

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent of: John Douglas Steinberg and Scott Douglas Hublou

U.S. Patent No.: 8,423,322

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Title: System and Method for Evaluating Changes in the Efficiency of an HVAC System

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REQUEST FOR EX PARTE REEXAMINATION

UNDER 35 U.S.C. § 302 AND 37 C.F.R. § 1.510

Reexamination is requested under 35 U.S.C. § 302 and 37 C.F.R. § 1.510 for claims 1–14 of U.S. Patent No. 8,423,322 (the '322 patent), which issued on April 16, 2013 to assignee EcoFactor, Inc.

The *ex parte* reexamination fee of \$12,600 is paid herewith by deposit account authorization. The Commissioner is hereby authorized to charge any additional fees which may be required regarding this request, or credit any overpayment, to Deposit Account No. 601876. Should no proper payment be enclosed herewith, as by a check being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing or a credit card payment form being unsigned, providing incorrect information resulting in a rejected credit card transaction, or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 601876.

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EXHIBITS

Exhibit No.	Description
1001	U.S. Patent No. 8,423,322 (“ the ’322 patent ”).
1002	Declaration of Rajendra Shah.
1003	U.S. Pat. App. Pub. 2005/0171645 (“ Oswald ”).
1004	U.S. Patent No. 5,729,474 (“ Hildebrand ”).
1005	U.S. Pat. App. Pub. 2006/0111816 (“ Spalink ”).
1006	U.S. Pat. No. 6,789,739 (“ Rosen ”).
1007	File History of Appl. No. 13/409,729 (“ the ’488 File History ”).
1008	File History of Appl. No. 13/230,610 (“ the ’322 File History ”).
1009	Decision Denying Institution in <i>Google LLC v. EcoFactor, Inc.</i> , IPR2020-00968, Paper 10 (PTAB Nov. 18, 2020).
1010	Public (Redacted) Initial Determination in ITC Investigation 1185 (“ the 1185 ID ”).
1011	Commission’s Final Determination in ITC Investigation 1185.
1012	U.S. Patent Pub. No. 2010/0070234 (“ the 234 publication ”).
1013	U.S. Pat. App. Pub. 2005/0288822 (“ Rayburn ”).
1014	C.V. of Rajendra Shah.
1015	Decision Denying Rehearing in <i>Google LLC v. EcoFactor, Inc.</i> , IPR2020-00968, Paper 14 (PTAB Oct. 14, 2021).
1016	U.S. Pat. App. Pub. 2012/0065935.
1017	U.S. Prov. App. 60/994011.
1018	BACnet™ - A standard communication infrastructure for intelligent buildings.
1019	U.S. Patent No. 5,943,544 (“ Charles ”).
1020	U.S. Patent No. 6,029,092 (“ Stein ”).

1021	U.S. Patent No. 7,775,452.
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I. INTRODUCTION

As set forth in the present request, claims 1-14 of the '322 patent are unpatentable over the prior art.

The Hildebrand, Oswald, and Spalink references present a substantial new question of patentability because they directly address the limitations thought by the patent Examiner to be missing from the prior art of record during the examination of the application leading to the '322 patent. Specifically, each of Hildebrand, Oswald, and Spalink teaches comparing an inside temperature recorded inside the first structure with an inside temperature of said first structure recorded at a different time to determine whether the operational efficiency of the HVAC system has decreased over time. As explained below in Section VII, neither Hildebrand, Oswald, nor Spalink were considered by the Examiner during prosecution.

Furthermore, because all claims of the '322 patent lack written description, as set forth herein, the claims of the '322 patent are only entitled to the actual September 12, 2011 filing date of the application that issued as the '322 patent. As a result, one of record Patent Owner EcoFactor Inc.'s ("EcoFactor") own published patent applications is 102(b) prior art to the '322 patent. The claims of the '322 patent thus are also unpatentable over EcoFactor's own purported work.

Requester previously filed a petition for *Inter Partes* Review of the '322 patent on May 21, 2020 (the "IPR Petition"). The Board issued a discretionary denial of the IPR Petition solely on procedural grounds under *NHK Spring Co. v. Intrix-Plex Techs., Inc.*, IPR2018-00752, Paper 8 (PTAB Sept. 12, 2018) (precedential) and *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (PTAB Mar. 20, 2020) (precedential) ("*NHK Spring / Fintiv*"). (Ex. 1009 at 6-18). The Board denied rehearing of those decisions on October 14, 2021. (Ex. 1015). The Board did not consider the IPR Petition's unpatentability arguments or any prior art on the merits. The denial was not based on § 325(d). Nor did the Board find that the IPR Petition was a similar, serial challenge previously presented to the Office. The instant request for *ex parte* reexamination, therefore, raises none of the concerns at issue in *In re Vivint, Inc.*, 14 F.4th 1342 (Fed. Cir. 2021).

II. CLAIMS FOR WHICH REEXAMINATION IS REQUESTED

Reexamination is requested for each of claims 1–14 of the '322 patent. Claims 1-12 are unpatentable in view of the prior art as set forth below:

- Proposed Rejection 1: Claims 1, 2, and 6 are anticipated by Hildebrand
- Proposed Rejection 2: Claims 1, 3, 5, and 7 are obvious over Hildebrand
- Proposed Rejection 3: Claims 1-3 and 5-6 are obvious over Hildebrand in view of Rosen
- Proposed Rejection 4: Claim 4 is obvious over Hildebrand in view of Oswald
- Proposed Rejection 5: Claims 1-7 are obvious over Oswald
- Proposed Rejection 6: Claims 2, 3, 5, and 6 are obvious as in Proposed Rejection 5, in further view of Rosen
- Proposed Rejection 7: Claims 8 and 9 are anticipated by Spalink
- Proposed Rejection 8: Claims 8 and 14 are obvious over Spalink
- Proposed Rejection 9: Claims 8-10 and 12-14 are obvious over Spalink in view of Rosen
- Proposed Rejection 10: Claim 11 is obvious over Spalink in view of Oswald
- Proposed Rejection 11: Claims 1-14 are obvious over the '234 Publication in view of Hildebrand

Consequently, reexamination is hereby requested for claims 1–14 of the '322 patent in view of the patents and patent publications discussed below. A copy of the '322 patent is attached as Exhibit 1001 of this document.

III. IDENTIFICATION OF PATENTS AND PRINTED PUBLICATIONS PRESENTED TO SHOW SUBSTANTIAL NEW QUESTION OF PATENTABILITY

1. U.S. Patent No. 5,729,474 (“**Hildebrand**”)
2. U.S. Pat. App. Pub. 2005/0171645 (“**Oswald**”)
3. U.S. Pat. App. Pub. No. 2006/0111816 (“**Spalink**”)
4. U.S. Patent Pub. No. 2010/0070234 (“**the '234 publication**”).

IV. CO-PENDING LITIGATION

Requester is aware of the following civil actions involving the '322 patent¹:

- *EcoFactor, Inc. v. Vivint, Inc.*, 6:22-cv-00034-ADA (W.D. Tex. Jan. 10, 2022)²;
- *ecobee Technologies ULC v. EcoFactor, Inc.*, 1:22-cv-10049 (D. Mass. Jan. 13, 2022);
- *EcoFactor, Inc. v. Ecobee, Inc.*, 6:22-cv-00033 (W.D. Tex. Jan. 10, 2022);
- *EcoFactor, Inc. v. Google LLC*, 6:22-cv-00032 (W.D. Tex. Jan. 10, 2022)³;
- *Google LLC v. EcoFactor, Inc.*, 4:22-cv-00162 (N.D. Cal. Jan. 10, 2022); and
- *EcoFactor, Inc. v. Pointcentral, LLC et al*, 6:22-cv-00055 (D. Or. Jan. 10, 2022).

V. THE ITC HAS ALREADY FOUND CERTAIN OF THE CHALLENGED CLAIMS INVALID

In litigation in the International Trade Commission (Smart HVAC Systems, and Components Thereof, ITC Inv. No. 337-TA-1185) (“the 1185 Investigation”), the Administrative Law Judge found, and the Commission agreed, that all the claims asserted in that investigation (*i.e.*, claims 1, 2, and 5) were anticipated or rendered obvious by the prior art. Specifically, the Commission found that Hildebrand anticipates claim 1 of the '322 patent and the combination of Hildebrand in view of Rosen renders obvious claims 2 and 5. (Ex. 1010 at 486-93). Patent Owner subsequently dismissed its appeal of the Commission’s findings on December 27, 2021. *EcoFactor, Inc. v. ITC*, Case No. 2021-2339, Dkt. No. 22 (Fed. Cir. Dec. 27, 2021).

¹ EcoFactor has also previously asserted the '322 patent in district court litigations against Alarm.com Inc., Johnson Controls Inc., Emerson Electric Co., Resideo Technologies Inc., Carrier Global Corporation, Daikin Industries, Ltd., and Schneider Electric USA Inc., and these actions have been terminated.

² The '322 patent was also at issue in *EcoFactor, Inc. v. Vivint, Inc.*, 1:19-cv-12327 (D. Mass. Nov. 12, 2019), which EcoFactor voluntarily dismissed on Jan. 10, 2022 before re-filing in W.D. Tex. on the same day.

³ The '322 patent was also at issue in *EcoFactor, Inc. v. Google, Inc.*, 1:19-cv-12322 (D. Mass. Nov. 12, 2019), which EcoFactor voluntarily dismissed on Jan. 10, 2022 before re-filing in W.D. Tex. on the same day.

In arguing for discretionary denial of the IPR Petition under § 314(a) in view of the *1185* Investigation, Patent Owner stated “once the ITC case makes a determination regarding invalidity as to a particular patent versus a particular prior art, neither side is likely to maintain the same assertion in district court.” (Ex. 1009 at 10). Despite Patent Owner’s representation to the PTAB, and the PTAB’s reliance on those representations in denying the petition under § 314(a) (*see* Ex. 1009 at 10), Patent Owner nonetheless maintains its assertion of the ’322 patent in district court proceedings. (*EcoFactor, Inc. v. Google LLC*, case No. 6:22-cv-00032 (W.D. Tex. Jan. 10, 2022)).

VI. OVERVIEW OF THE CHALLENGED ’322 PATENT CLAIMS

The ’322 patent at-issue (with an earliest-possible benefit date of 2007) relates generally to heating or cooling systems (“HVAC systems”). (Ex. 1001, Abstract, 1:17-18). Such HVAC systems have, for decades, been controlled by thermostats. (Ex. 1001, 1:26-37)(Ex. 1002, ¶32). Thermostats are typically wall-mounted units that have an internal temperature sensor, and which allow a user to set a target temperature. (Ex. 1001, 1:26-37)(Ex. 1002, ¶¶33-36). The target temperature, or “set point,” is compared against the actual temperature, and the HVAC system switched on or off in an attempt to achieve the set point temperature. (Ex. 1001, 1:26-37)(Ex. 1002, ¶¶33-36).

The ’322 patent states that there may be opportunities to improve typical thermostat function. (Ex. 1001, 1:54-2:2)(Ex. 1002, ¶37). For example, the ’322 patent discusses using measurements of inside temperature, outside temperature, and other factors to predict the building’s thermal characteristics and the performance of the HVAC system. (Ex. 1001, 8:63-9:9)(Ex. 1002, ¶¶38-39). As the ’322 patent notes, the rate at which an HVAC system can heat or cool a building depends on the temperature outside and the thermal properties of the building. (Ex. 1001, 2:52-67)(Ex. 1002, ¶¶38-39). Temperature and thermal properties, states the ’322 patent, can in turn be used in calculations of the operational efficiency of HVAC systems. (Ex. 1001, 11:10-19)(Ex. 1002, ¶¶38-39).

The exact nature of the calculations in the ’322 patent, however, is not disclosed. (Ex. 1002, ¶40). Rather, the ’322 patent states only generally that inside temperature, outside temperature, and other factors are taken into account, and that the server can calculate the “thermal mass index” of a house “by applying a basic algorithm that weighs each of these

external variables as well as variables for various characteristics of the home itself (such as size, level of insulation, method of construction, etc.) and data from other houses and environments.” (Ex. 1001, 11:14-19)(Ex. 1002, ¶40).

The ’322 patent has two independent claims. Independent claim 1 of the ’322 patent reads as follows:

“1. A system for evaluating changes in the operational efficiency of an HVAC system over time comprising:

at least one HVAC control system associated with a first structure that receives temperature measurements from at least a first structure conditioned by at least one HVAC system, and receives status of said HVAC system;

one or more processors that receive measurements of outside temperatures from at least one source other than said HVAC system and compare said temperature measurements from said first structure, wherein said one or more processors compares the inside temperature of said first structure and the outside temperature over time; and

one or more databases that store at least said temperature measurements obtained from said first structure over time,

wherein said one or more processors compares an inside temperature recorded inside the first structure with an inside temperature of said first structure recorded at a different time to determine whether the operational efficiency of the HVAC system has decreased over time.”

Thus, claim 1 is directed overall to a system for evaluating changes in the operational efficiency. To do this, the system must “compare[] an inside temperature recorded inside the first structure with an inside temperature of said first structure recorded at a different time.” The ’322 patent does not describe any calculations for evaluating operational efficiency. (Ex. 1002, ¶43). Nor does the ’322 patent describe calculations for comparing temperatures, or how those relate to changes in operational efficiency, if at all. (Ex. 1002, ¶43)(Ex. 1010, pp. 530-33, 539-45).

Independent claim 8 of the ’322 patent reads as follows:

“8. A system for detecting and correcting for anomalous behavior in HVAC control systems comprising:

a first HVAC control system that receives temperature measurements from at least a first structure conditioned by at least one HVAC system, and receives status of said HVAC system;

at least a second HVAC control system that obtains temperature measurements from at least a second structure conditioned by a second HVAC system, and status of said second HVAC system;

one or more processors that receive measurements of outside temperatures from at least one source other than said first and second HVAC systems and compare said temperature measurements from said first HVAC system and said second HVAC system and said outside temperature measurements over time to determine the efficiency of the first HVAC system and the second HVAC system; and

one or more databases that store said temperature measurements from said first and second HVAC systems.”

While claim 8 is similar in some respects to claim 1, it adds the concept of comparing data of two different structures. (Ex. 1002, ¶44). In contrast to independent claim 1, independent claim 8 requires two HVAC systems, and further requires a comparison of two inside temperatures and outside temperature. (Ex. 1002, ¶44).

VII. THE PROSECUTION HISTORY OF THE '322 PATENT

The present Request contends that claims 1-14 of the '322 patent are unpatentable as follows:

- Proposed Rejection 1: Claims 1, 2, and 6 are anticipated by Hildebrand
- Proposed Rejection 2: Claims 1, 3, 5, and 7 are obvious over Hildebrand
- Proposed Rejection 3: Claims 1-3 and 5-6 are obvious over Hildebrand in view of Rosen
- Proposed Rejection 4: Claim 4 is obvious over Hildebrand in view of Oswald
- Proposed Rejection 5: Claims 1-7 are obvious over Oswald
- Proposed Rejection 6: Claims 2, 3, 5, and 6 are obvious as in Proposed Rejection 5, in further view of Rosen
- Proposed Rejection 7: Claims 8 and 9 are anticipated by Spalink

- Proposed Rejection 8: Claims 8 and 14 are obvious over Spalink
- Proposed Rejection 9: Claims 8-10 and 12-14 are obvious over Spalink in view of Rosen
- Proposed Rejection 10: Claim 11 is obvious over Spalink in view of Oswald
- Proposed Rejection 11: Claims 1-14 are obvious over the '234 Publication in view of Hildebrand

None of Hildebrand, Oswald, and Spalink was considered by the Examiner during prosecution of the application that issued as the '322 patent. The application Examiner received 148 references submitted in an IDS, but Hildebrand, Oswald, and Spalink were not among them. (Ex. 1008 at pp. 199-204).

The application Examiner issued a non-final rejection of the claims under §112, for double patenting, and over other prior art. (Ex. 1008, pp. 84-93). The §112 rejection was with respect to the trademark term "Internet" used in dependent claims 3 and 10, and indefiniteness of the term "relative" in claim 8. The double patenting rejection was overcome by a terminal disclaimer. (Ex. 1008, p. 197).

With respect to the application Examiner's rejection of the claims over prior art, the application Examiner rejected claims 1, 4-8, and 11-14 under 35 U.S.C. 102(b) as being anticipated by Rayburn (US Patent Publication 2005/0288822). (Ex. 1008, pp. 88-90). Rayburn is not relied upon in this Request. Dependent claims 2, 3, 9, and 10 were rejected under 35 U.S.C. 103(a) as being unpatentable over Rayburn in view of Rosen (US Patent No. 6,789,739). (Ex. 1008, pp. 90-91). The application Examiner cited to paragraphs 18 and 19 of Rayburn as disclosing "wherein said one or more processors compares an inside temperature recorded inside the first structure with an inside temperature of said first structure recorded at a different time to determine whether the operational efficiency of the HVAC system has decreased over time." (*Id.* at 89). Paragraphs 18 and 19 of Rayburn are reproduced below:

"[0018] The first time the HVAC&R system 10 is operated, the controller 20 initially has no historical data with which to work to achieve the setpoint temperature 'T_{SP}' at approximately the setpoint time 't_{sp}'. An arbitrary system initiation time is selected, such as one hour prior to the setpoint time. Therefore, in the present example, the controller 20 would initiate operation of the HVAC&R system 10 at 7:00 a.m. It is to be understood that the controller 20 is configured to operate when the structure requires either heating or cooling. The HVAC&R system 10 is then permitted to run continuously in either heating or cooling mode until the setpoint temperature is reached. The controller 20 includes a timer that

measures the time 't₁' required for the HVAC&R system 10 to bring the temperature inside the structure 'T_{IN}' as sensed by indoor temperature sensor 38 to the setpoint temperature T_{SP}. An air treatment rate 'ATR' is then calculated by dividing the measured operating time t₁ of the HVAC&R system 10 by the absolute value of the difference in temperature from the inside temperature T_{IN} sensed by the indoor temperature sensor 38 and the setpoint temperature T_{SP} as shown in equation [1].

$$ATR = t_1 / |T_{SP} - T_{IN}| \quad [1]$$

[0019] Air treatment rate ATR is expressed in units of time divided by temperature, such as minutes/° F. Therefore, if the difference between the setpoint temperature T_{SP} and the indoor temperature T_{IN} as sensed by the indoor temperature sensor 38 is twelve degrees, and the HVAC&R system 10 is required to operate for 48 minutes to achieve the setpoint temperature T_{SP}, the air treatment rate ATR is 4 minutes per/° F. The 48 minute time value is referred to as the recovery time. Preferably, the air treatment rate ATR is stored in a memory device that is provided in the controller 20."

(Ex. 1013 at ¶¶18-19). Applicant argued for allowance over the rejection of the independent claims (1 and 8), but did not amend those claims. (Ex. 1008, p. 180). Specifically, Applicant argued:

"Rayburn fails to teach one or more processors that 'compares an inside temperature recorded inside the first structure with an inside temperature of said first structure recorded at a different time to determine whether the operational efficiency of the HVAC system has decreased over time.'

While Rayburn uses temperature differences to determine when to turn on an HVAC system, Rayburn does not appear to describe using temperature differences to determine whether the operational efficiency of the HVAC system has decreased over time."

In light of this significant difference, Applicant respectfully requests allowance of the claims."

(Ex. 1008, p. 180) (Emphasis in original). With respect to the prior art rejections of dependent claims, Applicant argued for allowance based on the dependence of the rejected claims from independent claims 1 and 8. (Ex. 1008, pp. 180-81). The application Examiner subsequently allowed the claims. (Ex. 1008, pp. 192-98). In the Examiner's Notice of Allowance, the Examiner stated that:

"With regards to Claims 1 and 8, the prior art of record or any combination of prior art searched fails to teach the limitations of compares an inside temperature recorded inside the first structure with an inside temperature of said first structure

recorded at a different time to determine whether the operational efficiency of the HVAC system has decreased over time.”

(Ex. 1008, p. 197). Thus, the application Examiner appeared to believe that the closest prior art lacked comparing an inside temperature taken at two different times “to determine whether the operational efficiency of the HVAC system has decreased over time.” (*Id.*)(Ex. 1002, ¶55).

The application Examiner, however, appears to have been unaware of prior art, including Hildebrand, Oswald, and Spalink, that taught comparing an inside temperature taken at two different times “to determine whether the operational efficiency of the HVAC system has decreased over time.” (Ex. 1002, ¶56).

Indeed, Applicant admitted that Hildebrand discloses this limitation during prosecution of a related patent.⁴ (Ex. 1007 at 296-98 (Response to Office Action dated Nov. 27, 2013, p. 6)). Specifically, in distinguishing Hildebrand from Applicant’s amended claims during prosecution of that patent, Applicant admitted that “Hildebrand compares existing measurements with previous measurements in order to determine system deterioration.” (Ex. 1007 at 296-98)(Ex. 1002, ¶57).

VIII. PRIOR POST-GRANT PROCEEDINGS

As noted above, Requester filed an IPR Petition against the ’322 patent on May 21, 2020. The IPR Petition asserted unpatentability based on prior art. In a decision dated July 22, 2021, the Board issued a discretionary denial of the IPR Petition under 35 U.S.C. § 314(a) in view of litigation in the International Trade Commission (*Smart HVAC Systems, and Components Thereof*, ITC Inv. No. 337-TA-1185) (“the 1185 Investigation”) involving the ’322 Patent. (Ex. 1009). The Board denied rehearing on October 14, 2021. (Ex. 1015). The Board’s decision was based solely on procedural grounds under *NHK Spring / Fintiv* under § 314(a), and not under § 325(d). (Ex. 1009 at 6-18). In denying the petition under § 314(a), the Board did not consider the prior art or any of the petition’s invalidity arguments on the merits. Nor did the Board find that the IPR Petition was a similar, serial challenge previously presented to the Office. The instant request for *ex parte* reexamination would be the first merits consideration by the Office of the prior art presented herein and, therefore, raises none of the concerns at issue in *In re Vivint*,

⁴ U.S. Patent No. 8,886,488 and the ’322 patent both claim priority to the same provisional application (No. 60/994,011).

Inc., 14 F.4th 1342 (Fed. Cir. 2021) (IPR petitioner filed multiple serial IPR petitions, using earlier IPR denials to correct past deficiencies, wherein the Board “actually relied on § 325(d) considerations for its core analysis”). Furthermore, while that IPR Petition relied in part on Oswald, it did not rely on Hildebrand or Spalink at all.

IX. EFFECTIVE FILING DATE OF CLAIMS 1-14 OF '322 PATENT

No claims of the '322 patent are entitled to the benefit of the filing dates of any prior applications, because the claims of the '322 patent do not have written description support in any prior application. (Ex. 1002, ¶59). Thus, the effective filing date of all claims of the '322 patent should be no earlier than September 12, 2011, which is the filing date of the application that issued as the '322 patent. (*Id.*).

To be entitled to the filing date of an earlier application, the earlier application must provide written description for the claims. 35 U.S.C. § 120. “There is no statutory limitation during a reexamination proceeding prohibiting the examiner from conducting a priority analysis.” *In re NTP, Inc.*, 654 F.3d 1268, 1277 (Fed. Cir. 2011). Indeed, “[u]nder § 120, a patent is entitled to the priority date of an earlier filed application” only if “the written description of the earlier filed application discloses the invention claimed in the later filed application sufficient to satisfy the requirements of § 112.” (*Id.*). Under this analysis, “[t]he test for sufficiency of a written description is ‘whether the disclosure of the application relied upon reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date.’” *Bard Peripheral Vascular, Inc. v. W.L. Gore & Assocs., Inc.*, 670 F.3d 1171, 1188 (Fed. Cir. 2012). Furthermore, “[w]hile the description requirement does not demand any particular form of disclosure or that the specification recite the claimed invention *in haec verba*, **a description that merely renders the invention obvious does not satisfy the requirement...**” *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351-52 (Fed. Cir. 2010)(*en banc*)(Emphasis added).

In the present case, the '322 patent issued from Application No. 13/230,610 (“the '610 application”), which was filed on September 12, 2011. The '610 application claims the benefit of U.S. Application No. 12/211,690, filed on September 16, 2008 as well as to Provisional Application No. 60/994,011, filed on Sep. 17, 2007. (Ex. 1001, (63), (60)).

A limitation in each independent claim of the '322 patent lacks written description support in all prior applications. (Ex. 1002, ¶62). These limitations are (in claim 1)

“compar[ing] an inside temperature recorded inside the first structure with an inside temperature of said first structure recorded at a different time to determine whether the operational efficiency of the HVAC system has decreased over time and (in claim 8) “compar[ing] said temperature measurements from said first HVAC system and said second HVAC system and said outside temperature measurements over time to determine the efficiency of the first HVAC system and the second HVAC system.” (Ex. 1001, claim 8)(Ex. 1002, ¶62).⁵ Because each of these limitations (and thus both independent claims of the ’322 patent) lacks written description support in all prior applications, the ’322 patent are only entitled to the actual September 12, 2011 filing date of Application (No. 13/230,610 (“the ’610 application”)) that issued as the ’322 patent. *See* 35 U.S.C. §§ 120, 112. (Ex. 1002, ¶62).

Here, with respect to independent claim 1, EcoFactor was not in possession of the concept of “compar[ing] an inside temperature recorded inside the first structure with an inside temperature of said first structure recorded at a different time to determine whether the operational efficiency of the HVAC system has decreased over time.” (Ex. 1001, claim 1)(Ex. 1002, ¶63). While the ’322 patent mentions monitoring operational efficiency, it never teaches to do this specifically by comparing two inside temperatures recorded at different times. (Ex. 1002, ¶63).

The words “operational efficiency” appear only in the Abstract and claims of the ’322 patent and again in portions of the written description that are similar to certain language of the claims. (*See, e.g.*, Ex. 1001, Abstract, 4:15-17, 4:38-40). However, the ’322 patent discloses no algorithms, calculations, or equations that could connect the idea of determining whether operational efficiency has decreased with the comparison of two inside temperatures. (Ex. 1002, ¶64). The ’322 patent does not explain how to calculate the “operational efficiency” of an HVAC system nor does it explain how to compare inside temperature measurements to determine whether the operational efficiency of the HVAC system has decreased over time. (Ex. 1002, ¶64).

EcoFactor has contended that certain portions of the ’322 patent directed to “thermal mass” provide written description for a temperature comparison that is used to “to determine

⁵ The ’322 patent is accompanied by a Certificate of Correction which deletes the language “relative” from this claim element.

whether the operational efficiency of the HVAC system has decreased over time.” (Ex. 1010, pp. 539-45, 543-44)(*See, e.g.*, Ex. 1001, 8:21-9:44, 10:57-11:47, 12:48-55, Fig. 11). However, EcoFactor’s own litigation expert admitted that these portions “do not expressly tie the comparison and analysis of the described to a change in operational efficiency per se.” (*Id.*). EcoFactor’s expert also admitted that thermal mass index is different than operational efficiency. (Ex. 1010, pp. 529-539, p. 530)(Ex. 1002, ¶65).

Even if calculating the thermal mass index were somehow relevant to calculating operational efficiency, the ’322 patent does not even explain how to calculate a thermal mass index. (Ex. 1010, pp. 529-539, p. 541)(Ex. 1002, ¶66). Instead, the ’322 patent only generically states that a “basic algorithm” that weighs dozens of variables should be used, but provides no detail on how to perform any calculation of the thermal mass index from such variables, nor does it describe any calculation of operational efficiency. (*Id.*)(Ex. 1001, 11:14-19)(Ex. 1002, ¶66).

To the extent that EcoFactor argues that the ’322 patent’s discussion of relative “efficienc[ies]” of different houses and determining which “percentile” that they belong provides written description support, the ’322 patent provides no explanation regarding how to “calculate” that efficiency, or even whether the described efficiency of the house is the same as the claimed “operational efficiency” of an HVAC system. (Ex. 1010, pp. 529-545)(Ex. 1001, 9:31-44, 8:31-8:62, Figs. 6A-10B)(Ex. 1002, ¶67).

Furthermore, litigation testimony from EcoFactor’s co-founder and named inventor Mr. Scott Hublou, confirms that EcoFactor did not have possession of this claim element at the time of the alleged invention. (Ex. 1010, pp. 531-33, 537, 540, 544-45)(Ex. 1002, ¶68).

For similar reasons, EcoFactor was also not in possession of a system which could “compare said temperature measurements from said first HVAC system and said second HVAC system and said outside temperature measurements over time to determine the efficiency of the first HVAC system and the second HVAC system.” (Ex. 1001, claim 8); (Ex. 1002, ¶69). The ’322 patent does not describe how to compare 1) temperature measurements for a first HVAC system; 2) temperature measurements for a second HVAC system; and 3) outside temperature measurements “over time” to determine the efficiency of a first HVAC system and a second HVAC system.” As noted above, while the ’322 patent discusses calculating the “efficiency” of different houses, it does not describe how to calculate that efficiency, let alone how to use the

inputs recited in independent claim 8 to do so. (*See, e.g.*, Ex. 1001, 9:10-44, 11:20-65); (Ex. 1002, ¶69).

The '322 patent issued from Application No. 13/230,610 (“the '610 application”), whose disclosures are similar to the issued patent.⁶ (Ex. 1002, ¶70). The '322 patent states that it is also a continuation of Application No. 12/211,733, (the '733 application) whose disclosures are also similar to the issued patent.⁷ (*Id.*). The '322 patent also claims priority to Provisional Application No. 60/994,011, which provides no additional description supporting these the above-identified claim elements. (Ex. 1017).

Because all claims of the '322 patent lack written description, all claims of the '322 patent are only entitled to the actual September 12, 2011 filing date of the '610 application directly leading to the issuance of the '322 patent. *See* 35 U.S.C. §§ 120, 112; (Ex. 1002, ¶71).

Requester further notes that in Investigation *I185*, the ITC found that claim 1 of the '322 patent was invalid for lacking written description. (Ex. 1010 at 539-45).

X. SUBSTANTIAL NEW QUESTIONS OF PATENTABILITY

Each of the Hildebrand, Oswald, Spalink, and the '234 publication prior art references would have been important to a reasonable Examiner, and raise substantial new questions of patentability. These references directly address the limitation thought by the Examiner to be missing from the prior art of record during the examination of the application leading to the '322 patent.

A. Overview of Hildebrand

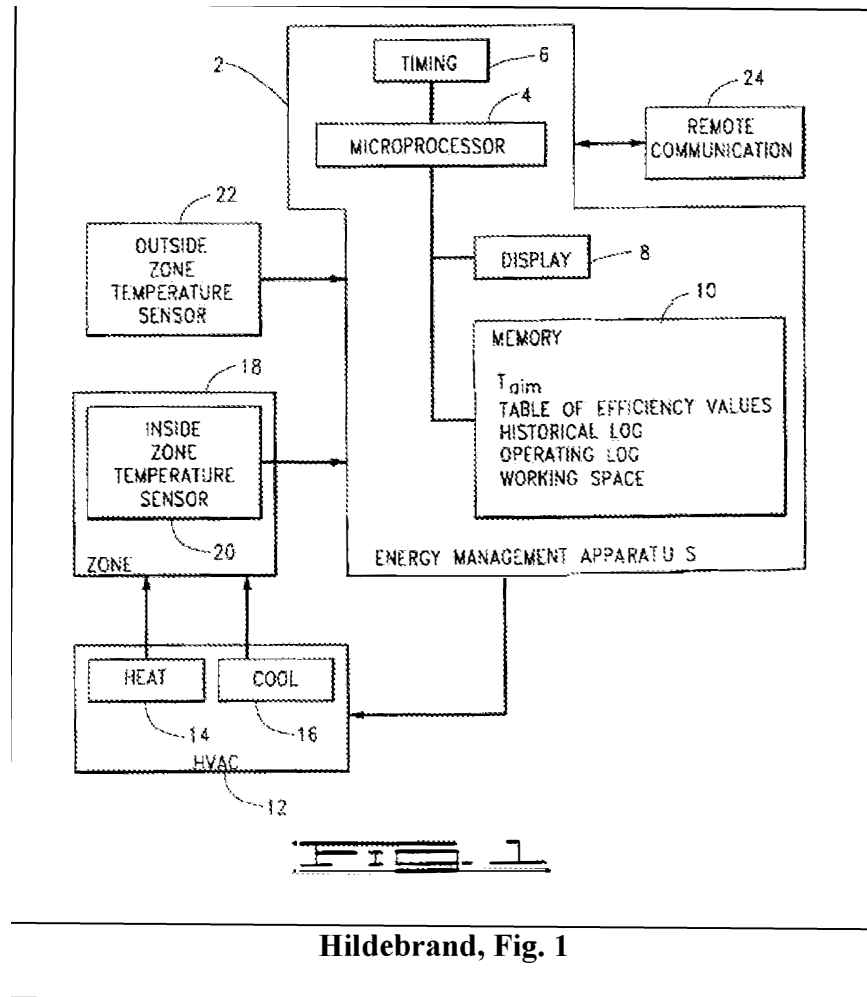
Hildebrand (Ex. 1004) was never considered by the application Examiner during the examination of the application leading to the '322 patent. The Examiner received 148 references submitted in an IDS during the examination of the application that issued as the '322 patent, but Hildebrand was not one of them. (Ex. 1008, pp. 199-204)(Ex. 1002, ¶78).

Hildebrand discloses a “Method of Anticipating Potential HVAC Failure” that “anticipat[es] potential failure of a temperature modification device (such as the equipment of

⁶ The '610 application published as U.S. Patent App. Pub. 2012/0065935 A1 (Ex. 1016).

⁷ the '733 application published as U.S. Patent App. Pub. 2010/0070234 (“the '234 publication”) (Ex. 1012).

the HVAC system 12).” (Ex. 1004 at 3:4:55-62, 1:5-10, Title, Abstract)(Ex. 1002, ¶79). As shown in FIG. 1, Hildebrand’s system measures inside temperature (18) and outside temperature (22), and Hildebrand further discloses an energy management apparatus 2 (like the ’322 patent’s HVAC control system) which includes a “digital computer” that operates the HVAC system 12. (Ex. 1004 at FIG. 1, 4:57-61)(Ex. 1002, ¶79).



Hildebrand specifically discloses computing the operational efficiency of an HVAC system “by dividing Δt [amount of time] by the difference between the two temperatures: $\Delta t / [T_{start} - T_{aim}]$ ” (Ex. 1004 at 6:36-40), where the two temperatures T_{start} and T_{aim} are recorded at different times, and the amount of time Δt is how long “it takes for the energized HVAC system 12 to change the actual temperature in the zone 18 from the respective T_{start} to the respective T_{aim} .” (Ex. 1004 at 6:30-33)(Ex. 1002, ¶80). Hildebrand relies on this ratio to determine how

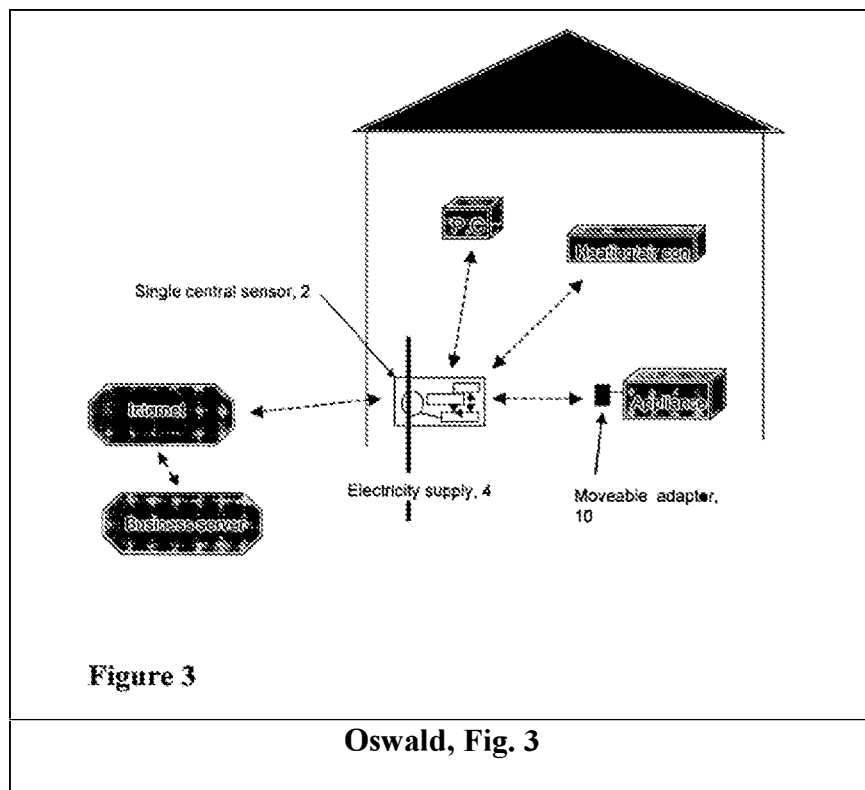
efficient the HVAC system is operating. (Ex. 1004 at 6:37-41, 5:40-60, 6:65-7:44, 8:34-51)(Ex. 1002, ¶80).

As discussed in Section VII *supra*, the application Examiner appeared to believe that the closest prior art lacked comparing an inside temperature taken at two different times “to determine whether the operational efficiency of the HVAC system has decreased over time” (Ex. 1008, p. 197), but as discussed in this section above and in the Claim Mapping section below (Section XI), Hildebrand’s processors are configured to compare an inside temperature taken at two different times “to determine whether the operational efficiency of the HVAC system has decreased over time.” (Ex. 1004 at 6:37-41, 5:40-60, 6:65-7:44, 8:34-51)(Ex. 1002, ¶81).

B. Overview of Oswald

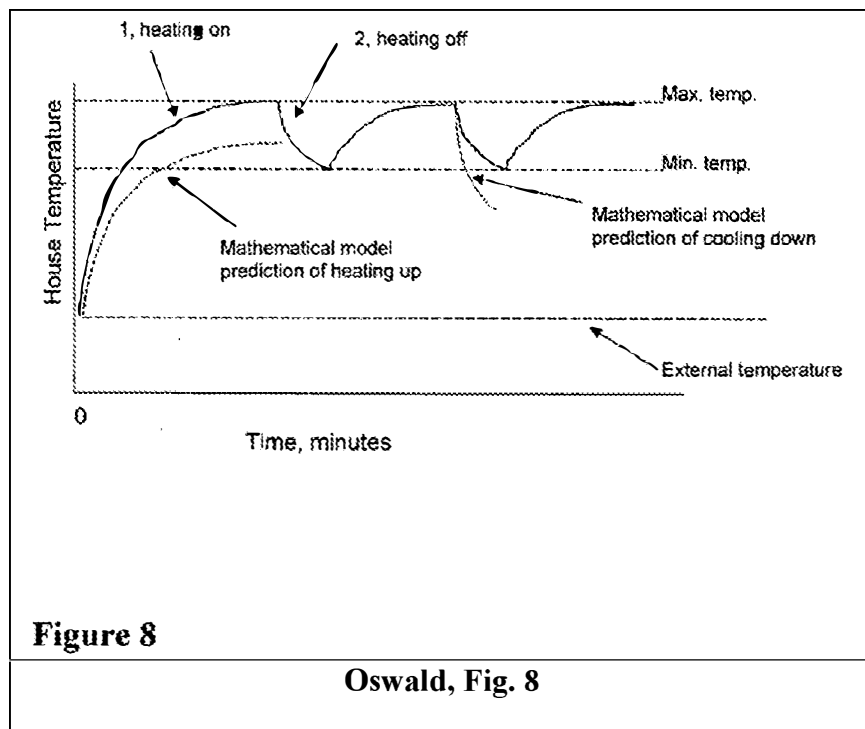
Oswald (Ex. 1003) was never considered by the application Examiner during the examination of the application leading to the ’322 patent. The Examiner received 148 references submitted in an IDS during the examination of the application that issued as the ’322 patent, but Oswald was not one of them. (Ex. 1008, pp. 199-204)(Ex. 1002, ¶156).

An overview of Oswald’s system is shown in Fig. 3, reproduced here:



(Ex. 1003, Fig. 3)(Ex. 1002, ¶157). As shown in Fig. 3, Oswald's system has a processor ("P.C.") and an HVAC System ("Heating/air con"). These components communicate with a "single central sensor, 2." (Ex. 1002, ¶157).

Oswald teaches creating a "transient thermal model". (Ex. 1003, ¶¶0024-0025, claims 27-28)(Ex. 1002, ¶158). The transient thermal model receives inside and outside temperature measurements. (*Id.*)(Ex. 1003, ¶¶0036, 0141, 0146-0148, 0024)(Ex. 1002, ¶158). Once created using these measurements, the transient thermal model is used to make predictions about how the HVAC system will be able to heat and cool the house, as shown, for example, in Oswald's Fig. 8, reproduced here:



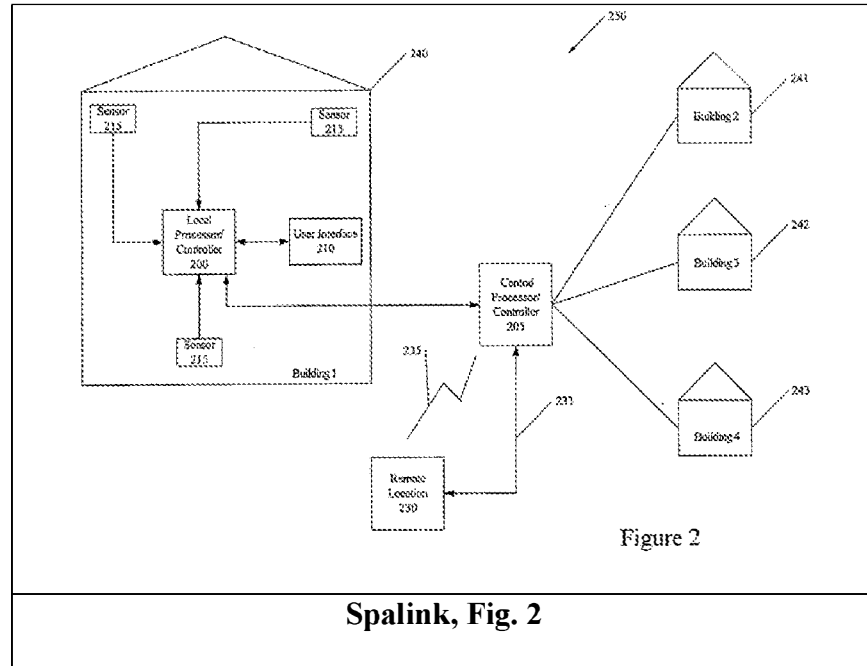
(Ex. 1003, Fig. 8, ¶¶0135-0136)(Ex. 1002, ¶158). As shown in Fig. 8, Oswald determines a predicted temperature as a function of time using a transient thermal model. This model is used to calculate the efficiency of the HVAC system, and to monitor its efficiency over time. (Ex. 1003, ¶¶0024-0025, 0146-0147)(Ex. 1002, ¶158).

C. Overview of Spalink

Spalink (Ex. 1005) was never considered by the application Examiner during the examination of the application leading to the '322 patent. The Examiner received 148 references

submitted in an IDS during the examination of the application that issued as the '322 patent, but Spalink was not one of them. (Ex. 1008, pp. 199-204)(Ex. 1002, ¶250).

Spalink teaches a system for detecting and correcting for anomalous behavior in HVAC control systems. An embodiment of Spalink's system is shown in Fig. 2, reproduced here:



(Ex. 1005, Fig. 2, ¶¶0061-0064)(Ex. 1002, ¶251). Figure 2 shows a central processor / controller 205 (middle), connected to several buildings 240-243. (Ex. 1005, ¶0061)(Ex. 1002, ¶251). Building 240 has an expanded conceptual view, showing a local processor / controller 200, several sensors 215, and a user interface 210 (e.g., a thermostat). (Ex. 1005, ¶0061)(Ex. 1002, ¶251).

Spalink teaches that the system, including the central and local processors, collects weather data as well as temperature measurements from inside the buildings, using the data to construct a mathematical model of each building and its climate control system, including the efficiency. (Ex. 1005, Abstract, ¶¶0073-0076, Fig. 3). The performance of climate control systems from similar buildings can be compared, and problems identified and corrected. Spalink explains:

“Referring to FIGS. 1A and 1B, the central receiving module 131 is configured to receive the sensed data associated with the buildings and sensed data associated with one or more other buildings....[A]ccording to some embodiments of the present invention, climate

control systems that appear to be operating within performance metrics and/or specifications at a local level, may be further improved by **comparing** the performance of the climate control system in the **building with the performance of climate control systems in similar buildings, i.e., systemic problems may be identified and corrected.**”

(Ex. 1005, ¶0044)(Emphasis added)(Ex. 1002, ¶252). Spalink teaches that such correction can occur by changing building control parameters to fix an identified problem, or by scheduling appropriate maintenance. (Ex. 1005, ¶¶0044, 0057, 0075, 0087)(Ex. 1002, ¶252).

D. The combination of the '234 Publication and Hildebrand

The '234 Publication was never considered by the application Examiner during the examination of the application leading to the '322 patent. During prosecution, the Examiner never made any determinations regarding the effective filing date(s) to which any of the claims of the '322 patent are entitled.

As set forth above under Section IX, all claims are only entitled to the actual September 12, 2011 filing date of the '610 application directly leading to the issuance of the '322 patent. As a result, EcoFactor's '234 Publication is prior art to all claims of the '322 patent.

The '234 Publication names the same inventors as the '322 patent and the '322 patent is a continuation of application No. 12/211,690, which published as the '234 Publication. (Ex. 1001)(Ex. 1012). The disclosures of the '234 Publication substantially overlap with those of the '322 patent. The '234 Publication, like the '322 patent, does not specifically disclose “one or more processors compares an inside temperature recorded inside the first structure with an inside temperature of said first structure recorded at a different time to determine whether the operational efficiency of the HVAC system has decreased over time” (as recited in claim 1) or “compare said temperature measurements from said first HVAC system and said second HVAC system and said outside temperature measurements over time to determine the efficiency of the first HVAC system and the second HVAC system” (as recited in claim 8). However, as set forth above, Hildebrand discloses these claim elements.

E. A Finding of an SNQ is Warranted

Hildebrand, Oswald, and Spalink each directly address the limitations thought by the application Examiner to be missing from the prior art of record during original prosecution. Specifically, the application Examiner believed the closest prior art lacked comparing an inside

temperature taken at two different times “to determine whether the operational efficiency of the HVAC system has decreased over time” (Ex. 1008, p. 197). The application Examiner, however, appears not to have been aware of prior art that taught this limitation.

Hildebrand, Oswald, and Spalink each individually, as well as collectively remedy this alleged deficiency. As explained above and below, Hildebrand, Oswald, and Spalink each teach a processor to compare an inside temperature taken at two different times “to determine whether the operational efficiency of the HVAC system has decreased over time.” (Ex. 1008, p. 197)(Ex. 1002, ¶¶81, 206, 267).

XI. PROPOSED REJECTION #1: CLAIMS 1, 2, AND 6 ARE ANTICIPATED BY HILDEBRAND

Claims 1, 2, and 6 are anticipated under pre-AIA 35 U.S.C. § 102 by Hildebrand. (Ex. 1004).

A. Effective Prior Art Date of Hildebrand

Hildebrand issued on March 17, 1998, and is thus prior art under pre-AIA 35 U.S.C. §102(b).

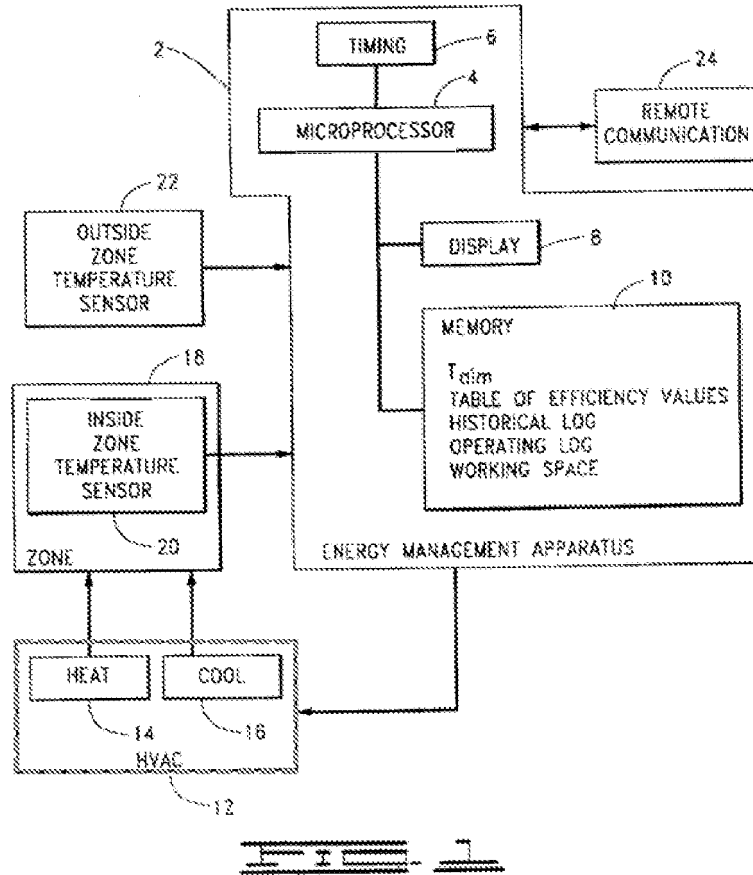
B. Claim Mapping

This section maps the challenged claims to the relevant disclosures of Hildebrand, where the claim text appears in bold-italics, and the relevant mapping follows the claim text. Requester has added numbering and lettering in brackets (e.g. 1[a], [1b]) to certain claim elements, to facilitate the discussion.

INDEPENDENT CLAIM 1

“[1Pre] A system for evaluating changes in the operational efficiency of an HVAC system over time comprising:”

Hildebrand discloses a **system for evaluating changes in the operational efficiency of an HVAC system over time**. The embodiment of FIG. 1 (reproduced below) is used to “anticipat[e] potential failure of a temperature modification device (such as the equipment of the HVAC system 12).” (Ex. 1004 at 3:4:55-62, 1:5-10, Title, Abstract)(Ex. 1002, ¶79). The HVAC system 12 is “a temperature modification device” and is the claimed **HVAC system**. (Ex. 1004 at 4:1-3)(Ex. 1002, ¶79).



(Ex. 1004 at FIG. 1)(red-dashed outlining added)(Ex. 1002, ¶79). In order to anticipate potential failure of the HVAC system 12 (the **HVAC system**), Hildebrand states an “**efficiency determination** is made in the preferred embodiment of the present invention,” which is the system of FIG. 1. (Ex. 1004 at 5:51-52, 3:41-43)(Ex. 1002, ¶83). That efficiency determination **evaluates how efficient the operation** of an “HVAC system” is because it determines whether the HVAC system has “more efficient operation” or “less efficient operation” when “[t]he present computed efficiency value is compared with a prior computed efficiency value.” (Ex. 1004 at 7:18-66, 1:46-49, 2:29-51). Accordingly, Hildebrand’s efficiency determination for the HVAC system measures **over time** how efficiently the HVAC system is operating (*e.g.*, heating, ventilating, and/or cooling a location)(Ex. 1002, ¶84).

Hildebrand teaches “[t]he preferred embodiment of the present invention is **designed to monitor** the operation and the effectiveness (**efficiency**) of an HVAC system.” (Ex. 1004, 1:46-49)(Emphasis added)(Ex. 1002, ¶84). The system monitors “operational efficiency” when it is tracking the ability of the HVAC system to heat or cool the structure, which Hildebrand

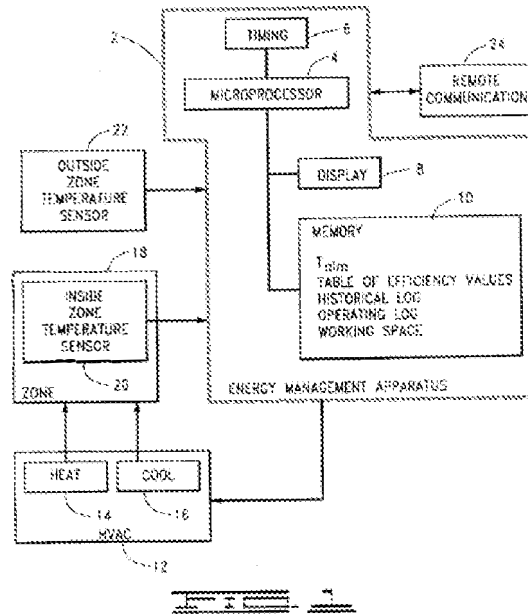
expressly uses as an indicator of the efficiency of operation. (Ex. 1004, 7:17-66, 2:2-9)(Ex. 1002, ¶83).

Hildebrand's efficiency determination "is computed by dividing Δt [amount of time] by the difference between the two temperatures: $\Delta t / |T_{start} - T_{aim}|$ " (Ex. 1004 at 6:36-40), where the amount of time Δt is how long "it takes for the energized HVAC system 12 to change the actual temperature in the zone 18 from the respective T_{start} to the respective T_{aim} " (Ex. 1004 at 6:30-33) (Ex. 1002, ¶80). Hildebrand relies on this ratio to determine how efficiently the HVAC system is operating. In a single stage HVAC system (i.e., the HVAC has only one level of heating or cooling) a longer amount of time Δt , if all else is equal, means that the energized HVAC system 12 is using more energy. (Ex. 1002, ¶85). In this manner, the "computed efficiency value" is an energy metric corresponding to the **operational efficiency of an HVAC system** under the broadest reasonable interpretation of the term "operational efficiency." (*Id.*)(Ex. 1004, 2:40-51, 7:18-44)(Ex. 1002, ¶85).

In the 1185 Investigation, the ALJ found, and the Commission agreed, that Hildebrand discloses this element. (Ex. 1010 at 486-89)(Ex. 1011).

"[1a] at least one HVAC control system associated with a first structure that receives temperature measurements from at least a first structure conditioned by at least one HVAC system, and receives status of said HVAC system;"

Hildebrand discloses **at least one HVAC control system** in the form of an energy management apparatus 2 (as shown in Figure 1, reproduced below), which includes a "digital computer" that operates the HVAC system 12. (Ex. 1002, ¶¶86, 79).



(Ex. 1004 at FIG. 1, 4:57-61)(red-dashed outlining added)(Ex. 1002, ¶86). The energy management apparatus 2 is an **HVAC control system** because it operates the HVAC system to “heat or cool a zone” (Ex. 1004 at 4:57-62), such as by “generating a control signal for energizing the HVAC system in response to . . . the need for . . . heated air or cooled air.” (Ex. 1004, 2:55-67, 5:3-10, 5:40-44)(Ex. 1002, ¶86). This signal is generated . . . by the microprocessor 4 [of the energy management apparatus 2] and output to the HVAC system 12.” (Ex. 1004 at 5:28-34).

Hildebrand discloses the **at least one HVAC control system** (energy management apparatus 2) is **associated with a first structure**. In Hildebrand “[t]he fluid (e.g., air or water) heated or cooled within the HVAC system 12 is provided to one or more respective zones, one of which is represented in FIG. 1 as zone 18.” (Ex. 1004 at FIG. 1, 4:1-10). That zone 18 is in a building, which is the claimed **first structure**. (Ex. 1004 at FIG. 1, 4:46-52)(Ex. 1002, ¶87). Accordingly, the energy management apparatus 2 is **at least one HVAC control system associated with a first structure**. (Ex. 1002, ¶¶86-87).

Hildebrand discloses the **at least one HVAC control system . . . receives temperature measurements from at least a first structure conditioned by at least one HVAC system** [HVAC system 12]. As discussed above, the HVAC system 12 in Hildebrand heats or cools a zone 18 in a building, corresponding to the claimed **first structure**. (Ex. 1002, ¶87). As depicted in FIG. 1, that zone 18 includes an inside zone temperature sensor 20. (Ex. 1004 at

FIG. 1, 5:11-17)(Ex. 1002, ¶88). The digital computer of the energy management apparatus 2 “monitor[s] and process[es] the output of the temperature sensor 20.” (Ex. 1004 at 5:11-17). In other words, the energy management apparatus 2 receives temperature measurements from the temperature sensor 20, which is in the **at least a first structure conditioned by at least one HVAC system**. (Ex. 1002, ¶¶87-88).

Hildebrand discloses the **at least one HVAC control system also receives status of said HVAC system**. First, the HVAC control system (energy management apparatus 2 of Hildebrand) determines whether heating or cooling is needed based on the difference between the actual temperature and the setpoint temperature, and also measures the rate of change in temperature during heating and cooling. (Ex. 1004, 4:64-5:27, 6:17-64)(Ex. 1002, ¶89). For example, Hildebrand explains:

“Energizing the HVAC system 12 further includes determining a difference between the stored desired temperature setpoint value and the stored actual temperature value. It also includes determining whether the difference indicates the need for the selected one of heated air or cooled air. This occurs, of course, if the actual zone temperature is below T_{aim} **during a selected heating mode** or if the actual zone temperature is above T_{aim} **during a selected cooling mode**. This is performed using **known computational and comparison techniques within the digital computer**.”

(Ex. 1004 at 5:19-28)(Emphasis added)(Ex. 1002, ¶89). In other words, Hildebrand’s HVAC control system must know the status of the HVAC system in order to know whether to call for heated or cooled air. (Ex. 1002, ¶89). Thus, the HVAC control system necessarily receives the status of the HVAC system. (Ex. 1002, ¶89)(Ex. 1010 at 487).

Second, Hildebrand provides a program listing as an example implementation of its invention. The program listing begins with a method declaration that receives a parameter entitled “mode”, as shown here, with highlighting added:

void CheckHVACTrends (char mode, char zone, unsigned char *deviation)

(Ex. 1004, col. 9, at top)(Ex. 1002, ¶90). This indicates that the method entitled “CheckHVACTrends” receives an input parameter “mode.” (Ex. 1002, ¶91). The parameter “mode,” moreover, indicates whether the HVAC system is in heating or cooling mode, as shown by the following C code and comments (highlighting added):

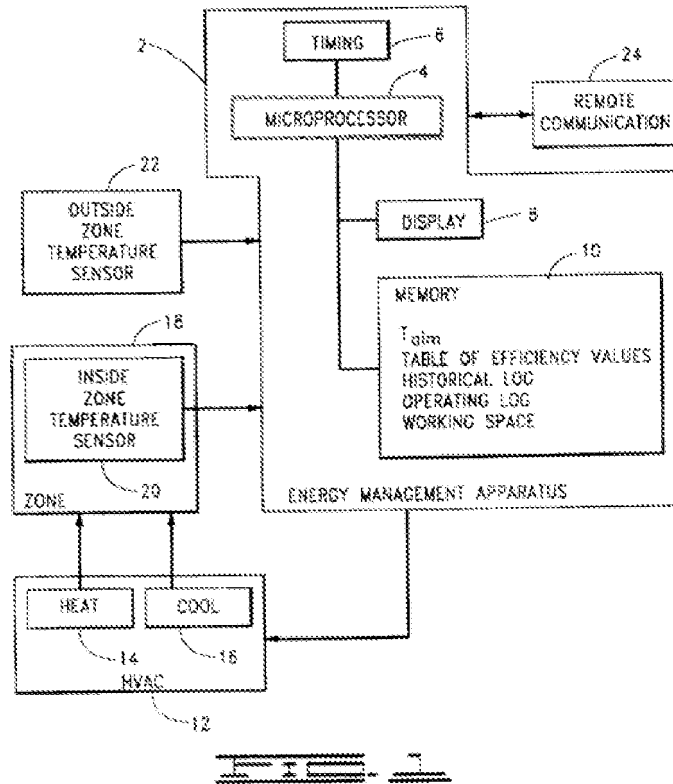
```
/* Get temperature difference from start to end */  
if (!mode) /* cool mode, Delta = Tstart - Taim */  
    Delta = data_ptr->start - data_ptr->aim;  
else /* heat mode, Delta = Taim - Tstart */  
    Delta = data_ptr->aim - data_ptr->start;
```

(Ex. 1004, 9:35-39 (counting line numbers starting at “void”))(Ex. 1002, ¶91). Because the program listing is code executed by the microprocessor in the energy management apparatus (Ex. 1004, 8:53-57, 4:55-64), the program listing indicates that the HVAC control system receives (via a passed parameter “mode”) status of said HVAC system (i.e. whether the system is in heat or cool mode). (Ex. 1002, ¶91).

In the *1185* Investigation, the ALJ found, and the Commission agreed, that Hildebrand discloses this element. (Ex. 1010 at 486-89). In rejecting Patent Owner’s argument that Hildebrand doesn’t receive the status of the HVAC system, the ALJ found that “[i]n determining whether the difference [between the stored desired temperature setpoint value and the stored actual temperature value] indicates the need for heating or cooling and then sending the appropriate signal, the system necessarily knows the status of the HVAC system.” (Ex. 1010 at 486-89)(Ex. 1002, ¶92).

“[1b] one or more processors that receive measurements of outside temperatures from at least one source other than said HVAC system and compare said temperature measurements from said first structure, wherein said one or more processors compares the inside temperature of said first structure and the outside temperature over time; and”

Hildebrand discloses a microprocessor 4 (as shown in Figure 1, reproduced below), which is **one or more processors** that, as explained below, perform the associated functions in the claims. (Ex. 1002, ¶¶92-93).



(Ex. 1004 at Fig. 1, 3:43-49)(red-dashed outlining added)(Ex. 1002, ¶92).

Hildebrand discloses **one or more processors that receive measurements of outside temperatures from at least one source other than said HVAC system**. For example, the “conventional temperature sensor 22 . . . located outside the zone 18 to measure the ambient temperature adjacent the zone 18” is a **source other than the HVAC system 12**. (Ex. 1004 at Fig. 1, 4:16-21)(Ex. 1002, ¶93-94). The **one or more processors** (microprocessor 4) in Hildebrand **receive outside temperature measurements** T_{out} from that temperature sensor 22. (Ex. 1004 at Fig. 1, 1:58-60, 2:39-46, 5:61-6:11)(Ex. 1002, ¶93). The reception by the microprocessor is apparent both because T_{out} is stored in memory 10 (a task which is carried out by the processor), and because it is used in efficiency calculations (a task also carried out by the microprocessor). (Ex. 1004, 5:65-6:28, 6:44-58, 7:18-23, 7:45-50, 14:32-48)(Ex. 1002, ¶94). The outside zone temperature sensor 22 is **at least one source other than said HVAC system**. (Ex. 1002, ¶93-94). The HVAC system is “HVAC system 12”, which is separate from the outside zone temperature sensor 22. (Ex. 1004, Fig. 1, 4:1-10)(Ex. 1002, ¶94).

Hildebrand discloses **compar[ing] said temperature measurements from said first structure, wherein said one or more processors compares the inside temperature of said**

first structure and the outside temperature over time. Specifically, Hildebrand teaches that it measures the temperature change over a specific period of time, and at a particular outside temperature, in order to estimate the heating or cooling rate of change. (Ex. 1004, 1:58-2:3, 6:17-40, 7:45-55)(Ex. 1002, ¶95). Hildebrand explains:

“The preferred embodiment of the present invention employs the following parameters: 1) **outside ambient temperature (T_{out})**, 2) **inside starting temperature (T_{start})**, 3) desired temperature setpoint (T_{aim}), 4) HVAC recovery time to change inside temperature from T_{start} to T_{aim} , and 5) the best or most efficient performance of the HVAC system to date. The method uses these parameters to determine the heating or cooling rate based on the temperature differential between the starting temperature (T_{start}) and the desired temperature setpoint (T_{aim}) and the corresponding recovery time to go from the starting temperature to the setpoint temperature. **The method then logs this heating or cooling rate relative to the outside ambient temperature.**”

(Ex. 1004, 1:58-2:3)(Emphasis added)(Ex. 1002, ¶95). In the process described here, Hildebrand demonstrates **compar[ing] said temperature measurements from said first structure**, because Hildebrand is repeatedly comparing inside temperatures by calculating an inside temperature change, namely the change from T_{start} to T_{aim} . (Ex. 1004, 6:17-40)(Ex. 1002, ¶95). When the comparison occurs, T_{aim} is a **temperature measurement from said first structure**, because at the end of the recovery time, inside temperature has reached the desired temperature setpoint, and thus T_{aim} is the same as the inside temperature. (Ex. 1004, 6:34-37)(Ex. 1002, ¶95). For example, Hildebrand determines that “ T_{aim} is achieved,” and in order to do so, must measure the temperature to be T_{aim} . (Ex. 1004, 6:29-37, 6:51-52 (“actual sensed temperature equal to T_{aim} ”))(Ex. 1002, ¶95).

Furthermore, the one or more processors (microprocessor 4) **compares the inside temperature of said first structure and the outside temperature over time.** (Ex. 1002, ¶96). This occurs because Hildebrand’s microprocessor repeatedly uses inside temperature and time to calculate a rate of change of inside temperature, at the current outside temperature for that particular time. (Ex. 1004, 12:66-13:37, 6:17-7:44)(Ex. 1002, ¶96). The respective rates of change are calculated several times per day—for example, each time the inside temperature deviates significantly from the setpoint, such that the HVAC system must be turned on. (Ex. 1004, 5:40-50)(Ex. 1002, ¶96).

Each time Hildebrand’s microprocessor calculates a rate of change, it stores the rate of change of the inside temperature in a table indexed by the outside temperature for which the rate

is valid. (Ex. 1004, 7:38-50)(Ex. 1002, ¶97). The result is a table that describes the rate of change in inside temperature (for both heating and cooling cases) as a function of outside temperature, where each value of the heating or cooling rate was taken at a different time. Thus, Hildebrand teaches **compar[ing] the inside temperature of said first structure and the outside temperature over time**. (Ex. 1002, ¶98).

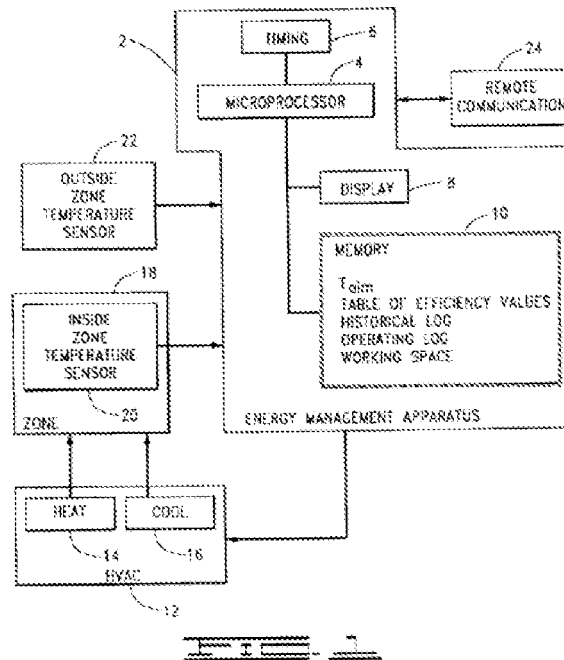
Hildebrand explains that the amount of time to cool or heat the location from T_{start} to T_{aim} is directly tied to the difference in inside and outside temperatures, so measuring the time to heat or cool the location from T_{start} to T_{aim} and relating those values to T_{out} at means that the inside and outside temperatures are **compared**. (Ex. 1002, ¶¶97, 98). For example, in Hildebrand's example of "outside ambient temperature of 30° F, (T_{out}), inside starting temperature of 60° F, (T_{start}) and a desired temperature setpoint of 70° F, (T_{aim})," it takes 60 minutes for the HVAC system to heat a home from T_{start} to T_{aim} . (Ex. 1004 at 8:33-42)(Ex. 1002, ¶97). Hildebrand contemplates that identical ambient conditions occur a month later. (Ex. 1004 at 8:42-49). However, in general, if the outside ambient temperature T_{out} is warmer than 30° F (*e.g.*, 50° F), the system should take less than 60 minutes (*e.g.*, 30 minutes) to heat from 60° F to 70° F. In this manner, Hildebrand's microprocessor 4 **compares the inside temperature of said first structure and the outside temperature over time**. (Ex. 1002, ¶96).

Based on the above, Hildebrand's microprocessor 4 forms at least part of the basis for both the claimed **HVAC control system** (energy management apparatus 2) as well as the **one or more processors** (microprocessor 4). (Ex. 1002, ¶¶93, 97). Claim 1 of the '322 patent requires no structural relationship between the claimed elements, nor does the claim require that any of the **one or more processors** cannot also be included as part of the **HVAC control system**. Moreover, the specification of the '322 patent provides no structural relationship between an **HVAC control system** and **one or more processors** (the term **HVAC control system** is used only in the claims and "Summary of the Invention" section that repeats the language of the claims). As stated above, the energy management apparatus 2 is the claimed **HVAC control system** and the microprocessor 4 is the claimed **one or more processors**. Because nothing in the claims or patent requires that the one or more processors cannot be included as part of the HVAC control system, Hildebrand's microprocessor 4 is at least part of the **HVAC control system** and **one or more processors**. (Ex. 1002, ¶¶93, 97).

In the 1185 Investigation, the ALJ found, and the Commission agreed, that Hildebrand discloses this element. (Ex. 1010 at 486-89). In rejecting Patent Owner's argument that Hildebrand doesn't "receive measurements of outside temperature from at least one source other than said HVAC system," the ALJ found that "Hildebrand's temperature sensor 22 is a source other than the HVAC system 12, and provides outside temperature measurements to the microprocessor 4." (Ex. 1010 at 487). In rejecting Patent Owner's argument that Hildebrand doesn't "compare[] the inside temperature ... and the outside temperature over time," the ALJ found that "the efficiency value is computed for a particular outside temperature condition, which is stored, and then the computation is repeated for another set of conditions, i.e., outdoor temperature, over time." (Ex. 1010 at 488).

"[1c] one or more databases that store at least said temperature measurements obtained from said first structure over time,"

Hildebrand discloses **one or more databases that store at least said temperature measurements obtained from said first structure over time** in the form of memory 10, which stores the output of the temperature sensor 20 that is within the zone 18.



(Ex. 1004 at FIG. 1, 5:11-17)(red-dashed outlining added)(Ex. 1002, ¶¶99-100). Accordingly, the memory 10 is a **database** that stores at least said temperatures obtained from said first structure for access at a later time. (Ex. 1002, ¶100). The output of the temperature sensor 20 is **from said first structure** because it is taken from a temperature sensor in zone 18, which is in a

building (the **first structure**). (Ex. 1004 at FIG. 1, 4:46-52)(Ex. 1002, ¶¶99-100). The temperature measurements are obtained and stored **over time** because storing the value of the actual temperature is “performed several times during various time periods.” (Ex. 1004 at 5:11-17, 5:40-49).

Hildebrand teaches that its energy management apparatus **stores said temperature measurements obtained from said first structure over time**. Hildebrand explains:

“Energizing the HVAC system 12 in the preferred embodiment also includes **storing in the digital computer a value of an actual temperature in the zone**. This is performed by **monitoring and processing the output of the temperature sensor 20**, which can be performed in a conventional manner, within the energy management apparatus 2 and **storing the value in memory 10**.”

(Ex. 1004, 5:12-17)(Emphasis added)(Ex. 1002, ¶99). Hildebrand further discloses that “data” including the inside temperature T_{start} , “can be collected and plotted over a period of time and made available for display or hard copy printout. Historical readings can be made on a periodic basis,” meaning the temperatures are stored **over time**. (Ex. 1004, 1:58-2:9)(Ex. 1002, ¶99). The temperature T_{start} , is the “the sensed temperature for the zone 18”, or the current temperature measurement from inside the structure at the time efficiency measurements begin. (Ex. 1004, 6:12-16)(Ex. 1002, ¶99).

The memory 10 of Hildebrand includes the claimed **database**. (Ex. 1002, ¶100). Hildebrand notes that data stored in the memory 10 can be stored in a table structure and indexed. (Ex. 1004, 6:65-7:4)(Ex. 1002, ¶100). A person of ordinary skill in the art (“POSITA”) would have recognized that an indexed table of data is a database. (Ex. 1002, ¶100).

The data structures include **temperature measurements obtained from said first structure over time** as can be seen from the C (or C++) program listing, which access T_{start} by dereferencing a pointer to the structure containing a property T_{start} , as shown in code reproduced here (highlighting added):

```
/* Get temperature difference from start to end */  
if (!mode) /* cool mode, Delta = Tstart - Taim */  
    Delta = data_ptr->start - data_ptr->aim;  
else /* heat mode, Delta = Taim - Tstart */  
    Delta = data_ptr->aim - data_ptr->start;
```

(Ex. 1004, 9:35-39 (counting line numbers starting at “void”))(Ex. 1002, ¶100). The same structure includes outside temperature and run time. (Ex. 1004, 9:31-34)(Ex. 1002, ¶100).

As another example, the stored temperatures are obtained **over time** at least because T_{start} and T_{aim} are stored, which are temperatures obtained at different times. (Ex. 1002, ¶100). A POSITA would have understood that T_{aim} is both a setpoint and a sensed temperature. For example, Hildebrand determines that “ T_{aim} is achieved,” and in order to do so, must measure the temperature to be T_{aim} . (Ex. 1004, 6:29-37, 6:51-52 (“actual sensed temperature equal to T_{aim} ”))(Ex. 1002, ¶100). Because T_{aim} is stored (see Figure 1 above showing memory 10 storing T_{aim} and code above showing a pointer to the structure containing a property T_{aim}) and is later used in calculations (see 6:42-64), it is also a **store[d]... temperature measurement[] obtained from said first structure over time**. (Ex. 1002, ¶100).

In the 1185 Investigation, the ALJ found, and the Commission agreed, that Hildebrand discloses this element, which Patent Owner did not dispute. (Ex. 1010 at 486-89).

“[1d] wherein said one or more processors compares an inside temperature recorded inside the first structure with an inside temperature of said first structure recorded at a different time to determine whether the operational efficiency of the HVAC system has decreased over time.”

Hildebrand discloses **wherein said one or more processors compares an inside temperature recorded inside the first structure with an inside temperature of said first structure recorded at a different time to determine whether the operational efficiency of the HVAC system has decreased over time**. As previously discussed, during prosecution of a related patent, Applicant admitted that “Hildebrand compares existing measurements with previous measurements in order to determine system deterioration.” (Ex. 1007 at 296-98)(Ex. 1002, ¶101).

As stated above under claim element [1b], Hildebrand’s microprocessor 4 (**one or more processors**) measures “the amount of time, Δt , it takes for the energized HVAC system 12 to change the actual temperature in the zone 18 from the respective T_{start} to the respective T_{aim} .” (Ex. 1004 at 6:26-33)(Ex. 1002, ¶102). This means that Hildebrand compares inside temperatures at different times because it measures the difference between a starting temperature T_{start} and a current temperature to determine when the temperature has reached the target

temperature T_{aim} (the claimed **compares an inside temperature with an inside temperature recorded at a different time**). (Ex. 1002, ¶102).

As further discussed above under claim element [1b], Hildebrand continues by describing an efficiency determination based on Δt , T_{start} , and T_{aim} . That efficiency determination is the claimed **operational efficiency**. (Ex. 1002, ¶103). The efficiency determination evaluates how efficient the operation of the **HVAC system** is because it determines whether the HVAC system has “less efficient operation” when “[t]he present computed efficiency value is compared with a prior computed efficiency value” (Ex. 1004 at 7:18-66, 7:5-7)(Ex. 1002, ¶103). Determining that the HVAC system has less efficient operation than before is the same as the claimed **determine whether the operational efficiency of the HVAC system has decreased over time**. (Ex. 1002, ¶103).

In the 1185 Investigation, the ALJ found, and the Commission agreed, that Hildebrand discloses this element. (Ex. 1010 at 489)(citing Ex. 1004 at 6:17-41).

CLAIM 2

“2. A system as in claim 1 in which said processors receive measurements of outside temperatures for geographic regions such as ZIP codes from sources other than said HVAC control systems.”

As discussed above under claim 1, element [1b], Hildebrand teaches measuring outside temperature using an outdoor sensor, which is a source other than said HVAC control system. (Ex. 1002, ¶104). A measurement of temperature from a sensor located outside is a temperature for geographic regions, because the measured air temperature at a location outside will approximate the air temperature around the sensor within a certain geographic region. (Ex. 1002, ¶104). The language “such as ZIP codes” does not limit the claim. *See Catalina Mktg. Int'l v. Coolsavings.com, Inc.*, 289 F.3d 801, 812 (Fed. Cir. 2002).

CLAIM 6

“6. A system as in claim 1 in which said HVAC system measures inside said first structure at only one physical location.”

Hildebrand’s system has only one temperature sensor, and thus **measures inside said first structure at only one physical location**. (Ex. 1004, 4:11-15, Fig. 1)(Ex. 1002, ¶105). The sensor is called a “zone” sensor and there were necessarily structures with only one zone, *e.g.* many apartments or single-family homes. (Ex. 1002, ¶105).

XII. PROPOSED REJECTION #2: CLAIMS 1, 3, 5, AND 7 ARE OBVIOUS OVER HILDEBRAND

Claims 1, 3, 5, and 7 are also obvious under pre-AIA 35 U.S.C. § 103(a) over Hildebrand which is applied in Proposed Rejection 1.

A. Overview of the Proposed Rejection

Hildebrand is applied as in Proposed Rejection 1 with respect to claim 1, with the exception that to the extent that Hildebrand does not disclose a database, this Proposed Rejection posits that it would have been obvious for Hildebrand's memory to include a database. Furthermore, to the extent that Hildebrand does not disclose receiving a status of the HVAC system, this Proposed Rejection posits that it would have been obvious for Hildebrand to receive the status of the HVAC system. Hildebrand further renders obvious dependent claims 3, 5, and 7 as discussed in detail below. (Ex. 1002, ¶107).

B. Rationale (Motivation) Supporting Obviousness and Reasonable Expectation of Success

It would have been obvious to a POSITA to receive the **status of said HVAC system** in Hildebrand. Hildebrand already teaches that its HVAC control system requires the status of the HVAC system in order to know whether to call for heating or cooling and to perform its calculations. (*See, e.g.*, Ex. 1004 at 5:19-28, 6:42-64). It would have been obvious for the HVAC control system to receive the status of the HVAC system in order for Hildebrand to carry out its disclosed calculations. (Ex. 1002, ¶108 (citing Ex. 1018)).

It was well known how to receive the status of an HVAC system during the relevant time. For example, a POSITA could have used BACnet (Building Automation and Control Networks), which was approved as a standard for networking in the HVAC industry by 1997. (Ex. 1018)(Ex. 1002, ¶109). This conventional protocol allowed HVAC systems to directly report status information to a device, such as a computer or thermostat. (Ex. 1018 at 3-7)(Ex. 1002, ¶109). A POSITA would have seen a number of advantages in using BACnet to receive the status of the HVAC system, including simplified wiring and improved fault detection resulting from additional information transmitted back to central control units. (Ex. 1002, ¶109). Updating various connections that had previously been physically wired together to networked communications paths would have reduced cost and complexity in wiring. (Ex. 1002, ¶109).

Additionally, using BACnet to receive the status of the HVAC system was a known technique that could have been used for the technique of determining the HVAC status to be the

status requested by the thermostat, with no unexpected results. *See KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 416-421 (2007)(Ex. 1002, ¶110).

Furthermore, a POSITA would have been motivated to, and would have had a reasonable expectation of success, in implementing a system that uses **one or more databases** to store temperature measurements over time. (Ex. 1002, ¶111) As Mr. Shah explains, a POSITA would have been motivated to use a database in order to facilitate storage and organization of the data regarding temperature data. (Ex. 1002, ¶111). Databases were widely used to store electronic information and could have been used predictably for that purpose with no unexpected results. (Ex. 1002, ¶111)(citing Exs. 1003; 1019; 1020). A number of databases were available in the relevant timeframe and were in use for HVAC control systems. (Ex. 1002, ¶111)(citing Ex. 1003, ¶¶0056-0059, Ex. 1019, Abstract, Fig. 2, 9:26-50, Ex. 1020, 1:64-66). Additionally, using a **database** to store data was a known technique that could have been substituted for the technique of using memory without a database, with no unexpected results. *See KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 416-421 (2007).

It further would have been obvious to a POSITA to provide a programmable thermostat that is the sole source of inside temperature (see claims 3 and 5). Hildebrand teaches measuring indoor temperature using a sensor. (Ex. 1004, 4:11-15, Fig. 1)(Ex. 1002, ¶112). The '322 patent recognizes that programmable thermostats were "prevalent" at the time of the alleged invention. (Ex. 1001 at 1:37-53)(Ex. 1002, ¶112). A POSITA would have been motivated to include a programmable thermostat in Hildebrand and would have reasonably expected to achieve the desired result, *i.e.*, delivering temperature data in a cost effective manner so that inside temperature data comes from a single source, the thermostat. (Ex. 1002, ¶112). A POSITA would have seen an advantage in reducing cost and redundancy by using a programmable thermostat that is the sole source of inside temperature. (*Id.*). A POSITA would have had a reasonable expectation of success implementing the modification of Hildebrand because the combination is merely combining prior art elements according to known methods to yield predictable results (*i.e.*, using the thermostat as the only source that provides the inside temperature data, to save on cost and reduce redundancy). (*Id.*). Accordingly, a POSITA would have found it obvious to implement Hildebrand's system as the sole source for current data regarding temperature inside a location. (*Id.*). Additionally, using a programmable thermostat as the sole source of inside temperature for a structure was a known technique (as the '322 patent

admits at 1:37-53) that could have been substituted for other microprocessor-based controllers, with no unexpected results. *See KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 416-421 (2007).

C. Graham Factors

The **level of ordinary skill** encompassed a (1) Bachelor's degree in engineering, computer science, or a comparable field of study, and (2) at least five years of (i) professional experience in building energy management and controls, or (ii) relevant industry experience. In my opinion, additional relevant industry experience may compensate for lack of formal education or vice versa. (Ex. 1002, ¶28).

The **scope and content of the prior art** are discussed throughout the Proposed Rejection

The **differences between the prior art and the claims** are discussed in the "Overview of the Combination" and in the claim mapping, below.

Requester is not aware of any **secondary considerations** that would make an inference of non-obviousness more likely.

D. Analogous Art

Hildebrand is analogous art because it is in the same field as the '322 patent (building energy management and controls), and its methods would have been reasonably pertinent to the problems facing the named inventors. (Ex. 1004, Abstract)(Ex. 1002, ¶113). *See Wyers v. Master Lock Co.*, 616 F.3d 1231, 1238 (Fed. Cir. 2010).

E. Claim Mapping

Hildebrand is as applied in Proposed Rejection 1. This section maps the challenged claims to additional relevant disclosures of Hildebrand, where the claim text appears in bold-italics, and the relevant mapping follows the claim text. Requester has added numbering and lettering in brackets (e.g. 1[a], [1b]) to certain claim elements, to facilitate the discussion.

"[1a] at least one HVAC control system ... [that] receives status of said HVAC system;"

Proposed Rejection 1 posits that Hildebrand discloses an **HVAC control system that receives status of said HVAC system**. To the extent that Hildebrand does not disclose this limitation, Hildebrand renders it obvious in two ways. (Ex. 1002, ¶115).

First, Hildebrand's determining the status of the HVAC system from the control signals sent from the HVAC control system to the HVAC system renders obvious the ***HVAC control***

system receiv[ing] [the] status of [the] HVAC system as that limitation is taught by the '322 patent. (Ex. 1002, ¶116).

The '322 patent does not specifically teach that the HVAC system *sends any signals*, let alone status signals to the HVAC control system. (Ex. 1002, ¶117). The only mentions of a “status” of an HVAC system in the '322 patent are in the claims, once in the abstract, and twice in the Summary of the Invention sections. The two mentions of “status of the HVAC system” in the Summary of the Invention describe the “status of the HVAC system” as being “on” or “off” (see Ex. 1001 at 4:30-37, *see also* claims 7 and 14), but the '322 patent does not state that the on/off status of the HVAC system is *received* by any device or from any device. The abstract of the '322 patent states “[t]he climate control system obtains . . . status of said HVAC system,” but again does not describe how the status is obtained, or from where. The claims only state that the “at least one HVAC control system . . . receives status of said HVAC system” (see claims 1 and 8), but do not describe how the status is obtained, or from where. (Ex. 1002, ¶117).

While the '322 patent states that thermostat 108 “turns the HVAC system on and off” (see Ex. 1001 at 7:40-58), it does not provide any disclosure of the HVAC system providing its status. The '322 patent does explain that cycling data is “reflected” in the control signals (i.e., on and off) sent to the HVAC system:

“Because **cycling of the HVAC system is controlled by the thermostat**, those differences in cycle time would be reflected in the data sensed by and **control signals generated by the thermostat**. It would be advantageous for a thermostat system to be able to use that information to diagnose problems and make recommendations based upon that data.”

(Ex. 1001 at 3:55-61)(Ex. 1002, ¶118). As a result, if **receives status of said HVAC system** is taught by the '322 patent under its broadest reasonable interpretation, it includes determining the status of the HVAC system to be the requested status sent by the thermostat to the HVAC system. Under this interpretation, a POSITA would have understood that Hildebrand’s “selected heating mode” and “selected cooling mode” (see, e.g., Ex. 1004 at 5:19-28) render obvious **receives status of said HVAC system**. (Ex. 1002, ¶118).

Second, to the extent **at least one HVAC control system ... [that] receives status of said HVAC system** only includes systems where the HVAC system sends a signal indicating its status to the HVAC control system, Hildebrand also renders this claim element obvious. (Ex. 1002, ¶119). Indeed, knowing when the system was on and cooling or heating allows the HVAC

control system to properly perform its calculations. (Ex. 1004, 6:39-7:4, 8:28-49, cols. 9-11). (Ex. 1002, ¶121).

Hildebrand discloses that the energy management apparatus 2 and the HVAC system 12 “can be implemented by any suitable devices well-known in the art.” (Ex. 1004, 3:41-57)(Ex. 1002, ¶120). Bi-directional communication between HVAC systems and their controls were well known, and included providing the ability for the HVAC system reporting its status information to the HVAC control system. (Ex. 1018 at 3-7)(Ex. 1003, FIGs. 1, 3 (showing bi-directional communication between the HVAC system and its controls))(Ex. 1021, FIG. 1, 3:35-45 (prior art system of which Mr. Shah is a named inventor, explaining it was “known” for an HVAC system to provide “status” information to a thermostat))(Ex. 1002, ¶120). For example, at the relevant time, BACnet was the most common protocol for HVAC networking, and allowed HVAC systems to directly report status information to a device, such as a computer or thermostat. (Ex. 1002, ¶120)(Ex. 1018 at 3-7, Tables 1-3). It would have been obvious to use a protocol such as BACnet to provide HVAC system status to the HVAC control system for the reasons discussed above. (Ex. 1002, ¶120).

“[1c] one or more databases that store at least said temperature measurements obtained from said first structure over time,”

Proposed Rejection 1 posits that Hildebrand discloses **one or more databases that store at least said temperature measurements obtained from said first structure over time**. To the extent that Hildebrand does not disclose that memory 10 includes a **database**, it would have been obvious to use a database to store temperature measurements in Hildebrand’s system. A POSITA would have been motivated to and would have had a reasonable expectation of success in implementing a system that uses **one or more databases** to store temperature measurements over time. (Ex. 1002, ¶122) As Mr. Shah explains, a POSITA would have been motivated to use a database in order to facilitate storage and organization of the data regarding temperature data. (Ex. 1002, ¶122). Databases were widely used to store electronic information and could have been used predictably for that purpose with no unexpected results. (Ex. 1002, ¶122)(citing Exs. 1003; 1019; 1020). A number of databases were available in the relevant timeframe and were in use for HVAC control systems. (Ex. 1002, ¶122)(citing Ex. 1003, ¶¶0056-0059, Ex. 1019, Abstract, Fig. 2, 9:26-50, Ex. 1020, 1:64-66). *See KSR Int’l Co. v. Teleflex, Inc.*, 550 U.S. 398, 416-21 (2007).

CLAIM 3

“3. A system as in claim 1 wherein said temperature measurements are obtained from a programmable thermostat that communicates using a network.”

This claim is rendered obvious by Hildebrand. First, Hildebrand discloses the use of thermostats and microcontroller-based HVAC system controllers, which a POSITA would have understood to be **a programmable thermostat**. (Ex. 1004, 1:10-17)(Ex. 1002, ¶123). The '322 patent acknowledges that programmable thermostats were well-known in the relevant timeframe. (Ex. 1001, 1:25-53)(Ex. 1002, ¶123). It would have been obvious to a POSITA to use the programmable thermostat's temperature sensor. As the '322 patent acknowledges, programmable thermostats were “prevalent” and sensed the ambient temperature. (Ex. 1001 at 1:37-49)(Ex. 1002, ¶123). Furthermore, Hildebrand teaches that its HVAC control system communicates using “remote communication network 24,” meaning it **communicates using a network**. (Ex. 1004, 4:22-34, 7:63-8:20, FIG. 1)(Ex. 1002, ¶123).

CLAIM 5

“5. A system as in claim 1 in which said HVAC system includes a programmable thermostat and said programmable thermostat is the sole source for current data regarding temperature inside said first structure conditioned by said HVAC system.”

This claim is obvious in view of Hildebrand for the reasons set forth under claim 3. Furthermore, programmable thermostats typically included an inside temperature sensor that, for residential systems, was the sole source for current inside temperature data. (Ex. 1002, ¶124). Claim 5 would have been obvious from Hildebrand's disclosure of microcontroller-based HVAC controllers, the widespread use of programmable thermostats containing the sole temperature sensor in a home, and Hildebrand's own disclosure of a single zone temperature sensor. (Ex. 1004, 4:11-15, Fig. 1)(Ex. 1002, ¶124).

CLAIM 7

“7. A system as in claim 1 in which the status of said HVAC system includes whether said system is “on” or “off”.”

See above, claim 1, element [1a]. Hildebrand's status indicates whether or not the system is in heat or cool mode. (Ex. 1002, ¶125). If the system is in heat or cool mode, it is obviously 'on', and if the system is in neither mode, it is obviously 'off'. (Ex. 1002, ¶125). For that

reason, Hildebrand obviously provides the status of said HVAC system includ[ing] whether said system is ‘on’ or ‘off’.” (Ex. 1002, ¶¶89, 126).

XIII. PROPOSED REJECTION #3: CLAIMS 1-3 AND 5-6 ARE OBVIOUS OVER HILDEBRAND IN VIEW OF ROSEN

Claims 1-3 and 5-6 are obvious under pre-AIA 35 U.S.C. § 103(a) over Hildebrand, in view of U.S. Pat. No. 6,789,739 (“Rosen”)(Ex. 1006).

Hildebrand is described above in Proposed Rejections 1 and 2.

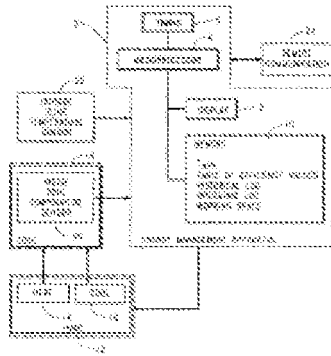
As discussed in Section VII, **Rosen** was cited by an Examiner in combination with Rayburn, in a rejection of certain then-pending dependent claims of the ’322 patent application. (Ex. 1008, pp. 90-91). However, the Applicant did not make any specific arguments with respect to Rosen (which was applied only to dependent claims), but rather relied on arguments made with respect to the Rayburn reference and the independent claims. (Ex. 1008, p. 179-82)(Ex. 1002, ¶129).

A. Effective Prior Art Date of Rosen

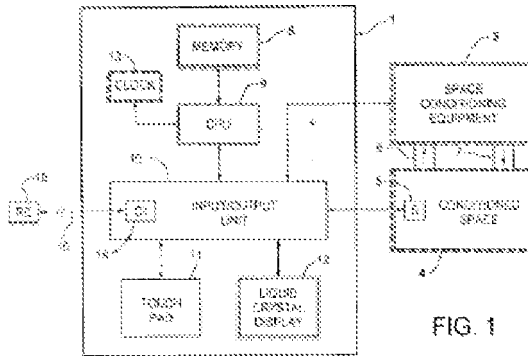
Rosen issued on September 14, 2004, and is therefore also prior art under pre- AIA 35 U.S.C. § 102(b).

B. Overview of Rosen

Rosen teaches an HVAC control system that has hardware elements similar to Hildebrand’s. (Ex. 1006, A side-by-side comparison of Fig. 1 of Hildebrand (left) and Fig. 1 of Rosen (right), with dashed boxes of the same color added around similar elements (HVAC system in red, building in blue, temperature sensor in yellow, microprocessor in light blue, clock/timer in purple, display in light purple, memory in green, and remote communications in orange):



Hildebrand, Fig. 1



Rosen Fig. 1

Rosen's HVAC control system intelligence is found within a programmable thermostat. (Ex. 1006, 3:3-7)(Ex. 1002, ¶131-32). The thermostat has a processor and a single temperature sensor within the same housing, although Rosen notes that the processor can be separate. (Ex. 1009, 3:3-7)(Ex. 1002, ¶132).

Rosen's HVAC control system has the ability to communicate over the Internet to a weather service provider. (Ex. 1006, 4:4-15)(Ex. 1002, ¶133). The weather service provider provides data including current outdoor temperature, localized to a particular geographic region based on, e.g., a ZIP code. (Ex. 1006, 4:40-49, 7:58-8:11)(Ex. 1002, ¶133).

C. Overview of the Proposed Rejection

Hildebrand is applied as in Proposed Rejections 1 and 2, with the exception that Rosen teaches the ability to obtain measurements of outside temperature over the Internet from a weather data provider. This Proposed Rejection posits that it would have been obvious to obtain outside temperature measurements from the Internet, thus replacing Hildebrand's use of outside temperature sensors. Furthermore, it would have been obvious to use Rosen's Internet-capable, programmable thermostat with a single temperature sensor in Hildebrand. (Ex. 1002, ¶134).

D. Rationale (Motivation) Supporting Obviousness

It would have been obvious to a POSITA to obtain outdoor temperatures for a geographic region (see claim 2), as taught by Rosen, in Hildebrand. (Ex. 1002, ¶135). Requester notes that the ITC found the combination of Rosen and Hildebrand obvious for this purpose. (Ex. 1010, pp. 489-93).

Hildebrand teaches measuring outdoor temperature using a sensor. (Ex. 1004, 4:16-21)(Ex. 1002, ¶136). Rosen, in turn, teaches (in 2004) that "local current weather information

sources are widely available and are routinely accessed by, for example, using the Internet.” (Ex. 1006, 4:10-15)(Ex. 1002, ¶136). Hildebrand already teaches that its local HVAC control systems have a network connection. (Ex. 1004, 4:22-34, 7:63-8:20)(Ex. 1002, ¶136). A POSITA would have seen an advantage in avoiding the expense of obtaining, wiring and servicing an extra outside temperature sensor by obtaining weather information from the Internet. (Ex. 1002, ¶136). Additionally, using the Internet to obtain outdoor temperatures, per Rosen, was a known technique that could have been substituted for the technique of measuring temperature with home sensors, with no unexpected results. *See KSR Int’l Co. v. Teleflex, Inc.*, 550 U.S. 398, 416-421 (2007).

It also would have been obvious to a POSITA to provide a programmable thermostat at one location that is the sole source of inside temperature (see claims 3, 5, and 6). Requester notes that the ITC found the combination of Rosen and Hildebrand obvious for this purpose. (Ex. 1010, pp. 489-93)(Ex. 1002, ¶137).

Hildebrand teaches measuring indoor temperature using a sensor. (Ex. 1004, 4:11-15, Fig. 1). Rosen teaches a single thermostat unit that has a single indoor temperature sensor and would provide the indoor temperature measurements. (Ex. 1006 at 2:2-6, 1:17-28, 3:3-9). The ’322 patent also recognized that programmable thermostats were “prevalent” at the time of the alleged invention. (Ex. 1001 at 1:37-53) (Ex. 1002, ¶138). A POSITA would have been motivated to combine Hildebrand with Rosen and would have reasonably expected to achieve the desired result, *i.e.*, delivering temperature data in a cost effective manner so that inside temperature data comes from a single source, the thermostat. (Ex. 1002, ¶138). A POSITA would have seen an advantage in reducing cost and redundancy by using a programmable thermostat at one location that is the sole source of inside temperature. (*Id.*). A POSITA would have had a reasonable expectation of success implementing the combination of Hildebrand and Rosen because the combination is merely combining prior art elements according to known methods to yield predictable results (*i.e.*, using the thermostat as the only source that provides the inside temperature data, to save on cost and reduce redundancy). (*Id.*). Accordingly, a POSITA would have found it obvious to implement Hildebrand’s system as the sole source for current data regarding temperature inside a location, as disclosed by Rosen. (*Id.*). Additionally, using a programmable thermostat as the sole source of inside temperature for a structure, per Rosen, was a known technique (as the ’322 patent admits at 1:37-53) that could have been substituted for the

technique of measuring temperature with a multitude of sensors, with no unexpected results. *See KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 416-421 (2007).

E. Graham Factors

The **level of ordinary skill** is described under Proposed Rejection 2. (Ex. 1002, ¶¶28-29).

The **scope and content of the prior art** are discussed throughout the Proposed Rejection.

The **differences between the prior art and the claims** are discussed in the “Overview of the Combination” and in the claim mapping, below.

Requester is not aware of any **secondary considerations** that would make an inference of non-obviousness more likely.

F. Reasonable Expectation of Success

A POSITA in the art in the relevant timeframe would have had a reasonable expectation of success in combining Rosen with Hildebrand in this manner, because the combination involved computer programming and network communications that were well-established by the relevant timeframe. (Ex. 1002, ¶¶139).

G. Analogous Art

Rosen is analogous art because it is in the same field as the '322 patent (building energy management and controls), and its methods would have been reasonably pertinent to the problems facing the named inventors. (Ex. 1004, Abstract)(Ex. 1006, 2:1-38)(Ex. 1002, ¶140). *See Wyers*, 616 F.3d at 1238.

H. Claim Mapping

This section maps the challenged claims to the relevant disclosures of Hildebrand and Rosen, where the claim text appears in bold-italics, and the relevant mapping follows the claim text.

CLAIM 1

With respect to independent claim 1, Hildebrand is as applied in the same manner discussed in Proposed Rejection 1, with the exception that under the combination, the outside temperature measurements, first recited in claim element [1b], come from an Internet weather

data source as taught by Rosen. (Ex. 1006, 4:40-59, Fig. 6)(Ex. 1002, ¶142). Such outdoor temperature data would obviously have been a measurement, and would have been from a source other than the HVAC system. (Ex. 1002, ¶142).

CLAIM 2

“2. A system as in claim 1 in which said processors receive measurements of outside temperatures for geographic regions such as ZIP codes from sources other than said HVAC control systems.”

In the combination, the outside temperature measurements come from an online weather information system per Rosen, and are localized (i.e. they are for geographic regions) using, for example, a ZIP code. (Ex. 1006, 7:19-61, 6:50-61, 8:21-42, 4:4-65)(Ex. 1002, ¶143).

Specifically, Rosen discloses a thermostat system that transmits its zip code as location data over the Internet to a weather website, which responds by transmitting the local weather data (e.g., outside temperature) for the thermostat location (e.g., zip code) to the thermostat. (Ex. 1006 at 7:42-43, 7:10-32, 9:6-10).

The ITC in the 1185 Investigation previously found that the combination of Rosen and Hildebrand rendered claim 2 of the '322 patent obvious. (Ex. 1010, pp. 489-93).

CLAIM 3

“3. A system as in claim 1 wherein said temperature measurements are obtained from a programmable thermostat that communicates using a network.”

The combination renders claim 3 obvious. Specifically, Rosen teaches a single thermostat unit that has a single indoor temperature sensor (like Hildebrand), and which provides the indoor **temperature measurements**. (Ex. 1006, 2:2-6, 1:17-28, 3:3-9)(Ex. 1004, 4:11-15, Fig. 1)(Ex. 1002, ¶144). Furthermore, Rosen's **programmable thermostat that communicates via the Internet**, which is a network. (Ex. 1006, 1:65-67, 2:11-15, 6:62-7:9)(Ex. 1002, ¶144).

CLAIMS 5 AND 6

“5. A system as in claim 1 in which said HVAC system includes a programmable thermostat and said programmable thermostat is the sole source for current data regarding temperature inside said first structure conditioned by said HVAC system.”

“6. A system as in claim 1 in which said HVAC system measures inside said first structure at only one physical location.”

As set forth under claim 3, Rosen teaches a programmable thermostat. (Ex. 1006, 2:2-6, 1:17-28, 3:3-9). Rosen teaches a single thermostat unit that has a single indoor temperature sensor (i.e., the **programmable thermostat is the sole source for current data regarding [inside] temperature and measures [inside temperature] at only one physical location**). (Ex. 1006, 2:2-6, 1:17-28, 3:3-9)(Ex. 1002, ¶145). In Rosen, a single thermostat includes a processor 1 (which further includes a central processing unit (CPU) 9) and controls space conditioning equipment 3 to provide heating and cooling to a conditioned space 4. (Ex. 1006, 3:31-53, 3:4-30). That control includes a switch that controls the on and off state of the HVAC system. (Ex. 1006, 1:17-27, 3:31-53). Rosen’s thermostat includes a single “temperature sensor 5” which, as shown in Figure 1 of Rosen, is **at only one physical location and is the sole source for current data regarding temperature inside said first structure conditioned by said HVAC system.**” (Ex. 1006, 3:3-9, FIG. 1) (Ex. 1002, ¶145). Rosen also allows the user to define desired temperatures that Rosen’s thermostat maintains over time, explaining that “[a] settable real time clock 13 is used to keep time in the thermostat system to facilitate diverse operations, such as different temperature set points (desired temperatures), during different periods of the day cycle.” (Ex. 1006, 3:20-24, 1:43-55, 5:27-37)(Ex. 1002, ¶145).

The ITC in the 1185 Investigation previously found that the combination of Rosen and Hildebrand rendered claim 5 of the ’322 patent obvious (claim 6 was not asserted). (Ex. 1010, pp. 489-93).

XIV. PROPOSED REJECTION #4: CLAIM 4 IS OBVIOUS OVER HILDEBRAND IN VIEW OF OSWALD

Claim 4 is obvious under pre-AIA 35 U.S.C. § 103(a) over Hildebrand (presented in Proposed Rejections 1 and 2), in further view of Oswald. Oswald is described in further detail below under Proposed Rejection 5 and above in Section X.B. This Proposed Rejection posits that it would have been obvious to use Oswald’s network that includes an electricity meter in Hildebrand’s system.

A. Effective Prior Art Date of Oswald

Oswald was published on August 4, 2005, and is therefore prior art under pre-AIA 35 U.S.C. § 102(b).

B. The Combination and Motivation

It would have been obvious to a POSITA to include a network that includes an electricity meter, as taught by Oswald, in Hildebrand's system. (Ex. 1002, ¶149).

Dependent claim 4 recites the system of claim 1 "in which said processors communicate with said HVAC system using a network that includes an electricity meter." As discussed *infra* in Proposed Rejection 5, Oswald teaches a processor that communicates with said HVAC system using a network that includes an electricity meter. (Ex. 1003, ¶¶0052)(Ex. 1002, ¶221).

It would have been obvious to provide communications between the HVAC control system of Hildebrand and an electric meter associated either with the building or the HVAC system via a network connection, as taught by Oswald. (Ex. 1002, ¶149). Such a network connection would have provided three advantages taught by Oswald. (Ex. 1002, ¶149). First, the control system of Hildebrand would have been able to access electric meter data to measure energy usage data, and provide this information to the user, along with the historical and HVAC efficiency data already provided by Hildebrand. (Ex. 1004, 2:3-10)(Ex. 1003, ¶¶0026, 0106-0110)(Ex. 1002, ¶149). Second, access to electrical power consumption data via the electric meter would have allowed Hildebrand to correlate Hildebrand's efficiency to power consumption. (Ex. 1002, ¶149). Third, by allowing the electrical meter to communicate over the Internet (including a home wireless network), a utility would be able to read and access electricity usage data without performing manual meter reading. (Ex. 1002, ¶149).

C. Reasonable Expectation of Success

A POSITA in the art in the relevant timeframe would have had a reasonable expectation of success in combining Oswald with Hildebrand in this manner, because the combination involved computer programming and network communications that were well-established by the relevant timeframe. (Ex. 1002, ¶151).

D. Graham Factors

The **level of ordinary skill** is described under Proposed Rejection 2. (Ex. 1002, ¶28).

The **scope and content of the prior art** are discussed throughout the Proposed Rejection.

The **differences between the prior art and the claims** are discussed in the “Overview of the Proposed Rejection” and in the claim mapping, below.

Requester is not aware of any **secondary considerations** that would make an inference of non-obviousness more likely.

E. Analogous Art

Oswald is analogous art because it is in the same field as the '322 patent (building energy management and controls), and its methods would have been reasonably pertinent to the problems facing the named inventors. (Ex. 1004, Abstract)(Ex. 1003, Abstract)(Ex. 1002, ¶152). *See Wyers*, 616 F.3d at 1238.

F. Claim Mapping

This section maps the challenged claims to the relevant disclosures of Hildebrand and Oswald where the claim text appears in bold-italics, and the relevant mapping follows the claim text.

CLAIM 4

“4. A system as in claim 1 in which said processors communicate with said HVAC system using a network that includes an electricity meter.”

See infra claim 4 mapping of Proposed Rejection 5, which is incorporated by reference.

XV. PROPOSED REJECTION #5: CLAIMS 1-7 ARE OBVIOUS OVER OSWALD

Claims 1-7 are obvious under pre-AIA 35 U.S.C. § 103(a) over Oswald (Ex. 1003). **Oswald** is described above under Proposed Rejection 4 and above in Section X.B.

A. Overview of the Proposed Rejection

Oswald discloses all the elements of claim 1, with the exception that to the extent that Oswald only receives times that temperatures measurements were taken and not the temperature measurements, this Proposed Rejection posits that it would have been obvious for Oswald's HVAC control system to receive the temperature measurements. Furthermore, to the extent that Oswald only compares times that temperatures measurements were taken and not the temperature measurements at those times, this Proposed Rejection posits that it would have been

obvious for Oswald to compare temperatures recorded at different times. Oswald further renders obvious dependent claims 2-7 as discussed in detail below. (Ex. 1002, ¶159).

B. Rationale (Motivation) Supporting Obviousness and Reasonable Expectation of Success

It would have been obvious to a POSITA to **receive[] temperature measurements** (*see* limitation [1a]) and to **compare[] an inside temperature recorded inside the first structure with an inside temperature of said first structure recorded at a different time** (*see* limitation [1d]). Oswald already teaches thermostat “switching open and closed as the temperature rises and falls through set limits” and “communicates this to the single central sensor 2 so that the system can still determine when temperature limits are reached and the transient thermal model can still be aligned with the real thermal response.” (Ex. 1003, ¶ 0148). While Oswald is not explicit about what values are “communicate[d] [] to the single central sensor 2,” it would have been obvious to receive the temperatures measurements, and to compare those temperatures. (Ex. 1003, ¶ 0148)(Ex. 1002, ¶160).

It would have been a simple design choice to implement Oswald to receive temperature measurements. (Ex. 1002, ¶161). Having received the temperature measurements taken at given times instead of the times that those temperature measurements were taken, Oswald would have obviously compared those temperatures at those times instead of comparing the times. (Ex. 1002, ¶161). It would have been a simple design choice to implement Oswald to receive temperature measurements taken at given times instead of the times that those temperature measurements were taken or a signal indicating temperature limits have been reached. (Ex. 1002, ¶161).

Oswald already provides “a normal house thermostat” that measures temperatures and communicates with the single central sensor as it switches open and closed as the temperature rises and falls through set limits. (Ex. 1003, ¶ 0148)(Ex. 1002, ¶162). A POSITA looking to implement the system of Oswald would have realized that that it would have been possible to receive the times over a fixed temperature change (the single central sensor could also receive a signal indicating that the temperature limits have been reached if the single central sensor had its own internal clock), or to receive temperatures over a fixed time period. (Ex. 1002, ¶162). This simple design choice between use of these two variables represents a simple substitution of one known element (receiving times that temperature measurements were taken) for another

(receiving temperatures taken at given times) to obtain predictable results (obtaining temperature measurements at different times in order to compare them). (Ex. 1002, ¶162)

A POSITA in the art in the relevant timeframe would have had a reasonable expectation of success in modifying Oswald in the manner. (Ex. 1002, ¶163). As Mr. Shah explains, the art was relatively predictable in the relevant timeframe (2007). (Ex. 1002, ¶163). A POSITA would have been able to implement Oswald to receive temperature measurements taken at given times instead of receiving the times that given temperature measurements were taken. (Ex. 1002, ¶163).

C. Graham Factors

The **level of ordinary skill** is described under Proposed Rejection 2. (Ex. 1002, ¶¶28-29).

The **scope and content of the prior art** are discussed throughout the Proposed Rejection.

The **differences between the prior art and the claims** are discussed in the “Overview of the Proposed Rejection” and in the claim mapping, below.

Requester is not aware of any **secondary considerations** that would make an inference of non-obviousness more likely.

D. Claim Mapping

This section maps the challenged claims to the relevant disclosures of Oswald, where the claim text appears in bold-italics, and the relevant mapping follows the claim text.

INDEPENDENT CLAIM 1

“[1Pre] A system for evaluating changes in the operational efficiency of an HVAC system over time comprising:”

Oswald teaches a **system for evaluating changes in the operational efficiency of an HVAC system over time**. (Ex. 1002, ¶¶165-171). Oswald relates to an Energy Management System (“EMS”). (Ex. 1003, Title, Abstract, ¶¶0002, 0012)(Ex. 1002, ¶165).

Oswald summarizes its disclosure as directed to:

“[a] household energy management **system** uses measurements of the household electricity supply 4 to identify and to determine the energy consumption of individual household appliances. From these measurements, **models can be built**

of the behaviour of the occupants of the house, the thermal properties of the house and the efficiency of the appliances.”

(Ex. 1003, Abstract)(Emphasis added)(Ex. 1002, ¶165). Oswald makes clear that “efficiency” is the same as “operational efficiency”. (Ex. 1003, ¶0036)(Ex. 1002, ¶167).

Among its “appliances”, Oswald’s EMS includes HVAC systems. Oswald’s Abstract continues:

“Using the models, the **household appliances**—in particular **heating and cooling appliances**—**can be controlled** to optimize energy efficiency....”

(Ex. 1003, Abstract (Emphasis added), ¶¶0122-0148, claims 8, 27-28)(Ex. 1002, ¶166).

Oswald’s “heating and cooling appliances” are HVAC systems because they are “devices for transferring heat into or out of a building.” (Ex. 1002, ¶166).

Oswald further teaches that its EMS **evaluates changes in the operational efficiency of an HVAC system over time**. (Ex. 1003, ¶¶0033-0036, 0024-0025, 0122-0148, claims 27-28)(Ex. 1002, ¶167). Specifically, Oswald teaches that its EMS can construct and continuously update a “transient thermal model” of a house. (Ex. 1003, ¶¶0122-0126)(Ex. 1002, ¶167-68). The transient thermal model can be used to evaluate the operational efficiency of the heating and cooling appliances (HVAC system) over time. (Ex. 1003, ¶¶0024-0025, claims 27-29, ¶¶0036, 0146-0148, claims 27-28)(Ex. 1002, ¶167-68). Oswald explains:

“In such a system, the **derived transient thermal model may be periodically updated** and the reference transient thermal model may be a derived transient thermal model from an earlier period, **whereby the warning means are for warning the user of the system of deteriorating thermal properties of the house or of deteriorating efficiency of the connected heating and/or cooling electrical appliances.**”

(Ex. 1003, ¶0024-0025)(Emphasis added)(*see also* Ex. 1003, claims 27- 28)(Ex. 1002, ¶169).

“[1a] at least one HVAC control system associated with a first structure that receives temperature measurements from at least a first structure conditioned by at least one HVAC system, and receives status of said HVAC system;”

Oswald teaches **at least one HVAC control system associated with a first structure that receives temperature measurements from at least a first structure conditioned by at least one HVAC system**. (Ex. 1002, ¶172). First, Oswald teaches that its Energy Management

System (“EMS”) has components in a **first structure**, such as a house, that are used to manage appliances at that location. (Ex. 1003, Abstract, claim 1, ¶¶0012-0018, 0123-0127, 0135-0148)(Ex. 1002, ¶173).

An **HVAC control system** in Oswald is the “single central sensor 2”. (Ex. 1003, ¶¶0054-0057, 0148, and 0119, 0086-0089)(Ex. 1002, ¶174). The sensor 2 helps control the HVAC system. (Ex. 1003, ¶¶0101, 0139, 0148)(Ex. 1002, ¶174). For example, Oswald states:

“The single central sensor system can alter the control temperature of the house if the householder is obviously active or has gone out.”

(Ex. 1003, ¶0101)(Ex. 1002, ¶174). Oswald further teaches that the single central sensor performs calculations to assist a setback and recovery schedule. (Ex. 1003, ¶0139)(“This allows the single central sensor system to calculate the optimum time to turn on.”)(Ex. 1002, ¶174).

The sensor 2 is **associated with a first structure**, the house, which is **conditioned by the HVAC system**. (Ex. 1002, ¶¶175-76).

The sensor 2 is shown in part in Oswald’s Fig. 3, which is reproduced below with added red-dashed outline around the HVAC control system:

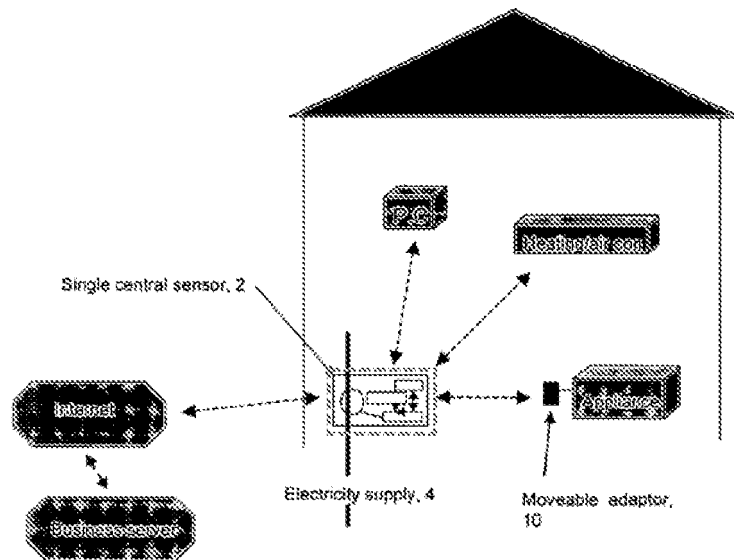


Figure 3

(Ex. 1002, ¶175).

The box labeled “single central sensor, 2” in Fig. 3, above, is shown in more detail in Oswald’s Fig. 1, which is reproduced below, again with the HVAC control system outlined with an added, red-dashed outline:

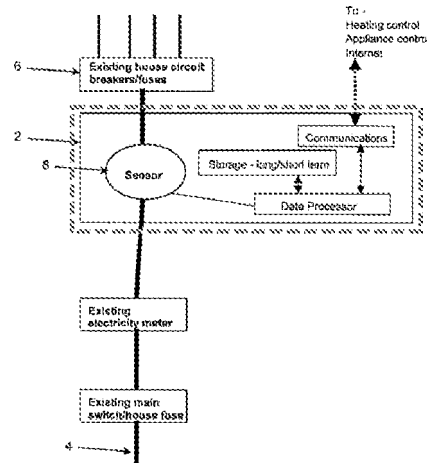


Figure 1

(Ex. 1002, ¶177).

Oswald’s HVAC control system **receives temperature measurements from a structure** (the house). Specifically, Oswald teaches that its EMS includes “one or more temperature sensors for measuring the temperature inside the house.” (Ex. 1003, ¶0024, claim 27)(Ex. 1002, ¶178).

Furthermore, Oswald teaches a thermostat that has a temperature sensor and passes the temperature to the HVAC control system. (Ex. 1002, ¶179). As shown in the Fig. 1 above, there is a “heating control appliance control” (upper right) in Oswald’s EMS. (Ex. 1002, ¶179). Oswald makes clear that the heating control comprises a thermostat. (Ex. 1003, ¶¶0136, 0140-0141, 0148)(Ex. 1002, ¶179). The thermostat has a temperature sensor, and this sensor passes temperature measurements to the sensor 2 (HVAC control system) (Ex. 1003, ¶0148)(Ex. 1002, ¶179). For example, Oswald states:

“[A] special house thermostat that communicates with the single central sensor 2 can be used. This thermostat acts as a normal house thermostat—switching open and closed as the temperature rises and falls through set limits. However, **it communicates this to the single central sensor 2 so that the system can still determine when temperature limits are reached and the transient thermal model can still be aligned with the real thermal response.**”

(Ex. 1003, ¶0148)(Emphasis added)(Ex. 1002, ¶179). From the paragraph above, a POSITA would have understood that the sensor 2 receives information that the thermostat has “switch[ed] open [or] closed as the temperature [rose] and [fell] through set limits”, (Ex. 1002, ¶179), and that Oswald uses such information to “determine when temperature limits are reached”, and to align the transient thermal model “with the real thermal response” (Ex. 1003, ¶0148), whereby “the software changes the coefficient terms in the model until the best fit with all known data is achieved...” (Ex. 1003, ¶0136)(Ex. 1002, ¶179). To the extent it is argued that Oswald only receives times that temperature measurements were taken and not the temperature measurements, it would have been a simple design choice to directly receive the temperatures. A POSITA looking to implement the system of Oswald would have realized that either option was possible – to receive the times that temperatures measurements were taken (or, the single central sensor could also receive a signal indicating that the temperature limits have been reached if the single central sensor had its own internal clock), or to receive the temperatures reached at those times. (Ex. 1002, ¶179).

A POSITA would have understood that Oswald’s “normal house thermostat” would have directly measured temperature, and it would have been obvious to communicate those temperatures to the sensor 2. This is confirmed by Oswald’s disclosures in claim 27 and ¶¶24-25, which describe:

**“at least one temperature sensor for measuring the temperature inside the house;
a source of information about the temperature outside the house;
a modelling means, which uses the inside temperature measurements received from the at least one temperature sensor...”**

(Ex. 1002, ¶179). Thus, Oswald teaches **at least one HVAC control system that receives temperature measurements from at least a first location conditioned by at least one HVAC system.** (Ex. 1002, ¶180).

Oswald teaches having its **HVAC control system receive the status of said HVAC system** in two ways.

First, Oswald teaches that a thermostat can switch the HVAC system ‘on’ and ‘off’, and communicate this to the sensor 2. (Ex. 1003, ¶0148)(Ex. 1002, ¶182). Oswald states:

“On a system where the single central sensor 2 has difficulty detecting changes such as the electrically powered gas valve opening on the gas boiler, [a] special

house thermostat that communicates with the single central sensor 2 can be used. **This thermostat acts as a normal house thermostat—switching open and closed as the temperature rises and falls through set limits.** However, **it communicates this to the single central sensor 2** so that the system can still determine when temperature limits are reached and the transient thermal model can still be aligned with the real thermal response.”

(Ex. 1003, ¶0148)(Emphasis added)(Ex. 1002, ¶182). Here, the sensor 2 is the HVAC control system, as explained above under this claim element. The thermostat “switch[es] open and closed as the temperature rises and falls through set limits”, which means the thermostat turns the HVAC system ‘on’ and ‘off’. (Ex. 1003, ¶0148)(Ex. 1002, ¶183). When the thermostat switches the HVAC system ‘on’ and ‘off’ it also communicates that to the sensor 2. (Ex. 1003, ¶0148)(Ex. 1002, ¶183). Thus, the HVAC control system receives the HVAC system status (whether the HVAC system is ‘on’ or ‘off’). (Ex. 1003, ¶0148)(Ex. 1002, ¶184).

Second, Oswald teaches that the sensor 2 monitors the electrical usage of the appliances to determine when they are ‘on’ or ‘off’. (Ex. 1003, ¶¶0061-0065, 0059, 0112, 0115, 0136, 0148)(Ex. 1002, ¶185). Specifically, Oswald states that “[t]he system can determine the starting and stopping of appliances used in the house by monitoring the magnitude of current step changes.” (Ex. 1003, ¶0061)(Ex. 1002, ¶185). This monitoring is carried out by the sensor 2, which is monitoring the flow of electricity into the house, and can differentiate between appliances based on their startup characteristics. (Ex. 1003, ¶¶0115, 0117, 0052)(Ex. 1002, ¶186). Optionally, Oswald also teaches using special adaptors or mobile sensors with individual appliances to increase the resolution of its monitoring. (Ex. 1003, ¶¶0051, 0082- 0090)(Ex. 1002, ¶186). Specifically with respect to the heating and cooling appliances, Oswald additionally states:

“At time 0 the heating is turned on and the actual temperature rises (as shown by Line 1) until it reaches the control temperature at its peak and the **heating is turned off**. From here the temperature falls according to Line 2 until the minimum temperature is recorded and the **heating is started up again**. **By sensing the electrical operation of heating controls such as a thermostat or gas valve, the single central sensor 2 will detect the time points when the maximum and**

minimum temperatures are reached and it can compare the actual times to the mathematically predicted response.”

(Ex. 1003, ¶0136)(Emphasis added)(Ex. 1002, ¶187). In other words, the HVAC control system can detect maxima and minima in the internal temperature of the house by receiving information about when the heating or cooling system is turned ‘on’ and ‘off’ (i.e. status of the HVAC system). (Ex. 1002, ¶188). Oswald also discloses that its transient thermal model uses “the operation of any heating or cooling electrical appliances” to make its predictions. (Ex. 1003, claim 27, ¶0024)(Ex. 1002, ¶188). Thus, the HVAC control system (sensor 2) **receives the status of the HVAC system**. (Ex. 1002, ¶189).

“[1b] one or more processors that receive measurements of outside temperatures from at least one source other than said HVAC system and compare said temperature measurements from said first structure, wherein said one or more processors compares the inside temperature of said first structure and the outside temperature over time; and”

Oswald teaches a **processor**, such as a PC. (Ex. 1003, ¶¶0052, 0057)(Ex. 1002, ¶191). One example of a processor is shown in the annotated version of Fig. 3 of Oswald, reproduced below with an added red-dashed outline around and an arrow indicating the PC (Personal Computer) within a house:

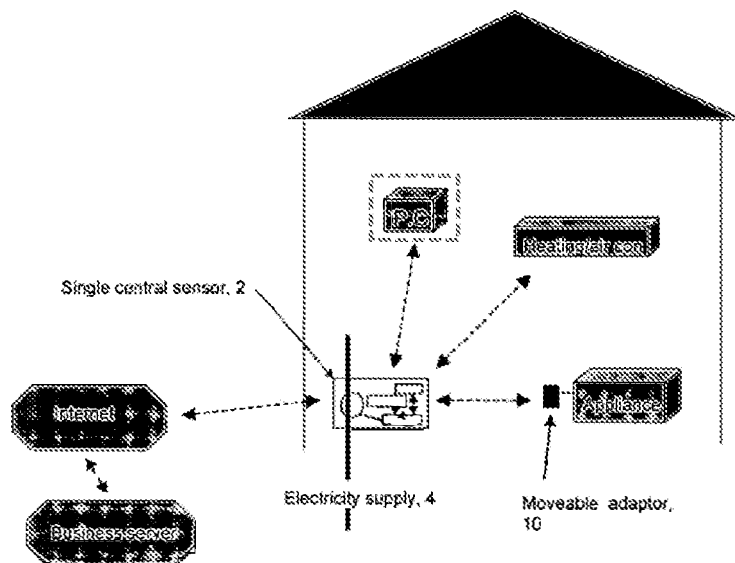


Figure 3

(Ex. 1002, ¶191)(red-dashed outlining added).

Oswald teaches that the processor can perform the analyses done for the EMS:

“The analysis is performed on computers either local to the house or on the Internet. Communications between the various system items use standard known communication systems i.e. phone, radio, Internet or communication by power cable.”

(Ex. 1003, ¶0052)(*see also* ¶¶0046-0057)(Ex. 1002, ¶192).

Oswald further teaches that the processor **receives outside temperature measurements from at least one source other than said HVAC system**. First, Oswald teaches that the system uses **outside temperatures** to construct a transient thermal model of the house. (Ex. 1003, ¶¶0024-0025, 0123-0133)(“Terms in the thermal model would include: ...[0132] Temperature outside.”)(Ex. 1002, ¶194).

The outside temperature measurements are received **from at least one source other than said HVAC system**. Note that this claim term excludes the “HVAC system” (i.e. the furnace and/or air conditioners themselves), not the “HVAC control system” (i.e. sensor 2). Oswald states:

“The household energy management system according to the second aspect of the invention may further comprise one or more temperature sensors for measuring the temperature inside the house; **a source of information about the temperature outside the house**; a modelling means, which uses the inside and outside temperature measurements to derive a transient thermal model of the house....”

(Ex. 1003, ¶0024 and claim 27)(Emphasis added)(Ex. 1002, ¶195). In the passage above, the inside temperature comes from a temperature sensor inside the house, whereas the outside temperature comes from “a source of information about the temperature outside the house.” This teaches that the information about outside temperature does not come from a sensor that is part of the HVAC system, but rather an outside source. (Ex. 1002, ¶196).

Oswald further teaches that:

“The system can use network data to improve validity. For example it can be informed of **local weather** from existing Internet weather databases which have weather information from nearby weather stations.”

(Ex. 1003, ¶0137)(Emphasis added)(Ex. 1002, ¶197). A POSITA would have considered local weather to include outside temperature. (Ex. 1002, ¶197).

Oswald's teachings (1) to use outside temperature, (2) that outside temperature (in contrast to inside temperature) can be taken from "a source of information about the temperature outside the house", and (3) that the system can access local weather information, disclosed receiving a measurement of outside temperature from a source other than the HVAC system, either from a temperature sensor outside the house, or from local weather reports over the Internet. (Ex. 1002, ¶198).

Finally, the processor **receive[s] the measurement of outside temperature** from either a sensor or Internet-based weather data, from other than the HVAC system. This is because the processor performs the analysis for the EMS, including of the transient thermal model, and thus requires receiving and using the measurement of outside temperature in order to perform that analysis. (Ex. 1003, ¶0052)(*see also* Ex. 1003, ¶¶0046-0057)(Ex. 1002, ¶199).

Oswald teaches **compar[ing] said temperature measurements from said first structure, wherein said one or more processors compares the inside temperature of said first structure and the outside temperature over time**. (Ex. 1002, ¶200). Specifically, Oswald teaches that both the inside temperature measurements and outside temperature measurements are used in the transient thermal model, which is then used to calculate expected inside temperature. (Ex. 1003, ¶¶0024, claim 27, 0122-0137, 0141, Fig. 8)(Ex. 1002, ¶200). The expected inside temperatures are compared to the actual inside temperature, and the model adjusted over time to achieve a better fit between the expected and the actual temperature. (Ex. 1003, ¶¶0024, 0135-0136, claim 27, Fig. 8)(Ex. 1002, ¶200).

Oswald explains generally that:

"[t]he household energy management system according to the second aspect of the invention may further comprise . . . **a modelling means, which uses the inside and outside temperature measurements to derive a transient thermal model of the house, which can predict changes in the inside temperature on the basis of the information about the outside temperature** and on the basis of the operation of heating and/or cooling electrical appliances identified as connected to the supply...."

(Ex. 1003, ¶0024)(Emphasis added)(*see also* claim 27)(Ex. 1002, ¶201).

Oswald provides an example of the model's predictions in Fig. 8, reproduced here:

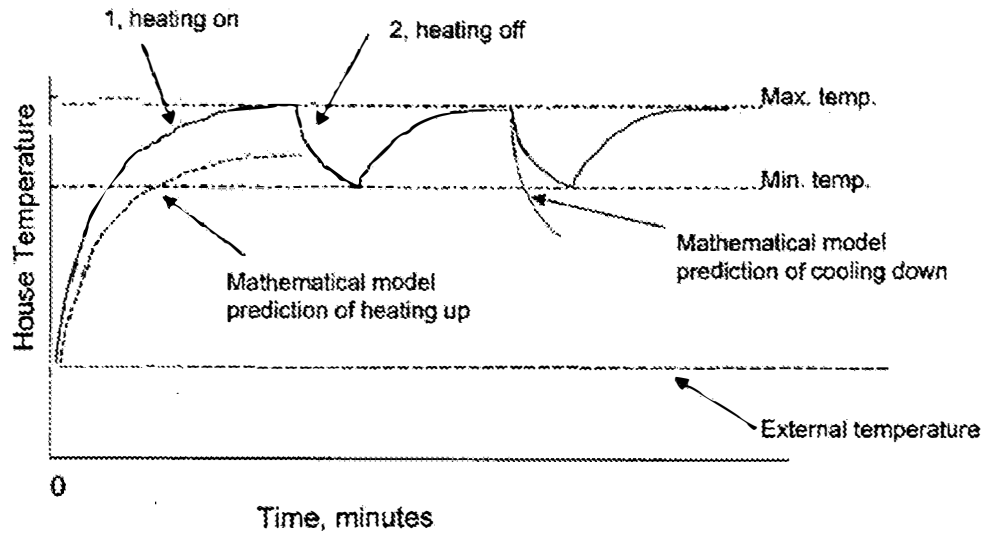


Figure 8

(Ex. 1002, ¶202). As can be seen, Fig. 8 of Oswald is a chart of House Temperature (inside temperature) versus Time. (Ex. 1002, ¶201). Oswald explains Fig. 8 as follows:

“At time 0 the heating is turned on and the actual temperature rises (as shown by Line 1) until it reaches the control temperature at its peak and the heating is turned off. From here the temperature falls according to Line 2 until the minimum temperature is recorded and the heating is started up again. By sensing the electrical operation of heating controls such as a thermostat or gas valve, the single central sensor 2 will detect the time points when the maximum and minimum temperatures are reached and it can compare the actual times to the mathematically predicted response. Differences in these two will demand the software changes the **coefficient terms in the model until the best fit with all known data is achieved.**”

(Ex. 1003, ¶0136)(Emphasis added)(see also Ex. 1003, ¶0135)(Ex. 1002, ¶201). Thus, the model is thus being used to calculate the function of inside temperature at all past times, and the model is being adjusted for the best fit with “all known data.” (Ex. 1003, ¶0136)(Ex. 1002, ¶201). “All known data” includes all temperature data (inside and out) recorded at different times. (Ex. 1002, ¶201).

The claimed **compar[ing] of the inside temperature of said first structure and the outside temperature over time** takes place because Oswald's model "predict[s] changes in the inside temperature on the basis of the information about the outside temperature". (Ex. 1003, ¶0024)(*see also* Ex. 1003, claim 27, Fig. 8, ¶¶0135-0136)(Ex. 1002, ¶202). This happens "over time", because the model is being continuously updated to provide a better fit, and the fit is with all known data, including inside and outside temperatures at different times. (Ex. 1003, ¶¶0025, 0135-0136, claim 28, Fig. 8)(Ex. 1002, ¶202).

Requester notes that this method of "comparing" is nearly identical to that of the '322 patent. (Ex. 1001, 4:38-53)(Ex. 1002, ¶203). The '322 patent does not describe any specific mathematical operation that falls within the category of "comparison", but does state that it compares actual inside temperature measurements based on "**expected** temperature measurements." (Ex. 1001, 4:38- 53)(Emphasis added)(Ex. 1002, ¶203). The expected measurements, in turn, are based "at least in part" (although in unspecified fashion) on past inside and outside temperature measurements. (Ex. 1001, 4:38-53)(Ex. 1002, ¶203). The '322 patent states:

"A further embodiment includes **a system for evaluating changes in the operational efficiency of an HVAC system over time** comprising ...one or more processors that receive measurements of outside temperatures from at least one source other than said HVAC control systems and **compare** said temperature measurements from said first location **with expected temperature measurements wherein the expected temperature measurements are based at least in part upon past temperature measurements obtained by said HVAC control system and said outside temperature measurements...**"

(Ex. 1001, 4:38-51)(Emphasis added)(Ex. 1002, ¶204). Here, the '322 patent's "expected temperature measurements" are predictions. (Ex. 1002, ¶204). The '322 patent compares these predictions to the actual inside temperature measurements, and if the actual measurements differ from the predictions, concludes that there is some problem. (Ex. 1002, ¶204). The use of "expected" measurements implies a model that is used to predict temperature based on past data—just as in Oswald. (Ex. 1002, ¶204).

Thus, Oswald uses the same method of "comparing" **the inside temperature of said first structure and the outside temperature over time** as the '322 patent. (Ex. 1002, ¶204).

*“[1c] one or more **databases that store at least said temperature measurements obtained from said first structure over time,**”*

Oswald teaches **one or more databases that store at least said temperature measurements obtained from said first structure over time.** Here, the claim phrase “said temperature measurements obtained from said first structure” refers to Oswald’s inside temperature measurements, as discussed above under claim limitation [1b]. (Ex. 1002, ¶205).

Oswald teaches that all “acquired data” will be stored in a database. (Ex. 1003, ¶0058-0059)(“Stored data [0059] **The data acquired will be stored on a database.**”)(Emphasis added)(Ex. 1002, ¶205). Because inside temperature measurements are acquired from sensors, they are “acquired data”, and a POSITA would have understood them to be stored in Oswald’s database. (Ex. 1002, ¶206).

While this literally applies to all temperature data (i.e. data acquired **over time**), Oswald also teaches that inside temperature data acquired “over time” is stored in the database, because the EMS compares different versions of the transient thermal model from different times to evaluate HVAC efficiency. (Ex. 1003, ¶¶0024-0025, claims 27-28)(Ex. 1002, ¶206). For example, Oswald teaches that the EMS has:

“means for comparing the derived transient thermal model with a reference transient thermal model; [¶][0025] In such a system, the derived transient thermal model may be periodically updated and the reference transient thermal model may be a derived transient thermal model from an earlier period.”

(Ex. 1003, ¶¶0024-0025)(Emphasis added)(Ex. 1002, ¶206). To do this, Oswald needs to store inside temperatures measured at different times. (Ex. 1002, ¶206). This is both because (1) each transient thermal model uses inside temperature as a function of time (as shown in Fig. 8) and (2) transient models from different time periods use temperature values from different times. (Ex. 1002, ¶206).

*“[1d] wherein **said one or more processors compares an inside temperature recorded inside the first structure with an inside temperature of said first structure recorded at a different time to determine whether the operational efficiency of the HVAC system has decreased over time.**”*

Oswald teaches that the **processor compares an inside temperature recorded inside the first structure with an inside temperature of said first structure recorded at a different**

time to determine whether the operational efficiency of the HVAC system has decreased over time. (Ex. 1002, ¶207).

First, Oswald teaches **determin[ing] whether the operational efficiency of the HVAC system has decreased over time**, by using the transient thermal model. (Ex. 1003, ¶¶0024-0025, 0145-0148, claims 27-28)(Ex. 1002, ¶207). Specifically, Oswald states:

“The transient thermal model can be used to determine the operational health of the heating system within the house. As explained previously, the system will continuously adjust coefficients within the transient thermal model to ensure it aligns with the true house thermal response. **Over months of operation, these coefficients will drift** as the thermal characteristics of the house worsen with age. **This will be most noticeable with a heating boiler as it becomes fouled through use—the house will begin to take longer to heat up. This gradual drift in characteristics can be used to monitor the degradation of the heating boiler** and when a predetermined limit is met then maintenance action can be recommended to the householder or service provider....By using the transient thermal model as the basis, changes in weather are automatically accounted for within the model **leaving just deterioration in boiler efficiency as the remaining explanation for deteriorating performance.”**

(Ex. 1003, ¶¶0146-0147)(Emphasis added)(Ex. 1002, ¶208). Thus, Oswald teaches periodically updating the transient thermal model with new data, and when the model parameters begin to worsen, detecting a “deterioration... in efficiency as the remaining explanation for deteriorating performance.” (Ex. 1003, ¶00147)(*see also* Ex. 1003, ¶¶0024-0025, 0145-0148, claims 27-28)(Ex. 1002, ¶208).

The computation of the transient thermal model, as well as the “comparison”, occurs on the **processor**. (Ex. 1003, ¶0052)(Ex. 1002, ¶209).

Oswald’s method further determines whether the HVAC efficiency has decreased over time by having **the processor compare an inside temperature recorded inside the first structure with an inside temperature of said first structure recorded at a different time.** (Ex. 1002, ¶210). Specifically, Oswald teaches continuously updating the transient thermal model, and observing when model parameters show a deterioration in performance. (Ex. 1003,

¶¶0024-0025, 0135-0136, claim 27, Fig. 8)(Ex. 1002, ¶210). Oswald first teaches continual adjustment to the transient thermal model using new data:

“The **transient thermal model can be used to determine the operational health of the heating system** within the house. As explained previously, the system **will continuously adjust coefficients within the transient thermal model** to ensure it aligns with the true house thermal response.”

(Ex. 1003, ¶0146)(Emphasis added)(*see also* Ex. 1003, ¶¶0024, 0135-0136, cl. 27, Fig. 8)(Ex. 1002, ¶211-12).

Oswald makes clear that a current transient thermal model is compared with a past transient thermal model, to determine whether the operational efficiency of the appliances (e.g. HVAC appliances) is worsening:

“The household energy management system according to the second aspect of the invention may... derive a transient thermal model of the house...[the invention has] **means for comparing the derived transient thermal model with a reference transient thermal model; and means for warning a user** of the system of poor thermal properties of the house or **of poor efficiency of the connected heating and/or cooling electrical appliances when the derived model differs from the reference model** by more than a predetermined limit.[¶][0025] In such a system, **the derived transient thermal model may be periodically updated and the reference transient thermal model may be a derived transient thermal model from an earlier period**, whereby the warning means are for warning the user of the system of deteriorating thermal properties of the house or of **deteriorating efficiency of the connected heating and/or cooling electrical appliances.**”

(Ex. 1003, ¶¶0024-0025)(Emphasis added)(Ex. 1002, ¶213).

Observing the gradual drift in transient thermal model characteristics to monitor the degradation of an HVAC system is **compar[ing] an inside temperature recorded inside the first structure with an inside temperature of said first structure recorded at a different time.** (Ex. 1002, ¶214). First, this is because each state of the transient thermal model is calculated using updated inside and outside temperatures from many different points in time, as explained above under limitation [1c]. (Ex. 1003, ¶¶0024-0025, claim 27, 0122-0137, Fig. 8)(Ex. 1002, ¶214). Thus, each of the model coefficients is based on and calculated from

multiple inside temperature measurements from a particular window in time. (Ex. 1002, ¶214). Second, by comparing model coefficients from two different transient thermal models representing different times, the Oswald system is comparing a set of inside temperatures from an earlier timeframe with a set of inside temperatures from a later timeframe, and using this to determine whether the operational efficiency of the HVAC system has decreased over time. (Ex. 1002, ¶215).

Oswald's comparisons include comparisons of temperatures, not just times, as Oswald teaches that:

“[The] thermostat acts as a normal house thermostat—switching open and closed as **the temperature rises and falls through set limits**. However, it communicates [the temperatures] to the single central sensor 2 so that the system can still determine when temperature limits are reached and the transient thermal model can still be aligned with the real thermal response.”

(Ex. 1003, ¶ 0148)(Emphasis added). To the extent it is argued that Oswald only compares times and not temperatures, it would have been a simple design choice to directly compare the temperatures. A POSITA looking to implement the system of Oswald would have realized that either option was possible – to compare the times to obtain a temperature change, or to compare temperatures recorded at different times. (Ex. 1002, ¶162, 179).

Requester again notes that Oswald's comparison method is similar to that of the '322 patent. (Ex. 1002, ¶216). The '322 patent does not describe comparing temperature recorded inside the first structure with an inside temperature of said first structure recorded at a different time directly. (Ex. 1002, ¶216). Rather, the '322 patent only describes using inside temperature to calculate another parameter, and comparing that other parameter over time. (e.g. Ex. 1001, 11:58-64)(comparing efficiency over time)(Ex. 1001, 4:38- 51)(comparing inside temperature with a calculated expected inside temperature for the same time)(Ex. 1002, ¶216). Oswald's method is conceptually identical: comparing transient thermal model coefficients that were calculated using inside temperatures recorded at different times. (Ex. 1002, ¶216).

CLAIM 2

“2. A system as in claim 1 in which said processors receive measurements of outside temperatures for geographic regions such as ZIP codes from sources other than said HVAC control systems.”

As discussed above under claim 1, element [1b], Oswald teaches receiving “local weather from existing Internet weather databases which have weather information from nearby weather stations.” (Ex. 1003, ¶0137)(Emphasis added)(Ex. 1002, ¶217). A measurement of temperature from a weather station is a temperature for geographic regions, because the measured air temperature at a location outside will approximate the “local” air temperature around the weather station within a certain geographic region. (Ex. 1002, ¶104 (Proposed Rejection, claim 1)). The language “such as ZIP codes” does not limit the claim. *See Catalina Mktg. Int’l v. Coolsavings.com, Inc.*, 289 F.3d 801, 812 (Fed. Cir. 2002).

In Oswald, the weather information is local and from Internet weather databases, and is obviously based on ZIP codes because weather systems in 2004 (the year Oswald was filed) commonly provided local weather information based on ZIP codes in the U.S. (Ex. 1002, ¶218). The ZIP code has been used by the U.S. Postal Service to define specific geographic regions, and has been well-recognized long before the date of the alleged invention. (*Id.*). At the time of the alleged invention, it was common for Internet weather databases to provide weather data based on ZIP code, and it would have been a simple matter of design choice for a POSITA to implement the “existing Internet weather databases” in Oswald to provide outside temperatures for geographic regions based on ZIP codes. (*Id.*). A POSITA would have been motivated to implement Oswald’s Internet weather databases in this manner because it would have been convenient to receive weather data in any format already being used, based on ZIP code. (*Id.*). Accordingly, Oswald’s disclosure of receiving weather information would have been for geographic regions based on ZIP codes. (*Id.*).

CLAIM 3

“3. A system as in claim 1 wherein said temperature measurements are obtained from a programmable thermostat that communicates using a network.”

Oswald discloses **said temperature measurements are obtained from a programmable thermostat**. As discussed, Oswald’s temperature sensor may be included in a “thermostat [that] acts as a normal house thermostat - switching open and closed as the temperature rises and falls through set limits... [and] communicates this to the single central sensor 2 so that the system can still determine when temperature limits are reached” (Ex. 1003 at ¶0148)(Ex. 1002, ¶219). Furthermore, the householder can “define when the house is to reach the controlled temperature schedule . . . For example, say the householder returns home at 17:30

in the evening and wants the house at the desired temperature at 17:30” (Ex. 1003 at ¶0139)(Ex. 1002, ¶219). That “controlled temperature schedule” is carried out by the thermostat, which will switch open and closed as the scheduled set limits are reached. The thermostat would store the controlled temperature schedule in order to set the temperature at the correct future time, such as a desired temperature at 17:30. (Ex. 1002, ¶219).

Oswald discloses that **the programmable thermostat communicates using a network**. In Oswald, “[c]ommunications between the various system items use standard known communication systems i.e. phone, radio, Internet or communication by power cable.” (Ex. 1003 at ¶0052)(Ex. 1002, ¶220). Oswald further explains that “[e]xisting communication methods will be used with the system to allow communication between **all** parts of the system.” (Ex. 1003 at ¶0057)(Emphasis added). Oswald further explains that all “data acquired” will be stored on a “server on the Internet-based network of computers.” (Ex. 1003 at ¶0059)(Ex. 1002, ¶220). A POSITA would have understood that this data would include the temperature measurements from the programmable thermostat. (Ex. 1002, ¶220).

CLAIM 4

“4. A system as in claim 1 in which said processors communicate with said HVAC system using a network that includes an electricity meter.”

Oswald teaches a processor that **communicates with said HVAC system using a network that includes an electricity meter**. (Ex. 1003, ¶¶0052)(Ex. 1002, ¶221).

First, Oswald teaches the processor can communicate with the other components of the system (e.g. the HVAC system) over a network. Oswald states:

“The analysis is performed on computers either local to the house or on the Internet. Communications between the various system items use standard known communication systems i.e. phone, radio, Internet or communication by power cable.”

(Ex. 1003, ¶0052)(Emphasis added)(Ex. 1002, ¶222). The communication systems (e.g. the Internet and or communication by power cable) are networks. (Ex. 1002, ¶222). Among the “various system items” described in the quote above is an electricity meter. (Ex. 1002, ¶223). The electricity meter of Oswald is shown in Fig. 2, reproduced here, with an added red-dashed box and red arrow indicating the meter:

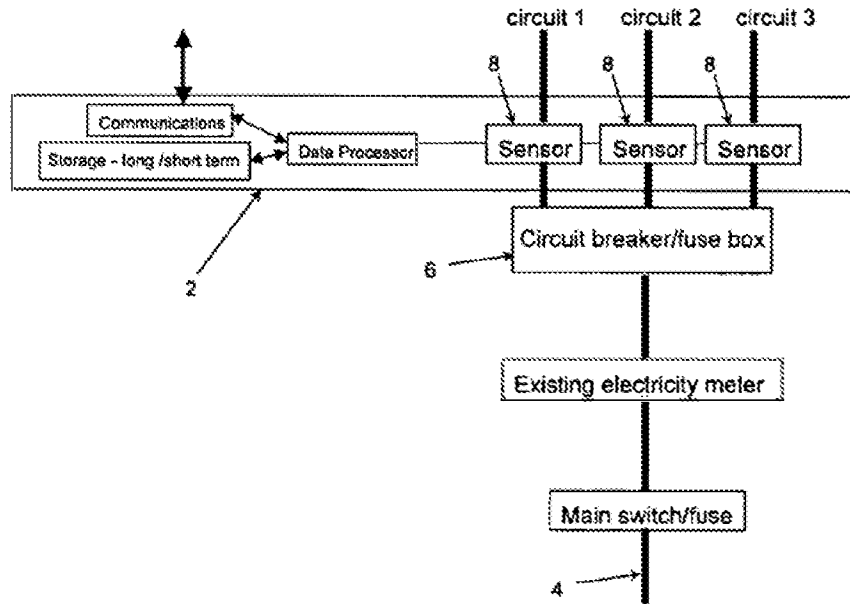


Figure 2

(Ex. 1002, ¶223). As shown in Fig. 2, Oswald's electricity meter is connected to sensors, which are in turn connected to data processing and communication functions in sensor 2 (the HVAC control system). (Ex. 1003, Fig. 2). Furthermore, Oswald states that the processor can communicate with other system components "us[ing] standard known communication systems i.e. phone, radio, Internet or **communication by power cable.**" (Ex. 1003, ¶0052)(Ex. 1002, ¶224). The "power cable" includes the electricity meter because the electricity meter is connected to the power cable network and interacts with the power cable (Ex. 1002, ¶225), and the power cable network includes the electricity meter, as is shown in Figs. 1 and 2, as well-understood in the art. (Ex. 1002, ¶225). Thus, Oswald teaches that the **processor communicate[s] with said HVAC system using a network that includes an electricity meter.** (Ex. 1002, ¶226).

CLAIMS 5 AND 6

"5. A system as in claim 1 in which said HVAC system includes a programmable thermostat and said programmable thermostat is the sole source for current data regarding temperature inside said first structure conditioned by said HVAC system."

"6. A system as in claim 1 in which said HVAC system measures inside said first structure at only one physical location."

As discussed in claim 3, Oswald discloses a **programmable thermostat**. Oswald further discloses **said programmable thermostat is the sole source for current data regarding temperature inside said first structure conditioned by said HVAC system**. Oswald describes “one or more temperature sensors for measuring the temperature inside the house.” (Ex. 1003 at ¶10024). Thus, Oswald contemplates that only a single temperature sensor may measure the inside temperature. In this case, the single temperature sensor would be the “sole source for current data regarding temperature inside said first structure conditioned by said HVAC system.” (Ex. 1002, ¶1227).

CLAIM 7

“7. A system as in claim 1 in which the status of said HVAC system includes whether said system is “on” or “off”.”

As discussed above under claim 1, element [1a], the HVAC control system receives status information that indicates whether the HVAC control system is ‘on’ or ‘off’. (Ex. 1002, ¶1228).

XVI. PROPOSED REJECTION #6: CLAIMS 2, 3, 5, AND 6 ARE OBVIOUS AS IN PROPOSED REJECTION 5, IN FURTHER VIEW OF ROSEN

Claims 2, 3, 5, and 6 are obvious under pre-AIA 35 U.S.C. § 103(a) over Oswald as in Proposed Rejection 5, in further view of U.S. Pat. No. 6,789,739 (“Rosen”)(Ex. 1006).

Rosen is described above in Proposed Rejection 3.

Oswald is described above in Proposed Rejections 4 and 5.

As discussed in Proposed Rejection 3, **Rosen** was cited by an Examiner in combination with Rayburn, in a rejection of certain then-pending dependent claims of the ’322 patent application. (Ex. 1008, pp. 90-91). However, the Applicant did not make any specific arguments with respect to Rosen (which was applied only to dependent claims), but rather relied on arguments made with respect to the Rayburn reference and the independent claims. (Ex. 1008, p. 179-82)(Ex. 1002, ¶129).

A. Overview of the Proposed Rejection

Oswald is applied as in Proposed Rejection 5. Rosen is as applied similarly as in Proposed Rejection 3.

Claim 2 of the '322 patent requires "receiv[ing] measurements of outside temperatures for geographic regions such as ZIP codes from sources other than said HVAC control systems." Oswald does not expressly teach using weather that is localized using a ZIP code, but Rosen does. It would have been obvious to combine Rosen's teaching of weather by ZIP code with Oswald's system for the reasons provided below. (Ex. 1002, ¶230). It also would have been obvious to a POSITA to use a programmable thermostat at one location that is the sole source of inside temperature, as taught by Rosen, in Oswald's system. (see claims 3, 5, and 6). (Ex. 1002, ¶230).

B. Rationale (Motivation) Supporting Obviousness

It would have been obvious to a POSITA to obtain outdoor temperatures for a geographic region (see claim 2), as taught by Rosen, in Oswald. (Ex. 1002, ¶231).

Oswald discloses that "local weather from existing Internet weather databases" should "improve validity" of the transient thermal model. (Ex. 1003 at ¶0137, FIG. 4)(Ex. 1002, ¶232). Based on that teaching in Oswald, a POSITA would have been motivated to implement Oswald's system so that the Internet weather databases provide the local weather data for geographic regions based on ZIP codes, because as stated above, the ZIP code represents a balance between larger geographic regions (that would not provide accurate weather data because the weather varies within the region) and smaller geographic regions (for which it would be inefficient and redundant to provide weather data). (Ex. 1002, ¶232). While Oswald does not explicitly state that the Internet weather databases provide the local weather data based on ZIP codes, such an implementation was known in the field of HVAC control systems, and would have been obvious to a POSITA. (Ex. 1002, ¶232). Specifically, Oswald teaches receiving local outside temperatures from Internet weather databases (*see, e.g.*, 1003 at ¶0137), and a POSITA would have been motivated to look to other references to understand how Internet weather databases store and transmit outside temperature data. (Ex. 1002, ¶232). As explained below, it was known for Internet weather databases to store and transmit outside temperature data for geographic regions based on ZIP codes, as disclosed by Rosen, and it would have been obvious to implement Oswald's system to receive outside temperatures for geographic regions based on ZIP codes from those Internet weather databases. (Ex. 1002, ¶232).

Additionally, using the Internet to obtain outdoor temperatures, per Rosen, was a known technique that could have been substituted for the technique of measuring temperature with

home sensors, with no unexpected results. *See KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 416-421 (2007)(Ex. 1002, ¶233).

It also would have been obvious to a POSITA to provide a programmable thermostat at one location that is the sole source of inside temperature (see claims 3, 5, and 6) as taught by Rosen, in Oswald's system. (Ex. 1002, ¶234).

Oswald teaches measuring indoor temperature using a sensor using a thermostat. (Ex. 1003, ¶¶ 0024, 0148)(Ex. 1002, ¶235). Rosen teaches a single thermostat unit that has a single indoor temperature sensor and would provide the indoor temperature measurements. (Ex. 1006 at 2:2-6, 1:17-28, 3:3-9). The '322 patent also recognized that programmable thermostats were "prevalent" at the time of the alleged invention. (Ex. 1001 at 1:37-53)(Ex. 1002, ¶235). A POSITA would have been motivated to combine Oswald with Rosen and would have reasonably expected to achieve the desired result, *i.e.*, delivering temperature data in a cost effective manner so that inside temperature data comes from a single source, the thermostat. (Ex. 1002, ¶235). A POSITA would have seen an advantage in reducing cost and redundancy by using a programmable thermostat at one location that is the sole source of inside temperature. (*Id.*). A POSITA would have had a reasonable expectation of success implementing the combination of Oswald and Rosen because the combination is merely combining prior art elements according to known methods to yield predictable results (*i.e.*, using the thermostat as the only source that provides the inside temperature data, to save on cost and reduce redundancy). (*Id.*). Accordingly, a POSITA would have found it obvious to implement Oswald's thermostat as the sole source for current data regarding temperature inside a location, as disclosed by Rosen. (*Id.*).

Additionally, using a programmable thermostat as the sole source of inside temperature for a structure, per Rosen, was a known technique (as the '322 patent, Ex. 1001, admits at 1:37-53) that could have been substituted for the technique of measuring temperature with a multitude of sensors, with no unexpected results. (Ex. 1002, ¶236).

C. Graham Factors

The **level of ordinary skill** is described under Proposed Rejection 2.

The **scope and content of the prior art** are discussed throughout the Proposed Rejection.

The **differences between the prior art and the claims** are discussed in the "Overview of the Combination" and in the claim mapping, below.

Requester is not aware of any **secondary considerations** that would make an inference of non-obviousness more likely.

D. Reasonable Expectation of Success

A POSITA in the art in the relevant timeframe would have had a reasonable expectation of success in combining Oswald and Rosen in the manner discussed in the Overview section. (Ex. 1002, ¶237). As Mr. Shah explains, the art was relatively predictable in the relevant timeframe (2007). (Ex. 1002, ¶239). A POSITA would have been able to integrate Rosen's use of ZIP codes into Oswald. (Ex. 1002, ¶240).

E. Claim Mapping

This section maps the challenged claims to the relevant disclosures of Oswald and Rosen, where the claim text appears in bold-italics, and the relevant mapping follows the claim text.

CLAIM 2

"2. A system as in claim 1 in which said processors receive measurements of outside temperatures for geographic regions such as ZIP codes from sources other than said HVAC control systems."

Oswald discloses that its system can receive local weather information over the Internet. Oswald states:

"The system can use network data to improve validity. For example it can be informed of **local weather** from existing Internet weather databases which have weather information from nearby weather stations."

(Ex. 1003, ¶0137)(Emphasis added)(Ex. 1002, ¶242). As discussed above under Proposed Rejection 3, claim element [1c], it was obvious to use weather information to provide outside temperature. (Ex. 1002, ¶242).

Oswald does not expressly state that its weather service provider localizes data using a ZIP code. Rosen, however, teaches a thermostat that receives location-specific weather data (including temperature) from a weather service, over the Internet, by providing a ZIP code. (Ex. 1006, 7:19-45, 6:50-61, 2:31-38, 7:58- 8:41)(Ex. 1002, ¶243).

Because Oswald teaches retrieving "local" weather data from an Internet weather service provider, but does not specify a way to localize the data, the person of ordinary skill would have sought out known means for doing so. (Ex. 1002, ¶244). Rosen provides a simple means to do so: by having a thermostat programmed with the ZIP code of the structure, which is then

provided over the Internet to a weather data provider. (Ex. 1006, 7:19-45, 6:50-61, 2:31-38, 7:58-8:41)(Ex. 1002, ¶244). The ZIP code is a commonly-used form of approximate location in the United States, and would have been familiar to a person of ordinary skill, who could have implemented its use in Oswald's system with no unexpected results. (Ex. 1002, ¶244). The combination was thus obvious. *See KSR*, 550 U.S. at 416-418.

CLAIM 3

“3. A system as in claim 1 wherein said temperature measurements are obtained from a programmable thermostat that communicates using a network.”

The combination renders claim 3 obvious. As discussed with respect to Proposed Rejection 3, Rosen teaches (as recited in claim 3) a single thermostat unit that has a single indoor temperature sensor, and would provide the indoor temperature measurements. (Ex. 1006, 2:2-6, 1:17-28, 3:3-9)(Ex. 1002, ¶245). Furthermore, Rosen teaches (as recited in claim 3) a programmable thermostat that communicates via the Internet (*e.g.* to obtain outside temperature information). (Ex. 1006, 1:65-67, 2:11-15, 6:62-7:9)(Ex. 1002, ¶245).

CLAIM 5 AND 6

“5. A system as in claim 1 in which said HVAC system includes a programmable thermostat and said programmable thermostat is the sole source for current data regarding temperature inside said first structure conditioned by said HVAC system.”

“6. A system as in claim 1 in which said HVAC system measures inside said first structure at only one physical location.”

As discussed in Proposed Rejection 3, Rosen teaches **a single thermostat unit that has a single indoor temperature sensor**. (Ex. 1006, 2:2-6, 1:17-28, 3:3-9)(Ex. 1002, ¶246). In Rosen, a thermostat system includes a processor 1 (which further includes a central processing unit (CPU) 9) and controls space conditioning equipment 3 to provide heating and cooling to a conditioned space 4. (Ex. 1006, 3:31-53, 3:4-30)(Ex. 1002, ¶246). That control includes a switch that controls the on and off state of the HVAC system. (Ex. 1006, 1:17-27, 3:31-53). Rosen's thermostat is also **programmable**. (Ex. 1002, ¶246). It allows the user to define desired temperatures that it maintains over time, explaining that “[a] settable real time clock 13 is used to keep time in the thermostat system to facilitate diverse operations, such as different temperature set points (desired temperatures), during different periods of the day cycle.” (Ex. 1006, 3:20-24, 1:43-55, 5:27-37)(Ex. 1002, ¶246).

XVII. PROPOSED REJECTION #7: CLAIMS 8 AND 9 ARE ANTICIPATED BY SPALINK

Claims 8 and 9 are anticipated under pre-AIA 35 U.S.C. § 102 by Spalink. (Ex. 1005).

A. Effective Prior Art Date of Spalink

Spalink was published on May 25, 2006, and is thus prior art under pre-AIA 35 U.S.C. §102(b).

B. Claim Mapping

This section maps the challenged claims to the relevant disclosures of Spalink, where the claim text appears in bold-italics, and the relevant mapping follows the claim text.

INDEPENDENT CLAIM 8

“[8Pre] A system for detecting and correcting for anomalous behavior in HVAC control systems comprising:”

Spalink teaches a system for detecting and correcting for anomalous behavior in HVAC control systems. An embodiment of Spalink’s system is shown in Fig. 2, reproduced here:

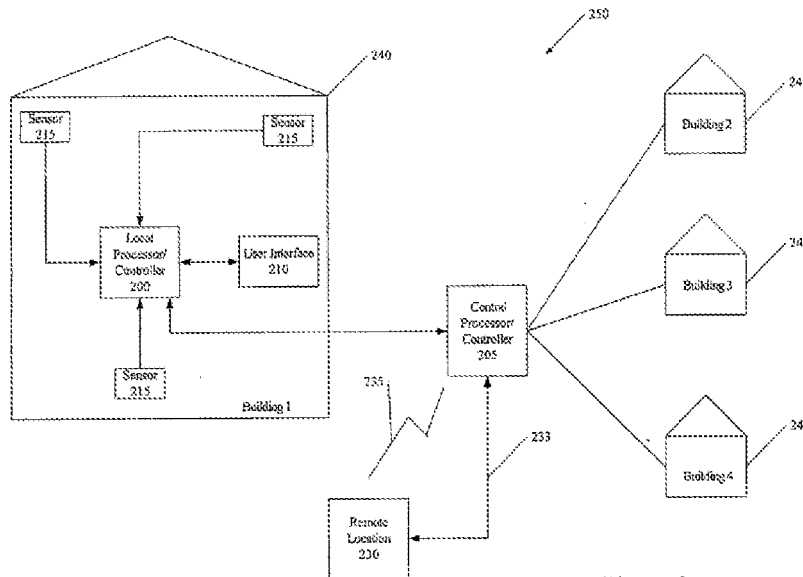


Figure 2

(Ex. 1005, Fig. 2, ¶¶0061-0064)(Ex. 1002, ¶251). Figure 2 shows a central processor / controller 205 (middle), connected to several buildings 240-243. (Ex. 1005, ¶0061)(Ex. 1002, ¶251). Building 240 has an expanded conceptual view, showing a local processor / controller 200, several sensors 215, and a user interface 210 (e.g., a thermostat). (Ex. 1005, ¶0061)(Ex. 1002, ¶251). Spalink teaches that the system, including the central and local processors, collects

weather data as well as temperature measurements from inside the buildings, using the data to construct a mathematical model of each building and its climate control system, including the efficiency. (Ex. 1005, Abstract, ¶¶0073-0076, Fig. 3)(Ex. 1002, ¶252).

Spalink further teaches **detecting and correcting for anomalous behavior in HVAC control systems**. Spalink teaches **detecting** anomalous behavior in HVAC control systems by comparing the efficiency of an HVAC system with the efficiency of HVAC systems in other buildings. (Ex. 1005, ¶0076)(Ex. 1002, ¶254-55). Spalink states, “when the actual sensed data from the building is compared to sensed data from other similar buildings, **a systemic problem may be revealed**. For example, **the building may be consuming 10 percent more energy than the other similar houses.**” (Ex. 1005, ¶0076)(Emphasis added)(Ex. 1002, ¶255). Thus, Spalink teaches **detecting anomalous behavior in HVAC control systems** by identifying poor efficiency compared to other buildings. (Ex. 1005, ¶0076)(Ex. 1002, ¶255).

Spalink then teaches **correcting for anomalous behavior in HVAC control systems** in two ways. **First**, Spalink corrects for anomalous behavior by adjusting parameters in the HVAC control system to compensate for the anomalous behavior. (Ex. 1005, ¶0039)(Ex. 1002, ¶256). To “adjust the parameters”, Spalink teaches adjusting the control system to improve the performance of the HVAC system. (Ex. 1005, ¶¶0075, 0039, 0041, 0045, 0051-0056, 0060)(Ex. 1002, ¶256). **Second**, Spalink also (separately) teaches correcting for anomalous behavior by scheduling timely maintenance. (Ex. 1005, ¶0087)(Ex. 1002, ¶257).

“[8a] a first HVAC control system that receives temperature measurements from at least a first structure conditioned by at least one HVAC system, and receives status of said HVAC system;”

Spalink teaches a first HVAC control system, in the form of a central / processor controller (such as central / processor controller 205) in combination with local processors / controllers 200, both of which are shown in Fig. 2 (reproduced below) with added red-dashed boxes:

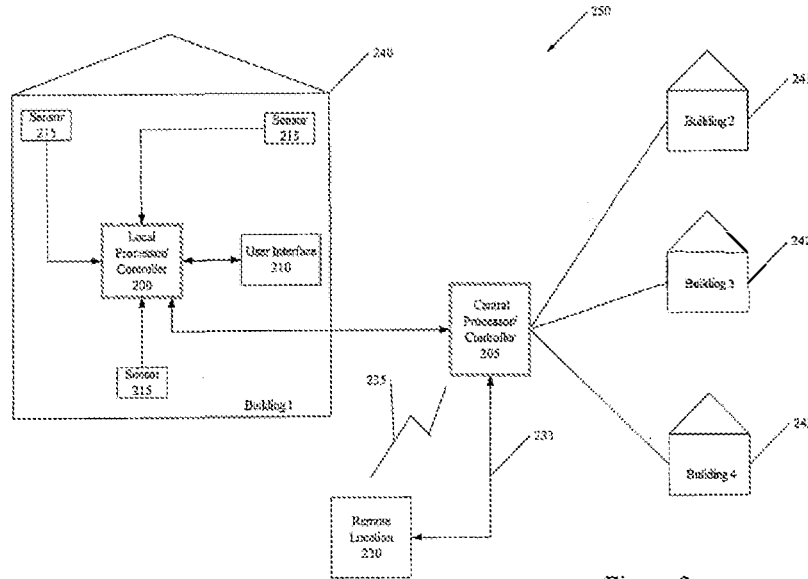


Figure 2

(Ex. 1005, Fig. 2, ¶¶0042, 0061-0063, Figs. 1A and 1B)(red-dashed outlining added)(Ex. 1002, ¶258). The basic concept of the processors / controllers and their principal functions are the same with respect to each figure of Spalink. (Ex. 1005, ¶¶0042, 0046, 0063, 0093)(Ex. 1002, ¶258).

The central and local processors / controllers form an **HVAC control system** because they control the indoor climate (*see* Ex. 1005, ¶¶0063, 0027, 0039, 0093-0097, Abstract)(Ex. 1002, ¶259), and receive the inside temperature measurements and status of the HVAC system (as required by element [8a], as discussed below).

The HVAC control system further **receives temperature measurements from at least a first structure conditioned by at least one HVAC system**. Specifically, the building includes sensors (e.g. sensors 215 in Fig. 2, above) that collect “sensed data”, which includes temperature inside the building. (Ex. 1005, ¶0030, Abstract)(Ex. 1002, ¶260). The sensed data is **received** and stored by the local controller (HVAC control system). (Ex. 1005, ¶¶0057, 0030)(Ex. 1002, ¶260). This is shown, for example, in Fig. 4, reproduced here with an added red-dashed box:

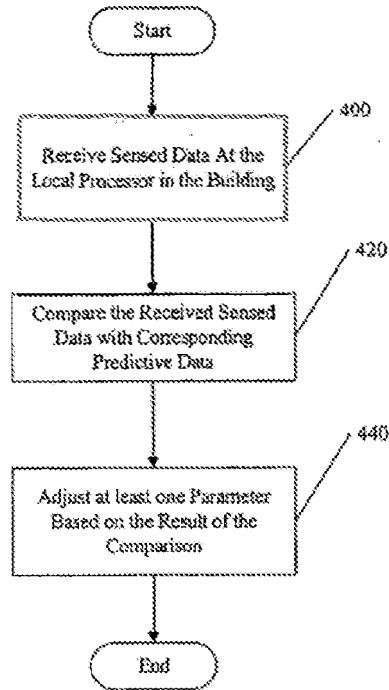


Figure 4

(Ex. 1005, Fig. 4, ¶0093)(red-dashed outlining added)(Ex. 1002, ¶260). This received sensed data, including the temperature inside the building (¶0030), is stored in the memory of the local processor / local controller, and passed along to the central processor controller. (Ex. 1005, ¶¶0036, 0042, 0074)(Ex. 1002, ¶260).

The HVAC control system (central and local processors / controllers) also **receives a status of said HVAC system**. (Ex. 1002, ¶261). Spalink teaches that “control systems of the present invention” (e.g. the local processor / local controller) can receive the “state of the climate control system.” (Ex. 1005, ¶0080)(Ex. 1002, ¶261). Indeed, Spalink explains that “combin[ing] [] collected information with specific records about user transactions [] determine[s] on-off cycles, run times, aggregate machine hours, and the like,” which includes the status of the HVAC system. (Ex. 1005, ¶¶85, 80 (“This information may be translated into specific state transitions of the climate control system.”)).

“[8b] at least a second HVAC control system that obtains temperature measurements from at least a second structure conditioned by a second HVAC system, and status of said second HVAC system”

Spalink teaches an overall system that comprises a plurality of buildings (as shown in Fig. 2, reproduced above), each with its own local processor / local controller. (Ex. 1005, ¶0062)(“As further illustrated in FIG. 2, the first building 240 (**as well as the second through fourth buildings**, although not illustrated in FIG. 2) includes one or more local processor/controllers 200....”)(Emphasis added)(Ex. 1002, ¶262). There is thus a **second HVAC control system** (found in any of the second through fourth buildings). (Ex. 1002, ¶262).

The **second HVAC control system obtains temperature measurements from at least a second structure conditioned by a second HVAC system, and status of said second HVAC system** in the same manner as the first HVAC control system, described above under element [8a]. (Ex. 1002, ¶263).

“[8c] one or more processors that receive measurements of outside temperatures from at least one source other than said first and second HVAC systems”

Spalink teaches **one or more processors**. Specifically, the central and local processors / controllers, together each comprise computer systems with microprocessors. (Ex. 1005, ¶¶0035, 0042)(Ex. 1002, ¶264).

The one or more processors receive both inside temperature measurements and **measurements of outside temperatures from at least one source other than said first and second HVAC systems**. (Ex. 1002, ¶265). First, the local processors / controllers 200 receive temperature measurements as discussed above under claim elements [8a] and [8b]. The temperature measurements include measurements of outside temperature from sensors located outside each building. (Ex. 1005, ¶¶0030- 0031)(Ex. 1002, ¶265). Second, the central processor / controller 205 also receives both inside and outside temperature measurements in the form of “reference data” from the local processors / controllers 200. (Ex. 1005, ¶0057)(Ex. 1002, ¶265). The “reference data” includes both the inside and outside temperature measurements. (Ex. 1005, ¶¶0030, 0031-0032, Abstract)(Ex. 1002, ¶265).

The outside temperature measurements received by both the local processors / controllers and the central processor / controller are **from at least one source other than said first and second HVAC systems**, because they are from sensors that are not part of the HVAC systems. (Ex. 1005, ¶¶0030-0031)(Ex. 1002, ¶266).

“[8d] and compare said temperature measurements from said first HVAC system and said second HVAC system and said outside temperature measurements over time to determine the efficiency of the first HVAC system and the second HVAC system; and”

Spalink further teaches that the central processor / controller **compares** the reference data (inside and outside temperature measurements) **from said first HVAC system and said second HVAC system and said outside temperature measurements over time**. Spalink states that a central processor / controller has a “central analyzing module 132” which “may be configured to **compare and/or aggregate reference data from one building with reference data from one or more other buildings**.” (Ex. 1005, ¶0057)(Emphasis added)(Ex. 1002, ¶267).

The data is compared “over time”. (Ex. 1005, ¶0031)(“As used herein, ‘**reference data**’ refers to recorded and persistently stored metrics and **time series of metrics**, which may include but are not limited to information about building structures, indoor climates, mechanical equipment, control systems, and/or the **local weather**, either in analog or digital format, and at various levels of resolution and accuracy.”)(Emphasis added)(see also Ex. 1005, ¶¶0072, 0049, 0073)(Ex. 1002, ¶267).

The comparison of reference data is “**for comparisons of energy efficiency** of certain types of structures **over time** and **under specific weather conditions**.” (Ex. 1005, ¶0073)(Emphasis added)(Ex. 1002, ¶268). The word “structures” clearly indicates how a structure, including its associated climate control system, performs. (e.g. Ex. 1005, ¶¶0076, 0057)(Ex. 1002, ¶268).

To perform “comparisons of energy efficiency” (Ex. 1005, ¶0073), the central processor compares sensed reference data. (Ex. 1005, ¶0076)(Ex. 1002, ¶268). Again, the “sensed data” being compared includes inside and outside temperatures from sensors inside and outside of the respective buildings connected to the central processor / controller. (Ex. 1005, ¶¶0030-0032, Abstract)(Ex. 1002, ¶269). The comparison results in a calculation of efficiency, i.e. the efficiency is the efficiency of the HVAC system, within the context of a particular building and particular weather conditions, as compared to HVAC systems in other buildings— just like the ’322 patent. (Ex. 1005, ¶¶0027, 0032, 0072). The comparison of the performance of one HVAC system to another allows the system to identify and correct problems. (Ex. 1005, ¶0044)(Ex. 1002, ¶269).

Thus, Spalink teaches that the central processor / controller receives and records “reference data”, including sensed inside temperatures and outside temperatures as a time series. (Ex. 1005, ¶¶0030, 0074)(Ex. 1002, ¶270). Spalink further teaches that the central processor analyzes and compares such reference data from different buildings (Ex. 1005, ¶0057), which can be used “for **comparisons of energy efficiency of certain types of structures over time and under specific weather conditions.**” (Ex. 1005, ¶¶0073)(Emphasis added)(*see also* ¶¶ 0076, 0057, 0044)(Emphasis added)(Ex. 1002, ¶270). This allows Spalink to **determine the efficiency of the first HVAC system and the second HVAC system.** (Ex. 1005, ¶¶0076, 0044)(Ex. 1002, ¶270).

*“[8e] one or more **databases that store said temperature measurements from said first and second HVAC systems.**”*

Spalink teaches that its **temperature measurements from said first and second HVAC systems** (part of the “reference data”, Ex. 1005, ¶¶0030-0031) are **store[d]** in memories at both the local processor / controller and central processor controller. (Ex. 1005, ¶¶0036, 0042)(Ex. 1002, ¶272). For the central processor / controller, the data is stored in a data store 156 separately for each building and as “aggregated reference data”, as shown in Fig. 1B, reproduced below with an added red-dashed box:

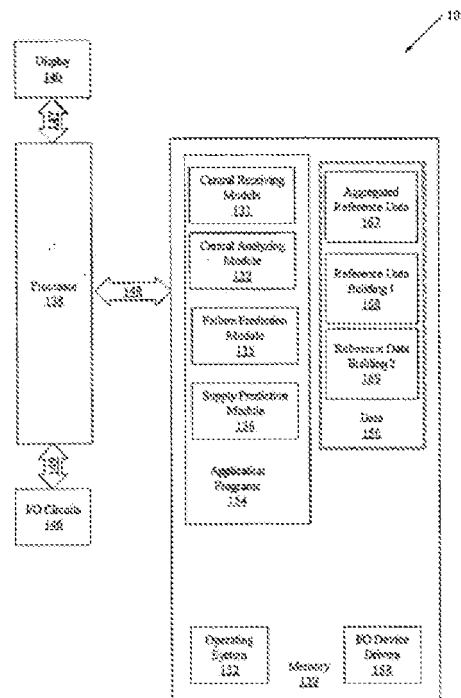


Figure 1B

(Ex. 1005, Fig. 1B, ¶0042)(Ex. 1002, ¶272). The central processor / controller receives all temperature measurements as “reference data”, as described above under claim element [8d], and stores them in the data store 156. (Ex. 1005, ¶0042)(Ex. 1002, ¶272). This stored data is then used for Spalink’s calculations. (Ex. 1005, ¶0057)(Ex. 1002, ¶272).

CLAIM 9

“9. A system as in claim 8 in which said processors receive said outside temperature measurements for geographic regions such as ZIP codes from sources other than said HVAC control systems.”

Spalink teaches using outdoor sensors at a building to measure local temperatures. (Ex. 1005, ¶0030)(Ex. 1002, ¶275). These temperatures are received by the one or more processors as discussed above under claim 8, element [8c]. The temperatures are from sources other than said HVAC control systems because they come from sensors, not from the central or local processors / controllers. (Ex. 1002, ¶275). Furthermore, a measurement of temperature from a sensor located outside is a temperature for geographic regions, because the measured air temperature at a location outside will approximate the air temperature around the sensor within a certain geographic region. (Ex. 1002, ¶275). The language “such as ZIP codes” does not limit the claim. *See Catalina Mktg. Int’l v. Coolsavings.com, Inc.*, 289 F.3d 801, 812 (Fed. Cir. 2002).

XVIII. PROPOSED REJECTION #8: CLAIMS 8 AND 14 ARE OBVIOUS OVER SPALINK

Claims 8 and 14 are obvious under pre-AIA 35 U.S.C. § 103 over Spalink. (Ex. 1005).

Spalink is discussed above under Proposed Rejection 7.

A. Overview of the Proposed Rejection

Spalink is applied as in Proposed Rejection 7, with the exception that to the extent that Spalink does not disclose a database, this Proposed Rejection posits that it would have been obvious for Spalink’s memory to include a database. Furthermore, to the extent that Spalink does not disclose receiving a status of the HVAC system, this Proposed Rejection posits that it would have been obvious for Spalink to receive the status of the HVAC system.

B. Rationale (Motivation) Supporting Obviousness and Reasonable Expectation of Success

It would have been obvious to a POSITA to receive the **status of said HVAC system** in Spalink. Spalink already teaches that its HVAC control system requires the status of the HVAC

system as an input to its model (Ex. 1005, ¶0092), and further teaches to use records about user interactions with the thermostat to determine “on-off cycles” and “run times.” (Ex. 1005, ¶¶85, 80)(Ex. 1002, ¶277). It would have been obvious for the HVAC control system to receive the status of the HVAC system in order for Spalink to carry out its disclosed calculations. (Ex. 1002, ¶277).

It was well known how to receive the status of an HVAC system during the relevant time. For example, a POSITA could have used BACnet (Building Automation and Control Networks), which was approved as a standard for networking in the HVAC industry by 1997. (Ex. 1018)(Ex. 1002, ¶278). This conventional protocol allowed HVAC systems to directly report status information to a device, such as a computer or thermostat. (Ex. 1002, ¶278). A POSITA would have seen a number of advantages in using BACnet to receive the status of the HVAC system, including simplified wiring and improved fault detection resulting from additional information transmitted back to central control units. (Ex. 1002, ¶278). Updating various connections that had previously been physically wired together to networked communications paths would have reduced cost and complexity in wiring. (Ex. 1002, ¶278).

Additionally, using BACnet to receive the status of the HVAC system was a known technique that could have been used for the technique of determining the HVAC status to be the status requested by the thermostat, with no unexpected results. *See KSR Int’l Co. v. Teleflex, Inc.*, 550 U.S. 398, 416-421 (2007); (Ex. 1002, ¶279).

Furthermore, a POSITA would have been motivated to and would have had a reasonable expectation of success in implementing a system that uses **one or more databases** to store temperature measurements over time. (Ex. 1002, ¶280). As Mr. Shah explains, a POSITA would have been motivated to use a database in order to facilitate storage and organization of the data regarding temperature data. (Ex. 1002, ¶280). Databases were widely used to store electronic information and could have been used predictably for that purpose with no unexpected results. (Ex. 1002, ¶280)(citing Exs. 1003; 1019; 1020). A number of databases were available in the relevant timeframe and were in use for HVAC control systems. (Ex. 1002, ¶280)(citing Ex. 1003, ¶¶0056-0059, Ex. 1019, Abstract, Fig. 2, 9:26-50, Ex. 1020, 1:64-66).

Additionally, using a **database** to store data was a known technique that could have been substituted for the technique of using memory without a database, with no unexpected results. *See KSR Int’l Co. v. Teleflex, Inc.*, 550 U.S. 398, 416-421 (2007).

C. Graham Factors

The **level of ordinary skill** is described under Proposed Rejection 2. (Ex. 1002, ¶¶28-29).

The **scope and content of the prior art** are discussed throughout the Proposed Rejection.

The **differences between the prior art and the claims** are discussed in the “Overview of the Proposed Rejection” and in the claim mapping, below.

Requester is not aware of any **secondary considerations** that would make an inference of non-obviousness more likely.

D. Claim Mapping

This section maps the challenged claims to the relevant disclosures of Spalink, where the claim text appears in bold-italics, and the relevant mapping follows the claim text.

“[8a] a first HVAC control system that ... receives status of said HVAC system;”

Proposed Rejection #7 posits that Spalink discloses an **HVAC control system that receives status of said HVAC system**. As discussed in Proposed Rejection #7, Spalink teaches that “control systems of the present invention” (e.g. the local processor / local controller) can receive the “state of the climate control system.” (Ex. 1005, ¶0080)(Ex. 1002, ¶283).

To the extent that Spalink does not disclose this limitation, Spalink renders it obvious in two ways. First, Spalink teaches that the local processor / local controller can receive user interface (e.g. thermostat) transactions initiated by a user, which renders obvious **receiv[ing] the status of the HVAC system** as that limitation is taught by the ’322 patent. (Ex. 1005, ¶¶0080-0081)(Ex. 1002, ¶284). Specifically, it would have been obvious to include the resulting status from a user interface transaction when, for example, the HVAC system is turned on or off. (Ex. 1002, ¶284). Furthermore, it would have been obvious to a POSITA that the local processor / local controller would receive the status of the HVAC system (e.g. whether it is ‘on’ or ‘off’, or in heating or cooling mode), because the local processor / local controller uses a model that uses as input the state of the climate control system. (Ex. 1005, ¶0092)(Ex. 1002, ¶284).

Spalink explains that “combin[ing] [] collected information with specific records about user transactions [] determine[s] on-off cycles, run times, aggregate machine hours, and the like,” which a POSITA would have understood to include the status of the HVAC system. (Ex.

1005, ¶¶85, 80 (“This information may be translated into specific state transitions of the climate control system.”)); (Ex. 1002, ¶285). Spalink’s determining the status of the HVAC system from the user interactions with the control system renders obvious the *HVAC control system receiv[ing] [the] status of [the] HVAC system* as that limitation is taught by the ’322 patent. (Ex. 1002, ¶285).

The ’322 patent does not specifically teach that the HVAC system *sends any signals*, let alone status signals to the HVAC control system. (Ex. 1002, ¶286). The only mentions of a “status” of an HVAC system in the ’322 patent are in the claims, once in the abstract, and twice in the Summary of the Invention sections. (Ex. 1002, ¶286). The two mentions of “status of the HVAC system” in the Summary of the Invention describe the “status of the HVAC system” as being “on” or “off” (*see* Ex. 1001 at 4:30-37, *see also* claims 7 and 14), but does not state that the on/off status of the HVAC system is *received* by any device or from any device. (Ex. 1002, ¶286). The abstract of the ’322 patent states “[t]he climate control system obtains . . . status of said HVAC system,” but again does not describe how the status is obtained, or from where. The claims only state that the “at least one HVAC control system . . . receives status of said HVAC system” (*see* claims 1 and 8), but do not describe how the status is obtained, or from where. (Ex. 1002, ¶286).

While the ’322 patent states that thermostat 108 “turns the HVAC system on and off” (*see* Ex. 1001 at 7:40-58), it does not provide any disclosure of the HVAC system providing its status. The ’322 patent does explain that cycling data is “reflected” in the control signals (i.e., on and off) sent to the HVAC system:

“Because **cycling of the HVAC system is controlled by the thermostat**, those differences in cycle time would be reflected in the data sensed by and **control signals generated by the thermostat**. It would be advantageous for a thermostat system to be able to use that information to diagnose problems and make recommendations based upon that data.”

(Ex. 1001 at 3:55-61)(Ex. 1002, ¶287). As a result, if **receives status of said HVAC system** is taught by the ’322 patent under its broadest reasonable interpretation, it includes determining the status of the HVAC system to be the requested status sent by the thermostat to the HVAC system (*i.e.*, based on the user input). (Ex. 1002, ¶287). Under this interpretation, a POSITA would have understood that Spalink’s “on-off cycles” (*See, e.g.*, Ex. 1004 at 5:19-28) renders obvious **receives status of said HVAC system**. (Ex. 1002, ¶287).

Second, to the extent **at least one HVAC control system ... [that] receives status of said HVAC system** only includes systems where the HVAC system sends a signal indicating its status to the HVAC control system, Spalink also renders this claim element obvious. (Ex. 1002, ¶288).

It was known for the HVAC system itself to provide its status to the HVAC control system. (Ex. 1002, ¶289). Bi-directional communication between HVAC systems and their controls were well known, and included providing the ability for the HVAC system reporting its status information to the HVAC control system. (Ex. 1018 at 3-7)(Ex. 1003, FIGs. 1, 3 (showing bi-directional communication between the HVAC system and its controls))(Ex. 1021, FIG. 1, 3:35-45 (prior art system of which Mr. Shah is a named inventor, explaining it was “known” for an HVAC system to provide “status” information to a thermostat))(Ex. 1002, ¶289). For example, at the relevant time, BACnet was the most common protocol for HVAC networking, and allowed HVAC systems to directly report status information to a device, such as a computer or thermostat. (Ex. 1018 at 3-7, Tables 1-3)(Ex. 1002, ¶289). It would have been obvious to use a protocol such as BACnet to provide HVAC system status to the HVAC control system for the reasons discussed above. (Ex. 1002, ¶289).

“[8b] at least a second HVAC control system that obtains ... status of said second HVAC system”

The **second HVAC control system obtains ... status of said second HVAC system** in the same manner as the first HVAC control system, described above under element [8a]. (Ex. 1002, ¶290).

“[8e] one or more databases that store said temperature measurements from said first and second HVAC systems.”

Proposed Rejection #7 posits that Spalink discloses **one or more databases that store at least said temperature measurements obtained from said first structure over time**. As discussed in Proposed Rejection #7, Spalink teaches that its **temperature measurements from said first and second HVAC systems** (part of the “reference data”, Ex. 1005, ¶¶0030-0031) are **store[d]** in memories at both the local processor / controller and central processor controller. (Ex. 1005, ¶¶0036, 0042)(Ex. 1002, ¶291).

To the extent that Spalink does not disclose that its memory includes a **database**, it would have been obvious to use a database to store temperature measurements in Spalink’s

system. A POSITA would have been motivated to and would have had a reasonable expectation of success in implementing a system that uses **one or more databases** to store temperature measurements over time. (Ex. 1002, ¶292). As Mr. Shah explains, a POSITA would have been motivated to use a database in order to facilitate storage and organization of the data regarding temperature data. (Ex. 1002, ¶292). Databases were widely used to store electronic information and could have been used predictably for that purpose with no unexpected results. (Ex. 1002, ¶292)(citing Exs. 1003; 1019; 1020). A number of databases were available in the relevant timeframe and were in use for HVAC control systems. (Ex. 1002, ¶292)(citing Ex. 1003, ¶¶0056-0059, Ex. 1019, Abstract, Fig. 2, 9:26-50, Ex. 1020, 1:64-66). *See KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 416-21 (2007).

CLAIM 14

“14.A system as in claim 8 in which the status of said first HVAC system includes whether said first HVAC system is “on” or “off”.”

As discussed above under claim 8, element [8a], the HVAC control system of Spalink receives the “state of the climate control system”, as well as transactions entered at the user interface (i.e. at the thermostat). (Ex. 1005, ¶¶0080-0082)(Ex. 1002, ¶293). It would have been obvious that such information (the “state of the climate control system” and “transactions” entered at the user interface”) included whether the HVAC system was ‘on’ or ‘off’, because this is the most basic status information concerning an HVAC system, and would have been seen as necessary for performing even basic calculation concerning the performance metrics of the Spalink climate control system. (Ex. 1005, ¶¶0075, 0044)(Ex. 1002, ¶293). For example, if inside temperature is rising, any calculation of efficiency would need to account for whether the HVAC system is ‘on’ or ‘off’. (Ex. 1002, ¶293).

XIX. PROPOSED REJECTION #9: CLAIMS 8-10 AND 12-14 ARE OBVIOUS OVER SPALINK IN VIEW OF ROSEN

Claims 8-10 and 12-14 are obvious under pre-AIA 35 U.S.C. §§ 103(a) over Spalink (presented in Proposed Rejections 7 and 8), in further view of Rosen. Rosen is described above under Proposed Rejection 3. This Proposed Rejection posits that it would have been obvious to use Rosen’s provision of outside temperature in Spalink’s system, analogous to the obviousness case of Proposed Rejection 3. This Proposed Rejection posits that it would have been obvious to

obtain outside temperature measurements from the Internet, thus replacing Spalink's use of outside temperature sensors. Furthermore, it would have been obvious to use Rosen's Internet-capable, programmable thermostat with a single temperature sensor in Spalink, analogous to the obviousness case of Proposed Rejection 3. (Ex. 1002, ¶294).

A. The Combination and Motivation

It would have been obvious to a POSITA to obtain outdoor temperatures for a geographic region, as taught by Rosen, in Spalink's system. (Ex. 1002, ¶295).

Spalink already teaches obtaining information about "the local weather, either in analog or digital format, and at various levels of resolution and accuracy." (Ex. 1005, ¶0031)(Ex. 1002, ¶296). This data includes measurements of outside temperature. (Ex. 1005, ¶0038-0039)(Ex. 1002, ¶296). While Spalink measures outside temperature directly using sensors, Rosen teaches (in 2004) that "local current weather information sources are widely available and are routinely accessed by, for example, using the Internet." (Ex. 1006, 4:10-15)(Ex. 1002, ¶296). Spalink further teaches a user interface, which is likely a thermostat, that is connected to a network. (Ex. 1005, ¶¶0052-0053, 0062)(Ex. 1002, ¶296). A POSITA would have seen an advantage and found it obvious to use a programmable thermostat, such as one described by Rosen, to obtain outside temperature measurements, in order to avoid the expense of obtaining, wiring and servicing an extra outside temperature sensor. (Ex. 1005, ¶0023)(Ex. 1002, ¶296). Additionally, using the Internet to obtain outdoor temperatures, per Rosen, was a known technique that could have been substituted for the technique of measuring temperature directly, with no unexpected results. (Ex. 1002, ¶296). *See KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 416-421 (2007).

It would have been obvious to a POSITA to provide a programmable thermostat at one location that is the sole source of inside temperature (see claims 10, 12, and 13). (Ex. 1002, ¶297).

Spalink teaches measuring indoor temperature using a sensor. (Ex. 1005, ¶0030). Rosen teaches a single thermostat unit that has a single indoor temperature sensor and would provide the indoor temperature measurements. (Ex. 1006 at 2:2-6, 1:17-28, 3:3-9). The '322 patent also recognized that programmable thermostats were "prevalent" at the time of the alleged invention. (Ex. 1001 at 1:37-53). A POSITA would have been motivated to combine Spalink with Rosen and would have reasonably expected to achieve the desired result, *i.e.*, delivering temperature data in a cost effective manner so that inside temperature data comes from a single source, the

thermostat. (Ex. 1002, ¶298). A POSITA would have seen an advantage in reducing cost and redundancy by using a programmable thermostat at one location that is the sole source of inside temperature. (*Id.*). A POSITA would have had a reasonable expectation of success implementing the combination of Spalink and Rosen because the combination is merely combining prior art elements according to known methods to yield predictable results (*i.e.*, using the thermostat as the only source that provides the inside temperature data, to save on cost and reduce redundancy). (*Id.*). Accordingly, a POSITA would have found it obvious to implement Spalink's system as the sole source for current data regarding temperature inside a location, as disclosed by Rosen. (*Id.*). Additionally, using a programmable thermostat as the sole source of inside temperature for a structure, per Rosen, was a known technique (as the '322 patent admits at 1:37-53) that could have been substituted for the technique of measuring temperature with a multitude of sensors, with no unexpected results. *See KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 416-421 (2007); (Ex. 1002, ¶299).

B. Reasonable Expectation of Success

A POSITA in the art in the relevant timeframe would have had a reasonable expectation of success in combining Rosen with Spalink in this manner, because the combination involved computer programming and network communications that were well-established by the relevant timeframe (2007). (Ex. 1002, ¶¶300).

C. Graham Factors

The **level of ordinary skill** is described under Proposed Rejection 2.

The **scope and content of the prior art** are discussed throughout the Proposed Rejection.

The **differences between the prior art and the claims** are discussed in the "Overview of the Combination" and in the claim mapping, below.

Requester is not aware of any **secondary considerations** that would make an inference of non-obviousness more likely.

D. Claim Mapping

This section maps the challenged claims to the relevant disclosures of Spalink and Rosen where the claim text appears in bold-italics, and the relevant mapping follows the claim text.

CLAIMS 8 AND 14

Independent claim 8 and dependent claim 14 are obvious in the same manner discussed in Proposed Rejection 8, with the exception that the outside temperature measurements, first recited in claim elements [8c], come from an Internet weather source. (Ex. 1006, 4:40-59, Fig. 6)(Ex. 1002, ¶303). Such outdoor temperature data would obviously have been a measurement, and would have been from a source other than the HVAC system. (Ex. 1002, ¶303).

CLAIM 9

“9. A system as in claim 8 in which said processors receive said outside temperature measurements for geographic regions such as ZIP codes from sources other than said HVAC control systems.”

Claim 9 recites system and method limitations requiring that the “outside temperature measurements are for geographic regions such as ZIP codes from sources other than said HVAC system.” In the combination, the outside temperature measurements come from an online weather information system per Rosen, and are localized (i.e. they are for **geographic regions**) using, for example, a ZIP code. (Ex. 1006, 7:19-57)(Ex. 1002, ¶304).

CLAIM 10

“10. A system as in claim 8 wherein said temperature measurements are obtained from a programmable thermostat that communicates with said first HVAC control system using a network.”

Spalink teaches that its user interface communicates with the processor (part of the HVAC control system) via a network. (Ex. 1005, ¶0053)(Ex. 1002, ¶305). The network can be the Internet. (Ex. 1005, ¶0023). Rosen teaches **a programmable thermostat that communicates via the Internet** (e.g. to obtain outside temperature information). (Ex. 1006, 1:65-67, 2:11-15, 6:62-7:9)(Ex. 1002, ¶305).

CLAIMS 12 AND 13

“12. A system as in claim 8 in which said first HVAC system includes a programmable thermostat and said programmable thermostat is the sole source for current data regarding temperature inside said location conditioned by said first HVAC system.”

“13. A system as in claim 8 in which said first HVAC system measures inside said first location at only one physical location.”

Rosen teaches **a single thermostat unit that has a single indoor temperature sensor**. (Ex. 1006, 2:2-6, 1:17-28, 3:3-9)(Ex. 1002, ¶306). While Spalink shows multiple sensors 215 in

Fig. 1B, the number of these sensors is not fixed. (Ex. 1002, ¶306). In a single-family home, it was common and obvious in the relevant timeframe to have one temperature sensor in the building, located in a thermostat. (Ex. 1006, 2:2-6, 1:17-28, 3:3-9)(Ex. 1002, ¶306). Claims 12 and 13 were thus obvious. (Ex. 1002, ¶306).

XX. PROPOSED REJECTION #10: CLAIM 11 IS OBVIOUS OVER SPALINK IN VIEW OF OSWALD

Claim 11 is obvious under pre-AIA 35 U.S.C. § 103(a) over Spalink (presented in Proposed Rejections 7 and 8), in further view of Oswald. Oswald is described above under Proposed Rejections 4 and 5. This Proposed Rejection posits that it would have been obvious to use Oswald's network that includes an electricity meter in Spalink's system, analogous to the obviousness case of Proposed Rejection 4.

A. The Combination and Motivation

It would have been obvious to a POSITA to include a network that includes an electricity meter, as taught by Oswald, in Spalink's system. (Ex. 1002, ¶308).

Dependent claim 11 recites the system of claim 8 "in which said processors communicate with said first HVAC system using a network that includes an electricity meter." As discussed in Proposed Rejection 4, Oswald teaches a processor that communicates with said HVAC system using a network that includes an electricity meter. (Ex. 1003, ¶¶0052)(Ex. 1002, ¶221).

Dependent claim 11 is similar in scope to claim 4 discussed under Proposed Rejection 4, above. It would have been obvious to add an electrical meter communicating via the Spalink network for reasons similar to those discussed above under Proposed Rejection 4. First, the control system of Spalink would have been able to access electric meter data to measure actual energy usage data, and provide this information to the user, (Ex. 1003, ¶0117)(Ex. 1002, ¶308), and second access to electrical power consumption data via the electric meter would have allowed Spalink to correlate Spalink's efficiency to actual power consumption. (Ex. 1002, ¶308). Third, by allowing the electrical meter to communicate over the Internet (including a home wireless network), a utility would be able to read and access electricity usage data without performing manual meter reading. (Ex. 1002, ¶308). Separately, by the relevant timeframe, it was a well-known technique to connect utility meters to communication networks, and this could

have been performed with a reasonable expectation of success and no unexpected results. *See KSR*, 550 U.S. at 416-421; (Ex. 1002, ¶308).

B. Reasonable Expectation of Success

A POSITA in the art in the relevant timeframe would have had a reasonable expectation of success in combining Oswald with Spalink in this manner, because the combination involved computer programming and network communications that were well-established by the relevant timeframe. (Ex. 1002, ¶309).

C. Graham Factors

The **level of ordinary skill** is described under Proposed Rejection 2.

The **scope and content of the prior art** are discussed throughout the Proposed Rejection.

The **differences between the prior art and the claims** are discussed in the “Overview of the Combination” and in the claim mapping, below.

Requester is not aware of any **secondary considerations** that would make an inference of non-obviousness more likely.

D. Claim Mapping

This section maps the challenged claims to the relevant disclosures of Spalink and Oswald where the claim text appears in bold-italics, and the relevant mapping follows the claim text.

CLAIM 11

“11. A system as in claim 8 in which said processors communicate with said first HVAC system using a network that includes an electricity meter.”

See claim 4 mapping of Proposed Rejections 4 and 5, which is incorporated by reference.

XXI. PROPOSED REJECTION #11: CLAIMS 1-14 ARE OBVIOUS OVER THE ’234 PUBLICATION IN VIEW OF HILDEBRAND

As set forth above, the claims of the ’322 patent are only entitled to the actual filing date of the application which issued as the ’322 patent— **September 12, 2011**. Accordingly, U.S.

Patent Publication 2010/0070234 (“the ’234 publication”) which published on March 18, 2010, is prior art under 35 U.S.C. § 102(b) (pre-AIA).

The combination of the ’234 publication (Ex. 1012) and Hildebrand (Ex. 1004) renders obvious the challenged claims under pre-AIA 35 U.S.C. § 103(a). (Ex. 1002, ¶313).

A. Overview of the Combination and Rationale (Motivation) Supporting Obviousness

The ’322 patent claims priority to and states that it is a continuation of the ’690 application, which published as the ’234 publication. (Ex. 1001, (63)). The ’234 publication names the same inventors as the ’322 patent. (Ex. 1012, (76))(Ex. 1001, (75)).

The disclosures of the ’234 publication are materially the same as those of the ’322 patent. (Ex. 1002, ¶315). The ’234 publication, like the ’322 patent, does not specifically disclose “compar[ing] an inside temperature recorded inside the first structure with an inside temperature of said first structure recorded at a different time to determine whether the operational efficiency of the HVAC system has decreased over time” (as recited in independent claim 1) or “compar[ing] said temperature measurements from said first HVAC system and said second HVAC system and said outside temperature measurements over time to determine the efficiency of the first HVAC system and the second HVAC system” (as recited in independent claim 8). (Ex. 1002, ¶315). However, as set forth under Proposed Rejection 1 and in further detail in the Claim Mapping section below, Hildebrand discloses these claim elements. (Ex. 1002, ¶315). It would have been obvious to use Hildebrand’s methods to calculate a value for the operational efficiency of an HVAC system in the systems and methods of the ’234 publication, for the reasons discussed below in the Claim Mapping section under each limitation, as appropriate. (Ex. 1002, ¶315).

B. Graham Factors

The **level of ordinary skill** is described under Proposed Rejection 2.

The **scope and content of the prior art** are discussed throughout the Proposed Rejection.

The **differences between the prior art and the claims** are discussed in the “Overview of the Combination” and in the claim mapping, below.

Requester is not aware of any **secondary considerations** that would make an inference of non-obviousness more likely.

C. Reasonable Expectation of Success

A POSITA in the relevant timeframe would have had a reasonable expectation of success in implementing the combination (as described with particularity below in the claim mapping section) of the '234 publication and Hildebrand. (Ex. 1002, ¶316). As Mr. Shah explains, the art was relatively predictable in the relevant timeframe (late 2011). (Ex. 1002, ¶316). A POSITA would have been able to make any necessary modifications to implement the combination. (Ex. 1002, ¶316). This is discussed in more detail in the claim mapping section, where appropriate.

D. Analogous Art

The '234 publication and Hildebrand are analogous art, because they are in the same field as the '322 patent (building energy management and controls). (Ex. 1001, Abstract, 1:15-2:2, 3:62-5:34, claim 1, preamble)(Ex. 1004, Abstract, Title, 1:5-40)(Ex. 1012, Abstract, Title, ¶¶0002-0018)(Ex. 1002, ¶317). Furthermore, both references are directed to systems and methods for controlling HVAC systems, including identifying problems with HVAC system operation. (Ex. 1001, Abstract, 1:18-2:19, 3:53-60, claim 1, preamble)(Ex. 1004, Abstract, Title, 1:42-2:20)(Ex. 1012, Abstract, Title, ¶¶0009-0025)(Ex. 1002, ¶317). *See Wyers v. Master Lock Co.*, 616 F.3d 1231, 1238 (Fed. Cir. 2010).

E. Claim Mapping

This section maps the challenged claims to the relevant disclosures of the '234 publication and Hildebrand, where the claim text appears in bold-italics, and the relevant mapping follows the claim text.

INDEPENDENT CLAIM 1

“[1Pre] A system for evaluating changes in the operational efficiency of an HVAC system over time comprising:”

The '234 publication discloses a system for controlling an HVAC system. (Ex. 1012, Abstract, claim 1, Fig. 2, ¶¶0019-0023, 0051-0053)(Ex. 1002, ¶319).

As set forth under Proposed Rejection 1, Hildebrand discloses [a] system for evaluating changes in the operational efficiency of an HVAC system over time. *See* Proposed Rejection 1, [1Pre], which is incorporated by reference herein. (Ex. 1002, ¶320).

A POSITA would have been motivated to use Hildebrand's operational efficiency calculations in the systems of the '234 publication. The '234 publication states that its system calculates the operational efficiency of an HVAC system but does not provide a specific method for doing so. (Ex. 1012, ¶¶0020, 0021, claim 1)(Ex. 1002, ¶321). A POSITA would have been motivated to calculate the operational efficiency of the HVAC system in order to monitor system health and to assist in the diagnosis of degradations in system efficiency. (*See, e.g.*, Ex. 1012, ¶¶0024, 0063)(Ex. 1002, ¶321). Hildebrand's operational efficiency calculations were a known technique for the purpose of better estimating structure characteristics and reducing energy demand that could have been predictably carried out by any reasonable computer system. (Ex. 1002, ¶321). The combination is thus also obvious under *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 416-21 (2007). Doing so would have been simply a predictable variation using known technologies. A POSITA would have had a reasonable expectation of success in implementing a system in which the system calculates the operational efficiency of an HVAC system because it would simply be a predictable variation using known technologies. (Ex. 1002, ¶321).

“[1a] at least one HVAC control system associated with a first structure that receives temperature measurements from at least a first structure conditioned by at least one HVAC system, and receives status of said HVAC system;”

The '234 publication discloses and renders obvious this claim element. (Ex. 1002, ¶322).

The '234 publication describes an “HVAC control system that measures temperature at at least a first location conditioned by [an] HVAC system.” (Ex. 1012, ¶¶0019, 0020, claim 1, claim 8, Fig. 2). The HVAC control system receives temperature measurements from at least a first structure conditioned by at least one HVAC system. (Ex. 1012, claim 1, claim 8). The '234 publication also discloses a server that receives temperature measurements and the status of the HVAC system, which are the functions performed by the claimed HVAC control system. (Ex. 1012, ¶¶0051, 0054, 0057)(Ex. 1002, ¶323). The thermostat “regularly measure[s] and send[s] to the server information about the temperature in the building.” (Ex. 1012, ¶¶0051, 0054, 0057). The server thus also receives temperature measurements from at least a first structure conditioned by at least one HVAC system. (*Id.*)(Ex. 1002, ¶323). The '234 publication states

that the server stores “information about the temperature in the building.” (Ex. 1012, ¶0057). A POSITA would have understood that the server is thus associated with that building. (Ex. 1002, ¶323). The ’234 publication further states that the server “receives status of said HVAC system.” (Ex. 1012, claim 1, claim 8, ¶¶0057, 0023, 0020)(Ex. 1002, ¶323).

“[1b] one or more processors that receive measurements of outside temperatures from at least one source other than said HVAC system and compare said temperature measurements from said first structure, wherein said one or more processors compares the inside temperature of said first structure and the outside temperature over time; and”

The ’234 publication discloses and renders obvious this claim element. (Ex. 1002, ¶324).

The ’234 publication describes a server which is one or more processors that receive measurements of outside temperatures from at least one source other than said HVAC system. (Ex. 1012, ¶¶0019-0023, 0045, 0066, claims 1, 2, 8, 9)(Ex. 1002, ¶325).

The ’234 publication discloses and renders obvious “compare said temperature measurements from said first structure, wherein said one or more processors compares the inside temperature of said first structure and the outside temperature over time.” (Ex. 1012, ¶¶0019-0023, 0057, 0063, 0070, claims 1, 8)(Ex. 1002, ¶326).

“[1c] one or more databases that store at least said temperature measurements obtained from said first structure over time,”

The ’234 publication discloses and renders obvious this claim element. (Ex. 1002, ¶327). The ’234 publication describes a “database” which stores “temperature measurements.” (Ex. 1012, ¶¶0019-0022, 0048, 0054, 0057, claims 1, 8, Fig. 5). These temperature measurements are temperatures obtained from said first structure over time. (Ex. 1012, ¶¶0048, 0051, 0054, claims 1, 8, Fig. 5)(Ex. 1002, ¶327).

“[1d] wherein said one or more processors compares an inside temperature recorded inside the first structure with an inside temperature of said first structure recorded at a different time to determine whether the operational efficiency of the HVAC system has decreased over time.”

The combination of the ’234 publication and Hildebrand renders obvious this claim element. (Ex. 1002, ¶328). The ’234 publication states that its system calculates the operational efficiency of an HVAC system but does not provide a specific method for doing so. (Ex. 1012, ¶¶0020, 0021, claim 1)(Ex. 1002, ¶328).

As set forth under Proposed Rejection 1, Hildebrand discloses that the one or more processors compares an inside temperature recorded inside the first structure with an inside temperature of said first structure recorded at a different time to determine whether the operational efficiency of the HVAC system has decreased over time. *See* Proposed Rejection, [1d], which is incorporated by reference herein. (Ex. 1002, ¶329).

A POSITA would have been motivated to use Hildebrand's operational efficiency calculations in the systems of the '234 publication. A POSITA would have been motivated to calculate the operational efficiency of the HVAC system in order to monitor system health and to assist in the diagnosis of degradations in system efficiency. (*See, e.g.*, Ex. 1012, ¶¶0024, 0063)(Ex. 1002, ¶330). Doing so would also involve determin[ing] whether the operational efficiency of the HVAC system has decreased over time. (Ex. 1002, ¶330). Hildebrand's operational efficiency calculations were a known technique for the purpose of better estimating structure characteristics and reducing energy demand that could have been predictably carried out by any reasonable computer system. (Ex. 1002, ¶330). The combination is thus also obvious under *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 416-21 (2007). Doing so would have been simply a predictable variation using known technologies. A POSITA would have had a reasonable expectation of success in implementing a system in which the system calculates the operational efficiency of an HVAC system because it would simply be a predictable variation using known technologies. (Ex. 1002, ¶330).

CLAIM 2

“2. A system as in claim 1 in which said processors receive measurements of outside temperatures for geographic regions such as ZIP codes from sources other than said HVAC control systems.”

The '234 publication discloses and renders obvious this claim element. (Ex. 1012, ¶0023, claim 2)(“A system as in claim 1 in which said processors receive measurements of outside temperatures for geographic regions such as ZIP codes from sources other than said HVAC control systems.”)(Ex. 1002, ¶331).

CLAIM 3

“3. A system as in claim 1 wherein said temperature measurements are obtained from a programmable thermostat that communicates using a network.”

The '234 publication discloses and renders obvious this claim element. (Ex. 1012, ¶¶0006-0008, 0023, claim 3)(“A system as in claim 1 wherein said temperature measurements are obtained from a programmable thermostat that communicates using the Internet.”).

CLAIM 4

“4. A system as in claim 1 in which said processors communicate with said HVAC system using a network that includes an electricity meter.”

The '234 publication renders obvious this claim element. (Ex. 1012, Fig. 2, claim 7)(“A system as in claim 1 in which said processors communicate with said HVAC system using a network that includes an electricity meter.”)(Ex. 1002, ¶333).

CLAIM 5

“5. A system as in claim 1 in which said HVAC system includes a programmable thermostat and said programmable thermostat is the sole source for current data regarding temperature inside said first structure conditioned by said HVAC system.”

The '234 publication discloses and renders obvious this claim element. (Ex. 1012, ¶¶0006-0008, Fig. 2, claim 5)(“A system as in claim 1 in which said HVAC system includes a programmable thermostat and said programmable thermostat is the sole source for current data regarding temperature inside said location conditioned by said HVAC system.”)(Ex. 1002, ¶334).

CLAIM 6

“6. A system as in claim 1 in which said HVAC system measures inside said first structure at only one physical location.”

The '234 publication discloses and renders obvious this claim element. (Ex. 1012, ¶¶0006-0008, Fig. 2, Fig. 4, 0053, claim 6)(“A system as in claim 1 in which said HVAC system measures inside said first location at only one physical location.”)(Ex. 1002, ¶335).

CLAIM 7

“7. A system as in claim 1 in which the status of said HVAC system includes whether said system is “on” or “off”.”

The '234 publication discloses and renders obvious this claim element. See above, claim 1, element [1a]. (see also Ex. 1012, ¶¶0023, 0053, claim 7)(“A system as in claim 1 in which the status of said HVAC system includes whether said system is ‘on’ or ‘off.’”)(Ex. 1002, ¶336).

INDEPENDENT CLAIM 8

“[8Pre] A system for detecting and correcting for anomalous behavior in HVAC control systems comprising:”

The '234 publication discloses and renders obvious this claim element. (Ex. 1002, ¶337). As set forth under claim 1, element [1pre], the '234 publication discloses an HVAC control system. The '234 publication describes “a system for detecting and correcting for anomalous behavior in HVAC control systems.” (Ex. 1012, ¶0022, claim 8). Furthermore, as set forth in detail under Proposed Rejection 1, Hildebrand detects the potential failure of a temperature modification device. (Ex. 1002, ¶337). Hildebrand further teaches correcting for the anomalous behavior of such a device by recommending inspection of the device. (Ex. 1004, 7:63-8:11)(Ex. 1002, ¶337).

“[8a] a first HVAC control system that receives temperature measurements from at least a first structure conditioned by at least one HVAC system, and receives status of said HVAC system;”

The '234 publication discloses and renders this claim limitation obvious for the reasons set forth above for claim element [1a]. (See also Ex. 1012, ¶0022, claim 8)(Ex. 1002, ¶338).

“[8b] at least a second HVAC control system that obtains temperature measurements from at least a second structure conditioned by a second HVAC system, and status of said second HVAC system”

The '234 publication discloses and renders this claim limitation obvious for the reasons set forth above for claim element [1a]. (See also Ex. 1012, ¶0022, claim 8)(Ex. 1002, ¶339). The '234 publication further states that its system can contain “a second HVAC control system that measures temperature at at least a second location conditioned by said second HVAC system, and reporting said temperature measurements as well as the status of said second HVAC control system.” (Ex. 1012, ¶¶0022, 0045, 0051, 0054, claim 8)(Ex. 1002, ¶339).

“[8c] one or more processors that receive measurements of outside temperatures from at least one source other than said first and second HVAC systems”

The '234 publication discloses and renders this claim limitation obvious for the reasons set forth above for claim element [1b]. (Ex. 1002, ¶340).

“[8d] and compare said temperature measurements from said first HVAC system and said second HVAC system and said outside temperature measurements over time to determine the efficiency of the first HVAC system and the second HVAC system; and”⁸

The combination of the '234 publication and Hildebrand discloses and renders obvious this claim element. (Ex. 1002, ¶¶341). The '234 publication states that its system “compare[s] said temperature measurements from said first HVAC controls [sic] system and said second HVAC control system and said outside temperature measurements.” (Ex. 1012, ¶¶0022, 0065, 0067, claim 8). The '234 publication also generally discusses comparing the “efficiency” of multiple houses. (Ex. 1012, ¶0063)(Ex. 1002, ¶341). The '234 publication further states that its “server calculates the current relative efficiency of home X as compared to other homes.” (Ex. 1012, ¶0067)(Ex. 1002, ¶341). However, the '234 publication does not provide a specific method for comparing said temperature measurements from said first HVAC system and said second HVAC system and said outside temperature measurements over time to determine the efficiency of the first HVAC system and the second HVAC system. (Ex. 1002, ¶341).

As set forth under Proposed Rejection 1, claim element [1d], Hildebrand discloses one or more processors which compare an inside temperature recorded inside the first structure with an inside temperature of said first structure recorded at a different time to determine whether the operational efficiency of the HVAC system has decreased over time. *See* Proposed Rejection 1 claim element, [1d], which is incorporated by reference herein. (Ex. 1002, ¶342). Furthermore, as set forth under Proposed Rejection 1, claim element [1b], Hildebrand takes outside temperature into account in its operational efficiency computations. (Ex. 1002, ¶342).

A POSITA would have been motivated to use Hildebrand's operational efficiency calculations in the systems of the '234 publication. (Ex. 1002, ¶343). A POSITA would have been motivated to calculate the operational efficiency of the HVAC system, and further to compare operational efficiencies between different HVAC systems, in order to monitor system health and to assist in the diagnosis of degradations in system efficiency. (*See, e.g.*, Ex. 1012, ¶¶0024, 0063)(Ex. 1002, ¶343). A POSITA would have been further motivated to “compare”

⁸ The '322 patent is accompanied by a Certificate of Correction which deletes the language “relative” from this claim element.

“outside temperature measurements over time” in order to account for the effect of outside temperature on HVAC system performance. (See, e.g., Ex. 1012, ¶0062)(Ex. 1002, ¶343).

Hildebrand’s operational efficiency calculations were a known technique for the purpose of better estimating structure characteristics and reducing energy demand that could have been predictably carried out by any reasonable computer system. (Ex. 1002, ¶344). The combination is thus also obvious under *KSR Int’l Co. v. Teleflex, Inc.*, 550 U.S. 398, 416-21 (2007). Doing so would have been simply a predictable variation using known technologies. A POSITA would have had a reasonable expectation of success in implementing a system in which the system calculates the operational efficiency of an HVAC system because it would simply be a predictable variation using known technologies. (Ex. 1002, ¶344).

“[8e] one or more databases that store said temperature measurements from said first and second HVAC systems.”

The ’234 publication discloses and renders this claim limitation obvious for the reasons set forth above for claim element [1d]. (Ex. 1002, ¶345). The ’234 publication further states that its system can store temperature measurements from multiple HVAC systems. (Ex. 1012, ¶¶0022, 0051, 0054, 0062, claim 8)(Ex. 1002, ¶345).

CLAIM 9

“9. A system as in claim 8 in which said processors receive said outside temperature measurements for geographic regions such as ZIP codes from sources other than said HVAC control systems.”

The ’234 publication discloses and renders obvious this claim element. (Ex. 1012, ¶0023, claim 9)(“A system as in claim 8 in which said processors receive measurements of outside temperatures for geographic regions such as ZIP codes from sources other than said HVAC control systems.”)(Ex. 1002, ¶346).

CLAIM 10

“10. A system as in claim 8 wherein said temperature measurements are obtained from a programmable thermostat that communicates with said first HVAC control system using a network.”

The ’234 publication discloses and renders obvious this claim element. (Ex. 1012, ¶¶0006-0008, 0023, claim 10)(“A system as in claim 8 wherein said temperature measurements

are obtained from a programmable thermostat that communicates with said HVAC control system using the Internet.”). (Ex. 1002, ¶347).

CLAIM 11

“11. A system as in claim 8 in which said processors communicate with said first HVAC system using a network that includes an electricity meter.”

The '234 publication renders obvious this claim element. (Ex. 1012, Fig. 2, claim 11)(“A system as in claim 8 in which said processors communicate with said HVAC system using a network that includes an electricity meter.”)(Ex. 1002, ¶348).

CLAIM 12

“12. A system as in claim 8 in which said first HVAC system includes a programmable thermostat and said programmable thermostat is the sole source for current data regarding temperature inside said location conditioned by said first HVAC system.”

The '234 publication discloses and renders obvious this claim element. (Ex. 1012, ¶¶0006-0008, Fig. 2, claim 12)(“ A system as in claim 8 in which said HVAC system includes a programmable thermostat and said programmable thermostat is the sole source for current data regarding temperature inside said location conditioned by said HVAC system.”)(Ex. 1002, ¶349).

CLAIM 13

“13. A system as in claim 8 in which said first HVAC system measures inside said first location at only one physical location.”

The '234 publication discloses and renders obvious this claim element. (Ex. 1012, ¶¶0006-0008, Fig. 2, Fig. 4, 0053, claim 13)(“A system as in claim 8 in which said HVAC system measures inside said first location at only one physical location.”)(Ex. 1002, ¶350).

CLAIM 14

“14. A system as in claim 8 in which the status of said first HVAC system includes whether said first HVAC system is “on” or “off”. ”

The '234 publication discloses and renders obvious this claim element. See above, claim 1, element [1a]. (see also Ex. 1012, ¶¶0023, 0053, claim 14)(“A system as in claim 8 in which the status of said HVAC system includes whether said system is ‘on’ or ‘off.’)(Ex. 1002, ¶351).

XXII. CONCLUSION

For the foregoing reasons, substantial new questions of patentability have been raised with respect to claims 1–14 of the '322 patent. The references cited above anticipate or render issued claims 1–14 of the '322 patent unpatentable for obviousness. Reexamination of issued claims 1–14 is hereby requested.

XXIII. CERTIFICATION OF NO ESTOPPEL

Pursuant to 37 C.F.R. 1.510(b)(6), Requester hereby certifies that the statutory estoppel provisions of 35 U.S.C. 315(e)(1) or 35 U.S.C. 325(e)(1) do not prohibit the requester from filing the instant *ex parte* reexamination request.

Respectfully submitted,

Dated: August 4, 2022

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