the process of modulating a digital control signal onto an analog carrier wave. 'Modulation' as taught in the '088 Patent does not include pulse width modulation. The modulating circuit is physically located in the control box;" 3) "demodulating circuit" means "a circuit which performs demodulation. Demodulation is the process of recovering a digital control signal from a modulated analog carrier wave. The demodulating circuit is physically located in the rotating camera base;" 4) "carrier wave" means "an analog sinusoidal wave, not a digital signal or a pulse train." Def. Interp. at p. 14:23-p.15:28.

The conflicting interpretations of these four terms reveal two basic disputes: a) whether the claim limits the carrier wave to an analog sinusoidal wave, or whether a carrier wave can be a series of pulses or digital signals; and b) whether the claim limits the physical location of the modulating and demodulating circuits or simply describes their electrical configuration with respect to other components in the claimed apparatus. Paragraphs three through five of claim 1 are not "means-plus-function" clauses. Although the terms in these paragraphs are interpreted using the specification as a guide, their meaning is not limited to specific embodiments disclosed in the specification. *See* Ekchian, 104 F.3d at 1303; Vitronics, 90 F.3d at 1582.

a. ***ANALOG v. DIGITAL NATURE OF CARRIER WAVE***

In its original claim construction chart, filed December 5, 2001, Lectrolarm advocated the following definition of the term "modem":

The modem consists of at least a modulator for converting from digital to analog and a demodulator for converting analog to digital. The modem modulates and transmits the digital signal produced by the first controlling means to the camera base.

A modem is a device for (1) converting a digital (discrete) signal to an analog (continuous) signal, (2) transmitting the analog signal, and (3) converting the analog signal back to a digital signal.

Pl. Reply, Exh. A at p. 2; *see also* Barbieri Decl., attached as Exh. 3 to Fisher's Supp. Decl., filed Nov. 1, 2001, at para. 13 ("At the transmitting end, the Modem converts the digital signal level (high, low) to a type of analog carrier signal that is compatible with the characteristics of the particular communication line.").

Lectrolarm now argues the modulating and demodulating circuits comprising the modem "can use analog or

digital modulation techniques." Pl. Interp. at p. 58:16-22. Pelco argues Lectrolarm's "180 degree reversal of its claim interpretation position with respect to the terms 'modem', 'carrier wave', 'modulation', and 'demodulation' ... results from Lectrolarm's [belated] realization that it could not successfully prevail in its newly proposed infringement claim against the Pelco coaxitron product with its initially offered claim interpretations of Claim 1." Def. Supp. Brief at p. 4:28-p.5:5.FN6 Pelco agrees with Lectrolarm's original interpretation and argues Lectrolarm's new broader interpretation is a "desperate" attempt to accuse products with larger sales now that discovery has revealed that Pelco's allegedly infringing PelcoVision products' sales are minimal. *See* Def. Supp. Brief at p. 7:27-p.8:6.

FN6. 0n March 20, 2002, Lectrolarm's motion to amend the scheduling order in order to supplement its claim charts by adding infringement claims against Pelco's coaxitron products was granted. *See* Doc.152. Lectrolarm argued in support of its motion that, because of the complexity of the technology involved and allegedly contradictory sworn statements by Pelco about the nature of communication used by its products, Lectrolarm lacked a firm basis for accusing Pelco's coaxitron controllers until December 2001, after its initial Markman brief was filed.

Lectrolarm responds that its original definition was directed towards a specific Pelco product and was formulated as part of Lectrolarm's defense to Pelco's motion for summary judgment. Pl. Supp. Resp. at p. 9:16-22. Lectrolarm contends Dr. Barbieri's declaration identified "one type of modulation, and was never intended to be the exclusive list that Pelco wants it to be." *Id* . Lectrolarm contends that on the first day of the Markman hearing, it agreed to accept Pelco's position that interpretation of non-means-plus-function elements (such as the terms "modem", "modulating circuit", "demodulating circuit", and "carrier wave") was unnecessary. *See* Pl. Supp. Resp. at p. 6:5-14 (citing RT at pp. 37-38). Lectrolarm argues it was Pelco that made a "180 degree reversal of its claim interpretation position" and that Pelco's subsequent position that these terms did require interpretation forced Lectrolarm to respond with a more comprehensive definition. *See* Pl. Supp. Resp. at p. 6:15-22.

Lectrolarm argues Pelco's change in position is part of a continuous effort to insert infringement arguments into the claim interpretation phase of the case. *See id*. at pp. 12-13. Lectrolarm argues Pelco advocates that the analog limitation be read into claim 1 because at least some of Pelco's allegedly infringing "products use pulse width modulation, which Pelco would like to believe does not use an analog or sinusoidal carrier wave." Pl. Supp. Resp. at p. 13:8-12.

At the Markman hearing/claim construction phase of patent litigation, "the words of the claims are construed independent of the accused product.... [T]he particular accused product (or process) is kept in mind, for it is efficient to focus on the construction of only the disputed elements or limitations of the claims." Scripps Clinic & Research Foundation v. Genentech, Inc., 927 F.2d 1565, 1580 (Fed.Cir.1991). Claim construction elaborat[es] the normally terse claim language[ ] in order to understand and explain, but not to change, the scope of the claims." *Id.; see also* Embrex, Inc. v. Service Eng'g Corp., 216 F.3d 1343, 1347 (Fed.Cir.2000) (same, quoting Scripps, 927 F.2d at 1580). The parties' dispute over whether the carrier wave identified in claim 1 is limited to an analog wave is properly addressed in an efficient, focused claim construction. No explicit reference to, or comparison with, the accused products is necessary to resolve the issue.

The '088 Patent itself does not explicitly limit the type of modulation used. Nowhere in the Patent is the prescribed carrier wave limited to an analog or sinusoidal wave. The terms "analog" and "sinusoidal" or

variants thereof are not used anywhere in the Patent. The '088 Patent claims, *inter alia,* a "modulating circuit that outputs the modulated version of the digital signal from said first controlling means with a prescribed carrier wave." Patent at col.10:23-26. The specification describes the first embodiment, in relevant part, as follows:

The output signal from the CPU (28) of the transmitting side is sent to a modulating circuit (32a). This modulating circuit (32a) performs a modulating operation on the digital signal from the CPU (28) of the transmitting side using a prescribed carrier wave in order to make the signal suitable for transmission. The output from this operation is sent along the signal line (27) to a demodulating circuit (32b) provided inside the rotating camera base (1). The demodulating circuit (32b) separates the carrier wave from the output signal sent by the modulating circuit (32a), recovers the digital signal and outputs this recovered signal to the CPU (33) of the receiving side. Thus, the modulating circuit (32a) inside the control box (26) and the demodulating circuit (32b) inside the rotating camera base (1) make up a modem.

Patent at col.4:41-55. The prosecution history is similarly devoid of any definition or limitation on the type of modulation used. *See* Def. Brief, Exh. B at 00117-24 (adding what is currently paragraph 3 to claim 1 after an initial rejection, but providing no interpretation of the terms "modem", "modulating circuit", "demodulating circuit", or "carrier wave").

The parties both reference definitions in dictionaries. Dictionary definitions are not treated like other extrinsic evidence. *See* Karlin Technology, Inc. v. Surgical Dynamics, Inc., 177 F.3d 968, 971 (Fed.Cir.1999) (using a dictionary to interpret the ordinary meaning of a claim term). A court may consult technical treatises and dictionaries to better understand the underlying technology. *See* Vitronics, 90 F.3d at 1584 n. 6. A dictionary definition may be relied upon in claim construction as long as the dictionary definition does not contradict any definition propounded explicitly or implicitly in the patent documents. *See id.*

Lectrolarm moved into evidence definitions from two different dictionaries: 1) *The IEEE* FN7 *Standard Dictionary of Electrical and Electronics Terms,* Sixth Edition ("IEEE Dictionary, 6th ed."); and 2) *Hargrave's Communications Dictionary* ("Hargrave's Dictionary"). The IEEE Dictionary, 6th ed., for the term "carrier wave" states, "see carrier." *See* RT at p. 408:17-18, p. 455:16-17. The IEEE Dictionary, 6th ed., gives the word "carrier" five definitions. Lectrolarm's position is that the first definition describes the term "carrier wave" as used in the '088 Patent, while Pelco argues only the fifth definition applies. *See* Pl. Supp. Resp. at p. 10:10-18; Def. Supp. Brief at p. 8:27-p.9:5, p. 10:19-p.11:6. The first and fifth entries under the term "carrier" in the IEEE Dictionary, 6th ed., are as follows:

FN7. IEEE stands for Institute of Electrical and Electronics Engineers.

(1) (A) (data transmission) A wave having at least one characteristic that may be varied from a known reference value by modulation. (B) (data transmission) That part of the modulated wave that corresponds in a specified manner to the unmodulated wave, having, for example, the carrier-frequency spectral components. *Note:* Examples of carriers are a sine wave and a recurring series of pulses.
...

(5) (A) A continuous frequency capable of being modulated or impressed with a signal. *Synonym:* carrier wave. (B) An alternating current that oscillates at a fixed frequency-used to transmit a signal.

IEEE Dictionary, 6th ed., at pp. 134-35.
Dr. Adams testified that, although the IEEE Dictionary provides five definitions for the term, "carrier", definition (5)(A) is "the only one that [expressly] says [it]'s a synonym for 'carrier wave'." RT at p. 408:21-22. Dr. Adams testified the definition in (5)(A) "is an analog carrier wave." RT at p. 341:8; p.409:2. Dr. Adams testified: " 'Carrier wave' as a term of art is commonly understood by a person of ordinary skill in the art to be an analog signal," RT at p. 337:8-9, and in the context of the '088 Patent, modulation refers to "the conversion of a digital signal into an analog carrier signal." RT at p. 230:3-7. Dr. Adams testified his position is consistent with Dr. Barbieri's declaration, representing Lectrolarm's original position as to the proper interpretation of the term, "modem". *See* RT at pp. 228-30.

Dr. Barbieri testified at the Markman hearing that the term "modulation" in the '088 Patent could refer to any type of modulation. *See* ESR at p. 44:14-16, p. 50:23-p.51:4, p. 52:22-23. In Dr. Barbieri's expert opinion, the modulation described in the Patent could be pulse width modulation. *See* ESR at p. 44:5-9. He testified that "carrier wave" could mean a train of pulses. *See* ESR at p. 42:1-23. Dr. Barbieri testified that the Patent did not limit the carrier wave to any particular form. *See* ESR at p. 44:24-p.45:8.

A second Lectrolarm expert, Dr. Sklar, testified that he disagreed with Dr. Adams' testimony that the term "carrier wave" in the '088 Patent was limited to a sinusoidal analog wave and that "carrier wave" did not include a pulse train as a carrier wave. *See* RT at p. 455:10-p.456:19. In Dr. Sklar's expert opinion, the terms "carrier", "carrier wave", "carrier waveform", and "carrier signal" are all synonyms. *See* id. Dr. Sklar testified the '088 Patent, by use of the term "carrier wave," claims both pulse width modulation and sinusoidal wave modulation. *See* id. Dr. Sklar testified that "carrier," as defined in the IEEE Dictionary, 6th ed., includes both sine waves and pulse trains, two types of carrier waves that could be used to perform the function of the "prescribed carrier wave" called out in the '088 Patent. *See* RT at p. 450-53, p. 457:5-16, 464:8-12.

The IEEE Dictionary, 6th ed., defines "modem" as follows:

(1) (data transmission) A contraction of Modulator-DEModulator, an equipment that connects data terminal equipment to a communication line.

(2) (supervisory control, data acquisition, and automatic control) A modulator/demodulator device that converts serial binary digital data to and from the signal form appropriate for the respective communication channel.

(3) (broadband local area networks) A modulator-demodulator device. The modulator encodes digital information onto an analog carrier signal by varying the amplitude, frequency, or phase of that carrier. The demodulator extracts digital information from a similarly modified carrier. A modem transforms digital signals into a form suitable for transmission over an analog medium.

(4) A device that modulates and demodulates signals transmitted over data communication facilities. One of the functions of a modem is to enable digital data to be transmitted over analog transmission facilities.

(5) (A) A device that performs modulation and demodulation functions necessary to transmit signals over communication lines. *Note:* This term originated as an abbreviation for modulator-demodulator. *Synonyms:* data set; demodulator-modulator; modulator-demodulator. *See also:* acoustic coupler.

(B) A device that transforms a digital signal received into an analog signal and vice versa.

IEEE Dictionary, 6th ed., at 660.

Pelco argues the correct definitions of "modem" in the context of the '088 Patent are definitions (4) and (5)(B). *See* Def. Supp. Brief at p. 8. Lectrolarm argues the correct definition is definition (1), the "only one [that] is for data transmission." Pl. Supp. Resp. at p. 8.

The IEEE Dictionary, 6th ed., defines pulse-width modulation as follows:

(1) Pulse-time modulation in which the value of each instantaneous sample of the modulating wave is caused to modulate the duration of a pulse. The modulating frequency may be fixed or variable. Examples of waveforms produced by PWM are shown in the corresponding figure. *See also:* pulse-duration modulation

(2) A form of pulse modulation in which the duration of the pulse carrier is varied.

IEEE Dictionary, 6th ed., at p. 842-43.

Hargrave's Dictionary defines "pulse duration modulation" as follows:

A method of modulating a carrier consisting of a train of pulses with another signal. The only parameter of the carrier to be affected by the modulation process is the duration (width) of the individual pulse.

Pules duration modulation is sometimes called pulse length modulation or pulse width modulation, both of which are deprecated terms. See also *modulation*.

Hargrave's Dictionary at p. 417.

Dr. Sklar defined modulation as "the process by which information will be placed upon a carrier wave to transport it." RT at p. 448:9-10. Modulation is the process of modifying, adjusting, or modulating "the characteristics of the carrier wave so that information can be imparted to it." RT at p. 448:12-15. The data being transmitted modulates the carrier wave, the carrier wave is modulated, and the result is that information is "modulated onto a carrier wave." *See* RT at p. 465:22-24, p. 472:1. Dr. Sklar testified that when a pulse train is used as a carrier wave, the carrier wave is a "digital waveform" with an idealized shape represented by digits, discrete pulses increasing and decreasing in intensity in "zero time." *See* RT at pp. 470-71. Dr. Sklar testified that when the pulse train carrier wave is shown "as it's actually transmitted," it is analog. RT at p. 471:8-9. "[W]hen you actually make a transmission, everything is analog. Whether it's pulses or whether it's a carrier wave, it's simply going to follow the laws of physics to be continuous and to have infinite resolution. And, therefore, anything that you send on a line is on an analog wave." RT at 471:11-16.

Dr. Sklar testified that, within the context of a radio system, the most general type of modulation would involve the modulation of digital data onto a sine wave. *See* RT at p. 477:21-p.478:3. Dr. Sklar added: "For any other system, I'm not sure that that's the most general, no. If it's a baseband system, as we described, it could be either one, either a pulse train or a sinusoid." Id. at p. 478:4-6. "[W]hat drives one to choose a

particular form of modulation are a half dozen criteria," including the quality of the arriving data, distance of transmission, amount of available power, capacity, speed, and expense. *See* RT at pp. 474-75. Dr. Sklar's expert opinion is that "the ' 088 Patent is not limited to any one form of modulation." RT at p. 476:10-12.

The literal meaning of a claim is fixed upon its issuance. *See Al-* Site Corp. v. VSI International, Inc., 174 F.3d 1308, 1320 (Fed.Cir.1999). Variants of a claimed invention that are based on after-developed technology could not have been disclosed in a patent. *See* Chiuminatta Concrete Concepts v. Cardinal Industries, Inc., 145 F.3d 1303, 1310 (Fed.Cir.1998). When a claim is written sufficiently broadly to cover after-developed technologies, the claims may be construed to limit their scope to those technologies disclosed in the written description of a patent. *See* Wang Labs., Inc. v. America Online, Inc., 197 F.3d 1377, 1383 (Fed.Cir.1999). Later-developed technologies may infringe a patent only under the doctrine of equivalents. *See Al-* Site Corp., 174 F.3d at 1320 ("An 'after arising equivalent' infringes, if at all, under the doctrine of equivalents.").

Dr. Sklar estimated that pulse width modulation was being used as early as 1945. *See* RT at p. 477:9-16. Dr. Adams testified that modems in 1985 could not transmit data as fast as today's modems. *See* RT at p. 206:5-6. Pelco does not argue that the '088 Patent cannot teach pulse width modulation because it was invented after the Patent issued. The '088 Patent was given a priority filing date of May 13, 1988. According to Dr. Sklar, pulse width modulation technology existed at that time. While the issue of later-developed technology may be relevant at the infringement stage of the litigation, no evidence was presented about the history of transmission technology which can be used to interpret the claims.

The Encyclopedia.com website describes "modulation" in the context of communications as:

a process in which some characteristic of a wave (the carrier wave) is made to vary in accordance with an information-bearing signal wave (the modulating wave); demodulation is the process by which the original signal is recovered from the wave produced by modulation. The original, unmodulated wave may be of any kind, such as sound or, most often, electromagnetic radiation, including optical waves. The carrier wave can be a direct current, an alternating current, or a pulse chain. In modulation, it is processed in such a way that its amplitude, frequency, or some other property varies.

http://www.encyclopedia.com/html/m/modulatl.asp.

In summary, Pelco's position is supported by 1) the testimony of Dr. Adams that in the context of the '088 Patent, modulation refers to "the conversion of a digital signal into an analog carrier signal." RT at p. 230:3-7. This testimony accords with Lectrolarm's original position and the declaration of Dr. Barbieri, one of Lectrolarm's experts, *see* Pl. Brief; 2) two IEEE Dictionary definitions advocated by Pelco describe the term, "modem," as a device that transmits digital signals over analog transmission lines, *see* IEEE Dictionary, 6th ed. at 660 (definitions (4) and (5)(B)); and 3) the only IEEE Dictionary definition of the term, "carrier," that is explicitly a synonym for the term, "carrier wave," defines "carrier" as "[a] continuous frequency capable of being modulated or impressed with a signal. *Synonym:* carrier wave." IEEE Dictionary, 6th ed., at p. 134.

Lectrolarm's position is supported by 1) the words of the '088 Patent, which do not specify the type of modulation used; 2) the testimony of Dr. Sklar who testified that the '088 Patent claims both pulse width modulation and sinusoidal wave modulation and that all signal transmission, including transmission using pulse trains as carrier waves, involves an analog wave; 3) Dr. Barbieri's testimony that "modulation"

includes pulse width modulation and "carrier wave" includes a pulse train within the meaning of the '088 Patent, *see* ESR at pp. 42-52; and 4) IEEE Dictionary definitions of "carrier" as including "a sine wave and a recurring series of pulses," *see* IEEE Dictionary, 6th ed., at p. .134, and "modem" as "[a] contraction of MODULATOR-DEModulator," IEEE Dictionary, 6th ed., at p. 660, the first of which is explicitly adopted by Dr. Sklar, *see* RT at p. 457:5-16.

The four technical terms, "modem", "modulating circuit", "demodulating circuit", and "carrier wave", are interpreted according to their ordinary meaning as understood by a person reasonably skilled in the art. *See* Quantum Corp., 65 F.3d at 1580. Since no special meaning is ascribed to these terms in the Patent, the issue is whether the "ordinary meaning" of these terms, as understood by one skilled in the art, is limited to analog transmission using a sinusoidal carrier wave, or whether it includes modulation using other types of carrier waves such as pulse trains. *See* Vitronics, 90 F.3d at 1582. Thisissue has now been dispositively resolved by the court-appointed technical expert.

A claim should not be construed in a manner that renders the claim language meaningless or superfluous. Texas Instruments, 988 F.2d at 1171. The '088 Patent uses the term, "carrier wave," rather than simply "carrier." Although Dr. Sklar testified that "carrier" is a synonym of "carrier wave," the term "wave" would be superfluous if it is interpreted to add nothing to the meaning of what is claimed. The use of the term "carrier wave" rather than "carrier" is significant because the IEEE Dictionary, a source relied upon by both parties as authoritative, calls out only one definition of the term "carrier" as being synonymous with "carrier wave." Definition (5)(A) defines "carrier": "A continuous frequency capable of being modulated or impressed with a signal. *Synonym:* carrier wave." IEEE Dictionary, 6th ed., at p. .134. The term "carrier wave" as used in the '088 Patent is interpreted to mean "a continuous frequency capable of being modulated or impressed with a signal." It is not limited to a wave that is exclusively sinusoidal in form.

This interpretation is consistent with Dr. Sklar's testimony that all signal transmission over a communication line, "[w]hether it's pulses or whether it's a carrier wave ... is on an analog wave." RT at p. 471:16. Dr. Barbieri testified that pulse amplitude modulation FN8 involves transmission using an analog signal. *See* ESR at p. 50:7-13. All three experts apparently agree ultimately that the "prescribed carrier wave" in the ' 088 Patent must, at its core, be "analog." How each expert defines "analog" is another matter.FN9 The fact that the carrier wave is a continuous frequency does not mean the carrier wave is limited to a pure sinusoidal wave; any "continuous frequency capable of being modulated or impressed with a signal" is a carrier wave whether or not it is a sinusoidal wave.

FN8. "Pulse amplitude modulation," like "pulse width modulation," is a method of modulating a pulse train. *See, e.g.,* RT at p. 450:23-p.452:10.

FN9. Dr. Sklar testified, "The word 'analog' simply means that the wave is a continuous wave having a value for every moment of time.... As long as it continues in time, continuously having a value for each moment in time, we think of this wave as an analog wave." RT at p. 449:6-18. This testimony is consistent with Dr. Adams' testimony that the IEEE Dictionary describes an analog wave in definition (5)(A) for "carrier," applied here to define "carrier wave" as "a continuous frequency capable of being modulated or impressed with a signal." *See* RT at p. 341:8; p.409:2. Dr. Sklar testified that some people refer to carrier waves used to transmit digital information as "digital waves" when, in his expert opinion, such waves are analog waves. *See* RT at pp. 471-72. While the experts appear to agree that the "carrier wave" in the '088 Patent is "analog," they appear to disagree as to which waves are properly called "analog" and which "digital." Since

the dispute over the terms "analog" and "digital" parallels the dispute over whether pulse trains can be carrier waves in a way that is potentially more confusing, the terms "digital" and "analog" are excluded from the interpretation of the term "carrier wave."

Dr. Adams' opinion that modulation techniques that do not use a carrier wave fall outside the limitations of the '088 Patent is consistent with this interpretation. *See* RT at p. 205:17-20. Whether or not pulse width modulation uses a carrier wave as taught by the '088 Patent cannot and need not be determined at this stage of the litigation based upon the evidence presented. Dr. Sklar testified the '088 Patent teaches both modulation using pulse trains (including pulse width modulation) and modulation using sine waves. *See* RT at p. 456:14-19. Dr. Barbieri testified that a train of pulses could be a carrier wave. *See* ESR at p. 42:17-18 ("the carrier wave is the train of pulses you're sending"). Dr. Adams testified that the '088 Patent does not teach pulse width modulation. *See* RT at p. 201:22-24.

The experts' testimony suggests that whether the '088 Patent encompasses pulse width modulation is not an issue that one of ordinary skill in the art of digital communications can answer in the absence of a specific application of pulse width modulation. Dr. Adams testified that, in his expert opinion, "it is overly broad to specify that a carrier wave is a pulse train." RT at p. 343:8-9. Dr. Adams testified that some types of pulse width modulation use a carrier while others do not. *See* RT at p. 341:16-17. When asked whether pulse width modulation involves modulating a wave. Dr. Adams responded, "You are-well, depending on how you are modulating, the type of modulation, you could be modulating a carrier or you could be modulating a carrier wave, as distinguished between a digital pulse train and an analog signal." RT at p. 341:20-23. Dr. Adams testified that, if it is assumed that a pulse train can be a carrier wave (an assumption with which Dr. Adams apparently disagrees), then pulse width modulation in which pulse trains are modulated would fall within the definition of "modulation" and "carrier wave" in the '088 Patent. *See* RT at p. 343:16-p.344:10. When asked whether any signals besides analog signals could be carrier waves, Dr. Adams responded, "Certain types of digital signals can have carrier waves." RT at 337:13-14.

Dr. Sklar testified that the names given to describe various aspects of signal transmission create a "paradox." *See* RT at p. 471:17-24. Dr. Sklar testified that certain waves are commonly called "digital waves" because they impart digital information even though the carrier looks like a continuous analog wave when represented in a drawing. *See* id. Dr. Sklar testified he would not refer to such a wave as a "digital wave," but instead would describe it as having "modulated digital information onto an analog wave." *See* RT at p. 471:25-p.472:1. Dr. Sklar testified:

... it's the same thing with pulse width modulation. One can call the pulse train a "digital wave." I don't really-that's okay. I don't think the name is important. But if wanted to be most precise, I would say I'm going to be taking digital information-in the case of pulse width modulation, I'm going to have discrete widths that I can change each pulse to based upon the digital data that I'm sending and I'm going to send it with this pulse train, which is actually an analog wave called a "pulse train."

RT at p. 472:1-10.

At the Markman hearing, Dr. Adams was unable to directly confirm that the carrier wave limitation in the '088 Patent had to be an analog sine wave, or even an analog wave. *See* RT at p. 334:25-p.335:4; p.336:17-22. Instead, Dr. Adams testified that the most common or most likely modulation technique would involve transmission using an analog sine wave. *See* id.FN10 Just as a non-means-plus-function patent claim

element is not limited to its preferred embodiment, neither is it limited to its "most common" embodiment. *See* Ekchian, 104 F.3d at 1303. Dr. Adams' testimony did not rule out the possibility that other signals besides an analog sine wave (or even waveforms commonly regarded as "analog" waves) could function as "carrier waves" within the meaning of the ' 088 Patent. Whether pulse width modulation as manifested in Pelco's allegedly infringing products is a type of modulation taught by the ' 088 Patent is a question of fact reserved for the infringement stage of the litigation.

FN10. Q: It's your position that the carrier wave must be an analog sine wave, or an analog wave?
A: I don't believe that that was my exact testimony.

However, a sine wave is the *most common* and would be recognized by a person of ordinary skill in the art in this time frame to be the type of modulation that would-or type of carrier wave that would be *most likely* to be used.

RT at p. 334:25-p.335:4 (emphasis added).
Q: When the Court asked you about transmitting data ...

from the control box to the camera, you indicated that in transmitting it that the carrier wave had to be an analog signal, correct?

A: I indicated that that is the *most common* technique for using a carrier wave, is an analog signal.

Q: Is it your position that a pulse train can also be used?

A: I believe the IEEE dictionary states that a pulse train for digital communications can be a carrier. It clarifies that a little further down to say that a carrier wave is an analog signal.

Q: Sir, is it your position that the term "carrier wave" is limited to an analog signal?

A: I don't believe I said that.

Q: You believe that "carrier wave" as a term of art means an analog signal?

A: "Carrier wave" as a term of art is *commonly* understood by a person of ordinary skill in the art to be an analog signal. RT at p. 336:17-p.337:9 (emphasis added).

The interpretation of "carrier wave" as "a continuous frequency capable of being modulated or impressed with a signal" is consistent with Dr. Barbieri's opinion expressed in his declaration and Lectrolarm's initial position. Pl. Reply, Exh. A at p. 2 ("A modem is a device for (1) converting a digital (discrete) signal to an analog (continuous) signal, (2) transmitting the analog signal, and (3) converting the analog signal back to a digital signal."); Barbieri Decl. at para. 13. In light of Dr. Sklar's expert opinion that pulse trains are really analog carrier waves, this position is consistent with Lectrolarm's current position that a pulse train may be a carrier wave within the meaning of the '088 Patent. Dr. Adams did not dispute this interpretation.

The interpretation of the other three disputed terms follows from the interpretation of "carrier wave." As the terms are used in the '088 Patent: 1) a "modem" is "a device which modulates digital information onto a carrier wave and demodulates the signal to recover the digital information from the modulated carrier wave"; 2) a "modulating circuit" is "a circuit that modulates a digital signal onto a continuous frequency capable of being modulated or impressed with a signal"; 3) a "demodulating circuit" is "a circuit that recovers a digital signal which has been modulated onto a continuous frequency capable of being modulated or impressed with a signal".

The true dispute between the parties-whether the claim limits the carrier wave to an analog sinusoidal wave, or whether a carrier wave can be a series of pulses or digital signals-can be resolved by judicial interpretation after an independent court technical consultant has testified. Dr. Von Nerzen's testimony and opinion is *undisputed* that a carrier or carrier wave was in 1988, known to one skilled in the art, to include wave forms, other than sinusoidal. Defendants' expert did not deny this and only Defendants' lawyers' arguments were contrary. Undisputable evidence proves these arguments false, they are not evidence and are entitled to no evidentiary weight. A carrier wave is "a continuous frequency capable of being modulated or impressed with a signal." The experts' testimony indicates the term includes more than just pure sinusoidal analog waves.

b. *PHYSICAL LOCATION v. ELECTRICAL CONFIGURATION OF THE MODULATING AND DEMODULATING CIRCUITS*

The second basic dispute regarding paragraphs three through five of claim 1 concerns whether claim 1 limits the physical location of the modulating and demodulating circuits or simply describes their electrical configuration with respect to other components in the claimed apparatus. Since the analysis for the two circuits is slightly different, the dispute about the locations of the modulating and demodulating circuits is addressed below in the discussion interpreting paragraphs four and five, respectively.

c. INTERPRETATION OF THIRD PARAGRAPH

The third paragraph is interpreted as:

a device for 1) receiving said digital signal for driving and controlling said rotating camera base outputted from said first controlling means; 2) modulating said digital signal onto a continuous frequency capable of being modulated or impressed with a signal; and 3) demodulating said signal to recover the digital information from the modulated continuous frequency.

4. ***Fourth Paragraph***

The fourth paragraph ("a control box including ...") provides for a control box containing the modulating circuit of the modem. The modulating circuit is electrically connected to the "first controlling means" referred to in the second paragraph. *See* Patent at col.10:26-27. The modulating circuit modulates a digital signal onto a continuous frequency capable of being modulated or impressed with a signal. The parties dispute the extent to which paragraph 4 limits the physical location of the modulating circuit.

Pelco argues claim 1 limits the modulating circuit to a physical location inside the control box. *See* Def. Interp. at p. 15:24-25. Lectrolarm argues claim 1 limits the electrical structure of the modulating circuit, but does not limit the physical location of the modulating circuit to inside the control box. *See* Pl. Interp. at p. 55:23-p.56:1.

Paragraph 4 refers to the "control box *including* said modulating circuit." Patent at col.10:23 (emphasis added). The term "including", by itself, does not limit the modulating circuit to a location "physically inside of" the control box; it is not synonymous with the term "within," rather, it suggests the modulating circuit is "part of," or "attached to," or "with" the control box. The term "including" is a synonym for the term "comprising." *See* Hewlett-Packard Co. v. Repeat-O-type Stencil Mfg. Corp., 123 F.3d 1445, 1451 (Fed.Cir.1997) ("The claim term 'including' is synonymous with 'comprising,' thereby permitting the inclusion of unnamed components."); Swain v. Mallory, 51 C.C.P.A. 1242, 329 F.2d 982, 987 (C.C.P.A.1964) (" 'comprising' is equivalent to 'including' "). The use of "including" simply identifies the modulating circuit as being one of the components of the "control box," but does not specify whether the modulating circuit is physically inside the control box or is somehow otherwise connected to it (e.g., on the outside of the structure housing the transmitting side CPU).

"The claim word 'including' is not construed in a lexicographic vacuum, but in the context of the specification and drawings." Toro Co. v. White Consol. Indus., 199 F.3d 1295, 1301 (Fed.Cir.1999) (citing, *inter alia,* Adams v. United States, 383 U.S. 39, 49, 86 S.Ct. 708, 15 L.Ed.2d 572 (1966) ("it is fundamental that claims are to be construed in light of the specifications and both are to be read with a view to ascertaining the invention")). Fig. 1 illustrates a modulating circuit physically inside the dotted line representing the "control box". *See* Patent at Fig. 1. This part of the specification suggests that the modulating circuit is physically inside the control box.

Further examination reveals a fundamental problem with Pelco's argument. The Patent does not describe the "control box" as a single, unified, enclosed physical structure. Figure 1 is not a diagram of the physical structure of one embodiment of the claimed invention. Instead, "Fig. 1 is a block diagram showing the *electrical* structure of a remote control apparatus exemplifying the present invention." Patent at col.2:30-32 (emphasis added). Figure 1 uses both solid and dotted lines. Elements such as the modulating circuit (32a) and the transmitting side CPU (28) are depicted using solid lines. These elements are separate physical entities. The control box and camera base are depicted using dotted lines. The dotted lines, unlike solid lines, do not themselves represent any solid enclosure. The term "control box" does not refer to a physical

"box" in the conventional sense, enclosed by solid walls. Instead, "control box" is a term of convenience used to refer to various elements on the transmitting side of the remote control apparatus.

This interpretation is supported by the testimony of Dr. Barbieri. Dr. Barbieri testified: "I think the dotted lines are intended to depict a collection of components that are assembled together." ESR at 36:11-13. "The bottom dotted line represents a collection of components that are interconnected together." ESR at 36:16-17. When asked if he previously testified if the dotted line marked "26" is the exterior of the control box, Dr. Barbieri responded:

Well, again those two dotted lines, to me they represent a way to differentiate between the components that are found in the camera base and the components that are found in the programming box. That's all they tell me.

They're not telling me exactly what [are] the metal-the boundaries of the metal construction of each of those two components, the camera base and the programming box.

ESR at p. 33:5-11.

To interpret the drawing otherwise would entail untenable results. For example, Figure 1 depicts the operating panel (8) physically inside the dotted line corresponding to the control box (26). If the dotted lines represented solid walls, a user would be required to pass through those walls to access the operating panel in order to input operating data as called for in the Patent. Such a construction borders on the absurd. The operating panel may have physical connections to components of the control box other than the required electrical connections, but the Patent teaches an operating panel with switches and controls accessible to users who are not themselves physically inside the control box.FN11

FN11. Figures 3 and 4 depict a sliding cover (21) on the operating panel (8) and parts inside the sliding cover, suggesting that these parts are physically inside a "control box." Other parts necessarily accessible by a human user are not depicted as being physically "enclosed" inside the sliding cover (e.g., the home position buttons (17)).

As an analogy, a desktop computer may be described as consisting of a keyboard, monitor, and CPU. In graphically depicting the electrical structure of a computer, a dotted line could be drawn around the components and labeled, "computer." The computer corresponds to the control box in the Patent. The keyboard corresponds to the operating panel. Although the keyboard is part of the computer and is inside the dotted line representing the computer in the drawing, the keyboard is not physically inside any solid enclosure surrounding all of the computer's components. Adding a modem to the components of this computer by placing it inside the dotted line could mean that it lies physically inside the same housing as the CPU (an internal modem) or outside that housing (an external modem). The important point from a functional standpoint is that the modem is electrically connected to the CPU, not its physical location. *Cf.* ESR at p. 32:20-24 (Barbieri: "It's like the external modems. You can connect an external modem to your computer. Now, you can have an internal modem in your computer. Does it make any difference in terms of the functionality of the modem for what you want to use it?").

The specification is the "single best guide to the meaning of a disputed term." Vitronics, 90 F.3d at 1582. The specification refers to "the modulating circuit (32a) inside the control box (26) ." Patent at col.4:53-54

(emphasis added); *see also* Pl. Brief at p. 28:24 (describing the modulating circuit as being "included *within* a control box") (emphasis added). This sentence suggests the modulating circuit is physically inside the control box. That interpretation fails for at least three reasons. First, as discussed, "control box" does not represent an enclosed physical entity, so describing something as being "inside" a non-enclosed entity is nonsensical. To interpret the modulating circuit as being physically located inside the control box would not limit the location of the modulating circuit in any defined, meaningful way, since there is no "inside" or "outside" of the collection of components labeled, "control box".

Second, the function of the modulating circuit to modulate a digital signal onto a prescribed wave of continuous frequency in no way depends upon whether the modulating circuit is physically located inside the CPU housing, outside that housing, or attached to the CPU only by wires. The Patent limits the modulating circuit to being electrically connected to the transmitting CPU; its physical location is otherwise irrelevant to its function.

Third, this limitation is not a means-plus-function limitation. "[W]hile it is true that claims are to be interpreted in light of the specification and with a view to ascertaining the invention, it does not follow that limitations from the specification may be read into the claims." Advanced Cardiovascular Sys. Inc. v. Scimed Life Sys. Inc., 261 F.3d 1329, 1338 (Fed.Cir.2001) (citation omitted). In *Advanced Cardiovascular,* all of the drawings in the asserted patents depicted connecting elements in parallel alignment both with each other and the claimed stent's longitudinal axis. *See id*. Nevertheless, the court refused to limit the connecting elements to being "generally parallel." *See id*. (holding that the fact that every drawing shows parallel elements "by itself, does not support adding such a limitation to the claims") (citing Johnson Worldwide Assoc., Inc. v. Zebco Corp., 175 F.3d 985, 992 (Fed.Cir.1999) (noting that "mere inferences drawn from the description of an embodiment of the invention cannot limit claim terms")). The scope of the modulating circuit limitation cannot be limited to a specific embodiment disclosed in the specification. *See* Ekchian, 104 F.3d at 1303.

The modulating circuit is one of the component parts of the control box. The modulating circuit is electrically connected to the first controlling means on the transmitting side and electrically connected to the demodulating circuit on the receiving side. The '088 Patent teaches no further limitation on the physical location of the modulating circuit.

The fourth paragraph is interpreted:

a set of component parts on the transmitting side of the remote control apparatus collectively referred to as a control box, including a circuit that modulates a digital signal onto a continuous frequency capable of being modulated or impressed with a signal, said circuit being electrically connected to the transmitting side CPU.

5. *Fifth Paragraph*

The fifth paragraph ("said demodulating circuit ...") provides for a demodulating circuit that recovers the digital signal which was modulated onto a prescribed carrier wave by the modulating circuit. The demodulating circuit is electrically connected to the modulating circuit. *See* Patent at col.10:31. The parties dispute the extent to which paragraph 5 limits the physical location of the demodulating circuit.

Pelco contends paragraph five claims a demodulating circuit physically located inside the camera base. *See* Def. Reply at p. 10; Def. Interp. at p. 15:26-28. Lectrolarm argues the fifth paragraph should be interpreted

to mean the demodulating circuit is part of the assembly of the rotating camera base, not that it is necessarily inside the housing of the base. *See* Pl. Reply at p. 3:19-25. Lectrolarm argues the specification "delineates the electrical structure, not physical structure, of the rotating camera base." Pl. Reply at p. 3:17-19.

The limitation has the "demodulating circuit ... being *provided* in said rotating camera base." Patent at col.10:28-31 (emphasis added). The words "provided in" suggest the demodulating circuit is physically located either completely inside the camera base or partially inside the camera base. Paragraph 4 contains a slightly different phrasing, using the word "including" instead of "provided in." The word "in" does not require that something be completely inside of something else.

Figure 1, depicting the electrical structure of the apparatus, shows the demodulating circuit located inside the rotating camera base (as represented by the dotted line). *See* Patent at Fig. 1. The dotted lines in Figure 1 do not represent solid walls. *See* ESR at p. 36 ("the dotted lines are intended to depict a collection of components ... such as the demodulating circuit, the CPU 33, ROM and RAM, drive circuit, stepper mo[tor]s"). Unlike the control box, whose physical structure is never depicted, the camera base's physical structure is depicted in Figure 2. The Figure 2 camera base consists of several component parts joined together in different ways: a base (3), a horizontally rotating body (4), a rotary shaft (5), a vertically rotating body (6), and a television camera (7). Patent at Fig. 2, col.2:48-66. The physical location of the demodulating circuit is not depicted.

Given the multi-component nature of the "camera base," the issue is what is meant by the phrase, "said demodulating circuit ... being provided in said rotating camera base." Patent at col.10:28-31. The specification describes "a demodulating circuit (32b) provided *inside* the rotating camera base (1)" and "the demodulating circuit (32b) *inside* the rotating camera base (1)." *See* Patent at col.4:47-49; col.4:53-55 (emphases added). This language does not specify any particular component within which the demodulating circuit must be located. By contrast, the first and second stepper motors, according to the description of the first embodiment, "are housed inside the horizontally rotating body (4)." Patent at col.2:60-61. The location of the demodulating circuit is not so specified.

Pelco's interpretation that "[t]he 'demodulating circuit' as claimed in the ' 088 Patent is physically located in the rotating camera base," *see* Def. Interp. at p. 15:26-28, is, like its suggested interpretation limiting the physical location of the modulating circuit, nonsensical. The "camera base" is not one structure wholly enclosed by walls; it is a name given to a collection of component parts which are physically and/or electrically connected. Rather than limiting the demodulating circuit to a physical location "inside the camera base" (a nonsensical phrase within the meaning of the '088 Patent given that there is no "inside" or "outside" of the "camera base"), the Patent teaches that the demodulating circuit is one of the component parts comprising the camera base. Its exact physical location could be wholly or partially inside one of the other component parts of the camera base, or adjacent to one or more of those parts.

The demodulating circuit is one of the component parts comprising the camera base. The demodulating circuit is electrically connected to the modulating circuit on the transmitting side and electrically connected to the second controlling means on the receiving side. The '088 Patent teaches no further limitation on the physical location of the demodulating circuit.

The fifth paragraph is interpreted to mean:

said demodulating circuit that 1) recovers the digital signal which has been modulated by said modulating

circuit onto a continuous frequency capable of being modulated or impressed with a signal; 2) is one of the component parts comprising the camera base; and 3) is electrically connected to said modulating circuit.

6. ***Sixth Paragraph***

The sixth paragraph ("a second controlling means ...") is a means-plus-function limitation. The function is to position the rotating camera base in response to the digital signal received from the demodulating circuit. *See* Patent at col.10:33-37 ("a second controlling means that drives and controls said rotating camera base based on the digital signal from said demodulating circuit"). The structure carrying out the function is at least the receiving side CPU, or digital electronic processor, of the camera base (e.g., CPU (33) in Figure 1). Pelco argues the second controlling means is the receiving side CPU only. *See* Def. Interp. at p. 16:1-2. Lectrolarm argues the second controlling means is the receiving side CPU and the drive circuit and stepper motors in the camera base. *See* Pl. Interp. at p. 61:3-4.

The claim language states that the function of the second controlling means is to "drive and control" the camera base. The word "drive" suggests the structure performing the function includes more than the receiving side CPU. The specification supports this interpretation:

The output signal from the CPU (33) of the receiving side is sent to a drive circuit (36). A first step motor (37) for driving the horizontally rotating body (4) to rotate, a second step motor (38) for driving the vertically rotating body (6) to rotate, a motor (39) for adjusting the focus, a motor (40) for adjusting the iris, and a motor (41) for adjusting the zooming operation of the television camera are connected to this drive circuit (36).

Patent at col.4:64-col.5:3.

The claim language requires the second controlling means to be electrically connected to the demodulating circuit. *See* Patent at col.10:35-37. Pelco contends this requirement is a direct electrical connection. *See* RT at p. 240. Figure 1 depicts only the receiving side CPU as directly connected to the demodulating circuit. *See* Patent at Fig. 1. The claim states the second controlling means functions "based on the digital signal from [the] demodulating circuit." Patent at col.10:34-35. Only the receiving side CPU, not the drive circuit or stepper motors, receives a signal directly from the demodulating circuit.

These limitations are not inconsistent with the second controlling means having a structure including more components than the receiving side CPU alone. The limitation that the second controlling means is electrically connected to the demodulating circuit does not require that every component part of the second controlling means be directly connected to the demodulating circuit. Lectrolarm does not argue that the second controlling means is the stepper motors and drive circuit alone. Lectrolarm includes the receiving side CPU in its proposed interpretation of the structure of the second controlling means. The receiving side CPU is directly electrically connected to the demodulating circuit. This connection is sufficient to meet the limitation that the second controlling means is electrically connected to the demodulating circuit. That the second controlling means consists of additional components does not violate the requirements of the claim language.

The language describing the first controlling means supports Lectrolarm's interpretation. The first controlling means "outputs a digital signal." Patent at col.10:15. The structure of the first controlling means is the transmitting side CPU. If the structure of the second controlling means were limited to the receiving

side CPU, the patent language would describe the function of the second controlling means as outputting a digital signal. Instead, the second controlling means "drives and controls." Patent at col.10:33. This difference in language suggests the structure of the second controlling means includes more than just the receiving side CPU.

The function of the second controlling means is to position the rotating camera base in response to the digital signal received from the demodulating circuit. The structure carrying out the function of the second controlling means is the receiving side CPU along with the drive circuit and stepper motors in the camera base and equivalents thereof. This "second controlling means" is electrically connected to the demodulating circuit.

Lectrolarm contends the CPU in the camera base "controls the camera base using data stored in RAM (35), based on an operating program stored in ROM (34) beforehand." Pl. Brief at p. 32:18-20. Pelco opposes Lectrolarm's interpretation to the extent it teaches the function and purpose of RAM (35). *See* Def. Opp. at p. 8:26-p. .9:3. The interpretation of Lectrolarm's claims with regard to the function and purpose of RAM (35) does not bear on the interpretation of the sixth paragraph of claim 1. RAM (35) is discussed in more detail in the interpretation of claim 2.

B. ***Claim 2***

Claim 2 reads:

A remote control apparatus for a rotating camera base that supports a television camera such that it is rotatable in the horizontal and vertical directions, said remote control apparatus for rotating base comprising: an input means for inputting the operating data for the automatic operation of said rotating camera base,

a storing means electrically connected to said input means for storing the operating data inputted by means of said input means, said storing means including a random access memory, and

a controlling means that controls the automatic operation of the rotating camera base based on previously stored operating data stored in said storing means, said controlling means being electrically connected to said storing means

whereby operating data preciously stored in said storing means is employed to automatically operate the rotating camera base in accordance with said previously stored operating data.

Patent at col.10:38-58.

1. ***First Paragraph: Preamble***

The preamble to claim 2 is almost identical to the preamble to claim 1. The only difference is that the penultimate word in the preamble to claim 1 is "camera," while the penultimate word in the preamble to claim 2 is "base." *See* Patent at col.10:13, 41. This difference does not change the interpretation of the preamble to claim 2. To the extent the words "remote control apparatus" and "rotating camera base" breathe life into claim 2, the preamble is a limitation on claim 2.

The preamble is interpreted as:

A remote control apparatus for operating a television camera base rotatable in the horizontal (pan) and

vertical (tilt) directions, said remote control apparatus comprising ....

2. *Second Paragraph*

The second paragraph ("an input means ...") is a means-plus-function limitation. The parties do not dispute the function and structure corresponding to the claimed input means. *See* Pl. Interp. at p. 64:19-21; Def. Interp. at p. 16:8-10. The function is to input operating data for the automatic positioning of the rotating camera base. The structure of this means-plus-function claim is discerned from the specification. The specification describes releasing the depressed state of an "auto switch" to switch the camera from automatic to manual operation. *See* Patent at col.3:14-21. The specification also describes a control pad, a memory set button, an auto switch, a set of panning and tilting speed switches on the operating panel, *see* Patent at col .3:14-31, 55-61, a memory clear button, an interval scan switch, *see* Patent at col.4:3-18, and various other buttons and switches, see Patent at col.5. The structure of the input means is the control pad and a set of buttons and switches (it can include button or switch they input including pan speed or tilt speed, and would include interval scan switches) on the operating panel, and equivalents thereof.

The term "operating data" is disputed. Lectrolarm interprets "operating data" as "data required to have the camera base ... move automatically from position to position in a repeating sequence." Pl. Interp. at p. 68:7-8. Lectrolarm contends "operating data" is at least the coordinates or angles of each position at which the camera stops and the amount of time the camera stops at each position. *See* Pl. Brief at p. 35:10-17; Pl. Interp. at p. 68:7-9; RT at p. 419:5-19. Pelco contends the camera positions in the operating data are represented as rotation angles, not coordinates. *See* Def. Opp. at p. 9:27-28; Def. Interp. at p. 16:19-20. Pelco contends "operating data" also includes a speed of rotation and tilt speed in addition to angle of rotation and stopping interval. *See* Def. Opp. at p. 10:6-11; Def. Interp. at p. 16:11-15. Pelco argues "operating data" is the "data needed to accomplish automatic operation of the camera in rectilinear motion, not all of the data needed to operate the camera such as focus or iris data." Def. Interp. at p. 16:16-18.

The claim language limits operating data to data inputted through the input means. *See* Patent at col.10:43 ("an input means for inputting the operating data"), col.10:47-48 ("operating data inputted by means of said input means"). The "operating data" is not limited to the particular embodiment in the specification since the "operating data" is not the structure implicated by this means-plus-function claim. *See* 35 U.S.C. s. 112, para. 6; Ekchian, Inc., 104 F.3d at 1303. The specification is the single best guide to interpreting the term. *See* Vitronics, 90 F.3d at 1582. The specification reinforces the interpretation of "operating data" as user-inputted data directing position and speed of movement. *See* Patent at col.3:59-61 (referring to "operating data that have been set using the control pad (13) and the panning and tilting speed control switches (15, 16)").

"Operating data" includes whatever positi on data can be specified for the automatic reciprocating motion of the camera between defined points. It must include at least the data specifying the stopping positions and the length of time the camera stops at those positions. Pelco argues the position data must be one angle, not coordinates. *See* RT at p. 241:21-p.248:11. While Dr. Barbieri agreed with Dr. Adams that "it doesn't make sense to use an X, Y coordinate frame," he observed that "you talk about an angular position for each of the two angles," pan and tilt, which "are called 'polar coordinates'." RT at pp. 418-19. The portion of the operating data specifying position is not represented by x, y, and z coordinates, but it may be stored as "angles" or as "polar coordinates." Nothing in the claim language limits the operating data to either rotation angles or polar coordinates. Since polar coordinates are equivalent to rotation angles, the operating data cannot be limited to rotation angles to the exclusion of polar coordinates.

Pelco argues the operating data must include speed of rotation and tilt speed. *See* Def. Interp. at p. 16:11-15. Nothing in the claim language requires the operating data to include tilt and rotation speeds. The specification describes speed control buttons (15) and (16) which allow a user to change speeds. *See* Patent at col.3:60-61. It also describes using the pan and tilt speed buttons to input operating data. *See* Patent at col.3:59-61. However, the specification describes a "motor speed" switch (24b) that can be set such that the camera operates automatically "without any relation with the speed selection by the control buttons (15) and (16)." Patent at col.4:17-18. The camera can operate with or without the speed data, so those data are not a necessary component of "operating data." Under Pelco's own interpretation that "operating data" includes only the "data needed to accomplish automatic operation of the camera in rectilinear motion, not all of the data needed to operate the camera such as focus or iris data," the speed data is not "operating data ." Def. Interp. at p. 16:16-18; *See also* RT at p. 390:23-p.392:1 (Dr. Adams acknowledging that the operating data inputted will depend on what the user wants the camera to do).

The "operating data" is the data inputted by the user through the control pad, buttons, and switches on the operating panel that direct the automatic reciprocating motion of the camera between defined points. The "operating data" must include at least position data (represented by angles of rotation, polar coordinates, or any other suitable unit of placement) and stopping interval data. "Operating data" may also include data specifying speed of rotation, pan, and tilt at the discretion of the user.

3. ***Third Paragraph***

The third paragraph of claim 2 ("a storing means ...") is a means-plus-function limitation. The function is the storing of operating data inputted by the control pad, switches, and buttons on the operating panel. The structure is a random access memory (RAM), electrically connected to the input means, and structural equivalents thereof. The structure also includes any part of a digital electronic processor necessary to effectuate the storing means' storage function.FN12

FN12. The specification makes clear the CPU is involved in storage, at least on the transmitting side. CPU (28) erases old data in RAM (30) and performs initialization, *see* Patent at col.5:19-22, and "stores" data in RAM (30), *see id*. at col.5:38-41, col.5:49-52, col.6:9-10.

Lectrolarm argues the storing means is not limited to RAM. *See* Pl. Reply at p. 6:16. Pelco contends that the storing means in claim 2 is limited to the use of RAM. *See* Def. Brief at p. 24:8-27. Paragraph 3 clearly states the "storing means includ[es] a random access memory." Patent at col.10:49. The patent language suggests the storing means may include other types of memory, but it must include RAM. The phrase "said storing means including a random access memory" was added as an amendment after the initial rejection of the patent application by the Examiner. Prosecution History at 00118. The Prosecution History suggests "random access memory" was added to overcome prior art which allegedly did not "teach or suggest the provision of a random access memory comprising a portion of the storing means for electrically storing operating data inputted by the input means" or "the provision of ... RAM ... to reduce noise ...." Prosecution History at 00122-23.

The structure of the "storing means" limitation is discerned from the specification. Despite the suggestion in the patent language (i.e., the word "including"), the specification makes clear the storing means structure is RAM and any part of the CPUs necessary to effectuate the storing means' storage function. The

specification describes: "A program for operating the CPU (28) of the transmitting side is stored beforehand in the ROM (29), and various data set for the various switches during automatic operation are stored in the RAM (30)." Patent at col.4:28-31. ROM (29) may store pre-programmed information used to operate the CPU (28), but ROM cannot be where the operating data inputted by the user is stored for later access. Operating data does not include the kind of pre-programmed data, not inputted by a user, stored in ROM. Figures 1, 5, and 7 call out RAM as the storage device means, not any other memory device. As a means-plus-function claim, the structure of the storing means limitation is read into the claim from the specification which does not teach any other structure as the storing means.

The parties dispute the physical location of the RAM. Pelco contends the RAM structure storing the operating data lies inside the control box. *see* Def. Brief at p. 7:22; Def. Interp. at p. 16:21-28. Lectrolarm contends the RAM structure is "located at the camera base." Pl. Brief at p. 36:15; Pl. Interp. at p. 78:15-16. The parties also differ as to the proper interpretation of the term "random access memory."

a. LOCATION OF STORING MEANS

(1) *Claim Language*

Paragraph 3 mentions "a storing means," including "a random access memory," not "two" or "many" or "at least one." *See* Patent at col.10:46, 49. The word "a" is "[u]sed before nouns and noun phrases that denote a single but unspecified person or thing." *See* http://www.dictionary.com. The use of the singular article "a" suggests only one RAM is involved. However, the Patent refers to other components of the invention in the singular when multiple parts are involved (e.g., "a rotating camera base" and "a control box"). It is not inconsistent with the language of the Patent to interpret "a storing means" as being composed of multiple parts. The limitation, "including a random access memory," does not preclude the possibility that there are two or more random access memories used as storing means. This interpretation is supported by the specification, discussed below, which clearly discloses two RAMs, RAM (30) and RAM (35).

The limitation requires the storing means to be "electrically connected to [the] input means," whose structure, defined above, is the control pad and a set of buttons and switches (including pan speed, tilt speed, and interval scan switches) on the operating panel, and equivalents thereof. Patent at col.10:46-47. Nothing in the claim language directly limits the location of the storing means.

(2) *Objects of Invention*

Lectrolarm argues the receiving side RAM is part of the storing means structure because RAM at the camera base would permit the camera to operate independently of the transmitting side thereby reducing the need for transmission of position data over the signal lines in furtherance of the Patent's noise-reduction objective. *See* Pl. Interp. at p. 72; RT at p. 142:17-24. Dr. Adams testified that continuous, back-and-forth communication over wires as long as six miles between the control box and the camera base could possibly increase the level of noise, or degrade the signal quality. *See* RT at p. 397:21, p. 398:10, p. 401:22-23.

The issue is whether the intrinsic evidence shows that the invention contemplates RAM at the receiving side as a means of noise reduction. The written description's summary of the purpose of the invention is not dispositive.FN13 The written description states:

FN13. The summary and objects of the invention can be used to interpret the claims. *See* Budde, 250 F.3d at 1378-79.

An object of the present invention is to provide a remote control apparatus for a rotating camera base wherein erratic performance due to the effects of noise can be prevented, thus exhibiting high reliability; a minimum of signal lines is needed thus simplifying the wiring construction; and remote control even from a far distance can be made possible.
Patent at col.1:52-58.FN14
FN14. The written description mentions other objects of the invention which the storing means undisputedly helps accomplish. For example, the "automatic" features of the invention require RAM. *See, e.g.,* Patent at col.1:59-col.2:2.

The prosecution history indicates the noise problem was solved by "the use of a digital signal for driving and controlling a rotating camera base, a modem being provided to receive and transmit the digital signals between the remotely controlled rotating camera and operating panel." Def. Brief, Exh. B, Prosecution History, 00122. The correspondence with the examiner continues: "Further, ... the remote control apparatus employs a storing means, including a random access memory, for storing operating data for automatically operating the rotating camera base in accordance with previously stored operating data." *Id*. Such correspondence argues "the provision of a digital signal, RAM, or optical link to reduce noise in the remotely controlled apparatus for a rotating camera base as disclosed and claimed by the Applicant" is not obvious or disclosed by the prior art. Prosecution History at 00123.

This correspondence suggests the inclusion of a RAM, along with a digital signal and optical link, is directed at solving the noise problem. The prosecution history does not specify whether the noise reduction goal is furthered by RAM on the transmitting side, RAM on the receiving side, or both. Dr. Barbieri testified that storing position data in the receiving side RAM furthers the noise reduction goal. *See* RT at p. 142:17-p.143:3. Without a storing means at the camera base, additional transmissions over the signal lines would be required to carry out the functions of the Patent. The additional communications would result in increased noise. *See id* . Dr. Adams testified that continuous, back-and-forth communication between a control box and a camera base, separated by a distance of up to six miles, could increase the level of noise. *See* RT at p. 397:21, p. 398:10, p. 401:22-23.

No evidence was introduced describing how the noise reduction goal is furthered by the provision of a transmitting side RAM. Since the noise-reduction goal is to reduce noise along the signal lines connecting the control box and the television camera, it is not clear how the provision of transmitting side RAM furthers that goal. The prosecution history mentions RAM as furthering the noise reduction goal. The evidence suggests that receiving side RAM, not transmitting side RAM, reduces noise. The evidence indicates the '088 Patent aims to reduce noise by, in part, providing for a RAM at the camera base.

(3) *Specification*

The "storing means" is a means-plus-function limitation whose structure is discerned from the specification. *See* Donaldson, 16 F.3d at 1193. The specification describes two distinct RAMs. RAM (30) is part of the control box along with the transmitting side CPU (28). RAM (35) is part of the camera base along with the receiving side CPU (33). *See* Patent at Fig. 1. The function of the storing means is to store operating data, defined above as the data inputted by the user through the control pad, buttons, and switches on the operating panel that direct the automatic reciprocating motion of the camera between defined points. The

only mention of the term, "operating data," in the specification provides that when the memory set button is pressed, "the operating data that have been set using the control pad (13) and the panning and tilting speed control switches (15, 16) are registered in a RAM." Patent at col.3:58-61. This sentence and Figure 5 are the only places in the specification where the acronym "RAM" is used alone without a corresponding number specifying transmitting side or receiving side RAM.FN15 The specification does not explicitly link the term "operating data" to either RAM (30) or RAM (35).

FN15. This use of RAM without a number does not appear to be an error which arose during the process of translating and preparing the patent for filing in the United States. *See* Prosecution History at 00059 (using "RAM" without a corresponding numeral).

Lectrolarm argues the "storing means" structure of paragraph 3 of claim 2 includes RAM (35), the RAM in the camera base (or receiving-side RAM). *See* Pl. Brief at p. 37. If RAM (35) does not store the operating data, Lectrolarm argues, there would be no purpose for including RAM (35). *See* Pl. Reply at p. 5: 25-26. Lectrolarm concedes "that the operating data passes through the RAM (30) in the control box in an intermediate step." *Id*. at p. 6:5-6. "The ultimate destination of that data, however, is the RAM (35) in the camera base." *Id*. at p. 6:6-8.

Pelco rejoins that the specification identifies RAM (30) as the storing means for the operating data. *See* Def. Brief at p. 7. The specification explains that part of the process for setting automatic operation of the rotating camera base involves a step in which "the CPU (28) of the transmitting side erases the data for A mode automatic operation that are stored in the RAM (30)." Patent at col.5:19-21. After RAM (30) is cleared, the new operating data are entered and "the CPU (28) of the transmitting side stores the rotation angle up to the point A and the speed of rotation of the television camera (7) and the stopping interval at the point A in the RAM (30)." Patent at col.5:38-41. CPU (28) stores similar operating data "at point B in the RAM (30)." *Id*. at col.5:49-52. After the operating data is entered and the auto switch is pressed, "the CPU (28) of the transmitting side begins to perform automatic operation." Patent at col.5:62-65. This portion of the specification describes operating data stored in "RAM" to include RAM (30). Pelco interprets the presence of RAM (35) as a part of the computer intelligence at the camera base needed to store "intermediate variables." *See* RT at p. 251:11-25.

With respect to the separate home position programming, "the CPU (28) of the transmitting side stores the selected home position in the RAM (30)." Patent at col.6:9-10. When a home position button is pressed, "CPU (28) of the transmitting side, through CPU (33) of the receiving side, causes the television camera (7) to rotate...." Patent at col.6:20-22. Operation and programming of both automatic and home position settings utilize at least RAM (30). *See* Patent at col.4:29-31 ("various data ... are stored in the RAM (30)"); col.5:20-21 ("data ... that are stored in the RAM (30)"); col.5:38-41 ("CPU (28) ... stores the rotation angle ... the speed ... and the stopping interval ... in the RAM (30)"); col.5:49-52 (same); col.6:9-10 ("CPU (28) ... stores the selected home position [data] in the RAM (30)"). The issue is whether the Patent teaches storage of operating data in RAM (35) in addition to RAM (30).

The only mention of RAM (35) in the specification reads:

Likewise, a ROM (34) and a RAM (35) are connected to the CPU (33) of the receiving side. A program or [sic] operating the rotating camera base (1) based on the output signal from the CPU (28) of the transmitting side is stored beforehand in the ROM (34). The output signal from the CPU (35) and the CPU (33) of the

receiving side is operated based on this stored data and the program stored in the ROM (34).

Patent at col.4:56-63.

"CPU (35)," at line 61, is a scrivener's error in the paragraph at column 4, lines 56 to 63.FN16 *See* RT at p. 497:2-4. The transmitting CPU is labeled "28", and the receiving side CPU is labeled "33". "35" is assigned to the receiving side RAM. There is no "CPU (35)" disclosed in any other part of the specification, including the figures, or anywhere else in the patent. Both parties acknowledge this is a scrivener's error. Def. Interp. at p. 10:2-13; Pl. Interp. at p. 73:11-12. The parties disagree as to both the court's power to interpret the error and the proper interpretation of the paragraph beginning, "Likewise, ..."

FN16. Another scrivener's error in the paragraph occurs at line 57 in the second sentence. "A program or operating ..." should be interpreted, "A program [f]or operating ...." *See* Patent at col.4:57-58.

Pelco argues mistakes affecting the scope of claims may be corrected only by the PTO upon successful petition for a certificate of correction pursuant to 35 U.S.C. s.s. 251-52, 254-55. *See* Def. Supp. Brief at p. 2. The public notice function of patents prohibits the broadening of patent claim language through the issuance of a certificate of correction unless "it is clearly evident from the specifications, drawings, and prosecution history how the error should appropriately be corrected." Superior Fireplace Co. v. Majestic Prods. Co., 270 F.3d 1358, 1372 (Fed.Cir.2001). Pelco argues Lectrolarm cannot broaden the claim language during claim construction because 1) it has neither sought nor obtained a certificate of correction; 2) how the error should be corrected is not obvious "since it is even now the subject of expert debate"; 3) the specification is otherwise clear as to the meaning of the claim; and 4) Pelco discussed the scrivener's error only to rebut the arguments of Lectrolarm, which failed until the end of the Markman hearing to acknowledge the error. *See* Def. Supp. Brief at p. 4:6-24. Pelco argues the circumstances require the court to find that column 4, lines 56 through 63 are "uninterpretable," *see* Def. Interp. at p. 14:1-2, and that the court lacks jurisdiction to interpret the "CPU 35" scrivener's error.

Lectrolarm is not seeking a certificate of correction or judicial correction of any patent language. The presence of a scrivener's error in the specification does not eliminate the "obligation to construe as a matter of law the meaning of the language used in the patent claim." Markman, 52 F.3d at 979; *see* CVl/Beta Ventures, 112 F.3d at 1153 n. 5 (interpreting from context a reference in the specification to "Fig. 2g" as a reference to "Fig. 2f"); Bailey v. Dart Container Corp., 157 F.Supp.2d 110, 124 n. 7 (D.Mass.2001) (concluding "that one of the ordinary skill in the art would understand the word 'hold' to be a typographical error, and that the intended term was 'vent hole' "). Like all disputed claim language, claim 2 must be interpreted first in light of the intrinsic evidence (the patent claims, specification and prosecution history), and then, only if necessary, the extrinsic evidence (expert testimony). *See* Vitronics, 90 F.3d at 1582. The presence of a typographical error in the specification does not relieve the patentee of the obligation to describe the scope of the invention such that the public understands what is claimed. *See* Markman, 517 U.S. at 373. There is no authority to support Pelco's argument that a typographical error in the specification, but one of a number of information sources in interpreting the claim language, renders that portion of the patent or its corresponding claim uninterpretable or unusable for claim construction purposes. Nor does it logically follow that lines 56-63 of column 4 are "uninterpretable."

The scrivener's error is found in the sentence, "The output signal from the CPU (35) and the CPU (33) of the receiving side is operated based on this stored data and the program stored in the ROM (34)." Patent at

col.4:60-63. The existing sentence describes an output signal sent from two CPUs, "CPU (35)" and operating signals which originate from stored data held in a RAM which is processed and transmitted through a CPU. The previous sentence refers to an output signal from the transmitting side of CPU (28). The paragraph discusses how the receiving side CPU (33) operates based on an output signal which originates in a RAM on the receiving side with the program stored in the receiving side ROM (4).

The importance of the "Likewise" paragraph is that it describes the existence and positions of the receiving side memory, RAM (35) and ROM (34) which receive the output signal from the transmitting side CPU (28) to the receiving side RAM which receives the output signal at the receiving side CPU (33), which operates the camera base using a program stored beforehand in ROM (34). Patent at col.4:57-64 There is only one RAM (35), one ROM (34) and one CPU (33) on the receiving side. The camera base operates in part based on an output signal and instructions from CPU (28) on the transmitting side. If CPU (28) is required to transmit an output signal for camera operation, the camera base may not "operate independently" of the transmitting side based on operating data stored in the receiving side RAM as Lectrolarm contends.

The second sentence in the disputed paragraph states that a program for operating the rotating camera base "is stored beforehand in ROM (34)." Patent at col.4:59-60. The third sentence provides, in part, "the CPU (33) of the receiving side is operated based on *this stored data* and the program stored in the ROM (34) ." Patent at col.4:61-63 (emphasis added). The phrase, "this stored data," appears to refer to the "program ... stored beforehand in ROM (34)" mentioned in the previous sentence. Yet, the third sentence states that the CPU (33) is operated based on "this stored data *and the program stored in the ROM (34)*." Patent at col.4:62-63 (emphasis added). A patent is not to be interpreted to make its words redundant or superfluous. Texas Instruments, 988 F.2d at 1171. "[T]his stored data" cannot be the same thing as the program stored beforehand in ROM (34). Throughout the claims stored operating date is described as stored in storing means. The storing means referred to include RAM. "[T]his stored data" refers to the stored operating data described in the claims. It follows that the output signal from RAM (35) and CPU (33) is operated based on stored operating data. The disputed paragraph refers to the receiving side and the camera operations are driven by stored data and program on the receiving side, one RAM that stores data is located on the receiving side, RAM (35). There is only one receiving side CPU (33) and there is no other CPU in Figure 1 of the specifications that could have the designation (35). Figures 1 and 7 both refer to RAM (35). Finally, only one CPU (33) is located on the receiving side which sends an output signal to the receiving side drive circuit (36).

The analysis of the third sentence in the "Likewise" paragraph entails: 1) the "output signal" comes from CPU (28); 2) the first part of the sentence, "The output signal from the CPU [(28)]," is a separate, independent clause from the second part of the sentence, "and the CPU (33) of the receiving side is operated based on this stored data ...." 3) "this stored data," refers to data stored in RAM (35). The "Likewise" paragraph discusses receiving side function by use of the phrase "on the receiving side" and no reference is made to a transmitting side CPU.

If the letters RAM are substituted for the letters CPU at line 61, column 4, the corrected patent language is sufficiently clear and explanatory to practice the invention.

This interpretation is supported by the surrounding language and the specification as a whole. The phrase, "this stored data," refers to the data stored in RAM (35), data which began as a digital signal outputted from CPU (28). The introductory word, "Likewise," reinforces the fact that receiving side CPU (33) operates in a manner similar to CPU (28)-i.e., based on user-inputted data stored in RAM and a program "stored

beforehand" for operating the CPU stored in ROM (34) on the receiving side.

The prosecution history supports this interpretation. The first English version of the patent filed with the PTO on May 12, 1989, contains a third sentence with the identical wording as the final version. *See* Prosecution History, attached as Exh. B to Def. Brief, 00015. However, the applicant submitted a request to receive the benefit of a prior filing date under 35 U.S.C. s. 119. *See* Request for Priority, received by the PTO on June 30, 1989, Prosecution History at 00107. Section 119 allows an application for a U.S. patent, which has within the past year been filed as part of a request for a patent in certain foreign countries (such as Japan), to "have the same effect as the same application would have if filed in this country on the date on which the application for patent for the same invention was first filed in such foreign country." 35 U.S.C. s. 119(a). Section 119(a) allows an applicant to claim the earlier filing date in subsequent actions to enforce the patent.

In its priority papers, filed June 29, 1989, *see* Pros. History at 00002, the applicant included a copy of the patent application submitted to the Japanese Patent office on May 13, 1988, *see* Pros. History at 00076. Although no translation into English from the original Japanese was provided by the parties, the presence of Roman characters and universally used and recognized Arabic numerals identify the same paragraph in the original Japanese application. *See* Prosecution History at 00091. The acronyms "CPU," "RAM," and "ROM" appear with Roman letters in the Japanese application along with the Arabic numerals corresponding to positions in the figures. *See id.*

In contrast to the paragraph as it reads in the '088 Patent's specification, the paragraph in the original Japanese application contains no mention of a "CPU (35)," confirming that this is a scrivener's error, which apparently occurred during the translation of the Japanese patent into English for filing with the PTO. Two other differences appear from comparing the paragraphs in the two applications. "CPU (28)" appears twice in the Japanese application instead of once as in the U.S. Patent. "RAM (35)" appears twice in the Japanese application, not once as in the U.S. Patent. *See* Pros. History at 00091; Patent at col.4:54-63. This evidence supports interpreting the third sentence at line 60 as, "The output signal from the RAM 35 and the CPU (33) of the receiving side is operated based on this stored data and the program stored in the ROM (34)."

The proper interpretation of the "Likewise" paragraph in the specification does not end the inquiry as to the location of the "storing means" limitation in paragraph 3 of claim 2. The specification discloses that RAM (35) stores "data" sent from CPU (28). Specifically, RAM (35) stores the "output signal" from CPU (28). The next question is whether this output signal contains data which is properly interpreted as "operating data" as defined by the Patent. "Operating data" is the data inputted by the user through the control pad, buttons, and switches on the operating panel that direct the automatic reciprocating motion of the camera between defined points. The "operating data" must include at least position data (represented by angles of rotation, polar coordinates, or any other suitable units) and stopping interval data. "Operating data" may also include data specifying speed of rotation, pan, and tilt at the discretion of the user.

The specification describes information defined as "operating data" is stored in RAM (30). At some point, CPU (28) outputs a signal containing operating data to CPU (33). The output signal is demodulated and the recovered data is stored in RAM (35). The data may be modified as it passes from RAM (30), through CPU (28), the modem, and CPU (33). The data must be the same as the data stored in RAM (30) at least to specify the position and dwell time information necessary to position the camera to satisfy the user's inputted instructions (and, if the user desires, information specifying pan and/or tilt speed).

CPU (33), part of the structure of the second controlling means, operates to drive and control the camera base using data stored in RAM (35). *See* Patent at col.10:32-37. The second controlling means positions the rotating camera base. To enable CPU (33) to position the camera to comply with the user's inputted instructions, the data stored in RAM (35) must at least include position and stopping interval data. In other words, it must include "the data inputted by the user through the control pad, buttons, and switches on the operating panel that specify the automatic reciprocating motion of the camera between defined points." This data, essential to the proper functioning of the second controlling means, precisely corresponds to the definition of "operating data." RAM (35), like RAM (30), must store "operating data" as that term is interpreted within the meaning of the '088 Patent.

Dr. Adams testified the patent does not teach what is stored in RAM (35), *see* RT at p. 250:24-p.251:1: "One would assume or infer that information related to the servo control functions of the CPU (33) is stored in RAM (35), but there is no explicit teaching of how RAM (35) is used." RT at p. 251:1-3. Dr. Adams was asked, "are servo control functions not operations? And would that not be operating data?" RT at p. 251:4-5. Dr. Adams' response was vague: "It is not operating data in the context of the patent. The patent is fairly-it doesn't mention it." RT at p. 251:6-7. When asked what RAM (35) does, Dr. Adams responded in general terms:

You have to have a RAM to support the CPU for it to operate. It has a practical function in that it stores intermediate variables, when the camera is undergoing rectilinear motion, when the camera is adjusting the iris, the focus control, et cetera. So there has to be some mechanism for storing that information while the camera is in operation.... A CPU requires a RAM to maintain intermediate results.

RT at p. 251:11-25.

The specification, properly interpreted, describes the receiving side CPU (33) as operating based on the data stored in the receiving side RAM (35) and the program stored in ROM (34). It does not describe RAM (35) as providing only a repository for storing intermediate variables. Dr. Adams' answer, insofar as it suggests RAM (35)'s function is only to store intermediate variables, is incomplete. The specification describes RAM (35) as storing "data," not confined to intermediate variables or results. The only types of "data" taught in the '088 Patent are "operating data" and "home position data." No other type of "data" is described.FN17 The "stored data" upon which CPU (33) bases its operation instructions must include at least "operating data," that is user-inputted data directing the automatic reciprocating motion of the camera. If "operating data" were not stored in RAM (35), and the only output signals from CPU (28) are stored in RAM (35), it would be impossible for CPU (33) to position the camera as specified by the user-inputted instructions.

FN17. The specification describes "programs stored beforehand" in ROM. These programs are not referred to as "data" in the specification. RAM (35) must store more than just a static "program stored beforehand" because it stores the data provided by the digital signal outputted from the transmitting side, RAM (30) and CPU (28) which sends user-inputted operating data. Without receipt of operating data, CPU (33) could not correctly position or reposition the camera base if it had only programs in memory stored beforehand.

Put another way, if RAM (35) stored no operating data but only intermediate results, there would be no way for CPU (33) to receive inputted operating data necessary to position the camera since CPU (33) operates based on data stored in RAM (35). Claim 1 describes how the first controlling means, CPU (28), outputs a digital signal for driving and controlling the rotating camera base. *See* Patent at col.10:15-17. The second

controlling means "drives and controls said rotating camera base [using] the digital signal [from CPU (28)]." Id. at col.10:33-34. CPU (28) does not drive and control the camera alone; it operates "through the CPU (33) of the receiving side." Patent at col.5:27-28, col.6:20-21. There are two controlling means, not just one, and the second receiving side controlling means operates based on data stored in RAM (35), data which must include camera-position information and the program stored in ROM (34).

The specification supports the interpretation that the structure of the storing means includes both RAM (30) and RAM (35). It describes what happens when an external sensor is triggered and the emergency switch (19) is not pressed: "CPU (33) of the receiving side makes the LED (18) on the corresponding home position button (17) light up while maintaining automatic operation of the television camera." Patent at col.6:43-46; RT at p. 143:6-21. This sentence suggests CPU (33) alone maintains automatic operation, which would require storage of operating data on the receiving side in RAM (35).

Lectrolarm argues RAM (35) must also store home position data because when the emergency switch (19) is depressed and an external sensor is triggered, "the CPU (33) of the receiving side causes the television camera (7) to rotate toward the home position from which the emergency signal has been sent." Patent at col.6:34-36.FN18 This state (i.e., showing the view on the monitor from the triggering home position) is maintained "until the emergency signal stops coming or for an interval time for stopping the camera (7) which has been set by the interval scan switch (24a)." Patent at col.6:38-41. Lectrolarm argues this description illustrates that the CPU (33) "respond[s] directly to a signal from [the] external sensor (31)" without accessing information from RAM (30). Pl. Opp. at p. 13:1-10. "In order to do this, the stored data for the appropriate response to the external sensor (31) must be available at RAM (35), which constitutes part of the storing means of claim 2 and is located in the electrical structure of the rotating camera base." Id. at p. 13:6-10.

FN18. Lectrolarm's reliance on other parts of the specification to elucidate the structure of the storing means is permissible. *See* Budde, 250 F.3d at 1379-80 (noting that the whole specification should be read in determining the structure capable of performing the claimed function).

The specification does not indicate which RAM (transmitting or receiving side) provides the CPU (33) with the home position data necessary to correctly position the camera in response to a signal from an external sensor when the emergency button is depressed.FN19 Under Pelco's interpretation, CPU (33) "causes" the camera to rotate into the proper home position based on data it receives from the transmitting side RAM (30) (through CPU (28)). Pelco argues CPU (33) sends a signal to CPU (28) when an external sensor is triggered. According to Pelco, CPU (28) then determines: whether the emergency button is pressed; to access the corresponding home position data previously stored in RAM (30), *see* Patent at col.6:9-10; and to send an appropriate signal to CPU (33) which receives the signal and causes the camera to move in response. Pelco supports its position by observing that, when the emergency button is not pressed, CPU (33) sends a signal back to the control box where an appropriate home position button lights up.

FN19. the specification does not describe how the home positions are linked to the external sensors. The Patent language states that "one can establish up to four home positions, each set in any location." Patent at col.6:11-12. Yet, for the system to work properly, the home positions must be set to correspond to the same physical location from which the external sensors pick up their triggering stimuli. *See e.g., id.* at col.6:44-46 (describing the illumination of the light emitting diode (LED) "on the corresponding home position button" in response to a signal sent from a given external sensor). Whether the external sensors are "set" according

to the home position data that is entered (i.e., polar coordinates or rotation angles) or whether they must be physically adjusted by hand to match the desired home positions is not explicitly stated. Apparently the preferred embodiment envisions the former. *See* Patent at col.4:32-40.

Even if Pelco's interpretation is correct, the "Likewise" paragraph expressly provides the output signal from CPU (28) is stored in RAM (35) before it is processed by CPU (33) to move the camera. The previously programmed home position data must be recalled from either RAM (35) directly or RAM (30). If the latter, CPU (28) sends the output signal to RAM (35) where it is stored at least temporarily before it is used by CPU (33) to move the camera. Lectrolarm's contention that "the stored data for the appropriate response to the external sensor (31) must be available at RAM (35)," Patent at p. 13:6-10, is true at least to the extent that the home position data must reach RAM (35) at some point before CPU (33) (along with the drive circuit and stepper motors) can cause the camera to move. The specification describes the storage of the home position data in RAM (30); RAM (35) is not explicitly mentioned as storing home position data. *See* Patent at col.6:9-10. However, since CPU (33) operates with data stored in RAM (35), RAM (35) must, to some extent, store home position data so that CPU (33) can cause the television camera to rotate into the correct home position. *See* Patent at col.6:33-35.

The reasonable interpretation is that CPU (33) accesses the home position data stored in RAM (35) without first contacting CPU (28) to access data stored in RAM (30). If CPU (33) communicates with CPU (28) before it retrieves data from RAM, it defeats the noise-reduction goal of the invention and renders superfluous the existence of RAM (35). The language of the specification and the function of RAM to reduce noise (disclosed in the prosecution history) suggest position data is stored in RAM (35).

The unanswered question is the extent to which RAM (35) stores a complete set of operating and home position data to enable CPU (33) to act completely independently of the receiving side. At the Markman hearing, Dr. Barbieri demonstrated a camera which maintained automatic operation even when the signal wires connecting the control box to the camera base were disconnected. The demonstration did not answer whether such a camera represents an embodiment encompassed by the '088 Patent. Intrinsic and extrinsic evidence support both interpretations.

This question need not be answered to disclose the invention fully and definitely and to interpret the claims. Contrary to Defendants' interpretation that operating and home position data cannot be stored in RAM (35), the evidence shows that the structure of the storing means includes components for data storage at both the transmitting side and the receiving side. The specification is explicit that operating data is stored at least in RAM (30). The "Likewise" paragraph supports the inference that RAM (35) also stores operating and home position data. The prosecution history supports the interpretation that position data is stored in RAM (35). Determining whether or not each RAM contains its own complete set of these data which would permit independent functioning of a camera is unnecessary.

With regard to means-plus-function claims, the statute provides:

the sixth paragraph of section 112 does not exempt an applicant from the requirements of the first two paragraphs of that section. Although paragraph 6 statutorily provides that one may use means-plus-function language in a claim, one is still subject to the requirement that a claim "particularly point out and distinctly claim" the invention. Therefore, if one employs means-plus-function language in a claim, one must set forth in the specification an adequate disclosure showing what is meant by the claim language. If an applicant

fails to set forth an adequate disclosure, the applicant has in effect failed to particularly point out and distinctly claim the invention as required by the second paragraph of section 112.

Donaldson, 16 F.3d at 1195.

"[I]n order for a claim to meet the particularity requirement of para. 2, the corresponding structure(s) of a means-plus-function limitation must be disclosed in the written description in such a manner that one skilled in the art will know and understand what structure corresponds to the means limitation. Otherwise, one does not know what the claim means." Atmel, 198 F.3d at 1382. "[F]ailure to disclose adequate structure corresponding to the recited function in accordance with 35 U.S.C. s. 112, para. 1, results in the claim being of indefinite scope, and thus invalid, under 35 U .S.C. s. 112, para. 2." Budde, 250 F.3d at 1376. "Because the claims of a patent are afforded a statutory presumption of validity, overcoming the presumption of validity requires that any facts supporting a holding of invalidity must be proved by clear and convincing evidence." *Id*.

Pelco does not argue the '088 Patent fails for indefiniteness. The Patent's description of the storing means is not so indefinite to overcome the presumption of validity. The Patent does not limit the location of the "storing means" to the transmitting side. The "storing means" structure includes a RAM at the transmitting side and a RAM (35) at the receiving side, as well as CPUs on both sides necessary to effect the storage function.

b. DEFINITION OF RAM

In its original Markman brief, Pelco contended "RAM means RAM." *See* Def. Brief at p. 24:23. Pelco now argues random access memory consists "of a memory which can be read from and written to in a clock cycle of the computer or cell, so that the speed of the computer is not [a]ffected, which is volatile, and which provides an unlimited number of write cycles." Def. Interp. at p. 17:7-11. Pelco argues "random access memory" as claimed in the '088 Patent does not include read only memory ("ROM"), electrically erasable programmable read only memory ("EEPROM"), or non-volatile random access memory ("NVRAM"). *See* id. at p. 17:13-16. Lectrolarm argues "random access memory" is a read/write memory that permits access to any of its address locations in any desired sequence with similar access time to each location. *See* Pl. Interp. at p. 87:5-7. Lectrolarm argues "random access memory" as used in the '088 Patent may be volatile or non-volatile. *See* id . Lectrolarm argues the issue of whether or not EEPROM is a "random access memory" within the meaning of the '088 Patent is a factual infringement issue, not properly addressed at the claim construction stage. *See* id. at p. 80.

The IEEE Dictionary, relied upon by both parties as an authoritative source, states under "random-access memory": "*See:* RAM." IEEE Dictionary, 6th ed., at p. 863. RAM is defined, in relevant part, as follows:

(1) (random-access memory) A memory that permits access to any of its address locations in any desired sequence with similar access time to each location. *Note:* The term RAM, as commonly used, denotes a read/write memory.

...

(3) High-speed read/write memory with an access time that is the same for all storage locations. *See also:* memory board; dynamic random-access memory; main storage; static random-access memory.

IEEE Dictionary, 6th ed., at 863; *see also* IEEE Dictionary, 7th ed., at 916 (same).

"Random access memory" as synonymous with and completely equivalent to the term "RAM" and means "a high-speed read/write memory that permits read-access and write-access to any of its address (storage) locations in any desired sequence with read access time similar to write-access time to each location."

One skilled in the art in 1988 knew that volatile memory in 1988 was a device that loses its memory store when all of the power sources are removed from the system. In 1988 the terms RAM and ROM were mutually exclusive. The Random Access Memory (RAM) referred to in the patent is a volatile memory with fast write capability and similar read and write times.

There are several different types of RAM. *See, e.g.,* Alpex Computer Corp. v. Nintendo, 102 F.3d 1214 (Fed.Cir.1996); RT at pp. 347:17-p.353:2; Pl. Markman Hrg. Exh. 11. No specific type of RAM is called out in the claims or the specification. Parsing the different variations of RAM in 1988 is not necessary nor possible at this stage. The parties argue about whether the accused products utilize RAM. *See, e.g.,* Pl. Markman Hrg. Exhs. 4-5. Such arguments are properly left for the infringement determination. The parties' arguments regarding what is and what is not RAM are addressed briefly for the sake of completeness.

The parties presented contradictory expert testimony about whether an EEPROM is a random access memory. Dr. Adams testified that 1) EEPROMs have limited write cycles, "typically less than a million," RT 185:24-25; 2) the write cycle of an EEPROM is slow in comparison to its read time, *see* RT at p. 185:7-9; and 3) EEPROMs are nonvolatile, *see* RT at p. 206:13-14. Dr. Barbieri testified that 1) EEPROM is a read/write memory, and 2) some RAMs, like EEPROMs, are non-volatile. *See* RT at p. 73:4-14. Dr. Adams acknowledged that an EEPROM could be used to store operating data as described in the '088 Patent and last "a very long time," *see* RT at p. 360:16, despite its finite write-cycle capacity. An EEPROM is a read/write memory. While an EEPROM's write time may be slower than its read time, no evidence was presented that write-cycle access time to any given location on an EEPROM chip would be different from write-cycle access time to other locations. Both EEPROM and RAM were in use before the patent issued. *See* RT at pp. 191-92.

No evidence was presented at the Markman hearing that the '088 Patent excludes non-volatile RAM or that non-volatile RAM could not be used in the invention disclosed in the Patent. While Pelco argued that RAM is volatile (i.e., it loses its stored memory if the power is removed), *see* Def. Markman Hrg. Exh. 18, Lectrolarm argued it could be volatile or non-volatile, *see* Pl. Interp. at p. 81. The Patent does not describe the particular cell structure or type of RAM taught.

A court appointed expert consultant testified October 15, 2002. His testimony unequivocally establishes that Random Access Memory (RAM) as used in the ' 088 patent, is volatile and that as of 1988, to one skilled in the art, the term ROM, including PROMs, CPROMs, and EEPROMs, were mutually exclusive from Random Access Memory (RAM). The definition of random access memory, RAM, as used in the '088 patent, is interpreted as a volatile memory with high-speed read-write memory that permits access to any of its address (storage) locations in any desired sequence with similar access time to each location.

4. ***Paragraph 4***

The fourth paragraph ("a controlling means ...") is a means-plus-function claim. The function is to control

the automatic operation of the rotating camera base using the previously stored operating data. Defendants argue the structure of controlling the automatic operation of the camera base "is only the CPU in the control apparatus, such as CPU (28), and does not include drive circuits, stepper motors or any other structure which causes the camera to move." Def. Opp. at p. 15:5-7; Def. Interp. at p. 20:9-13. Plaintiff argues the structure is the CPU, drive circuit, and stepper motors located in the camera base. *See* Pl. Interp. at p. 92:17-18.

The "first controlling means" in claim 1 is the transmitting side CPU and equivalents thereof. The "second controlling means" in claim 1 is the receiving side CPU, drive circuit, and stepper motors. The first controlling means "outputs a digital signal," *see* Patent at col.10:15, while the "second controlling means" "drives and controls" the camera base, *see* Patent at col.10:33. The "controlling means" in claim 2 is not limited by the language "outputs a digital signal" or "drives". *See* Patent at col.10:50-54. The "controlling means" in claim 2 "controls the automatic operation of the rotating camera base." Patent at col.10:50-51. The absence of language in paragraph 4 of claim 2 such as "outputs a digital signal," which would indicate a limitation confined to the structure to the CPU, permits the structure accomplishing the controlling function to include more than the CPU alone. The function of the controlling means, to "control the automatic operation of the rotating camera base," suggests the structure is the same as the first and second controlling means in claim 1.

Pelco argues the "second controlling means" in claim 1 is the receiving side CPU. *See* Def. Interp. at p. 16:1-2. Lectrolarm argues the "first controlling means" in claim 1 is the transmitting side CPU. *See* Pl. Interp. at p. 53. Neither Pelco nor Lectrolarm provide much support for the position that the "controlling means" in claim 2 does not include structure from both the first and second controlling means of claim 1. The controlling means controls the camera "based on previously stored operating data" and is "electrically connected to [the] storing means." The structure of the storing means includes RAM in both the control box and the camera base as well as any necessary component of the CPUs. Both CPUs are electrically connected to part of the structure of the storing means. Both CPUs and the drive circuit and stepper motors (and their structural equivalents) are part of the structure that performs the controlling functions described in paragraphs 2 and 6 of claim 1. The specification describes these components working together to control the movement of the camera base. *See, e.g.,* Patent at col.5:26-28 ("CPU (28) ... drives the first and second step motors (37/ 38) through the CPU (33) ... and the television camera (7) rotates"); col.6:20-22 ("CPU (28) of the transmitting side, through CPU (33) of the receiving side, causes the television camera (7) to rotate...."); col.8:60-64 ("Based on this input signal [from CPU (28)], the CPU (33) drives and controls the motors (37-41) via the drive circuit (36), thus making the rotating camera (1) perform the desired operation.").

The transmitting-side CPU, the receiving-side CPU, the drive circuit, and the stepper motors, and equivalents thereof, collectively comprise the structure of the "controlling means" in paragraph 4 of claim 2.

5. *Paragraph 5*

The fifth paragraph ("whereby operating data ...") is not a limitation. It states that the camera base is rotated automatically based on the operating data stored in the storing means. The fifth paragraph describes the result of the limitations in claim 2. "The function is properly identified as the language after the 'means for' clause and before the 'whereby' clause, because a whereby clause that merely states the result of the limitations in the claim adds nothing to the substance of the claim." Lockheed Martin Corp. v. Space Systems/Loral, Inc., 249 F.3d 1314, 1324 (Fed.Cir.2001), *citing* Texas Instruments, 988 F.2d at 1172 ("A 'whereby' clause that merely states the result of the limitations in the claim adds nothing to the patentability

or substance of the claim."). Because it does not limit the claim, interpretation of this paragraph is unnecessary.

C. ***Claim 3***

Claim 3 reads:

A remote control apparatus for a rotating camera base, as set forth in claim 2, wherein
said input means further includes a second input means for inputting the home position data used for making said rotating camera base rotate to prescribed home positions during automatic operation,

said storing means further stores the home position data inputted by means of [s]aid second input means,

an instructing means is further provided for inputting to said controlling means the instruction signals for making said rotating camera base rotate to prescribed home positions during automatic operation, said instructing means being electronically connected to said controlling means, and

said controlling means further makes said rotating camera base rotate to a prescribed home position during automatic operation according to the instruction signals from said instructing means, based on said home position data stored in said storing means.

Patent at col.10:59-col.11:10.
This claim covers the ability of the remote control apparatus to point the camera to pre-programmed "home positions."

1. ***First Paragraph: Preamble***

The preamble to claim 3 ("A remote control ...") identifies claim 3 as a dependent claim based on independent claim 2. In addition to new limitations in the language of claim 3, all of the limitations of claim 2 apply to claim 3. *See* 35 U.S.C. s. 112 ("A claim in dependent form shall be construed to incorporate by reference all the limitations of the claim to which it refers."); Robotic Vision Sys., Inc. v. View Eng'g, Inc., 189 F.3d 1370, 1376 (Fed.Cir.1999) ("Claims 11 and 12 are dependent claims of claim 1 and are to be construed to incorporate by reference all the limitations of claim 1.").

2. ***Second Paragraph***

The second paragraph ("said input means ...") is a means-plus-function limitation. In claim 2, the input means-plus-function claim is interpreted as: 1) the function of inputting operating data for the automatic positioning of the rotating camera base; 2) the structure consisting of the control pad and a set of buttons and switches (including pan speed, tilt speed, and interval scan switches) on the operating panel, and equivalents thereof. The "second input means" limitation in claim 3 functions to input "home position data" necessary to tell the camera how to move into desired home positions. The specification discloses corresponding structure consisting of an auto switch, a program switch, home position buttons, a control pad, and memory buttons. *See* Patent at col.3:14-21, 32-42; col.3:66-col.4:2; col.5:66-col.6:12. The structure of the second input means is the control pad and a set of buttons (including home position buttons) and switches on the operating panel, and equivalents thereof.

Like "operating data," the construction of the term, "home position data," is disputed. Lectrolarm contends

"home position data" means "the data for predefined stationary home position locations." Pl. Interp. at p. 97:3-4; Pl. Reply, Exh. A. Pelco contends home position data means "the data stored when a home position button and the memory set switch are pressed, which consists of the directional coordinates of the location currently being viewed on the monitor as supplied by the CPU on the transmitting side of the system." Def. Interp. at p. 21:4-9; Def. Brief at p. 24:19-22. The home position data are the information (in the form of polar coordinates or rotation angles, for example) necessary to specify the locations of prescribed home positions.

3. ***Third Paragraph***

The third paragraph ("said storing means ...") is a means-plus-function claim. The function is storing home position data that is inputted using the control pad, buttons (including the home position buttons), and switches on the operating panel. This function is in addition to storing operating data as claimed in claim 2. The structure is random access memory and equivalents thereof. The structure includes any part of a digital electronic processor necessary to effectuate the storing means' storage function. *See* Patent at col.5:19-22, col.5:38-41, col.5:49-52, col.6:9-10. The parties dispute the location of the storing means structure.

Claim 3 incorporates the same limitations regarding the physical location of the RAM and the definition of RAM discussed in connection with paragraph 3 of claim 2. The specification states that "the CPU (28) of the transmitting side stores the selected home position in the RAM (30)." Patent at col.6:9-10. As discussed above with respect to operating data, RAM (35) stores home position data to some unspecified extent. For example, the specification describes how the receiving side CPU (33) responds to a signal from an external sensor. *See* Patent at col.6:28-41. "[W]hen the emergency switch (19) is in a pressed state the CPU (33) of the receiving side causes the television camera (7) to rotate toward the home position from which the emergency signal has been sent ...." Patent at col.6:33-36. The CPU (33) operates based on data stored in RAM (35). Home position data must be stored in RAM (35) in order for CPU (33) to move the camera to the correct position in response to a signal from an external sensor. Pelco's interpretation would require additional communication between the camera base and control box which would defeat the noise-reduction goal that receiving side RAM (and other structures) is designed to further. The storing means includes RAM on both the transmitting side and receiving side.

4. ***Fourth Paragraph***

The fourth paragraph ("an instructing means ...") is a means-plus-function limitation. This paragraph refers to switches a human operator can push to cause the camera to suspend automatic operation and point to a home position corresponding to the switch pressed. The function of the instructing means is to send signals to the controlling means which ultimately cause the camera to rotate to a pre-programmed position corresponding to the switch pressed. The specification provides: "when any one of the home position buttons (17) is pressed (S15) during this automatic operation, the CPU (28) of the transmitting side, through the CPU (33) of the receiving side, causes the television camera (7) to rotate and stop such that the home position corresponding to the selected home position button (17) is shown on the monitor (S17), where the operation is switched from the automatic operation to manual operation." Patent at col.6:18-26. The structure of the instructing means is the home position buttons and the electrical circuitry connecting the home position buttons to the controlling means, and equivalents thereof.

5. ***Fifth Paragraph***

The fifth paragraph ("said controlling means ...") is a means-plus-function limitation. The function is to

position the rotating camera base into prescribed home positions in response to signals originating from the home position switches on the operating panel using the home position data previously stored in RAM. The structure accomplishing the controlling function is the same as the structure of the "controlling means" claimed in paragraph 4 of claim 2. *See* Pl. Markman Hrg. Exh. 17 at p. 9; Def. Markman Hrg. Exh. 2 at p. 9. The structure of the "controlling means" is the transmitting side CPU, the receiving side CPU, the drive circuit, and the stepper motors, and equivalents thereof.

D. ***Claim 4***

Claim 4 reads:

A remote control apparatus for a rotating camera base, as set forth in claim 2, wherein
said input means further includes a second input means for inputting the home position data used for making said rotating camera base rotate to prescribed home positions during automatic operation,

said storing means further stores the home position data inputted by means of said second input means,

external sensors that send an emergency signal to said controlling means are provided in said prescribed home positions and are electrically connected to said controlling means, and

said controlling means further makes said rotating camera base rotate to a prescribed home position based on the emergency signal sent from the external sensor and on said home position data stored in said storing means.

Patent at col.11:11-29.
This claim covers the ability of the remote control apparatus to suspend automatic operations and to point the camera to predefined home positions in response to "emergency" signals from external sensors.

1. ***First Paragraph: Preamble***

The preamble ("A remote control ...") identifies claim 4 as a dependent claim based on independent claim 2. All of the limitations of claim 2 apply to claim 4. *See* 35 U.S.C. s. 112.

2. ***Second Paragraph***

The second paragraph ("said input means ...") is a means-plus-function limitation. This limitation is the same as the second paragraph in claim 3. *See* Pl. Markman Hrg. Exh. 17 at p. 10; Def. Markman Hrg. Exh. 2 at p. 10. The function is to input "home position data" necessary to tell the camera how to move into desired home positions. The structure of the second input means is the control pad and a set of buttons (including home position buttons) and switches on the operating panel, and equivalents thereof.

3. ***Third Paragraph***

The third paragraph ("said storing means ...") is a means-plus-function claim. This limitation is the same as the limitation in paragraph 3 of claim 3. *See* Pl. Markman Hrg. Exh. 17 at p. 11; Def. Markman Hrg. Exh. 2 at p. 11. The function is storing home position data. The structure is random access memory and any part of a digital electronic processor necessary to effectuate the storing means' storage function, and equivalents thereof.

4. ***Fourth Paragraph***

The fourth paragraph ("external sensors that ...") is a limitation consisting of external signals in prescribed home positions electrically connected to the controlling means. The external sensors are infrared, supersonic, or other detectors, not limited to those disclosed in the specification, electrically connected to the receiving side CPU and the controlling means. Each sensor is associated with a home position. When an external sensor is triggered, it sends an electronic "emergency" signal to the controlling means.

5. ***Fifth Paragraph***

The fifth paragraph ("said controlling means ...") is a means-plus-function limitation. The function is to move the camera to the pre-programmed home position corresponding to the external sensor sending the "emergency" signal. The parties agree that the structure performing this function is the same as the "controlling means" claimed in claim 2. *See* Pl. Interp. at p. 105:5-7. The structure of the "controlling means" is the transmitting side CPU, the receiving side CPU, the drive circuit, and the stepper motors, and equivalents thereof.

E. ***Claim 5***

Claim 5 reads:

A remote control apparatus for a rotating camera base, as set forth in claim 4, that is further provided with a disabling means that prevents, based on the emergency signal from said external sensors, said controlling means from making said rotating camera base rotate to a prescribed home position, said disabling means being electrically connected to said external sensor, and

a display means that shows the presence or absence of said emergency signal, said display means being electrically connected to said external sensor.

Patent at col.11:30-41.
This claim covers the invention's ability to disable the automatic positioning of the camera to a home position corresponding to the external sensor from which a signal is received and instead notify the operator of the detection through a visual signal relayed to the operating panel.

1. ***First Paragraph: Preamble***

The preamble ("A remote control ...") identifies claim 5 as a dependent claim based on claim 4, which is itself a dependent claim based on claim 2. Claim 5 shares the limitations of claims 2 and 4.

2. ***Second Paragraph***

The second paragraph ("a disabling means ...") is a means-plus-function limitation. The function is to prevent the controlling means from causing the camera to rotate to the home position corresponding to the external sensor from which an "emergency" signal is received. The structure is in dispute. Pelco argues the structure of the "disabling means" is a switch located in the control box. *See* Def. Interp. at p. 23:1-3. Lectrolarm argues the structure of the "disabling means" is a switch and circuitry in the controlling means, electrically connected to the sensors. *See* Pl. Interp. at p. 106:20-21.

The specification teaches that the disabling means is the switch in the control box (the emergency switch (19) in the first embodiment) which disables the automatic positioning response when not pressed. *See* Patent at Fig. 1; col.7:9-21. The specification does not indicate that any circuitry is part of the disabling means. The structure of the disabling means is a switch located on the operating panel of the control box and equivalents thereof.

3. ***Third Paragraph***

The third paragraph ("a display means ...") is a means-plus-function limitation. The function is to display the presence or absence of an "emergency" signal coming from an external sensor. The structure is disputed. Both parties agree the structure is a visual signal which indicates the presence or absence of an "emergency" signal from the external sensors. *See* Pl. Reply at Exh. A; Def. Opp. at p. 20:16-23. The specification indicates the signal takes the form of a LED displayed on the operating panel (8). *See* Patent at Fig. 3; col.6:41-46; col.7:9-20. Defendants argue the signal is therefore "more than a mere visual signal as Lectrolarm submits, it is an indicator on the control panel." Def. Opp. at p. 20:23-24. Paragraph 3 states the display means is "electrically connected to said external sensor." Patent at col.11:36-37. The structure of the display means is a set of indicator lights, each associated with a particular home position button on the operating panel, which indicate the presence or absence of "emergency" signals from corresponding external sensors, and equivalents thereof.

V. *CONCLUSION*

For the reasons state above, the claims of the '088 Patent are interpreted as follows:

A. ***Claim 1***

1. ***First Paragraph: Preamble***

A remote control apparatus that operates a television camera base rotatable in the horizontal (pan) and vertical (tilt) directions, said remote control apparatus comprising:

2. ***Second Paragraph: First Controlling Means***

a first controlling means.

The function of the first controlling means is to output a digital signal consisting of instructions to position the camera base.

The structure of the first controlling means is the transmitting side CPU and equivalents thereof.

3. ***Third Paragraph: Modem***

a device for 1) receiving said digital signal for driving and controlling said rotating camera base outputted from said first controlling means; 2) modulating said digital signal onto a continuous frequency capable of being modulated or impressed with a signal; and 3) demodulating said signal to recover the digital information from the modulated continuous frequency.

A modem is a device which modulates digital information onto a carrier wave and demodulates the signal to recover the digital information from the modulated carrier wave.

The term carrier wave is completely synonymous with the term carrier, which, to one skilled in the art in 1988, means wave. A carrier wave is a continuous electromagnetic wave, of sinusoidal or non-sinusoidal form, capable of being modulated or impressed with a signal.

A modulating circuit is a circuit that modulates a digital signal onto a continuous frequency capable of being modulated or impressed with a signal. The modulating circuit is one of the component parts of the control box. The modulating circuit is electrically connected to the first controlling means on the transmitting side and electrically connected to the demodulating circuit on the receiving side.

A demodulating circuit is a circuit that recovers a digital signal which has been modulated onto a continuous frequency capable of being modulated or impressed with a signal. The demodulating circuit is one of the component parts comprising the camera base. The demodulating circuit is electrically connected to the modulating circuit on the transmitting side and electrically connected to the second controlling means on the receiving side.

4. ***Fourth Paragraph: Control Box***

a set of component parts on the transmitting side of the remote control apparatus collectively referred to as a control box, including a circuit that modulates a digital signal onto a continuous frequency capable of being modulated or impressed with a signal, said circuit being electrically connected to the transmitting side CPU.

5. ***Fifth Paragraph: Demodulating Circuit***

said demodulating circuit that 1) recovers the digital signal which has been modulated by said modulating circuit onto a continuous frequency capable of being modulated or impressed with a signal; 2) is one of the component parts comprising the camera base; and 3) is electrically connected to said modulating circuit.

6. Sixth ***Paragraph: Second Controlling Means***

a second controlling means.

The function of the second controlling means is to position the rotating camera base in response to the digital signal received from the demodulating circuit.

The structure of the second controlling means is the receiving side CPU along with the drive circuit and stepper motors in the camera base and equivalents thereof. The second controlling means is electrically connected to the demodulating circuit.

B. ***Claim 2***

1. ***First Paragraph: Preamble***

A remote control apparatus for operating a television camera base rotatable in the horizontal (pan) and vertical (tilt) directions, said remote control apparatus comprising:

2. ***Second Paragraph: Input Means***

an input means.

The function of the input means is to input operating data for the automatic positioning of the rotating camera base.

The structure of the input means is the control pad and a set of buttons and switches (including pan speed, tilt speed, and interval scan switches) on the operating panel, and equivalents thereof.

Operating data is the data inputted by the user through the control pad, buttons, and switches on the operating panel that direct the automatic reciprocating motion of the camera between defined points. The operating data must include at least position data (represented by angles of rotation, polar coordinates, or any other suitable units) and stopping interval data. Operating data may also include data specifying speed of rotation, pan, and tilt at the discretion of the user.

3. ***Third Paragraph: Storing Means***

a storing means.

The function of the storing means is to store the operating data inputted by the user through the control pad, buttons, and switches on the operating panel.

The structure of the storing means is a random access memory at the transmitting side and a random access memory at the receiving side, as well as any CPU components necessary to effect the storage function, and equivalents thereof.

Random access memory is completely synonymous with RAM and means a volatile memory with high speed read-write memory that permits access to any of its address (storage) locations in any desired sequence with similar access time to each location.

4. ***Fourth Paragraph: Controlling Means***

a controlling means.

The function of the controlling means is to control the automatic operation of the rotating camera base using the previously stored operating data.

The structure of the controlling means is the transmitting side CPU, the receiving side CPU, the drive circuit, and the stepper motors, and equivalents thereof.

5. ***Fifth Paragraph: Whereby***

whereby operating data preciously stored in said storing means is employed to automatically operate the rotating camera base in accordance with said previously stored operating data.

C. ***Claim 3***

1. ***First Paragraph: Preamble***

A remote control apparatus for operating a television camera base rotatable in the horizontal (pan) and vertical (tilt) directions, said remote control apparatus comprising all of the limitations in claim 2, and:

2. ***Second Paragraph: Second Input Means***

a second input means.

The function of the second input means is to input home position data necessary to tell the camera how to move into desired home positions.

The structure of the second input means is the control pad and a set of buttons (including home position buttons) and switches on the operating panel, and equivalents thereof.

Home position data is information (represented by angles of rotation, polar coordinates, or any other suitable units) necessary to specify the locations of prescribed home positions. Home position data is inputted by the user through the control pad, buttons (including the home position buttons), and switches on the operating panel.

3. ***Third Paragraph: Storing Means***

said storing means.

The function of the storing means is to store home position data inputted using the control pad, buttons (including the home position buttons), and switches on the operating panel.

The structure of the storing means is a random access memory at the transmitting side and a random access memory at the receiving side, as well as any CPU components necessary to effect the storage function, and equivalents thereof.

4. ***Fourth Paragraph: Instructing Means***

an instructing means.

The function of the instructing means is to send signals to the controlling means which ultimately cause the camera to rotate to a pre-programmed position corresponding to a particular home position button pressed by the user.

The structure of the instructing means is the home position buttons and the electrical circuitry connecting the home position buttons to the controlling means, and equivalents thereof.

5. ***Fifth Paragraph: Controlling Means***

said controlling means.

The function of the controlling means is to position the rotating camera base into prescribed home positions in response to signals originating from the home position switches on the operating panel using the home

position data previously stored in RAM.

The structure of the controlling means is the transmitting side CPU, the receiving side CPU, the drive circuit, and the stepper motors, and equivalents thereof.

D. ***Claim 4***

1. ***First Paragraph: Preamble***

A remote control apparatus for operating a television camera base rotatable in the horizontal (pan) and vertical (tilt) directions, said remote control apparatus comprising all of the limitations in claim 2, and:

2. ***Second Paragraph: Second Input Means***

a second input means.

The function of the second input means is to input home position data necessary to tell the camera how to move into desired home positions.

The structure of the second input means is the control pad and a set of buttons (including home position buttons) and switches on the operating panel, and equivalents thereof.

3. ***Third Paragraph: Storing Means***

said storing means.

The function of the storing means is to store home position data inputted using the control pad, buttons (including the home position buttons), and switches on the operating panel.

The structure of the storing means is a random access memory at the transmitting side and a random access memory at the receiving side, as well as any CPU components necessary to effect the storage function, and equivalents thereof.

4. ***Fourth Paragraph: External Sensors***

external signals in prescribed home positions electrically connected to the controlling means. The external sensors are infrared, supersonic, or other detectors, not limited to those disclosed in the specification, electrically connected to the receiving side CPU and the controlling means. Each sensor is associated with a home position. When an external sensor is triggered, it sends an electronic "emergency" signal to the controlling means.

5. ***Fifth Paragraph: Controlling Means***

said controlling means.

The function of the controlling means is to move the camera to the pre-programmed home position corresponding to the external sensor sending the "emergency" signal.

The structure of the controlling means is the transmitting side CPU, the receiving side CPU, the drive circuit, and the stepper motors, and equivalents thereof.

E. ***Claim 5***

1. ***First Paragraph: Preamble***

A remote control apparatus for operating a television camera base rotatable in the horizontal (pan) and vertical (tilt) directions, said remote control apparatus comprising all of the limitations in claims 2 and 4, and:

2. ***Second Paragraph: Disabling Means***

a disabling means.

The function of the disabling means is to prevent the controlling means from causing the camera to rotate to the home position corresponding to the external sensor from which an "emergency" signal is received.

The structure of the disabling means is a switch located on the operating panel of the control box and equivalents thereof.

3. ***Third Paragraph: Display Means***

a display means.

The function of the display means is to display the presence or absence of an "emergency" signal coming from an external sensor.

The structure of the display means is a set of indicator lights, each associated with a particular home position button on the operating panel, which indicate the presence or absence of "emergency" signals from corresponding external sensors, and equivalents thereof.

SO ORDERED.