UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

RPX CORPORATION,
   Petitioner,
   v.

COLLISION AVOIDANCE TECHNOLOGIES INC.,
   Patent Owner.

PTAB Case No. IPR2017-01336
   Patent No. 6,268,803

PETITION FOR INTER PARTES REVIEW
   OF U.S. PATENT NO. 6,268,803
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I. INTRODUCTION

Collision avoidance systems assist drivers in detecting and avoiding objects in their path. They are essential to vehicle safety. Over the past 40 years, vehicle manufacturers, academic institutions, and government agencies have been focused on developing intelligent electronic systems, such as collision avoidance and object detection systems to improve vehicle safety. Indeed, early collision avoidance systems helped eliminate driver blind spots and were used to guide tractor-trailers and other delivery trucks with, for example, backing into tight spaces. By the 1990s, multiple manufacturers were developing sensor-based systems to assist drivers in not only detecting an object but determining both the distance to and the location of that object from a point on the vehicle.

Claims of the '803 patent describe and claim this exact well-known approach. The purported invention has an August 1998 priority date and relies on transmit, receive, and control technologies that were pervasive at that time, including the steps of calculating the distance to an object and displaying the transverse location of that object relative to a point on the vehicle. During prosecution, the applicants never claimed to have invented the concept of vehicle sensors for detecting the presence of an object. Nor did they claim to have invented calculating the distance to an object. Nor did they contend that displaying the distance of an object on a display was new. Instead, the only asserted point of
novelty that they asserted were the steps of calculating and displaying, to the driver, the transverse location of an object with respect to the vehicle. But that approach was well-known both generally and in the collision avoidance field specifically.

This petition relies on one primary prior-art reference, U.S. Patent No. 4,674,073 to Naruse which is directed to collision avoidance systems and describe the use of multiple sensors, a control module, and a display to identify the location of an object near a vehicle. The Examiner did not have the benefit of this reference during the original examination. With the benefit of a fuller record, the Board should institute review and declare claims 1-8, 21, 22, 24, 25, and 28 of the ’803 patent unpatentable.

II. MANDATORY NOTICES

A. Real Party-in-Interest

RPX Corporation (“RPX”) is the sole real party-in-interest in this proceeding. RPX has not communicated with any client about its intent to contest the validity of the ’803 patent, the preparation of this petition, or the filing of this petition. RPX has complete control over all aspects of this proceeding and is responsible for all costs and expenses associated with this proceeding.

B. Related Matters

Patent Owner Collision Avoidance Technologies Inc. (“CATI”) has asserted the ’803 patent in litigation in the United States District Court for the Eastern
District of Texas, *Collision Avoidance Technologies Inc. v. Ford Motor Company*, Case No. 6:17-cv-00051 (filed January 26, 2017) and *Collision Avoidance Technologies Inc. v. Toyota Motor Sales, USA, Inc.*, Case No. 6:16-cv-00971 (filed June 30, 2016). RPX is not a party in either of these litigations. A second petition for *inter partes* review has been filed concurrently herewith.

C. **Counsel and Service Information**

Petitioner’s counsel are:

<table>
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<tr>
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<th>Back-Up Counsel</th>
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<td>858-720-5799 (fax)</td>
<td>602-648-7000 (fax)</td>
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Petitioner consents to electronic service. Service on and communications to the above attorneys can be sent to: PerkinsCollisionAvoidIPR@perkinscoie.com.

A Power of Attorney for Petitioner is being filed concurrently.
III. CERTIFICATION OF GROUNDS FOR STANDING

The ’803 patent issued in 2001 and qualifies for inter partes review. Petitioner is not barred or estopped from seeking review of claims 1-8, 21, 22, 24, 25, and 28 of the ’803 patent on the grounds identified herein.

IV. OVERVIEW OF CHALLENGE AND RELIEF REQUESTED

Petitioner challenges patentability of claims 1-8, 21, 22, 24, 25, and 28 of the ’803 patent and asks the Board to cancel those claims under 35 U.S.C. § 103 because they were obvious over the following references:

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<td>Claims 1-5, 7, 8, and 21 are obvious over Naruse (Ex. 1003)</td>
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<td>2</td>
<td>Claims 2 and 3 are obvious over Naruse and Gauthier (Ex. 1004)</td>
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<tr>
<td>3</td>
<td>Claims 6 and 7 are obvious over Naruse and Tagami (Ex. 1005)</td>
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<td>4</td>
<td>Claim 24 is obvious over Naruse and Cherry (Ex. 1006)</td>
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<tr>
<td>5</td>
<td>Claims 22 and 28 are obvious over Naruse and Hayashikura (Ex. 1007)</td>
</tr>
<tr>
<td>6</td>
<td>Claim 25 is obvious over Naruse and Ramer (Ex. 1008)</td>
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This petition also cites other references that illustrate the state of the art at the time of the alleged invention. See Ariosa Diagnostics v. Verinata Health, Inc., 805 F.3d 1359, 1365 (Fed. Cir. 2015) (“Art can legitimately serve to document the knowledge that skilled artisans would bring to bear in reading the prior art

¹ For full citations, please see the Exhibit List at the end of this Petition.
identified as producing obviousness.”). None of the references relied on in Grounds 1-6 were before the Examiner during the original examination of the ’803 patent.

The Petitioner also relies on the accompanying declaration of expert Nikolaos Papanikolopoulos (Ex. 1002). As shown below, the Petition and its supporting materials establish a reasonable likelihood that the Petitioner will prevail with respect to the cancellation of the challenged claims. See 35 U.S.C. § 314(a).

V. BRIEF DESCRIPTION OF TECHNOLOGY

The ’803 patent claims a system for detecting the distance to and the location of an object near a vehicle. The basic concepts are decades old.

A. Overview of the ’803 Patent

The ’803 patent issued from U.S. Patent Application No. 09/130,279, which was filed on August 6, 1998. (Ex. 1001 at Title Page.) The patent was originally assigned to Altra Technologies Inc. The ’803 patent has since been assigned to CATI, a patent assertion entity.

1. Alleged Problem

In its Background of the Invention, the ’803 patent describes various object detection and collision avoidance systems that were well-known in the industry before 1998. These systems included mirror systems, back-up alarms, video
systems, and sensor based systems (Ex. 1001 at 1:19-32, 1:33-39, 1:40-53, 1:54-2:7.) While these early systems were capable of detecting objects and calculating the distance from the vehicle to the object, they were unable to communicate the transverse location of the object from the vehicle. (Ex. 1001 at 2:11-15.) In other words, the systems could not tell a driver whether the object was “directly behind the vehicle, off to the side, or far enough to the left or right that the driver [would] not hit it.” (Id.)

2. **Summary of the Alleged Invention of the ’803 Patent**

The ’803 patent purports to address this deficiency using a system of conventional technologies to calculate and display to a driver the transverse location of an object. (Ex. 1001 at 1:7-10, 2:49-67.) Figure 3 is a system diagram depicting the claimed collision avoidance system that includes a sensor subsystem 34 for detecting objects that is connected to a control module 12 which calculates the distance from a vehicle to an object based on the signals received from the sensor subsystem. (Ex. 1001 at 4:8-14, 4:37-50.) The control module is also connected to an operator interface 32 that displays the calculated distance to an object and its transverse location with respect to the vehicle. (Id.)
Specifically, as shown in Figure 2 (reproduced below), multiple sensors (14.1) are mounted at different locations on a vehicle including, for example, the front, back and sides of a vehicle. (Ex. 1001 at Fig. 2, 4:5-7) These sensors (14 or 14.1) include transmitters (16) and receivers (18) for sending and receiving signals to detect an object. (Ex. 1001 at Fig. 1, 2:49-67, 3:37-4:27.) As shown in Figure 1, the multiple sensors (which are included in multiple subsystems including the proximity detector subsystem 34) are connected to a control module 12. (Id.)
Transmitter 16 sends a signal to detect the presence of the object. A return signal is received by receiver 18 and fed into control module 12. (Ex. 1001 at 4:15-21, 4:27-30.) Using the readings from sensors 14, the control module 12 calculates (a) an actual distance to the object and (b) a transverse location from a center point on the vehicle to the object. (Ex. 1001 at 4:37-47, 4:51-63, 5:55-63.) According to the ’803 patent, “[t]his is important because [what] the truck driver really wants to know [is], not that the object is off at this angle over here five feet away, [but] how far he can back up before he hits the object.” (Ex. 1001 at 4:43-45.)

Upon determining the actual distance and transverse location, control module 12 displays this information to the driver via a user interface. Figures 4a
and 6a are examples of such user interfaces. As shown, the actual distance is displayed numerically as “5.2” while the transverse location is indicated via the bar graph display 22. Specifically, the bar graph breaks the transverse set of locations into an odd number of segments. (Ex. 1001 at 5:64 to 6:10.) Control module 12 then lights the LED segments to display where the object is from the extreme left to the extreme right of the center of the vehicle (“transverse location”). (Id.)

![Figure 6a](image)

But as explained below, there is nothing novel about calculating, let alone displaying, a transverse location.

**B. The Challenged Claims**

This petition challenges claims 1-8, 21, 22, 24, 25, and 28 of the ’803 patent. Consistent with Applicant’s attempt to distinguish art applied during prosecution,
independent claims 1, 5, 9, 10, and 21 describe a collision avoidance system capable of calculating and displaying a transverse location. However, independent claims 9, 11, 17, and 21 do not recite a transverse location. All independent claims also recite additional well-known elements including transmitters, receivers, transceivers, control modules, measurement circuitry, and displays, as noted below.

1. A collision avoidance system, comprising:
   [a] a control module;
   [b] a plurality of transmitting devices connected to the control module, wherein the plurality of transmitting devices includes a first and a second transmitting device, wherein the first and second transmitting devices transmit a first signal and a second signal, respectively;
   [c] a plurality of receiving devices connected to the control module, wherein the plurality of receiving devices includes a first and a second receiving device, wherein the first receiving device receives a return representation of the signal transmitted from the first transmitting device and transmits to the control module a first return signal representative of the first return and wherein the second receiving device receives a return signal transmitted from the second transmitting device and transmits to the control device a second return signal representative of the return, and
   [d] wherein the control module includes measurement circuitry used to measure the first and
second return signals and calculate a transverse location of an object as a function of said first and second return signals and further wherein the control module includes a display means for displaying the transverse location.

Additionally, the dependent claims add conventional implementation details such as using a single transceiver, logging the transverse location, detecting slow-moving objects, and detecting stationary objects.

C. '803 Patent’s Prosecution History

During prosecution, the Examiner issued a single non-final office action rejecting most of the pending non-restricted claims anticipated or obvious in view of patent prior art references, and allowing claim 9. To overcome the rejections Applicant amended some independent claims to require that the collision avoidance system “calculate a transverse location as a function of a first and second return signal” and argued that the applied art failed to disclose the claim limitation. (Ex. 1010 at 2-4.) Although Applicant relied on the “transverse location” limitation to convince the Examiner to allow the claims, Applicant added several new claims, including independent claim 21, that did not include a “transverse location” limitation and did not appear to be further examined. (Ex. 1010 at 5-6.)
VI. OVERVIEW OF THE PRIMARY PRIOR ART REFERENCES

At the time of the alleged invention in 1998, vehicle safety was already a major concern, leading automotive companies and the government to support research activity, products development, and cooperative efforts in the field of collision avoidance. (Ex. 1002 ¶¶ 34-41.) In addition to private companies such as Toyota, Nissan, Volkswagen, and Renault, leaders in the field included the Intelligent Transportation Society of America and groups at Carnegie Mellon University, University of Maryland, and University of Massachusetts-Amherst, all of which were working to develop systems to improve vehicle safety through collision avoidance and object detection systems. (Id.)

This comprehensive effort resulted in numerous prior-art patents, publications, and products that disclosed all of the features recited in claims 1-8, 21, 22, 24, 25, and 28 of the ’803 patent. (Id. ¶ 41.) This Petition, however, focuses on one reference which disclosed the allegedly novel feature of calculating and displaying the transverse location of an object near the vehicle as well as the other conventional elements recited in the claims.

A. Naruse (Ex. 1003)

The Naruse patent issued on June 16, 1987, and is therefore prior art to the ’803 patent under 35 U.S.C. § 102(b).
Naruse is directed to an object detection system for use in vehicles. In fact, Naruse describes solving the same problem as the ’803 patent: how to determine “the direction or orientation in which an object is located” in reference to a vehicle. (Ex. 1003 at 1:33-35, 2:5-9.) To solve this problem, Naruse discloses the same basic solution as the ’803 patent—a series of “ultrasonic transmitting elements and ultrasonic receiving elements are alternately arranged” on a vehicle, and coupled to control circuitry for calculating and displaying the distance to and the location of an object. (Id. at 2:43-59, 4:62 to 5:4.)

Figure 3 of Naruse, shown below, illustrates a system structure similar to the one disclosed in the ’803 patent and includes (1) a display (DSU), (2) control circuitry (CPU, INU, DS1-3, SDV, SA1-3, SB1-3), and (3) a sensor unit (SEU) having multiple transmitters and receivers.
Figures 9a through 9g of Naruse provide a series of flow diagrams for the disclosed collision sensor system, including initialization, distance detection, minimum distance, and display algorithms. (Id. at 7:5-13.) The system in Naruse steps through the sensors to detect objects, and then, as described in the flow chart of Figure 9e, displays the distance to and location of the closest object to the vehicle on the display unit. (Id. at 12:55 to 13:3.) As depicted in the portion of Figure 3 below, “the distance to the object detected is displayed by the numerical display NDS while also activating the location indicator in accordance with the
content of the register R6, by energizing one of the twenty-three light emitting diodes LE1 to LE23.” (Id.)

B. Secondary References

This petition also relies on prior art references: U.S. Patent No. 5,303,205 (“Gauthier”) (Ex. 1004), U.S. Patent No. 4,349,823 (“Tagami”) (Ex. 1005), U.S. Patent No. 5,235,315 (“Cherry”) (Ex. 1006), U.S. Patent No. 5,654,715 (“Hayashikura”) (Ex. 1007), and U.S. Patent No. 5,877,849 (“Ramer”) (Ex. 1008) that teach various dependent claim limitations and will be discussed in detail with reference to those claims.

C. Invalidity Positions Against Each Claim Are Independent, Distinctive, And Not Redundant

This petition and a second petition filed concurrently herewith collectively rely on primary references (1) Naruse, and (2) Gauthier to form independent and distinctive invalidity grounds against claims 1-8, 21, 22, 24, 25, and 28. The
references are selected because of their distinctive teachings that cover different technical aspects of the ’803 patent and provide the Office and the public with a more complete view of the prior art landscape that existed before the filing of the ’803 patent, and which was not considered during the original examination. Petitioner respectfully requests that the grounds not be found redundant for at least the following reasons.

First, Naruse discloses an object detection system and display that are closer to the disclosed embodiments of the ’803 patent, whereas Gauthier presents an alternate approach to solving the same problem of detecting and displaying distance and location of a detected object.

Second, there is minimal overlap of prior art for the challenged claims. For example, both Naruse and Gauthier are presented against claim 21, in addition to Naruse being presented on its own and in combination with either Gauthier or Tagami for claims 2, 3, and 7. Only four of the nineteen challenged claims include a secondary ground for challenging the claim.

Third, the references address different claim constructions should the Board ultimately settle on a construction that was not proposed by Petitioner.

VII. LEVEL OF ORDINARY SKILL IN THE ART

A person of ordinary skill in the art at the time of the alleged invention would have had (a) a bachelor’s degree in electrical engineering, mechanical
VIII. CLAIM CONSTRUCTION

The Board gives each claim term from an unexpired patent such as the ’803 patent “its broadest reasonable construction in light of the specification of the patent in which it appears.” 37 C.F.R. § 42.100(b). Because Patent Owner may seek unreasonably narrow constructions for certain terms in an effort to distinguish the cited art, Petitioner addresses those terms here.

A. “control module” (claims 1, 4, 10, 11, 17, 18, 21-28)

Several of the challenged claims include limitations for a “control module” that require the control module to perform a variety of functions depending on the embodiment being claimed.

The ’803 patent describes several different embodiments, demonstrating the breadth of the claimed control module. For example, in one embodiment, “the control module includes measurement circuitry used to measure the first and
second return signals and display means for displaying a transverse location of an object as a function of said first and second return signals.” (Ex. 1001 at Abstract, 2:63-67.) In another embodiment, the control module “takes the readings from the rear-mounted sensors 14, determines whether it can triangulate and calculates an actual perpendicular distance from the truck to the object.” (Id. at 4:39-42.) In another embodiment, the distance between the vehicle and the object is displayed on the control module. (Id. at 4:60-61.) In yet another embodiment, “control module 12 calculates transverse location” and sends it to a display. (Id. at 5:60-61.) The ’803 patent indicates that one part of the control module is “the MicroController in the control module 12,” which is used to perform distance calculations. (Id. at 15:66 to 16:1.)

Figure 3 of the ’803 patent, below, illustrates the many systems that interact with the control module including, but not limited to, proximity detectors, side warning lights, rear warning lights, and a user interface.
Given the breadth of the functionality supported by the control module across the various embodiments, it would be improper to require that all circuitry for performing these functions be physically located within a microcontroller or microprocessor itself. Such a narrow interpretation is contrary to the specification, which expressly identifies the microcontroller or microprocessor as only one unit within the control module. (Id. at 15:66 to 16:1.) Moreover, nothing in the intrinsic evidence limits the control module to any particular physical structure to perform its many recited functions. (Ex. 1002 ¶ 61.) As such, the broadest
reasonable interpretation of “control module” is “a processor or microcontroller and accompanying components or circuitry.”

B. “transverse location” (claims 1, 4, 5, 6, 10)

Independent claims 1, 5, and 10 of the ’803 patent require that the “transverse location” of an object be calculated and displayed. The phrase is not a term of art, rather the applicant acted as its own lexicographer in coining the term. (Ex. 1002 ¶ 63.) In doing so, the applicant describes “transverse location” as the “location of the object (i.e., is the object directly behind the vehicle, off to the side, or far enough to the left or right that the driver will not hit it[?]).” (Ex. 1001 at 2:11-16.) The ’803 patent further explains that “[t]he system will also calculate the transverse location and display it on the bar graph as slightly right of center.” (Id. at 16:32-33.) In describing the location LEDs shown in Figures 4a to 4c and 6a to 6c, the ’803 patent says that “the purpose of the bar graph display is to break the transverse set of distances or locations, up into anywhere from 7 to 11 or more segments on the bar graph display. Control module 12 lights the segments that indicate where that object is from extreme left to extreme right.” (Id. at 5:64 to 6:2.) For example, Figure 6a, below (annotated), shows that an LED toward the right side of the display is lit, indicating that the location (or the “transverse location,” as that term is used in the patent) of the detected object is to the right side of the vehicle.
Using an odd number of LEDs (*e.g.*, 7 or 11, as proposed in the patent) to show the transverse location allows the display to indicate when the object is located directly behind the vehicle (lighting the center LED) or off to the left or right of center. (Ex. 1002 ¶ 64.) As such, based on the intrinsic record, the broadest reasonable interpretation of the phrase “transverse location” is “the offset to either the left or right of a longitudinal center line.” (*Id.*)

C. “fuses data” (claims 13, 22, 28)

Claims 13, 22, and 28 require that the control module “fuse[] data” from a plurality of transceivers or sensors. The ’803 patent indicates that a “Data Fusion Algorithm” is used to resolve the issue of multiple sensors detecting the same object. (Ex. 1001 at 14:19-35.) The algorithm resolves the redundant tracks, and
“link[s] the tracks from multiple radar modules together for one object.” (Id. at 14:31-35.)

The broadest reasonable interpretation of the term “fuses data” should be “resolves distance and location information from the data of multiple sensors.” (Ex. 1002 ¶ 66.)

D. “display means for displaying the transverse location” (claim 1)

This means-plus-function term should be construed under pre-AIA § 112, ¶ 6. The function is “displaying the transverse location,” and the corresponding structure is the graphic display of the operating interface shown in Figures 4a to 4c and Figures 6a to 6c of the ’803 patent, which may include a Liquid Crystal or other Display.

The proposed construction is supported by the ’803 patent specification. Specifically, the ’803 patent discloses that “control module 12 calculates transverse location and communicates that information via a graphical indicator such as bar graph 22 of FIG. 4a (also shown as 22’ in FIG. 6a). In the embodiment shown in FIGS. 4a-c and 6a-c, the purpose of the bar graph display is to break the transverse set of distances or locations, up into anywhere from 7 to 11 or more segments on the bar graph display.” (Ex. 1001 at 5:59-67.) “In another embodiment, transverse location is communicated through another graphic display, (e.g., a Liquid Crystal or other Display). In addition, in one embodiment transverse location is displayed
through a little video monitor. In one such embodiment, operator interface unit 32 displays an area behind the vehicle and places a dot within that area showing the closest object.” (Id.)

E. Other Terms

Other terms, including “measure,” “measurement circuitry,” “transceiver,” “sensor antenna pattern,” and “built-in-test function,” should be given their plain and ordinary meanings. (Ex. 1002 ¶ 69.) Petitioner does not expect those terms to require construction, but Petitioner reserves the right to challenge any construction raised by Patent Owner.

IX. THE UNPATENTABILITY OF CLAIMS 1-8, 21, 22, 24, 25, AND 28

As shown below, claims 1-8, 21, 22, 24, 25, and 28 are unpatentable because they are obvious over the identified prior art.

A. Ground 1: Claims 1-5, 7, 8, and 21 Are Obvious over Naruse

Naruse alone discloses or renders obvious every limitation of claims 1, 2, 3, 5, 7, 8, and 21.

1. 1[Preamble]: “A collision avoidance system, comprising:”

Naruse discloses the claimed collision avoidance system. Naruse’s collision avoidance system uses a plurality of transmit and receive sensors to detect the “the location of and the distance to an object.” (Ex. 1003 at 2:5-9.) The system steps
sequentially through the set of sensors to detect the presence of the object. (*Id.* at 2:13-17; Ex. 1002 ¶ 81.) Like the ’803 patent, Naruse uses a control module (blue), as depicted in Figure 3 below (annotated), to control the collision avoidance sensors (green) and to drive the display (red). (Ex. 1003 at 4:62-64.)

**Naruse’s Collision Avoidance System Diagram**

![Naruse’s Collision Avoidance System Diagram](image)

Indeed, Naruse’s collision avoidance system includes a similar system architecture as disclosed in Figure 3 of the ’803 patent including a control module (blue), a display (red), and various transmit and receive sensors (green) mounted on the front, side, and rear of a vehicle. (Ex. 1002 ¶ 82.)
Although Naruse’s Figure 3 architecture diagram is similar to the '803 patent’s Figure 3 architecture diagram, the control module can optionally be read (under the BRI of “control module”) to include the display module in Figure 3 of Naruse. (Ex. 1002 ¶ 83.)
2. **1[a]: “a control module”**

   The proposed construction for the term “control module” is “a processor or microcontroller and accompanying components or circuitry.” As shown in Figure 3 above and highlighted in blue, Naruse discloses the use of a CPU and various supporting circuitry for detecting, calculating, and displaying the location of an object, including a drive circuit SDV, transmitter switching circuits SA1, SA2, and SA3, receiver switching circuits SB1, SB2, and SB3, step-up transformers T1, T2, and T3, decision circuits DS1, DS2, and DS3, and an input circuit INU. (Ex. 1003 at 4:62 to 5:4.) The “control module” of Naruse further operates according to the flow charts of Figures 9a through 9g to detect distance to and location of nearby objects. *(Id. at 7:5-26; Ex. 1002 ¶ 85.)*

3. **1[b]: “a plurality of transmitting devices connected to the control module, wherein the plurality of transmitting devices includes a first and a second transmitting device, wherein the first and second transmitting devices transmit a first signal and a second signal, respectively”**

   Naruse discloses the claimed transmitters of limitation 1[b].

   **“a plurality of transmitting devices connected to the control module”**

   Naruse discloses “N detector units, including N ultrasonic transmitting elements.” (Ex. 1003 at 2:36-42.) Indeed, as shown in Figure 1, Naruse describes using *twelve* transmitting elements, TX1 through TX12, disposed along the rear of the vehicle as shown in the red boxes (annotated). Such ultrasonic transmitters
were standard components that were readily available years before the ’803 patent was filed. (Ex. 1002 ¶ 87.)

The transmitters shown in Figure 1 above are further depicted as part of the sensor unit SEU in Figure 3 below. Specifically, Naruse’s Figure 3 shows that the transmitters of the SEU (green) are connected to the control module (blue) by output lines OUT (purple).
Indeed, Naruse states that an “output line OUT from each of the switching circuits SA1, SA2, and SA3 is connected to the transmitters TX1 to TX4, TX5 to TX8, and TX9 to TX12, respectively.” (Ex. 1003 at 5:11-14.) The claim language does not require a direct connection between the transmitters and control module, nor does the ’803 patent describe such an embodiment. (Ex. 1002 ¶ 88.) For example, Figure 3 of the ’803 patent shows that the sensors are part of the proximity detector, forward-looking detector, or rear guard subsystems, and are therefore indirectly connected to the control module 12. As such, Naruse discloses that the plurality of transmitters are connected to a control module as required by limitation 1[b].
“the first and second transmitting devices transmit a first signal and a second signal, respectively”

Naruse’s twelve transmitting elements include a first and second transmitter. Naruse discloses that the object detection system steps sequentially through each of the transmitters as part of its sequential detection subroutine. (Ex. 1003 at 7:14-26; Ex. 1002 ¶ 89.) For example, the transmitter TX1 will transmit an ultrasonic wave that is received by RX1. The system will then transmit an ultrasonic wave from TX2, which is received by RX2. (Ex. 1002 ¶ 89.) Naruse discloses that objects are detected by transmitting ultrasonic waves. (Ex. 1003 at 7:57-61.) Naruse’s controller selects small sets of transmitters and “energizes the transmitting element connected to each of the switching circuits SA1 to SA3 . . . allowing them to emit [an] ultrasonic wave.” (Id. at 9:58-68.) Because Naruse sequentially steps through each of the transmitters, including the first and the second transmitter, each transmitter transmits its own signal by transmitting an ultrasonic wave. (Ex. 1002 ¶ 89.) Thus, the first and second transmitter transmit a first and second signal, respectively. (Id.)

In sum, Naruse discloses a plurality of transmitters connected to a control module wherein a first and second transmitter transmit a first and second signal.
4.  1[c]: “a plurality of receiving devices connected to the control module, wherein the plurality of receiving devices includes a first and a second receiving device, wherein the first receiving device receives a return representative of the signal transmitted from the first transmitting device and transmits to the control module a first return signal representative of the first return and wherein the second receiving device receives a return of the signal transmitted from the second transmitting device and transmits to the control device a second return signal representative of the return”

Naruse discloses the receiving devices of limitation 1[c].

“a plurality of receiving devices connected to the control module”

Naruse discloses “N detector units, including … N ultrasonic receiving elements.” (Ex. 1003 at 2:36-42.) Indeed, Figure 1 (annotated) of Naruse (below) shows twelve receiving elements, RX1 through RX12 disposed along the rear of the vehicle. Ultrasonic receivers were standard components that were readily available years before the ’803 patent was filed. (Ex. 1002 ¶ 91.)
The plurality of receiving elements (RX1 to RX12) are connected to switching circuits SB1 to SB3 of the control module by input lines IN as shown by the purple boxes in Figure 3 (annotated). (Ex. 1002 ¶ 92.)
In describing the components of Figure 3, Naruse indicates that an “an input line IN to each of the switching circuits SB1, SB2, and SB3 is connected to the receivers RX1 to RX4, RX5 to RX8, and RX9 to RX12, respectively.” (Ex. 1003 at 5:11-14.) In sum, Naruse discloses multiple receivers connected to a control module as required by limitation 1[c].

“the first receiving device receives a return representative of the signal transmitted from the first transmitting device and transmits to the control module a first return signal representative of the first return”

The receivers in Naruse receive reflected ultrasonic waves from a detected object that originated from the transmitters. Naruse’s receivers then send electrical signals, representative of the received ultrasonic waves, to the control module.
Specifically, the piezoelectric portion of the receiver converts the received ultrasonic wave into an electric signal that is processed by the control module. (Ex. 1002 ¶ 93.) The electrical signals from the receivers are fed into the CPU and its supporting circuitry to determine the distance to the detected object. (Ex. 1003 at 5:28-38; 11:24-29; Ex. 1002 ¶ 93.) Continuing the earlier example, receiver RX1 reads on the claimed first receiving device, because it receives a return (reflected ultrasonic waves) representative of the signal transmitted from the first transmitting device (transmitter TX1) and transmits to the control module a first return signal (electrical signal) representative of the first return (reflected ultrasonic waves from transmitter TX1).

“the second receiving device receives a return of the signal transmitted from the second transmitting device and transmits to the control device a second return signal representative of the return”

Naruse’s sequential detection subroutine steps through each of the twelve receivers, with each receiver receiving reflected ultrasonic waves from the neighboring transmitter and then sending a corresponding electric signal to the control module for processing. (Ex. 1003 at 7:14-18; Ex. 1002 ¶ 93.) As described above, the receivers in Naruse receive reflected ultrasonic waves from a detected object that originated from the transmitters, and then the receivers send electrical signals, representative of the received ultrasonic waves, to the control module. (Ex. 1003 at 4:30-35, 6:57-62, 7:57-68.) Continuing the earlier example, receiver RX2
reads on the claimed second receiving device, because it receives a return (reflected ultrasonic waves) representative of the signal transmitted from the second transmitting device (transmitter TX2) and transmits to the control module a second return signal (electrical signal) representative of the second return (reflected ultrasonic waves from transmitter TX2).

Therefore, Naruse discloses at least a first and a second receiver that each receives returns from their respective transmitters and transmit a respective signal representative of the respective returns to a control module.

5. 1[d]: “wherein the control module includes measurement circuitry used to measure the first and second return signals and calculate a transverse location of an object as a function of said first and second return signals and further wherein the control module includes a display means for displaying the transverse location.”

Naruse discloses measurement circuitry, calculating the transverse location, and display means recited in limitation 1[d].

“measurement circuitry used to measure the first and second return signals and calculate a transverse location of an object as a function of said first and second return signals”

Naruse discloses measurement circuitry, which includes the decision circuits DS1, DS2, and DS3 and the CPU. The decision circuits measure the received reflected ultrasonic wave and then indicate to the other circuitry within the control module when the received signal exceeds a given level. (Ex. 1003 at 6:36-62.)
Naruse’s measurement circuitry also includes the CPU which executes the sequential detection, distance, and minimum distance subroutines, which calculate the distance and location of the detected object. (Ex. 1003 7:5-26.) Naruse further discloses measuring the received return signals and calculating the distance to, and location of, the detected object. Specifically, Naruse discloses a detection routine for selecting the initial transmitter and receiver pairs “for [the] purpose of measurement.” Naruse “then sequentially shifts the location of the detectors selected when repeating the measurement.” (Ex. 1003 at 7:14-18.) Memory registers are used to store the measurement results for each of the transmitters and receivers. (Id. at 9:6-14.)

Naruse further discloses calculating the transverse location of the object based on the received return signals. As discussed above, the broadest reasonable construction of “transverse location” is “the offset to either the left or right of the longitudinal center line of the vehicle.” After the distance subroutine has finished capturing the individual measurements for each receiver in Naruse, a minimum distance calculation subroutine is executed to determine the sensor with the shortest distance to the detected object. (Id. at 7:18-23.) “The minimum calculation subroutine searches for data representing the minimum distance among the memories,” which stores the calculated distance information for the receivers. (Id. at 7:21-23; Ex. 1002 ¶ 95.) Figure 1of Naruse, below (annotated), shows the
sensor unit (SEU) with twelve transmitters and twelve receivers placed along the rear bumper of the vehicle.

The transverse location of the object is calculated by the minimum distance subroutine, and determines which of the sensors is closest to the detected object. Using the embodiment of Figure 1 as an example, if the RX12 sensor has the shortest distance to the object, then the transverse location of the object is on the right side of the vehicle. (Ex. 1002 ¶ 96.) On the other hand, if RX1 was determined to have the shortest distance, the transverse location of the object would be on the left side of the vehicle. (Id.) Accordingly, determining that sensors around RX6 have the shortest distance would result in a transverse location near the longitudinal center line of the vehicle. (Id.) The transverse location is a function of the first and second return signal, because each of the distances measured from the return signals is compared to the others to determine the sensor
with the shortest distance to the object.  (Ex. 1003 at 12:9-41; Ex. 1002 ¶ 97.)
Continuing the earlier example, the measured distance received by RX1 would be compared with the measured distance received by RX2, and the receiver location with the shortest distance to the object is used to represent the location of the object with respect to the longitudinal center line of the vehicle.  (Ex. 1002 ¶ 98.)

A skilled artisan would understand that while the distance in some embodiments of Naruse is arguably calculated based on a single signal (using Naruse’s minimum distance subroutine), the location is always a function of multiple return signals received by each transmitter/receiver pair, because Naruse uses multiple distance measurements (corresponding to multiple return signals) to determine the object’s location.  (Ex. 1002 ¶ 99.) That is the primary reason for having so many transmitter/receiver pairs in the first place.  (Id.)

Finally, although Naruse does not use the term “transverse location,” a person of ordinary skill in the art would understand that the location calculation of Naruse results in the determination of the offset to the left or right of a longitudinal center line of the vehicle where the object is located.  (Ex. 1002 ¶ 97.)

In sum, Naruse discloses the claimed measurement circuitry for measuring the return signals and for calculating the transverse location of an object as a function of the return signals.

“the control module includes a display means for displaying the transverse location”
The proposed function for “display means” is “displaying the transverse location,” and the corresponding structure is the graphic display of the operating interface shown in Figures 4a to 4c and Figures 6a to 6c of the ‘803 patent, which may include a Liquid Crystal or other Display. Naruse’s control module provides transverse location information to its display that indicates the transverse location of the detected object. Naruse discloses displaying the transverse location of the detected object using an LED bar graph that is nearly identical to the one disclosed and claimed by the ‘803 patent.

Specifically, the transverse location in Naruse is displayed on display unit DSU by “activating the location indicator in accordance with the content of the register R6, by energizing one of the twenty-three light emitting diodes LE1 to LE23.”
Naruse further discloses that “the indicators LE1 to LE23 [are] utilized to represent the location of an object.” (Ex. 1003 at 5:39-45.) Figure 1 and the excerpt of Figure 3 of Naruse, below (annotated), illustrate the display means, which includes 23 LED indicators LE1 to LE23 that identify the transverse location of the detected object. (Ex. 1002 ¶ 98.) The 23 positions represented by the LEDs LE1 to LE23 in the display of Figure 3 indicate whether an object is located to the left or right of the center line of the vehicle based on the sensor locations along the rear of the vehicle, as shown in Figure 1. (Ex. 1002 ¶ 98.)
In sum, Naruse discloses circuitry for calculating the transverse location of an object as a function of the first and second return signals and then displaying the transverse location as required by element 1[d].

6. 2: “The collision avoidance system of claim 1, wherein the first transmitting device and the first receiving device are cooperatively integrated into a single transceiver.”

Naruse teaches that “a detector comprising a single ultrasonic transmitter and an ultrasonic receiver may be disposed at each location.” (Ex. 1003 at 13:34-38 (emphasis added).) Although Naruse does not use the term “transceiver,” it was well-known in the art that the combination of a transmitter and receiver was commonly referred to as a “transceiver.” (Ex. 1002 ¶ 101.)

In one embodiment, Naruse discloses that “a plurality of ultrasonic transmitters TX1 to TX12 and ultrasonic receivers RX1 to RX12 disposed in alternate fashion with each other” can be installed on the same metal diaphragm as depicted in Figure 10a, below. (Ex. 1003 at 4:16-20, 13:4-8.) In this embodiment, a transmitter-receiver pair of TX1 and RX1 constitutes a transmitting device 1 and a receiving device 2 that are cooperatively integrated into a single diaphragm 21.
To the extent Naruse’s detector or other transmitter-receiver pair are considered not to be cooperatively integrated into a single transceiver, a person of ordinary skill in the art would have understood that a single transceiver could have been used to replace each transmitter and receiver pair disclosed in Naruse, which was a well-known design choice in 1998, without retarding Naruse’s underlying operative principles. (Ex. 1002 ¶¶ 102-103.)

7. 3: “The collision avoidance system of claim 1, wherein the second transmitting device and the second receiving device are cooperatively integrated into a single transceiver.”

Claim 3 is disclosed or rendered obvious by Naruse for the same reasons described for claim 2 as applied instead to TX2 and RX2. (Ex. 1002 ¶ 106.) The arguments set forth with respect to claim 2 are fully incorporated herein.

8. 4: “The collision avoidance system of claim 1, wherein the control module logs the transverse location of the object.”

Naruse discloses or renders obvious the system of claim 1 as described in Ground 1.
Naruse discloses logging the transverse location of the object. A minimum value calculation routine is executed by the object detection system of Naruse, which compares the distance value for each of the 23 locations and determines which location has the minimum distance. (Ex. 1003 at 12:9-41; Ex. 1002 ¶ 109.) Specifically, Naruse discloses storing the location with the minimum distance to the detected object in register R6. (Ex. 1003 at 12:16-17.) As described for claim 1[d] in Ground 1, Naruse determines the transverse location of the object. A person of ordinary skill in the art would understand that by storing the transverse location with the minimum distance, the controller is logging the location so that it can later be displayed. (Ex. 1002 ¶ 109.)

9. 5[Preamble]: “In a collision avoidance system having a plurality of sensors, including a first and a second sensor, a method of displaying a transverse location, comprising the steps of:”

Naruse discloses the recited collision avoidance system as described in limitation 1[a] above. Those arguments are incorporated in their entirety herein. Naruse further discloses that the system is configured to calculate the transverse location of an object. (Id. at 2:5-9; Ex. 1002 ¶ 111 (“It is a first object of the invention to provide an object detecting apparatus which monitors a broad region in a reduced time interval and is capable of providing accurate information relating to the location of and the distance to an object.”).)
10. 5[a]: “placing the system proximate an object”

The purpose of Naruse’s object detection system was to detect when the vehicle was near an object. In particular, Naruse discloses that the object detection system “is capable of providing accurate information relating to the location of and the distance to an object.” (Ex. 1003 at 2:5-9 (emphasis added); Ex. 1002 ¶ 113.) Moreover, a skilled artisan would have understood that the ultrasonic sensors of Naruse would only be effective when within a few meters of the object. (Ex. 1002 ¶ 113.) In other words, it is readily apparent from a review of Naruse that his invention—like element 5[a] of the ’803 patent—required a nearby, “proximate” object for the collision avoidance system to detect. Without proximate objects, there would have been no need for the system in the first place.

11. 5[b]: “transmitting a signal from the first sensor to said object”

Naruse discloses the transmitting step of limitation 5[b]. Naruse’s twelve transceivers include a first sensor that transmits a signal. Specifically, Naruse discloses that the object detection system steps sequentially through each of the transmitters as part of its sequential detection subroutine. (Ex. 1003 at 7:14-26; Ex. 1002 ¶ 115.) Furthermore, Naruse discloses that objects are detected “by transmitting [an] ultrasonic wave” that goes to the proximate object. (Ex. 1003 at 7:57-61.) Naruse’s controller selects small sets of the transmitters and “energizes the transmitting element connected to each of the switching circuits SA1 to SA3 …
allowing them to emit ultrasonic wave.” (Id. at 9:58-68.) Naruse therefore meets limitation 5[b].

12. 5[c]: “sensing a return from the object of the signal transmitted from the first sensor and generating a first return signal as a function of the sensed return of the signal transmitted from the first sensor”

Naruse discloses sensing a return from the object and generating a return signal based on the return of the transmitted signal as recited in limitation 5[c]. Naruse discloses that receivers receive reflected ultrasonic waves from the object, which were transmitted by the transmitters, and then send electrical signals to the control module representative of the received ultrasonic waves. (Ex. 1003 at 4:30-35, 6:57-62, 7:57-68.) The piezoelectric portion of the receiver converts the received ultrasonic wave into an electric signal that can be processed by the control module. (Ex. 1002 ¶ 117.) The electrical signals from the receivers are then used by the CPU and supporting circuitry to determine the distance to the detected object. (Id. at 5:28-38; 11:24-29; Ex. 1002 ¶ 117.)

13. 5[d]: “transmitting a signal from the second sensor to said object”

Naruse discloses transmitting step of limitation 5[d]. Because Naruse steps sequentially through each of the transmitters, including a first and a second transmitter, each transmitter transmits its own signal by transmitting an ultrasonic wave. (Ex. 1003 at 7:14-18; Ex. 1002 ¶ 119.)
14. 5[e]: “sensing a return from the object of the signal transmitted from the second sensor and generating a second return signal as a function of the sensed return of the signal transmitted from the second sensor”

Because Naruse steps sequentially through each of the receiver sensors, including a first and a second receiver sensor, each receiver receives a reflected ultrasonic wave and generates an electric signal as described for element 5[c] above. (Ex. 1003 at 7:14-18; Ex. 1002 ¶ 121.)

15. 5[f]: “calculating a transverse location as a function of the first and second return signals”

Naruse discloses calculating a transverse location as recited in limitation 5[f]. Naruse further teaches calculating the transverse location of the object based on the received return signals. The broadest reasonable construction of “transverse location” is “the offset to either the left or right of a longitudinal center line.” Although Naruse does not use the term “transverse location,” a person of ordinary skill in the art would understand that the location calculation of Naruse results in determining the transverse location of the object.

After the distance subroutine has completed capturing the individual measurements for each receiver, a minimum distance calculation subroutine is executed to determine the sensor with the shortest distance to the detected object. (Ex. 1003 at 7:18-23.) “The minimum calculation subroutine searches for data representing the minimum distance among the memories,” which stores the
calculated distance information for the receivers. (Id. at 7:21-23; Ex. 1002 ¶ 124.) Figure 1of Naruse, below (annotated), shows the sensor unit (SEU) with twelve transmitters and twelve receivers placed along the rear bumper of the vehicle.

The transverse location of the object is calculated by the minimum distance subroutine, which determines which of the sensors is closest to the detected object. Using the embodiment of Figure 1 above as an example, if the RX12 sensor has the shortest distance to the object, then the transverse location of the object is on the right side of the vehicle. (Ex. 1002 ¶ 124.) On the other hand, if RX1 was determined to have the shortest distance, the transverse location of the object would be on the left of the vehicle. (Id.) Accordingly, sensors around RX5 or RX6 would result in a transverse location near the center of the rear of the vehicle. (Id.) The transverse location is a function of the first and second return signal because each of the measured distances is compared to the others to determine the
sensor with the shortest distance to the object. (Ex. 1003 at 12:9-41; Ex. 1002 ¶ 124.)

A person of ordinary skill in the art would understand that while the *distance* in Naruse is calculated based on a single signal, the algorithm used to calculate this *location* is a function of multiple return signals received by each transmitter/receiver pair. (Ex. 1002 ¶ 126.)

16. 5[g]: “displaying an indication of the calculated transverse location”

Naruse discloses displaying an indication of the calculated transverse location as recited in limitation 5[g]. Naruse discloses displaying the calculated transverse location of the detected object using an LED bar graph identical to the one disclosed and claimed by the ’803 patent.
Naruse teaches displaying the transverse location by “activating the location indicator in accordance with the content of the register R6, by energizing one of the twenty-three light emitting diodes LE1 to LE23.” (Ex. 1003 at 12:65 to 13:2, Fig. 3.) Naruse further discloses that “the indicators LE1 to LE23 [are] utilized to represent the location of an object.” (Ex. 1003 at 5:39-45.) Figure 1 and the excerpt of Figure 3 of Naruse, below (annotated), illustrate the display means, which includes 23 LED indicators LE1 to LE23 that identify the transverse location of the detected object. (Ex. 1002 ¶ 128.) The 23 positions represented by the LEDs LE1 to LE23 in the display of Figure 3 will indicate whether the object is located to the left or right of the center line of the vehicle based on the sensor locations shown in Figure 1. (Id.)
17. 7: “The system according to claim 5, wherein the step of displaying an indication includes the steps of: dividing a line into a plurality of zones; and selecting a zone from the plurality of zones; and placing an indication within the selected zone.”

Naruse discloses or renders obvious the limitations of claim 5 as set forth above. Naruse also discloses dividing a line on the display into a plurality of zones (LEDs) and placing an indication in the selected zone by lighting the corresponding LED. (Ex. 1002 ¶ 130.) The table below includes Figure 6a of the ’803 patent and an excerpt from Figure 3 of Naruse (both annotated), showing that both displays include a line of LEDs that represent different transverse locations. The LED display in Naruse is divided into 23 sections or zones, and one of the sections of the line is selected in accordance with Naruse’s location detection and illuminated by lighting an LED.
Specifically, Naruse discloses “activating the location indicator in accordance with the content of the register R6, by energizing one of the twenty-three light emitting diodes LE1 to LE23. It is to be understood that positions 1 to 23 within the register R6 corresponds to these diodes LE1 to LE23.” (Ex. 1003 at 12:65 to 13:2, Fig. 3.)

18. 8: “The method according to claim 7, wherein the step of placing an indication includes the step of lighting a light-emitting diode representative of the selected zone.”

Naruse further discloses lighting an LED to indicate the selected zone where the object is located. (Ex. 1002 ¶ 133.) Specifically, as quoted above, Naruse teaches “activating the location indicator in accordance with the content of the register R6, by energizing one of the twenty-three light emitting diodes LE1 to LE23. It is to be understood that positions 1 to 23 within the register R6 corresponds to these diodes LE1 to LE23.” (Ex. 1003 at 12:65 to 13:2, Fig. 3.)

19. 21[Preamble]: “A collision avoidance system, which provides object detection around the exterior of a vehicle, comprising:”

Naruse discloses the claimed collision avoidance system that provides object detection around the exterior of a vehicle. Specifically, Naruse discloses “[a] plurality of ultrasonic transmitting elements and ultrasonic receiving elements are provided and are electrically switched in a sequential manner to change a region over which the existence of an object is to be detected, thus allowing the
existence of an object to be detected over an extended range. The distance to the object and a particular region in which it is detected are displayed.” (Ex. 1003 at Abstract.) Naruse further discloses that the system “is capable of providing accurate information relating to the location of and the distance to an object.” (Id. at 2:5-9; Ex. 1002 ¶ 135.) A skilled artisan would have understood that Naruse’s object detection system detects objects near the exterior of the vehicle, at least because Naruse’s figures show sensors on the exterior of the vehicle. (Id.)

20. 21[a]: “a control module”

Naruse discloses the recited control module as described for limitation 1[a] above. Those arguments are incorporated in their entirety herein.

21. 21[b]: “a plurality of transmitting devices connected to the control module, wherein each of the plurality of transmitting devices transmits a signal;”

Naruse discloses a plurality of transmitting devices connected to the control module as recited in limitation 1[b].

“a plurality of transmitting devices connected to the control module”

Naruse discloses the recited plurality of transmitting devices connected to the control module as set forth for limitation 1[b] above. The arguments set forth for limitation 1[b] are fully incorporated herein.

“each of the plurality of transmitting devices transmits a signal”
Naruse discloses that the object detection system steps sequentially through each of the twelve transmitters as part of its sequential detection subroutine. (Ex. 1003 at 7:14-26; Ex. 1002 ¶ 140.) Specifically, Naruse discloses that objects are detected “by transmitting a ultrasonic wave.” (Ex. 1003 at 7:57-61.) Naruse’s controller selects small sets of the transmitters and “energizes the transmitting element connected to each of the switching circuits SA1 to SA3 … allowing them to emit ultrasonic wave.” (Id. at 9:58-68.) Because Naruse sequentially steps through each of the transmitters, each transmitter transmits its own signal by transmitting an ultrasonic wave. (Ex. 1002 ¶ 141.) In sum, each of the plurality of transmitters transmits a signal. (Id.)

22. 21[c]: “a plurality of receiving devices connected to the control module, wherein each of the plurality of receiving devices receives a return representative of one of the plurality of transmitted signals and wherein each of the plurality of receiving devices transmits to the control module a return signal representative of the return received by that receiving device”

Naruse discloses the plurality of receiving devices of limitation 21[c].

“a plurality of receiving devices connected to the control module”

Naruse discloses a plurality of receiving devices connected to the control module as set forth in limitation 1[c] above. The arguments set forth for limitation 1[c] are fully incorporated herein.
“each of the plurality of receiving devices receives a return representative of one of the plurality of transmitted signals and transmits to the control module a first return signal representative of the first return… transmits to the control module a return signal representative of the return received by that receiving device”

Naruse’s sequential detection subroutine steps through each of the twelve receivers, with each receiver receiving reflected ultrasonic waves from the neighboring transmitter and then sending a corresponding electric signal to the control module for processing. (Ex. 1003 at 7:14-18; Ex. 1002 ¶ 143.) The receivers in Naruse receive ultrasonic waves reflected from an object external to the vehicle. The reflected ultrasonic waves read on the claimed “return representative of one of the … transmitted signals,” because the ultrasonic waves originated from the transmitters. (Id.) The Naruse receivers then send electrical signals, representative of the received ultrasonic waves, to the control module. (Ex. 1003 at 4:30-35, 6:57-62, 7:57-68.) Specifically, the piezoelectric portion of the receiver converts the received ultrasonic wave into an electrical signal that is processed by the control module. (Ex. 1002 ¶ 146.) The electrical signals from the receivers are fed into the CPU and its supporting circuitry to determine the distance to the detected object. (Id. at 5:28-38; 11:24-29; Ex. 1002 ¶ 146.) Thus, an electrical signal sent from any one of Naruse’s receivers to the CPU reads on the
claimed “a return signal representative of the return received by that receiving device”. (Id.)

A person of ordinary skill in the art would have understood that each of the receivers in Naruse receives the return ultrasonic wave, converts the wave into an electric signal, and sends the converted signal representative of the return wave to the control module for processing. (Ex. 1002 ¶ 147.) Indeed, a skilled artisan would also have recognized that the reception of the return wave was the entire reason for sending the transmitted wave. (Id.) Therefore, Naruse discloses a plurality of receivers that receive a return wave from an object, convert the returned wave into an electrical signal, and send a corresponding electrical return signal representative of the return to a control module.

23. 21[d]: “wherein the control module measures the return signals, detects an object as a function of the return signals, calculates a distance to and location of the object and displays the distance to and the location of the object.”

Naruse discloses the measuring, detecting, calculating, and displaying elements of limitation 21[d].

“measures the return signals, detects an object as a function of the return signals, calculates a distance to and location of the object”

Naruse discloses measuring the received signals, detecting an object based on those received signals, and calculating the distance to and location of the
detected object. Specifically, Naruse discloses a detection subroutine executed by the microcomputer CPU for selecting the initial transmitter and receiver pairs “for purpose of measurement, and then sequentially shifts the location of the detectors selected when repeating the measurement.” (Ex. 1003 at 7:5-6, 7:14-18.) Memory registers are used to store the measurement results for each of the transmitters and receivers. (Ex. 1003 at 9:6-14.) After the distance has been calculated based on the individual measurements for each receiver, a minimum distance calculation subroutine is executed by the microcomputer CPU to determine the location of the sensor with the shortest distance to the detected object. “The minimum calculation subroutine searches for data representing the minimum distance among the memories,” which stores the calculated distance information for the receivers. (Ex. 1003 at 7:5-6, 7:21-23; Ex. 1002 ¶ 149.) The sensor with the shortest distance is selected in determining the location of the object, and this determination is based on comparing the distance information from each receiver, including the signals from the first and second receiver. (Ex. 1003 at 12:9-41; Ex. 1002 ¶ 149.)

“displays the distance to and the location of the object”

Naruse discloses that the control module provides distance and location information to the display representing the distance to and location of the detected object. Naruse teaches a display subroutine executed by the microcomputer CPU such that “the distance to the object detected is displayed by the numerical display
NDS while also activating the location indicator in accordance with the content of the register R6, by energizing one of the twenty-three light emitting diodes LE1 to LE23.” (Ex. 1003 at 7:5-6, 12:63 to 13:2, Fig. 3.) Naruse further discloses that “the indicators LE1 to LE23 [are] utilized to represent the location of an object.” (Ex. 1003 at 5:39-45.) Figure 1 and the excerpt of Figure 3 of Naruse, below (annotated), illustrate the display, which includes 23 LED indicators LE1 to LE23 that identify the location of the detected object. (Ex. 1002 ¶ 150.) The table below shows the nearly identical distance and location displays of the ’803 patent on the left and Naruse on the right. Each display includes the distance to the object (blue) and the location of the object (red). (Ex. 1002 ¶ 150.)
B. Ground 2: Claims 2 and 3 Are Obvious over Naruse and Gauthier

Claims 2 and 3 of the ’803 patent are obvious over Naruse combined with Gauthier.

1. 2: “The collision avoidance system of claim 1, wherein the first transmitting device and the first receiving device are cooperatively integrated into a single transceiver.”

Naruse discloses or renders obvious the limitations of claim 1 as set forth in Ground 1 above. Naruse further discloses the transceiver of claim 2. Specifically, Naruse discloses that “a detector comprising a single ultrasonic transmitter and an ultrasonic receiver may be disposed at each location.” (Ex. 1003 at 13:34-38 (emphasis added).) A person of ordinary skill in the art would have understood that each ultrasonic transmitter and receiver pair in Naruse was cooperatively integrated into a single transceiver. (Ex. 1002 ¶ 159.)

To the extent that the Board wishes further support for this point, however, Gauthier discloses that each transmitter and receiver pair is integrated into a single transceiver. Specifically, Gauthier discloses that “[a] plurality of transceivers 60 functioning as obstruction distance sensors are mounted on a rear bumper 26 of vehicle 20. The transmitters/receivers emit an ultrasonic acoustic energy wave having a frequency of 40 to 50 kilohertz (kHz) rearward from the vehicle into a detection space immediately behind the vehicle”. (Ex. 1004 at 5:42-48.) Gauthier
further discloses “[t]he transceiver 60 is wired in parallel to simultaneously emit a pulse of ultrasonic acoustic energy and provide overlapping receive capability of a return ultrasonic echo signal.” (Ex. 1004 at 5:57-60.) Thus, the transceivers disclosed in Gauthier included a transmitter and a receiver cooperatively integrated into a single transceiver. (Ex. 1002 ¶ 160.)

Modifying Naruse’s system with Gauthier’s transceivers would not render Naruse’s system inoperable. Although Naruse teaches alternating transmitters and receivers (Ex. 1003 at 4:16-20) and having receivers receive signals transmitted by neighboring transmitters (Ex. 1003 at 7:14-24), modifying Naruse with Gauthier’s transceivers simply collocates the transmitters and their corresponding receivers, which does not materially affect Naruse’s operation beyond what a skilled artisan could accommodate in building the modified system. (Ex. 1002 ¶ 160.)

A person of ordinary skill in the art would have found it obvious to combine the individual transceivers disclosed in Gauthier with the object detection system of Naruse, because both patents are directed to solving the same problem in a similar way. (Ex. 1002 ¶ 161.) Specifically, both references disclose the use of ultrasonic sensors to determine the distance to a nearby object. (Ex. 1003 at 1:5-8; Ex. 1004 at 1:10-14.) Also, Gauthier specifically references Naruse as another object detection system in the prior art (Ex. 1004 at 2:6-13), making clear that persons working in this field at the time often considered the two references
together. And the use of individual transmitters and receivers in a single transceiver was a known design choice that was within the understanding of the skilled artisan at the time of the ’803 patent. (Ex. 1002 ¶ 161.) Factors motivating a skilled artisan’s choice to use a “cooperatively integrated single transceiver” rather than separate transmitters and receivers would have included portability, system simplification (with less parts), and market availability (many ultrasonic object-detection transceivers were sold in a single unit). (Id.)

2. 3: “The collision avoidance system of claim 1, wherein the second transmitting device and the second receiving device are cooperatively integrated into a single transceiver.”

The limitations of claim 3 are disclosed by Naruse combined with Gauthier for the same reasons described for claim 2 as applied instead to TX2 and RX2. (Ex. 1002 ¶ 163.)

C. Ground 3: Claims 6 and 7 Are Obvious over Naruse and Tagami

Claims 6 and 7 of the ’803 patent are obvious over Naruse combined with Tagami. Tagami issued on September 14, 1982, and is therefore prior art to the ’803 patent under 35 U.S.C. § 102(b).
1. "The system according to claim 5, wherein the step of displaying an indication includes the steps of creating a display showing an area behind the vehicle and showing the object at a location within the display corresponding to the transverse location."

Naruse discloses or renders obvious the limitations of claim 5 as set forth in Ground 1 above. As described in connection with limitation 5[g] of Ground 1 above, Naruse discloses a display that identifies the transverse location of the object by lighting an LED associated with the location of the object. To the extent that left any question, Naruse further discloses that when "various detectors are disposed at diverse locations around the car body, it is desirable that the display unit be defined with a visible pattern in the form of a car body, with position indicators such as light emitting diodes disposed at locations on the pattern which corresponds to the locations of the various detectors." (Ex. 1003 at 13:39-44 (emphasis added).) Figure 13 of Naruse, below, shows the embodiment where detectors (SEUs) are placed at locations around the car.
Naruse discloses that the display would show the car body and place LED indicators at the same locations around the car as where the detectors are actually located. A person of ordinary skill in the art would have understood this embodiment of Naruse to show the area behind the vehicle and to identify the transverse location of the detected object to the left or right of the vehicle using the LEDs located near the rear of the displayed car body. (Ex. 1002 ¶ 169.)

Additionally, Tagami discloses this limitation. Figure 4 of Tagami, below (annotated), illustrates the display, which includes zones Z2 and Z3 behind the vehicle M2. Markers M3 and M4 are used to represent the location of objects that are detected to behind the vehicle on either the left or the right side. (Ex. 1005 at 6:26-65; Ex. 1002 ¶ 170.)
Tagami displays the transverse location of the object by activating markers M3 or M4, depending on whether the detected object is located to the left or right of the rear of the vehicle. (Ex. 1005 at 6:26-65; Ex. 1002 ¶ 171.)

A person of ordinary skill in the art would have found it obvious to combine the display of Tagami with the display of Naruse, achieving the expected result of showing the transverse location of the detected object in reference to a display of the side or rear areas of the vehicle. Both references attempt to solve the same problem of detecting objects near the vehicle in order to reduce the likelihood of collisions. (Ex. 1003 at 1:5-8; Ex. 1005 at 1:5-15.) Additionally, the format of the display itself is a design choice, and a POSA would have understood the advantages of displaying the rear area of the vehicle for applications like those in Tagami where approaching objects to the rear of the vehicle are important. (Ex. 1002 ¶ 172.)

2. 7: “The system according to claim 5, wherein the step of displaying an indication includes the steps of: dividing a line into a plurality of zones; and selecting a zone from the plurality of zones; and placing an indication within the selected zone.”

Naruse discloses or renders obvious the limitations of claim 5 as set forth in Ground 1 above. Naruse further discloses the limitations of claim 7 as described in Ground 1 above. Tagami also discloses dividing the display areas into a plurality of zones. (Ex. 1002 ¶ 174.) Figure 4 of Tagami, below (annotated), illustrates a
plurality of segments within each of zones Z1, Z2, and Z3. (Ex. 1005 at 4:67 to 5:18)

A person of ordinary skill in the art would have found it obvious to combine the teachings of Tagami’s display with Naruse’s display for the same reasons as set forth for claim 6 above. (Ex. 1002 ¶ 175.)

**D.  Ground 4: Claim 24 is Obvious over Naruse and Cherry**

Claim 24 of the ’803 patent is rendered obvious by the combination of Naruse and Cherry. Cherry issued on August 10, 1993, and is therefore prior art to the ’803 patent under 35 U.S.C. § 102(b).
1. 24: “The system of claim 21, wherein the control module includes a built-in-test function which sequentially commands each transmitting device to transmit a signal, detects a return of the signal and sends a signal representative of said return to the control module for system verification.”

Naruse discloses initializing the object detection system and then performing the sequential detection process, which steps through each of the transmitters and receivers to determine if an object is present. Figures 9a and 9b, below, illustrate the flow of the object detection routine, including the initialization and the sequential detection subroutines.
Naruse discloses that the object detection system enters the initialization routine when the power is turned on, then it steps through the routines depicted in Figure 9a, above, looping at the completion of the routines. (Ex. 1003 at 7:6-13.) Upon initialization of the object detection system, the sequential detection subroutine is executed, which steps through each of the transmitters and receivers to determine whether an object is present, and if so, the distance to the object. (Ex. 1003 at 7:38 to 8:68; Ex. 1002 ¶ 190.) A person of ordinary skill in the art would have understood that the initialization routine would include a built-in-test function to verify proper operation of the system. (Ex. 1002 ¶ 190.)

Naruse does not explicitly disclose a built-in-test function to test the object detection system. Cherry, however, discloses a self-test mode for a vehicle object detection system. (Ex. 1006 at 1:6-18.) As depicted in Figure 2 of Cherry, below, a controller and supporting circuitry drive the self-test mode by causing the transmitter to emit an ultrasonic wave, and using the return signal from the receiver to determine if the system is correctly receiving reflections of the transmitted signal and is operational. (Ex. 1006 at 2:57 to 3:10.)
Figure 5 of Cherry, below, illustrates that “the monitored zone is increased to a self-test zone area 60 during the self-test mode so that minor reflections from the ground may be received by the receiver 16, and decreased to an obstacle detection zone area 62 during the obstacle detection mode so that reflections from the ground are effectively ignored by the receiver.” (Ex. 1006 at 4:7-13.)
The self-test mode is entered into when power is initially applied to the system, and the system can alternate between self-test mode and normal mode during operation of the vehicle. (Ex. 1006 at 2:11-14, 2:59 to 3:10.)

A person of ordinary skill in the art would have found it obvious to combine the self-test mode of Cherry with the Initialization and Sequential Detection subroutines of Naruse, which would result in sequentially testing each of the transmitters and receivers, according to the self-test mode of Cherry. (Ex. 1002 ¶ 194.) First, both Naruse and Cherry are directed to vehicle object detection systems that use ultrasonic transmitters and receivers. (Ex. 1003 at 1:5-8; Ex. 1006 at 1:6-8, 2:36-40.) Second, the use of self-test modes for vehicle systems was well-known and was within the understanding of the skilled artisan at the time of the ’803 patent. (Ex. 1002 ¶ 194.) The use of Cherry’s self-test mode with Naruse’s object detection initialization and sequential detection subroutines would result in the expected outcome of stepping sequentially through each transmitter and receiver to verify proper functionality before entering the normal operation mode. (Ex. 1002 ¶ 194.)

E. Ground 5: Claims 22 and 28 are Obvious over Naruse and Hayashikura

Claims 22 and 28 of the ’803 patent are rendered obvious by the combination of Naruse and Hayashikura. Hayashikura issued on August 5, 1997, and is therefore prior art to the ’803 patent under 35 U.S.C. § 102(b).
1. 22: “The system of claim 21, wherein the control module fuses data received from the plurality of sensors to detect objects within a 360° view surrounding the vehicle.”

Naruse discloses or renders obvious the system of claim 21 as described in Ground 1. Naruse combined with Hayashikura discloses the additional limitations of claim 22. (Ex. 1002 ¶ 212.)

“fuses data received from the plurality of sensors”

The proposed construction for “fuses data” is “resolves distance and location information from the data of multiple sensors.” Both Naruse and Hayashikura disclose using the combined data from multiple sensors to calculate the distance to and location of an object. (Ex. 1003 at 2:5-9; Ex. 1007 at 2:1-6; Ex. 1002 ¶¶ 213.)

Naruse fuses the data of twelve transmitter and receiver pairs to determine the distance to and location of an object. (Ex. 1003 at 4:16-20, 7:5-26; Ex. 1002 ¶¶ 214.) The disclosed embodiment of Naruse employs “a plurality of ultrasonic transmitters TX1 to TX12 and ultrasonic receivers RX1 to RX12 disposed in alternate fashion with each other, the number being twelve in this example.” (Ex. 1003 at 4:17-20.) Naruse’s system then executes sequential detection, distance, and minimum distance calculation subroutines (shown in Fig. 9a below) to resolve the distance to and location of an object near the vehicle from the data measurements of multiple sensors. (Ex. 1003 at 7:6-26, Fig. 9a.)
“Generally speaking, the sequential detection subroutine selects three sets of detectors (transmitters and receivers) simultaneously for purpose of measurement, and then sequentially shifts the location of the detectors selected when repeating the measurement...The minimum calculation subroutine searches for data representing the minimum distance among the memories.” (Ex. 1003 at 7:14-26.) As a result of running these subroutines, Naruse reconciles the location of and the distance to the object based on data measured from multiple sensors around the vehicle.

Hayashikura fuses the data of a plurality of sensors to determine the location of an object within the 360° area surrounding the vehicle. (Ex. 1002 ¶¶ 215-216.) For example, Hayashikura discloses that “provision of the plurality of the transmitter and receiver sections on and along the entire periphery of the vehicle
permits detection obstacles or the like over an entire (virtually 360°) range around the vehicle.” (Ex. 1007 at 2:30-33.) Hayashikura further discloses that its object detection system “determines presence or absence of an obstacle over the entire range (virtually 360°) around the vehicle and a distance to the obstacle if any.” (Id. at 4:54-57.) Hayashikura discloses storing the fused data of objects detected around the vehicle when it states that “[t]he processing device 4 updatably stores the data representative of the determined distances in all the directions.” (Id. at 4:64-65; Ex. 1002 ¶ 216.)

“detect objects within a 360° view surrounding the vehicle”

Naruse discloses that “an array comprising the plurality of detectors which are spaced from each other by a distance which is comparable to the detectable range of each detector may be used to provide a broad region as a whole in which the existence of an object can be detected.” (Ex. 1003 at 2:18-24.) Recognizing that the number of sensors can be changed to increase or decrease the area of coverage for the object detection system, Naruse discloses that “to derive information relating to N locations, there must be provided N detector units, including N ultrasonic transmitting elements and N ultrasonic receiving elements.” (Id. at 2:39-42.) Naruse further discloses that “a plurality of detector units may be disposed at diverse locations which are separate from each other ... around the car body.” (Id. at 13:34-44.) Figure 13 of Naruse, below, illustrates an embodiment
with various sensors located on multiple sides of the vehicle to give coverage of the rear, sides, and front of the vehicle. (Ex. 1002 ¶ 217.)

A POSITA would have understood from the disclosure of Naruse that additional sensors could be used to give an even greater coverage of the surrounding of the vehicle beyond the nearly 360° coverage shown in Figure 13 above. (Ex. 1002 ¶ 218.)

To the extent Patent Owner argues that Naruse fails to explicitly disclose detecting objects within a 360° view, Hayashikura more explicitly discloses this limitation. (Ex. 1002 ¶ 219.) Hayashikura discloses that “provision of the plurality of the transmitter and receiver sections on and along the entire periphery of the vehicle permits detection obstacles or the like over an entire (virtually 360°)
range around the vehicle.” (Ex. 1007 at 2:30-33.) Hayashikura further discloses that its object detection system “determines presence or absence of an obstacle over the entire range (virtually 360°) around the vehicle and a distance to the obstacle if any.” (Id. at 4:54-57.) Figure 1 of Hayashikura, below, illustrates that the object detection system provides 360° coverage surrounding the vehicle by using a plurality of radar sensors (3) around the vehicle. It is the combined coverage of the plurality of sensors that provides Hayashikura’s system with effectively 360° of coverage. (Ex. 1002 ¶ 219.)

![FIG.1](image)

A person of ordinary skill in the art would have found it obvious to combine the 360° object detection of Hayashikura with the multi-sensor detection system of Naruse, achieving the expected result of detecting objects in the 360° area.
surrounding the vehicle. (Ex. 1002 ¶ 220.) Both references attempt to solve the same problem of detecting objects around the vehicle in order to reduce the likelihood of collisions. (Ex. 1003 at 13:34-44; Ex. 1007 at 2:30-33.) The embodiment of Naruse in Figure 13 already approaches detecting objects within a 360° view, and person of ordinary skill in the art would have recognized the advantages of adding a few more sensors for additional coverage. (Ex. 1002 ¶ 220.) Also, the decision of how many sensors to incorporate is a design choice, and a person of ordinary skill in the art would have understood the advantages of adding enough sensors to detect objects in the 360° area surrounding the vehicle for applications like those in Hayashikura. (Id.)

2. 28: “The system of claim 21, wherein the control module fuses data received from the plurality of sensors and provides a single picture of all objects within a 360° view surrounding the vehicle.”

Naruse discloses or renders obvious the system of claim 21 as described in Ground 1. Naruse combined with Hayashikura discloses the additional limitations of fusing data from multiple sensors to detect objects within a 360° view surrounding the vehicle as described for claim 22 above. (Ex. 1002 ¶ 222.)

Naruse further discloses that when “various detectors are disposed at diverse locations around the car body, it is desirable that the display unit be defined with a visible pattern in the form of a car body, with position indicators such as light emitting diodes disposed at locations on the pattern which corresponds to the
locations of the various detectors.” (Ex. 1003 at 13:39-44 (emphasis added).) Figure 13 of Naruse, below, shows the embodiment where detectors (SEUs) are placed at locations around the car.

![Figure 13](image-url)

Naruse discloses that the display would show the car body and use LED indicators at locations around the car representative of the detectors on the car. A person of ordinary skill in the art would have understood this embodiment of Naruse to show the area around the vehicle and to display the location of the detected object using the LEDs located surrounding the displayed car body. (Ex. 1002 ¶ 224.)

Hayashikura further discloses detecting and displaying detected objects in the 360° area surrounding the vehicle, including displaying the distance to the detected objects. (Ex. 1007 at 3:28-31 (“The radar devices 3 are disposed in such a manner that their detecting ranges together cover about 360° around the vehicle 2 without substantially overlapping each other.”)) (emphasis added), 4:66 to 5:22
(“The display section 5 includes an image display device 51 and a sound synthesizer 52. The processing device 4 *visually presents, on the screen of the image display device 41, the data representative of the distance to the obstacle for each direction* … The processing device 4 in this embodiment displays a *mark 2M indicating the user’s vehicle on a virtually middle portion of the display screen* 51a, and also *marks S1 and S2 indicative of the positions of detected obstacles* along with the determined distances J1 and J2 to the obstacles.”) (emphasis added.) (Ex. 1002 ¶ 225.)

Figure 1 of Hayashikura, below, shows the 360° coverage of the object sensors, and Figure 5 of Hayashikura, also below, illustrates the disclosed display, showing, in “a single picture,” an indication of the vehicle in the middle of the screen (2M), and object markers (S1 and S2) around the vehicle. (Ex. 1002 ¶ 226.)
A person of ordinary skill in the art would have been motivated to combine the 360 detection and display system of Hayashikura with Naruse’s object detection system for the reasons set forth in the discussion of claim 22 above. (Ex. 1002 ¶ 227.)

F. Ground 6: Claim 25 is Obvious over Naruse and Ramer

Claim 25 of the ’803 patent is rendered obvious by Naruse combined with Ramer. Ramer was filed on May 12, 1997 and issued on March 2, 1999, and is therefore prior art under 35 U.S.C. § 102(e).

1. 25: “The system of claim 21, wherein the control module determines whether it can triangulate and calculates an actual perpendicular distance to the object and location of the object with respect to the vehicle.”

Naruse combined with Ramer discloses calculating a perpendicular distance from the vehicle to the object as recited in claim 25. As described above, Naruse discloses detecting the distance from the vehicle to a nearby object as illustrated by the sensors on the rear of the vehicle in Figure 1 (below). (Ex. 1003 at 2:5-9.)
A person of ordinary skill in the art would have understood that Naruse’s minimum distance subroutine results in calculating the perpendicular distance to the object if the object is located directly behind one of sensors TX1 through RX12 as depicted in Figure 1 above. (Ex. 1002 ¶ 253.)

Ramer teaches calculating the perpendicular distance from the vehicle using a triangulation method. (Ex. 1008 at Fig. 7, Abstract; 9:12-38; Ex. 1002 ¶ 254.) Figure 7 of Ramer, below, shows the triangulation method used to determine the perpendicular distance (R) to the detected object (O). In particular, Ramer calculates the perpendicular distance (R) to the object based on the determined spacing of the detectors (D and D’) and the angle of the return signals received by the detectors. (Id.) One of ordinary skill in the art would understand that before the Ramer system can triangulate, it must first determine if the detectors can
receive reflections of the transmitted signals. As such, the system in Ramer first determines whether it can triangulate before it performs the calculation and therefore teaches both the recited determination and calculation imitations of claim 25. (Ex. 1002 ¶ 252.)

A person of ordinary skill in the art would have been motivated to combine the perpendicular measurement system of Ramer with the object detection system of Naruse. Both references teach vehicle object detection systems that determine the distance to a nearby object. (Ex. 1003 at 1:5-8; Ex. 1008 at 1:5-9, 1:22-25.) (Ex. 1002 ¶¶ 250-255.) The combined system would have operated as expected,
providing the perpendicular distance between the rear-most portion of the vehicle
and the detected object. (Id.)

X. CONCLUSION

The Board should institute *inter partes* review and determine that claims 1-8,
21, 22, 24, 25, and 28 are unpatentable.

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## EXHIBIT LIST*

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<td>Ex. 1009 (“Lemelson”)</td>
<td>U.S. Patent No. 6,553,130</td>
</tr>
<tr>
<td>Ex. 1010</td>
<td>December 20, 1999 Amendment and Response to Office Action</td>
</tr>
</tbody>
</table>

* For convenience, this Petition shares the exhibit numbering used in the companion petitions that also challenge the ’803 patent. Not all exhibits are cited in this document.
CERTIFICATION OF WORD COUNT UNDER 37 CFR § 42.24(d)

Under the provisions of 37 CFR § 42.24(d), the undersigned hereby certifies that the word count for the foregoing PETITION FOR INTER PARTES REVIEW OF U.S. PATENT NO. 6,268,803 totals 13,640, excluding the cover page, signature block, and parts exempted by 37 C.F.R. § 42.24(a).

This word count was made by using the built-in word count function tool in the Microsoft Word software Version 2010 used to prepare the document.

Dated: May 2, 2017

Respectfully submitted,

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CERTIFICATE OF SERVICE

The undersigned hereby certifies that a true copies of the foregoing PETITION FOR INTER PARTES REVIEW OF U.S. PATENT NO. 6,268,803 and supporting materials (Exhibits 1001-1010 and Power of Attorney) have been served in their entirety this 2nd day of May, 2017, by FedEx® mail delivery service on Patent Owner at the correspondence address for the ’803 patent shown in USPTO PAIR:

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