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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
62/569,667	10/09/2017		130	50333-PRO		

23589
Hovey Williams LLP
10801 Mastin Blvd., Suite 1000
Overland Park, KS 66210

CONFIRMATION NO. 3928
FILING RECEIPT



Date Mailed: 10/18/2017

Receipt is acknowledged of this provisional patent application. It will not be examined for patentability and will become abandoned not later than twelve months after its filing date. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Maurice Shelton, Buffalo, KS;
Michael Paulson, Lawrence, KS;
Mike Bietsch, Nevada, MO;

Applicant(s)

Kustom Signals, Inc., Lenexa, KS;

Power of Attorney:

Thomas Luebbing--37874

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 10/17/2017

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 62/569,667**

Projected Publication Date: None, application is not eligible for pre-grant publication

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

TRAFFIC RADAR SYSTEM WITH MULTIPLE ZONE TARGET DETECTION

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No**PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES**

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER**Title 35, United States Code, Section 184****Title 37, Code of Federal Regulations, 5.11 & 5.15****GRANTED**

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier

license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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Raptor RP-1

Traffic Safety Radar

OPERATOR'S MANUAL

13. DIRECTIONAL OPERATIONAL SUPPLEMENT

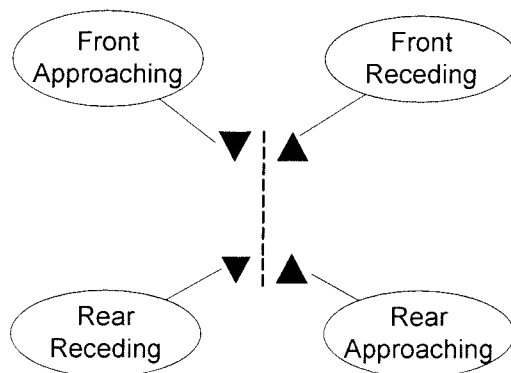
13.0 DIRECTIONAL OPERATION

The Raptor RP-1 uses state-of-the-art signal processing to determine the direction of travel of target vehicles. This additional information aids the officer in better target identification. This can be done by displaying the direction of travel with the motorist speed or by selecting the direction of vehicles to be displayed.

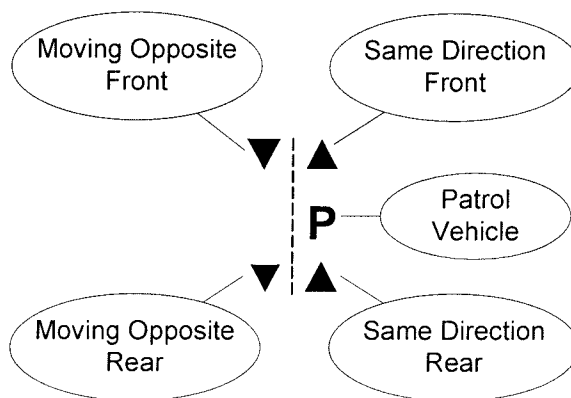
Definition of Terms:

STA ALL:	Stationary mode: Detects both approaching and receding vehicles. – “STA ALL” shown in the Patrol display area. The directional indicator above the Target display area will show the direction of target travel.
STA APR ONLY:	Stationary mode: Detects approaching vehicles only. – “STA APR ONLY” shown in the Patrol display area.
STA REC ONLY:	Stationary mode: Detects receding vehicles only. – “STA REC ONLY” shown in the Patrol display area.
Strongest Target:	Displays speed of strongest target vehicle signal regardless of speed.
Fastest Target:	Displays speed of fastest target vehicle, if this is not the strongest target signal.

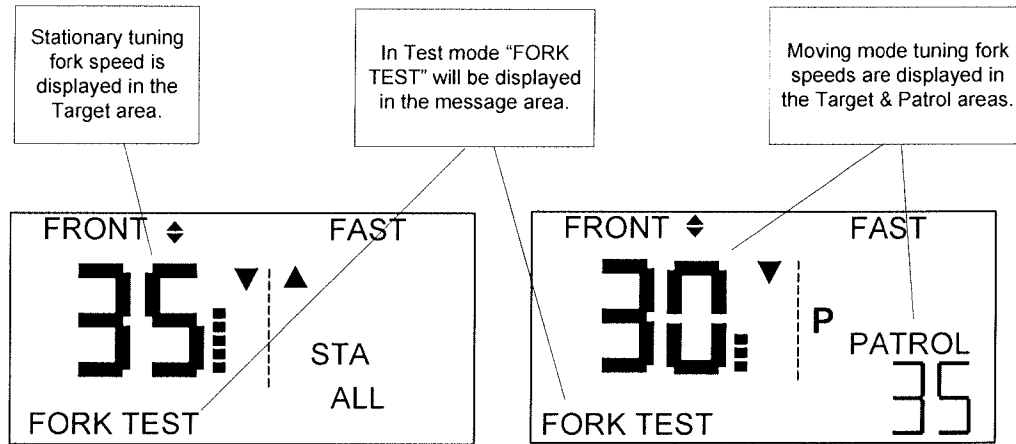
13.1 STATIONARY ROAD GRAPHIC



13.2 MOVING MODE ROAD GRAPHIC



13.3 TEST MODE

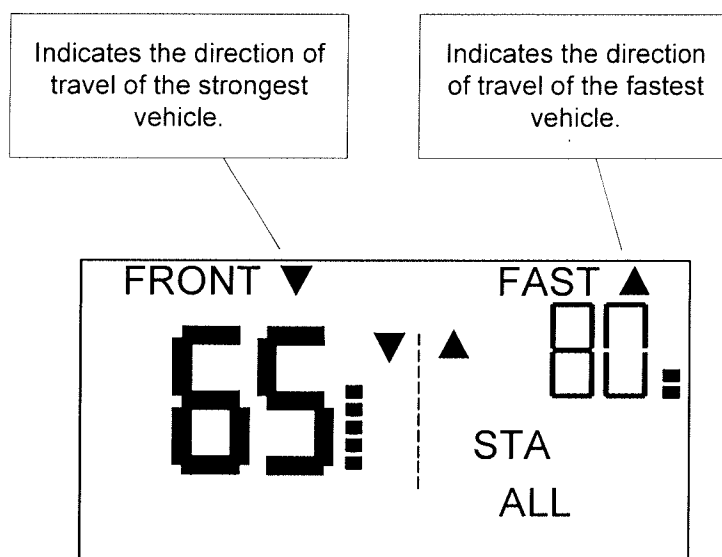


Pressing the Test (✓) switch places the radar in **TEST** mode, which is indicated by the "FORK TEST" displayed in the message area. While in test mode, the radar will display all speeds, both moving targets and non-moving targets such as tuning forks. The unit will remain in test mode for 30 seconds. Selecting a new mode, such as changing from stationary to moving, will refresh the timeout to 30 seconds allowing fork testing of all modes.

NOTE: Pressing the test button while in **TEST** mode will turn off **TEST** mode immediately.

13.4 STATIONARY OPERATION

13.4.1 STATIONARY ALL



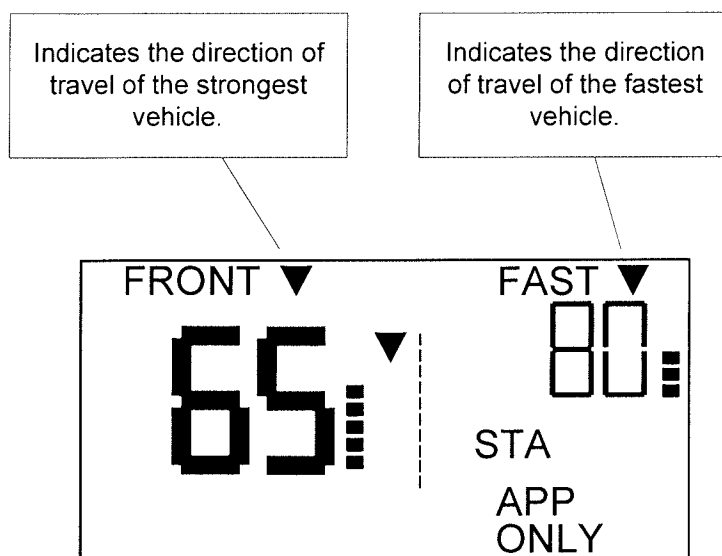
To monitor traffic in both directions (the Raptor RP-1 will automatically indicate which direction the strongest and fastest vehicles are traveling), repeatedly depress the MODE switch until “STA ALL” is displayed in the Patrol area.

When the radar is operated in the Stationary “ALL” mode, the roadway graphic will display both approaching and receding indicators. When a target is detected, the appropriate direction indicator (approaching or receding) will be displayed above the Target area.

If the “Fastest” function is activated, the appropriate fastest directional indicator (approaching or receding) will be displayed above the Fastest Target area.

The example shown is for an approaching 65 mph strongest vehicle and a receding 80 mph fastest vehicle.

13.4.2 STATIONARY APPROACHING ONLY



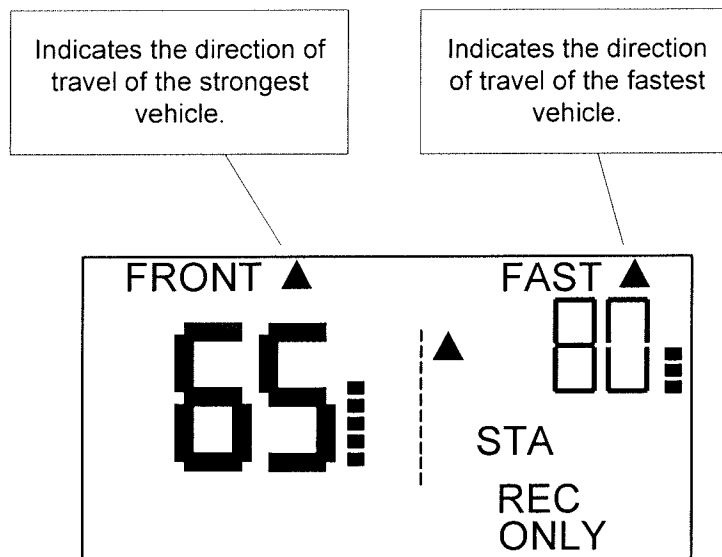
To activate the stationary, approaching targets only mode, repeatedly depress the MODE switch until “STA APR ONLY” appears in the Patrol area. All receding targets will be ignored in this mode.

When the radar is operated in the Stationary Approaching Only mode, the Target area will indicate the strongest approaching target speed. The road graphic indicator for approaching vehicles will be on.

If the “Fastest” function is activated, the Fastest Target area will display the fastest approaching target speed.

The example shown is for an approaching 65 mph strongest vehicle and an approaching 80 mph fastest vehicle.

13.4.3 STATIONARY RECEDING ONLY



To activate the stationary, receding targets only mode, repeatedly depress the MODE switch until “STA REC ONLY” appears in the Patrol area. All approaching targets will be ignored in this mode.

When the radar is operated in the Stationary Receding Only mode, the Target area will indicate the strongest receding target speed. The road graphic indicator for receding vehicles will be on.

If the “Fastest” function is activated, the Fastest Target area will display the fastest receding target speed.

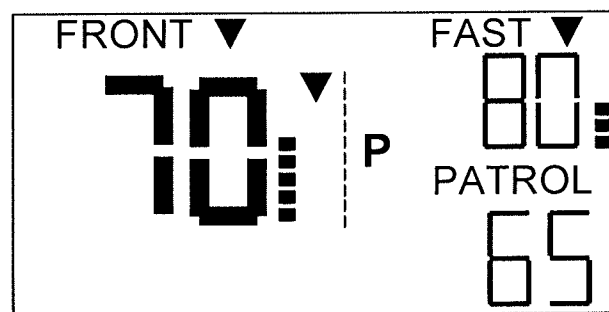
The example shown is for a receding 65 mph strongest vehicle and a receding 80 mph fastest vehicle.

13.5 MOVING MODE OPERATION

Patrol Speed:

In all moving mode operations, the PATROL window indicates the speed of the patrol vehicle and the patrol road graphic indicator will be lit.

13.5.1 MOVING OPPOSITE

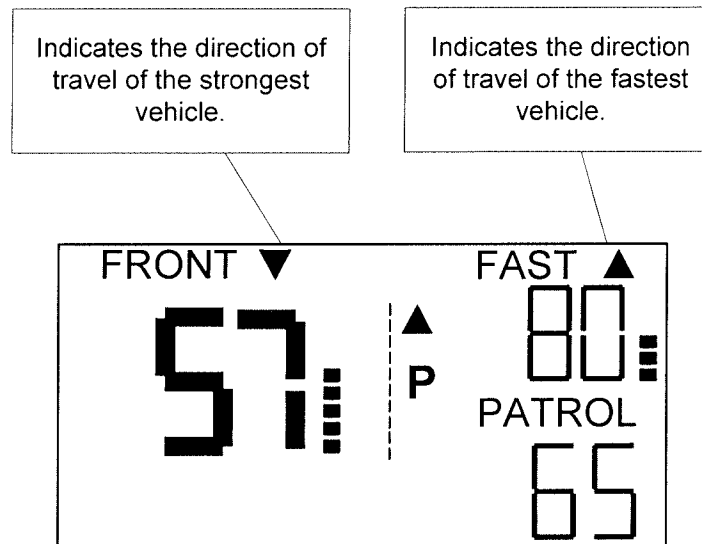


When operating the radar in Moving Opposite mode, the patrol vehicle and moving opposite road graphic will be on. The strongest vehicle speed will be displayed in the Target area.

If the “Fastest” function is activated, the Fastest Target area will display the fastest moving opposite target speed.

The example shown is for a patrol vehicle speed of 65 mph, a moving opposite 70 mph strongest vehicle, and a moving opposite 80 mph fastest vehicle.

13.5.2 MOVING SAME DIRECTION



When operating the radar in Same-Direction mode, the patrol vehicle and same direction road graphic indicators will be on. The strongest vehicle speed will be displayed in the Target speed area. When a target is detected, the appropriate direction indicator (approaching or receding) will be displayed above the Target area

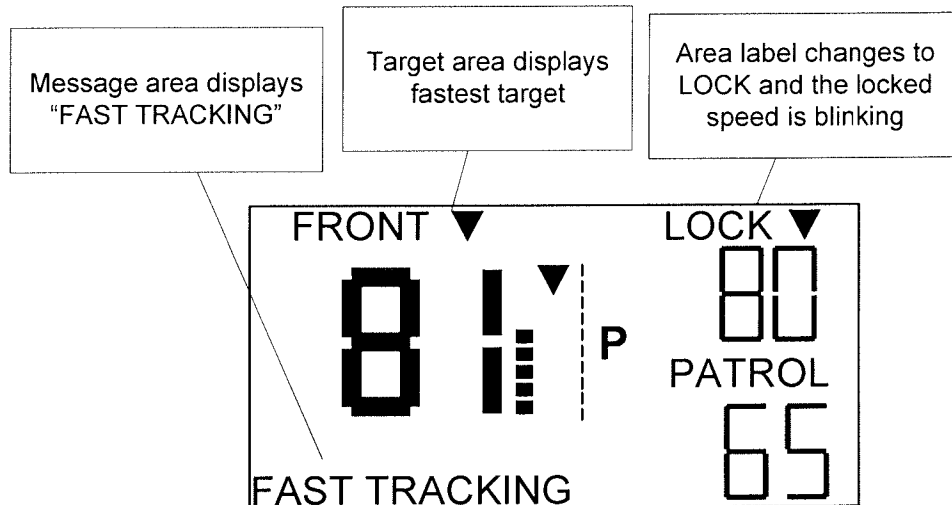
If the “Fastest” function is activated, the Fastest Target area will display the fastest moving same direction target speed. When a fastest target is detected, the appropriate fastest directional indicator (approaching or receding) will be displayed above the Fastest Target area

NOTE: The Raptor RP-1 does not require any input from the operator in Same Direction mode. The unit will automatically detect if the target vehicle is slower than the patrol vehicle and subtract the separation speed to always provide the operator the correct speed.

NOTE: In the Same-Direction Fastest Mode, the “fastest” target vehicle must be faster than the patrol vehicle by 3 MPH. **EXAMPLE 1:** Patrol vehicle = 65 MPH. Large target (strongest) = 43 MPH. Fastest vehicle = 56. In this event, no fastest speed would be displayed since the faster vehicle is **SLOWER** than the patrol vehicle.

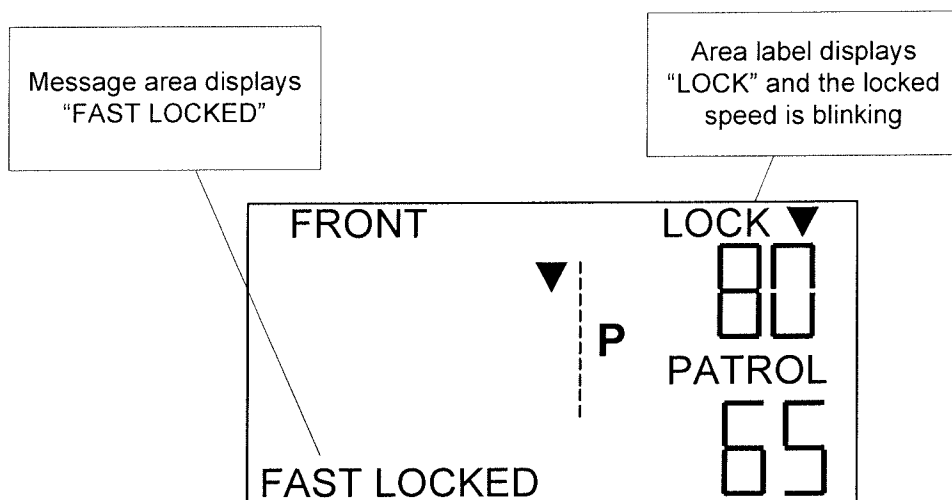
EXAMPLE 2: Patrol vehicle = 65. Large target = 43 MPH. Fastest vehicle = 78 MPH. The **PATROL** window will display 65, the **TARGET** window will display 43 and the **FAST** window will display 78.

13.6 FASTEST LOCKING



If the Lock button is pressed while tracking a fastest vehicle in any mode, the fastest speed will be locked and blinking in the Lock area, and fastest tracking will move to the Target area. The Message will display “FAST TRACKING” to alert the user the speed in the Target area is from the fastest target speed.

If there is no longer a vehicle to track after lock, the Message area will display “FAST LOCKED” to alert the user the current lock was made on a fastest target.



ASSIGNMENT

WHEREAS, We, Maurice Shelton, of Buffalo, KS, Mike Bietsch, of Nevada, MO, and Michael Paulson, of Lawrence, KS have invented certain new and useful improvements in a

TRAFFIC RADAR SYSTEM WITH MULTIPLE ZONE TARGET DETECTION

for which we are about to make application for U.S. Provisional Application; and

WHEREAS, Kustom Signals, Inc., a corporation duly organized under the laws of the State of Kansas and having its principal place of business at 9652 Loiret Boulevard, Lenexa KS 66219, is desirous of acquiring all interests in, to and under said invention, said application and any and all Letters Patent which may be granted for or upon said invention in the United States of America and all countries foreign thereto.

NOW, THEREFORE, to all whom it may concern be it known that for good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, we, Maurice Shelton, of Buffalo, KS, Mike Bietsch, of Nevada, MO, and Michael Paulson, of Lawrence, KS , as inventor(s), have sold, assigned and transferred, and by these presents do sell, assign and transfer unto said Kustom Signals, Inc. our full and exclusive right, title and interest, throughout the world, in, to and under the following:

- (a) said invention as fully set forth and described in said application;
- (b) said application, including the right to claim priority to said application;
- (c) any and all patent applications which claim the priority (directly or indirectly) of said application and have been, or may be, filed in the United States or any country foreign thereto, or via any international treaty or convention, together with all the rights to file and make any priority claims in connection with said later-filed applications;

- (d) any and all inventions disclosed or claimed in such later-filed applications;
- (e) any and all refilings, divisionals, and continuations of said later-filed applications;
- (f) any and all patents which may issue from said later-filed applications, refiling, divisionals and continuations; and
- (g) any and all reissues and extensions of, and additions to, any patents assigned herein.

ALL of the above shall be solely held and enjoyed by said Kustom Signals, Inc. for its own use and behoof, and for its successors, legal representatives and assigns, to the full end of the term for which any patents assigned herein may be granted, and we do hereby authorize and request that any patents assigned herein be issued in accordance with this Assignment.

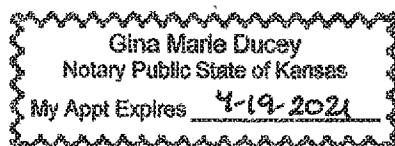
Assignor(s) further agree(s) to execute all paperwork and provide any other requested, non-monetary assistance in procuring, perfecting, enforcing, and/or defending Assignee's rights as assigned herein.


Michael Paulson

On this 10 day of October, 2017, before me personally appeared Michael Paulson, to me known to be the person described in and who executed the foregoing instrument, and who duly acknowledged to me that he executed the same for the uses and purposes therein set forth.


Notary Public

[SEAL]



Date: 10-6-17

Maurice Shelton
Maurice Shelton

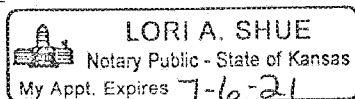
STATE OF)
) ss.
County of)

On this 6th day of October, 2017, before me personally appeared Maurice Shelton, to me known to be the person described in and who executed the foregoing instrument, and who duly acknowledged to me that he executed the same for the uses and purposes therein set forth.

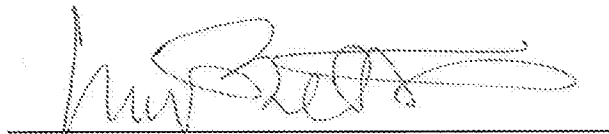
My Commission expires: 7-6-21

Lori A. Shue
Notary Public

[SEAL]



Date: 10/6/17


Mike Bietsch

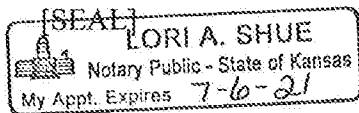
STATE OF)
County of) ss.
)

On this 6th day of October, 2017, before me personally appeared Mike Bietsch, to me known to be the person described in and who executed the foregoing instrument, and who duly acknowledged to me that he executed the same for the uses and purposes therein set forth.

My Commission expires:

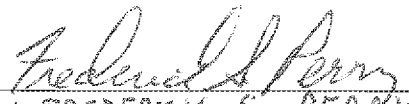
July 6, 2021.


Notary Public



Kustom Signals, Inc. hereby declares it accepts the rights and property hereby assigned and transferred to it.

Kustom Signals, Inc.

By 
Print: FREDERICK S. PERRY
Title: PRESIDENT

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)Applicant/Patent Owner: SHELTON, Maurice et al.

Application No./Patent No.: _____ Filed/Issue Date: _____

Titled: TRAFFIC RADAR SYSTEM WITH MULTIPLE ZONE TARGET DETECTIONKUSTOM SIGNALS, INC., a CORPORATION

(Name of Assignee)

(Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☒ The assignee of the entire right, title, and interest.
2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):
- ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.
- ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (e.g., bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

- A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.
- B. ☐ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

2. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

[Page 1 of 2]

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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STATEMENT UNDER 37 CFR 3.73(c)

3. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.☐ Additional documents in the chain of title are listed on a supplemental sheet(s).☒ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Thomas B. Luebbering/

Signature

Thomas B. Luebbering

Printed or Typed Name

10-09-2017

Date

37874

Title or Registration Number

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal

Application Number:				
Filing Date:				
Title of Invention:	TRAFFIC RADAR SYSTEM WITH MULTIPLE ZONE TARGET DETECTION			
First Named Inventor/Applicant Name:	Maurice Shelton			
Filer:	Thomas B. Luebbering/Rachel Nichols			
Attorney Docket Number:	50333-PRO			
Filed as Small Entity				
Filing Fees for Provisional				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
PROVISIONAL APPLICATION FILING FEE	2005	1	130	130
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				130

Electronic Acknowledgement Receipt

EFS ID:	30596669
Application Number:	62569667
International Application Number:	
Confirmation Number:	3928
Title of Invention:	TRAFFIC RADAR SYSTEM WITH MULTIPLE ZONE TARGET DETECTION
First Named Inventor/Applicant Name:	Maurice Shelton
Customer Number:	23589
Filer:	Thomas B. Luebbering/Rachel Nichols
Filer Authorized By:	Thomas B. Luebbering
Attorney Docket Number:	50333-PRO
Receipt Date:	09-OCT-2017
Filing Date:	
Time Stamp:	11:03:35
Application Type:	Provisional

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	\$ 130
RAM confirmation Number	101017INTEFSW00009383190522
Deposit Account	190522
Authorized User	Rachel Nichols

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37 CFR 1.17 (Patent application and reexamination processing fees)

37 CFR 1.19 (Document supply fees)
37 CFR 1.20 (Post Issuance fees)
37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	PTO_ADS_50333-PRO_974989-1.PDF	1835799	no	9
			a7235cf53e1254065e12a85a19dd0cf028328c31		
Warnings:					
Information:					
2		PTO_Application_50333-PRO_974935-1.PDF	6838754	yes	14
			88d60f48db33ef553e48a0cea084694b8ea744a8		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Specification		1	12	
	Claims		13	14	
Warnings:					
Information:					
3	Drawings-only black and white line drawings	PTO_Drawings_50333-PRO_974933-1.PDF	1771638	no	7
			9140b84bd238674524d447d5c0ab52d3a277d443		
Warnings:					
Information:					
4	Miscellaneous Incoming Letter	PTO_Traffic_Safety_Radar_50333-PRO_974977-1.PDF	347540	no	11
			4cb24073f4ca339ce671ebbc3f5df836b6bc85f0		
Warnings:					
Information:					
5	Miscellaneous Incoming Letter	PTO_Assignment_50333-PRO_974895-1.PDF	998861	no	6
			793d13872d0d06cfce1d64bf4c5b0c519cd11812		
Warnings:					
Information:					

6	Assignee showing of ownership per 37 CFR 3.73	PTO_373c_Stmt_50333-PRO_975007-1.PDF	116685	no	3
			3710a4fe9766819b6764f0aec1c794e8b589c52b		
Warnings:					
Information:					
7	Fee Worksheet (SB06)	fee-info.pdf	29948	no	2
			26915e3be19965dee05f9a5702e5cc8f0b69eced		
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Total Files Size (in bytes):				11939225	
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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	50333-PRO
		Application Number	
Title of Invention	TRAFFIC RADAR SYSTEM WITH MULTIPLE ZONE TARGET DETECTION		
The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76. This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.			

Secrecy Order 37 CFR 5.2:

☐	Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)
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Inventor Information:

Inventor	1				Remove
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Maurice		Shelton		
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service					
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Address 2					
City	Buffalo	State/Province	KS		
Postal Code	66717	Country	US		

Inventor	2				Remove
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Michael		Paulson		
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service					
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Inventor	3				Remove
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Mike		Bietsch		
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service					

Application Data Sheet 37 CFR 1.76		Attorney Docket Number		50333-PRO	
		Application Number			
Title of Invention	TRAFFIC RADAR SYSTEM WITH MULTIPLE ZONE TARGET DETECTION				
City	Nevada	State/Province	MO	Country of Residence	US
Mailing Address of Inventor:					
Address 1	15635 E. Halley Road				
Address 2					
City	Nevada	State/Province	MO		
Postal Code	64772	Country	US		
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button.					Add

Correspondence Information:

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☐ An Address is being provided for the correspondence information of this application.			
Customer Number	23589		
Email Address		Add Email	Remove Email

Application Information:

Title of the Invention	TRAFFIC RADAR SYSTEM WITH MULTIPLE ZONE TARGET DETECTION		
Attorney Docket Number	50333-PRO	Small Entity Status Claimed	☒
Application Type	Provisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	7	Suggested Figure for Publication (if any)	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)
☐ Request Not to Publish. I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application has not and will not be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	50333-PRO
		Application Number	
Title of Invention	TRAFFIC RADAR SYSTEM WITH MULTIPLE ZONE TARGET DETECTION		

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	☒ Customer Number	☐ US Patent Practitioner	☐ Limited Recognition (37 CFR 11.9)
Customer Number	23589		

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This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status		Remove
Application Number	Continuity Type	Prior Application Number
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.		Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)ⁱ the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Access Code ^j (if applicable)
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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	50333-PRO
		Application Number	
Title of Invention	TRAFFIC RADAR SYSTEM WITH MULTIPLE ZONE TARGET DETECTION		

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013. ☐ NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.	
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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	50333-PRO
		Application Number	
Title of Invention	TRAFFIC RADAR SYSTEM WITH MULTIPLE ZONE TARGET DETECTION		

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

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1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

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The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

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NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	50333-PRO
		Application Number	
Title of Invention	TRAFFIC RADAR SYSTEM WITH MULTIPLE ZONE TARGET DETECTION		

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant	1	Remove
If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section. Clear		
☒ Assignee	Legal Representative under 35 U.S.C. 117	Joint Inventor
Person to whom the inventor is obligated to assign.		Person who shows sufficient proprietary interest
If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:		
Name of the Deceased or Legally Incapacitated Inventor:		
If the Applicant is an Organization check here. ☒		
Organization Name	Kustom Signals, Inc.	
Mailing Address Information For Applicant:		
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Phone Number		Fax Number
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Additional Applicant Data may be generated within this form by selecting the Add button. Add		

Assignee Information including Non-Applicant Assignee Information:

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	50333-PRO
		Application Number	
Title of Invention	TRAFFIC RADAR SYSTEM WITH MULTIPLE ZONE TARGET DETECTION		

Assignee	1		
Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.			
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Organization Name	Kustom Signals, Inc.		
Mailing Address Information For Assignee including Non-Applicant Assignee:			
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This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Thomas B. Luebbering/		Date (YYYY-MM-DD)	2017-10-09	
First Name	Thomas B.	Last Name	Luebbering	Registration Number	37874
Additional Signature may be generated within this form by selecting the Add button. Add					

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	50333-PRO
		Application Number	
Title of Invention	TRAFFIC RADAR SYSTEM WITH MULTIPLE ZONE TARGET DETECTION		

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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TRAFFIC RADAR SYSTEM WITH MULTIPLE ZONE TARGET DETECTION

[0001] The present invention relates to Traffic Radar Systems for law enforcement and related applications, and more particularly to Traffic Radar Systems with more than one transceiver antenna.

ABSTRACT OF THE DISCLOSURE

[0002] A Traffic Radar System (TRS) utilizing an antenna scanning technique to monitor two or more zones of interest around the radar platform. The typical use is in law-enforcement, and the radar platform is typically the law-enforcement patrol vehicle.

[0003] The typical system includes radar processing hardware and firmware, a display, a remote control unit, and at least two micro-wave transceiver antennas.

[0004] The automatic zone selection operation of a Scan Mode feature can be activated while the patrol vehicle is stationary or while in the moving mode.

BACKGROUND OF THE INVENTION

[0005] Traffic Enforcement Systems utilizing Doppler radar technology have been in use for a number of years. Law Enforcement agencies deploy these Traffic Radar Systems (TRS) as a tool in the enforcement of vehicle speed regulations. Systems for detecting and displaying radar target data are well known. For example, U.S. Patent Number 5,528,246 "TRAFFIC RADAR WITH DIGITAL SIGNAL PROCESSING" issued to Henderson et al. describes using digital signal processing to determine strongest and fastest target speeds in an area zone in the front or in the rear of the patrol vehicle. The method disclosed by Henderson for front or rear zone control is of the industry standard operator switch for front or rear selection.

[0006] U.S. Patent Number 6,744,379 "SYSTEM AND METHOD FOR DISPLAYING RADAR DATA" issued to Aker et al. Aker describes a method to simultaneously display radar data from two antenna zone areas on two displays.

[0007] In the industry standard method described by Henderson, the operator must manually operate the control to switch between the front and rear antenna zones. Since the operator has selected a single zone, there is no confusion as to which zone is being displayed, or which zone the audible Doppler audio is being heard, or even on which zone the target speed will be locked as only one zone is displayed at a time.

[0008] The simultaneous display method described in Aker has the advantage of not requiring the operator to manually select the zone of interest, but it adds the confusion as to which display is displaying which zone. (Doppler audio signals from multiple zones are mixed further confusing the user), and which zone targets will be locked when the operator locks the target speeds.

SUMMARY OF THE INVENTION

[0009] An advantageous improvement in the design of the (TRS) is to allow for a method of scanning between two or more zones of interest, having a predefined parameter or system parameter set by the operator such as strongest or fastest target that determines which zone of interest is displayed to the operator.

[0010] Another improvement of the invention is that it allows multi-zone coverage of target detection without multiple display areas for each zone.

[0011] Another improvement of the invention is that even though multiple zones are covered, the Doppler audio signals are not mixed from multiple zones. The Doppler audio heard is only from the zone that is currently displayed.

[0012] Still another improvement of the invention is that even though multiple zones are covered; the radar lock controls are simplified as only one zone is displayed at a time and clearly indicated as noted below.

[0013] In an embodiment of the present invention, the aforesaid improvements may be addressed by a Traffic Radar System (TRS) that provides an automated sequence of scanning (alternately gathering data) between zones of interest. In this description of an embodiment of the invention, the antenna zones are referred to as 'Front' for the area ahead of the radar platform and 'Rear' for the area behind the radar platform. The radar platform will be referred to as the 'Patrol vehicle'.

[0014] The systems Digital Signal Processor (DSP) will analyze digitized signals from the radar Front and Rear antennas. Based on a predefined target parameter, the DSP will determine whether to display targets from the Front or Rear zone. For the description in this embodiment, the system parameter to determine which zone to display will be the 'Fastest' target. Meaning, the target speed from the zone with the Fastest target will be the displayed zone. The zone being with the displayed targets is referred to as the 'Selected' zone.

[0015] In another aspect of the invention, the DSP will only use signal data from the Selected zone for the operator audible Doppler audio.

[0016] An additional important operational aspect of the invention is to ensure the operator knows from which of the zones the targets are being displayed. Since this feature allows the system to automatically determine which zone to display based on the target parameters, it is important the operator can easily determine if the speeds being display are from the Front of the Patrol vehicle or from the Rear of the vehicle. In this embodiment of the invention, display color and position are used for zone indication.

[0017] Other advantages of this invention will become apparent from the following description taken in connection with the accompanying drawings, to set forth by way of illustration and example, embodiments of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] Fig. 1 Simplified System Block Diagram

[0019] Fig. 2 Target Detection Zones Diagram

[0020] Fig. 3 Remote Control -- Target Zone Controls Diagram

[0021] Fig. 4 Antenna Signals Path Diagram

[0022] Fig. 5 Target Detection Processing Timing Diagram

[0023] Fig. 6 Target Direction Setup Diagram

[0024] Fig. 7 Scan Mode Setup Diagram

[0025] Fig. 8 Scan Mode Speed Display Diagram

DETAILED DESCRIPTION

[0026] The following detailed description of embodiments of the invention is intended to describe aspects of the invention in sufficient detail to enable those skilled in the art to practice the invention. Other embodiments can be utilized and changes can be made without departing from the scope of the invention. The following detailed description is, therefore, not to be taken in a limiting sense. The scope of the present invention is defined only by claims presented in subsequent regular utility applications, along with the full scope of equivalents to which such claims are entitled.

[0027] In this description, references to "one embodiment," "an embodiment," or "embodiments" mean that the feature or features being referred to are included in at least one embodiment of the technology. Separate references to "one embodiment", "an embodiment",

or “embodiments” in this description do not necessarily refer to the same embodiment and are also not mutually exclusive unless so stated and/or except as will be readily apparent to those skilled in the art from the description. For example, a feature, step, etc. described in one embodiment may also be included in other embodiments, but is not necessarily included. Thus, the present technology can include a variety of combinations and/or integrations of the embodiments described herein.

[0028] Turning to the drawings, Fig. 1 depicts a simplified block diagram of the Traffic Radar System (TRS). This example is to show the current state of the industry. Block 102 is the forward facing, Front radar transceiver antenna assembly. Both microwave transmit and receive functions are housed in this assembly. Block 108 is the rearward facing Rear radar transceiver antenna assembly. The transceivers may be Kustom Signals Inc. 35.5 GHz Ka-Band antenna assemblies. The receiver output signals are cable connected to the DSP processing assembly block 104. The DSP processing assembly is connected to the users display block 106. Block 110 is the Remote Control unit. This remote control can be interfaced to the system as wired, IR, or RF.

[0029] Fig. 2 depicts the Front and Rear antenna target zones. 204 represents the patrol vehicle. 202 is the Front antenna target zone. In this embodiment, the Front antenna main beam is 12 degrees wide and can extend for a kilometer or more in front of the Patrol vehicle. 206 represents the Rear antenna target zone extending a kilometer or more behind the Patrol vehicle.

[0030] The system firmware allows the operator to set the desired target zone to Front only, Rear only, or Scan Mode. The target zone may be selected via controls on the Remote Control unit and/or on the display touch screen.

[0031] Fig. 3 depicts the control switches on the Remote Control unit. 302 is the control that allows the user to select the Front zone or discontinue the Front antenna transmission (Front Hold). 304 is the control that allows the user to select the Rear zone or discontinue the Rear antenna transmission (Rear Hold). 306 enables the user to select a Scan Mode operation in accordance with one aspect of the present invention.

[0032] Fig. 4 depicts the path of the signals from the antennas to the system DSP. Blocks 402 and 404 are the Front and Rear antennas. There are two main receive signal lines leaving each antenna. These receive signals are dual quadrature format (I/Q). Block 406 is the antenna switch circuit. It switches either the Front two signal lines or the Rear two signals lines onto the analog-to-digital converter input (block 408). If the user has selected the Front only zone, the antenna switch 406 always switches the Front two signals through to the analog-to-digital converter. If the Rear only zone is selected, the Rear two signals are always switched through to the analog-to-digital converter. This is the standard operation of a current TRS.

[0033] But if the user selects the Scan Mode operation, the DSP (block 410) will automatically alternately switch between the Front and Rear signals via the switch control line (412). The switched antenna signals are digitized by the analog-to-digital converter (block 408). These digitized signals are passed to the DSP (block 410) for target detection processing.

[0034] Fig. 5 depicts a simplified timing chart of how the new Scan Mode operates. The top part of the figure shows the timing diagram for the system when the user has set the operation to Front only or Rear only. 502 shows that at the beginning of the process a large array of the digitized samples must be buffered prior to the target processing in 504. In this embodiment 1024 samples are buffered, these could be from the Front or Rear antenna. During the target processing algorithm (504) the time domain samples are transformed to the frequency domain

and processed to qualify a list of targets. In 506, the list of targets is used along with the target specifications set by the user to determine which targets should be used and displayed as target speeds to the user. Before displaying to the user, the target frequencies found in 504 are converted to speed units of measure, typically miles-per-hour or kilometers-per-hour. This can be done in 504 or 506. After the speeds are displayed to the user, the process loops back to start over again. The optimal loop time is 4 or 5 times per second. This is fast enough to track accelerating or decelerating vehicles, but not so fast as to cause annoying flicker of the displayed speed numbers. In one embodiment of this invention, the loop time is 5 times per second.

[0035] The bottom part of Fig. 5 shows the timing of the new Scan Mode. As in the previous example 508 buffers 1024 of the digitized input samples, but in this case specifically the Front antenna samples. At the end of 508, the DSP sets the antenna control line to switch to the Rear antenna. After the switch, 510 and 512 run at the same time to buffer the Rear samples and process the Front targets. At the completion of the Rear samples buffering, the Rear targets are processed during 514. 516 uses the predefined or users set system parameter to determine if target from the Front or Rear should be displayed to the user. 518 uses the targets found by the comparison in 516 to display speeds to the user. After the speeds are displayed to the user, the process loops back to start over again. Obviously there is a heavier processing burden in the new Scan Mode compared to the traditional Front only or Rear only modes, but modern DSP devices used in this embodiment still easily perform this processing at the system 5 times per second rate.

[0036] It is instructive to give more details of how the system parameters are setup prior to the zone comparison in 516. The traditional TRS device allows the operator to set the mode

of operation to stationary or moving mode. Some devices also allow the moving mode operation to be set for moving opposite direction targets or moving same direction targets. Fig. 6 shows examples of the moving opposite direction mode setup for the Front antenna zone and moving same direction for the Rear antenna zone. In the moving opposite direction example, 604 is the patrol vehicle with the Front antenna turned on. 602 is the target vehicle in the opposite lane of the roadway moving in the opposite direction with respect to the patrol vehicle. In the moving same direction example, 606 is the patrol vehicle and block 608 is the moving same direction target in the Rear antenna zone. Most modern direction sensing TRS devices allow the user to setup multiple stationary target directions as well, such as stationary receding only, approaching only, or both directions modes. Advanced devices such as the Kustom Signals Inc. Raptor RP-1 radar system allow the operator to set all direction modes separately for each antenna. Detailed instructions on target direction setup can be found in Kustom Signals Inc. publication "Raptor RP-1 Operator's Manual", an excerpt of which is attached and incorporated into the present application in its entirety. Embodiments of the present invention use this ability to target direction per antenna to benefit the new Scan Mode feature.

[0037] Fig. 7 depicts the target direction setting in the Scan Mode. For the example shown in Fig. 7, the user has selected moving mode, set the Front target detection zone to moving opposite direction, set the Rear target detection zone to moving same direction, and set the operation to Scan Mode. In this embodiment, the operational modes are displayed with text labels and graphics symbols on a depiction of the roadway. 702 is the Front text label showing the Front antenna is active. 704 is the target graphic symbol on the roadway for the moving opposite direction Front zone. 706 is the area where the patrol vehicle speed will be displayed.

708 is the Rear text label showing the Rear antenna is active. 710 is the target graphic symbol on the roadway for the moving same direction Rear zone. 712 is the Scan label showing the operation is set in the Scan Mode.

[0038] The system is now set in Scan Mode as described in the example above, with the Front zone set to moving opposite direction and Rear zone set to moving same direction. The Front target processing algorithm (512) finds target that are traveling in opposite direction from the travel of the patrol vehicle in the Front zone and the Rear target processing algorithm (514) finds targets that are traveling in the same direction as the travel of the patrol vehicle in the Rear zone. 516, the compare Front / Rear Speeds algorithm, looks at the Front and Rear target speed values and chooses to display the zone that contains the target that matches the predefined or system parameter. In this example it is the zone with the fastest speed target.

[0039] An important aspect of this invention is to give clear indications to the user as to which zone, Front or Rear, it is currently displaying the target speeds. In one embodiment of the invention, color of the target speeds and position on the display are used to indicate the current zone (the front zone readings are displayed higher while the rear zone readings are displayed lower). In Fig 8, 802 shows the display for the system set to Stationary mode, Front target direction approaching, Rear target direction approaching, and Scan Mode. Both the Front and Rear labels are turned on to show both antennas are active. The Scan label is turned on to show the antenna signals are being scanned. In the roadway graphic, the symbol of the Front zone target is displayed in red and the graphic symbol of the Rear zone target is displayed in blue. This is to indicate target speeds from the Front zone will be displayed in red numbers and target speeds from the rear zone will be displayed in blue numbers. An option in the present embodiment is for the background color of the display to turn red when displaying

targets from the Front zone and turns blue if displaying targets from the rear zone. The importance is to give a clear indication to the operator for which zone is being displayed.

[0040] 804 is an example of when the radar signals from the Front antenna zone contain the fastest target. The target speeds are displayed in red to match the Front target graphic symbol color. The target speeds are positioned in the upper part of the display to relate to the Front label position. The Rear label is turned off; leaving the Front label on to show the Front zone is being displayed. In this display, 87 represents the speed of a vehicle with the strongest signal and 106 represents the speed of a vehicle that is going the fastest. The arrow next to 87 indicates that the vehicle with the strongest signal is approaching (an up arrow would indicate the vehicle is receding). Likewise, the arrow next to 106 indicates that the fastest vehicle is approaching as well.

[0041] 806 is an example of when the radar signals from the Rear antenna zone contain the fastest target. The target speed is displayed in blue to match the Rear target graphic symbol color. The target speed is positioned in the lower part of the display to relate to the Rear label position. The Front label is turned off; leaving the Rear label turned on to show the Rear zone is being displayed.

[0042] Another benefit of this invention with Scan Mode over a system that simultaneously displays targets from multiple zones is with a straight-forward "Lock" target control. Since only targets from one antenna zone are displayed at any one time, the "Lock" control is obviously for the currently displayed zone.

[0043] Still another benefit of this invention over a system that simultaneously displays targets from multiple zones is with the requirement for TRS devices to provide an audible Doppler audio output to the user that correlates to the target speeds. As shown in the Fig 5 timing

diagram, this invention buffers the Front and Rear antenna signals in separate arrays. Since only targets from one zone are displayed at any one time, the Doppler audio heard by the user is processed only from the arrays from that zone. This makes it obvious to the user which zone he is monitoring.

The following are potentially novel aspects of the present invention:

1. Monitor two or more radar zones, buffer arrays of the two or more zones, display targets from only one of the zones based on predefined or user selected system parameter.
2. Distinguish which of the radar zones is displayed by the speed readings' color and/or position on the display area and/or display background color.
3. Monitor two or more radar zones, buffer arrays of the two or more zones, display targets from only one of the zones based on predefined or user selected system parameter. Provide an audible Doppler audio output to the user that correlates to the target speeds from the displayed zone only.

The following are exemplary claims for aspects of the invention:

1. A Traffic Radar System (TRS) comprising:
 - a first radar transceiver antenna assembly configured for transmitting signals from a first portion of a patrol vehicle and receiving signals reflected back toward the first portion of the patrol vehicle;
 - a second radar transceiver antenna assembly configured for transmitting signals from a second portion of a patrol vehicle and receiving signals reflected back toward the second portion of the patrol vehicle;
 - a processing assembly for receiving and analyzing output signals from the first radar transceiver antenna assembly and the second radar transceiver antenna assembly; and
 - a display for displaying speed information provided by the processing assembly; and
- the processing assembly having a scan mode in which the processing assembly monitors output signals from both the first radar transceiver antenna assembly and the second radar transceiver antenna assembly but directs the display to only display speed information for either the first radar transceiver antenna assembly or the second radar transceiver antenna assembly based on preselected parameters.

2. The TRS of claim 1, wherein the first radar transceiver antenna assembly is a front radar transceiver antenna assembly, the first portion of the patrol vehicle is a front portion of the patrol vehicle, the second radar transceiver antenna assembly is a rear radar transceiver antenna assembly, and the second portion of the patrol vehicle is a rear portion of the patrol vehicle.

3. The TRS of claim 1, wherein the processing assembly distinguishes from which of the first and second radar transceiver antenna assemblies speed information is displayed by coloring the displayed speed information.

4. The TRS of claim 1, wherein the processing assembly distinguishes from which of the first and second radar transceiver antenna assemblies speed information is displayed by positioning the displayed speed information at selected positions on the display.

Although the invention has been described with reference to the particular embodiments, it is noted that equivalents may be employed and substitutions made herein without departing from the scope of the invention.

Fig. 1 System Block Diagram

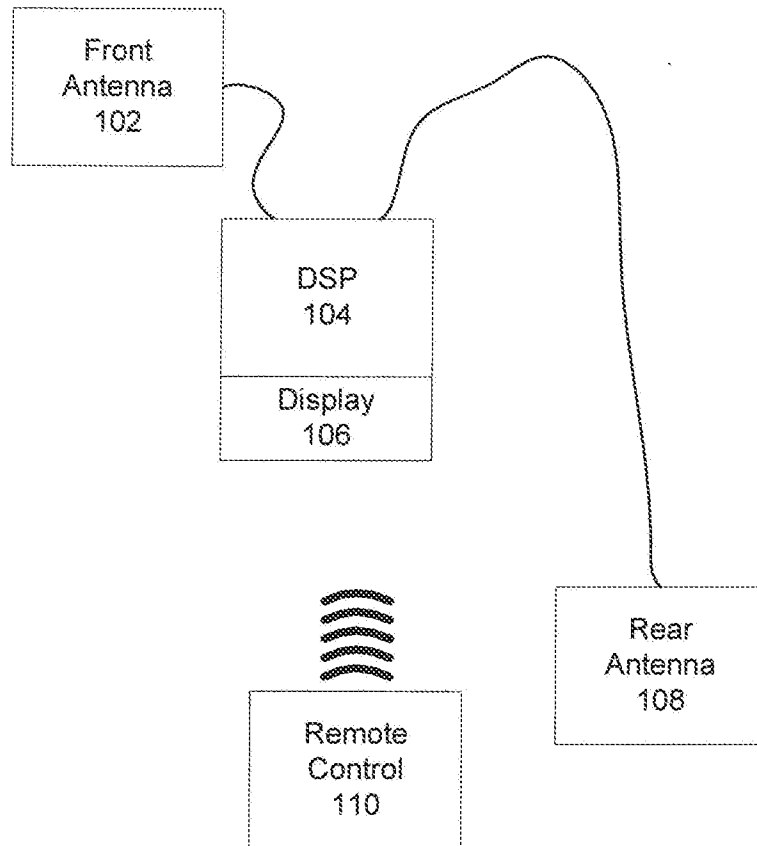


Fig. 2 Target Detection Zones

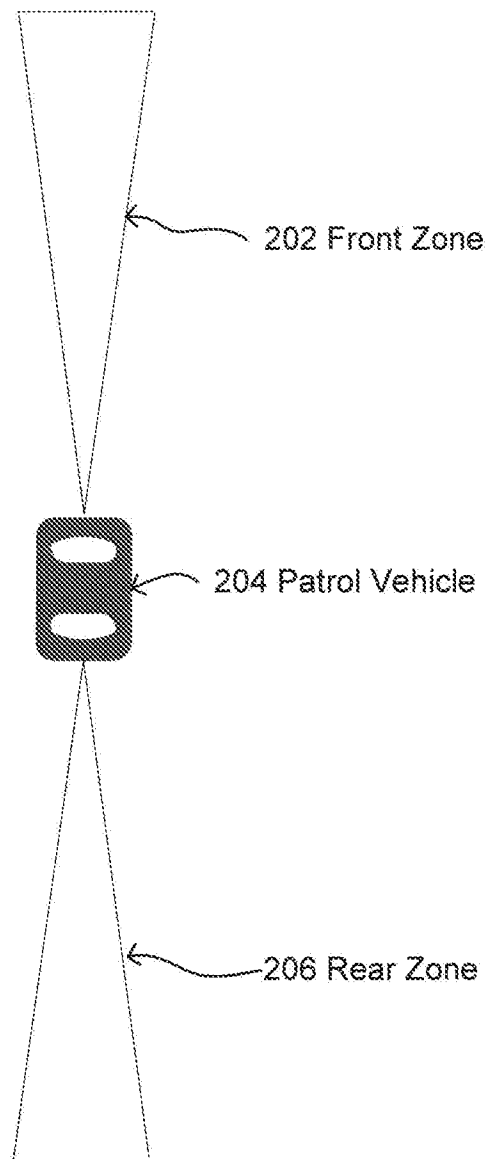


Fig. 3 Remote Control – Target Zone Controls

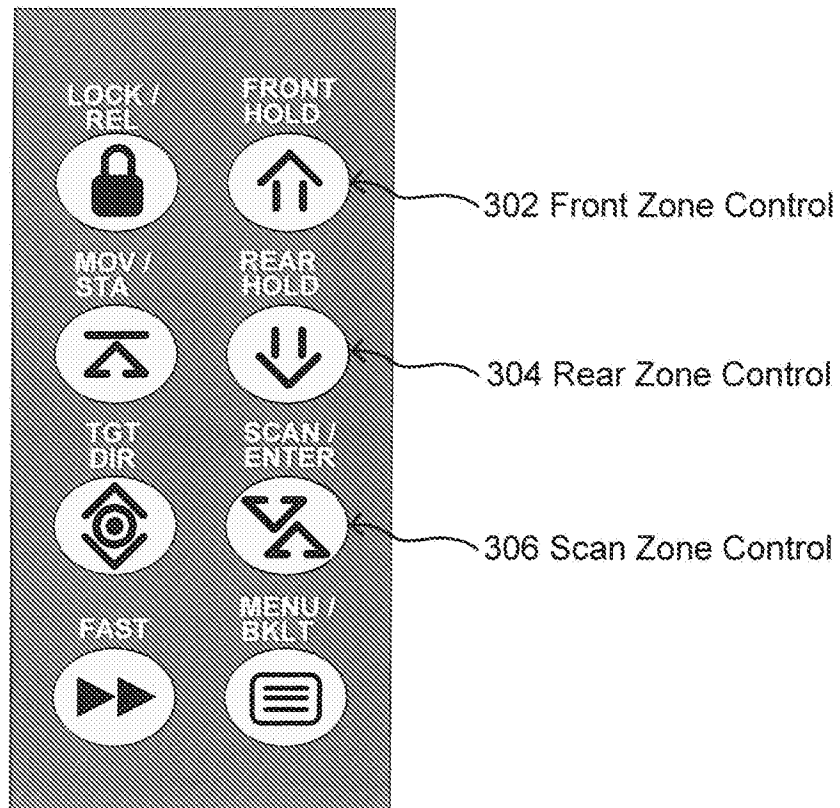


Fig. 4 Antenna Signals Path Diagram

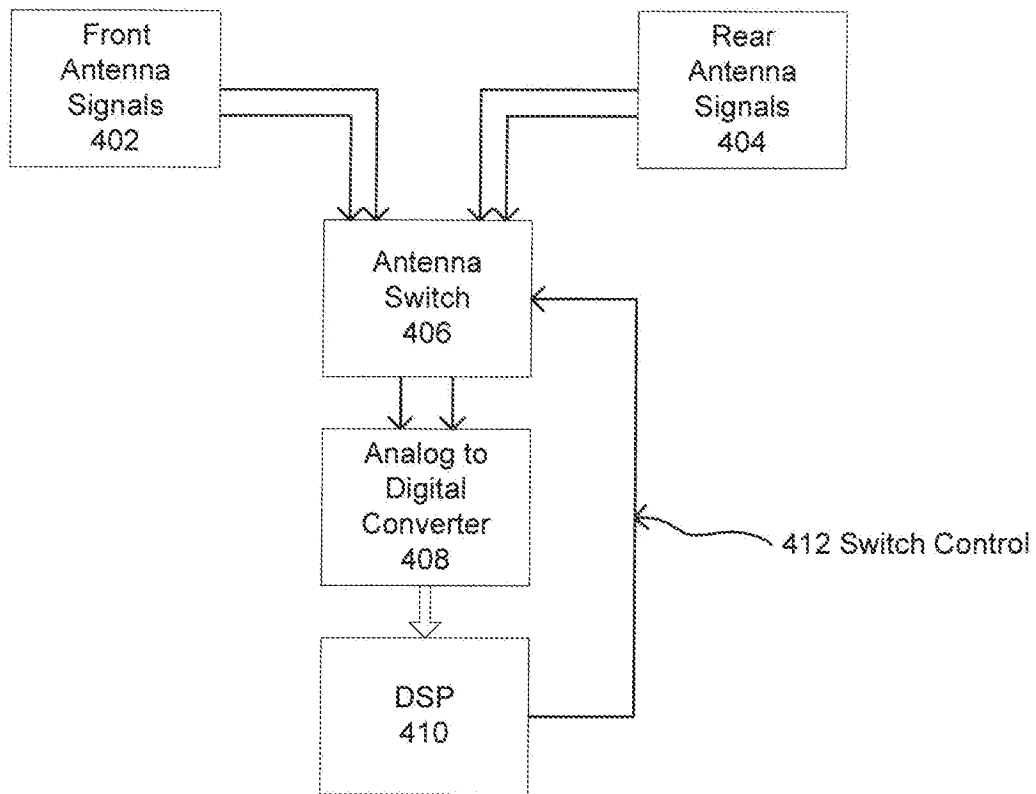


Fig. 5 Target Detection Processing Timing Diagram

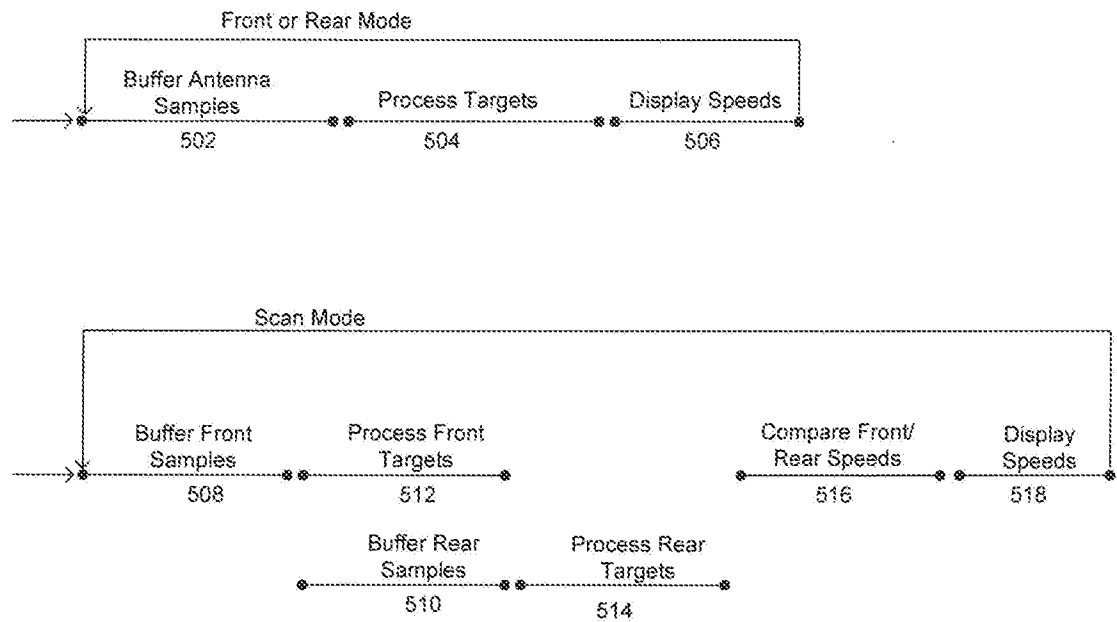


Fig. 6 Target Direction Setup Diagram

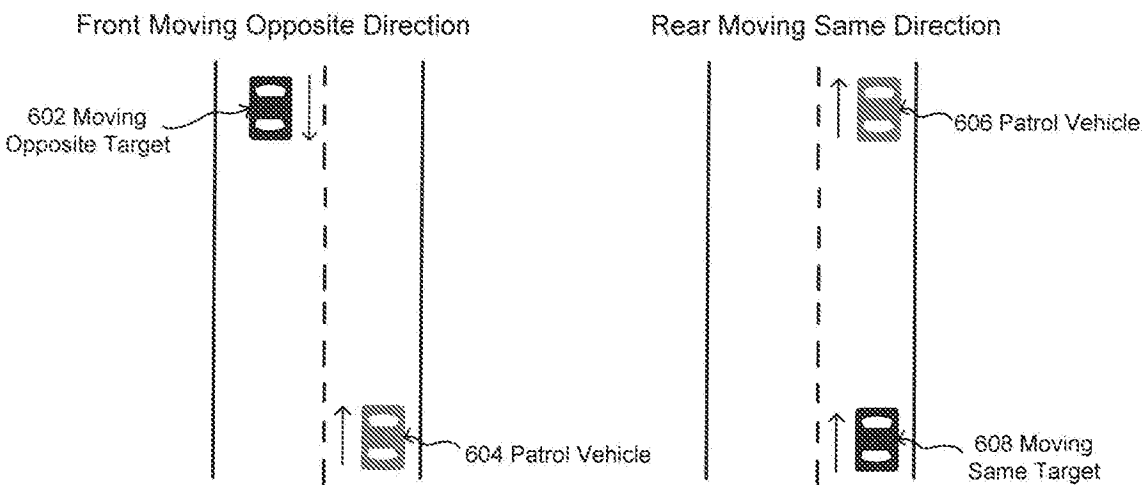


Fig. 7 Scan Mode Setup Diagram

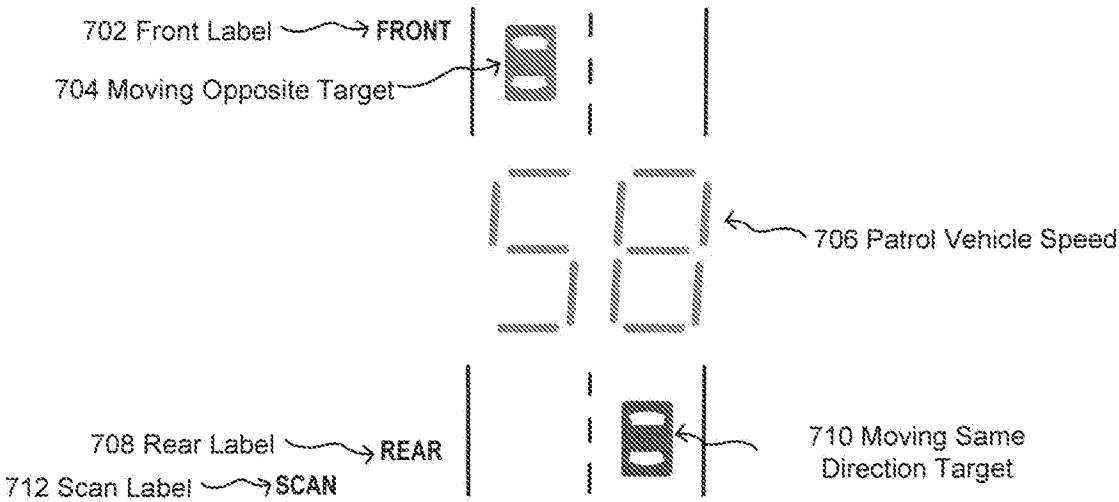
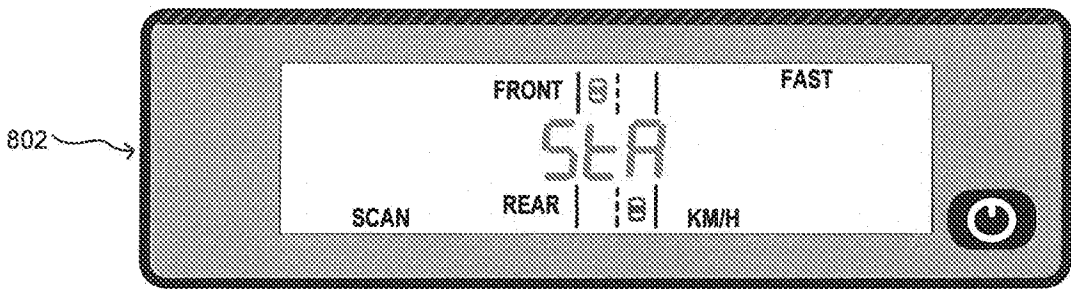


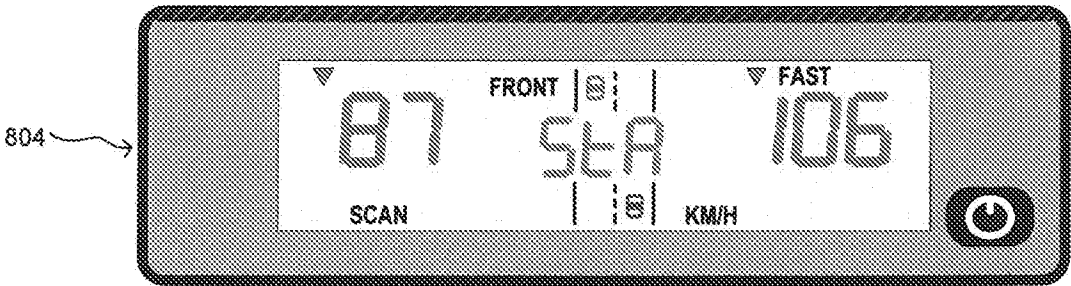
Fig. 8 Scan Mode Speed Display Diagram

Fig. 8 Scan Mode Speed Display Diagram

Example: Stationary Front-Approaching and Rear Approaching Scan Mode.



Example: Fastest target detected in the Front zone.



Example: Fastest target detected in the Rear zone.

