

United States District Court,
S.D. Ohio.

B.F. GOODRICH FLIGHTSYSTEMS, INC,
Plaintiff.

v.

INSIGHT INSTRUMENTS CORPORATION, and Insight Avionics, Inc,
Defendants.

v.

B.F. GOODRICH FLIGHTSYSTEMS, INC. and The B.F. Goodrich Company,
Counterclaim Defendants.

Feb. 25, 1992.

Jerold A. Jacover, John L. Cline, Willian Brinks Olds Hofer Gilson & Lione, Chicago, Ill., Douglas James Suter, Isaac, Brant, Ledman & Becker, Columbus, Ohio, for plaintiff and counterclaim defendants.

Peter K. Sommer, Sommer, Oliverio & Sommer, Buffalo, N.Y., William J. Christensen, Columbus, Ohio, for defendants.

ORDER

KINNEARY, Senior District Judge.

This matter comes before the Court to consider the motion of the Plaintiff for a preliminary injunction prohibiting the Defendants from the continued production and marketing of a device which is claimed to infringe upon the Plaintiff's patent. Fed.R.Civ.P. 65; 35 U.S.C. s. 283 (1988).

As an initial matter, the parties seek clarification of an order granted from the bench during the hearing for the preliminary injunction with respect to a motion for the substitution of the Plaintiff's name to reflect a change in corporate ownership. On December 30, 1991, the Plaintiff filed a motion to amend the Complaint to reflect its corporate name change. On January 2, 1992, the Defendants responded with an alternative motion to alter the case caption by substituting the names of the Plaintiff, Defendant, and Counterclaim Defendant, arguing that an amendment of the Complaint would require the filing of an amended Answer. They argued that a change in the caption would avoid the unnecessary burden of refileing documents for no reason other than to reflect the Plaintiff's new name. During the hearing, the Plaintiff renewed its motion, stating that is was one "to substitute B.F. Goodrich Flight Systems as the Plaintiff for Foster Air Data." Hr'g Tr. at I-81. On February 14, 1992, the parties filed a joint stipulation agreeing to change the case caption without amending the pleadings for that purpose. The Stipulation is consistent with the Court's understanding of the motion, and therefore GRANTS the parties' request to so amend the pleadings.-

I. STANDARD FOR PRELIMINARY INJUNCTION

It is well settled that in order for a preliminary injunction to issue, a plaintiff must establish the following criteria: (1) the likelihood of the plaintiff's success on the merits; (2) whether the injunction will save the plaintiff from irreparable injury; (3) whether the injunction would harm others; and (4) whether the public interest would be served by the injunction. *International Longshoremen's Ass'n Local 1937 v. Norfolk Southern Corp.*, 927 F.2d 900, 903 (6th Cir.), *cert. denied*, 116 L.Ed.2d 38 (1991); *Tyson Foods, Inc. v. McReynolds*, 865 F.2d 99, 101 (6th Cir.1989); *Forry, Inc. v. Neundorfer, Inc.*, 837 F.2d 259, 262 (6th Cir.1988); *Frisch's Restaurant, Inc. v. Shoney's, Inc.*, 759 F.2d 1261, 1263 (6th Cir.1985); *In re De Lorean Motor Co.*, 755 F.2d 1223, 1228 (6th Cir.1985); *USACO Coal Co. v. Carbomin Energy, Inc.*, 689 F.2d 94 (6th Cir.1982); *Mobil Corp. v. Marathon Oil Co.*, 669 F.2d 366, 368 (6th Cir.1981), *cert. denied*, 455 U.S. 982 (1982). The four factors used to determine the efficacy of a preliminary injunction motion are not prerequisites to a successful motion; rather, they are merely elements to be balanced in relation to one another, with no single element being dispositive. *De Lorean Motor Co.*, 755 F.2d at 1229. Thus "the degree of likelihood of success may depend on the strength of the other factors." *Id.* Moreover, the strength of the "likelihood of success that need be shown will vary inversely with the degree of injury the plaintiff will suffer absent the injunction." *Id.* (quoting *Metropolitan Detroit Plumbing & Mechanical Contractors Assn. v. HEW*, 418 F.Supp. 585, 586 (E.D.Mich.1976)); *Schalk v. Teledyne, Inc.*, 751 F.Supp. 1261, 1264 (W.D. Mich.1990). However, where it is shown that the burden imposed upon a defendant by the issuance of a preliminary injunction would be equivalent to that suffered by a plaintiff, the plaintiff must show a strong probability of success on the merits in order to prevail. *Frisch's Restaurant*, 759 F.2d at 1270; *In re De Lorean*, 755 F.2d at 1229; *Schalk*, 751 F.Supp. at 1264. Thus the flexibility traditionally afforded examination of the foregoing factors is tempered by the need to analyze carefully the dynamics of the injury claimed by each of the parties in the case. *Schalk*, 751 F.Supp. at 1264 (citing *Friendship Materials, Inc. v. Michigan Brick, Inc.*, 679 F.2d 100, 103 (6th Cir.1982)). With this standard in mind, the Court now considers the Plaintiff's motion.

II. STANDARD FOR INFRINGEMENT

The issuance of a patent creates a legal presumption of validity. 35 U.S.C. s. 282. The patent owner bears the burden of proving infringement by a preponderance of the evidence. *Laitram Corp. v. Rexnord, Inc.*, 939 F.2d 1533, 1535, 19 U.S.P.Q.2d 1367 (Fed. Cir.1991). Infringement may be shown in one of two ways: either by literal infringement, or under the doctrine of equivalents. *Stiftung v. Renishaw*, 740 F.Supp. 1038, 1044, 18 U.S.P.Q.2d 1817 (S.D.N.Y.1990) (hereinafter *Stiftung I*), *rev'd in part, vacated in part, on other grounds*, 945 F.2d 1173, 20 U.S.P.Q.2d 1094 (1991). Determination of whether literal infringement has occurred requires two inquiries: (1) determination of the scope of the claim; and (2) determination whether the claim reads on the accused device. *Id.* Thus the court is to determine the "metes and bounds" of protection afforded to the claims, and then, for the purposes of this case, the Court must decide whether the claims are likely to be found by a jury to cover the accused device. *Stiftung v. Renishaw PLC*, 945 F.2d 1173, 1177, 20 U.S.P.Q.2d 1094 (Fed. Cir.1991) (hereinafter *Stiftung II*); *Palumbo v. Don-Joy Co.*, 762 F.2d 969, 974, 226 U.S.P.Q. 5 (Fed. Cir.1985).

Determination of the scope of the claim, or, claim interpretation, begins with examination of the language of the claim itself. *Smithkline Diagnostics, Inc. v. Helena Laboratories Corp.*, 859 F.2d 878, 882, 8 U.S.P.Q.2d 1468, 1472 (Fed. Cir.1988). "If accused matter falls clearly within the claim, infringement is made out and that is the end of it." *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 339 U.S. 605, 607 (1950). In considering the language of the claim, a court may consider the patent's specification, the prosecution history of the patent, and the other claims in the patent. *Mannesmann Demag Corp. v. Engineered Metal Prods. Co.*, 793 F.2d 1279, 230 U.S.P.Q. 45, 46 (Fed. Cir.1986). Once interpreted, the court must compare

the claims of the patent with the accused device. *SRI International v. Matsushita Elec. Corp.*, 775 F.2d 1107, 1121, 227 U.S.P.Q. 577 (Fed. Cir.1985). Infringement of a claim requires that the accused device meet every limitation of the asserted claim, either literally or by equivalents. *Stiftung II*, 945 F.2d at 1178; *Johnston v. Ivac Corp.*, 885 F.2d 1574, 1577, 12 U.S.P.Q.2d 1382 (Fed. Cir.1989); *Pennwalt Corp. v. DurandWayland, Inc.*, 833 F.2d 931, 935, 4 USPQ2d 1737, 1739-40 (Fed. Cir.1987) (*en banc*), *cert. denied*, 485 U.S. 961 (1988). It need only be shown that one claim of the patented device is infringed upon in order for the patentee to prevail on his claim. *D.M.I., Inc. v. Deere & Co.*, 755 F.2d 1570, 1575, 225 U.S.P.Q. 236 (Fed. Cir.1985).

Construction of a claim limitation written in means plus function form is governed by 35 U.S.C. s. 112(6) which provides:

An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof. FN1

As suggested by the foregoing language, literal infringement in a means plus function claim occurs when an accused device performs the identical function claimed for the means element, and performs that function using the structure disclosed either in the specification or an equivalent structure. *Intel Corp. v. International Trade Comm'n*, 946 F.2d 821, 841, 20 U.S.P.Q.2d 1161 (Fed. Cir.1991). *See also* *Deere*, 755 F.2d at 1573-74, 225 U.S.P.Q. at 238-39 (Fed. Cir.1985). Thus the court may refer to the specification of the claim in order to determine the nature and extent of the structure embraced by the claim. *Stiftung I*, 740 F.Supp. at 1044-45. "The specification aids in ascertaining the scope and meaning of the language employed in the claims inasmuch as words must be used in the same way in both the claims and the specification." *ZMI Corp. v. Cardiac Resuscitator Corp.*, 844 F.2d 1576, 1580, 6 U.S.P.Q.2d 1557 (Fed. Cir.1988) (citation omitted). Similarly, the court may consider the prosecution history of the patent in suit in order to ascertain the scope of the protection to be afforded the patentee. *ZMI Corp.*, 844 F.2d at 1580. "[T]he prosecution history (or file wrapper) limits the interpretation of claims so as to exclude any interpretation that may have been disclaimed or disavowed during prosecution in order to obtain claim allowance." FN2 *Id.* (quoting *Standard Oil Co. v. American Cyanamid Co.*, 774 F.2d 448, 452 (Fed. Cir.1985)).

As has been stated, literal infringement can also be made out when an accused device embodies the corresponding "structure, material, or acts described in the specification *and the equivalents thereof*." 35 U.S.C. s. 112 para. 6 (emphasis added); *Texas Instruments, Inc. v. United States Int'l Trade Comm'n*, 805 F.2d 1558, *reh'q denied, reaff'd* 846 F.2d 1369 (1986). Thus the statute does not require an exact copy of a protected item in order to find literal infringement. One issue in this case is whether the accused device employs structures which are equivalent to those found in the infringed device.

Neither the Federal Circuit nor its predecessor courts have established a definitive test to determine the scope of equivalent elements to prove literal infringement. *Corning Glass Works v. Sumitomo Elec. U.S.A., Inc.*, 868 F.2d 1251, 1260, 9 U.S.P.Q.2d 1962 (Fed. Cir.1989). Equivalent elements have been described as those which achieve "substantially the same thing in substantially the same way to get substantially the same result," *Tektronix, Inc. v. United States*, 445 F.2d 323, 329, 170 U.S.P.Q. 100 (Ct.Cl.1971); as achieving "the same purpose, quality, and function as the claimed ingredient," *Atlas Powder Co. v. E.I. Du Pont De Nemours & Co.*, 750 F.2d 1569, 1579-80, 224 U.S.P.Q. 409 (Fed. Cir.1984); and have been determined by comparing the "function/way/result of the substitution with the function/way/result of the limitation in the

context of the invention." *Corning Glass Works*, 868 F.2d at 1260 (explaining and approving *Corning Glass Works v. Sumitomo Elec. U.S.A., Inc.*, 671 F.Supp. 1369 (S.D.N.Y.1987)). *See also* *Perkin-Elmer Corp. v. Westinghouse Elec. Corp.*, 822 F.2d 1528, 1531-35, 3 U.S.P.Q.2d 1321 (Fed. Cir.1987) (substituted loop-coupling not equivalent because it did not produce the same structural-functional-operational interrelationships achieved by tap-coupling specified in claim); *Raytheon Co. v. Roper Corp.*, 724 F.2d 951, 962, 220 U.S.P.Q. 592 (Fed. Cir.1983), *cert. denied*, 469 U.S. 835 (1984) (substituted hole in duct " 'performs substantially the same function in substantially the same way to obtain the same' result as ... blower inlet" of the claim); *Caterpillar Tractor Co. v. Berco, S.p.A.*, 714 F.2d 1110, 1115, 219 U.S.P.Q. 185 (Fed. Cir.1983) (thinner driving flange in accused seal did not affect the mode of operation or result obtained by flange in claimed invention).FN3

Despite the literal breadth of the statute, however, means plus function language is not a talisman for limitless protection of the concept the claim purports to protect. Far from expanding the scope of such a claim, section 112 para. 6 "operates to *cut back* on the types of *means* which could literally satisfy the claim language." *Johnston v. Ivac Corp.*, 885 F.2d 1574, 1580, 12 U.S.P.Q.2d 1382 (Fed. Cir.1989) (emphasis in original); *see also* *Pennwalt Corp.*, 833 F.2d at 933-34 ("section 112, paragraph 6, rules out the possibility that any and every means which performs the function specified in the claim *literally* satisfies that limitation." (emphasis in original)). Thus a literal reading of section 112 para. 6, which would encompass any means for performing a given function, would produce a prohibited result.

In the alternative, infringement may also be found under the doctrine of equivalents, the essence of which "is that one may not practice a fraud on a patent." *Graver Tank*, 339 U.S. at 608. To apply the doctrine of equivalents, the finder of fact must determine the range of equivalents to which a claim is entitled in light of the prosecution history, the specification, the pioneer-nonpioneer status of the invention, and the prior art. *Deere*, 755 F.2d at 1575. It must then be determined whether the accused product performs substantially the same work or function, in substantially the same way, to obtain substantially the same overall result as the claimed invention. *Id.*; *Graver Tank*, 339 U.S. at 608 (quoting *Machine Co. v. Murphy*, 97 U.S. 120f 125 (1877)); *Pennwalt*, 833 F.2d at 934.

In determining whether an accused device infringes under the doctrine of equivalents, the Supreme Court has advised:

What constitutes equivalency must be determined against the context of the patent, the prior art, and the particular circumstances of the case. Equivalence, in patent law, is not the prisoner of a formula and is not an absolute to be considered in a vacuum. It does not require complete identity in every purpose and in every respect. In determining equivalents, things equal to the same thing may not be equal to each other and, by the same token, things for most purposes different may sometimes be equivalent. Consideration must be given to the purpose for which an ingredient is used in a patent, the qualities it has when combined with other ingredients, and the function which it is intended to perform. An important factor is whether persons reasonably skilled in the art would have known of the interchangeability of an ingredient not contained in the patent with one that was.

Graver Tank, 339 U.S. at 609. Thus, even if it is determined that an accused device performs substantially the same function in substantially the same way, there can be no infringement if the asserted scope of equivalency would itself encompass the relevant prior art. *We Care, Inc. v. Ultra-Mark Int'l Corp.*, 930 F.2d 1567, 1571, 18 U.S.P.Q.2d 1562 (Fed. Cir.1991) (citing *Insta-Foam Prods., Inc. v. Universal Foam Sys.*, 906 F.2d 698, 704 (Fed. Cir.1991)); *Wilson Soorting Goods Co. v. David Geoffrey & Assoc.*, 904 F.2d 677, 683,

14 U.S.P.Q.2d 1942 (Fed. Cir.1990). This result obtains because the parameters of a patentee's claim may encompass only that which results from original inventive effort, and not those things which may fairly be considered to have been in the public domain prior to creation of the patentee's invention.FN4

[A] patentee should not be able to obtain, under the doctrine of equivalents, coverage which he could not lawfully have obtained from the PTO by literal claims. The doctrine of equivalents exists to prevent a fraud on a patent, not to give a patentee something he could not lawfully have obtained from the PTO had he tried.

Wilson Sporting Goods, 904 F.2d at 684 (emphasis in original).

That which would have been obvious to one skilled in the pertinent art at the time the patentee applied for the patent will be excluded from the permissible range of equivalents protected by the patent. 35 U.S.C. s. 103 (1988). Thus, establishment of the limitations, if any, to be placed upon the scope of equivalents requires that the Court (1) determine the scope and content of the prior art; (2) ascertain the differences between the prior art and the claims at issue; and (3) resolve the level of ordinary skill in the pertinent art. Ryko Mfg. Co. v. Nu-Star, Inc., 950 F.2d 714, 716, 21 U.S.P.Q.2d 1053 (Fed. Cir.1991) (citing Graham v. John Deere Co., 383 U.S. 1, 17 (1965)). "Such secondary considerations as commercial success, long felt but unresolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented." Deere, 383 U.S. at 17-18.

Critical, too, is the language and limitations of the claim itself, for the doctrine of equivalents does not expand the scope of the original claim. Wilson Sporting Goods, 904 F.2d at 683-84.

[A] court may not, under the guise of applying the doctrine of equivalents, erase a plethora of meaningful structural and functional limitations of the claim on which the public is entitled to rely to avoid infringement.... [T]he doctrine of equivalents ... is not designed to permit wholesale redrafting of a claim to cover non-equivalent devices, i.e., to permit a claim expansion that would encompass more than an insubstantial change.

Perkin-Elmer Corp. v. Westinghouse Elec. Corp., 822 F.2d 1528, 1532, 3 U.S.P.Q.2d 1321 (Fed. Cir.1987) (citations omitted).

Every patent is entitled to a certain range of equivalents, the scope of which depends upon where, in the spectrum of novelty, the invention falls. Inventions which represent broad breakthroughs in the inventive world are known as "primary" or "pioneer" inventions, and are afforded a broad range of equivalents. Eibel Process Co. v. Minnesota & Ontario Paper Co., 261 U.S. 45, 63 (1923). Pioneer inventions are distinguished from others as comprising "a distinct step in the progress of the art, [as] distinguished from a mere improvement or perfection of what had gone before." Westinghouse v. Boyden Power Brake Co., 170 U.S. 537, 562 (1898).

Between the poles of revolutionary achievement and modest improvement lies a plain of existence of varying gradations upon which most devices ultimately lie. Texas Instruments v. U.S. Int'l Trade Comm'n, 846 F.2d 1369, 1370, 6 U.S.P.Q.2d 1414 (Fed. Cir.1988) (denying rehearing). The point on this hypothetical plain or continuum upon which a device lies, and hence the scope of equivalence it will be afforded, is a question reserved for the trier of fact. Sun Studs, Inc. v. ATA Equip. Leasing, Inc., 872 F.2d 978, 987, 10 U.S.P.Q.2d 1338 (citing Royer v. Schultz Belting Co., 135 U.S. 319, 325 (1890)).

Finally, as stated at the outset, a patent is presumed to be valid. 35 U.S.C. s. 282; *Ryko*, 950 F.2d at 715. one who would challenge the validity of a patent must prove his case by clear and convincing evidence. *Id.* at 716. A patent is invalid if "the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time of the invention to a person having ordinary skill in the art to which the subject matter pertains." *Id.* (citing 35 U.S.C. s. 103 (1988)). Therefore, in order for the Defendant to establish that the patent at issue is invalid, it will bear the burden of proffering facts which clearly show that the patent was obvious in light of the prior art.

III. PLAINTIFF'S INVENTION

The patent at issue in this case is No. 4,023,408 (hereinafter "the Ryan patent" or "the '408 patent"), which was issued to Paul Ryan and Nicholas Spitzer on May 17, 1977, and which expires on May 17, 1994, for an invention known as the "Stormscope." The Stormscope is a product which detects electrical disturbances emanating from lightening strikes and displays the disturbances on a viewing screen which provides the pilot of a small aircraft with a graphic representation of the lightening activity relative to the location of the aircraft. Hr'g Tr. at I-163, testimony of Dr. John Williamson. The theory behind the device is that the most severe turbulence, and hence the most dangerous portion of a storm, is usually accompanied by significant lightening activity. Therefore, a device which locates lightening activity will provide a pilot with information sufficient to avoid dangerous storm cells. *Id.* at I-47-48.

Reduced to its simplest terms, the '408 patent consists of three basic components: a receiving means, a processing means, and a display means. The receiving means, as taught by the Claim at issue in this case, consists of crossed H-field antennae which receive electrical impulses. *Id.* at I-163. The electrical waves received by the antennae act as a sort of "finger print" for lightening activity; that is, certain electrical frequencies are associated with lightening strokes. A set of tuned amplifiers, called band pass amplifiers, impose on the received signals a pre-determined frequency range, called a pre-determined frequency band, by which the Stormscope "throws out" electrical data which may derive from other sources, and "listens" only for those frequencies which derive from lightening activity. *See Id.* at 163-64, 170.

The processing means of the Stormscope, logic circuitry which consists of a "foldback" function and an analog-to-digital converter, is connected to the receiving means. *Id.* at 170. The purpose of the processing means is to produce a processed signal the amplitude of which is inversely proportionate to the received signals. *Id.* This is accomplished by means of an inversion mechanism, or, the "foldback" function. The foldback merely inverts the signal on itself to create a numerical value which is 1 over its previous value. *Id.* Though simple in concept, this function represents perhaps the most significant aspect of the Stormscope.

According to the inventor, Paul Ryan, it was established in the literature prior to the invention of the Stormscope that an oscilloscope, when connected to an antenna, could produce an image on a display screen which would represent each lightening stroke. *Id.* at I-50. Two obstacles rendered this observation of little value. The first was that there was no memory in the oscilloscope by which the image could be displayed for more than a fraction of a second. The second, and more perplexing, was that the closer the stroke was to the oscilloscope, the larger was the display on the screen. Thus, where a lightening stroke occurred nearby, the image on the screen would be quite strong and would deflect farther away from the center of the display screen; the farther away the strike the less the deflection and hence the closer it would appear to the center of the screen. *Id.* at 51. In other words, although the oscilloscope arrangement was capable of determining the direction of a lightening stroke, it could not determine the distance of the stroke from the plane. This

had the unsettling effect of making distant storms appear close to the hypothetical aircraft, which would appear in the center of the screen, or, the observation location, while storms close by appeared to be far off. Such a result was "upside down from what [a pilot] would expect," *id.*, thus rendering the available technology of limited value for practical commercial application.

Ryan solved this dilemma by inverting the signal to 1 over its previous value, and simultaneously transforming the signal to digital form, which, when delivered to the display screen, would produce a deflection which was inversely proportionate to the received signals. *Id.* at I-172. Through this process the received signals of relatively large magnitude could be displayed relatively close to the observation location, while signals of relatively smaller magnitude could be displayed relatively far from the observation location. Thus a lightening stroke which occurred nearby would appear on the screen to be close to the aircraft, and vice versa. Mr. Ryan testified that, although this process took considerable time to develop, most found this process, after explanation, to be obvious. *Id.* I-73.

The third element of the Stormscope relevant to the present inquiry is the display means. As the name suggests, this element consists of a cathode ray tube which displays the processed signals in a graphic representation to show the pilot where the lightening is located. *Id.* at I-167.

IV. THE ACCUSED DEVICE

The accused device in this case is known as the "Strike Finder." The Strike Finder was invented by John Youngquist, a Canadian inventor who resides in Port Erie, Ontario. Described by Mr. Youngquist as "a high-speed computer based data acquisition system," the Strike Finder accomplishes the same result as the Stormscope: it shows a pilot the location and distance of lightening strikes for storm avoidance purposes. Like the Stormscope, the Strike Finder does not locate dangerous turbulence, but rather locates the lightening associated with such turbulence, relying upon the correspondence between the two phenomena to provide a reliable prediction of dangerous weather conditions to a pilot.

The Strike Finder contains a receiving means which consists of two H-field antennae and an E-field antenna. *Id.* at 113, 115. Described as a pulse-based system, *id.* at 105, 118, the H-field antennae operate by responding directly to the strength of the magnetic field, thus delivering to the processing means what the Defendant refers to as "the quantity of H, ... rather than the derivative of H." FN5 *Id.* at II-112. The significance of the pulse-based operation of the Strike Finder is that the system "captures the major part of the information that emanates from the lightening strike instead of filtering most of it out." *Id.* at II-105. Thus, the Strike Finder is able to sample the electrical data produced by the lightening strike some 2,000 times in the course of each strike. *Id.* at II-105, 121. The result is that rather than analyzing only certain frequency data, the Strike Finder is able to compile and sample data from a wide spectrum of the frequency band. *Id.* at II-118. The signals gathered by the H-field antennae are then relayed to a set of amplifiers which increase the intensity of the signal. *Id.* at II-113.

The received signals are then relayed by means of a pair of multiplex amplifiers, which are irrelevant to the present inquiry, to a pair of analog-to-digital converters ("A/D converters") *Id.* at II-119. The received analog signal is converted to a numerical representation in the A/D converters, *id.* at 120-23, with the resulting data stored in the acquisition memory. *Id.* at II-123. The acquisition memory component stores the data it receives and analyzes the results in order to determine which of the data represent actual lightening strikes and which are in reality electrical interference emanating from engine noise, radio equipment, and the like. *Id.* at II-124-25. In this way the Strike Finder is able to "keep" data which is generated by

lightening and "throw out" data which derives from interference. *See id.*

The acquisition memory is controlled by a component referred to as a microprocessor. The microprocessor is a computer which handles numerous functions of the Strike Finder. *Id.* at II-126. Among the various functions of the microprocessor is its ability to display the entire track of a storm in order to allow the pilot to determine whether a storm is increasing or decreasing in intensity over time. *Id.* at II-126-28. Though a cherished feature in the mind of the inventor, it is of no relevance to the issue of infringement. *See infra* p. 21.

The final matter commanding the Court's attention is the display component. The Strike Finder displays the processed signals on a thin, flat panel display that has the appearance of a liquid crystal display. Designed especially for the Strike Finder, the display screen consists of both an X and Y matrix which are oriented at a 45 degree angle. *Id.* at II-129. This function allows for a more realistic display of the storm pattern on the screen. *Id.* at I-131. In addition to this largely cosmetic feature, the ordering of the matrix is arbitrary. By ordering the pixels in a non-sequential manner, the Strike Finder display avoids the type of shadow effect common to sequentially numbered pixels by assuring that no two adjacent pixels are ever illuminated sequentially. *Id.* at II-132. The graphic display which the Strike Finder incorporates is virtually identical to the Stormscope: both place an airplane in the center of the screen, and both display rings circumscribing the face of the screen by which the pilot is able to determine the distance of the strike from the observation point.

IV. PRELIMINARY INJUNCTION

A. Likelihood of Success on the Merits

The Court now turns to the merits of the present controversy. The starting point for determination of the scope of the Plaintiff's patent protection is the language of the patent itself. *Smithkline Diagnostics, Inc.*, 859 F.2d at 882. Claim 1 of the '408 patent reads as follows: FN6

1 A system for detecting electrical disturbances generated by weather phenomena, and for displaying such disturbances for ready observation with reference to an observation location comprising,

2 receiving means for receiving electrical signals generated by said weather phenomena in a predetermined frequency band,

3 processing means, connected to said receiving means for processing said receiving signals and providing processed signals whose amplitude is inversely related to said received signals, and

4 display means driven by said processed signals by designating locations, relative to said observation location, determined by said processing signals,

5 whereby received signals of relatively large magnitude will be displayed relatively close to said observation location and received signals of relatively smaller magnitude will be displayed relatively far from said observation location.

From the foregoing language it is readily ascertainable that the claim consists of five parts: a preamble, a receiving means, a processing means, a display means, and a whereby clause. The whereby clause describes a device for the display of weather disturbances which is said to be comprised of several means necessary to

accomplish that goal. Use of the term "comprised" renders this claim an "open" claim which will read on devices which merely add additional elements or steps. *Stiftung II*, 945 F.2d at 1178; *Moleculon Research Corp. v. CBS, Inc.*, 793 F.2d 1261, 1271, 229 U.S.P.Q. 805 (Fed. Cir.1986), *cert. denied*, 479 U.S. 1030 (1987); *Cues, Inc. v. Polymer Indus., Inc.*, 680 F.Supp. 380, 384-85, 8 U.S.P.Q.2d 1847 (N.D. Ga.1988); *Water Technologies Corp. v. Calco, Ltd.*, 658 F.Supp. 961, 976, 1 U.S.P.Q.2d 1178 (N.D. Ill.1986). The Court notes further that the parties concede that the preamble and the whereby clause read on the Strike Finder. *See Hr'g Tr.* at I-187-88, 190, 195, 205-06; II-214; *see also id.*, at I-197; Pl. Ex. 85 at.59, II-214. Thus the Court will confine its examination of the language of the Claim to the receiving, processing, and display means.

As the language of the receiving means indicates, the function of the receiving means is to receive specified electrical emissions from a lightening strike. The function of the processing means is to provide signals whose amplitude is inversely related to the received signals. The function of the display means is to convert the processed signals into a visual representation providing the location of the disturbance relative to a fixed observation point.

The structure disclosed in the Claim for performing the receiving function of the Ryan Stormscope is a pair of crossed H-field antennae and a corresponding pair of tuned amplifiers. The structure for performance of the processing means is a foldback circuit and an analog-to-digital converter, also known as logic circuitry. Finally, the structure for displaying the received signals is a cathode ray tube.

Turning to the Strike Finder, it is at once clear that its receiving means performs the identical function as that found in the Stormscope. Whereas the function of the receiving means of the Stormscope is to receive specified electrical signals, the function of the receiver of the Strike Finder is likewise to receive signals emanating from the electrical discharge of lightening. *Hr'g Tr.* at II-205. The structure for accomplishing this task, again like to the Stormscope, is a pair of H-field antennae. *Id.* at 204-05.

Relying on the language from the patent declaring that the received signals exist "in a predetermined frequency band," the Defendants argue that the two functions are quite different because the accused device receives data from a wider frequency range. Dr. Thurston testified that "[t]he fundamental difference between these [receiving means] is that whereas these [the Plaintiff's] are tuned to give a decaying sinusoidal response, the band widths [on the accused device] are quite large so that the characteristics of the pulse are maintained. And it's actually the pulses, then, that are transmitted through the two amplifiers rather than having a decaying sinusoid generated." *Id.*

While it is true that in the specification of the Ryan patent the frequencies are centered at 50 khz. per second, no such limitation is taught in the patent itself. *Id.* at I-164. Indeed, the language of the patent teaches only that the receiving means must receive data in a "pre-determined frequency band." There is nothing in the patent which suggests or encourages any particular frequency range, nor is there any requirement that the range be narrow or broad. Rather, the patent teaches merely that one cannot "leave[] things to chancel' when it comes to determination of the lightening signal. *Id.* at I-165. It is thus apparent that whether the tuning of a receiving means is centered at 50 khz., like the Stormscope, or 100 khz., like the Strike Finder, *see id.* at I-178, both limit the frequency range of admitted electrical impulses for the purpose of disregarding certain electrical data which have entered the receiving means. By distinguishing between those signals which emanate from lightening and those which derive from some other source, the receiving means of the Strike Finder accomplishes the same function and achieves the same result as that taught in the Ryan patent. The Court believes that there is enough similarity between the two means to support a finding

that the Strike Finder structure is equivalent to that taught in the '408 patent.

Turning next to the processing means, it is again clear that Claim one of the Ryan patent reads on the Strike Finder. As stated earlier, the function of the processing means in the '408 patent is to provide signals whose amplitude is inversely related to the received signals. Nowhere does the Claim provide a description of the precise manner in which the signal is to be inverted. As described earlier, the structure contained in the specification accomplishes this result by inverting the signal on itself to create a numerical value which is equal to 1 over its previous value. Thus the claim is limited to protection against those devices which produce a processed signal inversely related to a received signal; the claim is silent as to how the inversion must be performed.

The Plaintiff demonstrated that the Strike Finder produces a signal which is inversely proportionate to the signal it receives. Dr. Williamson performed a test on the Strike Finder in which he injected into the antennae signals of varying amplitudes and measured the deflection created on the display. *Id.* at I-181. As indicated in Plaintiff's Exhibit 18, the deflection curve which resulted from the test showed that when stronger signals were fed into the antennae, the resulting deflection was relatively low, while signals of smaller amplitude produced deflections which were relatively large. This process is crucial to the creation of a comprehensible visual representation for a pilot, and is perfectly consistent with the function of the processing means as taught by the '408 patent. *See id.* at I-180-84.

The Defendants failed to produce evidence sufficient to inform the Court of the precise nature of its argument of noninfringement on this point. The Defendant admits that the processing means of the Strike Finder performs the equivalent function as that performed by the Ryan patent. *Id.* at II-148. However, the Defendants chose to present relatively little expert testimony on this important issue, and that which was presented was not entirely clear. Dr. Thurston stated that "the range [of a lightning strike] is not calculated by doing a reciprocal of the amplitude of the incoming pulse, but it's done in calculations from the leading edge [of the strike]." *Id.* at II-212. Dr. Thurston later asserted that the reciprocal relationship between the amplitude of the received signals and the processed signals cannot be determined "consistently by doing an inverse of a number or division of an amplitude or division by an amplitude because the amplitude may very well be lost in the initial processes of the digital data." *Id.* at II-213. Nowhere do the Defendants proffer expert testimony to explain the nature of the calculations the Strike Finder performs to determine distance or the data which results from these-calculations.

The flaw in the Defendants' argument, to the extent it is understood, is that the '408 patent protects more than the specific inversion process contained in the embodiment of the patent. The open language of the claim does not suggest that protection should be granted only as to the structure appearing in the embodiment. Thus the Defendants' failure of evidence is immaterial, for Dr. Williamson's testimony supports the Plaintiff's contention that the accused means infringed upon the '408 patent. The Court concludes, therefore, that irrespective of the precise manner in which the result is achieved, the Plaintiff is likely to show that the processing means of the Strike Finder performs the identical function as that performed in the Stormscope by means of an equivalent structure. In addition, should the Defendants cure their evidentiary failures at trial, the Court is persuaded that, when viewed as a whole, the similarity between the Strike Finder and the '408 patent are substantial enough to support a determination that there is infringement under the doctrine of equivalents, if not literal infringement through the use of equivalent structures. *See discussion infra* at 28.

The Court turns finally to the display means of Strike Finder. The patent provides for "a display means

driven by said processed signals to display said processed signals by designating locations, relative said location, determined by said processed signals." Thus the function of the '408 display means is to convert the processed signals into a visual representation providing the location of the disturbance relative to a fixed observation point. Once again the patent language is devoid of any particular method for displaying the processed signals. Although the specification utilized a cathode ray tube for the actual display of the signals, the patent itself teaches merely that the signals, once inverted, are to be displayed so as to reflect the range and direction from which the signals are received relative to a fixed observation location.

The Defendants do not contest that the function of the accused display means is identical to that which is taught in the Ryan patent. Instead, it is argued that its structure does not infringe this aspect of the '408 patent because it employs a flat panel display which is more sophisticated than the tube which exists in the Stormscope. Yet this argument overlooks the fact that merely improving on the display means does not avoid infringement since the teaching of the patent is not necessarily restricted by the embodiment in which it appears. *Stiftung II*, 945 F.2d at 1178. Moreover, the Defendants' expert testified that he believed the difference between the accused device and the patent lay not in the particular embodiment of the means but in the nature of the signals which drive the display screen. *Id.* at II-219. It thus appears that Dr. Thurston did question the equivalence of the accused structure. Nevertheless, having already found, at least for purposes of the preliminary injunction, that the Strike Finder produces a signal which is inversely related to the received signal, the Defendants' argument is without merit. Therefore, the Court concludes that the display means of the Strike Finder is equivalent to that taught in the Ryan patent.

Upon review and comparison of the Strike Finder and the Ryan patent, the Court concludes that there is a substantial likelihood that the Plaintiff will be able to demonstrate that the accused device infringes literally upon the '408 patent.

In the alternative, the Plaintiff asks the Court to consider whether the Strike Finder infringes upon the Ryan patent under the doctrine of equivalents. Much of the analysis which applies to literal infringement also applies to infringement by equivalents.FN7 Two relevant matters which remain to be discussed, however, concern the pioneering status of the '408 patent and the nature and extent of the prior art, both of which may limit the range of equivalents available to the Ryan patent.

Turning first to the issue of prior art, the Court is persuaded that there was little, if any, pertinent literature available to Paul Ryan at the time he invented the Stormscope. Although the Defendants argues that two reports constitute prior art in this case, L & T Report FN8 Nos. 180 and 202, FN9 the Court finds that they are too insubstantial to support a finding that they would enable one skilled in the art to produce a lightning detection system based upon the information they contain.

Dr. Williamson testified, in essence, that the Reports were no more than a proposal for a hypothetical system, which did not teach the reader how to build the device which was apparently in the mind of the author. Hr'g Tr. at II-11, 13, 18, 25, 26, 27. For example, he testified that the critical process contained in the Ryan patent, the inversion process, was not taught in either of the reports. Rather, Dr. Williamson believed that where a proposal appeared in the text of the reports, to the extent it could be called a proposal at all, it resulted in a subtraction process, and not true inversion. *Id.* at II-15. Even Dr. Thurston was apparently unable to achieve an inversion using the suggested algorithm. He was able to create an inversion only after adjusting the corresponding constant. *Id.* at II-226, 230. Indeed, Dr. Thurston testified that the constant which he adjusted was not disclosed in the reports. *Id.* at II-229. Although there is no testimony suggestive of how Dr. Thurston deduced the needed constant, the Plaintiff established on cross examination

that Dr. Thurston was quite familiar with the Ryan patent before he experimented with the information contained in the L & T reports, *id.* at II-229-30, thus creating the inference that the Ryan patent itself may have suggested the constant which formed the basis of Dr. Thurston's experiment. Thus the Reports did not teach any method for achieving the inversion.FN10

Dr. Williamson's conclusion that the Reports did not teach the proposed system, and thus would not render the system obvious to one skilled in the art, was supported by Dr. Thurston's testimony. Dr. Williamson stated that the requisite level of skill for interpretation of the Reports was "a man with a first degree in electrical engineering, or some equivalent diploma from a training college, and perhaps two or three years of experience." *Id.* at II-7. Yet Dr. Thurston testified that even with his extensive training he would need "at least a few month & " of experimentation to develop a prototype, and "a lot longer than that" to develop a fully operational device. *Id.* at II-234-35. It is thus clear that even if the Reports contain information which provide something more than a mere aspiration or proposal for a device like the Stormscope, their failure to enable one skilled in the art to build the device from the Reports renders them of dubious value as prior art.

The Court's conclusion is further buttressed by the Defendants' failure to provide any evidence with respect to the extent of the circulation these Reports may have enjoyed at the time Ryan prosecuted his patent. Although Mr. Youngquist testified that he was able to order the reports from the Library of Congress, *id.* at II-166-67, that information merely tells the Court that if one knows of the existence of the Reports, they may be obtained. Even Mr. Youngquist conceded that "there is not much literature that relates to building an instrument or something used in an aircraft." *Id.* at II-101. Indeed, the Defendants' expert testified that he had not heard of the Reports prior to the litigation, and apparently did not find them during his research of this case in the Ohio State University Library. *Id.* at II-233-34.

Turning to the secondary considerations outlined by the *Deere* court, such as commercial success, long felt but unresolved needs, and failure of others, *John Deere*, 383 U.S. at 17-18, the Court finds that these factors further militate in favor of a finding that the L & T Reports are not likely to be shown as prior art. For example, Dr. Williamson pointed out that the Reports do in fact teach that, at least as early as 1951, there was a clear recognition that a storm avoidance system such as the one Ryan created was desirable. Hr'g Tr. at II-17. It was not until the Stormscope was marketed in 1976, however, that the long-felt need was fulfilled. In addition, the Plaintiff proffered testimony to the effect that the Stormscope achieved immediate acceptance by experts in the industry,FN11 that there was lingering skepticism in the industry whether the device could perform as claimed,FN12 and that it ultimately enjoyed a significant degree of commercial success.FN13 It is thus clear that these indicia support a finding that the L & T Reports are not likely to constitute prior art.

From the foregoing, the Court concludes that it is unlikely that the Defendants will be able to demonstrate that the L & T Reports could qualify as prior art in this matter. Given the conclusion that the scope of the prior art is extremely limited, if not non-existent, it naturally follows that there is no basis for comparison of the differences between the prior art and the patent at issue. Moreover, given that the state of the art was, at most, very sparse, the Court further concludes that the Ryan patent, though perhaps not a pioneering invention, is quite close to the pioneering end of the pioneer/nonpioneer continuum. That the Ryan patent was of the pioneering genre entitles it to a broader scope of equivalents than would otherwise be available. In view of this conclusion, the Court cannot say that the Strike Finder is so far changed in principle that it performs the function of the claimed invention in a substantially different way. *SRI International v. Matsushita Elec. Corp. of America*, 775 F.2d 1107, 1124, 227 U.S.P.Q. 577 (Fed. Cir.1985). Accordingly, the Court concludes that, should the Plaintiff be unable to prevail on its claim of literal infringement, it is

nevertheless likely to prevail on the merits of its infringement claim under the doctrine of equivalents.

The foregoing conclusion also requires that the Court reject the Defendants' claim that the Ryan patent is invalid as obvious in light of prior art. A patent is invalid if "the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time of the invention to a person having ordinary skill in the art to which the subject matter pertains." *Id.* (citing 35 U.S.C. s. 103 (1988)). Given the expert testimony to the effect that the lightning detection system of the Ryan patent would not have been obvious to one skilled in the art in January of 1975, *id.* at II-16, and the Defendants' failure to adduce clear and convincing evidence to the contrary, the Court is satisfied that there is little likelihood that the Defendants will be able to prevail on this defense at trial on the merits.

B. Irreparable Injury

The Plaintiff argues that absent a preliminary injunction it will suffer an erosion of customer confidence and, hence, suffer a permanent loss of its market share as a result of the Defendants' usurpation of the '408 patent. Specifically, the Plaintiff presented evidence to the effect that the Strike Finder competes directly with the Stormscope, Hr'g Tr. at I-89 (testimony of Dennis Schmidt); there was favorable market reaction to the lower price of the Strike Finder, *id.*; orders for the Stormscope diminished precipitously after the introduction of the Strike Finder, *id.* at I-90; the gross profit on each Stormscope diminished by more than two-thirds after the price was lowered in response to the infringing competition, *id.*; the price reduction would be permanent should the Strike Finder remain on the market, *id.* at I-92; and that the Plaintiff lost a portion of its market share as a consequence of the introduction of the accused device, *id.* at I-93. As Mr. Schmidt stated with simple elegance: "Once you lose a customer, he's gone forever." *Id.*

The Defendants have chosen not to controvert the testimony of Mr. Schmidt. Rather, they simply contend that there is no infringement, and that the assets of Insight Avionics, which is alleged to be in excess of \$4,600,000, is adequate to offset any loss the Plaintiff might incur. With respect to the claimed assets, the Court notes that the only evidence which was presented at trial to corroborate the Defendants' claim was Defendants' Exhibit AP, which purports to represent the assets of Insight Avionics. *See also* Hr'g Tr. at II-162-65. It is enough to note that nowhere do the Defendants assert that this document has been prepared by an independent auditor or that it has even been notarized. From an evidentiary standpoint, it is nothing more than a piece of paper. Moreover, even if Insight had the value for which Mr. Youngquist contends, it is the Defendants' testimony that none of the claimed funds are held by banks in the United States. *Id.* at II-185. Indeed, the Defendants have neither cash nor real estate in this country. *Id.* at II-184-85.

The Defendants argue that they maintain a supply of inventory in the United States which is valued at approximately \$150,000. However, even if the inventory is as valuable as the Defendants claim, it is no match for the millions of dollars the Plaintiff claims to have lost as a result of the infringement, not to mention the lost market share which is an injury money will not remedy. Even if the inventory could cure the harm suffered by the Plaintiff, there is no evidence to suggest that it would have any value to the Plaintiff. Indeed, Mr. Schmidt testified that the inventory would have no value at all to B.F. Goodrich since "it couldn't service the product; we couldn't sell the product; we would be putting someone else's name in the cockpit." *Id.* at I-95. Accordingly, the Court concludes that continued infringement would work an irreparable harm on the Plaintiff.

C. Harm to Others and The Public Interest

The final matters for consideration, whether the injunction would harm others and whether the public interest would be served by the injunction, will be treated together.

At this stage of the proceedings there is a strong likelihood-of success on the merits for the Plaintiff, as well as a clear finding of irreparable injury. Having so found, the necessary showing for the last two factors is less burdensome for the Plaintiff than would have been the case had the strength of its case on the merits been weaker. *See In re De Lorean Motor Co.*, 755 F.2d at 1229. The Court notes simply that although a limited segment of the public would benefit from the introduction of a low-cost storm avoidance device, all of society benefits from the protection of patent rights, since it is the seed of inventive genius the Constitution and the statutes construing it seek ultimately to protect. The Court is also aware that issuance of the injunction will hurt not only Mr. Youngquist, but the employees of Insight Avionics as well. The Court is well aware that where it is shown that the burden imposed upon a defendant by the issuance of a preliminary injunction would be equivalent to that suffered by a plaintiff, the plaintiff must show a strong probability of success on the merits in order to prevail. *Frisch's Restaurant, Inc.*, 759 F.2d at 1270; *In re De Lorean*, 755 F.2d at 1229; *Schalk*, 751 F.Supp. at 1264. Nevertheless, the Court is persuaded that the Plaintiff has made such a showing.

WHEREUPON, upon consideration and being duly advised, the Court accepts the Joint Stipulation of the parties, and it is hereby ORDERED that the name "B.F. Goodrich FlightSystems, Inc." be substituted for the name "Foster Air Data Systems, Inc." It is further ORDERED that the names "Insight Avionics, Inc." and "Insight Instruments Corp." be substituted for the names "Insight Avionics" and "Insight Instruments, Inc." for identification of the corporate Defendants. The Court further finds the Plaintiff's motion for a preliminary injunction to be meritorious, and it is, therefore, GRANTED. The Defendants are hereby TEMPORARILY ENJOINED from marketing the Strike Finder in the United States or its territories pending resolution of this matter at the trial on the merits.

IT IS SO ORDERED.

FN1. The purpose of this statute is to provide patent protection for claims which otherwise would be too indefinite to qualify for a patent. *Data line Corp. v. Micro Technologies, Inc.* 813 F.2d 1196, 1201, 1 U.S.P.Q.2d 2052 (Fed. Cir.1987).

FN2. This aspect of the patent at issue will not be considered at this juncture since the parties proffered no evidence on the subject. The Court will revisit this issue, should it become necessary, at the trial on the merits.

FN3. The foregoing language, though immensely helpful, may have been limited by the Federal Circuit in *Intel Corp. v. International Trade Comm'n*, 946 F.2d 821, 20 U.S.P.Q.2d 1161, 20 U.S.P.Q.2d 1161 (Fed. Cir.1991), where the court suggested that such descriptions were properly understood to apply principally to cases involving the doctrine of equivalents, not the inquiry whether an equivalent structure provides the basis for literal infringement in a means plus function claim. In *Intel Corp.*, the court stated that "under section 112, paragraph 6, the aids for determining a structural equivalent to the structure disclosed in the patent specification are the same as those used in interpreting any other type of claim language, namely, the specification, the prosecution history, other claims in the patent, and expert testimony." *Id.* at 842-43 (citations omitted). The descriptions advanced in *Texas Instruments* were described as dicta, and are

apparently useful as analogous interpretive guides only. Thus, to the extent the *Texas Instruments* language may help to animate the otherwise undefined and esoteric concept of structural equivalents in a means plus function limitation, the Court presumes the Federal Circuit would not disapprove reliance upon those concepts in this case.

FN4. It should be noted that the construction of the claim in light of the prior art is a question relevant only in the context of the doctrine of equivalents; it is of no relevance to construction of a claim stated in means plus function format pursuant to section 112(6). *Intel*, 946 F.2d at 842. The issue of prior art is also relevant to the question whether the patent is obvious in light of the prior art existent at the time the application for the patent was prosecuted, and hence, is invalid. Accordingly, the Court's discussion of prior art will be limited to these two issues.

FN5. Nowhere is the meaning of this rather technical expression adequately explained.

FN6. The format of Claim 1 of the '408 patent is arranged in schematic suggested by the parties for ease of understanding.

FN7. As stated earlier, to apply the doctrine of equivalents, the finder of fact must determine the range of equivalents to which a claim is entitled in light of the prosecution history, the specification, the pioneer-nonpioneer status of the invention, and the prior art. *D.M.I., Inc. v. Deere & Co.*, 755 F.2d 1570, 1575 (Fed. Cir.1985).

FN8. L & T stands for the Lightning and Transients Institute, which was located in Minnesota in the early 1950s.

FN9. The reports upon which the Defendants rely were apparently drafted as a series of proposals by a private research company in an effort to obtain grant money from the United States government in order to produce a lightning detection system. Hr'g Tr. at II-8.

FN10. The foregoing example is merely illustrative of the imprecision with which the Reports were written. Dr. Williamson also testified that the diagram of the display means, although it looks quite like that which Ryan achieved, is no more than "the author's impression of what he would get if he were able to achieve his objective." Hr'g Tr. at II-26. Indeed, a visual display with a fixed observation point is neither novel nor instructive, given the general usage of analog representations. There is nothing in the Reports, however, which teaches how to create a signal which would produce such a display.

Dr. Williams further testified that the line drawing which the Defendant claimed was a "Schematic of Inversion Bright-Up Method" was not "even a schematic. It isn't an electrical circuit. It is curve on a page with some mathematical symbols attached. It doesn't tell me how to do it, it doesn't tell me what the mathematical symbols are. No, there is no way that you can say that this teaches how to do that." *Id.* at II-

28.

FN11. Paul Ryan testified that in the spring of 1976, he attended the Redding, Pa. airshow, during which he made the acquaintance of Bill Garvey, who was an editor for *Pilot Magazine*. Hr'g Tr. at I-69. After a subsequent test flight in extremely intense thunder storms during which the Stormscope performed well, Mr. Garvey authored an article which appeared in *Pilot* magazine giving the product an extremely favorable review. *Id.* at I-70-71.

FN12. As a result of the publicity the Stormscope received from the article in *Pilot* magazine, Mr. Ryan testified that he was inundated with inquiries about the product. Hr'g Tr. at I-72. Nevertheless, sales were very low because pilots were still not convinced that the Stormscope could perform as represented. *Id.* Even engineers at the Redding airshow expressed initial skepticism until Ryan explained to them the principles which underlay the Stormscope. *Id.* at I-72-73.

FN13. The Plaintiff proffered the testimony of Dennis Schmidt, the Vice-President of sales for B.F. Goodrich Flight Systems and the predecessor company, Foster Air Data Systems, Inc, that the total sales of the Stormscope was approximately 90 million dollars, for the years between 1976 and 1990. Hr'g Tr. at I-84.

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