

Exhibit E-8
Initial Invalidity Claim Chart for U.S. Patent No. 10,984,911
Masimo Pulse Oximetry System relying on SET Sensor (“SET”)

The Masimo pulse oximetry system relying on a SET sensor (“SET”), is a pulse oximetry system relying on a SET pulse oximeter that was known, in public use, publicly available, offered for sale, and/or sold in the United States at least as of 2003, is prior art to U.S. Patent No. 10,984,911 (the “’911 patent”) pursuant to at least pre-AIA 35 U.S.C. §§ 102(a), 102(b), and/or 102(e) under the ’911 patent’s proper priority date. SET anticipates and/or renders obvious the asserted claims of the ’911 patent under pre-AIA 35 U.S.C. §§ 102 and/or 103.

As set forth in the chart below, all asserted claims of the ’911 patent are anticipated and/or rendered obvious over SET under at least the apparent construction of the claims advanced by Masimo based on its Preliminary Infringement Contentions served on May 25, 2023 (the “Infringement Contentions”). The excerpts cited herein are exemplary. For any claim limitation, Apple may rely on excerpts cited for any other limitation and/or additional excerpts not set forth fully herein to the extent necessary to provide a more comprehensive explanation for a reference’s disclosure of a limitation. Where an excerpt refers to or discusses a figure or figure items, that figure and any additional descriptions of that figure should be understood to be incorporated by reference as if set forth fully therein. Apple expressly reserves the right to use the entirety of any reference and otherwise to supplement these contentions to add additional information showing that SET invalidates the asserted claims of the ’911 patent.

To the extent that any of the below claim limitations are found to not be expressly disclosed by the below reference, Apple contends that any such limitation would have been obvious, either based on the knowledge of one of ordinary skill in the art or based on any of the art cited for the ’911 patent in Apple’s Initial Invalidity Contentions, which are incorporated herein by reference. In particular, as evidenced by the below and in Apple’s Initial Invalidity Contentions, the ’911 patent is merely a collection of prior art elements that fails to meet the statutory requirement of nonobviousness under § 103, and the factors delineated in *KSR Int’l Co. v. Teleflex, Inc.*, 550 U.S. 398 (2007), weigh against a finding of nonobviousness.

For example, it would have been obvious to a person of ordinary skill in the art to combine the teaching of SET with the teachings of the other references charted for the ’911 patent in Apple’s Initial Invalidity Contentions; such references are in the same field of art, and discuss various techniques and improvements that would have been known to yield predictable results when applied to the technology claimed in the ’911 patent, and a person of ordinary skill therefore would have been motivated to so combine them in view of the disclosures therein.

Apple also contends that one of ordinary skill in the art would find such limitation obvious for at least one or more of the following reasons: (1) the combination would unite old elements with no change in their respective function; (2) the combination would have been

a predictable variation of a work in the same or a different field of endeavor; (3) the modification would have used a known technique to improve a similar device in the same way; (4) the modification was a known problem for which there was an obvious solution; (5) the modification would have been “obvious to try”; (6) the modification was known work in one field of endeavor that would have prompted variations of it for use in either the same or different field based on design incentives or other market forces; (7) there was an explicit teaching, suggestion, or motivation in the prior art for the modification.

These Initial Invalidity Contentions are based on Apple’s present understanding of the ’911 patent claims and Masimo’s theories of infringement against Apple. Apple expressly does not agree that, under a correct construction or reading of the claims, that Apple’s accused products meet the limitations of the asserted claims of the ’911 Patent or that the claims satisfy the requirements of 35 U.S.C. § 112. Apple’s contentions herein are not, and should in no way be seen as, admissions as to or adoptions of any particular claim scope or construction, or as an admission that any particular element is met by any accused product in any particular way. Apple therefore objects to any attempt to imply claim construction from this chart. Apple’s Initial Invalidity Contentions do not represent Apple’s agreement or view as to the meaning, definiteness, written description support for, or enablement of any claim contained therein. However, at least under Masimo’s apparent application of the claims for the purposes of infringement (which Apple expressly disagrees with), SET would have rendered the asserted claims of the ’911 patent invalid. Except where specifically noted otherwise, this chart applies the apparent constructions of claim terms as used by Masimo in its Infringement Contentions; such use, however, does not imply that Apple adopt or agree with Masimo’s constructions in any way. Apple further reserves the right to supplement these contentions in response to any claim construction orders by the Court.

Apple is investigating this prior art and has not yet completed discovery from third parties who may have information concerning it. Pursuant to Federal Rule of Civil Procedure 26(e), the Local Rules of the District of Delaware, and the Orders of record in this matter Apple reserves the right to modify, amend, and/or supplement these contentions as information becomes available (*e.g.*, witness testimony and/or non-public documentation) and as discovery proceeds.

Claim 1	Prior Art
1[pre] A physiological monitoring device comprising:	Under at least the apparent construction based on Masimo's Infringement Contentions, and to the extent that the preamble is limiting, SET discloses and/or renders obvious a physiological monitoring device. For example, SET discloses and/or suggests a physiological monitoring device comprising a Masimo SET sensor, such as an LNOP or NR sensor, and a Radical display module: <i>See, e.g., LNOP & NR at 1:</i>

LNOP® & NR

SpO₂ adhesive & reusable sensors



We've got you covered from head to toe.

In the OR, NICU, transport, sleep lab, or other critical areas of the hospital, Masimo offers the adhesive and reusable sensors you desire, and the pulse oximetry performance you need. Masimo SET[®] LNOP[®] and NR[®] sensors continuously and non-invasively monitor arterial oxygen saturation (SpO₂) and pulse rate. They are designed to be used with the Masimo SET pulse oximetry system, the only system clinically proven to work during motion and low perfusion. Masimo sensors are intended for adult, pediatric or neonatal patient applications. Masimo SET - offering the best performing pulse oximetry system for your hospital.

See, e.g., LNOP & NR at 2:

Masimo SET signal extraction pulse oximetry™

The signal integrity of Masimo LNOP sensors and the advanced signal processing of Masimo SET combine to provide accurate and reliable tracking of the patient's true physiology, even during motion and low perfusion.

Masimo SET insignia ensures quality, high-performance and Masimo SET compatibility.



Signal IQ™ quality indicator let's the clinician know the integrity of the data from the monitoring site.

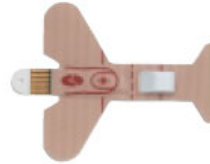
Durable material resists moisture and tears, thereby prolonging sensor life.

Reusable patient cables come in a variety of lengths and configurations to suit your needs.

Masimo SET Radical with LNOP Adt Long Adhesive Sensor

Masimo Signal Extraction at 6:

LNOP Adt
Adult Single Patient Adhesive Sensor



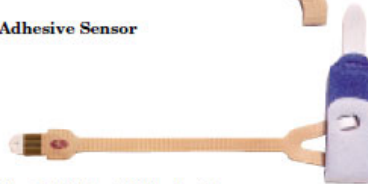
LNOP Pdt
Pediatric/Slender Digit
Single Patient Adhesive Sensor



LNOP Neo
Neonatal Single Patient Adhesive Sensor



LNOP NeoPt
Sensitive Skin Neonatal Single Patient Adhesive Sensor



LNOP DCI
Reusable Finger Sensor



LNOP DCIP
Pediatric Reusable Finger Sensor



Masimo Sensor Patient Cable



Masimo Signal Extraction at 7:

Radical™ signal extraction™ pulse oximeter

Radical as a Standalone Pulse Oximeter

Radical's lightweight and rugged design, provides continuous and reliable arterial oxygen saturation monitoring anywhere throughout the continuum of care: in the ER, OR, ICU and recovery room, in any specialty clinic, the general floor and home.

Radical as a Handheld Pulse Oximeter

The Handheld pulse oximeter easily detaches from the standalone unit as a full-featured Handheld pulse oximeter to travel with the patient during hospital transport providing continuous, seamless Masimo SET performance.

Radical with SatShare™ as an Upgrade to Your Existing Validated* Monitor

Radical with SatShare interface upgrades existing monitors to Masimo SET pulse oximetry. This unique upgrade capability gives clinicians a quick, easy and affordable way to upgrade their existing conventional pulse oximeters to Masimo SET performance.



	Technology Bulletin 1 at 1: Masimo SET® pulse oximetry is a new and fundamentally distinct method of acquiring, processing and reporting arterial oxygen saturation and pulse rate. As illustrated below, Masimo SET technology enables the power of adaptive filters to be applied to real-time physiologic monitoring by utilizing proprietary techniques to accurately establish a “noise reference” in the detected physiologic signal, thus enabling the direct calculation of arterial oxygen saturation and pulse rate. Because it is not bound by a conventional “red over infrared” ratio approach, the Masimo SET system substantially eliminates the problems of motion artifact, low peripheral perfusion and most low signal-to-noise situations. This greatly extends the utility of SpO₂ in high motion, low signal and noise intensive environments. The superior performance of Masimo SET pulse oximetry has been clinically validated. The table below summarizes the results of one such study. To the extent Masimo contends or the Court determines that SET does not expressly or inherently disclose this limitation, it would have been obvious to combine SET with one or more references charted for this limitation in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions.
1[a] at least three LEDs recessed into a cavity, the at least three LEDs configured to emit light of at least three	Under at least the apparent construction based on Masimo’s Infringement Contentions, SET discloses and/or renders obvious at least three LEDs recessed into a cavity, the at least three LEDs configured to emit light of at least three different wavelengths. For example, SET discloses and/or suggests where the SET sensor has two LEDs recessed into a cavity, the two LEDs configured to emit light of two different wavelengths comprising Red and IR wavelengths:

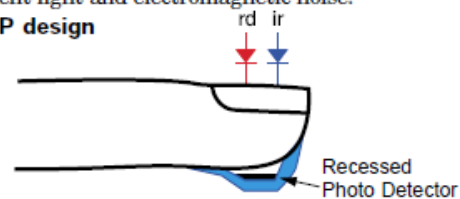
different wavelengths;

See, e.g., Masimo Signal Extraction at 5:

Low Noise Optical Probe (LNOP®)

The LNOP sensors are uniquely designed to assume that noise, both physiological and non-physiological, will be present. Unlike conventional pulse oximetry sensor design, the photodetector is recessed in a cavity to minimize optical path length changes during motion. The cavity is covered by a conformable adhesive that allows the fleshy part of the digit to move in and out of the cavity during motion, similar to shock absorbers in automobiles. In comparison, conventional sensors place the photodetector directly on the tissue. The LNOP design also minimizes the effects of venous blood movement at the monitored site due to motion. Another advantage of the recessed photodetector and the overall shielded design is that it is better protected from ambient light and electromagnetic noise.

LNOP design

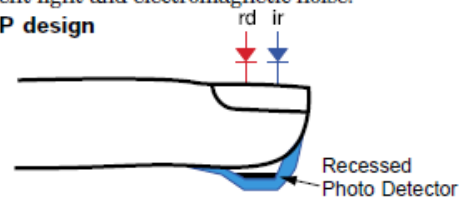


	To the extent Masimo contends or the Court determines that SET does not expressly or inherently disclose this limitation, it would have been obvious to combine SET with one or more references charted for this limitation in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions.
1[b] at least one detector configured to detect at least a portion of the light emitted from the at least three LEDs after at least a portion of the light has been attenuated by tissue, the at least one detector configured to output at least one signal responsive to the detected light;	Under at least the apparent construction based on Masimo’s Infringement Contentions, SET discloses and/or renders obvious at least one detector configured to detect at least a portion of the light emitted from the at least three LEDs after at least a portion of the light has been attenuated by tissue, the at least one detector configured to output at least one signal responsive to the detected light. For example, SET discloses and/or suggests where the SET pulse oximeter sensor has a detector configured to detect at least a portion of the light emitted from the two LEDs after at least a portion of the light has been attenuated by tissue, such as the tissue of a patient’s finger, and the at least one detector configured to output at least signal responsive to the detected light, such as a detected physiologic signal: <i>See, e.g., Masimo Signal Extraction at 5:</i>

Low Noise Optical Probe (LNOP*)

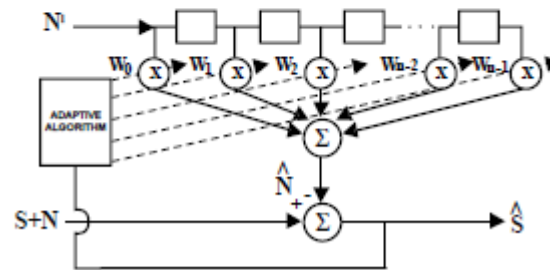
The LNOP sensors are uniquely designed to assume that noise, both physiological and non-physiological, will be present. Unlike conventional pulse oximetry sensor design, the photodetector is recessed in a cavity to minimize optical path length changes during motion. The cavity is covered by a conformable adhesive that allows the fleshy part of the digit to move in and out of the cavity during motion, similar to shock absorbers in automobiles. In comparison, conventional sensors place the photodetector directly on the tissue. The LNOP design also minimizes the effects of venous blood movement at the monitored site due to motion. Another advantage of the recessed photodetector and the overall shielded design is that it is better protected from ambient light and electromagnetic noise.

LNOP design



Technology Bulletin 1 at 2:

The detected physiologic signal is generally composed of both desired signal (S) and undesired signal (N) or noise portions. To remove the effects of the undesired signal, some knowledge of the noise characteristics, or equivalently its noise reference (N'), must be known. The adaptive filter will adjust its filtering characteristics, so that the noise reference input is transformed into an estimate of the undesired signal portion ($\hat{N}$) of the physiologic signal. A subtracter subsequently removes the undesired signal from the physiologic signal to yield an estimate of the desired signal portion ($\hat{S}$). The combination comprising the adaptive filter and the subtracter is commonly called an adaptive noise canceller (ANC).

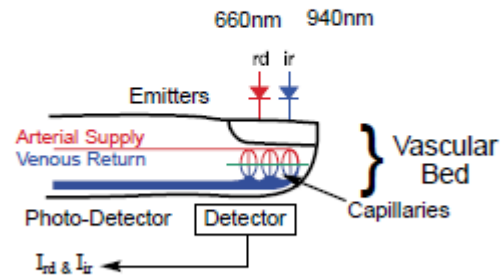


Adaptive Noise Canceller (ANC) block diagram

Technology Bulletin 1 at 3:

Conventional Pulse Oximetry

The conventional "red over infrared" approach measures the differential optical density of red (I_{rd}) and infrared (I_{ir}) light as projected through a vascular bed and calculates a ratio (r) of the optical densities. Utilizing the optical density ratio, an arterial oxygen saturation (SpO_2) value is empirically reported based on the ratio obtained.



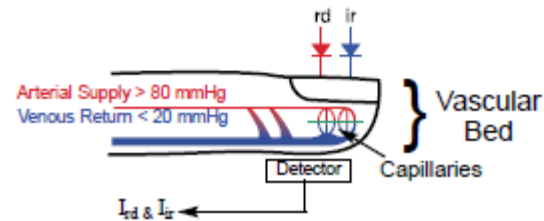
Basis For Measurement:

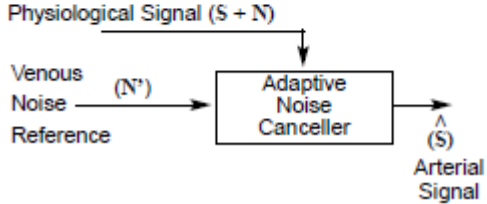
$$\frac{I_{rd}}{I_{ir}} = \frac{S_{rd} + N_{rd}}{S_{ir} + N_{ir}} = \text{Ratio } (r) \rightarrow \% SpO_2$$

Technology Bulletin 1 at 3:

Masimo SET® Pulse Oximetry

Masimo Signal Extraction Technology rejects the conventional wisdom and begins with an understanding that during patient motion the venous blood, being at a relatively low pressure, is quite susceptible to the local effects of perturbation during motion. Considering the finger for example, the venous blood in the vascular bed will be easily deformed during motion, representing a significant source of in-band noise within the frequency bandwidth of interest. In addition, the venous blood is a strong absorber of light. Hence, it can represent a significant contributor to the total optical density during motion episodes. Furthermore, the venous blood saturation is normally lower than the arterial blood saturation. This explains why saturation values tend to drop in conventional pulse oximeter systems during episodes of patient motion.



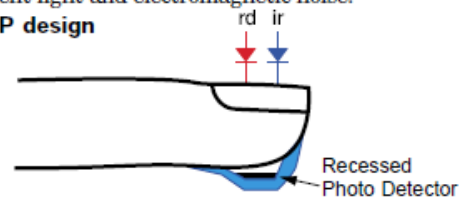
	During routine patient motions (shivering, waving, tapping, etc.), the resulting noise can be quite substantial and can easily overwhelm a conventional ratio based oximetry system. Having identified the venous blood as a significant contributor to noise during motion, it follows that if the noise reference corresponding to the venous component could be measured, then an adaptive noise canceller might be utilized to cancel its contribution.  To the extent Masimo contends or the Court determines that SET does not expressly or inherently disclose this limitation, it would have been obvious to combine SET with one or more references charted for this limitation in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine SET with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining SET with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions.
1[c-1] a light block surrounding the at least one detector, the light block comprising a shoebox structure configured to recess the at least one detector into the shoebox structure, wherein the shoebox structure is at least	Under at least the apparent construction based on Masimo's Infringement Contentions, SET discloses and/or renders obvious a light block surrounding the at least one detector, the light block comprising a shoebox structure configured to recess the at least one detector into the shoebox structure, wherein the shoebox structure is at least partially formed of a black material, wherein a top of the shoebox structure includes only one opening through which light is configured to pass. For example, SET discloses and/or suggests a light block surrounding the at least one detector, implemented as a Low Noise Optical Probe with a Recessed Photo Detector, the light block comprising a shoebox structure configured to recess the at least one detector into the shoebox structure of the Recessed Photo Detector structure, wherein a top of the shoebox structure includes only one opening through which light is configured to pass to the detector:

partially formed of a black material, wherein a top of the shoebox structure includes only one opening through which light is configured to pass,	<i>See, e.g., Masimo Signal Extraction at 4:</i> Masimo Signal Extraction Technology® begins with a new understanding of how motion affects the tissue and venous blood. Conventional pulse oximeters assume that arterial blood is the only blood moving (pulsating) in the measurement site. During patient motion, however, the venous blood also moves, which causes conventional pulse oximeters to under-read because they can not distinguish between the arterial and venous blood. Masimo SET signal processing identifies the venous blood signal, isolates it, and, using adaptive filters, cancels it. It then reports the true arterial oxygen saturation. Masimo SET consists of a breakthrough Discrete Saturation Transform™ algorithm and a revolutionary Low Noise Optical Probe™ sensor design. Masimo Signal Extraction at 5:
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Low Noise Optical Probe (LNOP*)

The LNOP sensors are uniquely designed to assume that noise, both physiological and non-physiological, will be present. Unlike conventional pulse oximetry sensor design, the photodetector is recessed in a cavity to minimize optical path length changes during motion. The cavity is covered by a conformable adhesive that allows the fleshy part of the digit to move in and out of the cavity during motion, similar to shock absorbers in automobiles. In comparison, conventional sensors place the photodetector directly on the tissue. The LNOP design also minimizes the effects of venous blood movement at the monitored site due to motion. Another advantage of the recessed photodetector and the overall shielded design is that it is better protected from ambient light and electromagnetic noise.

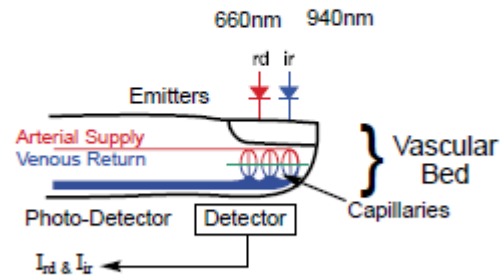
LNOP design



Technology Bulletin 1 at 3:

Conventional Pulse Oximetry

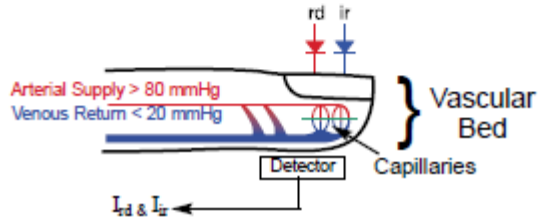
The conventional "red over infrared" approach measures the differential optical density of red (I_{rd}) and infrared (I_{ir}) light as projected through a vascular bed and calculates a ratio (r) of the optical densities. Utilizing the optical density ratio, an arterial oxygen saturation (SpO_2) value is empirically reported based on the ratio obtained.



Basis For Measurement:

$$\frac{I_{rd}}{I_{ir}} = \frac{S_{rd} + N_{rd}}{S_{ir} + N_{ir}} = \text{Ratio } (r) \rightarrow \% SpO_2$$

Technology Bulletin 1 at 3:

	Masimo SET® Pulse Oximetry Masimo Signal Extraction Technology rejects the conventional wisdom and begins with an understanding that during patient motion the venous blood, being at a relatively low pressure, is quite susceptible to the local effects of perturbation during motion. Considering the finger for example, the venous blood in the vascular bed will be easily deformed during motion, representing a significant source of in-band noise within the frequency bandwidth of interest. In addition, the venous blood is a strong absorber of light. Hence, it can represent a significant contributor to the total optical density during motion episodes. Furthermore, the venous blood saturation is normally lower than the arterial blood saturation. This explains why saturation values tend to drop in conventional pulse oximeter systems during episodes of patient motion.  The diagram illustrates a cross-section of a finger. A red arrow labeled 'rd' and a blue arrow labeled 'lr' point into the finger from the top. Inside the finger, a red line represents 'Arterial Supply > 80 mmHg' and a blue line represents 'Venous Return < 20 mmHg'. A bracket on the right side of the finger is labeled 'Vascular Bed'. Below the vascular bed, a small circle is labeled 'Capillaries'. A box labeled 'Detector' is positioned below the capillaries. Two arrows, one red and one blue, point from the detector towards the bottom left, labeled 'I_{rd} & I_{ir}'. To the extent Masimo contends or the Court determines that SET does not expressly or inherently disclose this limitation, it would have been obvious to combine SET with one or more references charted for this limitation in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions.
1[c-2] the opening comprising an area smaller than a detection surface	Under at least the apparent construction based on Masimo’s Infringement Contentions, SET discloses and/or renders obvious wherein the opening comprising an area smaller than a detection surface area of the at least one detector.

area of the at least one detector; and	To the extent Masimo contends or the Court determines that SET does not expressly or inherently disclose this limitation, it would have been obvious to combine SET with one or more references charted for this limitation in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions.
1[d] a processor configured to receive and process one or more signals responsive to the outputted at least one signal and determine a physiological parameter of a user responsive to the one or more signals.	Under at least the apparent construction based on Masimo’s Infringement Contentions, SET discloses and/or renders obvious a processor configured to receive and process one or more signals responsive to the outputted at least one signal and determine a physiological parameter of a user responsive to the one or more signal. For example, SET discloses and/or suggests a processor such as the signal processor of the Radical unit configured to receive and process one or more signals responsive to the outputted at least one signal and determine a physiological parameter of a user responsive to the one or more signals such as blood oxygen: <i>See, e.g.,</i> LNOP & NR at 2:

Masimo SET signal extraction pulse oximetry™

The signal integrity of Masimo LNOP sensors and the advanced signal processing of Masimo SET combine to provide accurate and reliable tracking of the patient's true physiology, even during motion and low perfusion.

Masimo SET insignia ensures quality, high-performance and Masimo SET compatibility.



Signal IQ™ quality indicator lets the clinician know the integrity of the data from the monitoring site.

Durable material resists moisture and tears, thereby prolonging sensor life.

Reusable patient cables come in a variety of lengths and configurations to suit your needs.

Masimo SET Radical with LNOP Adt Long Adhesive Sensor

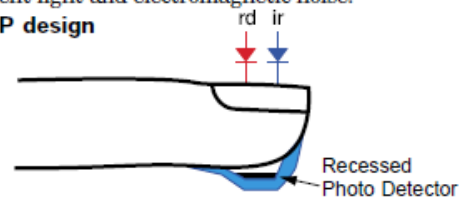
Masimo Signal Extraction at 4:

	Masimo Signal Extraction Technology® begins with a new understanding of how motion affects the tissue and venous blood. Conventional pulse oximeters assume that arterial blood is the only blood moving (pulsating) in the measurement site. During patient motion, however, the venous blood also moves, which causes conventional pulse oximeters to under-read because they can not distinguish between the arterial and venous blood. Masimo SET signal processing identifies the venous blood signal, isolates it, and, using adaptive filters, cancels it. It then reports the true arterial oxygen saturation. Masimo SET consists of a breakthrough Discrete Saturation Transform™ algorithm and a revolutionary Low Noise Optical Probe™ sensor design. Masimo Signal Extraction at 5:
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Low Noise Optical Probe (LNOP*)

The LNOP sensors are uniquely designed to assume that noise, both physiological and non-physiological, will be present. Unlike conventional pulse oximetry sensor design, the photodetector is recessed in a cavity to minimize optical path length changes during motion. The cavity is covered by a conformable adhesive that allows the fleshy part of the digit to move in and out of the cavity during motion, similar to shock absorbers in automobiles. In comparison, conventional sensors place the photodetector directly on the tissue. The LNOP design also minimizes the effects of venous blood movement at the monitored site due to motion. Another advantage of the recessed photodetector and the overall shielded design is that it is better protected from ambient light and electromagnetic noise.

LNOP design



Masimo Signal Extraction at 7:

Radical™ signal extraction™ pulse oximeter

Radical as a Standalone Pulse Oximeter

Radical's lightweight and rugged design, provides continuous and reliable arterial oxygen saturation monitoring anywhere throughout the continuum of care: in the ER, OR, ICU and recovery room, in any specialty clinic, the general floor and home.

Radical as a Handheld Pulse Oximeter

The Handheld pulse oximeter easily detaches from the standalone unit as a full-featured Handheld pulse oximeter to travel with the patient during hospital transport providing continuous, seamless Masimo SET performance.

Radical with SatShare™ as an Upgrade to Your Existing Validated* Monitor

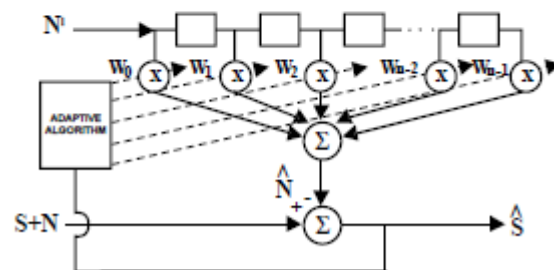
Radical with SatShare interface upgrades existing monitors to Masimo SET pulse oximetry. This unique upgrade capability gives clinicians a quick, easy and affordable way to upgrade their existing conventional pulse oximeters to Masimo SET performance.



Technology Bulletin 1 at 1:

	Masimo SET® pulse oximetry is a new and fundamentally distinct method of acquiring, processing and reporting arterial oxygen saturation and pulse rate. As illustrated below, Masimo SET technology enables the power of adaptive filters to be applied to real-time physiologic monitoring by utilizing proprietary techniques to accurately establish a “noise reference” in the detected physiologic signal, thus enabling the direct calculation of arterial oxygen saturation and pulse rate. Because it is not bound by a conventional “red over infrared” ratio approach, the Masimo SET system substantially eliminates the problems of motion artifact, low peripheral perfusion and most low signal-to-noise situations. This greatly extends the utility of SpO₂ in high motion, low signal and noise intensive environments. The superior performance of Masimo SET pulse oximetry has been clinically validated. The table below summarizes the results of one such study. Technology Bulletin 1 at 2:	
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The detected physiologic signal is generally composed of both desired signal (S) and undesired signal (N) or noise portions. To remove the effects of the undesired signal, some knowledge of the noise characteristics, or equivalently its noise reference (N'), must be known. The adaptive filter will adjust its filtering characteristics, so that the noise reference input is transformed into an estimate of the undesired signal portion ($\hat{N}$) of the physiologic signal. A subtracter subsequently removes the undesired signal from the physiologic signal to yield an estimate of the desired signal portion ($\hat{S}$). The combination comprising the adaptive filter and the subtracter is commonly called an adaptive noise canceller (ANC).

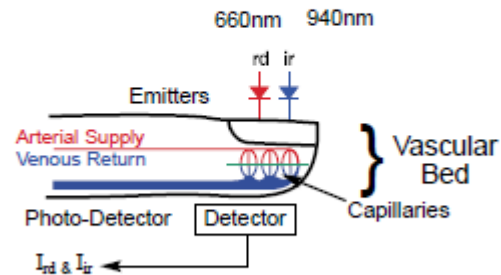


Adaptive Noise Canceller (ANC) block diagram

Technology Bulletin 1 at 3:

Conventional Pulse Oximetry

The conventional "red over infrared" approach measures the differential optical density of red (I_{rd}) and infrared (I_{ir}) light as projected through a vascular bed and calculates a ratio (r) of the optical densities. Utilizing the optical density ratio, an arterial oxygen saturation (SpO_2) value is empirically reported based on the ratio obtained.



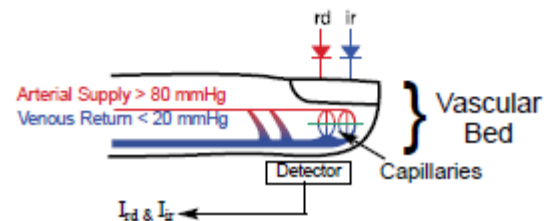
Basis For Measurement:

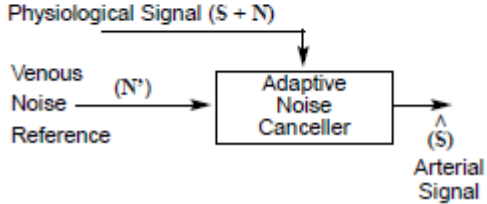
$$\frac{I_{rd}}{I_{ir}} = \frac{S_{rd} + N_{rd}}{S_{ir} + N_{ir}} = \text{Ratio } (r) \rightarrow \% SpO_2$$

Technology Bulletin 1 at 3:

Masimo SET® Pulse Oximetry

Masimo Signal Extraction Technology rejects the conventional wisdom and begins with an understanding that during patient motion the venous blood, being at a relatively low pressure, is quite susceptible to the local effects of perturbation during motion. Considering the finger for example, the venous blood in the vascular bed will be easily deformed during motion, representing a significant source of in-band noise within the frequency bandwidth of interest. In addition, the venous blood is a strong absorber of light. Hence, it can represent a significant contributor to the total optical density during motion episodes. Furthermore, the venous blood saturation is normally lower than the arterial blood saturation. This explains why saturation values tend to drop in conventional pulse oximeter systems during episodes of patient motion.



	During routine patient motions (shivering, waving, tapping, etc.), the resulting noise can be quite substantial and can easily overwhelm a conventional ratio based oximetry system. Having identified the venous blood as a significant contributor to noise during motion, it follows that if the noise reference corresponding to the venous component could be measured, then an adaptive noise canceller might be utilized to cancel its contribution.  To the extent Masimo contends or the Court determines that SET does not expressly or inherently disclose this limitation, it would have been obvious to combine SET with one or more references charted for this limitation in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine SET with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining SET with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions.
Claim 2	Prior Art
2. The device of claim 1, wherein the at least three LEDs comprises at least eight LEDs.	Under at least the apparent construction based on Masimo's Infringement Contentions, and to the extent that the preamble is limiting, SET discloses and/or renders obvious the device of claim 1. <i>See, e.g., Claim 1.</i> Under at least the apparent construction based on Masimo's Infringement Contentions, SET discloses and/or renders obvious wherein the at least three LEDs comprises at least eight LEDs. To the extent Masimo contends or the Court determines that SET does not expressly or inherently disclose this limitation, it would have been obvious to combine SET with one or more references charted for this limitation in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have been

	motivated to combine SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions.
Claim 3	Prior Art
3. The device of claim 2, wherein the at least eight LEDs comprises at least two LEDs of the same wavelength.	Under at least the apparent construction based on Masimo’s Infringement Contentions, and to the extent that the preamble is limiting, SET discloses and/or renders obvious the device of claim 1. <i>See, e.g., Claim 1.</i> Under at least the apparent construction based on Masimo’s Infringement Contentions, SET discloses and/or renders obvious wherein the at least eight LEDs comprises at least two LEDs of the same wavelength. To the extent Masimo contends or the Court determines that SET does not expressly or inherently disclose this limitation, it would have been obvious to combine SET with one or more references charted for this limitation in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions.
Claim 4	Prior Art
4. The device of claim 1, wherein the at least three LEDs comprises at least twelve LEDs.	Under at least the apparent construction based on Masimo’s Infringement Contentions, and to the extent that the preamble is limiting, SET discloses and/or renders obvious the device of claim 1. <i>See, e.g., Claim 1.</i> Under at least the apparent construction based on Masimo’s Infringement Contentions, SET discloses and/or renders obvious wherein the at least three LEDs comprises at least twelve LEDs. To the extent Masimo contends or the Court determines that SET does not expressly or inherently disclose this limitation, it would have been obvious to combine SET with one or more references charted for this limitation in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have been

	motivated to combine SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions.
Claim 5	Prior Art
5. The device of claim 1, wherein at least two LEDs of the at least three LEDs are configured for concurrent activation.	Under at least the apparent construction based on Masimo’s Infringement Contentions, and to the extent that the preamble is limiting, SET discloses and/or renders obvious the device of claim 1. <i>See, e.g., Claim 1.</i> Under at least the apparent construction based on Masimo’s Infringement Contentions, SET discloses and/or renders obvious wherein at least two LEDs of the at least three LEDs are configured for concurrent activation. To the extent Masimo contends or the Court determines that SET does not expressly or inherently disclose this limitation, it would have been obvious to combine SET with one or more references charted for this limitation in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions.
Claim 8	Prior Art
8. The device of claim 1, wherein the opening provides an optical path from the tissue to the at least one detector.	Under at least the apparent construction based on Masimo’s Infringement Contentions, and to the extent that the preamble is limiting, SET discloses and/or renders obvious the device of claim 1. <i>See, e.g., Claim 1.</i> Under at least the apparent construction based on Masimo’s Infringement Contentions, SET discloses and/or renders obvious wherein the opening provides an optical path from the tissue to the at least one detector. For example, SET discloses and/or suggests wherein the opening of the Recessed Photo Detector housing provides an optical path from the tissue such as the tissue of the finger to the at least one detector: <i>See, e.g., Masimo Signal Extraction at 4:</i>

Masimo Signal Extraction Technology® begins with a new understanding of how motion affects the tissue and venous blood. Conventional pulse oximeters assume that arterial blood is the only blood moving (pulsating) in the measurement site. During patient motion, however, the venous blood also moves, which causes conventional pulse oximeters to under-read because they can not distinguish between the arterial and venous blood. Masimo SET signal processing identifies the venous blood signal, isolates it, and, using adaptive filters, cancels it. It then reports the true arterial oxygen saturation.

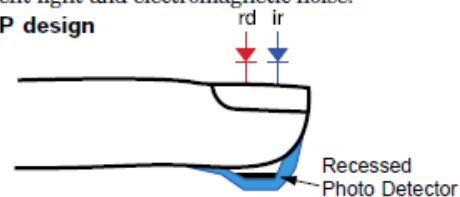
Masimo SET consists of a breakthrough Discrete Saturation Transform™ algorithm and a revolutionary Low Noise Optical Probe™ sensor design.

Masimo Signal Extraction at 5:

Low Noise Optical Probe (LNOP*)

The LNOP sensors are uniquely designed to assume that noise, both physiological and non-physiological, will be present. Unlike conventional pulse oximetry sensor design, the photodetector is recessed in a cavity to minimize optical path length changes during motion. The cavity is covered by a conformable adhesive that allows the fleshy part of the digit to move in and out of the cavity during motion, similar to shock absorbers in automobiles. In comparison, conventional sensors place the photodetector directly on the tissue. The LNOP design also minimizes the effects of venous blood movement at the monitored site due to motion. Another advantage of the recessed photodetector and the overall shielded design is that it is better protected from ambient light and electromagnetic noise.

LNOP design



To the extent Masimo contends or the Court determines that SET does not expressly or inherently disclose this limitation, it would have been obvious to combine SET with one or more references charted for this

	limitation in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions.
Claim 10	Prior Art
10[pre] A physiological monitoring device comprising:	Under at least the apparent construction based on Masimo’s Infringement Contentions, and to the extent that the preamble is limiting, SET discloses and/or renders obvious a physiological monitoring device. For example, SET discloses and/or suggests [a physiological monitoring device comprising a Masimo SET sensor, such as an LNOP or NR sensor, and a Radical display module: <i>See, e.g., LNOP & NR at 1:</i>

LNOP® & NR

SpO₂ adhesive & reusable sensors



We've got you covered from head to toe.

In the OR, NICU, transport, sleep lab, or other critical areas of the hospital, Masimo offers the adhesive and reusable sensors you desire, and the pulse oximetry performance you need. Masimo SET[®] LNOP[®] and NR[®] sensors continuously and non-invasively monitor arterial oxygen saturation (SpO₂) and pulse rate. They are designed to be used with the Masimo SET pulse oximetry system, the only system clinically proven to work during motion and low perfusion. Masimo sensors are intended for adult, pediatric or neonatal patient applications. Masimo SET - offering the best performing pulse oximetry system for your hospital.

See, e.g., LNOP & NR at 2:

Masimo SET signal extraction pulse oximetry™

The signal integrity of Masimo LNOP sensors and the advanced signal processing of Masimo SET combine to provide accurate and reliable tracking of the patient's true physiology, even during motion and low perfusion.

Masimo SET insignia ensures quality, high-performance and Masimo SET compatibility.



Signal IQ™ quality indicator let's the clinician know the integrity of the data from the monitoring site.

Durable material resists moisture and tears, thereby prolonging sensor life.

Reusable patient cables come in a variety of lengths and configurations to suit your needs.

Masimo SET Radical with LNOP Adt Long Adhesive Sensor

Masimo Signal Extraction at 6:

LNOP Adt
Adult Single Patient Adhesive Sensor



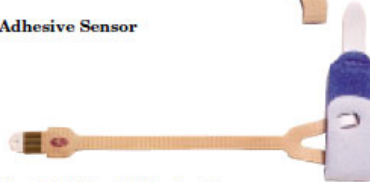
LNOP Pdt
Pediatric/Slender Digit
Single Patient Adhesive Sensor



LNOP Neo
Neonatal Single Patient Adhesive Sensor



LNOP NeoPt
Sensitive Skin Neonatal Single Patient Adhesive Sensor



LNOP DCI
Reusable Finger Sensor



LNOP DCIP
Pediatric Reusable Finger Sensor



Masimo Sensor Patient Cable



Masimo Signal Extraction at 7:

Radical™ signal extraction™ pulse oximeter

Radical as a Standalone Pulse Oximeter

Radical's lightweight and rugged design, provides continuous and reliable arterial oxygen saturation monitoring anywhere throughout the continuum of care: in the ER, OR, ICU and recovery room, in any specialty clinic, the general floor and home.

Radical as a Handheld Pulse Oximeter

The Handheld pulse oximeter easily detaches from the standalone unit as a full-featured Handheld pulse oximeter to travel with the patient during hospital transport providing continuous, seamless Masimo SET performance.

Radical with SatShare™ as an Upgrade to Your Existing Validated* Monitor

Radical with SatShare interface upgrades existing monitors to Masimo SET pulse oximetry. This unique upgrade capability gives clinicians a quick, easy and affordable way to upgrade their existing conventional pulse oximeters to Masimo SET performance.



	Technology Bulletin 1 at 1: Masimo SET® pulse oximetry is a new and fundamentally distinct method of acquiring, processing and reporting arterial oxygen saturation and pulse rate. As illustrated below, Masimo SET technology enables the power of adaptive filters to be applied to real-time physiologic monitoring by utilizing proprietary techniques to accurately establish a “noise reference” in the detected physiologic signal, thus enabling the direct calculation of arterial oxygen saturation and pulse rate. Because it is not bound by a conventional “red over infrared” ratio approach, the Masimo SET system substantially eliminates the problems of motion artifact, low peripheral perfusion and most low signal-to-noise situations. This greatly extends the utility of SpO₂ in high motion, low signal and noise intensive environments. The superior performance of Masimo SET pulse oximetry has been clinically validated. The table below summarizes the results of one such study. To the extent Masimo contends or the Court determines that SET does not expressly or inherently disclose this limitation, it would have been obvious to combine SET with one or more references charted for this limitation in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions.
10[a] at least three LEDs recessed into a cavity, the at least three LEDs configured to emit light of at least three	Under at least the apparent construction based on Masimo’s Infringement Contentions, SET discloses and/or renders obvious at least three LEDs recessed into a cavity, the at least three LEDs configured to emit light of at least three different wavelengths. For example, SET discloses and/or suggests where the SET sensor has two LEDs recessed into a cavity, the two LEDs configured to emit light of two different wavelengths comprising Red and IR wavelengths:

different wavelengths;

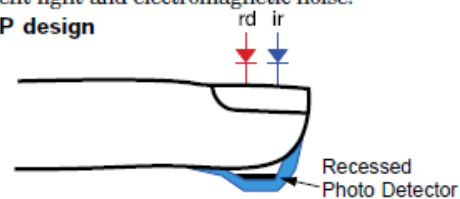
See, e.g., Masimo Signal Extraction at 5:

Low Noise Optical Probe (LNOP®)

The LNOP sensors are uniquely designed to assume that noise, both physiological and non-physiological, will be present. Unlike conventional pulse oximetry sensor design, the photodetector is recessed in a cavity to minimize optical path length changes during motion. The cavity is covered by a conformable adhesive that allows the fleshy part of the digit to move in and out of the

cavity during motion, similar to shock absorbers in automobiles. In comparison, conventional sensors place the photodetector directly on the tissue. The LNOP design also minimizes the effects of venous blood movement at the monitored site due to motion. Another advantage of the recessed photodetector and the overall shielded design is that it is better protected from ambient light and electromagnetic noise.

LNOP design

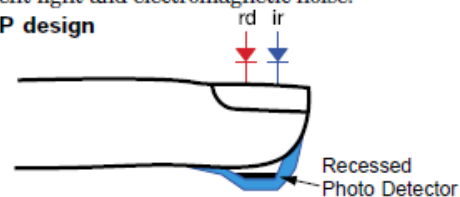


	To the extent Masimo contends or the Court determines that SET does not expressly or inherently disclose this limitation, it would have been obvious to combine SET with one or more references charted for this limitation in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions.
10[b] at least one detector configured to detect at least a portion of the light emitted from the at least three LEDs after at least a portion of the light has been attenuated by tissue, the at least one detector configured to output at least one signal responsive to the detected light;	Under at least the apparent construction based on Masimo’s Infringement Contentions, SET discloses and/or renders obvious at least one detector configured to detect at least a portion of the light emitted from the at least three LEDs after at least a portion of the light has been attenuated by tissue, the at least one detector configured to output at least one signal responsive to the detected light. For example, SET discloses and/or suggests where the SET pulse oximeter sensor has a detector configured to detect at least a portion of the light emitted from the two LEDs after at least a portion of the light has been attenuated by tissue, such as the tissue of a patient’s finger, and the at least one detector configured to output at least signal responsive to the detected light, such as a detected physiologic signal: <i>See, e.g., Masimo Signal Extraction at 5:</i>

Low Noise Optical Probe (LNOP*)

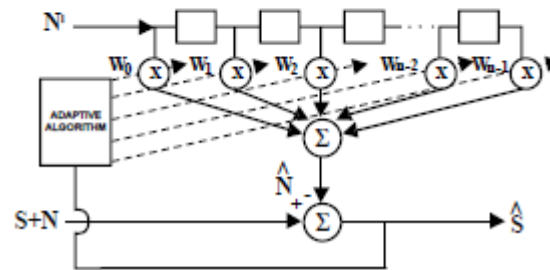
The LNOP sensors are uniquely designed to assume that noise, both physiological and non-physiological, will be present. Unlike conventional pulse oximetry sensor design, the photodetector is recessed in a cavity to minimize optical path length changes during motion. The cavity is covered by a conformable adhesive that allows the fleshy part of the digit to move in and out of the cavity during motion, similar to shock absorbers in automobiles. In comparison, conventional sensors place the photodetector directly on the tissue. The LNOP design also minimizes the effects of venous blood movement at the monitored site due to motion. Another advantage of the recessed photodetector and the overall shielded design is that it is better protected from ambient light and electromagnetic noise.

LNOP design



Technology Bulletin 1 at 2:

The detected physiologic signal is generally composed of both desired signal (S) and undesired signal (N) or noise portions. To remove the effects of the undesired signal, some knowledge of the noise characteristics, or equivalently its noise reference (N'), must be known. The adaptive filter will adjust its filtering characteristics, so that the noise reference input is transformed into an estimate of the undesired signal portion ($\hat{N}$) of the physiologic signal. A subtracter subsequently removes the undesired signal from the physiologic signal to yield an estimate of the desired signal portion ($\hat{S}$). The combination comprising the adaptive filter and the subtracter is commonly called an adaptive noise canceller (ANC).

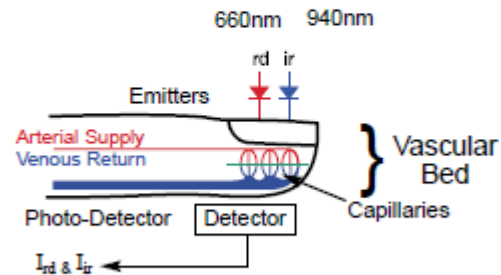


Adaptive Noise Canceller (ANC) block diagram

Technology Bulletin 1 at 3:

Conventional Pulse Oximetry

The conventional "red over infrared" approach measures the differential optical density of red (I_{rd}) and infrared (I_{ir}) light as projected through a vascular bed and calculates a ratio (r) of the optical densities. Utilizing the optical density ratio, an arterial oxygen saturation (SpO_2) value is empirically reported based on the ratio obtained.



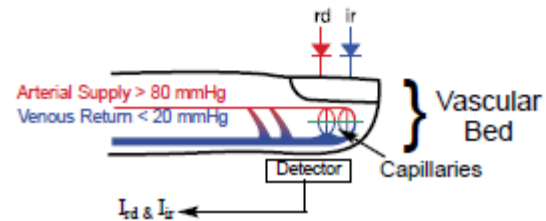
Basis For Measurement:

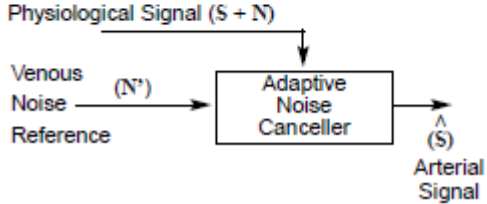
$$\frac{I_{rd}}{I_{ir}} = \frac{S_{rd} + N_{rd}}{S_{ir} + N_{ir}} = \text{Ratio } (r) \rightarrow \% SpO_2$$

Technology Bulletin 1 at 3:

Masimo SET® Pulse Oximetry

Masimo Signal Extraction Technology rejects the conventional wisdom and begins with an understanding that during patient motion the venous blood, being at a relatively low pressure, is quite susceptible to the local effects of perturbation during motion. Considering the finger for example, the venous blood in the vascular bed will be easily deformed during motion, representing a significant source of in-band noise within the frequency bandwidth of interest. In addition, the venous blood is a strong absorber of light. Hence, it can represent a significant contributor to the total optical density during motion episodes. Furthermore, the venous blood saturation is normally lower than the arterial blood saturation. This explains why saturation values tend to drop in conventional pulse oximeter systems during episodes of patient motion.

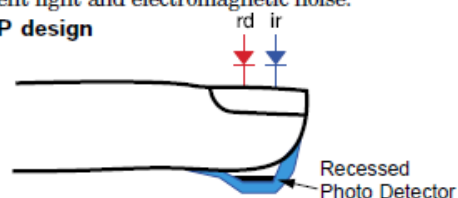


	During routine patient motions (shivering, waving, tapping, etc.), the resulting noise can be quite substantial and can easily overwhelm a conventional ratio based oximetry system. Having identified the venous blood as a significant contributor to noise during motion, it follows that if the noise reference corresponding to the venous component could be measured, then an adaptive noise canceller might be utilized to cancel its contribution.  To the extent Masimo contends or the Court determines that SET does not expressly or inherently disclose this limitation, it would have been obvious to combine SET with one or more references charted for this limitation in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine SET with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining SET with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions.
10[c] an electromagnetic interference shield positioned between the at least three LEDs and the at least one detector;	Under at least the apparent construction based on Masimo's Infringement Contentions, SET discloses and/or renders obvious an electromagnetic interference shield positioned between the at least three LEDs and the at least one detector. For example, SET discloses and/or suggests a recessed photodetector overall shielded design that better protects the detector from ambient light and electromagnetic noise: <i>See, e.g., Masimo Signal Extraction 2001 at 5:</i>

Low Noise Optical Probe (LNOP*)

The LNOP sensors are uniquely designed to assume that noise, both physiological and non-physiological, will be present. Unlike conventional pulse oximetry sensor design, the photodetector is recessed in a cavity to minimize optical path length changes during motion. The cavity is covered by a conformable adhesive that allows the fleshy part of the digit to move in and out of the cavity during motion, similar to shock absorbers in automobiles. In comparison, conventional sensors place the photodetector directly on the tissue. The LNOP design also minimizes the effects of venous blood movement at the monitored site due to motion. Another advantage of the recessed photodetector and the overall shielded design is that it is better protected from ambient light and electromagnetic noise.

LNOP design



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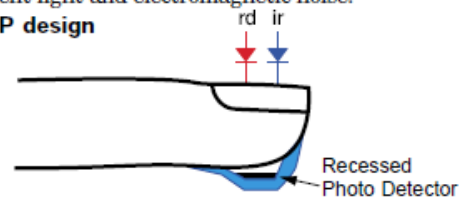
	motivated to combine SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions.
10[d-1] a light block surrounding the at least one detector, the light block at least partially formed of black materials, the light block comprising a base, four side walls and a top forming an enclosure,	Under at least the apparent construction based on Masimo’s Infringement Contentions, SET discloses and/or renders obvious a light block surrounding the at least one detector, the light block at least partially formed of black materials, the light block comprising a base, four side walls and a top forming an enclosure. For example, SET discloses and/or suggests a light block surrounding the at least one detector, implemented as a Low Noise Optical Probe with a Recessed Photo Detector, the light block Recessed Photo Detector structure comprising a base, four side walls and a top forming an enclosure for the detector: <i>See, e.g., Masimo Signal Extraction at 4:</i>

	Masimo Signal Extraction Technology® begins with a new understanding of how motion affects the tissue and venous blood. Conventional pulse oximeters assume that arterial blood is the only blood moving (pulsating) in the measurement site. During patient motion, however, the venous blood also moves, which causes conventional pulse oximeters to under-read because they can not distinguish between the arterial and venous blood. Masimo SET signal processing identifies the venous blood signal, isolates it, and, using adaptive filters, cancels it. It then reports the true arterial oxygen saturation. Masimo SET consists of a breakthrough Discrete Saturation Transform™ algorithm and a revolutionary Low Noise Optical Probe™ sensor design. Masimo Signal Extraction at 5:
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Low Noise Optical Probe (LNOP*)

The LNOP sensors are uniquely designed to assume that noise, both physiological and non-physiological, will be present. Unlike conventional pulse oximetry sensor design, the photodetector is recessed in a cavity to minimize optical path length changes during motion. The cavity is covered by a conformable adhesive that allows the fleshy part of the digit to move in and out of the cavity during motion, similar to shock absorbers in automobiles. In comparison, conventional sensors place the photodetector directly on the tissue. The LNOP design also minimizes the effects of venous blood movement at the monitored site due to motion. Another advantage of the recessed photodetector and the overall shielded design is that it is better protected from ambient light and electromagnetic noise.

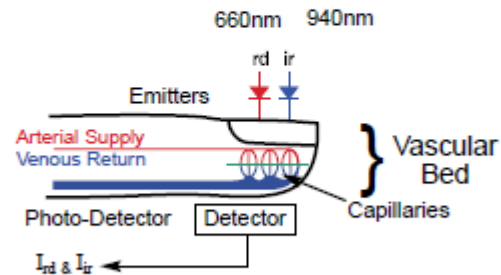
LNOP design



Technology Bulletin 1 at 3:

Conventional Pulse Oximetry

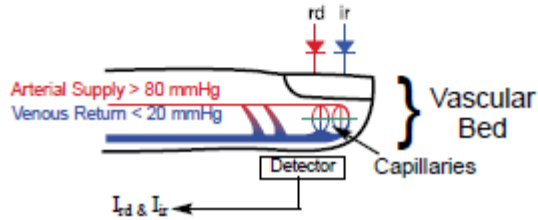
The conventional "red over infrared" approach measures the differential optical density of red (I_{rd}) and infrared (I_{ir}) light as projected through a vascular bed and calculates a ratio (r) of the optical densities. Utilizing the optical density ratio, an arterial oxygen saturation (SpO_2) value is empirically reported based on the ratio obtained.



Basis For Measurement:

$$\frac{I_{rd}}{I_{ir}} = \frac{S_{rd} + N_{rd}}{S_{ir} + N_{ir}} = \text{Ratio } (r) \rightarrow \% SpO_2$$

Technology Bulletin 1 at 3:

	Masimo SET® Pulse Oximetry Masimo Signal Extraction Technology rejects the conventional wisdom and begins with an understanding that during patient motion the venous blood, being at a relatively low pressure, is quite susceptible to the local effects of perturbation during motion. Considering the finger for example, the venous blood in the vascular bed will be easily deformed during motion, representing a significant source of in-band noise within the frequency bandwidth of interest. In addition, the venous blood is a strong absorber of light. Hence, it can represent a significant contributor to the total optical density during motion episodes. Furthermore, the venous blood saturation is normally lower than the arterial blood saturation. This explains why saturation values tend to drop in conventional pulse oximeter systems during episodes of patient motion.  The diagram illustrates a cross-section of a finger. A red arrow labeled 'rd' and a blue arrow labeled 'lr' point towards the finger. Inside the finger, a red line represents 'Arterial Supply > 80 mmHg' and a blue line represents 'Venous Return < 20 mmHg'. A bracket on the right side of the finger is labeled 'Vascular Bed'. Below the vascular bed, a box labeled 'Detector' is shown. An arrow points from the detector to the text 'I_{rd} & I_{ir}'. To the extent Masimo contends or the Court determines that SET does not expressly or inherently disclose this limitation, it would have been obvious to combine SET with one or more references charted for this limitation in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions.
10[d-2] wherein the light block comprises a window, the window	Under at least the apparent construction based on Masimo’s Infringement Contentions, SET discloses and/or renders obvious wherein the light block comprises a window, the window having an area smaller than a detection surface area of the at least one detector.

having an area smaller than a detection surface area of the at least one detector; and	To the extent Masimo contends or the Court determines that SET does not expressly or inherently disclose this limitation, it would have been obvious to combine SET with one or more references charted for this limitation in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine SET with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining SET with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions.
10[e] a processor configured to receive and process one or more signals responsive to the outputted at least one signal and determine a physiological parameter of a user responsive to the one or more signals.	Under at least the apparent construction based on Masimo's Infringement Contentions, SET discloses and/or renders obvious a processor configured to receive and process one or more signals responsive to the outputted at least one signal and determine a physiological parameter of a user responsive to the one or more signals. For example, SET discloses and/or suggests a processor such as the signal processor of the Radical unit configured to receive and process one or more signals responsive to the outputted at least one signal and determine a physiological parameter of a user responsive to the one or more signals such as blood oxygen: <i>See, e.g.,</i> LNOP & NR at 2:

Masimo SET[®] signal extraction pulse oximetry™

The signal integrity of Masimo LNOP sensors and the advanced signal processing of Masimo SET combine to provide accurate and reliable tracking of the patient's true physiology, even during motion and low perfusion.

Masimo SET insignia ensures quality, high-performance and Masimo SET compatibility.



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Durable material resists moisture and tears, thereby prolonging sensor life.

Reusable patient cables come in a variety of lengths and configurations to suit your needs.

Masimo SET Radical with LNOP Adt Long Adhesive Sensor

Masimo Signal Extraction at 4:

Masimo Signal Extraction Technology® begins with a new understanding of how motion affects the tissue and venous blood. Conventional pulse oximeters assume that arterial blood is the only blood moving (pulsating) in the measurement site. During patient motion, however, the venous blood also moves, which causes conventional pulse oximeters to under-read because they can not distinguish between the arterial and venous blood. Masimo SET signal processing identifies the venous blood signal, isolates it, and, using adaptive filters, cancels it. It then reports the true arterial oxygen saturation.

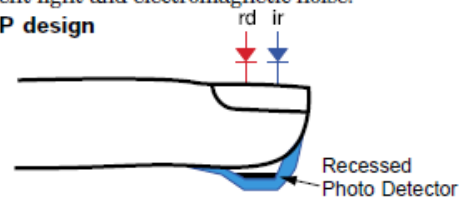
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Masimo Signal Extraction at 5:

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LNOP design



Masimo Signal Extraction at 7:

Radical™ signal extraction™ pulse oximeter

Radical as a Standalone Pulse Oximeter

Radical's lightweight and rugged design, provides continuous and reliable arterial oxygen saturation monitoring anywhere throughout the continuum of care: in the ER, OR, ICU and recovery room, in any specialty clinic, the general floor and home.

Radical as a Handheld Pulse Oximeter

The Handheld pulse oximeter easily detaches from the standalone unit as a full-featured Handheld pulse oximeter to travel with the patient during hospital transport providing continuous, seamless Masimo SET performance.

Radical with SatShare™ as an Upgrade to Your Existing Validated* Monitor

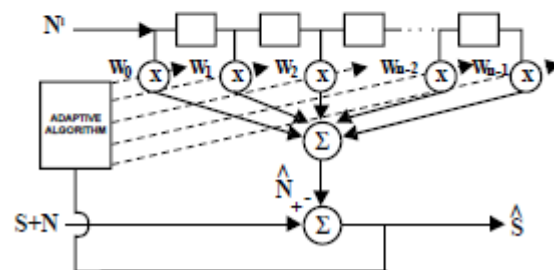
Radical with SatShare interface upgrades existing monitors to Masimo SET pulse oximetry. This unique upgrade capability gives clinicians a quick, easy and affordable way to upgrade their existing conventional pulse oximeters to Masimo SET performance.



Technology Bulletin 1 at 1:

	Masimo SET® pulse oximetry is a new and fundamentally distinct method of acquiring, processing and reporting arterial oxygen saturation and pulse rate. As illustrated below, Masimo SET technology enables the power of adaptive filters to be applied to real-time physiologic monitoring by utilizing proprietary techniques to accurately establish a “noise reference” in the detected physiologic signal, thus enabling the direct calculation of arterial oxygen saturation and pulse rate. Because it is not bound by a conventional “red over infrared” ratio approach, the Masimo SET system substantially eliminates the problems of motion artifact, low peripheral perfusion and most low signal-to-noise situations. This greatly extends the utility of SpO₂ in high motion, low signal and noise intensive environments. The superior performance of Masimo SET pulse oximetry has been clinically validated. The table below summarizes the results of one such study. Technology Bulletin 1 at 2:	
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The detected physiologic signal is generally composed of both desired signal (S) and undesired signal (N) or noise portions. To remove the effects of the undesired signal, some knowledge of the noise characteristics, or equivalently its noise reference (N'), must be known. The adaptive filter will adjust its filtering characteristics, so that the noise reference input is transformed into an estimate of the undesired signal portion ($\hat{N}$) of the physiologic signal. A subtracter subsequently removes the undesired signal from the physiologic signal to yield an estimate of the desired signal portion ($\hat{S}$). The combination comprising the adaptive filter and the subtracter is commonly called an adaptive noise canceller (ANC).

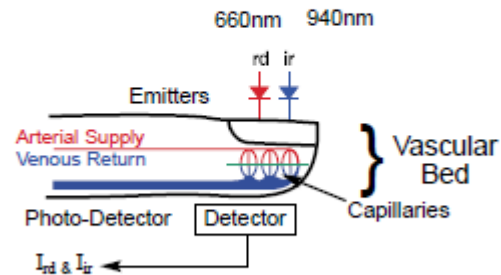


Adaptive Noise Canceller (ANC) block diagram

Technology Bulletin 1 at 3:

Conventional Pulse Oximetry

The conventional "red over infrared" approach measures the differential optical density of red (I_{rd}) and infrared (I_{ir}) light as projected through a vascular bed and calculates a ratio (r) of the optical densities. Utilizing the optical density ratio, an arterial oxygen saturation (SpO_2) value is empirically reported based on the ratio obtained.



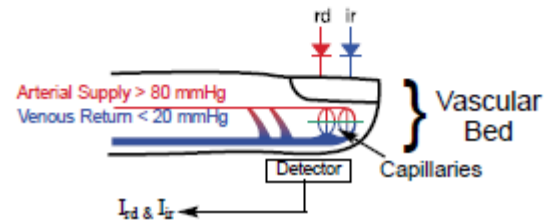
Basis For Measurement:

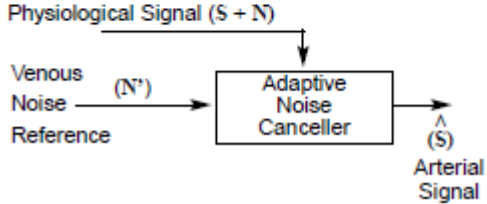
$$\frac{I_{rd}}{I_{ir}} = \frac{S_{rd} + N_{rd}}{S_{ir} + N_{ir}} = \text{Ratio } (r) \rightarrow \% SpO_2$$

Technology Bulletin 1 at 3:

Masimo SET® Pulse Oximetry

Masimo Signal Extraction Technology rejects the conventional wisdom and begins with an understanding that during patient motion the venous blood, being at a relatively low pressure, is quite susceptible to the local effects of perturbation during motion. Considering the finger for example, the venous blood in the vascular bed will be easily deformed during motion, representing a significant source of in-band noise within the frequency bandwidth of interest. In addition, the venous blood is a strong absorber of light. Hence, it can represent a significant contributor to the total optical density during motion episodes. Furthermore, the venous blood saturation is normally lower than the arterial blood saturation. This explains why saturation values tend to drop in conventional pulse oximeter systems during episodes of patient motion.



	During routine patient motions (shivering, waving, tapping, etc.), the resulting noise can be quite substantial and can easily overwhelm a conventional ratio based oximetry system. Having identified the venous blood as a significant contributor to noise during motion, it follows that if the noise reference corresponding to the venous component could be measured, then an adaptive noise canceller might be utilized to cancel its contribution.  To the extent Masimo contends or the Court determines that SET does not expressly or inherently disclose this limitation, it would have been obvious to combine SET with one or more references charted for this limitation in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions.
Claim 11	Prior Art
11. The device of claim 10, wherein the at least three LEDs comprises at least eight LEDs.	Under at least the apparent construction based on Masimo’s Infringement Contentions, and to the extent that the preamble is limiting, SET discloses and/or renders obvious the device of claim 10. <i>See, e.g., Claim 10.</i> Under at least the apparent construction based on Masimo’s Infringement Contentions, SET discloses and/or renders obvious wherein the at least three LEDs comprises at least eight LEDs. To the extent Masimo contends or the Court determines that SET does not expressly or inherently disclose this limitation, it would have been obvious to combine SET with one or more references charted for this

	limitation in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions.
Claim 12	Prior Art
12. The device of claim 11, wherein the at least eight LEDs comprises at least two LEDs of the same wavelength.	Under at least the apparent construction based on Masimo’s Infringement Contentions, and to the extent that the preamble is limiting, SET discloses and/or renders obvious the device of claim 11. <i>See, e.g., Claim 11.</i> Under at least the apparent construction based on Masimo’s Infringement Contentions, SET discloses and/or renders obvious wherein the at least eight LEDs comprises at least two LEDs of the same wavelength. To the extent Masimo contends or the Court determines that SET does not expressly or inherently disclose this limitation, it would have been obvious to combine SET with one or more references charted for this limitation in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions.
Claim 13	Prior Art
13. The device of claim 10, wherein the at least three LEDs comprises at least twelve LEDs.	Under at least the apparent construction based on Masimo’s Infringement Contentions, and to the extent that the preamble is limiting, SET discloses and/or renders obvious the device of claim 10. <i>See, e.g., Claim 10.</i> Under at least the apparent construction based on Masimo’s Infringement Contentions, SET discloses and/or renders obvious wherein the at least three LEDs comprises at least twelve LEDs. To the extent Masimo contends or the Court determines that SET does not expressly or inherently disclose this limitation, it would have been obvious to combine SET with one or more references charted for this limitation in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have been

	motivated to combine SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions.
Claim 14	Prior Art
14. The device of claim 10, wherein at least two LEDs of the at least three LEDs are configured for concurrent activation.	Under at least the apparent construction based on Masimo’s Infringement Contentions, and to the extent that the preamble is limiting, SET discloses and/or renders obvious the device of claim 10. <i>See, e.g., Claim 10.</i> Under at least the apparent construction based on Masimo’s Infringement Contentions, SET discloses and/or renders obvious wherein at least two LEDs of the at least three LEDs are configured for concurrent activation. To the extent Masimo contends or the Court determines that SET does not expressly or inherently disclose this limitation, it would have been obvious to combine SET with one or more references charted for this limitation in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions.
Claim 17	Prior Art
17. The device of claim 10, wherein the window provides an optical path from the tissue to the at least one detector.	Under at least the apparent construction based on Masimo’s Infringement Contentions, and to the extent that the preamble is limiting, SET discloses and/or renders obvious the device of claim 10. <i>See, e.g., Claim 10.</i> Under at least the apparent construction based on Masimo’s Infringement Contentions, SET discloses and/or renders obvious wherein the window provides an optical path from the tissue to the at least one detector. For example, SET discloses and/or suggests wherein the window of the Recessed Photo Detector housing provides an optical path from the tissue such as the tissue of the finger to the at least one detector: <i>See, e.g., Masimo Signal Extraction at 4:</i>

Masimo Signal Extraction Technology® begins with a new understanding of how motion affects the tissue and venous blood. Conventional pulse oximeters assume that arterial blood is the only blood moving (pulsating) in the measurement site. During patient motion, however, the venous blood also moves, which causes conventional pulse oximeters to under-read because they can not distinguish between the arterial and venous blood. Masimo SET signal processing identifies the venous blood signal, isolates it, and, using adaptive filters, cancels it. It then reports the true arterial oxygen saturation.

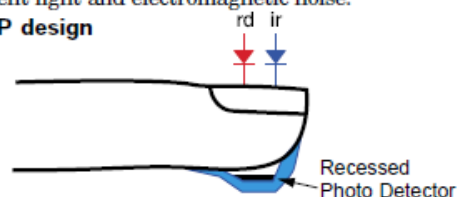
Masimo SET consists of a breakthrough Discrete Saturation Transform™ algorithm and a revolutionary Low Noise Optical Probe™ sensor design.

Masimo Signal Extraction at 5:

Low Noise Optical Probe (LNOP*)

The LNOP sensors are uniquely designed to assume that noise, both physiological and non-physiological, will be present. Unlike conventional pulse oximetry sensor design, the photodetector is recessed in a cavity to minimize optical path length changes during motion. The cavity is covered by a conformable adhesive that allows the fleshy part of the digit to move in and out of the cavity during motion, similar to shock absorbers in automobiles. In comparison, conventional sensors place the photodetector directly on the tissue. The LNOP design also minimizes the effects of venous blood movement at the monitored site due to motion. Another advantage of the recessed photodetector and the overall shielded design is that it is better protected from ambient light and electromagnetic noise.

LNOP design



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	motivated to combine SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions.
Claim 19	Prior Art
19[pre] A method for determining a physiological parameter of a living patient, the method comprising:	Under at least the apparent construction based on Masimo’s Infringement Contentions, and to the extent that the preamble is limiting, SET discloses and/or renders obvious a method for determining a physiological parameter of a living patient. For example, SET discloses and/or suggests a physiological monitoring device comprising a Masimo SET sensor, such as an LNOP or NR sensor, and a Radical display module, that determines a physiological parameter of a living patient such as blood oxygen: <i>See, e.g., LNOP & NR at 1:</i>

LNOP® & NR

SpO₂ adhesive & reusable sensors



We've got you covered from head to toe.

In the OR, NICU, transport, sleep lab, or other critical areas of the hospital, Masimo offers the adhesive and reusable sensors you desire, and the pulse oximetry performance you need. Masimo SET[®] LNOP[®] and NR[®] sensors continuously and non-invasively monitor arterial oxygen saturation (SpO₂) and pulse rate. They are designed to be used with the Masimo SET pulse oximetry system, the only system clinically proven to work during motion and low perfusion. Masimo sensors are intended for adult, pediatric or neonatal patient applications. Masimo SET - offering the best performing pulse oximetry system for your hospital.

See, e.g., LNOP & NR at 2:

Masimo SET signal extraction pulse oximetry™

The signal integrity of Masimo LNOP sensors and the advanced signal processing of Masimo SET combine to provide accurate and reliable tracking of the patient's true physiology, even during motion and low perfusion.

Masimo SET insignia ensures quality, high-performance and Masimo SET compatibility.



Signal IQ™ quality indicator let's the clinician know the integrity of the data from the monitoring site.

Durable material resists moisture and tears, thereby prolonging sensor life.

Reusable patient cables come in a variety of lengths and configurations to suit your needs.

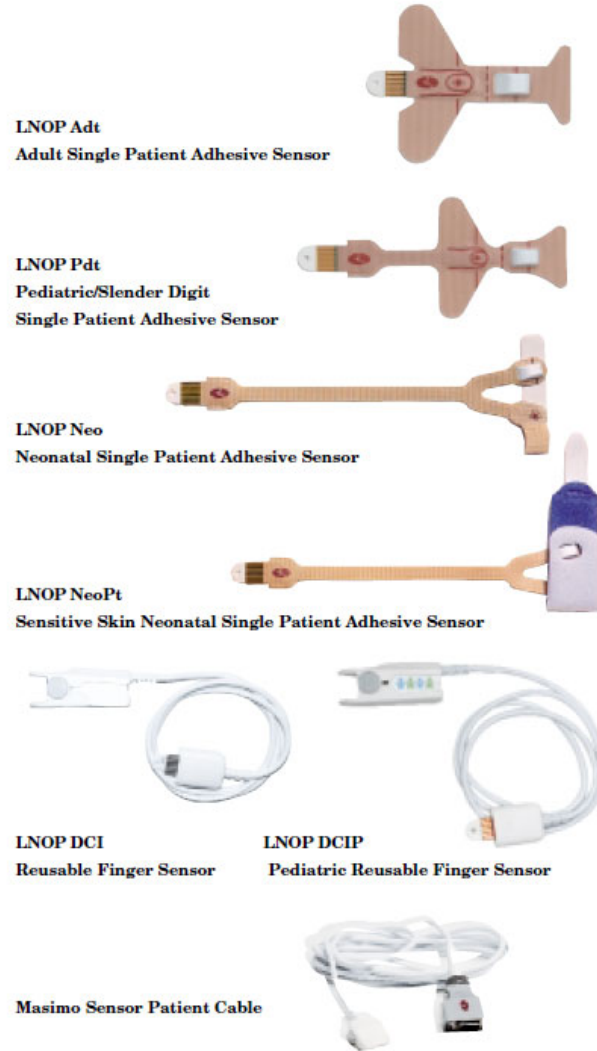
Masimo SET Radical with LNOP Adt Long Adhesive Sensor

Masimo Signal Extraction at 4:

Masimo Signal Extraction Technology® begins with a new understanding of how motion affects the tissue and venous blood. Conventional pulse oximeters assume that arterial blood is the only blood moving (pulsating) in the measurement site. During patient motion, however, the venous blood also moves, which causes conventional pulse oximeters to under-read because they can not distinguish between the arterial and venous blood. Masimo SET signal processing identifies the venous blood signal, isolates it, and, using adaptive filters, cancels it. It then reports the true arterial oxygen saturation.

Masimo SET consists of a breakthrough Discrete Saturation Transform™ algorithm and a revolutionary Low Noise Optical Probe™ sensor design.

Masimo Signal Extraction at 6:



Masimo Signal Extraction at 7:

Radical™ signal extraction™ pulse oximeter

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Technology Bulletin 1 at 1:

	Masimo SET® pulse oximetry is a new and fundamentally distinct method of acquiring, processing and reporting arterial oxygen saturation and pulse rate. As illustrated below, Masimo SET technology enables the power of adaptive filters to be applied to real-time physiologic monitoring by utilizing proprietary techniques to accurately establish a “noise reference” in the detected physiologic signal, thus enabling the direct calculation of arterial oxygen saturation and pulse rate. Because it is not bound by a conventional “red over infrared” ratio approach, the Masimo SET system substantially eliminates the problems of motion artifact, low peripheral perfusion and most low signal-to-noise situations. This greatly extends the utility of SpO₂ in high motion, low signal and noise intensive environments. The superior performance of Masimo SET pulse oximetry has been clinically validated. The table below summarizes the results of one such study.
	To the extent Masimo contends or the Court determines that SET does not expressly or inherently disclose this limitation, it would have been obvious to combine SET with one or more references charted for this limitation in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions.
19[a] positioning a sensor with respect to body tissue of a living patient, the sensor comprising at least three LEDs, at least one detector, and a light block at least partially surrounding the at	Under at least the apparent construction based on Masimo’s Infringement Contentions, SET discloses and/or renders obvious positioning a sensor with respect to body tissue of a living patient, the sensor comprising at least three LEDs, at least one detector, and a light block at least partially surrounding the at least one detector, wherein a top of the light block comprises only one opening through which light is configured to pass. For example, SET discloses and/or suggests positioning a SET pulse oximetry sensor with respect to body tissue of a living patient, such as the body tissue of a patient’s finger, the sensor comprising at two LEDs, a detector, and a light block comprising a Recessed Photo Detector housing at least partially surrounding the at least one detector, wherein a top of the light block Recessed Photo Detector housing comprises only one opening through which light is configured to pass to the detector:

least one detector,
wherein a top of the
light block
comprises only one
opening through
which light is
configured to pass;

See, e.g., LNOP & NR at 1:

LNOP® & NR

SpO₂ adhesive & reusable sensors



**We've got you
covered from
head to toe.**

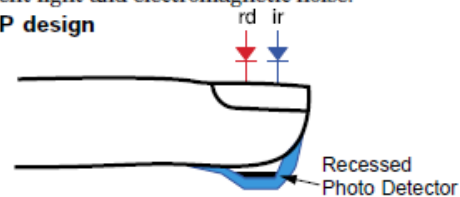
In the OR, NICU, transport, sleep lab, or other critical areas of the hospital, Masimo offers the adhesive and reusable sensors you desire, and the pulse oximetry performance you need. Masimo SET® LNOP® and NR® sensors continuously and non-invasively monitor arterial oxygen saturation (SpO₂) and pulse rate. They are designed to be used with the Masimo SET pulse oximetry system, the only system clinically proven to work during motion and low perfusion. Masimo sensors are intended for adult, pediatric or neonatal patient applications. Masimo SET - offering the best performing pulse oximetry system for your hospital.

Masimo Signal Extraction at 5:

Low Noise Optical Probe (LNOP®)

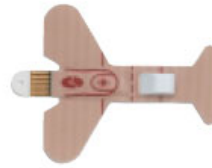
The LNOP sensors are uniquely designed to assume that noise, both physiological and non-physiological, will be present. Unlike conventional pulse oximetry sensor design, the photodetector is recessed in a cavity to minimize optical path length changes during motion. The cavity is covered by a conformable adhesive that allows the fleshy part of the digit to move in and out of the cavity during motion, similar to shock absorbers in automobiles. In comparison, conventional sensors place the photodetector directly on the tissue. The LNOP design also minimizes the effects of venous blood movement at the monitored site due to motion. Another advantage of the recessed photodetector and the overall shielded design is that it is better protected from ambient light and electromagnetic noise.

LNOP design



Masimo Signal Extraction at 6:

LNOP Adt
Adult Single Patient Adhesive Sensor



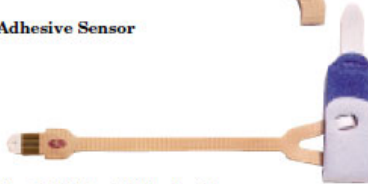
LNOP Pdt
Pediatric/Slender Digit
Single Patient Adhesive Sensor



LNOP Neo
Neonatal Single Patient Adhesive Sensor



LNOP NeoPt
Sensitive Skin Neonatal Single Patient Adhesive Sensor



LNOP DCI
Reusable Finger Sensor



LNOP DCIP
Pediatric Reusable Finger Sensor



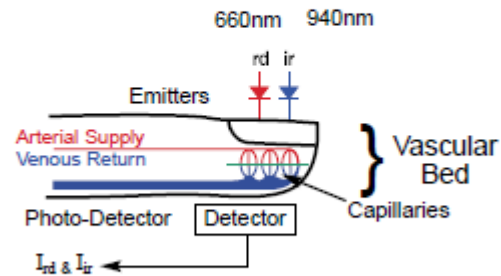
Masimo Sensor Patient Cable



Technology Bulletin 1 at 3:

Conventional Pulse Oximetry

The conventional "red over infrared" approach measures the differential optical density of red (I_{rd}) and infrared (I_{ir}) light as projected through a vascular bed and calculates a ratio (r) of the optical densities. Utilizing the optical density ratio, an arterial oxygen saturation (SpO_2) value is empirically reported based on the ratio obtained.



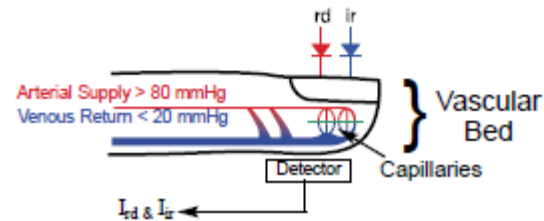
Basis For Measurement:

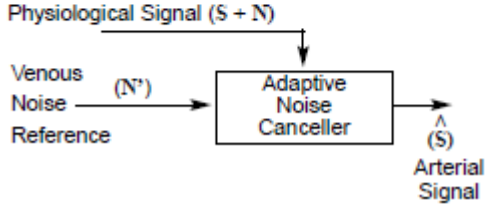
$$\frac{I_{rd}}{I_{ir}} = \frac{S_{rd} + N_{rd}}{S_{ir} + N_{ir}} = \text{Ratio } (r) \rightarrow \% SpO_2$$

Technology Bulletin 1 at 3:

Masimo SET® Pulse Oximetry

Masimo Signal Extraction Technology rejects the conventional wisdom and begins with an understanding that during patient motion the venous blood, being at a relatively low pressure, is quite susceptible to the local effects of perturbation during motion. Considering the finger for example, the venous blood in the vascular bed will be easily deformed during motion, representing a significant source of in-band noise within the frequency bandwidth of interest. In addition, the venous blood is a strong absorber of light. Hence, it can represent a significant contributor to the total optical density during motion episodes. Furthermore, the venous blood saturation is normally lower than the arterial blood saturation. This explains why saturation values tend to drop in conventional pulse oximeter systems during episodes of patient motion.

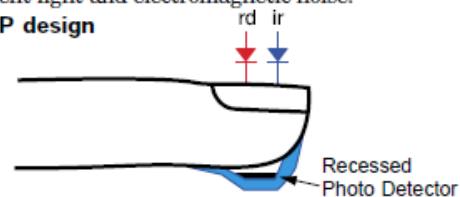


	During routine patient motions (shivering, waving, tapping, etc.), the resulting noise can be quite substantial and can easily overwhelm a conventional ratio based oximetry system. Having identified the venous blood as a significant contributor to noise during motion, it follows that if the noise reference corresponding to the venous component could be measured, then an adaptive noise canceller might be utilized to cancel its contribution.  To the extent Masimo contends or the Court determines that SET does not expressly or inherently disclose this limitation, it would have been obvious to combine SET with one or more references charted for this limitation in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine SET with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining SET with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions.
19[b] activating the at least three LEDs such that at least three wavelengths of light are emitted from the at least three LEDs;	Under at least the apparent construction based on Masimo's Infringement Contentions, SET discloses and/or renders obvious activating the at least three LEDs such that at least three wavelengths of light are emitted from the at least three LEDs. For example, SET discloses and/or suggests activating the two LEDs such that at least two wavelengths of light are emitted from the two LEDs, such as the wavelengths of light corresponding to red and IR: <i>See, e.g., Masimo Signal Extraction at 5:</i>

Low Noise Optical Probe (LNOP*)

The LNOP sensors are uniquely designed to assume that noise, both physiological and non-physiological, will be present. Unlike conventional pulse oximetry sensor design, the photodetector is recessed in a cavity to minimize optical path length changes during motion. The cavity is covered by a conformable adhesive that allows the fleshy part of the digit to move in and out of the cavity during motion, similar to shock absorbers in automobiles. In comparison, conventional sensors place the photodetector directly on the tissue. The LNOP design also minimizes the effects of venous blood movement at the monitored site due to motion. Another advantage of the recessed photodetector and the overall shielded design is that it is better protected from ambient light and electromagnetic noise.

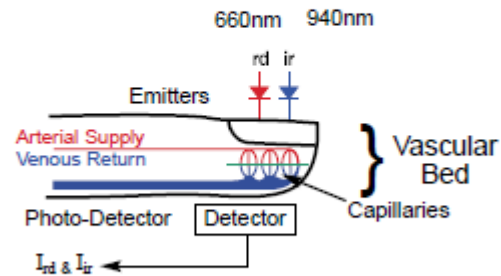
LNOP design



Technology Bulletin 1 at 3:

Conventional Pulse Oximetry

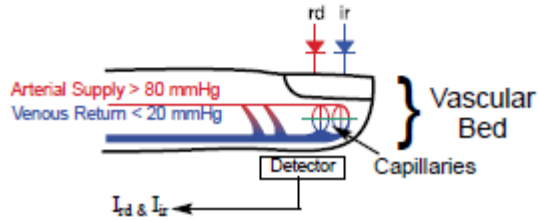
The conventional "red over infrared" approach measures the differential optical density of red (I_{rd}) and infrared (I_{ir}) light as projected through a vascular bed and calculates a ratio (r) of the optical densities. Utilizing the optical density ratio, an arterial oxygen saturation (SpO_2) value is empirically reported based on the ratio obtained.



Basis For Measurement:

$$\frac{I_{rd}}{I_{ir}} = \frac{S_{rd} + N_{rd}}{S_{ir} + N_{ir}} = \text{Ratio } (r) \rightarrow \% SpO_2$$

Technology Bulletin 1 at 3:

	Masimo SET® Pulse Oximetry Masimo Signal Extraction Technology rejects the conventional wisdom and begins with an understanding that during patient motion the venous blood, being at a relatively low pressure, is quite susceptible to the local effects of perturbation during motion. Considering the finger for example, the venous blood in the vascular bed will be easily deformed during motion, representing a significant source of in-band noise within the frequency bandwidth of interest. In addition, the venous blood is a strong absorber of light. Hence, it can represent a significant contributor to the total optical density during motion episodes. Furthermore, the venous blood saturation is normally lower than the arterial blood saturation. This explains why saturation values tend to drop in conventional pulse oximeter systems during episodes of patient motion.  To the extent Masimo contends or the Court determines that SET does not expressly or inherently disclose this limitation, it would have been obvious to combine SET with one or more references charted for this limitation in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine SET with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining SET with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions.
19[c] detecting, at the at least one detector, at least a portion of the light	Under at least the apparent construction based on Masimo's Infringement Contentions, SET discloses and/or renders obvious detecting, at the at least one detector, at least a portion of the light emitted from the at least three LEDs after at least a portion of the light has been attenuated by the body tissue and passed through the

emitted from the at least three LEDs after at least a portion of the light has been attenuated by the body tissue and passed through the opening of the top of the light block, wherein the at least one detector outputs at least one signal responsive to the detected light; and	opening of the top of the light block, wherein the at least one detector outputs at least one signal responsive to the detected light. For example, SET discloses and/or suggests where the SET pulse oximeter sensor has a detector configured to detect at least a portion of the light emitted from the two LEDs after at least a portion of the light has been attenuated by tissue, such as the tissue of a patient's finger, and the at least one detector configured to output at least signal responsive to the detected light, such as a detected physiologic signal, and where there is a light block surrounding the at least one detector, implemented as a Low Noise Optical Probe with a Recessed Photo Detector, the light block comprising a shoebox structure configured to recess the at least one detector into the shoebox structure of the Recessed Photo Detector structure, wherein a top of the shoebox structure includes only one opening through which light is configured to pass to the detector: <i>See, e.g., Masimo Signal Extraction at 4:</i>
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Masimo Signal Extraction Technology® begins with a new understanding of how motion affects the tissue and venous blood. Conventional pulse oximeters assume that arterial blood is the only blood moving (pulsating) in the measurement site. During patient motion, however, the venous blood also moves, which causes conventional pulse oximeters to under-read because they can not distinguish between the arterial and venous blood. Masimo SET signal processing identifies the venous blood signal, isolates it, and, using adaptive filters, cancels it. It then reports the true arterial oxygen saturation.

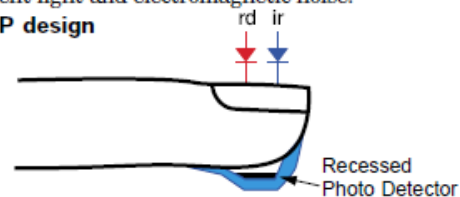
Masimo SET consists of a breakthrough Discrete Saturation Transform™ algorithm and a revolutionary Low Noise Optical Probe™ sensor design.

See, e.g., Masimo Signal Extraction at 5:

Low Noise Optical Probe (LNOP*)

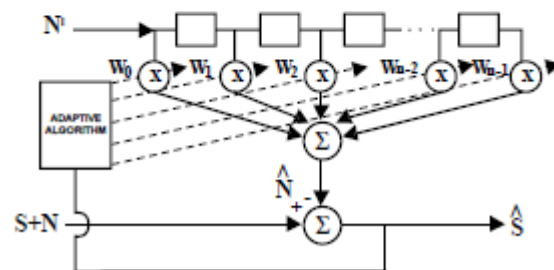
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LNOP design



Technology Bulletin 1 at 2:

The detected physiologic signal is generally composed of both desired signal (S) and undesired signal (N) or noise portions. To remove the effects of the undesired signal, some knowledge of the noise characteristics, or equivalently its noise reference (N'), must be known. The adaptive filter will adjust its filtering characteristics, so that the noise reference input is transformed into an estimate of the undesired signal portion ($\hat{N}$) of the physiologic signal. A subtracter subsequently removes the undesired signal from the physiologic signal to yield an estimate of the desired signal portion ($\hat{S}$). The combination comprising the adaptive filter and the subtracter is commonly called an adaptive noise canceller (ANC).

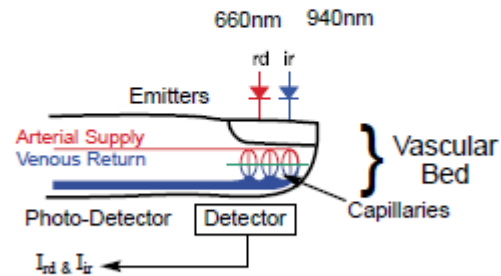


Adaptive Noise Canceller (ANC) block diagram

Technology Bulletin 1 at 3:

Conventional Pulse Oximetry

The conventional "red over infrared" approach measures the differential optical density of red (I_{rd}) and infrared (I_{ir}) light as projected through a vascular bed and calculates a ratio (r) of the optical densities. Utilizing the optical density ratio, an arterial oxygen saturation (SpO_2) value is empirically reported based on the ratio obtained.



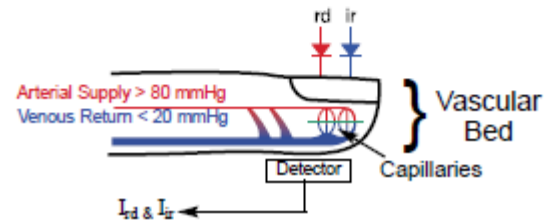
Basis For Measurement:

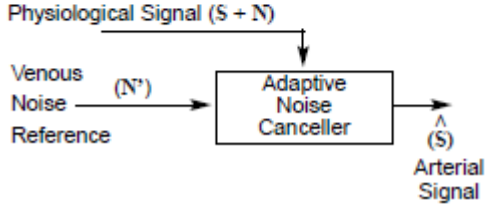
$$\frac{I_{rd}}{I_{ir}} = \frac{S_{rd} + N_{rd}}{S_{ir} + N_{ir}} = \text{Ratio } (r) \rightarrow \% SpO_2$$

Technology Bulletin 1 at 3:

Masimo SET® Pulse Oximetry

Masimo Signal Extraction Technology rejects the conventional wisdom and begins with an understanding that during patient motion the venous blood, being at a relatively low pressure, is quite susceptible to the local effects of perturbation during motion. Considering the finger for example, the venous blood in the vascular bed will be easily deformed during motion, representing a significant source of in-band noise within the frequency bandwidth of interest. In addition, the venous blood is a strong absorber of light. Hence, it can represent a significant contributor to the total optical density during motion episodes. Furthermore, the venous blood saturation is normally lower than the arterial blood saturation. This explains why saturation values tend to drop in conventional pulse oximeter systems during episodes of patient motion.



	During routine patient motions (shivering, waving, tapping, etc.), the resulting noise can be quite substantial and can easily overwhelm a conventional ratio based oximetry system. Having identified the venous blood as a significant contributor to noise during motion, it follows that if the noise reference corresponding to the venous component could be measured, then an adaptive noise canceller might be utilized to cancel its contribution.  To the extent Masimo contends or the Court determines that SET does not expressly or inherently disclose this limitation, it would have been obvious to combine SET with one or more references charted for this limitation in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine SET with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining SET with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions.
19[d] determining a physiological parameter of the living patient responsive to the outputted at least one signal.	Under at least the apparent construction based on Masimo's Infringement Contentions, SET discloses and/or renders obvious determining a physiological parameter of the living patient responsive to the outputted at least one signal. For example, SET discloses and/or suggests determining a physiological parameter of the living patient responsive to the outputted at least one signal, implemented for example by a Radical unit configured to receive and process one or more signals responsive to the outputted at least one signal and determine a physiological parameter of a user responsive to the one or more signals such as blood oxygen: <i>See, e.g., LNOP & NR at 2:</i>

Masimo SET[®] signal extraction pulse oximetry™

The signal integrity of Masimo LNOP sensors and the advanced signal processing of Masimo SET combine to provide accurate and reliable tracking of the patient's true physiology, even during motion and low perfusion.

Masimo SET insignia ensures quality, high-performance and Masimo SET compatibility.



Signal IQ™ quality indicator lets the clinician know the integrity of the data from the monitoring site.

Durable material resists moisture and tears, thereby prolonging sensor life.

Reusable patient cables come in a variety of lengths and configurations to suit your needs.

Masimo SET Radical with LNOP Adt Long Adhesive Sensor

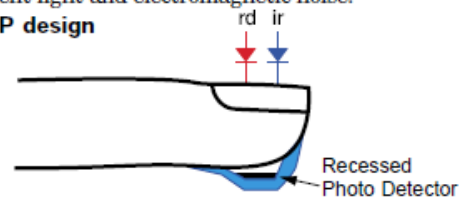
Masimo Signal Extraction at 4:

	Masimo Signal Extraction Technology® begins with a new understanding of how motion affects the tissue and venous blood. Conventional pulse oximeters assume that arterial blood is the only blood moving (pulsating) in the measurement site. During patient motion, however, the venous blood also moves, which causes conventional pulse oximeters to under-read because they can not distinguish between the arterial and venous blood. Masimo SET signal processing identifies the venous blood signal, isolates it, and, using adaptive filters, cancels it. It then reports the true arterial oxygen saturation. Masimo SET consists of a breakthrough Discrete Saturation Transform™ algorithm and a revolutionary Low Noise Optical Probe™ sensor design. Masimo Signal Extraction at 5:
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Low Noise Optical Probe (LNOP*)

The LNOP sensors are uniquely designed to assume that noise, both physiological and non-physiological, will be present. Unlike conventional pulse oximetry sensor design, the photodetector is recessed in a cavity to minimize optical path length changes during motion. The cavity is covered by a conformable adhesive that allows the fleshy part of the digit to move in and out of the cavity during motion, similar to shock absorbers in automobiles. In comparison, conventional sensors place the photodetector directly on the tissue. The LNOP design also minimizes the effects of venous blood movement at the monitored site due to motion. Another advantage of the recessed photodetector and the overall shielded design is that it is better protected from ambient light and electromagnetic noise.

LNOP design



Masimo Signal Extraction at 7:

Radical™ signal extraction™ pulse oximeter

Radical as a Standalone Pulse Oximeter

Radical's lightweight and rugged design, provides continuous and reliable arterial oxygen saturation monitoring anywhere throughout the continuum of care: in the ER, OR, ICU and recovery room, in any specialty clinic, the general floor and home.

Radical as a Handheld Pulse Oximeter

The Handheld pulse oximeter easily detaches from the standalone unit as a full-featured Handheld pulse oximeter to travel with the patient during hospital transport providing continuous, seamless Masimo SET performance.

Radical with SatShare™ as an Upgrade to Your Existing Validated* Monitor

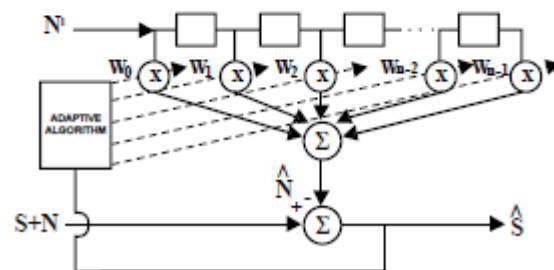
Radical with SatShare interface upgrades existing monitors to Masimo SET pulse oximetry. This unique upgrade capability gives clinicians a quick, easy and affordable way to upgrade their existing conventional pulse oximeters to Masimo SET performance.



Technology Bulletin 1 at 1:

	Masimo SET® pulse oximetry is a new and fundamentally distinct method of acquiring, processing and reporting arterial oxygen saturation and pulse rate. As illustrated below, Masimo SET technology enables the power of adaptive filters to be applied to real-time physiologic monitoring by utilizing proprietary techniques to accurately establish a “noise reference” in the detected physiologic signal, thus enabling the direct calculation of arterial oxygen saturation and pulse rate. Because it is not bound by a conventional “red over infrared” ratio approach, the Masimo SET system substantially eliminates the problems of motion artifact, low peripheral perfusion and most low signal-to-noise situations. This greatly extends the utility of SpO₂ in high motion, low signal and noise intensive environments. The superior performance of Masimo SET pulse oximetry has been clinically validated. The table below summarizes the results of one such study. Technology Bulletin 1 at 2:	
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The detected physiologic signal is generally composed of both desired signal (S) and undesired signal (N) or noise portions. To remove the effects of the undesired signal, some knowledge of the noise characteristics, or equivalently its noise reference (N'), must be known. The adaptive filter will adjust its filtering characteristics, so that the noise reference input is transformed into an estimate of the undesired signal portion ($\hat{N}$) of the physiologic signal. A subtracter subsequently removes the undesired signal from the physiologic signal to yield an estimate of the desired signal portion ($\hat{S}$). The combination comprising the adaptive filter and the subtracter is commonly called an adaptive noise canceller (ANC).

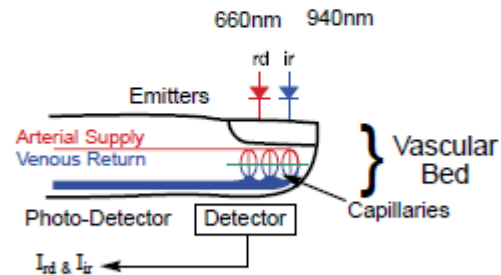


Adaptive Noise Canceller (ANC) block diagram

Technology Bulletin 1 at 3:

Conventional Pulse Oximetry

The conventional "red over infrared" approach measures the differential optical density of red (I_{rd}) and infrared (I_{ir}) light as projected through a vascular bed and calculates a ratio (r) of the optical densities. Utilizing the optical density ratio, an arterial oxygen saturation (SpO_2) value is empirically reported based on the ratio obtained.



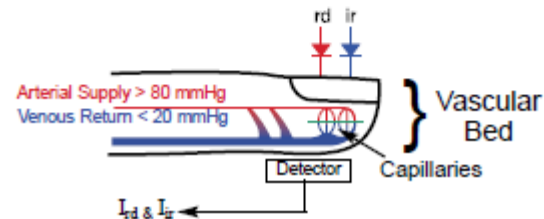
Basis For Measurement:

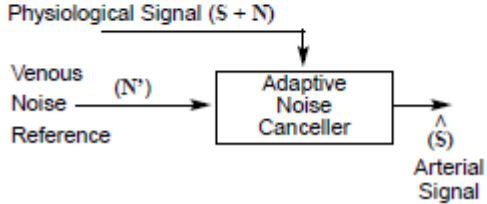
$$\frac{I_{rd}}{I_{ir}} = \frac{S_{rd} + N_{rd}}{S_{ir} + N_{ir}} = \text{Ratio } (r) \rightarrow \% SpO_2$$

Technology Bulletin 1 at 3:

Masimo SET® Pulse Oximetry

Masimo Signal Extraction Technology rejects the conventional wisdom and begins with an understanding that during patient motion the venous blood, being at a relatively low pressure, is quite susceptible to the local effects of perturbation during motion. Considering the finger for example, the venous blood in the vascular bed will be easily deformed during motion, representing a significant source of in-band noise within the frequency bandwidth of interest. In addition, the venous blood is a strong absorber of light. Hence, it can represent a significant contributor to the total optical density during motion episodes. Furthermore, the venous blood saturation is normally lower than the arterial blood saturation. This explains why saturation values tend to drop in conventional pulse oximeter systems during episodes of patient motion.



	During routine patient motions (shivering, waving, tapping, etc.), the resulting noise can be quite substantial and can easily overwhelm a conventional ratio based oximetry system. Having identified the venous blood as a significant contributor to noise during motion, it follows that if the noise reference corresponding to the venous component could be measured, then an adaptive noise canceller might be utilized to cancel its contribution.  To the extent Masimo contends or the Court determines that SET does not expressly or inherently disclose this limitation, it would have been obvious to combine SET with one or more references charted for this limitation in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine SET with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining SET with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions.
Claim 20 20. The method of claim 19, wherein an area of the opening is smaller than a detection surface area of the at least one detector.	Prior Art Under at least the apparent construction based on Masimo's Infringement Contentions, and to the extent that the preamble is limiting, SET discloses and/or renders obvious the method of claim 19. <i>See, e.g., Claim 19.</i> Under at least the apparent construction based on Masimo's Infringement Contentions, SET discloses and/or renders obvious wherein an area of the opening is smaller than a detection surface area of the at least one detector. To the extent Masimo contends or the Court determines that SET does not expressly or inherently disclose this limitation, it would have been obvious to combine SET with one or more references charted for this

	limitation in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions.
Claim 21	Prior Art
21. The method of claim 19, wherein the light block is formed of black materials and further comprises a base, side walls, and a top forming an enclosure, and wherein the at least one detector is positioned in the enclosure.	Under at least the apparent construction based on Masimo’s Infringement Contentions, and to the extent that the preamble is limiting, SET discloses and/or renders obvious the method of claim 19. <i>See, e.g., Claim 19.</i> Under at least the apparent construction based on Masimo’s Infringement Contentions, SET discloses and/or renders obvious wherein the light block is formed of black materials and further comprises a base, side walls, and a top forming an enclosure, and wherein the at least one detector is positioned in the enclosure. For example, SET discloses and/or suggests where the light block surrounding the at least one detector, implemented as a Low Noise Optical Probe with a Recessed Photo Detector housing comprises a base, side walls, and a top forming an enclosure for the detector, and wherein the at least one detector is positioned in the enclosure: <i>See, e.g., Masimo Signal Extraction at 4:</i>

Masimo Signal Extraction Technology® begins with a new understanding of how motion affects the tissue and venous blood. Conventional pulse oximeters assume that arterial blood is the only blood moving (pulsating) in the measurement site. During patient motion, however, the venous blood also moves, which causes conventional pulse oximeters to under-read because they can not distinguish between the arterial and venous blood. Masimo SET signal processing identifies the venous blood signal, isolates it, and, using adaptive filters, cancels it. It then reports the true arterial oxygen saturation.

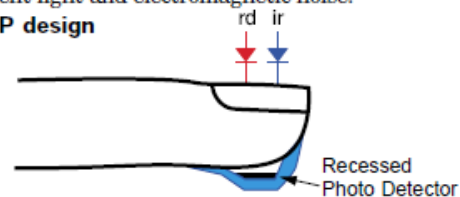
Masimo SET consists of a breakthrough Discrete Saturation Transform™ algorithm and a revolutionary Low Noise Optical Probe™ sensor design.

Masimo Signal Extraction at 5:

Low Noise Optical Probe (LNOP*)

The LNOP sensors are uniquely designed to assume that noise, both physiological and non-physiological, will be present. Unlike conventional pulse oximetry sensor design, the photodetector is recessed in a cavity to minimize optical path length changes during motion. The cavity is covered by a conformable adhesive that allows the fleshy part of the digit to move in and out of the cavity during motion, similar to shock absorbers in automobiles. In comparison, conventional sensors place the photodetector directly on the tissue. The LNOP design also minimizes the effects of venous blood movement at the monitored site due to motion. Another advantage of the recessed photodetector and the overall shielded design is that it is better protected from ambient light and electromagnetic noise.

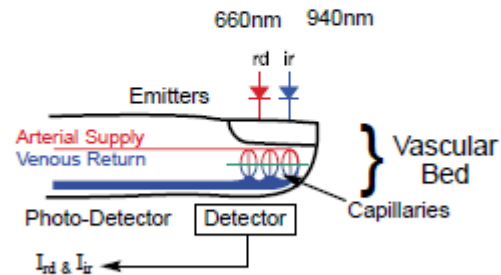
LNOP design



Technology Bulletin 1 at 3:

Conventional Pulse Oximetry

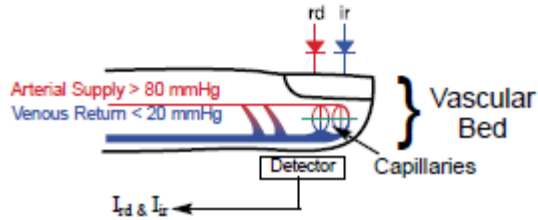
The conventional "red over infrared" approach measures the differential optical density of red (I_{rd}) and infrared (I_{ir}) light as projected through a vascular bed and calculates a ratio (r) of the optical densities. Utilizing the optical density ratio, an arterial oxygen saturation (SpO_2) value is empirically reported based on the ratio obtained.



Basis For Measurement:

$$\frac{I_{rd}}{I_{ir}} = \frac{S_{rd} + N_{rd}}{S_{ir} + N_{ir}} = \text{Ratio } (r) \rightarrow \% SpO_2$$

Technology Bulletin 1 at 3:

	Masimo SET® Pulse Oximetry Masimo Signal Extraction Technology rejects the conventional wisdom and begins with an understanding that during patient motion the venous blood, being at a relatively low pressure, is quite susceptible to the local effects of perturbation during motion. Considering the finger for example, the venous blood in the vascular bed will be easily deformed during motion, representing a significant source of in-band noise within the frequency bandwidth of interest. In addition, the venous blood is a strong absorber of light. Hence, it can represent a significant contributor to the total optical density during motion episodes. Furthermore, the venous blood saturation is normally lower than the arterial blood saturation. This explains why saturation values tend to drop in conventional pulse oximeter systems during episodes of patient motion.  The diagram illustrates a cross-section of a finger. A red arrow labeled 'rd' and a blue arrow labeled 'lr' point towards the finger. Inside the finger, a red line represents 'Arterial Supply > 80 mmHg' and a blue line represents 'Venous Return < 20 mmHg'. A bracket on the right side of the finger is labeled 'Vascular Bed'. Below the vascular bed, a box labeled 'Detector' is shown. Arrows labeled 'Ird & Iir' point away from the detector. To the extent Masimo contends or the Court determines that SET does not expressly or inherently disclose this limitation, it would have been obvious to combine SET with one or more references charted for this limitation in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions.
Claim 22	Prior Art
22. The method of claim 19, wherein said activating the at least three LEDs	Under at least the apparent construction based on Masimo’s Infringement Contentions, and to the extent that the preamble is limiting, SET discloses and/or renders obvious the method of claim 19. <i>See, e.g., Claim 1.</i>

comprises concurrently activating at least two LEDs of the at least three LEDs.	Under at least the apparent construction based on Masimo’s Infringement Contentions, SET discloses and/or renders obvious wherein said activating the at least three LEDs comprises concurrently activating at least two LEDs of the at least three LEDs. To the extent Masimo contends or the Court determines that SET does not expressly or inherently disclose this limitation, it would have been obvious to combine SET with one or more references charted for this limitation in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions.
Claim 23	Prior Art
23. The method of claim 19, wherein the at least three LEDs comprises at least eight LEDs.	Under at least the apparent construction based on Masimo’s Infringement Contentions, and to the extent that the preamble is limiting, SET discloses and/or renders obvious the method of claim 19. <i>See, e.g., Claim 19.</i> Under at least the apparent construction based on Masimo’s Infringement Contentions, SET discloses and/or renders obvious wherein the at least three LEDs comprises at least eight LEDs. To the extent Masimo contends or the Court determines that SET does not expressly or inherently disclose this limitation, it would have been obvious to combine SET with one or more references charted for this limitation in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions.
Claim 24	Prior Art
24. The method of claim 23, wherein the at least eight LEDs comprises at	Under at least the apparent construction based on Masimo’s Infringement Contentions, and to the extent that the preamble is limiting, SET discloses and/or renders obvious the method of claim 23. <i>See, e.g., Claim 23.</i>

least two LEDs of the same wavelength.	Under at least the apparent construction based on Masimo’s Infringement Contentions, SET discloses and/or renders obvious wherein the at least eight LEDs comprises at least two LEDs of the same wavelength. To the extent Masimo contends or the Court determines that SET does not expressly or inherently disclose this limitation, it would have been obvious to combine SET with one or more references charted for this limitation in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions.
Claim 25	Prior Art
25. The method of claim 19, wherein the at least three LEDs comprises at least twelve LEDs.	Under at least the apparent construction based on Masimo’s Infringement Contentions, and to the extent that the preamble is limiting, SET discloses and/or renders obvious the method of claim 19. <i>See, e.g., Claim 19.</i> Under at least the apparent construction based on Masimo’s Infringement Contentions, SET discloses and/or renders obvious wherein the at least three LEDs comprises at least twelve LEDs. To the extent Masimo contends or the Court determines that SET does not expressly or inherently disclose this limitation, it would have been obvious to combine SET with one or more references charted for this limitation in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining SET with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions.
Claim 28	Prior Art
28. The method of claim 19, wherein the at least a portion of the light passes through the opening	Under at least the apparent construction based on Masimo’s Infringement Contentions, and to the extent that the preamble is limiting, SET discloses and/or renders obvious the method of claim 19. <i>See, e.g., Claim 19.</i>

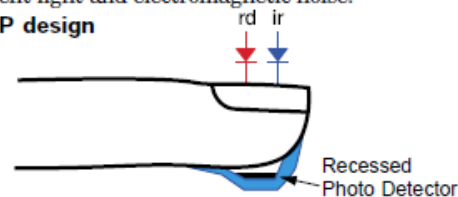
after it interacts with the body tissue.	Under at least the apparent construction based on Masimo’s Infringement Contentions, SET discloses and/or renders obvious wherein the at least a portion of the light passes through the opening after it interacts with the body tissue. For example, SET discloses and/or suggests wherein the at least a portion of the light passes through the opening of the Recessed Photo Detector housing after it interacts with the body tissue such as the tissue of the finger: <i>See, e.g., Masimo Signal Extraction at 4:</i>
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	Masimo Signal Extraction Technology® begins with a new understanding of how motion affects the tissue and venous blood. Conventional pulse oximeters assume that arterial blood is the only blood moving (pulsating) in the measurement site. During patient motion, however, the venous blood also moves, which causes conventional pulse oximeters to under-read because they can not distinguish between the arterial and venous blood. Masimo SET signal processing identifies the venous blood signal, isolates it, and, using adaptive filters, cancels it. It then reports the true arterial oxygen saturation. Masimo SET consists of a breakthrough Discrete Saturation Transform™ algorithm and a revolutionary Low Noise Optical Probe™ sensor design. Masimo Signal Extraction at 5:
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Low Noise Optical Probe (LNOP*)

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LNOP design



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	motivated to combine SET with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining SET with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions.
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