

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TOYOTA MOTOR CORPORATION,
Petitioner,

v.

GENERAL ELECTRIC COMPANY,
Patent Owner.

IPR2019-00012
Patent 8,118,237 B2

Before MICHAEL W. KIM, LYNNE H. BROWNE, and
AMANDA F. WIEKER, *Administrative Patent Judges*.

WIEKER, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining Some Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I. INTRODUCTION

A. Background

Toyota Motor Corporation (“Petitioner”) filed a Petition requesting an *inter partes* review of claims 1–23 (“the challenged claims”) of U.S. Patent No. 8,118,237 B2 (Ex. 1001, “the ’237 patent”). Paper 2 (“Pet.”). General Electric Company (“Patent Owner”) filed a Preliminary Response. Paper 6 (“Prelim. Resp.”). We instituted an *inter partes* review of challenged claims 1–23 on all grounds of unpatentability, pursuant to 35 U.S.C. § 314. Paper 7 (“Dec. on Inst.”).

After institution, Patent Owner filed a Response (Paper 14, “PO Resp.”), Petitioner filed a Reply (Paper 19, “Pet. Reply”), and Patent Owner filed a Sur-reply (Paper 30, “PO Sur-reply”). An oral hearing was held on January 22, 2020, and a transcript of the hearing is included in the record. Paper 33 (“Tr.”).

We issue this Final Written Decision pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. This Final Written Decision is issued concurrently with a Final Written Decision for IPR2019-00014, which also challenges the patentability of claims 1–23 of the ’237 patent. For the reasons set forth below, Petitioner has met its burden of showing, by a preponderance of the evidence, that challenged claims 1–10, 12, 22, and 23 of the ’237 patent are unpatentable, but has not met its burden of showing that challenged claims 11 and 13–21 are unpatentable.

B. Related Proceedings

The parties represent that there are no related litigation matters involving the ’237 patent. Pet. 2; Paper 4, 1.

Petitioner filed concurrently a petition in IPR2019-00014, also regarding the '237 patent. Paper 4, 1.

C. The '237 Patent

The '237 patent is titled “System and Method for Vehicle Temperature Control,” and issued on February 21, 2012, from U.S. Patent Application No. 12/371,675, filed February 16, 2009. Ex. 1001, codes (21), (22), (45), (54).

The '237 patent explains that the battery of an electric or plug-in hybrid vehicle typically is re-charged by connecting the vehicle to an electrical power grid when the vehicle is not in use, e.g., overnight. *Id.* at 1:22–28. During subsequent use, when disconnected from the power grid, heating or cooling of the vehicle cabin drains the vehicle’s battery and “reduces the range of the vehicle and/or the power available for traction in the electric motor.” *Id.* at 1:32–39. To avoid this problem, the '237 patent discloses pre-heating or pre-cooling the vehicle cabin by drawing power from the electrical power grid when the vehicle is not in use. *Id.* at 1:42–62, Abstr.

To this end, the '237 patent discloses electric or plug-in hybrid vehicle 10, with energy storage system 18 (e.g., battery), power connector 14 for connecting to electrical power grid receptacle 16, and temperature control system 12. *Id.* at 3:17–29, Fig. 1. Temperature control system 12 includes control loop 22, controller 24, heating and cooling system 26, internal cabin temperature sensor 28, and external ambient temperature sensor 30. *Id.* at 3:57–4:14, Fig. 1. “As the temperature control system 12 uses grid power from the electrical power grid . . . , no power is

drawn from on-board energy storage system 18 to run the temperature control system 12.” *Id.* at 3:45–49.

In operation, and when connected to the electrical power grid for re-charging of energy storage system 18, controller 24 receives a plurality of input signals, specifically, first input signal 32, reflecting the desired time for vehicle start-up;¹ second input signal 34, reflecting both the desired vehicle cabin temperature and the actual cabin temperature (measured by sensor 28); and, optionally, third input signal 36, reflecting the actual ambient temperature outside the vehicle (measured by sensor 30). *Id.* at 4:17–26, 4:31–33, 4:65–5:10, 5:28–32, 6:27–33, Fig. 2. Controller 24 uses these inputs “to determine an optimal time at which temperature control loop 22 is to be activated prior to the desired time for start-up and use of the vehicle 10,” which is a period of time sufficient to pre-heat or pre-cool the vehicle before use. *Id.* at 5:11–15; *see also id.* at 4:26–30. At the determined activation time, controller 24 transmits an activation signal to temperature control loop 22, which activates heating/cooling system 26 to begin heating or cooling the vehicle. *Id.* at 5:44–49. Heating or cooling ends when either (1) the desired vehicle cabin temperature is reached, or (2) a predetermined period of time has passed after the designated vehicle start-up time (e.g., five minutes after the desired vehicle start-up time), if the vehicle has not been started. *Id.* at 5:52–6:3.

¹ The desired time may be input to programmable timer 33, provided by remote control 35, or generated by controller 24 based on a pattern of prior vehicle use (e.g., weekdays at 7:00 AM). *Id.* at 4:34–62.

D. Illustrative Claims

The '237 patent includes 23 claims, all of which are challenged. Claims 1, 13, 18, 22, and 23 are independent claims. Claims 1 and 13 are illustrative and are reproduced below.

1. A vehicle comprising:
 - a power connector configured to mate with an electrical power grid receptacle and receive a grid power therefrom;
 - a heating and cooling system electrically connected to the power connector to receive grid power therefrom and configured to modify a temperature in a cabin of the vehicle;
 - a temperature control loop configured to selectively activate and control the heating and cooling system; and
 - a controller configured to:
 - receive a first input signal comprising a desired vehicle activation time;
 - receive a second input signal comprising a starting vehicle cabin temperature and a desired vehicle cabin temperature;
 - determine a temperature control loop activation time based on the first and second input signals, the temperature control loop activation time being a time prior to the desired vehicle activation time;
 - transmit an activation signal to the temperature control loop at the temperature control loop activation time to activate the heating and cooling system;
 - determine if the vehicle is activated at the desired vehicle activation time or within a pre-determined time thereafter; and
 - if the vehicle is not activated at the desired vehicle activation time or within the pre-determined time thereafter, then transmit a deactivation signal to the temperature control loop to deactivate the heating and cooling system.

13. A method for controlled temperature modification comprising:
inputting a planned use for a vehicle into a temperature control system, the planned use comprising a future time at which the vehicle is started;
measuring a vehicle cabin temperature;
comparing the measured vehicle cabin temperature to a desired vehicle cabin temperature;
determining an activation time for the temperature control system based on the planned vehicle use, the measured vehicle cabin temperature, and the desired vehicle cabin temperature;
modifying the determined activation time based on a planned duration of vehicle use; and
activating the temperature control system at the determined activation time to modify the vehicle cabin temperature.

Ex. 1001, 9:22–52, 10:34–49.

E. Applied References

Petitioner relies upon the following references (Pet. 3–4):

Kadota et al., Japanese Laid-Open Patent Application No. H7-193901, filed Dec. 28, 1993, published July 28, 1995 (Ex. 1005,² “Kadota”);

Hirokazu et al., Japanese Laid-Open Patent Application No. 2007-269161, filed Mar. 31, 2006, published Oct. 18, 2007 (Ex. 1008,³ “Hirokazu”);

Hotta et al., U.S. Patent No. 5,330,385, filed Dec. 1, 1992, issued July 19, 1994 (Ex. 1006, “Hotta”);

² We cite to the English translation, provided as Exhibit 1005. *See* Ex. 1005, 1 (certificate of translation). The original Japanese-language publication was filed as Exhibit 1004.

³ We cite to the English translation, provided as Exhibit 1008. *See* Ex. 1008, 1 (certificate of translation). The original Japanese-language publication was filed as Exhibit 1007.

Gerard et al., U.S. Patent Application No. 2006/0080007 A1, filed Oct. 12, 2004, published Apr. 13, 2006 (Ex. 1009, “Gerard”); and

Heinle, U.S. Patent Application No. 2005/0109051 A1, filed Nov. 24, 2004, published May 26, 2005 (Ex. 1010, “Heinle”).

Petitioner submits the Declaration of Mahdi Shahbakhti, Ph.D. (Ex. 1003), the Supplemental Declaration of Mahdi Shahbakhti, Ph.D. (Ex. 1016), the Reply Declaration of Mahdi Shahbakhti, Ph.D. (Ex. 1018), and the October 24, 2019, deposition of Jay B. Ross (Ex. 1017).

Patent Owner submits the Declaration of Jay B. Ross (Ex. 2005), the July 18, 2019, deposition of Mahdi Shahbakhti, Ph.D. (Ex. 2004), and the December 3, 2019, deposition of Mahdi Shahbakhti, Ph.D. (Ex. 2009).

F. Asserted Grounds of Unpatentability

We instituted an *inter partes* review based on the following grounds (Dec. on Inst. 8, 31–32):

Claim(s) Challenged	35 U.S.C. §⁴	References/Basis
1–4, 6, 7, 9–11, 13–22	103	Kadota, Hirokazu
5	103	Kadota, Hirokazu, Hotta
8	103	Kadota, Hirokazu, Gerard
12	103	Kadota, Hirokazu, Heinle
23	103	Kadota, Heinle

⁴ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. § 103. Because the application from which the ’237 patent issued was filed before March 16, 2013, the effective date of the relevant amendment, the pre-AIA version of § 103 applies.

II. DISCUSSION

A. *Claim Construction*

The Petition was filed October 31, 2018, prior to the effective date of the rule change that replaced the broadest reasonable interpretation standard. *See* Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings Before the Patent Trial and Appeal Board, 83 Fed. Reg. 51,340 (Oct. 11, 2018). We, therefore, apply the broadest reasonable interpretation standard in this proceeding. As such, the claim terms of the '237 patent are given their broadest reasonable interpretation in light of the specification. 37 C.F.R. § 42.100(b) (2018). “Under a broadest reasonable interpretation, words of the claim must be given their plain meaning, unless such meaning is inconsistent with the specification and prosecution history.” *TriVascular, Inc. v. Samuels*, 812 F.3d 1056, 1062 (Fed. Cir. 2016).

We determine that no claim term requires express construction for purposes of this Decision. *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (“[W]e need only construe terms ‘that are in controversy, and only to the extent necessary to resolve the controversy.’” (citing *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))); *see* Pet. 12 (“Petitioner believes that no claim terms require construction.”); *see generally* PO Resp. (silent as to claim construction). *But see* Pet. Reply 2–8 (arguing Patent Owner’s argument turns on claim construction); PO Sur-reply 2 (“Patent Owner’s argument, thus, does not depend at all on a construction of the term ‘grid power.’”).

B. Principles of Law

A claim is unpatentable under 35 U.S.C. § 103(a) if “the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) objective evidence of nonobviousness.⁵ *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). When evaluating a combination of teachings, we must also “determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.” *KSR*, 550 U.S. at 418 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)). Whether a combination of elements would have produced a predictable result weighs in the ultimate determination of obviousness. *Id.* at 416–417.

In an *inter partes* review, the petitioner must show with particularity why each challenged claim is unpatentable. *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016); 37 C.F.R. § 42.104(b). The burden of persuasion never shifts to Patent Owner. *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015). To

⁵ No objective evidence of nonobviousness has been introduced into the record in this proceeding.

prevail, Petitioner must support its challenge by a preponderance of the evidence. 35 U.S.C. § 316(e) (2012); 37 C.F.R. § 42.1(d).

We analyze the challenges presented in the Petition in accordance with the above-stated principles.

C. Level of Ordinary Skill in the Art

Petitioner cites the testimony of Dr. Shahbakhti to support its contention that a person of ordinary skill in the art would have had “at least a bachelor’s degree in mechanical or controls engineering and 1–2 years [of] work experience with air-conditioning control engineering or equivalent graduate study,” and would “have taken classes or work experience in thermodynamics and control-system design” such that the ordinarily skilled artisan would have understood the “interplay between air temperature, heat transfer, and control systems at play in the air-conditioning systems described in the ’237 patent and the prior art.” Pet. 12 (citing Ex. 1003 ¶ 47; quoting Ex. 1003 ¶ 48).

“Patent Owner does not take a position” as to the appropriate level of skill in the art and instead “addresses Petitioner’s arguments in accordance with the Board’s agreement with and adoption of Petitioner’s definition.” PO Resp. 1–2; Ex. 2005 ¶¶ 1–14 (adopting the definition of Dr. Shahbakhti).

We agree with and adopt Petitioner’s identification of the appropriate level of skill in the art, which is consistent with the level of ordinary skill in the art reflected in the prior art of record and the testimony of Dr. Shahbakhti and Mr. Ross. Ex. 1003 ¶¶ 47–48; Ex. 2005 ¶¶ 12–14.

*D. Obviousness over the Combined Teachings of
Kadota and Hirokazu*

Petitioner contends that claims 1–4, 6, 7, 9–11, and 13–22 of the '237 patent would have been obvious over the combined teachings of Kadota and Hirokazu. Pet. 14–72. Patent Owner disagrees. PO Resp. 2–30.

1. Overview of Kadota (Ex. 1005)

Kadota is titled “Air conditioning device for electric vehicle,” and discloses a system to “accomplish advance air conditioning inside a vehicle . . . while accomplishing charging of the battery.” Ex. 1005, 2–3.

Kadota’s Figures 1 and 2 are reproduced below.

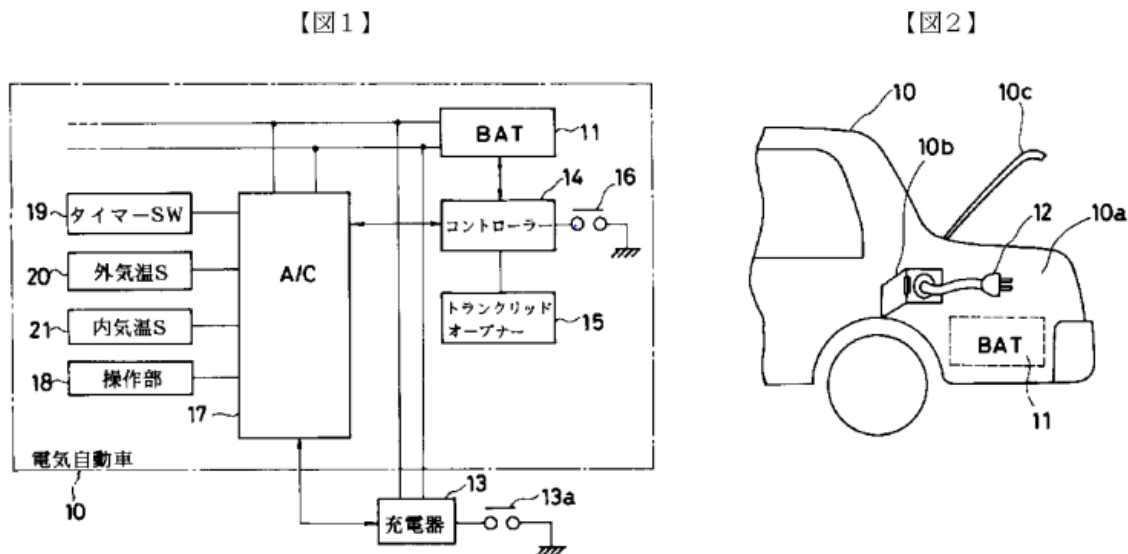


Figure 1 (left) and Figure 2 (right) depict electric vehicle 10, in functional and illustrated forms, respectively. *Id.* at 11, 13. Vehicle 10 includes battery 11 and connector 12, where connector 12 connects to charger 13 to recharge battery 11. *Id.* ¶ 9. Vehicle 10 also includes air conditioning device 17, which “comprises a commonly known air conditioning unit capable of heating and cooling, and a control unit.” *Id.* ¶ 10. A desired

cabin temperature (T_{ptc}) is set by operation unit 18. *Id.* Vehicle 10 also includes timer switch 19, outside air temperature sensor 20 (T_{amb}), and cabin air temperature sensor 21 (T_{inc}). *Id.*

Kadota discloses advance air conditioning of the vehicle. *Id.* at Fig. 5. First, the system obtains the “operation start forecast time t_1 of the electric vehicle,” i.e., the desired time of vehicle use, as entered by an occupant through timer switch 19. *Id.* ¶ 14, Fig. 5 (S22). Next, the outside air temperature and the cabin temperature are detected by sensors 20, 21. *Id.* ¶ 14,⁶ Fig. 5 (S23). Then,

the advance air conditioning time t for the cabin temperature T_{inc} to reach the cabin temperature setting value T_{ptc} if advance air conditioning is started from the current time $t_x (=0)$ is calculated, as shown in FIG. 6, on the basis of the detected outside air temperature $T_{[amb]}$ and cabin temperature T_{inc} , and the cabin temperature setting value T_{ptc} set by the operation unit 18 by an occupant.

Id. ¶ 14, Fig. 5 (S24); *see also id.* ¶ 15 (discussing power requirements). If controller 14 gives permission,⁷ advance air conditioning begins when the current time matches the air conditioning start time. *Id.* ¶ 16, Fig. 5 (S26–29).

⁶ Kadota includes an apparent typographical error, in that “the outside air temperature” is twice identified as T_{ptc} instead of T_{amb} in paragraph 14.

⁷ Kadota explains that advance conditioning is permitted only if charger 13 has a sufficient power rating to permit *both* advance air conditioning *and* recharging of the battery. *Id.* ¶¶ 13, 15, Fig. 4. In other words, “the sum of the electric power P_B necessary for charging and the electric power P_{AC} necessary for advance air conditioning cannot exceed the maximum rating power P of the charger 13.” *Id.* ¶ 13.

2. Overview of Hirokazu (Ex. 1008)

Hirokazu is titled “Air conditioner control device,” and discloses an air conditioner that “operates prior to the driver starting to drive, so that the cabin temperature becomes a suitable temperature when driving starts.” Ex. 1008, 3; *see also id.* ¶ 37 (air conditioning operating when connected to a charger or when battery has sufficient capacity). Hirokazu explains that the air conditioner device includes “operation pattern memory means for storing in memory an operation pattern of a vehicle; and setting means for setting a set value indicating the operation time of the air conditioner, on the basis of the operation pattern.” *Id.* ¶ 10. Thus, through “fuzzy controls and learning controls on the weekly driving patterns of each individual driver,” Hirokazu’s device can “change the operating time of the air conditioner in conjunction with the vehicle operation pattern.” *Id.* ¶¶ 11–14. This avoids problems associated with the use of remote controls and timers to set the air conditioning start time. *Id.* ¶ 14; *see also id.* ¶¶ 6–7.

Additionally, Hirokazu explains that once air conditioning is initiated in this manner, the air conditioner will continue to operate without change, as a normal air conditioner, if the vehicle is started within a fixed time of the assumed start-up time. *Id.* ¶ 45. Alternatively, the air conditioner will stop automatically if “driving of the electric vehicle is not accomplished even when the assumed start-up time has passed by a fixed amount.” *Id.* ¶ 46

3. Independent Claim 1

Petitioner contends that claim 1 would have been obvious over the combined teachings of Kadota and Hirokazu. Pet. 14–27; Pet. Reply 2–20. Petitioner relies upon Kadota for the majority of claim limitations (Pet. 14–

25), and relies upon Hirokazu for the limitation regarding transmitting a deactivation signal if the vehicle is not activated within a predetermined time (*id.* at 26–27). Petitioner contends that a person of ordinary skill in the art would have been motivated to combine this feature of Hirokazu’s system with Kadota. *Id.* at. 27.

Regarding claim 1, Patent Owner argues that Kadota does not disclose or suggest the claimed power connector, temperature control loop, or activation signal. PO Resp. 2–24; PO Sur-reply 1–6.

i. Claim 1: “A vehicle comprising”

Petitioner contends that Kadota teaches the subject matter of the preamble of claim 1. Pet. 14–15. Patent Owner does not dispute this position. PO Resp. 2–24. We are persuaded by Petitioner’s undisputed contention.⁸ Kadota discloses electric vehicle 10. Ex. 1005 ¶ 9, Fig. 2; *see also* Ex. 1003 ¶¶ 65–67.

ii. “a power connector configured to mate with an electrical power grid receptacle and receive a grid power therefrom”

Petitioner contends that Kadota teaches this limitation of claim 1. Pet. 15–16. Petitioner contends that Kadota’s “connector 12 ‘is pulled out and connected to a charger 13.’” *Id.* (quoting Ex. 1005 ¶ 9; citing Ex. 1005, Fig. 2). Relying on Dr. Shahbakhti’s testimony, Petitioner contends that a person of ordinary skill in the art “would understand this pronged electrical connector 12 mates with a receptacle that receives grid power,” where the grid is “an interconnected network of electrical sources and consumers from

⁸ We need not decide whether the claim preamble is limiting because Petitioner has shown that it is satisfied by the prior art.

which power to charge electric and hybrid vehicles is commonly drawn.”
Id. at 16 (quoting Ex. 1003 ¶ 70; citing Ex. 1003 ¶ 71).

Patent Owner disputes Petitioner’s position. PO Resp. 2–12. According to Patent Owner, the electrical grid provides alternating current (AC) electric power and, consequently, the claimed “‘electrical power grid receptacle’ outputs AC power.” *Id.* at 3. Because vehicle batteries, such as Kadota’s battery 11, operate on direct current (DC) electric power, Patent Owner explains that AC power must be converted to DC power to charge a vehicle battery. *Id.* at 4–5. According to Patent Owner, Kadota does not disclose any conversion components between its battery 11 and charger 13, which indicates that charger 13 must be producing DC power. *Id.* at 5–6 (citing, e.g., Fig. 1). As such, Patent Owner contends charger 13 cannot be an “electrical power grid receptacle” because it outputs DC power and, accordingly, connector 12 cannot be a “power connector configured to mate with an electrical power grid receptacle.” *Id.* at 6–7. Patent Owner also argues that charger 13 also cannot be the recited power connector, because it is external to the vehicle. *Id.* at 7.

Patent Owner also argues that Kadota does not mention grid power, and Kadota’s Figure 1 depicts charger 13 as connecting only to the vehicle and to a chassis ground. *Id.* at 7–8. Patent Owner argues that Petitioner fails to explain why, in light of Figure 1, a person of ordinary skill in the art would have understood that charger 13 necessarily connects to grid power, and that Dr. Shahbakhti’s testimony is conclusory. *Id.* at 8–9; *see also id.* at 9–12 (arguing Petitioner bears the burden of proof and expert testimony cannot take the place of affirmative prior art disclosures).

We have considered the parties’ arguments and cited evidence, and we are persuaded by Petitioner’s contentions. Kadota discloses that power connector 12 extends from the vehicle and mates with charger 13, to receive electrical power to recharge battery 11. Ex. 1005 ¶¶ 9 (explaining that “battery 11 . . . supplies electric power” to the vehicle and “connector 12 is connected to the battery 11, and during charging . . . is pulled out and connected to a charger 13”), 12, Figs. 1–2. Although Kadota does not use the phrase “electrical power grid” or depict the grid in its figures, we credit Dr. Shahbakhti’s testimony that “a person of ordinary skill in the art would understand that Kadota’s vehicle connects with, and receives power from, the electrical power grid,”⁹ as was common practice. Ex. 1003 ¶¶ 68–70 (citing Ex. 1005 ¶ 9, Fig. 1). Dr. Shahbakhti explains that “connector 12 mates with a receptacle that receives grid power. Power flows from the grid, through the charger and connector, to Kadota’s vehicle.” *Id.* ¶ 71. Dr. Shahbakhti does not suggest that Kadota’s vehicle *might* connect to the grid, but testifies that it does so. *Id.* ¶¶ 68 (“connects with”), 71 (“mates with”).

Dr. Ross appears to agree that electric vehicle batteries are recharged using grid power. Ex. 1017, 52:11–17 (Dr. Ross agreeing that “[u]sing the grid to provide electrical power to the vehicle . . . is the predominant way that electric vehicles . . . have their batteries recharged”); Ex. 2005 ¶ 22 (Dr. Ross opining that “AC power can be used to charge car batteries, [but] it must first be converted to DC power”). Dr. Ross offers no opinion as to

⁹ For consistency throughout this Decision, we omit the italic typeface utilized by Petitioner in its briefing, when referring to reference names.

any other, non-grid source for electric vehicle battery charge, and we discern no other non-grid source in the record. Ex. 1017, 50:17–51:4.

We do not agree that Dr. Shahbakhti’s testimony should be disregarded simply because Kadota does not disclose grid power explicitly, or because Figure 1 depicts charger 13 connecting only to the vehicle and a chassis ground. PO Resp. 7–9. Kadota’s Figure 1 is a functional block diagram that does not depict all aspects of Kadota’s system. Ex. 1005 ¶ 9. For example, Figure 1 does not depict connector 12 or the control unit of air conditioning device 17. *Id.* ¶¶ 9–10, Figs. 1–2. Accordingly, we do not agree that the absence of an expressly depicted grid connection would have led an ordinarily skilled artisan to conclude that a grid connection is not inherent. Indeed, Dr. Shahbakhti considered this figure and nonetheless concluded that an ordinarily skilled artisan would have understood that Kadota’s vehicle receives grid power to recharge the battery. Ex. 1003 ¶¶ 65 (considering Figure 1), 68, 71. Dr. Ross does not provide any contrary testimony. *See* Ex. 2005 ¶¶ 15–27 (providing no opinion as to the understanding of an ordinarily skilled artisan with regard to the depicted connections).

We also have considered Patent Owner’s argument, and Dr. Ross’ testimony, that charger 13 and connector 12 output DC power and, accordingly, cannot be an “electrical power grid receptacle” and a “power connector configured to mate with an electrical power grid receptacle,” respectively, because no intervening components, such as an AC/DC converter, are depicted in Figure 1. PO Resp. 3–7; Ex. 2005 ¶¶ 21–25. We disagree. This argument turns on the absence of disclosed conversion components between Kadota’s charger 13 (coupled to the electrical grid) and

battery 11. However, as discussed above, Figure 1 is an incomplete functional block diagram. Ex. 1005 ¶ 9. “It is well-established . . . that a specification need not disclose what is well-known in the art.” *Streck, Inc. v. Research & Diagnostic Sys., Inc.*, 665 F.3d 1269, 1288 (Fed. Cir. 2012) (citing *Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1384 (Fed. Cir. 1986) (“[A] patent need not teach, and preferably omits, what is well known in the art.”)).

Moreover, evidence of record demonstrates that battery chargers, including vehicle battery chargers, were well known in the art and necessarily include an AC/DC converter. For example, Patent Owner’s cited evidence shows that in “every [battery] charging system[,] . . . [a] diode (also called a rectifier) arrangement *must be included* to convert the ac voltage . . . to a fixed dc level.” Ex. 2007, 103 (emphasis altered from original); *see also* Ex. 1010 ¶ 19 (“[T]he voltage converter 10 [is] used . . . to convert the alternating current to a direct current.”).

Likewise, the ’237 patent also does not disclose or depict explicitly an AC/DC converter between electrical power grid receptacle 16 and battery 18. Ex. 1001, Fig. 1. Thus, by Patent Owner’s reasoning, electrical power grid receptacle 16 of the ’237 patent *also* would output DC power, because converter components are not disclosed expressly between the grid receptacle 16 and battery 18. *See* PO Resp. 3–7. However, Patent Owner’s declarant, Dr. Ross, confirms that this is not the case. Dr. Ross opines that a person of ordinary skill in the art would have understood that conversion components are included between the electrical power grid receptacle and the battery, even though they are not depicted. Ex. 1017, 55:8–56:5, 57:1–19. During his deposition, Dr. Ross illustrated where such a

charger/converter would be located, in an annotated version of Figure 1 of the '237 patent (Ex. 1015), reproduced below. *Id.* at 56:6–12.

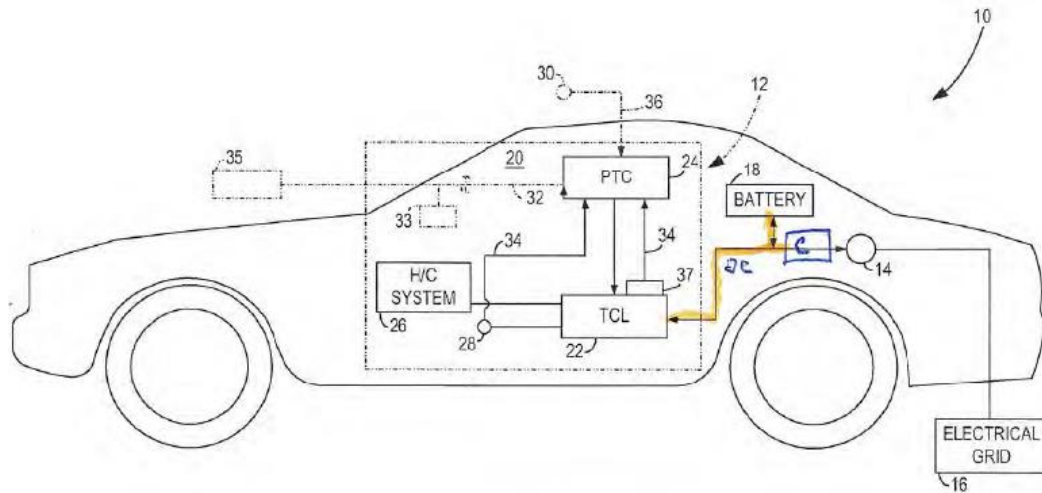


FIG. 1

Exhibit 1015 is a version of Figure 1 of the '237 patent, which depicts a vehicle that includes a temperature control system, annotated by Dr. Ross to depict a charger/converter added to the figure as a blue box with the letter “c,” between battery 18 and power connector 14/electrical power grid receptacle 16. Ex. 1017, 55:8–56:5; Ex. 1001, 2:65–67. Exhibit 1015 also depicts in orange highlighting, as annotated by Dr. Ross, the portions of the figure that are “operating in direct current,” after the added charger/converter. *Id.* at 58:3–59:16.

Thus, although an AC/DC converter is not depicted expressly in Kadota’s Figure 1, we discern that an ordinarily skilled artisan would have understood that conversion nonetheless occurs between the electrical power grid receptacle and the battery, as well known and necessary to convert AC grid power to DC battery charging power. Accordingly, we do not agree with Patent Owner that Kadota’s charger 13 must output DC power, and

cannot be an electrical power grid receptacle. As directly analogous to the structures disclosed in the '237 patent, we are persuaded that Kadota's connector 12 is a "power connector" that is "configured to mate with an electrical power grid receptacle," namely Kadota's charger 13, "and receive a grid power therefrom," as claimed. Additionally, Petitioner asserts, and we agree, that Kadota at least suggests that such a connection would have been obvious to a person of ordinary skill in the art. *See, e.g.*, Ex. 1003 ¶¶ 68–72; Ex. 1017, 50:17–52:17; Ex. 2005 ¶ 22; Inst. Dec. 14.

For the foregoing reasons, we are persuaded by Petitioner's contentions and find that Kadota teaches or suggests this limitation of claim 1.

iii. "a heating and cooling system electrically connected to the power connector to receive grid power therefrom and configured to modify a temperature in a cabin of the vehicle"

Petitioner contends that Kadota teaches this limitation of claim 1. Pet. 16–17. Patent Owner does not dispute this position. PO Resp. 2–24. We are persuaded by Petitioner's undisputed contention. Kadota discloses air conditioning device 17 for heating and cooling the vehicle cabin, which connects to, and receives power from, charger 13. Ex. 1005 ¶¶ 6, 9–10 ("[A]ir conditioning device 17 is connected to the charger 13 . . ."), Fig. 1; *see also* Ex. 1003 ¶¶ 73–77 (explaining the same).

iv. "a temperature control loop configured to selectively activate and control the heating and cooling system"

Petitioner contends that Kadota teaches this limitation of claim 1. Pet. 18. According to Petitioner, Kadota's air conditioning device 17 includes "a 'commonly known air conditioning unit capable of heating and cooling' and a 'control unit.' It is 'capable of heating and cooling . . . so that

the cabin temperature becomes a preset temperature.” *Id.* (quoting Ex. 1005 ¶¶ 6, 10). Petitioner also relies upon Dr. Shahbakhti’s testimony that Kadota’s air-conditioning device “must include a temperature control loop to allow it to automatically bring the cabin air temperature to this desired cabin temperature by activating the air-conditioning unit.” *Id.* (quoting Ex. 1003 ¶ 80). Moreover, Petitioner relies upon Dr. Shahbakhti’s testimony that a person of ordinary skill in the art would have understood that Kadota’s temperature control unit includes software that compares the current, measured cabin temperature to the desired cabin temperature, and that the software is located within the control unit of Kadota’s air conditioning device 17. *Id.* ¶ 81 (citing Ex. 1005 ¶ 10); Pet. 18; *see infra* n.8.

Patent Owner disputes Petitioner’s position. PO Resp. 12–19. Patent Owner argues that “Petitioner makes no attempt to point to anything within Kadota itself that actually discloses a temperature control loop, nor does Petitioner rely on any other reference.” *Id.* at 13 (arguing Dr. Shahbakhti also fails to identify where Kadota discloses a temperature control loop). Patent Owner also argues that Dr. Shahbakhti provides only conclusory testimony that fails to explain *why* a temperature control loop must exist. *Id.* at 13–14 (citing *DDS Tech. Mgmt., Inc. v. Apple Inc.*, 885 F.3d 1367, 1374–75 (Fed. Cir. 2018)). According to Patent Owner, Petitioner relies impermissibly on its declarant to fill gaps in Kadota’s teachings. *Id.* at 14; *see also* PO Sur-reply 3–4 (asserting the same).

Patent Owner also alleges that Dr. Shahbakhti defines a temperature control loop as “a ‘loop’ of control unit steps that selectively activates heating and cooling system components to a desired target temperature,” and

that Kadota does not meet this definition. PO Resp. 14. Patent Owner argues that Kadota's step S29 in Figure 5 occurs after the control unit exits all possible loops. *Id.* at 15–16. According to Patent Owner, “Kadota discloses nothing further about how the air conditioner is controlled once it is started at step S29, except a circumstance in which Kadota later determines that it no longer can cool to the desired temperature with the available power,” in which case “the system gives up on achieving a desired cabin temperature and instead ‘controls’ the ‘advance air conditioning capability’ to avoid exceeding the available power.” *Id.* at 16–17. Patent Owner argues that because Kadota controls the air conditioner to a power limit and not to a desired target temperature, at least in this circumstance, Kadota does not meet Dr. Shahbakhti's definition of a temperature control loop. *Id.* at 17–18; *see also* PO Sur-reply 4–5.

We have considered the parties' arguments and cited evidence, and we are persuaded by Petitioner's contentions. Patent Owner does not dispute that the functional aspects of this limitation are taught by Kadota, namely that Kadota's system activates and controls the heating and cooling system. Tr. 29:2–30:2 (Patent Owner's counsel stating, “[T]hat Kadota shows the turning on of air conditioning is not disputed.”). This is consistent with Kadota's disclosure of “an electric vehicle air conditioning device comprising an air conditioning means 17 capable of heating and cooling, and accomplishing air conditioning inside a vehicle cabin so that the cabin temperature becomes a preset temperature.” Ex. 1005 ¶ 6. Rather, the parties' dispute involves whether this function is accomplished by a “temperature control loop.”

Although Kadota does not utilize the exact terminology of a temperature control loop, we credit Dr. Shahbakhti's *undisputed* testimony that a person of ordinary skill in the art would have understood that such a loop is necessarily present in Kadota, i.e., it is inherent. Ex. 1003 ¶ 80. Dr. Shahbakhti explains that temperature control loops were well known and commonly installed before 2009. *Id.* ¶ 33. Dr. Shahbakhti supports this opinion with a 2004 textbook that describes an exemplary "simple closed loop feedback system" for heating and cooling, in which a controller compares current, measured temperatures (from sensors) to a desired cabin temperature (from a temperature control switch), to appropriately heat or cool the vehicle. *Id.* (citing Ex. 1012, 358). Dr. Shahbakhti also explains that a person of ordinary skill in the art would have understood that "any vehicle air-conditioning system with an automatic temperature-control option *necessarily includes* a temperature control loop" to "selectively activate[] the heating and cooling system components to a desired target temperature." *Id.* (emphasis added; citing Ex. 1012, 358).

It is with this supporting background that Dr. Shahbakhti testifies that, consistent with well-known practice, "Kadota's air-conditioning device 17 *must include* a temperature control loop to allow it to automatically bring the cabin air temperature to this desired cabin temperature by activating the air-conditioning unit. The device includes software (control logic) that compares the current measured cabin temperature to the user-set desired cabin temperature." *Id.* ¶ 80 (emphasis added). Dr. Shahbakhti also testifies that an ordinarily skilled artisan would have understood that the temperature control loop software is located within Kadota's control unit. *Id.* ¶¶ 80–81;

see also id. ¶¶ 34–35 (asserting the same); *see infra* n.8. Patent Owner does not present declarant testimony to dispute *any* of these positions.

Accordingly, Patent Owner’s criticism that neither Kadota nor any other reference expressly teach this limitation is misplaced. PO Resp. 13. As discussed above, Dr. Shahbakhti testifies that Kadota *must include* a temperature control loop; in other words, Dr. Shahbakhti testifies that this feature is inherent. Ex. 1003 ¶ 80; *Cont’l Can Co. USA, Inc. v. Monsanto Co.*, 948 F.2d 1264, 1268 (Fed. Cir. 1991) (“[The] evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill.”). As such, Petitioner does not engage in impermissible gap filling, as Patent Owner alleges. PO Resp. 14. Rather, Petitioner and Dr. Shahbakhti show that this feature is disclosed inherently by Kadota.

Additionally, and contrary to Patent Owner’s argument, Dr. Shahbakhti testifies *why* a temperature control loop must exist: “to automatically bring the cabin air temperature to this desired cabin temperature,” by comparing actual and desired cabin temperatures. Ex. 1003 ¶ 80; PO Resp. 14. Patent Owner does not present any evidence to suggest that cabin air temperature is brought to the desired temperature in any other manner.

We also do not agree with Patent Owner’s argument that Kadota does not include a temperature control loop because, in the event of insufficient power capacity, “the system gives up on achieving a desired cabin temperature.” PO Resp. 16–18; PO Sur-reply 4–5.¹⁰ Dr. Shahbakhti

¹⁰ It is not dispositive that the temperature control loop is not depicted expressly in Figure 5. PO Resp. 14–15. As Petitioner notes, step S29

explains that a person of ordinary skill in the art would have recognized that Kadota includes temperature control loop software that, during normal operation, “compares the current measured cabin temperature to the user-set desired cabin temperature” in order to “automatically bring the cabin air temperature to this desired cabin temperature by activating the air-conditioning unit.” Ex. 1003 ¶ 80; *see also id.* ¶ 33 (“selectively activat[ing] heating and cooling system components to a desired target temperature”). This testimony describes “a ‘loop’ of control unit steps that selectively activates heating and cooling system components to a desired target temperature”—a temperature control loop, as defined by Dr. Shahbakhti. PO Resp. 14.

We do not agree that the atypical operating circumstance identified by Patent Owner necessitates a different result. PO Resp. 17–18; *see also* PO Sur-reply 4–5 (asserting the same). At paragraph 17, Kadota describes a case where, due to “changes in the outside air temperature,” the “advance air conditioning capability [is] controlled so that the sum of the charging power PB and the advance air conditioning power PAC never exceeds the maximum rating power of the charger”; in other words, Kadota controls air conditioning so that the power charger is not overloaded. Ex. 1003 ¶ 17. However, Patent Owner does not show why this atypical operating case would have precluded a person of ordinary skill in the art from understanding Kadota as including a temperature control loop. Indeed, Patent Owner offers no evidence of how an ordinarily skilled artisan would have understood this disclosure, other than citations to Dr. Shahbakhti’s

depicts the *activation* of the temperature control loop, not the loop itself. Pet. Reply 14.

deposition. PO Resp. 17–18 (citing Ex. 2004, 52:18–53:25). This deposition testimony, however, includes Dr. Shahbakhti’s opinion that Kadota “doesn’t say” that its “system is giving up trying to reach” the desired cabin temperature because, instead, “you can adjust to run with the lower power.” Ex. 2004, 52:18–53:25; *see also* Ex. 1003 ¶ 17 (explaining that air conditioning is controlled to not exceed the charger’s power rating). Thus, in the absence of any evidence showing that this operating case would have precluded a person of ordinary skill in the art from understanding Kadota as including a temperature control loop, we find Patent Owner’s assertion regarding this case in Kadota to be unpersuasive attorney argument. Additionally, Petitioner asserts, and we agree, that Kadota at least suggests that such a temperature control loop would have been obvious to a person of ordinary skill in the art. *See, e.g.*, Ex. 1003 ¶¶ 34–35, 78–82; Ex. 1012, 358.

For the foregoing reasons, we are persuaded by Petitioner’s contentions, supported by the unrebutted testimony of Dr. Shahbakhti, that Kadota teaches or suggests this limitation of claim 1.

v. *“a controller configured to: receive a first input signal comprising a desired vehicle activation time”*

Petitioner contends that Kadota teaches this limitation of claim 1. Pet. 19–21. Patent Owner does not dispute this position. PO Resp. 2–24. We are persuaded by Petitioner’s undisputed contention. Kadota discloses that the air conditioning device’s control unit receives an “operation start forecast time” (t_1). Ex. 1005 ¶¶ 7 (determining the time at which advance air conditioning will start based on, *inter alia*, the operation start forecast time), 10 (operation start forecast time set with timer switch 19), 14 (t_1), Fig. 5 (S22); *see also* Ex. 1003 ¶¶ 83–86, 89–90 (asserting the same).

vi. *“a controller configured to: . . . receive a second input signal comprising a starting vehicle cabin temperature and a desired vehicle cabin temperature”*

Petitioner contends that Kadota teaches this limitation of claim 1. Pet. 22–23. Patent Owner does not dispute this position. PO Resp. 2–24. We are persuaded by Petitioner’s undisputed contention. Kadota discloses that the air conditioning device’s control unit receives a desired “cabin temperature setting value” (T_{ptc}) and a current sensed cabin temperature (T_{inc}). Ex. 1005 ¶¶ 10 (T_{ptc} set with operation unit 18; T_{inc} sensed with sensor 21), 14 (same), Fig. 5 (S23–S24); see also Ex. 1003 ¶¶ 83–86, 91–94 (asserting the same).

vii. *“a controller configured to: . . . determine a temperature control loop activation time based on the first and second input signals, the temperature control loop activation time being a time prior to the desired vehicle activation time”*

Petitioner contends that Kadota teaches this limitation of claim 1. Pet. 24–25. Patent Owner does not dispute this position. PO Resp. 2–24. We are persuaded by Petitioner’s undisputed contention. Kadota discloses that the air conditioning device’s control unit determines an “advance air conditioning start time” (t) based on the operation start forecast time (t_1), the desired “cabin temperature setting value” (T_{ptc}), and the current sensed cabin temperature (T_{inc}), and determines when time (t) has been reached. Ex. 1005 ¶¶ 14, 16, Fig. 5 (S28); see also Ex. 1003 ¶¶ 83–86, 95–98 (asserting the same).

viii. *“a controller configured to: . . . transmit an activation signal to the temperature control loop at the temperature control loop activation time to activate the heating and cooling system”*

Petitioner contends that Kadota teaches this limitation of claim 1. Pet. 25. According to Petitioner, “once the time for advance air conditioning

arrives, Kadota's process 'advances to step S29 and advance air conditioning is started' Kadota's controller begins air conditioning by transmitting an activation signal to its temperature control loop." *Id.* (citing Ex. 1005 ¶ 16, Fig. 5; Ex. 1003 ¶¶ 99–101). In support of these contentions, Petitioner relies upon Dr. Shahbakhti's testimony that an ordinarily skilled artisan "would understand the controller begins air conditioning by transmitting an activation signal to the temperature control loop. The temperature control loop, in turn, activates the heating and cooling system to bring the cabin temperature to a desired temperature." Ex. 1003 ¶ 100.

Patent Owner disputes Petitioner's position. PO Resp. 19–24. Patent Owner argues that Dr. Shahbakhti provides only conclusory testimony and fails to explain why a person of ordinary skill in the art would have understood Kadota's controller to transmit an activation signal, and that Kadota does not support such an understanding. *Id.* at 20, 22. Patent Owner argues that Kadota's Figure 5, at step S29, is carried out by the control unit of the air conditioning device. Thus, because Petitioner argues that Kadota's temperature control loop software is located within the control unit,¹¹ Patent Owner contends:

[B]y Petitioner's reasoning, the control unit on air conditioning device 17 is both configured to transmit an activation signal to the temperature control loop and also run the temperature control loop. But if that is the case, the control unit in air conditioning

¹¹ We do not agree with Patent Owner's argument that Petitioner fails to comply with 37 C.F.R. § 42.104(b)(4) by presenting an alternate contention that the temperature control loop could be located in another vehicle controller. PO Resp. 20–21. During the oral hearing, Petitioner indicated that it is not relying upon that contention. Tr. 10:6–22. In addition, Patent Owner's arguments are moot. PO Resp. 22.

device 17 would not be transmitting an activation signal to anywhere; it would simply be performing both steps itself.

Id. at 20–21; *see also* PO Sur-reply 5–6 (asserting the same).

In its Reply, Petitioner contends that Patent Owner’s position “rests solely on attorney argument,” as Patent Owner did not offer any contrary declarant testimony. Pet. Reply 17, 19. Additionally, Petitioner contends that the claims do not require the temperature control loop software to be separate from the controller, as Patent Owner’s argument presumes. *Id.* at 19. According to Petitioner, Patent Owner fails to demonstrate “that one piece of computer software cannot transmit an activation signal to another piece of computer software.” *Id.*

In its Sur-reply, Patent Owner counters that it is irrelevant whether Kadota’s controller and temperature control loop are housed together because, in either circumstance, Petitioner has not explained why the controller must be configured to transmit an activation signal to the temperature control loop. PO Sur-reply 5.

We have considered the parties’ arguments and cited evidence, and we are persuaded by Petitioner’s contentions. Patent Owner does not dispute that the functional aspects of this limitation are taught by Kadota, i.e., that, at the activation time, Kadota’s heating and cooling system is activated by the control unit. Tr. 29:20–30:2. This is consistent with Kadota’s disclosure that “[i]f the advance air conditioning start time has been reached, the process advances to step S29 and advance air conditioning is started,” to bring the cabin temperature toward the desired temperature, T_{ptc} . Ex. 1005 ¶¶ 6, 10, 16. Rather, the parties’ dispute involves whether

this function is achieved through the transmission of an activation signal from the controller to the temperature control loop.

Although Kadota does not describe an activation signal explicitly, we credit Dr. Shahbakhti's *undisputed* testimony that a person of ordinary skill in the art would have understood that an activation signal is transmitted from Kadota's controller to the temperature control loop, to begin the functional process described by Kadota. Ex. 1003 ¶ 100. Dr. Shahbakhti explains that temperature control loops were well known and were necessarily present in "any vehicle air-conditioning system with an automatic temperature-control option," including Kadota, "to automatically bring the cabin air temperature to th[e] desired cabin temperature by activating the air-conditioning unit." *Id.* ¶¶ 33 (citing Ex. 1012, 358), 80. Dr. Shahbakhti also explains that Kadota's temperature control loop includes software, and an ordinarily skilled artisan would have understood that Kadota's temperature control loop software is located within Kadota's control unit. *Id.* ¶¶ 80–81; *see also id.* ¶¶ 34–35 (asserting the same); *see supra* n.8. Patent Owner does not present declarant testimony to dispute any of these positions.

In light of this unrebutted testimony regarding the understanding of a person of ordinary skill in the art, we are persuaded by Petitioner's contention that Kadota's control unit transmits an activation signal to its temperature control loop, in order to begin the undisputed function of activating the heating and cooling system. Pet. 25. We have considered Patent Owner's argument that Dr. Shahbakhti's testimony does not explain *why* a person of ordinary skill in the art would have understood an activation signal to be present, but we disagree. PO Resp. 20. Dr. Shahbakhti explains that Kadota's controller transmits an activation signal to "begin[] air

conditioning” where, upon receipt of this signal, the temperature control loop activates the heating and cooling system. Ex. 1003 ¶¶ 99–100. This testimony is consistent with Kadota’s functional disclosure. Ex. 1005 ¶ 16. Patent Owner’s criticisms in this regard are merely attorney argument, because Patent Owner does not provide any contrary testimony as to the understanding of a person of skill in the art.

We also have considered Patent Owner’s concern that if the temperature control unit software is co-located with the control unit, then “the control unit in air conditioning device 17 would not be transmitting an activation signal to anywhere; it would simply be performing both steps itself,” i.e., the control unit would both “transmit an activation signal to the temperature control loop and also run the temperature control loop.” PO Resp. 20–21. We do not agree with this argument. Patent Owner does not provide any evidence or reasoning to dispute that the control unit operates as Dr. Shahbakhti testifies, i.e., that the temperature control loop is located in software within Kadota’s control unit (Ex. 1003 ¶ 81); that the control unit transmits an activation signal to that temperature control loop (*id.* ¶ 100); or that that temperature control loop then activates the heating and cooling system to reach the desired temperature (*id.*). Indeed, we discern that the operation of software necessarily involves the transmission of command signals within the microprocessor. Tr. 30:4–31:3.

For the foregoing reasons, we are persuaded by Petitioner’s contentions, supported by the un rebutted testimony of Dr. Shahbakhti, that Kadota teaches this limitation of claim 1.

ix. *“a controller configured to: . . . determine if the vehicle is activated at the desired vehicle activation time or within a pre-determined time thereafter; and if the vehicle is not activated at the desired vehicle activation time or within the pre-determined time thereafter, then transmit a deactivation signal to the temperature control loop to deactivate the heating and cooling system”*

Petitioner contends that Hirokazu teaches this limitation of claim 1. Pet. 26–27. Patent Owner does not dispute this position. PO Resp. 2–24. We are persuaded by Petitioner’s undisputed contention. Hirokazu teaches that its air conditioner stops automatically if the vehicle is not started “when the assumed start-up time has passed by a fixed amount.” Ex. 1008 ¶ 46, Abstr., Fig. 3; *see also* Ex. 1003 ¶¶ 83–86, 102–107 (asserting the same).

x. *Rationale to Combine*

Petitioner contends that a person of ordinary skill in the art would have found it obvious to include Hirokazu’s teaching of a shut-off timer into Kadota to “conserve energy and save money.” Pet. 26–27 (quoting Ex. 1003 ¶ 112; citing Ex. 1003 ¶¶ 108–116). Petitioner contends that “[i]nstead of allowing pre-heating and pre-cooling to proceed indefinitely, the ordinarily skilled artisan would ‘want to stop using grid electricity if the driver did not use the vehicle close to its scheduled time.’ Making this change[] would require only ‘minor modification’ to Kadota’s system.” *Id.* (quoting Ex. 1003 ¶¶ 112, 116); *see also id.* at 71–72 (additional reasoning). In its Response, Patent Owner does not dispute Petitioner’s contention. PO Resp. 2–24.

We are persuaded by Petitioner’s undisputed contention. We credit Dr. Shahbakhti’s un rebutted testimony that a person of ordinary skill in the art would have recognized “efficiency and convenience benefits” in applying Hirokazu’s teaching of stopping pre-heating or pre-cooling when the vehicle

is not started within a predetermined period of time. Ex. 1003 ¶ 111. As Dr. Shahbakhti recognizes, continuing to operate the air conditioning unit indefinitely until the vehicle is started can result in useless power consumption, wasting energy and money. *Id.* ¶ 112. We discern that conservation of resources, i.e., energy and/or money, is a plausible motivation to modify Kadota's disclosure. Moreover, Dr. Shahbakhti's testimony is supported by Kadota's disclosure. See Ex. 1005 ¶ 4 (explaining that, in the prior art, "the air conditioning device continues to operate from the time when charging of the battery has concluded until operation of the electric vehicle begins, creating the problem of useless electric power consumption"); see also *DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1368 (Fed. Cir. 2006) ("[A]n implicit motivation to combine exists . . . when the 'improvement' is technology-independent and the combination of references results in a product or process that is more desirable, for example because it is stronger, cheaper, cleaner, faster, lighter, smaller, more durable, or more efficient."); *KSR*, 550 U.S. at 416 ("The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.").

xi. Summary

For the foregoing reasons, we determine that Petitioner has met its burden of demonstrating by a preponderance of the evidence that claim 1 is unpatentable over Kadota and Hirokazu.

4. Independent Claim 22

Independent claim 22 includes many limitations that are substantially similar to those of independent claim 1, and Petitioner makes similar

contentions. Pet. 14–27, 29–32. Likewise, Patent Owner relies upon the same arguments discussed above regarding claim 1. PO Resp. 12, 19, 23. For the same reasons discussed above, we are persuaded by Petitioner’s contentions regarding these limitations.

Additionally, claim 22 recites a controller that is configured to “determine a pattern of past vehicle usage” and “generate a first input signal based on the pattern of past vehicle usage, the first input signal comprising a desired vehicle activation time,” wherein the controller determines the temperature control loop activation time based, in part, upon this signal. Ex. 1001, 12:7–18. Petitioner contends that Hirokazu teaches the subject matter of these limitations, and that a person of ordinary skill in the art would have been motivated to modify Kadota in view of Hirokazu’s teachings. Pet. 28–29, 71–72. Patent Owner does not present any arguments directed to these limitations. *See generally* PO Resp.

We are persuaded by Petitioner’s undisputed contentions. Hirokazu discloses an “air conditioner control device comprising: operation pattern memory means for storing in memory an operation pattern of a vehicle; and setting means for setting a set value indicating the operation time of the air conditioner, on the basis of the operation pattern.” Ex. 1008 ¶¶ 10, 14, claim 1. Petitioner provides persuasive reasoning explaining why a person of ordinary skill in the art would have been motivated to include such features of Hirokazu with Kadota, e.g., to improve user convenience by eliminating the need for radio-based remote communications. Pet. 28–29, 71–72; Ex. 1003 ¶¶ 111, 113–114, 220.

For the foregoing reasons, we determine that Petitioner has met its burden of demonstrating by a preponderance of the evidence that claim 22 is unpatentable over Kadota and Hirokazu.

5. Dependent Claims 2–4, 6, 7, 9, and 10

Dependent claims 2–4, 6, 7, 9, and 10 all depend, directly or indirectly, from claim 1.

- Dependent claim 2 recites, “a first temperature sensor positioned in the vehicle cabin and configured to: measure the starting vehicle cabin temperature; and transmit the starting vehicle cabin temperature to the controller via the second input signal.”
- Dependent claim 3 recites, “a second temperature sensor configured to: measure an ambient temperature outside the vehicle cabin; and transmit the ambient temperature to the controller via a third input signal.”
- Dependent claim 4 recites, “wherein the controller is further configured to determine the temperature control loop activation time based on the first, second, and third input signals.”
- Dependent claim 6 recites limitations substantially similar to the additional limitations of claim 22.
- Dependent claim 7 recites, “a programmable timer configured to generate the first input signal.”
- Dependent claim 9 recites, “wherein the heating and cooling system, the temperature control loop, and the controller are powered by the grid power.”
- Dependent claim 10 recites, “wherein the temperature control loop is configured to: set the desired vehicle cabin temperature; and transmit the desired vehicle cabin temperature to the controller via the second input signal.”

Petitioner contends that Kadota and Hirokazu teach the claimed subject matter, and that a person of ordinary skill in the art would have been motivated to modify Kadota in view of Hirokazu’s teachings. Pet. 32–42,

71–72. Patent Owner does not present any arguments directed to these claims beyond its arguments directed to independent claim 1, addressed above. *See generally* PO Resp.

We are persuaded by Petitioner’s undisputed contentions.

- Regarding dependent claim 2, Kadota teaches inside air temperature sensor 21, the output of which (T_{inc}) is sent to the air conditioning control unit in a second input signal. Ex. 1005 ¶¶ 10, 14, Fig. 1; Ex. 1003 ¶¶ 118–122.
- Regarding dependent claim 3, Kadota teaches outside air temperature sensor 20, the output of which (T_{amb}) is sent to the air conditioning control unit in a third input signal. Ex. 1005 ¶¶ 10, 14, Fig. 1; Ex. 1003 ¶¶ 125–129.
- Regarding dependent claim 4, Kadota teaches that the advance air conditioning time (t) is calculated based on t_1 , T_{amb} , T_{inc} , and T_{ptc} . Ex. 1005 ¶¶ 14–16, Fig. 1; Ex. 1003 ¶¶ 131–136.
- Regarding dependent claim 6, Hirokazu teaches the subject matter of this limitation and Petitioner provides persuasive reasoning to show that a person of ordinary skill in the art would have been motivated to include these features of Hirokazu with Kadota. *See supra* II.D.4; Ex. 1008 ¶¶ 10, 14, claim 1; Pet. 28–29, 71–72; Ex. 1003 ¶¶ 111, 113–114, 220.
- Regarding dependent claim 7, Kadota teaches timer switch 19 to set the operation start forecast time. Ex. 1005 ¶¶ 10, 14, Fig. 1; Ex. 1003 ¶¶ 149–153.
- Regarding dependent claim 9, Kadota teaches that charger 13 supplies electric power to air conditioning device 17, including its air conditioning unit and control unit. Ex. 1005 ¶¶ 10, 13, Fig. 1; Ex. 1003 ¶¶ 164–165; *see supra* II.D.3.ii.
- Regarding dependent claim 10, Kadota teaches that an occupant sets the desired cabin temperature with operation unit 18. Ex. 1005 ¶ 14, Fig. 1. We credit Dr. Shahbakhti’s testimony that an ordinarily skilled artisan would have understood “Kadota’s temperature control loop to read the desired temperature from operation unit 18,” such that claim 10 would have been obvious. Ex. 1003 ¶¶ 169–172.

For the foregoing reasons, we determine that Petitioner has met its burden of demonstrating by a preponderance of the evidence that claims 2–4, 6, 7, 9, and 10 are unpatentable over Kadota and Hirokazu.

6. Claims 11 and 13–17

Claim 11 depends from claim 1 and further recites that “the controller is further configured to modify the temperature control loop activation time based on a planned duration of vehicle use.” Ex. 1001, 10:24–26. Likewise, independent claim 13 recites a method including steps of “determining an activation time . . . ,” “modifying the determined activation time based on a planned duration of vehicle use,” and “activating the temperature control system at the determined activation time” *Id.* at 10:34–49. Claims 14–17 depend from claim 13. *Id.* at 10:50–11:3.

Petitioner contends that Kadota determines an activation time and activates the air conditioning system at the determined activation time. Pet. 48–49; *see supra* II.D.3.vii. Petitioner does not contend that Kadota *modifies* that activation time, as required by claims 11 and 13. Pet. 42–43 (claim 11), 50–51 (claim 13). Instead, Petitioner argues that Hirokazu determines an activation time based on the vehicle’s operation pattern, including duration of use, and “sets the operation time of its air-conditioning system based on this stored vehicle operation pattern.” *Id.* at 50. Petitioner contends that a person of ordinary skill in the art would have found it obvious to modify Kadota to use a similar approach. *Id.* According to Petitioner,

Kadota prevents air-conditioner use when power levels are too low to simultaneously charge the battery and precondition the cabin. Using the planned drive duration to decide whether battery charge was sufficient, as in Hirokazu, would allow

Kadota's system to prioritize pre-heating and pre-cooling, enhancing occupant comfort. An ordinary artisan would see this as potentially desirable for drivers who use their vehicles primarily for short trips, as they might prefer a pre-conditioned cabin to a fully charged battery.

Id. at 50–51 (citing Ex. 1003 ¶¶ 174–179; Ex. 1005 ¶ 13; Ex. 1008 ¶¶ 20, 37, claim 1).

In our Institution Decision, we were preliminarily unpersuaded by these contentions. Dec. on Inst. 24–25. We preliminarily determined that although Hirokazu teaches *setting* an activation time based upon a past pattern of vehicle usage, Hirokazu does not disclose *modifying* that set time in any manner. *Id.* at 24; Ex. 1008, claim 1 (“setting a set value indicating the operation time . . . on the basis of the operation pattern”). Moreover, we preliminarily determined that Petitioner had not explained why a skilled artisan “would have been motivated to *modify* a time already set by Kadota, in view of Hirokazu’s teachings, rather than simply to set Kadota’s activation time as taught by Hirokazu in the first instance.” Dec. on Inst. 24–25.

Patent Owner appears to agree with our preliminary conclusions and argues, in its Response, that “[a]t best, Petitioner only alleges that Hirokazu discloses *setting* the activation time based on the vehicle’s operation pattern. However, Petitioner does not even address (much less show) that Hirokazu discloses *modifying* that activation time.” PO Resp. 25–26. Patent Owner contends that the only way in which Hirokazu changes the start time of air conditioning is to *cancel* it entirely, if battery charge is insufficient. *Id.* at 26–28 (citing Ex. 1008 ¶ 37).

In the Reply, Petitioner provides a new declaration from Dr. Shahbakhti to support its argument that

Hirokazu's system updates its vehicle operation pattern, including vehicle start time and trip duration, ***each time*** the vehicle is driven. The updated vehicle start time is used to determine an activation time for Hirokazu's advance air conditioning function. And Hirokazu uses its updated duration of vehicle use to assess whether to begin the advanced air conditioning. Thus, Hirokazu discloses, "changing the operating time of the air conditioner . . . in conjunction with the vehicle operation pattern" each time the vehicle is driven. These disclosures, combined with Kadota, render "modifying the determined activation time based on a planned duration of vehicle use" and "activating the temperature control system" obvious.

Pet. Reply. 20–21 (citing Ex. 1008 ¶¶ 11, 20, 37; Ex. 1018 ¶¶ 9–12).

According to Petitioner, "'setting' Hirokazu's next air conditioner start time necessarily 'modifies' the activation time" because it uses updated data (including the driver's start time and duration, which is stored each time the car is driven) to predict when the driver is likely to next drive the car. *Id.* at 21–22 (citing, e.g., Ex. 1008 ¶¶ 28, 41–42, Fig. 3).

In the Reply, Petitioner also contends that Hirokazu "suggests factoring the expected duration of vehicle use into the decision of when to activate the air-conditioning system," and that this would have been obvious to use in "Kadota's system by assessing whether battery charge was sufficient for an expected trip duration before beginning advance air conditioning." *Id.* at 23. Thus, according to Petitioner, this would not cancel air conditioning but rather, Kadota's "control system *waits* and re-assesses power levels until sufficient power for advance air conditioning is present." *Id.* at 23–24.

In response, Patent Owner argues that this is an improper new reply argument based on new evidence (Ex. 1018; Ex. 1008 ¶¶ 41–43, Fig. 3) and, “[i]n any event, Petitioner does not explain how its new argument amounts to anything more than simply reading the ‘modify,’ [and] ‘modifying’ limitations out of claims 11[and] 13–17.” PO Sur-reply 6–7.

We have considered all evidence of record and we determine, based on the complete trial record, that Petitioner has not met its burden of demonstrating the unpatentability of claims 11 and 13–17 by a preponderance of the evidence.

These claims require two key aspects. First, an activation time is determined based on the desired vehicle activation time, the starting cabin temperature, and the desired cabin temperature. Ex. 1001, 9:38–39, 10:42–45. Second, *that same activation time* is modified based on a planned duration of vehicle use. *Id.* at 10:25–26 (“modify *the* temperature control loop activation time”), 10:46–47 (“modifying *the* determined activation time”). We agree that Kadota satisfies the first aspect; Kadota’s control unit determines an “advance air conditioning start time” (t), based on the operation start forecast time (t_1), the desired “cabin temperature setting value” (T_{ptc}), and the current sensed cabin temperature (T_{inc}). Ex. 1005 ¶¶ 14, 16, Fig. 5 (S28); *see supra* II.D.3.vii. Likewise, Hirokazu determines an operation time of the air conditioner. Ex. 1008 ¶ 10.

Petitioner does not establish, however, that either Kadota or Hirokazu *modifies* that same, already-determined activation time, or that this would have been obvious. First, Petitioner does not rely on Kadota to teach the *modifying* limitation. Pet. 42–43, 50–51. Second, although Hirokazu “sets the operation time of its air-conditioning system based on this stored vehicle

operation pattern” (Pet. 50), this, again, only addresses the first aspect of the claims—determining an activation time. The Petition does not contend, and certainly does not demonstrate, that Hirokazu then *modifies* the time that has just been determined. At best, the combined teachings of Kadota and Hirokazu suggest only that Kadota’s activation time likewise could have been determined based on a stored pattern of past vehicle use, as taught by Hirokazu, at the outset. We are not persuaded that the combined teachings would have suggested that an ordinarily skilled artisan would have *first determined* an activation time, as taught by either Kadota or Hirokazu, and then *modified* that same time based on a planned duration of vehicle use.

Finally, even if we accept that Petitioner’s Reply arguments and evidence are proper,¹² they too are unpersuasive. According to Petitioner, “‘setting’ Hirokazu’s next air conditioner start time necessarily ‘modifies’ the activation time” because it uses updated data. Pet. Reply 21–22. This interpretation ignores that the claim requires two aspects: first, determining an activation time based on the desired vehicle activation time, the starting

¹² We need not resolve the issue because we are unpersuaded by Petitioner’s Reply arguments. However, we note that neither the Petition nor Dr. Shahbakhti’s original declaration discussed that Hirokazu’s system updates the stored pattern each time the vehicle is driven, or that each new air conditioner start time is based on this updated data, such that “‘setting’ Hirokazu’s next air conditioner start time necessarily ‘modifies’ the activation time.” *Compare* Pet. Reply 20–21, *with* Pet. 42–43, 50–51; *compare* Ex. 1003 ¶¶ 174–180, 208, *with* Ex. 1018 ¶¶ 7–14. It appears that Petitioner’s Reply improperly “proceed[s] in a new direction with a new approach as compared to the positions taken in a prior filing,” and that this interpretation of the prior art could have been presented earlier. Trial Practice Guide Update (Aug. 2018), 15, <https://go.usa.gov/xU7GP>; *see also* Patent Trial and Appeal Board Consolidated Trial Practice Guide, November 2019, 74 (combining the Trial Practice Guide and updates).

cabin temperature, and the desired cabin temperature; and then, modifying that same first activation time. Petitioner attempts to read one action—setting the *next* air conditioner start time—on both requirements, simply because updated data is used in the “setting” process. However, regardless of what data is used to set the next activation time, the claim requires two aspects. Petitioner has not presented a cogent explanation of how those two aspects of the claim are satisfied by the combined teachings of Kadota and Hirokazu.

For the foregoing reasons, Petitioner has *not* met its burden of demonstrating by a preponderance of the evidence that claims 11 and 13–17 are unpatentable over Kadota and Hirokazu.

7. Claims 18–21

Independent claim 18 and dependent claims 19–21 include subject matter similar to that of claims 11 and 13, i.e., a controller programmed to “determine a temperature modification period based on the desired vehicle activation time, the starting cabin air temperature . . . , and the desired cabin air temperature,” and “change a length of the temperature modification period based on a planned duration of vehicle use.” Ex. 1001, 11:4–26.

Petitioner’s contentions regarding independent claim 18, both in the Petition and in the Reply, are substantially similar to those made regarding claims 11 and 13. Pet. 56–66; Pet. Reply 25–26. Likewise, Patent Owner makes arguments substantially similar to those presented regarding claims 11 and 13. PO Resp. 29–30, PO Sur-reply 6–7.

For the same reasons discussed above regarding substantially similar claims 11 and 13, we are not persuaded by Petitioner’s contentions regarding the “determine a temperature modification period” and “change a length of

the temperature modification period” limitations. For the foregoing reasons, Petitioner has *not* met its burden of demonstrating by a preponderance of the evidence that claims 18–21 are unpatentable over Kadota and Hirokazu.

8. Conclusion

For the reasons detailed above, we determine that Petitioner has met its burden of demonstrating by a preponderance of the evidence that claims 1–4, 6, 7, 9, 10, and 22 are unpatentable over Kadota and Hirokazu, but that Petitioner has not met its burden of demonstrating by a preponderance of the evidence that claims 11 and 13–21 are unpatentable.

E. Obviousness over the Combined Teachings of Kadota, Hirokazu, and Hotta

Petitioner contends that claim 5 of the ’237 patent would have been obvious over the combined teachings of Kadota, Hirokazu, and Hotta. Pet. 73–75. Patent Owner disagrees, relying upon the same arguments discussed above regarding claim 1 in view of Kadota and Hirokazu. PO Resp. 30–31.

1. Overview of Hotta (Ex. 1006)

Hotta is titled “Air Conditioning System Suitable for Use in an Electric Vehicle,” and discloses a “pre-air con” system for “adjusting the temperature or humidity or the like in the [vehicle cabin] in advance by using an external power supply or the like before a driver or a passenger enters the vehicle.” Ex. 1006, code (54), 6:19–24, 14:52–54 (during charging). Hotta explains that the air conditioning will stop when the difference between the vehicle cabin temperature and the desired temperature is equal to, or less than, two degrees. *Id.* at 20:23–30.

2. Dependent Claim 5

Claim 5 depends from claim 1 and further recites, “the temperature control loop is configured to deactivate the heating and cooling system when the starting vehicle cabin temperature reaches the desired vehicle cabin temperature.” Ex. 1001, 10:1–4. Petitioner relies upon Hotta as teaching the claimed subject matter, and also contends that a person of ordinary skill in the art would have been motivated to modify Kadota/Hirokazu in view of Hotta’s teachings. Pet. 73–75. Patent Owner does not present any arguments directed to claim 5, beyond those addressed regarding claim 1. PO Resp. 30.

We are persuaded by Petitioner’s undisputed contentions. Hotta teaches that when “the difference between the [cabin] room temperature TR and the target temperature $TS2$ is less than or equal to 2 . . . [, then] the room temperature TR is approximate to the target temperature $TS2$, and a mode for operating the air conditioner is released or halted.” Ex. 1006, 20:23–30, Fig. 23 (S315). We credit Dr. Shahbakhti’s testimony that an ordinarily skilled artisan would have been motivated to incorporate this teaching into the vehicle of Kadota as modified by Hirokazu, to converse power when pre-heating or pre-cooling the vehicle. Ex. 1003 ¶¶ 141–143.

For the foregoing reasons, Petitioner has met its burden of demonstrating by a preponderance of the evidence that claim 5 is unpatentable over Kadota, Hirokazu, and Hotta.

*F. Obviousness over the Combined Teachings of
Kadota, Hirokazu, and Gerard*

Petitioner contends that claim 8 of the '237 patent would have been obvious over the combined teachings of Kadota, Hirokazu, and Gerard. Pet. 75–77. Patent Owner disagrees, relying upon the same arguments discussed above regarding claim 1 in view of Kadota and Hirokazu. PO Resp. 30–31.

1. Overview of Gerard (Ex. 1009)

Gerard is titled “Scheduling Remote Starting of Vehicle,” and discloses a method for scheduling the remote start of a vehicle engine. Ex. 1009, codes (54), (57). Gerard discloses that a user defines a schedule of desired engine start times and vehicle controls, e.g., operation of a defroster, seat warmer, or heating, ventilation, or air conditioning (HVAC) system. *Id.* ¶ 18. The schedule is established with a “remote programming device, such as a user’s cellular radiotelephone 20,” or a “computer 54 with a wireless IP address for Internet access.” *Id.* The schedule and vehicle settings are transmitted from the remote device over a communication system, such as a local area network, a wide area network, a cellular communication network, or the Internet. *Id.* ¶ 19.

2. Dependent Claim 8

Claim 8 depends from claim 1 and further recites, “the first input signal comprises one of a wireless signal, an internet-based protocol, and a controller-area network (CAN) bus based protocol transmitted from a remote device.” Ex. 1001, 10:12–15. Petitioner relies upon Gerard as teaching the claimed subject matter, and also contends that a person of ordinary skill in

the art would have been motivated to modify Kadota/Hirokazu in view of Gerard's teachings. Pet. 75–77. Patent Owner does not present any arguments directed to claim 8, beyond those addressed regarding claim 1. PO Resp. 30–31.

We are persuaded by Petitioner's undisputed contentions. Gerard teaches that a "schedule and vehicle settings can be transmitted from a remote device (20, 54) over a communication system (22, 24, 26, 28) to the communication device 10 of the vehicle 32," including over "a local area network 24, wide area network 26, cellular communication network 22, or Internet 28." Ex. 1009 ¶¶ 18–19. We credit Dr. Shahbakhti's testimony that an ordinarily skilled artisan would have found it obvious to incorporate this teaching "into the design of a vehicle's air-conditioning control system," such as Kadota's as modified by Hirokazu, in order to allow a user to specify the desired vehicle departure time even when far away from the vehicle. Ex. 1003 ¶¶ 157–161.

For the foregoing reasons, Petitioner has met its burden of demonstrating by a preponderance of the evidence that claim 8 is unpatentable over Kadota, Hirokazu, and Gerard.

*G. Obviousness over the Combined Teachings of
Kadota, Hirokazu, and Heinle*

Petitioner contends that claim 12 of the '237 patent would have been obvious over the combined teachings of Kadota, Hirokazu, and Heinle. Pet. 78–79, 90–91. Patent Owner disagrees, relying upon the same arguments discussed above regarding claim 1 in view of Kadota and Hirokazu. PO Resp. 30–31.

1. Overview of Heinle (Ex. 1010)

Heinle is titled “Motor Vehicle Air-Conditioning System Having Standstill Air-Conditioning,” and discloses a vehicle with a standstill air-conditioning mode of operation, in which 230 volt AC electrical power is supplied to generator 7, which acts as electric motor 7' to drive compressor 3 of air-conditioning system 1 and secondary units, such as a fan, to control the temperature of the vehicle cabin when the vehicle is standing still. Ex. 1010, codes (54), (57), ¶ 19, Fig. 2.

2. Dependent Claim 12

Claim 12 depends from claim 1 and further recites that the vehicle comprises “an internal combustion engine (ICE) based vehicle, and wherein the grid power is received solely for powering the heating and cooling system, the temperature control loop, and the controller, such that the grid power is supplied thereto without limitations associated with re-charging of a vehicle on-board energy storage system.” Ex. 1001, 10:27–33. Petitioner relies upon Heinle as teaching the claimed subject matter, and also contends that a person of ordinary skill in the art would have been motivated to modify Kadota/Hirokazu in view of Heinle’s teachings. Pet. 78–79, 90–91. Patent Owner does not present any arguments directed to claim 12, beyond those addressed regarding claim 1. PO Resp. 31.

We are persuaded by Petitioner’s undisputed contentions. Heinle teaches a motor vehicle air-conditioning mode that operates “in the event that the motor vehicle engine is at a standstill, using an auxiliary power supply.” Ex. 1010, code (57). Heinle teaches that if an external power supply is provided, such as “a 230 V AC source,” then electrical power is

used to “drive[] the compressor 2 of the air-conditioning system 1 via the (in this case) inactive auxiliary power unit 5 so as to ensure the cooling function of said air-conditioning system 1 when at a standstill.” *Id.* ¶ 19 (also disclosing voltage conversion). We credit Dr. Shahbakhti’s testimony that an ordinarily skilled artisan would have recognized the benefits of using grid power to power air-conditioning and heating systems in conventional vehicles with internal combustion engines, as taught by Heinle, to improve driver comfort and conserve fuel. Ex. 1003 ¶¶ 190–193.

For the foregoing reasons, Petitioner has met its burden of demonstrating by a preponderance of the evidence that claim 12 is unpatentable over Kadota, Hirokazu, and Heinle.

*H. Obviousness over the Combined Teachings of
Kadota and Heinle*

Much of independent claim 23 is identical to much of claim 1. *Compare* Ex. 1001, 9:22–44 (part of claim 1), *with id.* at 12:22–44 (identical part of claim 23).¹³ Claim 23, however, does not recite that the controller determines if the vehicle is activated at the activation time and transmits a deactivation signal if the vehicle is not activated—the limitation of claim 1 for which Petitioner relies on Hirokazu. *Compare id.* at 9:45–52, *with id.* at 12:22–51. Additionally, claim 23 further includes the limitation recited in claim 12, which is not included in claim 1. *Id.* at 12:45–51.

¹³ Claims 1 and 23 both include the limitations of “a power connector,” “a heating and cooling system,” “a temperature control loop,” and “a controller configured to: receive a first input signal . . . ; receive a second input signal . . . ; determine a temperature control loop activation time . . . ; [and] transmit an activation signal” Ex. 1001, 9:22–44, 12:22–44.

Thus, Petitioner contends that claim 23 would have been obvious over the combined teachings of Kadota and Heinle, for the same reasons discussed above in Sections II.D.3.i–viii (claim 1) and II.G.2 (claim 12). Pet. 78–91. Patent Owner does not present any arguments directed to claim 23, beyond those addressed regarding claim 1. PO Resp. 31.

For the same reasons discussed in Sections II.D.3.i–viii (claim 1) and II.G.2 (claim 12), we are persuaded by Petitioner’s contentions. *See, e.g.*, Ex. 1003 ¶¶ 190–193; Ex. 1005 ¶¶ 6–7, 9–10, 12, 14, 16, Figs. 1–2, 5; Ex. 1010, code (57), ¶ 19.

III. CONCLUSION

In summary:¹⁴

Claim(s)	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1–4, 6, 7, 9–11, 13–22	103	Kadota, Hirokazu	1–4, 6, 7, 9, 10, 22	11, 13–21
5	103	Kadota, Hirokazu, Hotta	5	
8	103	Kadota, Hirokazu, Gerard	8	
12	103	Kadota, Hirokazu, Heinle	12	
23	103	Kadota, Heinle	23	
Overall Outcome			1–10, 12, 22, 23	11, 13–21

¹⁴ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner’s attention to the April 2019 *Notice*

IV. ORDER

Upon consideration of the record before us, it is:

ORDERED that claims 1–10, 12, 22, and 23 of the '237 patent have been shown to be unpatentable;

FURTHER ORDERED that claims 11 and 13–21 of the '237 patent have not been shown to be unpatentable; and

FURTHER ORDERED that, because this is a final written decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding. See 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. See 37 C.F.R. § 42.8(a)(3), (b)(2).

IPR2019-00012
Patent 8,118,237 B2

PETITIONER:

Jeffrey Totten
Abhay Watwe
FINNEGAN, HENDERSON, FARABOW,
GARRETT & DUNNER, LLP
Jeffrey.tottten@finnegan.com
Abhay.watwe@finnegan.com

PATENT OWNER:

Scott Kamholz
Raj Paul
COVINGTON & BURLING LLP
skamholz@cov.com
rpaul@cov.com