

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Applied Concepts Inc.,
Petitioner,

v.

Kustom Signals Inc.,
Patent Owner.

Case IPR2024-00829
Patent No. 11,194,039

Before CARL M. DEFRANCO, RICHARD H. MARSCHALL, and
BACH V. HOANG, *Administrative Patent Judges*.

PATENT OWNER'S RESPONSE

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Claim Listing

Limitation	Claim Language
[1.0]	A traffic radar system comprising:
[1.1]	a first radar transceiver configured to transmit and receive radar beams from a front zone corresponding to an area in front of a patrol vehicle and to generate a first electronic signal corresponding to the received radar beam;
[1.2]	a second radar transceiver configured to transmit and receive radar beams from a rear zone corresponding to an area behind the patrol vehicle and to generate a second electronic signal corresponding to the received radar beam;
[1.3]	a speed determining element configured to determine and output a speed of the patrol vehicle and not receive signals or data from the patrol vehicle; and
[1.4]	a processing element configured to
[1.5]	receive a plurality of digital data samples derived from one of either the first or second electronic signals,
[1.6]	receive the speed of the patrol vehicle from the speed determining element,
[1.7]	perform a time domain to frequency domain conversion on the digital data samples creating a plurality of frequency bins, each frequency bin associated with a frequency bin number, having a relative magnitude value, and corresponding to a speed of a vehicle,
[1.8]	convert the speed of the patrol vehicle to a frequency bin number,

Limitation	Claim Language
[1.9]	form a patrol vehicle speed window that includes a range of frequency bin numbers having the frequency bin number of the converted patrol vehicle speed as a center of the range,
[1.10]	determine at least one group of successive frequency bin numbers outside of the patrol vehicle speed window whose relative magnitude is greater than a spike threshold value,
[1.11]	convert one frequency bin number in each group to the relative speed of one target vehicle, and
[1.12]	convert the relative speed of the target vehicle to an absolute speed using the speed of the patrol vehicle.
[2.0]	The traffic radar system of claim 1, wherein the processing element is further configured to perform one of the following depending the directions of travel of the patrol vehicle and the target vehicle:
[2.1]	add the relative speed of the target vehicle to the speed of the patrol vehicle to determine the absolute speed of the target vehicle,
[2.2]	subtract the relative speed of the target vehicle from the speed of the patrol vehicle to determine the absolute speed of the target vehicle, and
[2.3]	subtract the speed of the patrol vehicle from the relative speed of the target vehicle to determine the absolute speed of the target vehicle.
[3.0]	The traffic radar system of claim 1, wherein the processing element is further configured to determine whether the patrol vehicle is moving or stationary and convert the relative speed of the target

Limitation	Claim Language
	vehicle to the absolute speed using the speed of the patrol vehicle only when the patrol vehicle is moving.
[4.0]	The traffic radar system of claim 1, wherein the speed determining element outputs the patrol vehicle speed in a stream of messages and the processing element is further configured to determine that the patrol vehicle is moving when the patrol vehicle speed is greater than a first threshold value for a predetermined number of successive messages.
[5.0]	The traffic radar system of claim 1, wherein the speed determining element outputs the patrol vehicle speed in a stream of messages and the processing element is further configured to determine that the patrol vehicle is stationary when the patrol vehicle speed is less than a second threshold value for a predetermined number of successive messages.
[6.0]	The traffic radar system of claim 1, wherein the speed determining element is further configured to receive and process radio frequency signals from a global navigation satellite system.
[7.0]	The traffic radar system of claim 1, further comprising a display configured to display a plurality of speeds, and the processing element is further configured to control the display to display the speed of the patrol vehicle and the absolute speed of the target vehicle.

Limitation	Claim Language
[8.0]	The traffic radar system of claim 1, further comprising an analog to digital converter configured to receive the first electronic signal and the second electronic signal and output a plurality of front radar digital data samples and a plurality of rear radar digital samples.
[9.0]	A traffic radar system comprising:
[9.1]	a first radar transceiver configured to transmit and receive radar beams from a front zone corresponding to an area in front of a patrol vehicle and to generate a first electronic signal corresponding to the received radar beam;
[9.2]	a second radar transceiver configured to transmit and receive radar beams from a rear zone corresponding to an area behind the patrol vehicle and to generate a second electronic signal corresponding to the received radar beam;
[9.3]	a speed determining element configured to receive and process radio frequency signals from a global navigation satellite system to determine and output a speed of the patrol vehicle; and
[9.4]	a processing element configured to
[9.5]	receive a plurality of digital data samples derived from one of either the first or second electronic signals,
[9.6]	receive the speed of the patrol vehicle from the speed determining element,
[9.7]	perform a time domain to frequency domain conversion on the digital data samples creating a plurality of frequency bins, each frequency bin associated with a frequency bin number, having a relative magnitude value, and corresponding to a speed of a vehicle,

Limitation	Claim Language
[9.8]	convert the speed of the patrol vehicle to a frequency bin number,
[9.9]	form a patrol vehicle speed window that includes a range of frequency bin numbers having the frequency bin number of the converted patrol vehicle speed as a center of the range,
[9.10]	determine at least one group of successive frequency bin numbers outside of the patrol vehicle speed window whose relative magnitude is greater than a spike threshold value,
[9.11]	convert one frequency bin number in each group to the relative speed of one target vehicle, and
[9.12]	convert the relative speed of the target vehicle to an absolute speed using the speed of the patrol vehicle.
[10.0]	The traffic radar system of claim 9, wherein the processing element is further configured to perform one of the following depending the directions of travel of the patrol vehicle and the target vehicle:
[10.1]	add the relative speed of the target vehicle to the speed of the patrol vehicle to determine the absolute speed of the target vehicle,
[10.2]	subtract the relative speed of the target vehicle from the speed of the patrol vehicle to determine the absolute speed of the target vehicle, and
[10.3]	subtract the speed of the patrol vehicle from the relative speed of the target vehicle to determine the absolute speed of the target vehicle.

Limitation	Claim Language
[11.0]	The traffic radar system of claim 9, wherein the processing element is further configured to determine whether the patrol vehicle is moving or stationary and convert the relative speed of the target vehicle to the absolute speed using the speed of the patrol vehicle only when the patrol vehicle is moving.
[12.0]	The traffic radar system of claim 9, wherein the speed determining element outputs the patrol vehicle speed in a stream of messages and the processing element is further configured to
[12.1]	determine that the patrol vehicle is moving when the patrol vehicle speed is greater than a first threshold value for a predetermined number of successive messages, and
[12.2]	determine that the patrol vehicle is stationary when the patrol vehicle speed is less than a second threshold value for a predetermined number of successive messages.
[13.0]	The traffic radar system of claim 12, wherein the processing element is further configured to set a mode of speed detection to moving when the processing element determines that the patrol vehicle is moving or to stationary when the processing element determines that the patrol vehicle is stationary.
[14.0]	The traffic radar system of claim 9, further comprising a display configured to display a plurality of speeds, and the processing element is further configured to control the display to display the speed of the patrol vehicle and the absolute speed of the target vehicle.

Limitation	Claim Language
[15.0]	The traffic radar system of claim 9, further comprising an analog to digital converter configured to receive the first electronic signal and the second electronic signal and output a plurality of front radar digital data samples and a plurality of rear radar digital samples.

Pursuant to 37 C.F.R. § 42.120, Patent Owner, Kustom Signals Inc., submits the following Response to the Petition for *Inter Partes* Review of claims 1–15 of U.S. Patent No. 11,194,039 filed by Petitioner, Applied Concepts Inc. Because ACI has not met its burden of proof, and because Kustom presents the Board with facts that demonstrate the patentability of the challenged claims, the claims must be confirmed. The patentability of the claims is supported by the Declaration of Chris G. Bartone, Ph.D., P.E., attached as Exhibit 2002.

I. The '039 Patent

A. Disclosure

U.S. Patent No. 11,194,039 was filed on September 21, 2018. (Ex.1001, face.) The '039 patent claims priority to U.S. Provisional Application Serial Nos. 62/569,667 and 62/569,923 (both filed October 9, 2017) and 62/570,446 (filed October 10, 2017). (*Id.*) These provisional applications are incorporated by reference in their entireties into the '039 patent. (*Id.*, 1:6–18.)

The '039 patent discloses vehicular traffic speed-control systems implemented with radar in law enforcement patrol vehicles. (*Id.*, abstract, 1:24–26, 1:30–32.) Because the '039 patent relates to radar-based traffic enforcement efforts, a person of ordinary skill in the art at the time of its invention (“POSITA”) would understand that accuracy in determining patrol-vehicle speed and thus target-vehicle speed is of paramount importance. A POSITA would understand that traffic

enforcement, and the legal proceedings arising from it, mandate the most accurate and defensible solution available. (Ex.2002 ¶43; Ex.2007 ¶¶5–9; Ex.2008 at 3, at 21 §2.15; Ex.2009 at 3, at 25 §2.15.)

Systems of the type described in the '039 patent typically include at least one radar transceiver that transmits a radar beam and receives reflections as it bounces off target vehicles. (Ex.1001, 1:30–35.) “The received reflections of the radar beam are converted to an electronic signal which is processed to determine the speeds of the target vehicles, which may then be displayed on a display.” (*Id.*, 1:34–37.) When determining targeted vehicle speeds, “it is necessary to know the speed of the patrol vehicle” and to distinguish between radar returns that are from the ground or stationary objects, reflecting the patrol vehicle's speed and target vehicle speeds. (*Id.*, 1:37–39, 10:4–17.)

The '039 patent discloses that “[p]rior art traffic radar systems have accessed the patrol vehicle speed from the patrol vehicle itself. But, connecting the traffic radar system to the patrol vehicle's speed detection electronics may be difficult and time consuming. Furthermore, each patrol vehicle make and/or model may use a different protocol to output the patrol vehicle's speed, thereby requiring multiple software or firmware interfaces for the traffic radar system to properly receive the patrol vehicle speed from different vehicles.” (*Id.*, 1:39–48.) (Ex.2002 ¶¶44, 46.)

Consequently, embodiments of the invention disclosed in the '039 patent include “a patrol vehicle speed detector that is independent from the patrol vehicle and thus requires no connection to the patrol vehicle and no specific vehicle software or firmware interface.” (Ex.1001, 1:52–58; *see also* Ex.2005, [0008].) (Ex.2002 ¶¶45, 47.) Some embodiments employ a speed-determining element that “is configured to receive and process radio frequency signals from a global navigation satellite system to determine and output a speed of the patrol vehicle” that is then used as part of calculating the target vehicle speed. (Ex.1001, 2:26–29.) (Ex.2002 ¶48.)

The speed determining element 22 generally determines a speed of the main unit 34 and by extension, the patrol vehicle 30. The speed determining element 22 may receive and process radio frequency (RF) signals from a multi-constellation global navigation satellite system (GNSS) such as the global positioning system (GPS), the GLONASS system, the Galileo system, the quasi-zenith satellite system (QZSS), and so forth. The speed determining element 22 may also may [sic] receive and process RF signals from telecommunications networks that provide or utilize Assisted GPS (A-GPS).

(Ex.1001, 5:50–60.) (Ex.2002 ¶49.)

U.S. provisional application serial number 62/569,923, incorporated by reference into the '039 patent, explains that “data from a GPS receiver or other constellation module [is used] to steer or assist the [digital signal processor (“DSP”)] signal processing search of the Doppler return information for the patrol vehicle’s radar return signal to improve accuracies.” (Ex.2005, [0002].) “The system determines the patrol vehicle speed through a combination of constellation data and radar return.” (Ex.2005, [0011]; *see also id.*, [0013] (“using the independent GPS sensor data for determining a search window to guide or steer the DSP processing of the radar measured speed of the patrol vehicle.”).) (Ex.2002 ¶50.) “If the patrol vehicle 30 is in stationary mode, then the target vehicle speed, that was just converted, is an absolute, or actual, target vehicle speed. If the patrol vehicle 30 is in moving mode, then the target vehicle speed is a speed relative to the speed of the patrol vehicle 30.” (Ex.1001, 9:19–23.) Thus, it is important for the radar device to know whether the patrol vehicle is moving or stationary. (Ex.2002 ¶51.)

To accomplish the automatic distinction between moving and stationary modes, the '039 patent teaches additional steps to provide an accurate speed determination. These steps are necessary due to the “noisy” nature of GPS/GNSS measurements when determining the precise speed and position of the patrol vehicle. GPS “jitter” or “drift” is a phenomenon in which a GPS’s reported location(*i.e.*, its latitude and longitude) changes over time due to atmospheric conditions,

interference from other signals, multipath interference, electronic noise, and other environmental factors—even though the GPS receiver is fully stationary. (Ex.2002 ¶52.)

To overcome the GPS jitter problem, the '039 patent—and particularly the incorporated '923 application—identifies a technique that “improves rejection of jitter in the stationary GPS positioning data.” (Ex.2005, [0032].) The improved jitter rejection method employs thresholds to make the automatic mode determination. The '923 application notes: “Auto-Mode switching is improved by setting tolerances and time requirements on the switching.” (*Id.*) Thus, the '039 patent explains:

Based on the value of the patrol vehicle speed, the processing element 26 sets a mode of speed detection to either “stationary”, if the patrol vehicle speed is less than a first threshold speed for at least four consecutive satellite data messages, or “moving”, if the patrol vehicle speed is greater than a second threshold speed for at least four consecutive satellite data messages. An exemplary first threshold speed is 1.1 mph. An exemplary second threshold speed is 3.1 mph.

(Ex.1001, 7:49–57; *see also id.*, 11:27–33.) (Ex.2002 ¶53.)

By adopting this dual-threshold, nonzero thresholding methodology that uses different positive values rather than simply relying on a binary zero/nonzero, single-threshold choice, the '039 patent overcomes the GPS jitter problems present in the

art to automatically determine the appropriate methodology for calculating a target vehicle's speed based on the speed of the patrol vehicle. (Ex.2002 ¶54.)

The '039 patent describes using a patrol vehicle speed based upon a speed-determining element's processing of GPS data in the form of a recommended minimum specific GNSS data ("RMC")-format satellite data message. (Ex.1001, 7:27-38.) (Ex.2002 ¶55.) The speed-determining element is initialized by sending it command messages to program the format of its data output, thereby improving the speed-determining element's performance. (Ex.1001, 6:64-7:26.) This "improvement in the GPS communications is to limit the constellation message to a certain type, increase the output update rate to higher than once per second, and to increase the baud rate." (Ex.2005, [0029].) "At the default output rate of once per second there can be a lot of change in the 'Speed Over Ground' value if the patrol vehicle is accelerating or deaccelerating." (*Id.*) Thus, the '039 patent describes that the "processing element 26 may complete the target vehicle speed determination process multiple times per second." (Ex.1001, 10:4-17.) (Ex.2002 ¶56.)

A POSITA would thus recognize the '039 patent teaches that the GNSS receiver must be configured to provide the needed GNSS position data at a rapid rate so the speed-determining element 22 can accurately determine the speed of the patrol vehicle. A POSITA would also recognize that the '039 patent teaches this update rate to be faster than a nominal GPS measurement rate (*i.e.*, 1 Hz). The '039 patent

teaches this update rate to be 5 times per second (*i.e.*, 5 Hz), for an update interval of 200 milliseconds. (Ex.2002 ¶57.)

B. Prosecution History

During prosecution of U.S. Patent Application No. 16/137,860, the examiner rejected claim 1 and its dependents as indefinite. (Ex.1002 at 46, 57, 70.) After claim 1 was amended to clarify that its speed-determining element is “configured to determine and output a speed of the patrol vehicle and not receive signals or data from the patrol vehicle,” the examiner allowed the claims. (*Id.* at 12–13, 34, 40.) (Ex.2002 ¶40.)

A POSITA would recognize that a unique and innovative aspect of claim 1 is that the speed-determining element does not receive signals or data from the patrol vehicle. As a result, none of the varied and complex interfaces necessary to connect prior-art speed-detection devices to a host vehicle are needed to employ the '039 patent's invention in a patrol vehicle. (Ex.1001 at 1:39–48.) (Ex.2002 ¶41.)

II. Level of Ordinary Skill in the Art

Kustom agrees that at POSITA would have possessed the elements of knowledge and education proposed by ACI and adopted by the Board in its Institution Decision (*see* Paper 10 at 7)—but with additional minimum years of experience. Kustom proposes that, at the time of the invention of the '039 patent, a POSITA would have had a working knowledge of Doppler radar systems. A

POSITA would have had a Bachelor of Science degree in an academic discipline emphasizing electrical, mechanical, instrumentation engineering or other disciplines related to measurement science, in combination with specific training or *at least two years* of related work experience with Doppler radar systems. Alternatively, a POSITA could have also had a Master of Science degree in electrical engineering with *at least one year* of related work experience in the same disciplines. (Ex.2002 ¶¶68–72.)

III. Claim Construction

Based upon ACI's application of certain prior art in its Petition, the following claim terms appear material to the parties' dispute. *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999).

- “first threshold,” “second threshold,” and “predetermined number of successive messages” (claims 4, 5, and 12)
- “the processing element is configured to determine whether the patrol vehicle is moving or stationary” (claim 11)

Accordingly, the Board should construe these terms to the extent necessary to resolve the controversy. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co. Matal*, 868 F.3d 1013, 1017 (Fed. Cir. 2017).

A. “first threshold,” “second threshold,” and “predetermined number of successive messages”

In applying claims to the prior art, ACI and its expert argue that “first threshold” is met by a value of zero, that “second threshold” is met by any positive number, and that “predetermined number of successive messages” is met by a single message. (Paper 1 at 37–38, Ex.1003 at 43; Ex.2010, Tr.110:20–24, 111:18–113:8, 116:19–23.) These constructions ignore the purpose and teachings of the '039 patent, as well as plain English.

As explained above, the '039 patent describes a technique by which the claimed radar system automatically determines whether the patrol vehicle is stationary or moving and, based upon that determination, switches modes to ensure the appropriate calculation is employed to determine the target vehicle's speed based, in part, on the patrol vehicle's speed. The specification explains:

Referring to step 101, a satellite data message is received from the speed determining element 22....

Referring to step 102, the satellite data message is processed to determine a speed of the patrol vehicle 30. The satellite data message is parsed to find a Speed Over Ground field, and the value of the field is retrieved....

Referring to step 103, a mode of speed detection is set according to the patrol vehicle speed. Based on the value of the patrol vehicle speed, the mode of speed

detection is set to either “stationary”, if the patrol vehicle speed is *less than 1.1 mph* for at least *four consecutive satellite data messages*, or “moving”, if the patrol vehicle speed is *greater than 3.1 mph* for at least *four consecutive satellite data messages*.

(Ex.1001, 11:14–33, emphases added; *see also id.*, 7:39–57.) (Ex.2002 ¶77.)

The exemplary positive-value thresholds identified in the specification—1.1 mph for the first, 3.1 mph for the second—are important for addressing the GPS jitter phenomenon discussed in the '923 application, in which a stationary GPS receiver may appear to be moving as a result of errors that GPS systems and receivers frequently encounter. If the first threshold for whether the vehicle is moving is set at zero as ACI suggests, these GPS errors will result in a determination that the patrol vehicle is moving when it is not. (Ex.2002 ¶78.)

That is why the '039 patent's specification describes—and claims 4, 5, and 12 recite—multiple speed readings to make the mode determination. The *successive messages* (plural) to be compared to *separate recited thresholds* (first and second) compensate for the GPS jitter problem to make accurate moving/stationary determinations. If only a single speed reading were used to make this determination as ACI suggests, it would make little sense to describe and claim a second threshold. Indeed, because of GPS jitter, a POSITA would recognize that there will always be some measure of indicated location change, even if small, between separate GPS

messages. Thus, zero cannot be the threshold for a GNSS-based environment. (Ex.2002 ¶78.)

A POSITA would understand that when a determination is made based on “noisy” data like GPS readings, a certain amount of hysteresis is built into the decision. For example, a light sensor in a car that automatically dims the console lights when the sun goes down will typically have some hysteresis in the decision logic, so the dashboard lights are not constantly dimming and brightening at a rapid, annoying rate with each slight change in lighting conditions. (Ex.2002 ¶79–82.)

Accordingly, “first threshold” and “second threshold” should be construed as positive (*i.e.*, non-zero) speed values that are different from one another. And “predetermined number of successive messages” should be construed as a preselected set of at least two sequential messages. (*Id.* ¶¶82–84.)

B. “the processing element is configured to determine whether the patrol vehicle is moving or stationary”

ACI and its expert argue that this element of claim 11 is met by the Aker prior art reference's disclosure of “‘a multimode radar where *operator selection of moving or stationary mode* ... is also provided.’ Accordingly, the DSP determines whether the patrol vehicle is moving or stationary based on the mode selection made by the operator.” (Paper 1 at 28; Ex.1003 at 34, citation omitted.) Again, this construction ignores the '039 patent's purpose and teachings.

The incorporated '923 application repeatedly discloses that the traffic radar system *automatically* switches between moving and stationary modes of operation. (Ex.2005, [0002], [0015], [0030]; *id.* at 34 (4), 35 (3), 36 (7).) In other words, the system “determine[s] whether the patrol vehicle is moving or stationary” without the operator flipping a switch to tell it what mode it is in. This is consistent with the ordinary meaning of “determine,” which requires *making* a determination, rather than having a determination made by an external force. *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (words of a claim are given their ordinary and customary meaning in the context of the entire patent, including the specification). (Ex.2002 ¶¶171, 213.)

Accordingly, “the processing element is configured to determine whether the patrol vehicle is moving or stationary” should be construed to mean that the processing element is configured to determine automatically, without operator input, whether the patrol vehicle is moving or stationary.

IV. Asserted Prior Art

A. Aker and Aker '724

ACI uses Aker and Aker '724 as primary references in grounds 1A and 1B to attack independent claims 1 and 9 and certain dependent claims of the '039 patent. (Paper 1 at 5–39.) ACI owns the Aker references (Ex.1004, face; Ex.1007, 1:39–43) and treats them together. Aker discloses that its invention “is useful in the field of

traffic surveillance radars.” (Ex.1004, [0001].) To accurately determine the speed of a target vehicle (the vehicle whose speed a patrol vehicle is trying to determine for traffic-enforcement purposes), a radar unit must also have access to the patrol vehicle's speed. Generally speaking, Aker discloses two ways to determine a patrol vehicle's speed: either “by acquiring and tracking the patrol car speed from returns from stationary objects as is well known he [*sic*] prior art” or “by means of a link to the speedometer.” (Ex.1004, [0064].) Aker explains:

In species within the genus of the invention wherein patrol car speed is determined from the car's speedometer (as opposed to processing returns from stationary objects such as the ground), an optional speedometer link transducer 59 provides a signal or data to the DSP from which the indicated speed on the speedometer can be determined for use in moving mode target speed calculations.

(Ex.1004, [0051].) (Ex.2002 ¶86.)

Aker explains that when “a ‘hardwired’ link to the speedometer via transducer 59 [is used], the processing blocks 212 and 214 and the blocks described below pertaining to patrol speed processing of stationary target returns are replaced with a process to read the transducer and calculate the patrol speed from data acquired from it.” (Ex.1004, [0099].) Figure 1 of Aker depicts a block diagram relevant to this disclosure and showing the signal paths and DSP:

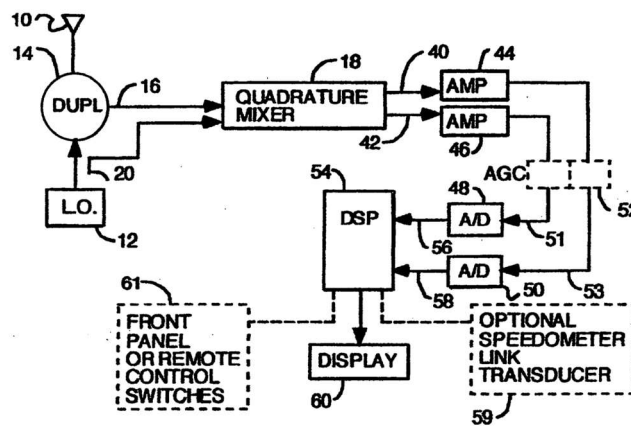


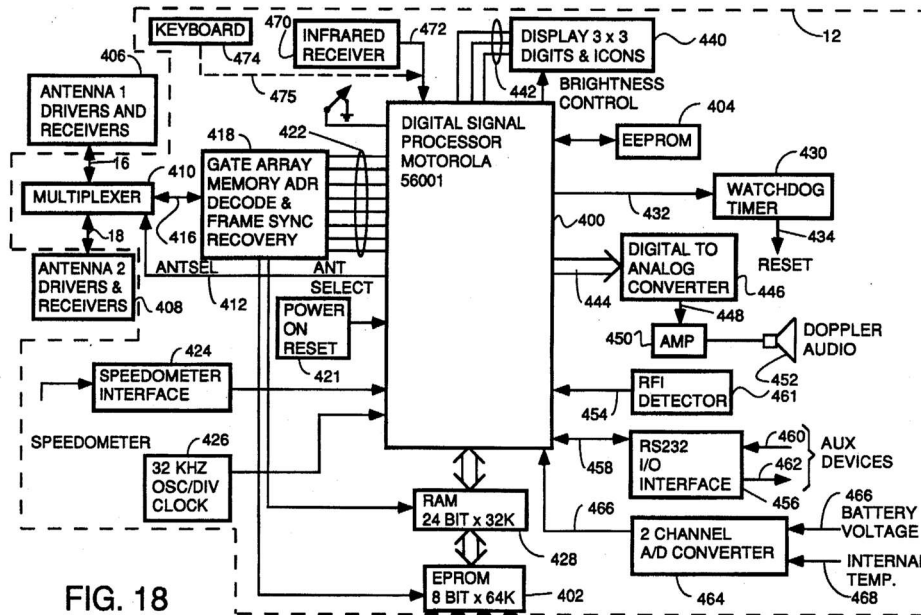
FIG. 1

(Ex.1004 at 2.) (Ex.2002 ¶87.)

Aker also discloses “a process for a multimode digital FFT, direction sensing, doppler radar where the operator can select between” various modes in which the patrol vehicle is either stationary or moving. (Ex.1004, [0008]–[0025].) Importantly for purposes of this proceeding, Aker’s teaching specifically discloses that the operator selects whether the patrol vehicle is stationary or moving. (Ex.1004, [0049]–[0050].) (Ex.2002 ¶88.)

ACI argues that Aker ’724 further details the operation of the Aker disclosure (Paper 1 at 6.) To that end, Aker ’724 discloses that “a control program is detailed in the flow charts described later herein and the actual executable binary code in [sic] included herewith as Appendix A. The code of Appendix A is ported for a Motorola 56001 digital signal processor (hereafter DSP).” (Ex.1007, 18:31–35; *see*

also id. at 75–102.) Figure 18 of Aker '724 depicts that DSP and “speedometer interface 424”:



(*Id.* at 14; *id.*, 27:60–61.) (Ex.2002 ¶89.)

Aker '724 further explains that the “DSP also has an optional speedometer interface 424 in some embodiments through which the DSP can read the actual patrol car speed for purposes of comparing this speed to the ‘patrol speed’ derived from the radar returns of stationary objects.” (Ex.1007, 20:34–38.) But Aker '724 cautions: “The software of Appendix A does not use the actual speedometer speed as the patrol speed because this is not accurate enough. Instead, the patrol speed is derived from the Doppler shifted radar returns from the ground.” (*Id.*, 20:38–40.)

This is done by using the strongest radar return over time and assuming this is the return from the ground. Basically,

the ground return is usually the strongest radar return although when targets get close, their returns become stronger for a short time than the ground return but then the target return goes away altogether. The software therefore assumes that the strongest return over an interval which is longest enough [*sic*] to distinguish over transitory target returns, is the return from which the patrol speed is derived. The software also includes the ability to compare the calculated patrol speed from the return selected in the above described manner to the speed read from the speedometer, and, if the difference is greater than 3 MPH, to discard the calculated patrol speed and re-calculate it from a different radar return.

(*Id.*, 20:42–55.) (Ex.2002 ¶90.)

Together, Aker and Aker '724 teach that a patrol vehicle's in-car speedometer may be tapped to supply a patrol vehicle's speed to a processor for use in calculating a target vehicle's speed. But, critically, ACI's code programmed for the Motorola 56001 "does not use the actual speedometer speed as the patrol speed because this is not accurate enough." (Ex.1007, 20:38–40.) Because the optional patrol vehicle speed determined by tapping a patrol vehicle's in-car speedometer is not accurate enough, the prior art relies instead on radar returns from the ground to calculate the patrol vehicle's speed. (*Id.*, 20:42–55.) But in situations where the radar-calculated patrol vehicle speed differs from the speed read from the patrol vehicle's

speedometer by more than 3 miles per hour, Aker '724 teaches “to discard the calculated patrol speed and re-calculate it from a different radar return.” (*Id.*, 20:51–55). Consequently, even if an error is found to exist as a result of the speed-comparison step, Aker '724 still teaches use of radar-based patrol vehicle speed calculations rather than use of a vehicle's speedometer.

Aker thus teaches a preference for radar-based patrol-vehicle speed calculations rather than use of a vehicle's speedometer when accuracy is required. Given the context of the art, Aker '724 requires accuracy because that is what was programmed by ACI's inventors to be employed in its processor for use in the demanding field of speed enforcement. (Ex.2002 ¶91.)

B. Thomas

ACI relies on Thomas as a secondary reference in all its asserted grounds. (Paper 1 at 7–40, 42–70.) Thomas “relates to a controller for a vehicle engine which is designed to restrict the vehicle speed automatically within a zone in which the vehicle is travelling” (Ex.1005 at 5:1–6.) Thomas acknowledges “a widespread need to be able to ensure that vehicles adhere to speed limits especially within urban districts. There has been proposed [*sic*] methods of controlling vehicle speed by interrupting the throttle linkage of the vehicle. Such systems are largely mechanical and tend to be complex and expensive to fit to a vehicle.” (*Id.* at 5:8–13.) (Ex.2002 ¶93.)

Thomas teaches that the “controller 10 of the present invention can be connected to almost any vehicle in the world. The system will connect to either the engine management system of modern cars or the ignition system on older vehicles with carburetors and no engine management.” (Ex.1005 at 4:15–19.) (Ex.2002 ¶94.) Within the controller 10, the current speed (*e.g.*, from receiver 12) is applied to a comparator 14, and the comparator 14 compares the current vehicle speed with the speed limit. The output of the comparator is a control signal to either control (*i.e.*, reduce fuel injector operation) or nominally control (*i.e.*, normal fuel injector operation) that is applied to the regenerator 16 (*i.e.*, fuel injector driver). The engine management systems (*i.e.*, injector output) provides an input to the regenerator 16, which then provides an output to control the fuel injectors. (Ex.1005 at 5:19–7:20.) (Ex.2002 ¶95.)

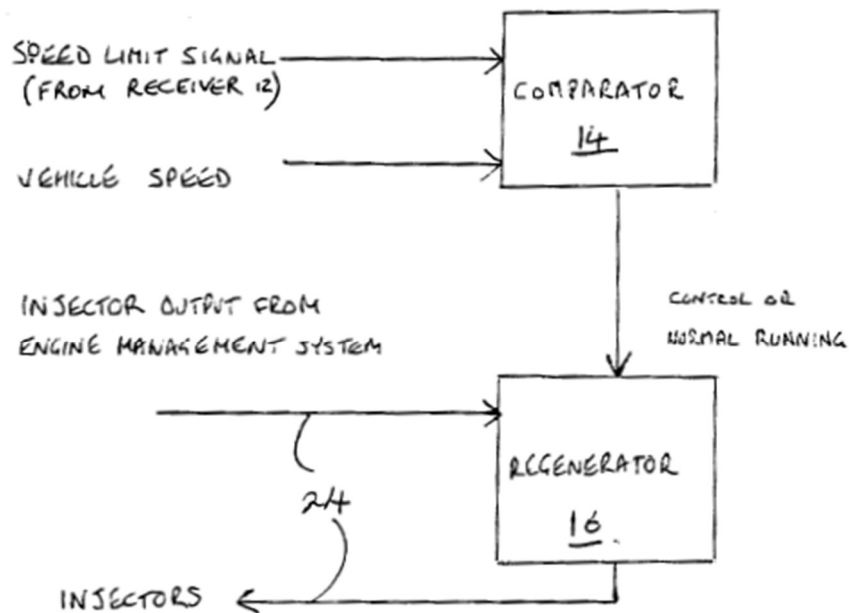


FIGURE 2

(Ex.1005 at 3.)

Thomas provides a detailed circuit diagram showing that the controller 10 receives speed information from either receiver 12 or the antilock braking system (“ABS”) sensors 22, and then outputs control signals to the engine management information on lines 24 connected to the fuel injectors 20:

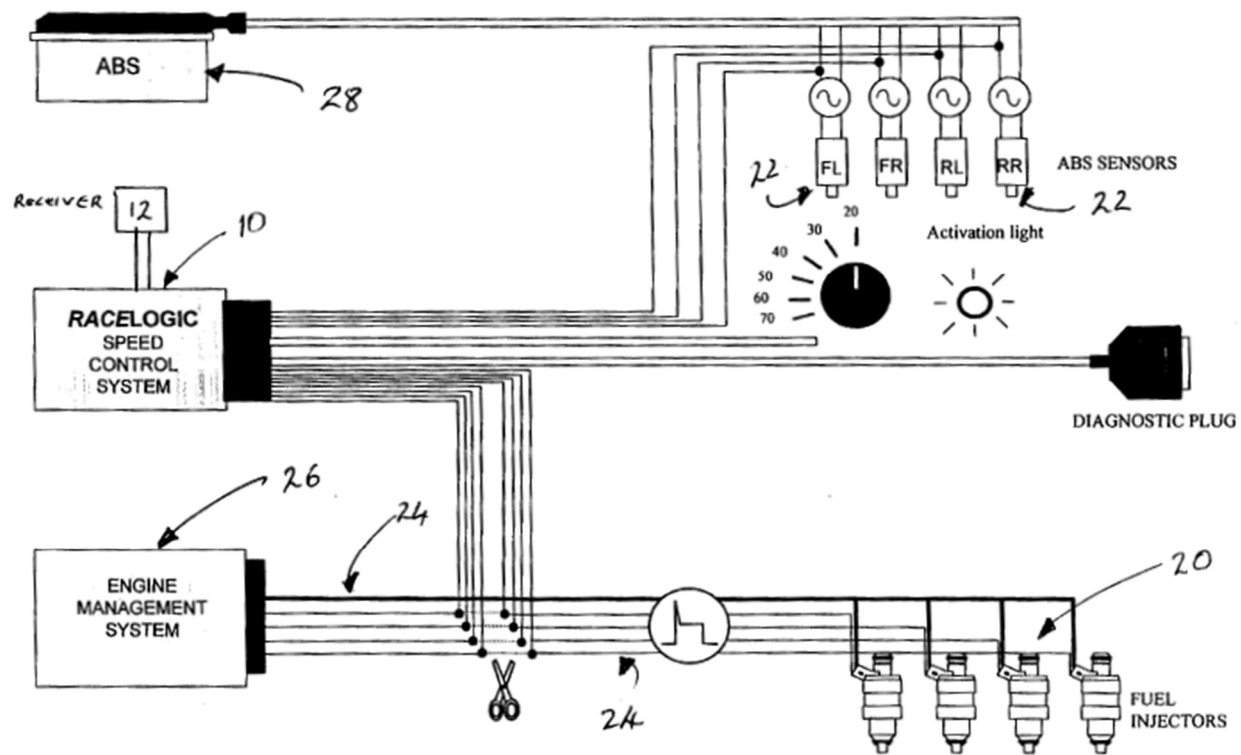


FIGURE 1

(*Id.* at 2.) The diagram also shows a manual speed-limit input (*id.* at 2, at 19:19–22) and an “Activation light” showing that the vehicle’s speed is being controlled (*id.* at 2.) (Ex.2002 ¶96.)

Thomas discloses three ways to determine a vehicle’s speed:

1. using an ABS sensors 22 already fitted to the vehicle (as shown in the illustrated embodiment);
2. using a road speed sensor already fitted to the vehicle; and
3. using a calculated speed computed from the global positioning system (GPS).

(Ex.1005 at 9:5–13; *see also id.* at 16:24–30.) (Ex.2002 ¶¶97–99.)

Thomas uses the word “speedometer” only twice. (Ex.1005 at 8:21, 16:28.) Contrary to the language used by ACI in its Petition (Paper 1 at 9–10, 19, 29, 40, 42), Thomas never uses the phrase “GPS speedometer” or “GPS-enabled speedometer” when referring to the GPS system used to calculate speed in Thomas’s third disclosed speed-determination method. (Ex.2002 ¶100.)

Thomas states that at the time of its disclosure there were “a number of standard receivers used to interpret the GPS signals from the collection of satellites used for global positioning. *These receivers allow determination the a [sic] vehicle position to within about 50–100 meters. To increase the accuracy of the positioning, a differential radio receiver unit may be connected to the GPS receiver, and this will improve the accuracy to about 10 meters.*” (Ex.1005 at 11:15–21, emphasis added.) (Ex.2002 ¶101.)

Thomas further explains: “The information available from the GPS system can be used to calculate speed, therefore obviating the need for a separate speed sensor 22 input.” (Ex.1005 at 11:32–12:1.) The “current-vehicle-speed-limit signal is generated from GPS data in conjunction with an in-board database” that can be used to determine the speed limit to which the vehicle’s speed must conform. (*Id.* at 6:15–17, 11:28–31.) “The controller preferably reduces the vehicle speed in a predetermined manner and thus avoids potentially dangerous rapid deceleration. The

predetermined manner is preferably a progressive manner.” (*Id.* at 6:25–29; *see also id.* at 10:1–2.) (Ex.2002 ¶102.)

Thomas's only disclosure for calculating speed using GPS uses distance traveled over time: “In the GPS method, the absolute Latitude and Longitude of the vehicle is known at a precise time. Two such readings can be subtracted to give distance travelled over time. This can then be used to work out vehicle speed.” (Ex.1005 at 17:11–15.) (Ex.2002 ¶103.)

Thomas does not disclose the update rate at which GPS measurements are to be obtained and does not disclose the update rate at which the speed is calculated. (Ex.2002 ¶104.) Thomas does not disclose any consistency check on GPS measurement as a precursor to the using the GPS-derived speed to control the vehicle's fuel injectors. Thomas's controller 10 does not output GPS position or speed; it outputs control signals to control the fuel injectors. (Ex.2002 ¶¶105–106.)

C. Carmichael

ACI relies on Carmichael in grounds 1B and 2B as a secondary reference to attack dependent claims 3–5 and 11–13 of the '039 patent. (Paper 1 at 33–39, 65–70.) Carmichael discloses a “module for interfacing on-board electronics in a vehicle with a radar device and/or camera.” (Ex.1006, abstract.) Carmichael describes the difficulties in interfacing with various on-board electronics to obtain the speed of the vehicle due to varying standards and various vehicle manufactures. (Ex.1006,

[0008].) Carmichael disclosed that the speed of the patrol vehicle can be obtained from the speedometer, but the disadvantage of this method requires interface to the various manufactures' speedometers, and this would likely require lengthy specific calibrations to account for the speedometer transducer. (*Id.*, [0004].) (Ex.2002 ¶108.)

Carmichael interfaces to the host vehicle's electronics via an on-board diagnostic connector to provide vehicle information to the video surveillance camera and radar device:

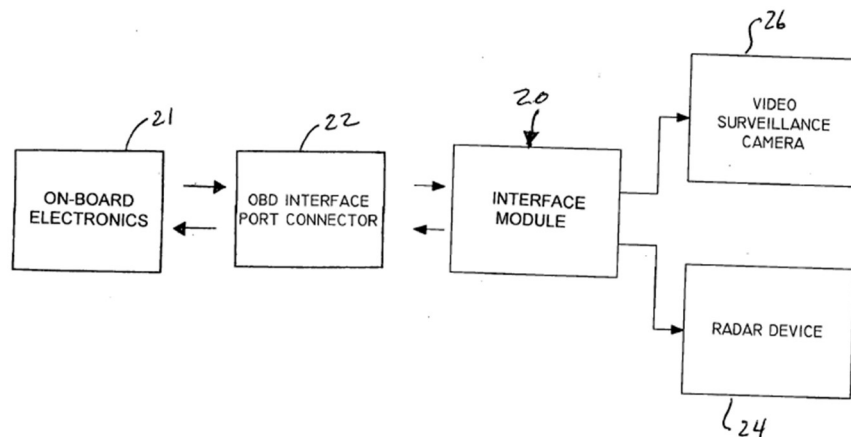


FIG. 1

(Ex.1006 at 2.) (Ex.2002 ¶109.) Carmichael “is directed to apparatus for interfacing with the On-Board Diagnostic (OBD) computer (also referred to herein as the on-board electronics) in a vehicle with a radar device and/or video surveillance system.” (Ex.1006, [0022].) Numerous data busses are disclosed between the vehicle's electronics and the radar device that have “different signaling protocols, such as

variable pulse width (VPW), pulse width modulation (PWM) and IOS 9141 that are used by the various forms of on-board electronics.” (*Id.*, [0022].) The Carmichael device distinguishes which of the various protocols are employed by a vehicle’s system, decodes speed information from data provided by the decoded vehicle data, and then “use[s] the vehicle speed information when a patrol vehicle is in motion to calculate the speed of a target vehicle in a known manner.” (*Id.*, [0022], [0055].) (Ex.2002 ¶110.)

Carmichael describes a capability for automatically or manually switching between stationary and moving modes of operation of a radar:

For ease of operation, it is desirable to have the radar device automatically switch over to stationary mode if the patrol vehicle is stopped. Likewise, it is also desirable to have the radar device to switch back to moving mode once the patrol vehicle is moving again. It is also important from the operator’s point of view that the mode switchover be selectable from either automatic or manual settings. The radar device preferably contains a software menu that the operator can use to select between manual and automatic mode switchover. VIP_CHOICE at block 231 is the variable used to hold the state of the manual/automatic switchover and its status is saved in non-volatile memory on power down and recalled on power up. First, the VIP_CHOICE variable is checked to

determine if the radar is in automatic or manual mode switchover. The routine exits if VIP_CHOICE is equal to a 1 meaning that the radar is in manual mode. In manual switchover mode, the radar will display a zero in the patrol window when the radar device has come to a stop and will not display any target speeds nor will the device switch over automatically to stationary mode.

(Ex.1006, [0062].) (Ex.2002 ¶111.)

Claim 9 of Carmichael recites:

The apparatus for interfacing between on-board electronics in a vehicle and a radar device as claimed in accordance with claim 2 wherein said radar device has a moving mode and a stationary mode, said radar device automatically switching to the stationary mode if the vehicle speed information indicates that the speed of the vehicle is zero and automatically switching to the moving mode if the vehicle speed information is not zero.

(Ex.1006 at 22.) (Ex.2002 ¶112.)

Thus, Carmichael discloses comparing a single speed reading with a single threshold—zero—to determine whether the device is in stationary or moving mode.

(Ex.2002 ¶113.) Carmichael receives the vehicle speed information from the vehicle itself via the OBD interface port. Regardless of the accuracy of the speed value, Carmichael receives the vehicle speed information through direct wire connections,

and the “noise” characteristics (*i.e.*, variation) of the speed data would be low. Carmichael’s teaching to use a single threshold to evaluate a low-variance speed signal via direct connection is very different from using a dual-threshold methodology with a “noisy” speed signal obtained from a GPS device. (Ex.2002 ¶114.)

D. Shelton

ACI relies on Shelton as a primary reference in grounds 2A and 2B to attack independent claims 1 and 9 and certain dependent claims of the ’039 patent. (Paper 1 at 39–70.) Shelton discloses “a method and apparatus for processing Doppler return information by analyzing a limited area of the frequency spectrum corresponding to the speedometer output of the patrol vehicle.” (Ex.1008, 1:9–13.) Shelton discloses:

the signal processing system of the radar unit converts the pulses from the speedometer and calculates the speedometer speed. Using this speed as the center of a search window, the system searches for the patrol vehicle radar return signal that falls within the search window. Once the patrol speed is found, other targets can be found and their speed accurately determined.

(*Id.*, 1:53–59.) (Ex.2002 ¶116.)

In particular, Shelton discloses an “electronic speedometer 20 outputs a certain number of pulses for each mile the patrol vehicle travels. A common value of the speedometer pulses is 8,000 pulses per mile.” (Ex.1008, 2:44–46.) By counting the pulses from the speedometer to determine speed, the Shelton disclosure teaches that the vehicle radar returns can be analyzed more accurately by creating a narrow search window in the radar returns, thereby reducing false returns. (*Id.*, 1:53–59, 4:42–46, at 5, Fig.4.) The search window Shelton identifies is ± 5 mph. (*Id.*, 4:16–19, at 5, Fig.4 #82.) (Ex.2002 ¶117.)

Shelton is a traffic radar system that interfaces to the patrol vehicle's speedometer to estimate the speed of the patrol vehicle. The patrol vehicle's speed reading from the electronic speedometer is used to center a search window around the Doppler-derived radar signal returns. Shelton does not use GPS, any other GNSS, or signal processing associated with GPS/GNSS for any purpose. (Ex.2002 ¶118.)

E. Henderson

ACI relies on the Henderson in grounds 2A and 2B as a secondary reference in combination with Shelton to attack independent claims 1 and 9 and certain dependent claims of the '039 patent. (Paper 1 at 39–70.) Henderson discloses that a “traffic radar processes Doppler return information by analysis of the received frequency spectrum in order to improve target identification and minimize

interference and unwanted harmonics.... The speed of the patrol car is determined by recognizing a signature that exhibits an asymmetry due to the cosine effect.” (Ex.1009, abstract.) Henderson further discloses “systems [that] work in tandem to process control options and radar Doppler return signals, screen and search for interference patterns, then determine a combination of target and/or patrol vehicle speeds and indicate those speeds to the operator.” (*Id.*, 2:63–67.) (Ex.2002 ¶120.)

Henderson states that “[t]he radar relies on ground reflection Doppler signals to determine the patrol vehicle speed.” (Ex.1009 at 38, 8:14–15.) Henderson states that “[o]ne of the unique features of the DSP based traffic radar is its ability to analyze the frequency information returns of the reflected microwave carrier. Because of the cosine effect phenomenon, the patrol vehicle Doppler return has a unique signature when compared to target vehicle Doppler return signals.” (Ex.1009 at 38, 8:1–7.) Henderson notes that “[t]ests indicate that the patrol speed can be accurately found by this pattern search approximately 60% to 70% of the time, with strongest return still used as a fallback.” (Ex.1009 at 39, 9:5–7.) Thus, Henderson calculates vehicle speed by matching radar-return signatures or selecting the strongest return. (Ex.1009 at 38–39, 8:2–16, 9:5–7, 9:13–22; *see also* Ex.2002 ¶121.)

A POSITA would recognize that Henderson is a traffic radar system that uses DSP in an attempt to more accurately identify and calculate the patrol vehicle speed

from the asymmetric radar returns from road/roadside objects caused by the cosine effect. Henderson does not use GPS, any other GNSS, or signal processing associated with GPS/GNSS for any purpose. (Ex.2002 ¶122.)

V. Patentability of the Challenged Claims

A. Legal Framework

In an IPR, “the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc.*, 815 F.3d at 1363 (citing 35 U.S.C. § 312(a)(3)). This burden of persuasion *never* shifts to Patent Owner. *See Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (discussing the IPR burden of proof).

A patent claim is unpatentable under 35 U.S.C. § 103 if the differences between the claimed subject matter 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 ordinary skill in the art; and (4) when in evidence, objective evidence of non-obviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). “A reference qualifies as prior art for an obviousness determination under § 103 only

when it is analogous to the claimed invention.” *In re Klein*, 647 F.3d 1343, 1348 (Fed. Cir. 2011).

A finding of obviousness based only on the conclusion that prior art references **could** be combined is erroneous as a matter of law. *See Virtek Vision Int’l ULC v. Assembly Guidance Sys., Inc.*, 97 F.4th 882, 887 (Fed. Cir. 2024) (“The mere fact that these possible arrangements existed in the prior art does not provide a reason that a skilled artisan would have substituted the one-camera angular direction system in Keitler and Bridges with the two-camera 3D coordinate system disclosed in Briggs.”). “The obviousness inquiry does not merely ask whether a skilled artisan could combine the references, but instead asks whether ‘they would have been motivated to do so.’” *Adidas AG v. Nike, Inc.*, 963 F.3d 1355, 1359 (Fed. Cir. 2020) (quoting *InTouch Techs., Inc. v. VGO Commc’ns, Inc.*, 751 F.3d 1327, 1352 (Fed. Cir. 2014)). Consequently, ACI must establish that a person of ordinary skill in the art **would** have been motivated to combine its proposed prior art references and reasonably expect success in achieving the claimed invention. *Personal Web Techs. LLC v. Apple, Inc.*, 848 F.3d 987, 993 (Fed. Cir. 2017).

“A finding by the Board that a patent challenger has demonstrated a motivation to combine references does not necessarily imply that the challenger has also met its burden of showing a reasonable expectation of success” in achieving what is claimed in the challenged patent. *Eli Lilly & Co. v. Teva Pharms. Int’l*

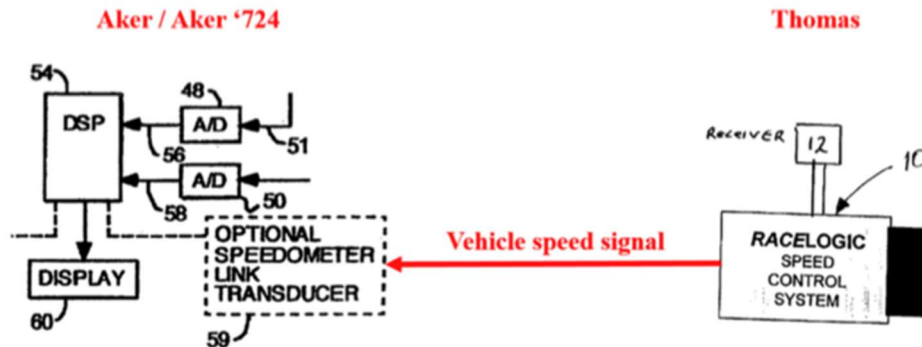
GmbH, 8 F.4th 1331, 1344 (Fed. Cir. 2021). That is because the two concepts, while often analyzed together, are different in scope. “The reasonable expectation of success requirement refers to the likelihood of success in combining references to meet the limitations of *the claimed invention*.” *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1367 (Fed. Cir. 2016) (emphasis added). By contrast, motivation to combine is independent of the content of the challenged patent's claims. *See id.* at 1368 (Fed. Cir. 2016) (“[T]he Petition did not provide a specific or credible explanation why an ordinary artisan would have expected Zavgorodny's azidomethyl protecting group to meet Tsien's quantitative deblocking requirement under conditions suitable for use in Tsien's sequencing methods. While this shortcoming is irrelevant to a finding that there was no reasonable expectation of success in meeting the claims of the '537 patent, which do not require quantitative deblocking at all, it is central to a finding of no motivation to combine.”).

B. All of ACI's asserted grounds fail because there is no motivation to combine or reasonable expectation of success.

1. ACI's “compatibility” arguments do not establish a motivation to combine Thomas with the Aker references.

There is no reason to combine the Aker references with Thomas, and ACI fails to establish that a POSITA would be motivated to make such a combination or have a reasonable expectation of success in achieving the '039 patent's claimed invention

by doing so. The heart of ACI's proposed combination is to use Thomas' controller 10 as the input to the optional speed link transducer 59 taught by the Aker references:



(Paper 1 at 8). (Ex.2002 ¶157.) In a nutshell, ACI argues this combination is appropriate because “Aker discloses receiving a current vehicle speed from a speedometer, *without limitation to any specific type of speedometer* and thus *is compatible* with a GPS speedometer such as that disclosed in Thomas,” which “Thomas emphasizes ‘*can be* retro-fitted to 99% of cars on the road today.’” (Paper 1 at 9–10, emphases added.) These simplistic arguments cannot establish obviousness as a matter of law. *Virtek*, 97 F.4th at 887; *Adidas*, 963 F.3d at 1359. These statements of mere *possible* combination are not statements that a POSITA *would be* motivated to combine Thomas with the Aker references. *Id.*

To the contrary, a POSITA would not be motivated to combine Thomas with the Aker references. Although Aker and Aker '724 both disclose a link or interface with a “speedometer” (Ex.1004, [0064]; Ex.1007, 20:34–38) Thomas's controller 10 outputs not vehicle position or speed but a control signal going to the fuel injectors.

(Ex.2002 ¶124.) Indeed, Thomas uses the word “speedometer” only twice. (Ex.1005 at 8:21, 16:28.) (Ex.2002 ¶¶100, 124.) And Thomas never uses the phrases “GPS speedometer” or “GPS-enabled speedometer,” which ACI employs in its argument in an apparent attempt to turn the GPS-based speed-calculation system disclosed in Thomas’s third method into something it is not. (Paper 1 at 9–10, 19, 29, 40, 42.) Moreover, Thomas’s controller 10 outputs its control signals on single wires going to the fuel injectors. A POSITA would understand that interfacing to a vehicle’s fuel injectors is a well-known and straightforward technology to decrease vehicle speed. Thus, a POSITA would not be motivated to look toward a simple fuel-injector controller when seeking to modify a much more complicated GNSS-based traffic radar system with patrol-vehicle speed determination, where the GNSS speed is used to verify the patrol vehicle speed and is used to enhance the performance of the absolute target velocity speed determination. (Ex.2002 ¶124.)

As explained in §V.B.3, *infra*, Aker in fact discloses that its speedometer must be sufficiently accurate for its intended purpose—determining the patrol vehicle’s speed. As Aker explains, a POSITA would not uncritically adopt “any speedometer” for the application-critical task of determining the speed of the patrol vehicle, because some speedometers are “not accurate enough.” (Ex.1007, 20:38–40.) (Ex.2002 ¶127.) Thus, within the confines of the accuracy required for radar systems

used in law enforcement, a POSITA would require a reason to select a GPS-based solution to determine vehicle speed.

2. ACI misconstrues Thomas to misidentify the problem that Thomas purportedly solves.

ACI fails to establish that Thomas is concerned with the problems addressed in the '039 patent. The broad gloss that Thomas discloses a “GPS speedometer” or “GPS-enabled speedometer” does not demonstrate its utility for use in the law-enforcement environment. Thomas’s disclosed speed limiter addresses distinctly different concerns than those present with radar-based speed enforcement and the accuracy it requires. If Thomas’s GPS-based speed calculation is inaccurate in its application, it does not have the same consequence as it would in the law-enforcement environment of the '039 patent. Thus, ACI fails to establish why Thomas’s GPS-based speedometer would commend itself to a POSITA. *See Klein*, 647 F.3d at 1350 (Board’s finding that prior-art references were analogous was not supported by substantial evidence).

ACI argues:

Thomas discloses a GPS speedometer, and states that “[t]he information available from the GPS system can be used to calculate speed, therefore obviating the need for a separate speed sensor input.” ACI-1005, 7:32–8:1.
Thomas discloses such sensors as ‘largely mechanical

and tend to be complex and expensive to fit to a vehicle.'

Id., 1:12–13.”

(Paper 1 at 9, emphasis added.) By linking these separate statements, ACI implies that “a separate speed sensor input” is “largely mechanical and tend to be complex and expensive,” which therefore is a problem to be solved by the GPS disclosed in Thomas. But Thomas’s GPS does not solve a “mechanical” and “complex” *sensor* problem, as ACI misleadingly argues.

While Thomas does recognize that a “GPS system can be used to calculate speed, *therefore obviating the need for a separate speed sensor input*” (Ex.1005 at 11:32–12:1, emphasis added), Thomas does not remark about the complexity *of such sensors*. In fact, the section of Thomas that ACI tries to link to sensors is not related to sensors at all:

There is a widespread need to be able to ensure that vehicles adhere to speed limits especially within urban
10 districts. There has been proposed methods of controlling vehicle speed by interrupting the throttle linkage of the vehicle. Such systems are largely mechanical and tend to be complex and expensive to fit to a vehicle. Such systems are also imprecise in their control of the vehicle speed.

(Ex.1005 at 5:8–14, emphasis added.) Thus, Thomas plainly recognizes that *throttle-control systems and their associated linkages* are “largely mechanical and tend to be complex and expensive to fit to a vehicle.” (*Id.*) Thomas does not disclose complaints about the effectiveness of existing *speed sensor systems*, as ACI implies.

(Ex.2002 ¶125.) To the contrary, Thomas recognizes that alternatives exist and are equally useful as the GPS sensors it mentions. (See Ex.1005 at 16:24–30). Moreover, Thomas teaches *minimizing* additional sensors (Ex.1005 at 6:10–12, 10:32–11:1), which is contrary to ACI's fundamental combinatorial logic.

3. ACI's combination ignores the teachings of Aker, Aker '724, and Thomas, which demonstrate that GPS is not suitable in Aker's solution.

ACI's argument that the Aker references are “without limitation to any specific type of speedometer” (Paper 1 at 9) ignores their teachings. The Aker references specifically identify precise sources of speed data—*i.e.*, speedometer- and radar-derived—and an important requirement for those sources—*i.e.*, accuracy. The Aker references disclose an embodiment in which “patrol car speed *is determined from the car's speedometer*,” which Aker '724 confirms by disclosing that its “DSP can read *the actual patrol car speed*,” which is “the *actual speedometer speed*.” (Ex.1004, [0051]; Ex.1007, 20:34–40, emphases added.) Aker itself describes the “use of a ‘hardwired’ link to the speedometer via transducer 59,” confirming that Aker derives its patrol-car speed from the car's electronic signals used for the in-dash speedometer. (Ex.1004, [0099].) ACI provides no evidence to establish why a POSITA would understand those passages to mean anything other than the ordinary English understanding: data derived from a patrol car's speedometer.

Aker also discloses its preferred embodiment for determining speed by “processing returns from stationary objects such as the ground,” which Aker ’724 clarifies to mean “Doppler shifted radar returns from the ground.” (Ex.1004, [0051]; Ex.1007, 20:40–42.) Aker ’724 makes clear that radar-derived returns for determining speed are its preferred method because it has actually implemented software that relies on radar-derived speed determinations and, more importantly, specifically criticizes speedometer-derived speed: “[t]he software of Appendix A **does not use the actual speedometer speed as the patrol speed because this is not accurate enough.**” Instead, the patrol speed is derived from the Doppler shifted radar returns from the ground.” (Ex.1007, 20:38–40, emphasis added.) Aker ’724 so prioritizes radar-derived returns over less-accurate speedometer-derived data that Aker ’724 chooses to recalculate a radar-derived speed rather than simply rely on speedometer-derived data if there is a discrepancy between the two:

The software also includes the ability to compare the calculated patrol speed from the return selected in the above described manner to the speed read from the speedometer, and, if the difference is greater than 3 MPH, to discard the calculated patrol speed and re-calculate it from a different radar return.

(Ex.1007, 20:42–55; *see also id.*, abstract (“The counting and display unit has a computer programmed to perform digital signal processing on the digital data

received from the antenna to improve the quality and accuracy of the calculated speeds for patrol speed, strongest target speed and fastest target speed”).) (Ex.2002 ¶126.)

Thus, contrary to ACI's factually incorrect argument that the Aker references disclose a generic teaching of a speedometer “without limitation to any specific type” (Paper 1 at 9), the Aker references teach specific speed-determining sources, a strong preference for radar-derived speed, and the importance of accuracy of the determined speed. A POSITA reading the Aker references together would conclude that while using the vehicle's own speedometer is possible, it is not accurate enough for purposes of the invention. Stated another way, ACI's own references in fact teach a *specific limitation* as to the speedometer: it must be sufficiently accurate. (Ex.2002 ¶127.)

In addition to the 3 mph accuracy limitation taught by the Aker references, the '039 patent and the relevant prior art on traffic radar systems for patrol vehicles stress the importance of determining the speed of the patrol vehicle so that it can be used to convert the relative target vehicle speed to an absolute target speed using the speed of the patrol vehicle. A POSITA would understand that the accuracy of determining patrol-vehicle speed is an important element of traffic radar systems used by police. In fact, the speed-determining accuracy of police radar devices is a critical factor as specified by the U.S. Department of Transportation's National

Highway Traffic Safety Administration. For police radar-type devices, the NHTSA specifies that the Speed Accuracy in Field Operation in the determination of the target speed must be accurate to (+1, -2 mph) when the radar is in Stationary Mode, and ± 2 mph when the radar is in Moving Mode. (Ex.2008 at 21, 50; Ex.2009 at 25, 54.) (Ex.2002 ¶128.)

A POSITA would understand that if the patrol-vehicle speed is not accurate, the speed of the target vehicle will not be accurate. Issuing erroneous speeding citations to vehicle operators would be inappropriate and would inhibit law enforcement officers' ability to issue valid speeding citations. Thus, a POSITA would understand that the patrol vehicle speed must be accurately determined so officers can issue valid citations. (Ex.2002 ¶128.)

Understanding the demands and application of the Aker references, a POSITA would not be motivated to use Thomas' GPS teaching as an input for Aker's "optional transducer 59" because Thomas expressly explains that its GPS transceivers are not accurate enough for the speed-determination function of the Aker references. (Ex.2002 ¶129.)

There are a number of standard receivers used to interpret the GPS signals from the collection of satellites used for global positioning. *These receivers allow determination the a [sic] vehicle position to within about 50–100 meters. To increase the accuracy of the positioning, a differential*

***radio receiver unit may be connected to the GPS receiver,
and this will improve the accuracy to about 10 meters.***

(Ex.1005 at 11:15–21, emphasis added.) This 10-meter position accuracy is consistent with what a POSITA would understand to be the position accuracy of a prototype differentially corrected GPS. (Ex.2002 ¶135.)

When using GPS to calculate speed, Thomas discloses that “the absolute Latitude and Longitude of the vehicle is known at a precise time. Two such readings can be subtracted to give distance travelled over time. This can then be used to work out vehicle speed.” (Ex.1005 at 17:12–15.) A POSITA would understand that two factors go into this speed determination:

- 1) the accuracy of the two position solutions; and
- 2) the time interval between these two positions.

Regarding factor 1), a POSITA would also understand that the 10-meter error disclosed in Thomas is an error of ± 10 meters, not ± 5 meters as ACI has argued (Paper 8 at 3). A differential GPS (“DGPS”) position error of 10 meters is the difference between the true position and the calculated DGPS position. Position errors associated with a DGPS user solution are statistical in nature and not biased in a constant direction. In other words, the DGPS position solution error may be in any direction from the true position, which would be represented as ± 10 meters. (Ex.2002 ¶135.)

Regarding factor 2), Thomas does not explicitly disclose either what update rate would be used to determine the position or at what interval the speed would be calculated. Thomas is concerned with controlling fuel injectors in a slow and controlled manner, to reduce the vehicle speed if it exceeds the speed limit. What Thomas does teach is that when the vehicle's speed exceeds the posted speed limit, "the output-torque signal is produced to reduce the torque produced by the engine in a preset manner; normally the torque will be gradually reduced to effect gradual slowing down of the vehicle." (Ex.1005 at 9:32–10:2.) A POSITA would understand that Thomas's controller 10 operates in a slow and controlled fashion to avoid sudden speed changes. (Ex.2002 ¶136.)

A POSITA performing a performance analysis on Thomas's ± 10 -meter accuracy statement would consider the worst case in estimating the speed that would be calculated from subtracting two absolute Latitude and Longitude position estimates from the GPS receiver. (*See* Ex.1005 at 11:17–18, 17:12–15.) (Ex.2002 ¶138.) Since Thomas does not disclose the rate at which data is collected, a POSITA would likely consider using position update rates at a nominal rate of 1 Hz, understanding Thomas's accuracy statement of ± 10 meters to be a nominal 1 Hz rate. In the dynamic application of police radar enforcement, "[a]t the default output rate of once per second there can be a lot of change in the 'Speed Over Ground'

value if the patrol vehicle is accelerating or deaccelerating.” (Ex.2005, [0029].)

Thus, the update rate would be at least once per second. (Ex.2002 ¶139.)

Even if Thomas's differential technique were available, it still would not be accurate enough. Using the worst-case position error estimates (*i.e.*, ± 10 meters) and a nominal 1 Hz update rate, a POSITA would calculate the maximum expected error of the speed estimate produced by Thomas's GPS receiver to be 44.74 mph. (*i.e.*, $20\text{m} \cdot (1\text{mile}/1609.344\text{m}) \cdot (3600\text{sec}/1\text{hr})$). Similar calculations could be done as shown in the table below for other position accuracy conditions. It would be obvious to a POSITA that the position and hence speed accuracies disclosed in Thomas would not be sufficiently accurate for the traffic radar systems claimed in the '039 patent.

Position Differences, [m] vs Speed Error [mph]		
Update Rate [Hz]:		1
Update Interval [s]:		1
Position Difference [m]		Speed Error, [mph]
200	(<i>i.e.</i> , $\pm 100\text{m}$)	447.39
100	(<i>i.e.</i> , $\pm 50\text{m}$)	223.69
50	(<i>i.e.</i> , $\pm 25\text{m}$)	111.85
20	(<i>i.e.</i> , $\pm 10\text{m}$)	44.74
10	(<i>i.e.</i> , $\pm 5\text{m}$)	22.37
5	(<i>i.e.</i> , $\pm 2.5\text{m}$)	11.18
4.47	(<i>i.e.</i> , $\pm 2.23\text{m}$)	10
2.5	(<i>i.e.</i> , $\pm 1.25\text{m}$)	5.59

(Ex.2002 ¶140.)

If the center of the patrol-vehicle speed window is off, formed from the GNSS-converted speed of the patrol vehicle, then the window will likely be outside the frequency response of the patrol-vehicle radar returns, corresponding to the speed of the patrol vehicle. Thus, the radar returns corresponding to the speed of the patrol vehicle would not be within the window. (Ex.2002 ¶141.)

This inaccuracy in the GNSS speed and window center would be expected not to exclude the patrol-vehicle radar-return frequency bins in the determination of the relative target vehicle speed. A POSITA would expect the patrol-vehicle radar-return frequency bins to interfere with the relative speed determination of the target-vehicle radar-return frequency bins. (Ex.2002 ¶142.) A POSITA would further expect these inaccuracies in patrol-vehicle speed determination, and the inaccuracies in the relative speed of the target-vehicle determination, to lead to inaccuracies in the absolute speed of the target-vehicle determination. (Ex.2002 ¶143.)

A POSITA would also analyze what degree of position accuracy would be needed to support a ± 5 mph window as taught in the '039 patent. (Ex.1001, 9:2–13, 12:13–16.) If the window is off by 10 mph, then the taught ± 5 mph window would be totally outside the patrol-vehicle radar-return frequency bins. Thus, if the speed error of the speed-determining element is 10 mph, the radar system would be ineffective in windowing the patrol vehicle's radar frequency bins. Using this 10-mph speed error, a POSITA can calculate the position accuracy needed to support

the ± 5 mph window as: $10\text{mph} * (1609.344\text{m}/1\text{mile}) * (1\text{hr}/3600\text{sec})$, which equals 4.47 meters (*i.e.*, $\pm 2.23\text{m}$); as shown in the above table. (Ex.2002 ¶144.)

A POSITA would understand that Thomas's ± 10 -meter DGPS position accuracy produces maximum speed errors that would far exceed the necessary speed accuracies taught in the '039 patent. Thus, a POSITA would recognize that Thomas's DGPS accuracy statements would not provide an accurate enough window to exclude the police radar-return frequency bins in the determinations of the relative target speed and hence the absolute target speed using the speed of the patrol vehicle, as taught in the '039 patent. (Ex.2002 ¶145.) Given Aker '724's complaint that the "actual speedometer speed" is not sufficiently accurate (Ex.1007, 20:38–40), a POSITA would understand that a separately installed GPS receiver as disclosed by Thomas would produce greater error.

Moreover, Aker '724 discloses that the preferred embodiment compares the patrol-vehicle speedometer output to the radar-calculated patrol-vehicle speed and rejects the calculated speed if it varies by more than 3 mph from the speedometer speed. (Ex.1007, 20:50–55.) As demonstrated above, a POSITA understands that the potential errors from Thomas's GPS element far exceed Aker '724's maximum 3 mph variance from actual patrol vehicle speed. Thus, a POSITA would not be

motivated to use Thomas's GPS in Aker's invention, because the proposed modification would render Aker unsatisfactory for its intended purpose.

ACI also argues that there is a reason to use Thomas's GPS "in the event of an issue with the existing speedometer in the vehicle." (Paper 1 at 10.) But this argument overlooks that the Aker references *already disclose, and in fact prefer, an alternative method for determining speed: radar-returns*. (Ex.1007, 20:38–55.) A POSITA who understands that Thomas's GPS solution is not as accurate as a patrol car's expected 3 mph level of accuracy would not be motivated to use it in place of the patrol car's speedometer. Thus, ACI is wrong to suggest a POSITA would use the less-accurate GPS of Thomas to correct the inaccuracies of a car's built-in speedometer when the Aker references already solve that problem with their preferential use of radar-derived speed determination.

4. ACI's combination of Shelton and Henderson with Thomas relies on the same flawed logic as the Aker/Thomas combination and fails to provide a motivation to combine.

ACI's grounds 2A and 2B repeat the same logic for combining Thomas's GPS teaching with Shelton and Henderson's radar-based system. (*Compare* Paper 1 at 42–44 *with id.* at 9–11.) Consequently, the same frailties in ACI's combinatorial logic persist. *See* §§V.B.1–3, *supra*.

Whereas Aker discloses a required speedometer accuracy of within 3 mph, Shelton relies on a speed window of ± 5 mph to distinguish patrol-vehicle speed from

target-vehicle speed. (Ex.1008, Fig. 4 #82, 4:16–19.) A POSITA would understand that the source of vehicle-speed data is expected to be accurate enough to be within 5 mph of the actual patrol-car speed. If it is not, Henderson's old method of selecting the strongest radar return to determine patrol-vehicle speed (Ex.1009 at 38–39, 8:2–16, 9:5–7, 9:13–22) would not achieve the advantage of using the claimed invention. Thus, the Shelton-Henderson and Thomas combination does not overcome the accuracy deficiencies described above. (Ex.2002 ¶145.)

A POSITA would recognize that if the window is off by 10 mph, the taught ± 5 mph window would be totally outside the patrol-vehicle radar-return frequency bins. Thus, if the speed error of the speed-determining element is 10 mph, the radar system would be ineffective in windowing the patrol vehicle's radar-return frequency bins. Using this 10-mph speed error, a POSITA would calculate the position accuracy needed to support the ± 5 mph window as: $10\text{mph} * (1609.344\text{m}/1\text{mile}) * (1\text{hr}/3600\text{sec})$, which equals 4.47 meters (*i.e.*, $\pm 2.23\text{m}$); as shown in the above table. *See* §V.B.3, *supra*, at 42. (Ex.2002 ¶146.) Because Thomas's differential GPS position accuracy produces maximum speed errors that would far exceed the necessary speed accuracies taught in the '039 patent, a POSITA would have no motivation to combine Shelton-Henderson and Thomas. (Ex.2002 ¶147.)

C. Ground 1A: Claims 1–3, 6–11, and 14–15 are nonobvious over Aker, Aker '724, and Thomas.

Even assuming that a POSITA would have been motivated to combine Thomas with the Aker references, the combination still does not render obvious claims 1–3, 6–11, 15, and 15.

1. Claim 9

[9.3] a speed determining element configured to receive and process radio frequency signals from a global navigation satellite system to determine and output a speed of the patrol vehicle; and

ACI relies on Thomas's speed controller 10 configured to determine and output a speed of the patrol vehicle, stating that "the controller 10 from Thomas (including the GPS receiver 12) provides a "current-vehicle-speed signal" calculated based on the GPS data to the 'speedometer link transducer 59' of the DSP in the counting display unit" (Paper 1 at 16; *see also id.* at 6, 8, 11, 17). No other description of the proposed combination is made, other than a block diagram reproduced in the Petition at page 8. (Ex.2002 ¶151.)

Thomas teaches that within the controller 10, the current speed (*e.g.*, from receiver 12) is applied to a comparator 14, and the comparator 14 compares the current vehicle speed with the vehicle speed limit (*i.e.*, the speed limit). The output of the comparator is a control signal to either control (*i.e.*, reduce fuel injector operation) or nominally control (*i.e.*, normal fuel injector operation) that is applied

to the regenerator 16 (i.e., fuel injector driver). The engine management systems (i.e., injector output) provide an input to the regenerator 16, which then provides an output to control the fuel injectors. (Ex.1005 at 1:19-3:20, 5:25-30, Figure 2)

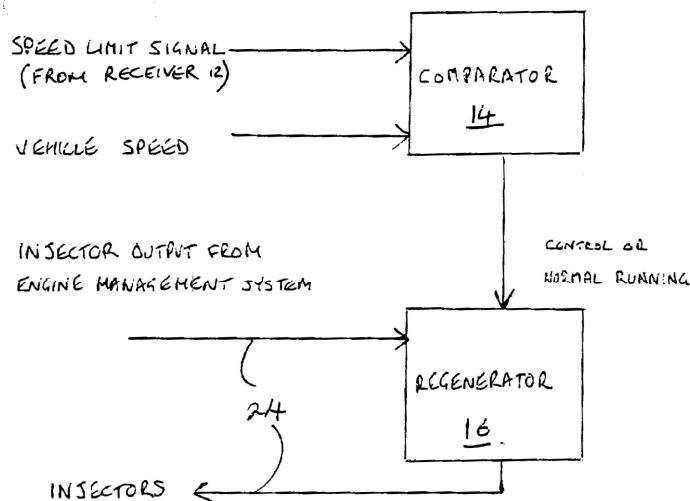


FIGURE 2

(Ex.2002 ¶153.)

Thomas provides the detailed circuit diagram of Figure 1, shown below, where the controller 10 receives speed information from either receiver 12 or the ABS Sensors 22, and then outputs control signals to the engine management system on lines 24 connected to the fuel injectors 20. Figure 1 also shows a manual speed limit input (Ex.1005, 15:19-22, Figure 2) and a speed being controlled Activation light”.

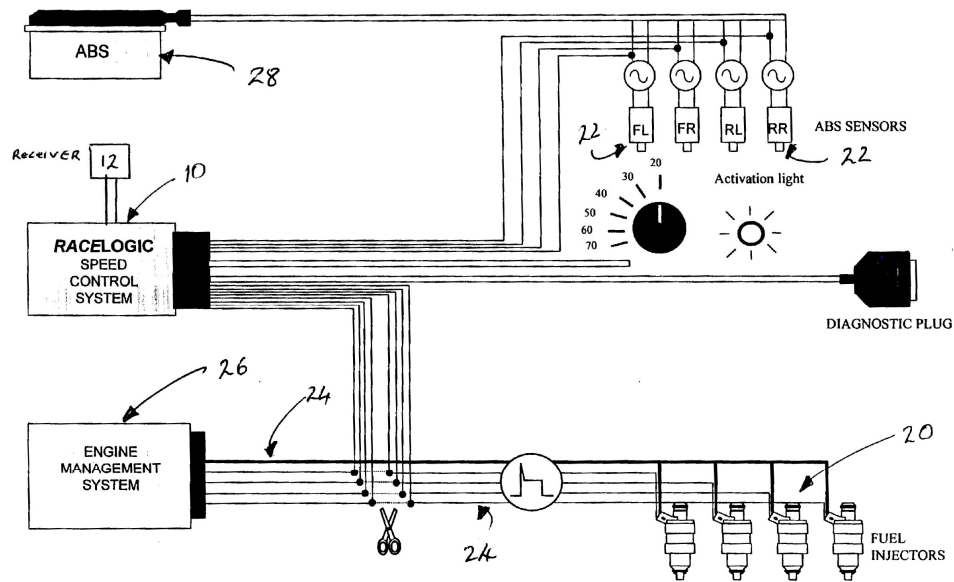


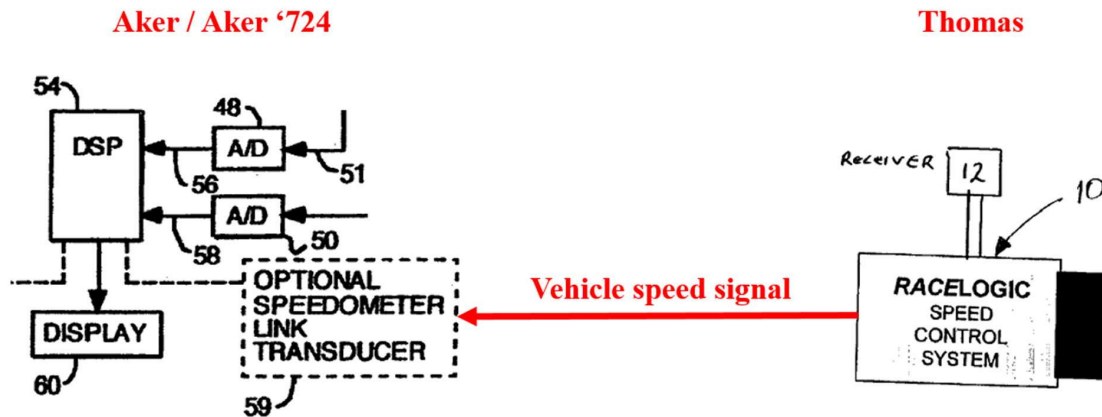
FIGURE 1

(Ex.2002 ¶154.)

Controller 10 outputs signals that travel over wires that go to the fuel injectors to either control (*i.e.*, reduce the vehicle speed that has exceeded the speed limit) or control in a nominal fashion (*i.e.*, for a vehicle speed less than speed limit) the fuel injectors. Controller 10 does not output any GPS position or speed information.

(Ex.2002 ¶155.)

Thomas's controller 10 does not output position or speed. ACI has substantially modified Thomas's Figure 1, showing only one line coming out of the controller 10:



(Paper 1 at 8.)

ACI fails to explain specifically how Thomas is being modified to pass a speed signal to its output and how the output is being modified. In addition, Aker/Aker '724 are shown as having a speed link transducer receiving the signal from Thomas. The Petition fails to describe:

- the format of the signal from Thomas;
- the format signal input of the Aker/Aker '724 transducer and how that format is compatible with the output of Thomas's controller 10;
- if and how this signal from the speed link transducer of Aker/Aker '724 is capable of transducing that signal into a format suitable for the DSP 54.

(Ex.2002 ¶157.)

Because ACI does not address these issues or otherwise explain how this proposed combination would work, it fails to provide any technical basis for the

conclusory statement that a POSITA “would have both found the combination obvious and been motivated perform the combination.” “[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006). Contrary to ACI’s conclusory statement, the proposed combination is insufficient because Thomas’s controller 10 outputs a control signal rather than a speed signal, and the transducer of the Aker references is not configured to receive such signals. (Ex.2002 ¶157.)

[9.4] a processing element configured to

The Petition describes DSP in Aker, but fails to describe with any detail how the processing element is **configured** to satisfy the claim limitations stated in the rest of claim 9. The ‘039 teaches sending multiple commands to the GNSS receiver to minimize messages on the port, provide GNSS data at a faster than nominal rate (*e.g.*, 5 updates per second/5 Hz rate) with update interval of 200 msec, and at a higher than nominal bit rate (*i.e.*, baud rate). Without reading these specific settings into the claim limitations, it is nonetheless clear from the specification that the ’039 patent teaches the GNSS receiver is to be configured by the processor, which ACI does not address. (Ex.2002 ¶158.)

The Petition fails to describe how a processing element is **configured** to receive the speed from the patrol vehicle from the speed-determining element. (Ex.1001, 6:64-7:26.) Once again, the Petitioner provides only a conclusory statement “Accordingly, the Aker-Thomas combination renders this limitation obvious.” (Paper 1 at 16–17.) This is insufficient to sustain an obviousness rejection. *Kahn*, 441 F.3d at 988. (Ex.2002 ¶159.)

[9.6] receive the speed of the patrol vehicle from the speed determining element

As described in claim element [9.3], *supra*, ACI relies on Thomas’s “controller 10 (the speed determining element) that ‘*calculate[s]*’ a ‘*current-vehicle-speed signal ... from GPS (global positioning data)*’ and outputs the signal to a separate component in the systems.” (Paper 1 at 17.) But Thomas’s controller 10 does not output position or speed. Internal to Thomas’s controller 10, the current-vehicle-speed signal from GPS is applied to a comparator 14, which compares the current vehicle speed with the vehicle speed limit. The output of the comparator is a control—not speed—signal to either control (*i.e.*, reduce fuel injector operation) or nominally control (*i.e.*, normal fuel injector operation) that is applied to the regenerator 16 (*i.e.*, fuel injector driver). The engine-management system (*i.e.*, injector output) provides an input to the regenerator 16, which then provides an output to control the fuel injectors. (Ex.1005 at 5:19–3:20, 5:25–30, Figs.1–2.) (Ex.2002 ¶161.)

Even if Thomas's controller 10 did produce speed at the output, which it does not and cannot, ACI does not explain how the single output line of Thomas's modified controller 10 could be applied to the speedometer transducer interface of Aker, or how the alleged "Vehicle Speed Signal" from the modified Thomas controller 10 would interface. (Ex.2002 ¶162.) ACI also does not sufficiently—if at all—describe how Thomas's control will process the speed information through the comparator and regenerator to somehow magically produce the speed of the patrol vehicle from the speed-determining element that is required in claim element [9.6]. (Ex.2002 ¶163.) Yet again, the Petition simply states in conclusory fashion: "Accordingly, the Aker-Thomas combination renders this limitation obvious." This is insufficient to sustain an obviousness rejection. *Kahn*, 441 F.3d at 988.

[9.8] convert the speed of the patrol vehicle to a frequency bin number

The Petition asserts that "Aker discloses converting the speed of the patrol vehicle from the speedometer to a frequency bin number instead of from the Doppler radar signal." (Paper 1 at 21.) But this claim element requires the GNSS-derived patrol vehicle speed to be converted to a frequency bin number. Aker does not use GNSS to determine the speed of the patrol vehicle. And as described in claim element [9.3], *supra*, Thomas's controller 10 does not output position or speed. ACI does not provide any detail on how the controller 10 output signal, on a wire, going

to a fuel injector, will be interfaced to Aker's speedometer interface. (Ex.2002 ¶¶165–169.)

2. Claims 10–11, 14–15

Because these claims all depend from claim 9, they are nonobvious for the reasons discussed in §V.C.1, *supra*.

[11.0] The traffic radar system of claim 9, wherein the processing element is further configured to determine whether the patrol vehicle is moving or stationary and convert the relative speed of the target vehicle to the absolute speed using the speed of the patrol vehicle only when the patrol vehicle is moving

Claim 11 is nonobvious for the additional reason that the Petition fails to identify the claim element “the processing element is further configured to determine whether the patrol vehicle is moving or stationary” ACI points to Aker, which describes that the “operator” selects moving or stationary mode. (Paper 1 at 28.) The plain meaning of *processor configured to determine* the mode necessarily excludes a system that relies on the *operator* to determine the mode. *See* §III.B, *supra*. (Ex.2002 ¶171.)

3. Claim 1

[1.3] a speed determining element configured to determine and output a speed of the patrol vehicle and not receive signals or data from the patrol vehicle; and

See §V.C.1.[9.3], *supra*. Claim 1 prohibits obtaining the speed of the patrol vehicle from any device, such as a speedometer, that receives signals or data from

the patrol vehicle. Yet, the Petition relies on obtaining speed of the patrol vehicle by interfacing to the patrol vehicle itself. (Ex.2002 ¶175.) Specifically, Thomas's controller 10 is "interfaced" into the vehicle's engine-management or ignition system and receives signals from that system. (Ex.1005, 4:15–19.) Moreover, Thomas's controller 10 does not output position or speed. Thus, ACI has not provided sufficient evidence that the proposed combination renders claim 1 obvious.

[1.4] a processing element configured to

See §V.C.1.[9.4], supra.

[1.6] receive the speed of the patrol vehicle from the speed determining element

See §V.C.1.[9.6], supra.

[1.8] convert the speed of the patrol vehicle to a frequency bin number

See §V.C.1.[9.8], supra.

4. Claims 2–3, 6–8

Because these claims all depend from claim 1, they are nonobvious for the reasons discussed in §V.C.3, *supra*. Additionally, claim 3 is nonobvious for the reasons discussed in §V.C.2.[11.0], *supra*.

D. Ground 1B: Claims 3–5 and 11–13 are nonobvious over Aker, Aker '724, Thomas, and Carmichael.

Even assuming that a POSITA would have been motivated to combine Thomas with the Aker references, combining Thomas and Carmichael with the Aker references still does not render obvious claims 3–5 and 11–13.

1. Claim 11

Because claim 11 depends from claim 9, it is nonobvious for the reasons discussed in §V.C.1, *supra*.

[11.0] The traffic radar system of claim 9, wherein the processing element is further configured to determine whether the patrol vehicle is moving or stationary and convert the relative speed of the target vehicle to the absolute speed using the speed of the patrol vehicle only when the patrol vehicle is moving.

Additionally, ACI alleges that Carmichael's automatic switch-over between stationary and moving mode, which uses a single zero speed threshold, modifies the Aker-Thomas combination to satisfy the claim limitations of claim 11, where Thomas's controller 10 satisfies "a speed determining element." (Paper 1 at 36.) But Carmichael obtains vehicle speed information directly from the vehicle over a direct connection. In other words, Carmichael does not teach or even suggest obtaining the speed of the vehicle through a satellite-based radio frequency link (*i.e.*, GNSS). (Ex.2005 ¶¶190–91.)

Moreover, the position and speed estimates from a GNSS receiver are "noisy," and utilizing a single, zero-speed threshold as taught by Carmichael to determine if the vehicle is stationary or moving will always produce a "moving" determination. *See* §III.A, *supra*. Because the proposed combination does not meet the limitation "convert the relative speed of the target vehicle to the absolute using the speed of the patrol vehicle only when the patrol vehicle is moving," a POSITA would have

no reasonable expectation of success in achieving the claimed invention. (Ex.2005 ¶191.)

2. Claim 12

Because claim 12 depends from claim 9, it is nonobvious for the reasons discussed in §V.C.1, *supra*.

[12.0] The traffic radar system of claim 9, wherein the speed determining element outputs the patrol vehicle speed in a stream of messages and the processing element is further configured to

Additionally, ACI argues that “Thomas’s controller 10 sends a stream of messages at regular intervals including the current vehicle speed. These messages comprise the “current-vehicle-speed signal” described in Thomas.” (Paper 1 at 37.) But Thomas’s controller 10 does not output the patrol vehicle speed, not does it stream any messages. As stated previously, the output of the Thomas’s controller 10 is a control signal that goes to fuel injectors. The Petition thus does not provide any basis or engineering analysis on how the controller 10 disclosed by Thomas would output the patrol vehicles speed in a stream of messages that would go to a processing element required by claim 12. (Ex.2005 ¶¶192–195.)

[12.1] determine that the patrol vehicle is moving when the patrol vehicle speed is greater than a first threshold value for a predetermined number of successive messages, and

[12.2] determine that the patrol vehicle is stationary when the patrol vehicle speed is less than a second threshold value for a predetermined number of successive messages

These limitations require the processing element to use two or more successive messages that satisfy a nonzero first threshold to determine that the vehicle is moving, and to use two or more successive messages that satisfy a different nonzero second threshold to determine that the vehicle is stationary. *See* §III.A, *supra*. ACI fails to describe how Carmichael compares successive messages against a first threshold. Indeed, Carmichael does not disclose this element. Likewise, the Petitioner fails to describe how Carmichael compares successive messages against a second threshold—because it does not. Carmichael also fails to disclose these elements because it does not describe a use of a threshold other than zero and does not disclose the use of dual positive thresholds that are different. (Ex.2005 ¶197.)

3. Claim 13

Because claim 13 depends from claim 12, it is nonobvious for the reasons discussed in §V.D.2, *supra*.

4. Claims 3–4

Because these claims depend from claim 1, they are nonobvious for the reasons discussed in §V.C.3, *supra*.

Additionally, claim 4 uses the same claim language as claim elements [12.0] and [12.1], *supra*, and is not obvious for the reasons discussed in those elements. *See* § V.D.2, *supra*.

5. Claim 5

Because claim 5 depends from claim 1, it is nonobvious for the reasons discussed in §V.C.3, *supra*. Additionally, claim 5 uses the same claim language as claim elements [12.0] and [12.2], *supra*, and is not obvious for the reasons discussed in those elements. *See* § V.D.2, *supra*.

E. Ground 2A: Claims 1–3, 6–11, and 14–15 are nonobvious over Shelton, Henderson, and Thomas

Even assuming that a POSITA would have been motivated to combine Shelton, Henderson, and Thomas, the combination still does not render obvious claims 1–3, 6–11, 14, and 15.

1. Claim 9

[9.3] a speed determining element configured to receive and process radio frequency signals from a global navigation satellite system to determine and output a speed of the patrol vehicle; and

ACI relies on Thomas's speed controller 10 configured to determine and output the speed of the patrol vehicle, stating that "the controller 10 from Thomas (including the GPS receiver 12) provides a pulse signal representing the current vehicle speed as calculated based on the GPS data to the DSP of Shelton in the same manner as the 'electronic speedometer' described herein." (Paper 1 at 49, citation

omitted.) But Thomas's controller 10 outputs a control signal going to a fuel injector, not a speed signal. (Ex.2002 ¶¶204–207.)

The combination of Shelton, Henderson, and Thomas fails to render obvious this claim element for the additional reasons discussed in §V.C.1.[9.3], *supra*.

[9.4] a processing element configured to

ACI cites to Shelton's DSP (a processing element) that performs various processing tasks related to target speed determination, followed by a conclusory statement of obviousness. (Paper 1 at 49–50.) ACI fails to describe with any detail how the processing element is *configured* to satisfy the claim limitations stated in the rest of the claim. The '039 patent teaches sending multiple commands to the GNSS receiver to configure it for the traffic radar system with speed detection. *See* §V.C.1.[9.3], *supra*. (Ex.2002 ¶¶208–209.) This is insufficient to sustain an obviousness rejection. *Kahn*, 441 F.3d at 988.

[9.6] receive the speed of the patrol vehicle from the speed determining element

ACI identifies *Thomas's controller 10* as the speed determining element in claim element [9.3], *supra*. But here, ACI discusses only *Shelton's speedometer* and its output pulses to the DSP. (Paper 1 at 50–51.) Because claim 9 requires the processing element to receive the patrol vehicle's speed from the speed-determining element, ACI's argument fails on its own terms by ignoring the purported speed-determining element it identified earlier in the claim. (Ex.2002 ¶210.)

The combination of Shelton, Henderson, and Thomas fails to render obvious this claim element for the additional reasons discussed in §V.C.1.[9.6], *supra*.

[9.8] convert the speed of the patrol vehicle to a frequency bin number

Again, ACI ignores its earlier argument that Thomas's controller 10 is the speed-determining element that provides the speed of the patrol vehicle. (Ex.2002 ¶210.) Instead, ACI describes only Shelton's speedometer output to the DSP. (Paper 1 at 52–53.) Thus, ACI's argument again fails on its own terms. (Ex.2002 ¶211.) *See also* §V.C.1.[9.8], *supra*.

2. Claims 10–11, 14–15

Because these claims all depend from claim 9, they are nonobvious for the reasons discussed in §V.E.1, *supra*. With respect to claim 15, ACI cites to claim 8 as support for its obviousness argument (Paper 1 at 65), but claim 15 does not depend from claim 8. (Ex.2002 ¶227.)

[11.0] The traffic radar system of claim 9, wherein the processing element is further configured to determine whether the patrol vehicle is moving or stationary and convert the relative speed of the target vehicle to the absolute speed using the speed of the patrol vehicle only when the patrol vehicle is moving

Claim 11 is nonobvious for the additional reason that ACI fails to identify the claim element “the processing element is further configured to determine whether the patrol vehicle is moving or stationary” Petitioner points to the Shelton/Henderson “operator interface, *including mode selection*,” in which the

operator uses buttons on the front panel of the radar unit and the remote-control unit to select between moving and stationary modes. (Paper 1 at 60.) The plain meaning of *processor configured to determine* the mode necessarily excludes a system that relies on the *operator* to determine the mode. *See* §III.B, *supra*. (Ex.2002 ¶213.)

3. Claim 1

[1.3] a speed determining element configured to determine and output a speed of the patrol vehicle and not receive signals or data from the patrol vehicle; and”

See § V.E.1.[9.3] *supra*.

[1.4] a processing element configured to

See § V.E.1.[9.4], *supra*.

[1.6] receive the speed of the patrol vehicle from the speed determining element

See § V.E.1.[9.6], *supra*.

[1.8] convert the speed of the patrol vehicle to a frequency bin number

See § V.E.1.[9.8], *supra*.

4. Claims 2–3, 6–8

Because these claims all depend from claim 1, they are nonobvious for the reasons discussed in §V.E.3, *supra*. Additionally, claim 3 is nonobvious for the reasons discussed in §V.E.2.[11.0], *supra*.

F. Ground 2B: Claims 3–5 and 11–13 are nonobvious over Shelton, Henderson, Thomas, and Carmichael

Even assuming that a POSITA would have been motivated to combine Thomas with Shelton and Henderson, combining Thomas and Carmichael with Shelton and Henderson still does not render obvious claims 3–5 and 11–13.

1. Claim 11

Because claim 11 depends from claim 9, it is nonobvious for the reasons discussed in §V.E.1, *supra*.

[11.0] The traffic radar system of claim 9, wherein the processing element is further configured to determine whether the patrol vehicle is moving or stationary and convert the relative speed of the target vehicle to the absolute speed using the speed of the patrol vehicle only when the patrol vehicle is moving

See §V.D.1.[11.0], *supra*. (Ex.2002 ¶¶231–236.)

2. Claim 12

Because claim 12 depends from claim 9, it is nonobvious for the reasons discussed in §V.E.1, *supra*.

[12.0] The traffic radar system of claim 9, wherein the speed determining element outputs the patrol vehicle speed in a stream of messages and the processing element is further configured to

See §V.D.2.[12.0], *supra*. (Ex.2002 ¶¶237–240.)

[12.1] determine that the patrol vehicle is moving when the patrol vehicle speed is greater than a first threshold value for a predetermined number of successive messages, and

[12.2] determine that the patrol vehicle is stationary when the patrol vehicle speed is less than a second threshold value for a predetermined number of successive messages

See §V.D.2.[12.1]/[12.2], supra. (Ex.2002 ¶¶241–242.)

3. Claim 13

Because claim 13 depends from claim 12, it is nonobvious for the reasons discussed in §V.F.2, *supra*.

4. Claims 3–5

Because these claims depend from claim 1, they are nonobvious for the reasons discussed in §V.E.3, *supra*.

Claim 4 uses the same claim language as claim elements [12.0] and [12.1], *supra*, and is not obvious for the additional reasons discussed in those elements. Claim 5 uses the same claim language as claim elements [12.0] and [12.2], *supra*, and is not obvious for the additional reasons discussed in those elements. *See §V.D.2.[12.0]–[12.2], supra.*

VI. Conclusion

For at least the reasons set forth above, the Petition fails to establish by a preponderance of the evidence that the challenged claims are unpatentable. Accordingly, the claims should be confirmed under 35 U.S.C. § 316.

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Respectfully submitted,

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Certificate of Word Count Compliance

Pursuant to 37 C.F.R. § 42.24(d), the undersigned certifies that this **Patent Owner's Response** complies with the type-volume limits of 37 C.F.R. § 42.24(a)(1)(i) by virtue of 37 C.F.R. § 42.24(b)(2), because it contains 13,173 words, according to the word-processing system used to prepare this paper, excluding the words in the Table of Contents, Table of Authorities, Claim Listing, Certification Under § 42.24(d), and Certificate of Service, as set forth in 37 C.F.R. § 42.24(a)(1).

Dated: February 13, 2025

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Certificate of Service

Pursuant to 37 C.F.R. § 42.6(e), I certify that on February 13, 2025, a true and correct copy of the foregoing **Patent Owner's Response** was served by electronic mail on Petitioner's lead and backup counsel at the following email addresses:

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