# United States Court of Appeals for the Federal Circuit

05-1112, -1151, -1152

HONEYWELL INTERNATIONAL INC. and
HONEYWELL INTELLECTUAL PROPERTIES INC.,

Plaintiffs-Appellants,

v.

UNIVERSAL AVIONICS SYSTEMS CORP.,

Defendant-Cross Appellant,

and

SANDEL AVIONICS INC.,

Defendant-Cross Appellant.

Steven D. McCormick, Kirkland & Ellis, LLP, of Chicago, Illinois, argued for plaintiffs-appellants. With him on the brief was Christopher Landau, of Washington, DC. Of counsel on the brief was Sarah Sklover, Mayer Brown Rowe & Maw LLP, of New York, New York. Of counsel was John C. O'Quinn.

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Howard G. Pollack, Fish & Richardson P.C., of Redwood City, California, argued for defendant-cross appellant Sandel Avionics, Inc. With him on the brief were Frank E. Scherkenbach, of Boston, Massachusetts, Michael R. Headley, of Redwood, California, and John A, Dragseth, of Minneapolis, Minnesota.

Appealed from: United States District Court for the District of Delaware

Magistrate Judge Mary Patricia Thynge

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DECIDED: May 25, 2007

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Before RADER, GAJARSA, and DYK, Circuit Judges.

RADER, Circuit Judge.

In a series of decisions on summary judgment, the United States District Court for the District of Delaware invalidated certain claims and found no infringement of patents owned by Honeywell International Inc. and Honeywell Intellectual Properties Inc. (Honeywell). Honeywell Int'l, Inc. v. Universal Avionics Sys. Corp., 343 F. Supp. 2d 272 (D. Del. 2004) (Final Decision); Honeywell Int'l, Inc. v. Universal Avionics Sys. Corp., 264 F. Supp. 2d 135 (D. Del. 2003) (Claim Construction Decision); Honeywell Int'l, Inc., v. Universal Avionics Sys. Corp., 288 F. Supp. 2d 638 (D. Del. 2003)

(Invalidity Decision); Honeywell Int'l, Inc., v. Universal Avionics Sys. Corp., 289 F. Supp. 2d 493 (D. Del. 2003) (Non-infringement Decision). Honeywell contests issues of claim construction, infringement, and subject matter jurisdiction on a few claims withdrawn from the litigation. Universal Avionics Systems Corp. (Universal) and Sandel Avionics Inc. (Sandel) cross-appeal the district court's final decision that other remaining claims were not barred by public uses or premature sales activity. Final Decision, 343 F. Supp. 2d at 309. In addition, Sandel appeals the district court's determination that Honeywell did not commit inequitable conduct. Id. at 313. Universal further appeals the district court's denial of its commercial counterclaims. Final Decision, 343 F. Supp. 2d at 319. Finding errors, this court vacates the claim construction of a few terms and remands for a new infringement determination. This court affirms the district court's retention of jurisdiction over the withdrawn claims and the district court's decision that § 102(b) does not erect a bar.

I

This patent infringement case involves aviation electronics, specifically terrain warning systems. "Terrain warning systems" warn pilots to prevent them from flying into a mountain or hillside. This type of accident is called a "controlled flight into terrain" (CFIT).

Air travel has benefited from terrain warning technology for approximately thirty years. The prior art technology, known as "ground proximity warning systems" or (GPWS), sharply reduced CFIT accidents beginning in the 1970s and 80s. This GPWS technology, however, featured a number of limitations. GPWS technology used radio waves to measure the distance of the aircraft above the ground. Using the downward

looking information from the radio altimeter, GPWS technology tried to predict the threat of CFIT posed by terrain near the aircraft. This system worked well for gradual changes in terrain. The GPWS system, however, provided no reliable warnings in abruptly changing terrain. In sum, the prior art did not provide information regarding the terrain ahead of the aircraft.

Honeywell began research in the 1980s aimed at developing a "look ahead" terrain warning system. Without forward-looking radar or forward-looking sensors aboard civilian aircraft, Honeywell's research focused on a "virtual" look ahead system. This virtual system would not physically detect the terrain ahead of the aircraft but instead would compare the aircraft's position with an on-board digitized map of the earth's terrain and man-made obstacles. In 1995, Honeywell received patent protection for its virtual look ahead system, including the five patents-in-suit: U.S. Patent Nos. 5,839,080 (the '080 patent), 6,092,009 (the '009 patent), 6,122,570 (the '570 patent), 6,138,060 (the '060 patent), and 6,219,592 (the '592 patent). These patents fall into two main categories: the "look ahead patents" ('080, '570, and '592) and the "display patents" ('060 and '009).

The patented technology works as a system of algorithms that define a volume of space referred to as an alert envelope. The alert envelope is defined by: (1) the aircraft's flight path, (2) the look ahead distance, and (3) the terrain boundary floor. This alert envelope takes into account the position and speed of the aircraft as well as the flight path. The system then searches the database of digitized maps and warns about any terrain or obstacles within the alert envelope. The system refers to alert distance in front of the aircraft as the "look ahead distance." The distance that the system looks

below the aircraft depends on a safe terrain clearance value, referred to as a "terrain floor boundary." This boundary varies as a function of the aircraft's distance from a reference point, such as an airport or runway. The look ahead patents disclose the inputs into the system, the definition of alert inputs, and the output alerts. The display patents disclose and claim various methods for providing representations of the terrain surrounding the aircraft, including the display of the contours of threatening terrain.

Honeywell contacted the FAA in early 1995 seeking certification for its "look ahead" terrain warning system. Honeywell called its system an "Enhanced Grand Proximity Warning System" or "EGPWS." In 1996, stemming from the CFIT accident that claimed the life of Commerce Secretary Ron Brown, the United States Congress pressured the FAA to issue regulations raising the requirements for CFIT prevention technology. The FAA now requires that all commercial aircraft of a certain size include a look ahead warning system.

Following the release of FAA's system requirements, Universal and Sandel began to develop competing terrain warning systems. Universal introduced its certified system, which it called TAWS, in 2000. Sandel announced its system, which it called the ST3400 TAWS/RMI in 2000. Both the Universal and Sandel systems are virtual look ahead systems. Sandel asserts, however, that its device lacks at least five limitations in the asserted patent claims. Similarly, Universal argues that the asserted claims as construed by the trial court do not cover its system.

Honeywell brought suit against Universal and Sandel in the District of Delaware in 2002.[1] The district court construed the claims in a Memorandum Opinion dated May 30, 2003. Claim Construction Decision, 264 F. Supp. 2d at 135. On October 16, 2003, the district court granted defendants' motions for summary judgment of invalidity of certain claims that had been withdrawn from the litigation. Invalidity Decision, 288 F. Supp. 2d at 638. The district court granted defendants' summary judgment motions of non-infringement on October 28 and 29, 2003. Non-infringement Decision, 289 F. Supp. 2d at 493. The district court denied all of defendants' remaining counterclaims of invalidity during a seven-day bench trial which began on November 2, 2003. Final Decision, 343 F. Supp. 2d at 272.

II

Honeywell appeals the district court's construction of five claim terms. This court reviews claim construction without deference. Cybor Corp. v. FAS Techs., Inc., 138 F.3d 1448, 1456 (Fed. Cir. 1998). Claim one of the '080 patent contains four of those five contested claim terms, including the claim terms "signals representative of," "look ahead distance," "alert envelope," and "terrain floor boundary." These terms mean the same thing in each patent. Claim 1 of the '080 patent recites:

> An apparatus for alerting a pilot of an aircraft of proximity to terrain, the apparatus comprising:
>
> an input for receiving signals representative of a position of the aircraft, a flight path angle of the aircraft and a speed of the aircraft and coupled to a data base of stored terrain information;

[1] The case was originally assigned to the Honorable Roderick McKelvie, but after he announced his departure from the bench the parties agreed to have the case tried by Magistrate Judge Mary Patricia Thynge.

an output;

a signal processing device, coupled to said input, and coupled to said output, for:

(a) defining a look ahead distance as a function of the speed of the aircraft;

(b) defining a first alert envelope, indicative of a first severity of terrain threat,

wherein boundaries of said first alert envelope are determined as a first function of the flight path angle, said look ahead distance, and a terrain floor boundary;

(b) [sic] defining a second alert envelope, indicative of a second severity of terrain threat, wherein boundaries of said second alert envelope are determined as a second function of the flight path angle, said look ahead distance and said terrain floor boundary; and

(d) outputting an alert signal when a subset of the stored terrain information is located within the boundaries of at least one of the said first and said second alert envelopes.

(emphases added).

The one remaining contested claim term —highest $h_{max}$ and lowest $h_{min}$— appears only in the '009 patent, one of the display patents. Independent claim 1 of the '009 patent recites:

An aircraft terrain information system for providing a visual display to the pilot of the contours of the terrain proximate to the aircraft, the warning system comprising:

position means for receiving signals representative of the position of the aircraft terrain data means for storing terrain data representative of terrain elevations;

a cockpit display; and

contour means, responsive to said position means and said terrain data means, for displaying on said cockpit display a display of the contours of at least a portion of the terrain proximate to the aircraft wherein said

contour display includes the highest $h_{max}$ and lowest $h_{min}$ terrain levels of said portion of the terrain.

(emphasis added).

Only two of the five contested terms contributed to the summary judgment of non-infringement. Universal advises this court to construe only the terms "look ahead distance" and "terrain floor boundary" because those terms controlled the district court's infringement determination. Without citing any authority, Universal argues that this court may not have jurisdiction to consider the construction of the remaining claim terms. However, the district court discerned factual issues in dispute regarding infringement of those remaining terms. Thus, this court proceeds to evaluate all five contested terms.

A. "Look ahead distance"

Claim 1 of the '080 patent requires a signaling device for "defining a look ahead distance as a function of the speed of the aircraft." The district court construed the term "look ahead distance" to mean "a distance along the ground track of the aircraft that marks the outer limit of each alert envelope that is a function of aircraft speed and time to complete an evasive maneuver." Claim Construction Decision, 264 F. Supp. 2d at 146.

Honeywell argues that the correct construction of this term would define the distance the system looks ahead of the aircraft as a function of speed of the aircraft, according to the language of the claim. While the specification describes in detail the manner in which Honeywell calculates the time component of the look ahead distance in its preferred embodiment, the claim itself includes no limitation regarding the time

component, asserts Honeywell. Thus, Honeywell argues the district court improperly read a limitation into the claim from a preferred embodiment.

The district court correctly construed "look ahead distance." "Look ahead distance" is not a term of art. As the record shows, time is inherent in the calculation of "look ahead distance." Usage within the patent makes clear that the purpose of the "look ahead distance" limitation is to allow time to make an evasive maneuver. The specification states that "look ahead distance" is a function of airplane speed and "look ahead time." '080 patent col.9 ll.14-15. "Look ahead time" is thus the time necessary to make an evasive maneuver. In the preferred embodiment, the patent describes "look ahead distance" as the sum of time for "a single turning radium," time for "terrain clearance at the top of the turn," and "a predetermined reaction" time. '080 patent col.9 ll.16-19; see also '080 patent FIGURE 5. Given the clear purpose of the "look ahead distance" limitation, this court concludes that the district court correctly construed it to mean "[a] distance along the ground track of the aircraft that marks the outer limit of each alert envelope and that is a function of aircraft speed and time to complete an evasive maneuver."

However, even under the district court's claim construction, this court finds that the grant of summary judgment was improper. The record shows a genuine issue of material fact because there is evidence that the allegedly infringing devices were also set to provide a warning that allows time to conduct an evasive maneuver. As the district court noted, Sandel's system provides a "caution" alert at 60 seconds, which is called the "time to impact scheme," and a "warning" alert at 30 seconds. Expert testimony noted that Sandel's system provided "the pilot time to decide what is the best

course of action under the unique circumstances presented." Universal's system also uses a fixed "time to impact," which is set to a default of 30 and 60 seconds. Documents that were part of the summary judgment record specifically suggest that the "look ahead" feature allowed "time for the pilot to make the necessary maneuvers or data corrections for terrain avoidance." Accordingly, this court remands on the question of whether the allegedly infringing devices infringe under the district court's construction of "look ahead distance."

B. "Terrain Floor Boundary"

Claim 1 of the '080 patent further requires alert envelopes which are calculated in part by a measurement of the "terrain floor boundary." The district court construed the term to mean "a boundary that extends downwardly below the aircraft which is proportional to the distance to the closest runway." Claim Construction Decision, 264 F. Supp. 2d at 150 (emphases added). Honeywell finds no limitation in the claim tying this term to a proportional distance to the closest runway. Again, Honeywell argues that the district court incorrectly read a limitation from the specification into the claim.

As the district court correctly noted, the term "terrain floor boundary" had no ordinary meaning to a skilled artisan at the time of filing of the patent application. Id. at 151 ("Further, there is no evidence to indicate that 'terrain floor boundary' was a term having ordinary meaning known to one skilled in the art at the time of the filing of the patent application."). Without a customary meaning of a term within the art, the specification usually supplies the best context for deciphering claim meaning. Irdeto Access, Inc. v. Echostar Satellite Corp., 383 F.3d 1295, 1300 (Fed. Cir. 2004). Here, the specification states: "The terrain floor boundary is the basis for the terrain threat

boundaries and is similar to the terrain floor developed for the GPWS." '080 patent col.10 ll.38-40. The patent then explains: "The terrain floor relates to a distance ΔH below the aircraft and is proportional to the distance to the closest runway to prevent nuisance warnings when the aircraft is taking off and landing . . . ." '080 patent col.10 ll.40-42 (emphasis added). The district court used this general language about the terrain floor as its primary reference for defining "terrain floor boundary." While Honeywell notes that the patent proceeds later to discuss "terrain floor boundary" more specifically as a "function of the distance from the runway," '080 patent col.11 ll.18-19 (emphases added), and again, in the discussion of terrain warning boundaries, the patent defines the ΔH terrain floor as "a function of the distance from a runway," '080 patent col.12 ll.8-10 (emphases added), this function is defined in the specification as distance proportional to the closest runway. As such, this court disagrees with Honeywell that the district court improperly read a limitation from the specification into the claim.

However, this court again finds that while the district court correctly construed the term, its finding of non-infringement by Sandel and Universal was erroneous. The Universal device calculates terrain floor boundary as a function of the destination runway. However, Universal's software requirements state that when the airplane deviates from the flight plan, the software redefines the destination as the airport and runway "with the closest Runway Threshold." Sandel's device calculates the terrain floor boundary—which Sandel calls "clearance buffer"—as a function of the distance to the closest runway and the altitude of the airplane. Sandel's CEO, Gerald Block, testified that Sandel's "clearance buffer" "is based on both the distance of the airplane

from and the altitude of the airplane above the weighted average distance of the nearest runways or airport reference points." Thus this court discerns issues of material fact regarding whether the accused devices infringe the "terrain floor boundary" limitation as construed by the district court.

C. "Signals Representative Of"

Claim 1 of the '080 patent further requires that the apparatus have "an input for receiving signals representative of a position of the aircraft, a flight path angle of the aircraft and the speed of the aircraft coupled to a data base of stored terrain information." (emphasis added). The district court interpreted the phrase "signals representative of" to mean "[t]he signals received by the apparatus are instantaneous values of the recited variables; i.e. they indicate the numerical value of that variable at a given sampling time." Claim Construction Decision, 264 F. Supp. 2d at 145. In explaining this claim construction, the district court stated:

> Honeywell argues that its patent covers any signal relating to the angle, position, and speed of the flight . . . The terrain awareness systems compare flight data with stored terrain information, in order to warn the pilots of danger. If the court construed Honeywell's patent to include any signal representing one of the previously mentioned variable, it would claim both signals which indicate threat, and signals which do not. Since the point of the invention is to warn of dangerous conditions, the patent should be limited to signals which represent threat. Because a pilot cannot read a signal, the signals are transformed into numbers, thus "dangerous signals" are understood in terms of numbers . . . Thus, reading the patents in the broad manner that Honeywell proposes, that is, allowing the patents to apply to the entire spectrum of signals, would defeat the purpose of the patent.

Id. at 145-46.

Honeywell argues on appeal that the district court unduly narrowed the term "signals." Honeywell contends that the term should encompass any electronic, visual,

audible, or other ways to convey such information. Further, Honeywell argues that "signals representative of" are, by definition, such signals that represent or portray. Honeywell argues that nothing in the claims, specification, or prosecution history limits the signals to instantaneous and numerical values.

Universal states that the term "signals representative of" should mean "that the input receives signals from other devices which represent discreet and instantaneous numeric values of recited variables that warn a pilot of dangerous conditions." However, Universal offers no argument to support this interpretation.

Sandel supports the district court's construction as based on the claim language itself; i.e. that the claim requires "signals representative of" position, flight path angle, and speed in calculating distances and creating alert envelopes. According to Sandel, only numerical terms allow the system to function, but Sandel offers no evidence in support of this assertion.

This court has acknowledged: "In some cases, the ordinary meaning of claim language . . . involves little more than the application of the widely accepted meaning of commonly understood words." Phillips, 415 F.3d at 1314. Consistent with that guidance, this court perceives that the signals represent the inputs into the system, namely the position, flight path angle, and speed of the aircraft. The patent does not require numerical or instantaneous signals. In context, one of ordinary skill in this art would consider the district court's construction too narrow.

Apparently the district court unduly narrowed the claim based on its overall perception of the invention. Specifically, the district court assumed that the pilot reads the signals at issue. Claim Construction Decision, 264 F. Supp. 2d at 145-46. To the

contrary, the signals represent the inputs into the system about aircraft position, speed, and flight angle, not a data representation for pilot consumption. The pilot does not read these inputs. Instead the system's software processes these inputs to generate visual and aural warnings. Thus, the trial court erred by stating that the pilot would read these signals.

In sum, one of ordinary skill in this art would not limit this term to numerical or instantaneous values. Rather these signals are inputs into the system which uses its algorithms to process this information into appropriate warnings.

D. "Alert Envelope"

Honeywell appeals the district court's claim construction of the term "alert envelope." Claim 1 of the '080 patent calls for a "first alert envelope" and a "second alert envelope." According to the claim, these indicate a first and second terrain threat. The district court construed "first alert envelope" as a "term of art in avionics and means an at least 2-dimensional region in the vertical plane surrounded by a continuous boundary." Claim Construction Decision, 264 F. Supp. 2d at 148. For the term "second alert envelope," the district court required "two distinct alert zones, the boundaries of which are independently determined by distinct first and second functions of the same variables; specifically flight path angle, look ahead distance, and terrain floor boundary." Id. The district court construed the terms according to its reading of "the language set forth in the claim." Id.

Claim 1 of the '080 patent describes the "first alert envelope" as a determination of the "first function of the flight path angle, said look ahead distance and said terrain floor boundary." Claim 1 of the '080 patent describes the "second alert envelope" as

"indicative of a second severity of terrain threat, wherein boundaries of said second alert envelope are determined as a second function of the flight path angle, said look ahead distance and said terrain floor boundary" and "outputting an alert signal when a subset of the stored terrain information is located within the boundaries of at least one of said first and second alert envelopes."

Once again, the claim itself provides considerable information about its meaning. In part, the district court correctly defined the "alert envelope" as a two dimensional region of space with some detail about the way to determine the boundaries of each envelope. The district court, however, incorrectly added the limitations not found in the specific language of the claim. Specifically, the trial court read in requirements that the alert envelope appear "in the vertical plane" and "surrounded by a continuous boundary." The claim itself explains that "alert envelope" encompasses "an at least two dimensional region whose boundaries are determined as a function of the flight path angle, look ahead distance and terrain floor boundary." In sum, one of skill in this art would agree that the claim defines this term adequately without additional limitations.

E. Highest $H_{max}$ and lowest $H_{min}$

Finally, Honeywell appeals the district court's claim construction of the requirement of a "highest $H_{max}$ and lowest $H_{min}$." Claim 1 of the '009 patent requires the terrain display to include "the highest $h_{max}$ and lowest $h_{min}$ terrain levels of said portion of the terrain." The district court construed this phrase to require "that the display show a numeric value for the highest and lowest points." Claim Construction Decision, 264 F. Supp. 2d at 155. The district court stated that "without numeric values, the highest and

lowest points display would be useless to the pilot because he would have no frame of reference of the terrain relative to the aircraft." Id.

Once again, as occurred with the numeric inclusion above, the district court included an unnecessary limitation in the claim. Indeed, dependent claim 21 specifically discloses a display with numeric information. '009 patent col.40 ll.8-10 ("The system of claim 1 wherein said contour means additionally displays on said cockpit display a range value.") As this court has noted, "the claims themselves provide particular meaning to claim terms." Phillips, 415 F.3d at 1314. "Other claims of the patent in question, both asserted and unasserted, can also be valuable sources of enlightenment as to the meaning of a claim term." Id. (citing Virtonics Corp. v. Conceptronic, Inc., 90 F.3d 1576, 1582 (Fed Cir. 1996)). Finally, "the presence of a dependent claim that adds a particular limitation gives rise to a presumption that the limitation in question is not present in the independent claim." Phillips, 415 F.3d at 1315 (citing Liebel-Flarsheim Co. v. Medrad, Inc., 353 F.3d 898, 910 (Fed. Cir. 2004)). Thus, the language of claim 21 is strong evidence against limiting claim 1 to require a numeric display. As such, this court construes the claim phrase "highest $h_{max}$ and lowest $h_{min}$" to require only an apparatus that shows the highest and lowest points of the terrain within the portion of terrain displayed.

In light of the full context of the claims and intrinsic evidence, this court determines that one of ordinary skill in this art would perceive undue limitations in three of the five contested aspects of the district court's claim construction. On remand, the trial court will have an opportunity to apply this broader claim construction in the context of infringement and validity.

III

The district court precluded Honeywell from relying on the doctrine of equivalents. In fact, the trial court excluded Honeywell's only evidence of equivalents, the deposition testimony of Dr. Hansman. The district court determined that Dr. Hansman's belated testimony on the doctrine of equivalents was defective because it was not contained in his expert report.

The district court set a fixed date for disclosing expert testimony and Honeywell made no mention of the doctrine of equivalents in its expert reports filed on that date. During cross examination for Dr. Hansman's deposition, he did not testify about the doctrine of equivalents other than a statement that he had not formed any opinions on the matter. On the next day, during direct examination by his attorney, however, Dr. Hansman expressed an opinion on equivalents. Dr. Hansman admitted to discussions with his counsel.

On appeal this court must determine whether Honeywell properly supplemented Dr. Hansman's expert report under Fed. Rule of Civ. Proc. 26(e). Evidentiary rulings do not generally raise issues unique to patent law. Therefore, this court applies the law of the appropriate regional circuit to such procedural rulings. Rhodia Chimie v. PPG Indus. Inc., 402 F.3d 1371, 1376-77 (Fed. Cir. 2005) (citing ATD Corp. v. Lydall, Inc., 159 F.3d 534, 548 (Fed. Cir. 1998)). The United States Court of Appeals for the Third Circuit reviews a district court's decision to exclude evidence for abuse of discretion. Rhodia Chimie, 402 F.3d at 1377 (citing Glass v. Philadelphia Elec. Co., 34 F.3d 188, 191 (3rd Cir. 1994)). Even when an exclusion of evidence occasions severe forfeiture for a party, the Third Circuit will not disturb those decisions absent a clear abuse.

Rhodia Chimie noted that the Third Circuit typically considers four factors in evaluating whether the district court properly exercised its discretion:

> (1) the prejudice or surprise in fact of the party against whom the excluded evidence would have been submitted; (2) the ability of that party to cure the prejudice; (3) the extent to which waiver of discovery deadline would disrupt the orderly and efficient trial of the case or of other cases in the court, and (4) bad faith or willfulness in failing to comply with the district court's order.

Id. at 1381 (citing In re TMI Litig., 193 F.3d 613, 721 (3d Cir. 1999)). In this case, the district court did not address these factors in its opinion. Rather, the district court simply limited the expert's testimony to information contained in the expert report. The district court cited several cases where courts excluded testimony that fell outside the expert's report.

Honeywell attempts to distinguish these cases as featuring evidence offered on the doorstep of the trial. Thus Honeywell argues, the rule seeks to prevent ambush at trial, which is not the case here. Honeywell argues that Dr. Hansman merely supplemented his testimony in response to evidence from Universal that appeared several days before Dr. Hansman's deposition. However, Dr. Hansman only a day earlier on cross examination expressed no opinion regarding the doctrine of equivalents. With this context, the district court properly perceived the prospect of surprise, or "ambush" with Dr. Hansman's new testimony. After all, he had indicated he had not considered equivalents just a day earlier. Under the circumstances, applying Third Circuit law, this court cannot discern that the district court abused its discretion in excluding Dr. Hansman's deposition testimony.

IV

Honeywell further appeals the district court's October 16, 2003, decision granting defendants' motions for summary judgment of invalidity for claims withdrawn from the litigation. Specifically, Honeywell argues that the district court erred by exercising jurisdiction over defendants' request for declaratory relief on the withdrawn claims of the '009 and '060 patents.

At the district court, Honeywell represented to Universal and Sandel that it would not pursue infringement of these previously asserted claims of the '009 and '060 patents. Based on this representation, Honeywell attempted to withdraw all of the originally asserted display claims, except claims 27-33 of the '009 patent and claims 4-5 of the '060 patent. The district court determined that Honeywell's refusal to withdraw all of the claims in the display patents left the defendants with a reasonable apprehension of suit. As such, the district court maintained jurisditicion over the claims Honeywell sought to withdraw. Ultimately the district court found claims 1-3, 8, 9, 13, 24, 34-36, 41, and 43-45 of the '009 patent and claims 1-3 of the '060 invalid based on anticipation.

The Supreme Court's decision in MedImmune, Inc. v. Genetech Inc., 549 U.S. ____ (2007), recently eliminated this court's "reasonable apprehension of imminent suit" test. Under the new legal regime envisioned by the Supreme Court, this court analyzes whether the district court erred as a matter of law in finding an actual controversy between the parties, as required by the Declaratory Judgment Act, 28 U.S.C. § 2201(a), and Article III of the Constitution.

Of course, infringement of a dependent claim also entails infringement of its associated independent claim. When Honeywell withdrew some independent claims from the litigation, it also chose to maintain causes of action based on certain

dependent claims relating to its display technology. As noted, Honeywell thus left the entire subject matter of the display claims at issue. This case differs from the situation in Grain Processing Corp. v. American Maize-Prods. Co., 840 F.2d 902, 905 (Fed. Cir. 1988), which Honeywell cites for support. In Grain Processing, the patentee agreed not to assert an entire group of process claims that had initially formed a basis for the complaint, leaving at issue only the four asserted product claims. Id. at 904. Honeywell made no such blanket withdrawal of the display claims in this case. Further, Honeywell has also charged Sandel with infringement of the display patents in another lawsuit. As such, this court affirms the district court's decision to retain jurisdiction over the withdrawn claims of the '060 and '009 patents. Honeywell does not appeal the substance of the trial court's decision on the invalidity of those claims. Accordingly, this court affirms that decision.

V

On cross-appeal, Sandel and Universal appeal the district court's denial of defendants' remaining counterclaims of invalidity under 35 U.S.C. § 102(b). The Patent Act entitles an inventor "to a patent unless . . . the invention was . . . in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States." Id. The district court held a seven-day bench trial on Sandel's and Universal's counterclaims of invalidity based on these bars. The district court determined that the claims were not invalid for either a public use or a commercial sale.

Following a bench trial, this court reviews the district court's conclusions of law without deference and its findings of fact for clear error. Merck & Co., Inc. v. Teva Pharms. USA, Inc., 395 F.3d 1364, 1369 (Fed. Cir. 2005). The same standards apply

to review of "on sale" or "public use" determinations. Unitherm Food Sys., Inc. v. Swift-Eckrich, Inc., 375 F.3d 1341, 1349-50 (Fed. Cir. 2004).

A. On-sale Bar

The on-sale bar prohibits the patenting of an invention that has been the subject of an offer for sale before critical date in § 102(b). Pfaff v. Wells Elecs., Inc., 525 U.S. 55, 66-67 (1998). In applying the statutory on-sale bar, this court follows the test set forth in Pfaff. 525 U.S. at 67. The Pfaff test requires that (1) the invention be the subject of a commercial sale or offer for sale and (2) the invention be "ready for patenting" at the time of the offer or sale. Id. An accused infringer may overcome a patent's presumption of validity by presenting clear and convincing evidence that the patented device was on-sale before the critical date. A defendant must prove that both prongs of the test occurred before the critical date.

In this case, Universal and Sandel point to Honeywell's proposals to Gulfstream and Canadair to develop its systems with their luxury airplane. Negotiations associated with that proposal occurred between January and July of 1994.

Honeywell negotiated with Gulfstream and Canadair to apply the new system in luxury airplanes. As the district court found, "both projects involved experimental aircraft, uncertified equipment . . . ." Final Decision, 343 F. Supp. 2d at 295. Moreover, the record shows that Honeywell entered into these negotiations to facilitate its programs to test its new system with human pilots in a genuine cockpit setting. These human factor and cockpit integration tests were a part of Honeywell's program to determine that the invention worked for its intended purpose. If, and only if, these tests were successful, Honeywell proposed commercial terms for the supply of 100 new

systems to replace the GPWS systems. If the tests were not successful, Honeywell proposed to supply its GPWS systems instead. Beyond these experimental programs, Honeywell did not offer its inventive system to any other customer until well after the critical date. The record also shows, often in the form of internal corporate communications, that Honeywell did not refer to the new system as ready for sale. Thus, the record consistently shows that Honeywell's negotiations and proposals before the critical date evinced a purpose of experimentation, as the district court found. See TP Labs, Inc. v. Prof'l Positioners, Inc., 724 F.2d 965 (Fed. Cir. 1984).

Although the experimentation did not alter any specific part of Honeywell's claimed system, this aspect of the record does not prejudice Honeywell's invocation of experimentation to negate any on-sale bar. Although such evidence would strengthen the case for negating experimentation, this negating doctrine does not require changes to the claimed invention to substantiate an experimental use. See City of Elizabeth v. Am. Nicholson Pave Co., 97 U.S. 126, 135 (1877).

Regarding the second prong of the Pfaff test, the record also shows that the invention was not "ready for patenting" before the critical date. An invention is "ready for patenting" when evidence shows that the invention was reduced to practice or described in a written description sufficient to permit one of ordinary skill in the art to practice the invention without undue experimentation. Pfaff, 525 U.S. at 67-68. An invention is reduced to practice when the patentee has an embodiment that meets every limitation and operates for its intended purpose. Eaton v. Evans, 204 F.3d 1094, 1097 (Fed. Cir. 2000). An invention works for its intended purpose when there is a

demonstration of the workability or utility of the claimed invention. Fujikawa v. Wattanasin, 93 F.3d 1559, 1563 (Fed. Cir. 1996).

The record in this case features a videotape of the invention in use aboard an actual airplane. This video shows that the invention in operation before the critical date, which in this case is July 31, 2004. In addition, other documents and demonstrations, such as Hans Muller's Design Notes and an article published by a reporter in June, 2004, (the "George article") allegedly support a reduction to practice. Reduction to practice requires proof that the invention worked for its intended purpose. EZ Dock v. Schafer Sys., Inc., 276 F.3d 1347, 1351 (Fed. Cir. 2002). The video, according to the record and the findings of the district court, shows that Honeywell performed tests to determine that the invention worked for its intended purpose. These tests, however, were part of the Honeywell effort to reduce the invention to practice, rather than an actual reduction. Following these tests, Honeywell still had work to do to ascertain the success of the operation. Further, the documents show that the system was still in development at the time of the tests and the other documentation. In sum, Honeywell used computer simulations, test aircraft, and demonstrations to those with expertise in air safety such as pilots to move the invention toward a reduction to practice. These tests began slightly before and continued well after the critical date. The district court, after a seven-day bench trial, determined that the evidence did not clearly and convincingly show that Honeywell had reduced the invention to practice before the critical date. Further, the district court determined that the documents, including the Design Notes, did not sufficiently enable one skilled in the art to practice the invention.

Thus, the record supports the district court's findings and conclusions after trial. As such, this court affirms the district court's decision.

B. Public Use

Universal and Sandel also argue on appeal that Honeywell's claims are invalid under § 102(b) based on public use. Specifically, Universal and Sandel argue that Honeywell's flight demonstrations had a commercial purpose. The district court disagreed: "Although these flights allowed contact with potential customers, there is no evidence that they were solely or primarily for marketing purposes." Final Decision, 288 F. Supp. 2d at 308. Further, Universal and Sandel argue that one of these flights, in which a reporter was aboard, constituted a public disclosure. This reporter published an article, the George article, about this flight in which he indicated the system was still under development. Thus the district court determined that "[t]he George article clearly indicates that the system is in its development phase." Id. at 287.

The § 102(b) bar prohibits a public use of an invention more than one year before the filing date of the patent application. A barring public use requires a public use more than one year before the patent filing date that employs a completed invention in public, without confidentiality restrictions, and without permitted experimentation. Allied Colloids Inc. v. Am. Cyanamid Co., 64 F.3d 1570, 1574 (Fed. Cir. 1995). As noted, an experimental purpose can negate a purportedly public use. Pfaff, 535 U.S. at 66-68. "This court has repeatedly stressed that evidence of experimental use . . . operates to negate application of section 102(b)." EZ Dock, 276 F.3d at 1351-52. In explaining the difference between "experimental" use and "commercial" or "public use," the Supreme Court noted that "a bona fide effort to bring [the] invention to perfection, or to ascertain

whether it will answer the purpose intended" does not constitute a "public use." City of Elizabeth, 97 U.S. at 137. "Any attempt to use [the invention] for a profit, and not by way of experiment . . . would deprive the inventor of his right to a patent." Id.

Based on City of Elizabeth, this court has consistently distinguished permitted experimental uses from barred public or commercial uses. EZ Dock, 276 F.3d at 1352; Allied Colloids Inc., 64 F.3d at 1574. Thus, the focus of the test is whether the use was truly experimental or in fact commercial. Allied Colloids, 64 F.3d at 1576-77. Applying these negating principles to this case shows that from 1993 through the critical date, Honeywell demonstrated a version of its look ahead system to aviation-industry people through a series of in-flight demonstrations aboard its King Air airplane using a laptop computer prototype. One of these demonstrations, in March of 1994, involved the pilot and writer, Fred George (author of the George article).

These demonstrations, as the district court correctly found, were experimental and not barring public uses. Although these demonstrations did not always relate to claimed features, this court permits testing to determine the workability of an invention even if the claims do not expressly set forth the intended use under examination. EZ Dock, 276 F.3d at 1353. All of the demonstrations involved testing Honeywell's EGPWS system on flights, the intended use of the invention. In any event, because, as set forth above, this court agreed with the district court that the claimed invention was not ready for patenting prior to the critical date, this court sustains as well the trial court's finding that the presentations, including the presentation which included Fred George, are not a bar under § 102(b).

VII

Sandel appeals the district court's determination that Honeywell had not committed inequitable conduct in its procurement of its patents relating to its EGPWS system. Sandel's inequitable conduct claim arises from Honeywell's alleged failure to disclose the Gulfstream documentation or the George article. Honeywell submitted declarations from two individuals, a Mr. Daly and a Mr. Torget. Mr. Daly was Vice President and General Manager of the Flight Safety Systems Division during the relevant time period and Mr. Torget was a mechanic for the King Air aircraft. Mr. Daly filed his declaration in support of the '080 patent application. In it, he noted that regulatory approval required prior commercial use. In addition, his statement discloses the flight demonstrations and the use of the system on the Gulfstream flight. Mr. Torget was the mechanic for the King Air aircraft and responsible for maintaining the documentation necessary on the aircraft to obtain FAA authorization. He too submitted his declaration as part of the prosecution of the '080 patent. In it, he states that the activities were experiments to satisfy applicable FAA regulations.

Thus, the district court, after hearing evidence from both sides, concluded that Honeywell had made affirmative disclosures of the Gulfstream and Collins proposals and the King Air aircraft flight, which was one of the flights which resulted in the George article, to the United States Patent and Trademark Office (Patent Office). Further, the district court did not find any intent on the part of Honeywell to deceive the Patent Office. Thus, the district court concluded: "In light of the information disclosed to the examiner, Sandel and Universal have not shown that any material misstatement or

omission by Honeywell during the prosecution of the patents in suit [evinces] an intent to deceive." Final Decision, 343 F. Supp. 2d at 312.

Applicants for patents have a duty to prosecute patent applications in the Patent Office with candor, good faith, and honesty. Molins PLC v. Textron, Inc., 48 F.3d 1172, 1178 (Fed. Cir. 1995); see also 37 C.F.R. § 1.56. A breach of this duty—including affirmative misrepresentations of material facts, failure to disclose material information, or submission of false material information—coupled with an intent to deceive, constitutes inequitable conduct. See Molins, 48 F.3d at 1178. In determining whether inequitable conduct occurred, a trial court must determine whether the party asserting the inequitable conduct defense has shown by clear and convincing evidence that the alleged nondisclosure or misrepresentation occurred, that the nondisclosure or misrepresentation was material, and that the patent applicant acted with the intent to deceive the United States Patent and Trademark Office. Glaxo Inc. v. Novopharm Ltd., 52 F.3d 1043, 1048 (Fed. Cir. 1995). The nondisclosure or misrepresentation must meet threshold levels of both materiality and intent. Molins, 48 F.3d at 1178. Once the threshold levels of materiality and intent have been established, the trial court must weigh materiality and intent to determine whether the equities warrant a conclusion that inequitable conduct occurred. Id. The more material the information misrepresented or withheld by the applicant, the less evidence of intent will be required in order to find inequitable conduct. N.V. Akzo v. E.I. DuPont de Nemours, 810 F.2d 1148, 1153, (Fed. Cir. 1987). This court reviews all of these underlying factual determinations for clear error. Glaxo, 52 F.3d at 1028.

On appeal, Sandel challenges the district court's determination that the Gulfstream documentation and George article were not material. Information is material "if there is a 'substantial likelihood that a reasonable examiner would have considered the information important in deciding whether to allow the application to issue as a patent.' " Halliburton Co. v. Schlumberger Tech. Corp., 925 F.2d 1435, 1440 (Fed. Cir. 1991) (quoting 37 C.F.R. § 1.56 (1989)). Information cumulative of other information already before the Patent Office is not material. Here, as the district court found, Honeywell provided the Patent Office with express statements about its commercial flights and about the industry demonstrations. Final Decision, 343 F. Supp. 2d at 313. Moreover, Sandel does not challenge the district court's determination that Honeywell had no intent to deceive the Patent Office regarding its pre critical date activates. As such, this court affirms the district court's decision denying inequitable conduct.

VIII

Finally, Universal appeals the district court's decision regarding its commercial counterclaims. At the district court, Universal alleged that Honeywell "filed the lawsuit against it in bad faith with knowledge that its patents were invalid under § 102(b) and unenforceable due to inequitable conduct, as part of an overall scheme to monopolize the market and for the purpose of interfering with Universal's actual and prospective business relations." Universal asserted that Honeywell "employed negative publicity and filed the litigation against it to disrupt its business relations with potential customers." In other words, Universal charged that Honeywell's litigation was a sham.

The district court, applying the standard set forth in Professional Real Estate Investors, Inc. v. Columbia Pictures Industries, Inc., 508 U.S. 49, 56 (1993), determined

that "while summary judgment of non-infringement and anticipation was ultimately grounded, a reasonable litigant could have expected success on the merits of Honeywell's claim for patent infringement against those parties." Final Decision, 343 F. Supp. 2d at 326. Further, the district court determined that Universal had not shown that Honeywell used the litigation as an anti-competitive weapon. Id. After all, the record showed that Honeywell conducted a reasonable pre-suit investigation. Id. Moreover, with regard to Honeywell's publicity, the trial court correctly noted that "patentees are permitted to make representations about their rights even though they are inaccurate." Id. Because Universal did not show by clear and convincing evidence that Honeywell acted in bad faith, the district court denied Universal's counterclaims. Id.

The Supreme Court, in Professional Real Estate, 508 U.S. at 50, outlined a two-part definition of sham litigation: Only if the litigation is shown to be objectively meritless may a court proceed to examine the litigant's subjective motivation to ascertain if the litigation merely masks illegal behavior. If the litigation is not objectively baseless, it cannot be deemed a sham regardless of the subjective intent involved in bringing the litigation. "[A]n objectively reasonable effort to litigate cannot be sham regardless of subjective intent." Professional Real Estate, 508 U.S. at 57.

"We must approach a federal antitrust claim as would a court of appeals in the circuit of the district court whose judgment we review." Loctite Corp. v. Ultraseal Ltd., 781 F.2d 861, 875 (Fed. Cir. 1985); U.S. Philips Corp. v. Windmere Corp., 861 F.2d 695, 702 (Fed. Cir. 1988). However, questions about whether conduct in procuring or enforcing a patent is sufficient to strip a patentee of its immunity from the antitrust laws

is decided on Federal Circuit law. Nobelpharma AB v. Implant Innovation, Inc., 141 F.3d 1059, 1067 (Fed. Cir. 1998).

Universal has not identified any evidence of record that shows a genuine case that Honeywell's infringement action was "so baseless that no reasonable litigant could realistically expect to secure favorable relief." Professional Real Estate, 508 U.S. at 673. This court agrees with the district court that Universal's assertions are without merit. Accordingly, this court holds that the district court did not err in denying Universal's commercial counterclaims.

## COSTS

Each party shall bear its own costs.

AFFIRMED-IN-PART, VACATED-IN-PART, and REMANDED.