CERTIFICATE CONCERNING DESIGN AND CONSTRUCTION OF ELECTRONIC SPEED MEASURING DEVICES

I, Katrina Sorich, do certify under penalty of the laws of the State of Washington that the following is true and correct:

I have been employed as a technician by American Traffic Solutions for 4 years. I became a speed validation technician in 2020 and have over 1200 hours performing speed validation tests. I am nationally certified as a RADAR and LIDAR operator. The City of Kirkland currently uses the AutoPatrol™ 3D radar fixed speed safety camera system, an electronic speed measuring device provided through a contract with American Traffic Solutions, Inc. ("ATS"). Part of my duties include monitoring regular testing of the AutoPatrol 3D radar fixed speed safety camera systems used by the City of Kirkland.

ATS contracted with the City of Kirkland to provide an Automated Speed Enforcement ("ASE") system designed to record the speed of a vehicle and obtain photographs or other recorded images of the vehicle and the vehicle's registration plate while the vehicle is traveling in excess of speed limits in certain safety zones within posted limits.

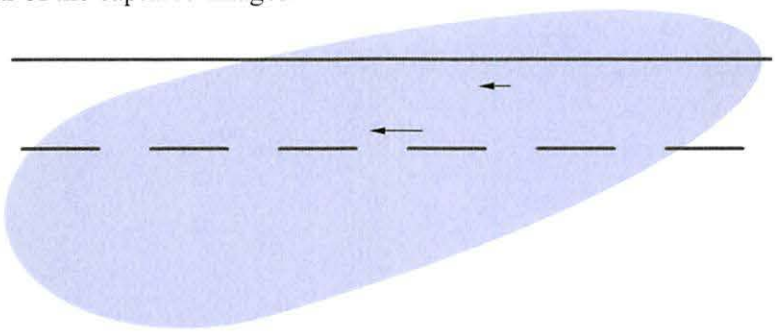
The ASE program includes the use of the AutoPatrol 3D radar fixed speed safety camera systems at the following locations within the City of Kirkland:

Location Code	Location Description	Lanes Monitored
KRKF001	NB 132ND AVE NE @ MUIR ELEMENTARY/KAMIAKIN MIDDLE	1
KRKF002	SB 132ND AVE NE @ MUIR ELEMENTARY/KAMIAKIN MIDDLE	1
KRKF003	EB 80TH ST @ ROSE HILL ELEMENTARY	1
KRKF004	WB 80TH ST @ ROSE HILL ELEMENTARY	1
KRKF005	SB 724 STATE ST @ LAKEVIEW ELEMENTARY SCHOOL	1
KRKF006	WB 10600 NE 68TH ST @ LAKEVIEW ELEMENTARY SCHOOL	1
KRKF007	NB 12637 84TH AVE NE @ SANDBURG ES / FINN HILL MS / THOREAU ES	1
KRKF008	SB 14006 84TH AVE NE @ SANDBURG ES / FINN HILL MS / THOREAU ES	1

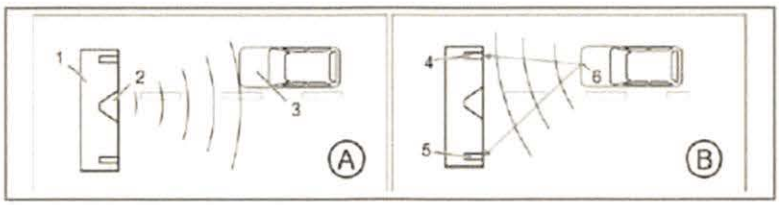
The AutoPatrol 3D radar fixed speed safety camera system operates by measuring vehicle speed, as well as position relative to the radar to calculate and differentiate multiple vehicles in the radar beam. The speed of a moving vehicle is measured by Doppler radar. Doppler radar is a generally accepted technology used for measuring speed. The AutoPatrol 3D radar technology is used throughout the US and Europe as well as other countries and is approved by the Swiss national metrology institute- METAS.

The AutoPatrol 3D radar fixed speed safety camera system uses a tracking radar sensor for measuring vehicle speeds and detecting speed violations. The AutoPatrol 3D radar is aligned at a fixed angle across the road. The AutoPatrol 3D radar emits a horizontal beam over the road surface as represented by the illustration below. The tracking radar can simultaneously detect multiple vehicles and measure their speed, distance, angle and movement within the radar beam. The radar tracks multiple vehicles by reconstructing vehicle movement from the measured object speed, angle and distance values. If a vehicle passes a defined trigger line, the radar outputs the vehicle's speed and lane information. The camera connected to the tracking radar uses this

information to determine if there is a speed violation and to capture photographs showing the measured speed and lane on the databar of the captured images.



The tracking radar utilizes the Doppler Effect for speed determination. If an electromagnetic wave is emitted at a moving object, then the wave is reflected back from the moving object. The frequency of the wave received back by the radar shifts based on the speed of the moving object and its direction of travel. The tracking radar continuously determines this frequency shift of each object to calculate the object's speed. The tracking radar consists of two receiving antennas integrated into a single radar sensor. This configuration allows the radar to measure the distance and angle of the vehicle relative to the position of the radar sensor. Illustration A and B show the measurement principle in simplified form. The radar sensor emits a radar beam (illustration A). The radar beam is reflected by the vehicle (illustration B). The two receivers receive the reflected radar beam. The radar sensor evaluates the return frequency, as well as the phase difference of the reflected radar beam from both of the receivers. With the aid of these values the radar sensor calculates the vehicle position.



1 Radar sensor
2 Transmitter
3 Detected vehicle
4 Receiver A
5 Receiver B
6 Reflected signal

Prior to operation each day, the system performs a system self-test. This self-test performs an electronic tuning fork test to produce a specific frequency and returns an associated speed value. Only if the return value meets the acceptance criteria to show that the system is operating correctly will the system enter measure mode. Unless a self-test is successful, the system will not enter measure mode and no violations will be captured. Additional information stored as metadata within each image includes coordinates of the vehicle position at the time of capture. This information is extracted and utilized through a secondary speed verification process to provide yet another means to validate offender speed and position based on the two images obtained and image analytics. In addition to the internal system checks and the manufacturer calibration certification, the 3D radar system is subject to routine and independent calibration check of the speeds produced by the system at least annually by a qualified technician.

Each day the computer which controls the fixed speed safety camera system is rebooted. The reboot is initiated each day and each time the computer is rebooted an internal check is performed on all operations of

each fixed speed safety camera system, including the clocks, sensors, camera and speed calculating hardware and software, in order to verify that all operations are functioning correctly. When the internal check detects a problem with one of the operations on a given fixed speed safety camera system, then that particular fixed speed safety camera system is inactivated and a request for service is relayed to ATS support personnel. This means that violations cannot be issued until any internal problem is fixed.

Speed validation tests are regularly performed on each installed and operable AutoPatrol 3D radar fixed speed safety camera system. The test is conducted by having a LIDAR Operator obtain true measurements of up to five vehicles per lane in the ascending and/or descending direction. The speed of the vehicle is captured by the LIDAR Operator and then relayed via cellular to an ATS Technician. The ATS Technician then compares the vehicle speed measured by the AutoPatrol 3D radar fixed speed safety camera system to the speed measured by the LIDAR Operator to ensure the accuracy of the AutoPatrol 3D radar fixed speed safety camera system. ATS maintains the results of each test in a Validation Report. The speed validation for each system was performed on the following date and the systems at each location were found to be in proper working order:

Location Code	Location Description	Date of Test
KRKF001	NB 132ND AVE NE @ MUIR ELEMENTARY/KAMIAKIN MIDDLE	4/23/2025
KRKF002	SB 132ND AVE NE @ MUIR ELEMENTARY/KAMIAKIN MIDDLE	4/23/2025
KRKF003	EB 80TH ST @ ROSE HILL ELEMENTARY	4/23/2025
KRKF004	WB 80TH ST @ ROSE HILL ELEMENTARY	4/23/2025
KRKF005	SB 724 STATE ST @ LAKEVIEW ELEMENTARY SCHOOL	4/23/2025
KRKF006	WB 10600 NE 68TH ST @ LAKEVIEW ELEMENTARY SCHOOL	4/23/2025
KRKF007	NB 12637 84TH AVE NE @ SANDBURG ES / FINN HILL MS / THOREAU ES	4/23/2025
KRKF008	SB 14006 84TH AVE NE @ SANDBURG ES / FINN HILL MS / THOREAU ES	4/23/2025

Preventative maintenance, including visual inspections, is regularly performed on the AutoPatrol 3D radar fixed speed safety camera systems. Preventative maintenance activities include: cleaning of the cameras and housing, general site inspection of environment and road conditions, inspection of poles, bases and enclosures, and inspection of system cables and connections. The location and date that preventative maintenance is performed is recorded in the Preventative Maintenance Log, which along with the Validation Report(s) referenced above, is attached hereto.

I am a custodian, or otherwise qualified witness, as to the attached records. I make this declaration based on personal knowledge, and if called and sworn as a witness, I could and would testify as set forth in the following paragraph.

Attached as Exhibits are: Exhibit A - Speed Validation Reports, Exhibit B - Preventative Maintenance Logs, and Exhibit C - Annual System Verification Certificate for all AutoPatrol 3D radar fixed speed safety camera systems installed and used by the City of Kirkland. All documents and materials included as Exhibit A, Exhibit B and Exhibit C are authentic and are what they purport to be, and accurately describe the matters set forth therein. All such records are business records in that they are: (1) records kept in the ordinary course of business; (2) created at or near the time of the transactions or events reflected therein by, or based on information from, a person with knowledge of the transaction or events; and (3) kept as part of a regular business activity.

Based upon my education, training, experience, and knowledge of the AutoPatrol 3D radar fixed speed safety camera system, it is my opinion that the system is so designed and constructed as to accurately employ measurement techniques based on a division of distance over time in such a manner that it will give accurate measurements of the speed of motor vehicles.

I, Katrina Sorich, certify (or declare) under penalty of perjury under the laws of the State of Washington that the foregoing is true and correct.

Dated this 17th day of May 2025 in Mesa, AZ

Katrina Sorich, Speed Validation Technician

American Traffic Solutions™

Speed Validation Report

Client: Kirkland, WA

Date: April 23, 2025

Locations:

- KRKF001 - NB 132ND AVE NE @ MUIR ELEMENTARY/KAMIAKIN MIDDLE
  - Radar Serial Number: 590-112/61555
- KRKF002 - SB 132ND AVE NE @ MUIR ELEMENTARY/KAMIAKIN MIDDLE
  - Radar Serial Number: 590-112/62115
- KRKF003 - EB 80TH ST @ ROSE HILL ELEMENTARY
  - Radar Serial Number: 590-113/65637
- KRKF004 - WB 80TH ST @ ROSE HILL ELEMENTARY
  - Radar Serial Number: 590-112/60096
- KRKF005 - SB 724 STATE ST @ LAKEVIEW ELEMENTARY SCHOOL
  - Radar Serial Number: 590-112/60101
- KRKF006 - WB 10600 NE 68TH ST @ LAKEVIEW ELEMENTARY SCHOOL
  - Radar Serial Number: 590-113/61662
- KRKF007 - NB 12637 84TH AVE NE @ SANDBURG ES / FINN HILL MS / THOREAU ES
  - Radar Serial Number: 590-112/61246
- KRKF008 - SB 14006 84TH AVE NE @ SANDBURG ES / FINN HILL MS / THOREAU ES
  - Radar Serial Number: 590-112/62140

Equipment:

Kustom Pro-Lite Lidar Serial Number: LP03126

Certification Date: December 10, 2024

Technicians:

Lidar Operator: Bryan Cole Beck

RLC Operator: Katrina Sorich

A speed validation test was conducted for the sites listed above. The Lidar Operator obtained true measurements of five vehicles per lane in the ascending and/or descending direction. Those speeds were obtained using a Kustom Pro-Lite Lidar instrument. The speed of the vehicle is captured by the Lidar Operator and then relayed via cellular to the RLC Technician. The RLC Technician is monitoring the vehicle speed at the Fixed Speed Camera system simultaneously to ensure the accuracy of the system. The speed validation tests
performed on the above-listed dates confirmed the accuracy of the Fixed Speed Camera systems at each location.

I, Katrina Sorich, certify that the information contained in this report is true and accurate.

Signed: 

Date: May 17, 2025
American Traffic Solution
Katrina Sorich, Speed Validation Technician
Speed Integrity Team

Certificate of Achievement

Speed Integrity Technician

Has successfully completed the training course for
Speed Integrity Technician

This course encompasses all the necessary tasks required to perform the duties as a Speed Integrity Technician. Through this course each participant is required to display the proper competency through written and practical examinations. In addition, the course certifies each participant as a Lidar Operator

Presented to: Bryan Cole Beck

This Day: 11/07/2024

Douglas Trujillo
Douglas Trujillo
Police Traffic Laser/Radar Instructor

nsa
Get work done.

315 Trane Drive | Knoxville, TN 37919 | www.nsa.bz

Certificate of Achievement

Speed Integrity Technician

Has successfully completed the course for Speed Inegrity Technician

This course encompasses all the necessary tasks required to perform the duties as a Speed Integrity Technician. Through this course each participant is required to display the proper competencies in Radar and Laser Technology. In addition, this course certifies each participants as a Lidar operator.

Presented to: Katrina Sorich

This Day: November 18, 2020

ATS American Traffic Solutions™

Tylor Yochim
Radar Instructor

RDLD Certificate of Achievement V1.0 | American Traffic Solutions, Inc., 7681 East Gray Road, Scottsdale, AZ 85260 | Certificate # VCC-1118-AZ-01

PB Electronics Inc.

248 W Peaceful Ct., Shepherdsville, KY 40165
502 543-7032 www.pbelectronics.com

Factory Authorized Calibration Center for Stalker, MPH, Kustom, Decatur and LTI

Certificate of Calibration

Manufacturer: Kustom	Model: Pro-Lite	Serial Number: LP03126

I hereby certify that this Speed Measuring Device has been checked for accuracy and correctness of operation under my supervision. This Speed Measuring Device is certified accurately within +/- 0.5 mph in stationary mode using equipment traceable to National Institute of Standards and technology.

The laser transmitter of this device has been tested and found to be within specified range for Laser Devices as established by the Federal Communications Commission and IACP.

FCC License number PG-18-12552 Technician Signature

PB ELECTRONICS
FACTORY AUTHORIZED SERVICE CENTER for:
STALKER
KUSTOM SIGNALS INC
MPH INDUSTRIES
LASER TECHNOLOGY

Tuning Forks Serial Numbers: n/a	Date: December 10, 2024

VERRA MOBILITY

SELF-ACCURACY TEST
Kustom Pro-Lite Lidar Speed Measurement Tool

DATE: April 23, 2025

Start of shift "Self-Diagnostic test" time: 10:06 AM

Start of shift Distance check: 100' lidar

End of shift "Self-Diagnostic test" time: 12:31 PM

End of shift Distance check: 100'

City and State: Kirkland, WA

Lidar Serial Number: LP03126

Certification Date: December 10, 2024

OPERATOR: Bryan Cole Beck

I, *Bryan Cole Beck*, certify that the Kustom Pro-Lite Lidar speed measurement device was setup, tested, and operated in accordance with the manufactures specifications to include its self-diagnostic check.

Further, I certified that the self-check distance was completed and accurate.

Signature: *Bryan Cole Beck*

Date: April 23, 2025

American Traffic Solutions™

Speed Validation Worksheet

Date	4/23/2025
Time	10:17 AM
Site ID	KRKF001
Location	Kirkland, WA
Address	NB 132ND AVE NE @ MUIR ELEMENTARY/KAMIAKIN MIDDLE
Posted Speed Limit	20MPH
Trigger Speed Limit	26MPH
Speed Type	School
Lidar Technician	Bryan Cole Beck
AutoPatrol Technician	Katrina Sorich
Lidar Serial Number	LP03126
Radar Serial Number	590-112/61555
Detection Type	Autopatrol-Radar
Measure Mode Capture	Yes
Photo enforcement signs present	Yes
Pass/ Fail	Pass
Ascending or Descending	Descending

City Lane	Times	Lidar Speeds	AP Speeds	Delta	Comments
1	10.17.58	25	26	1	
1	10.18.12	8	9	1	
1	10.18.21	9	9	0	
1	10.18.47	20	19	-1	
1	10.19.18	16	17	1	

American Traffic Solutions™

Speed Validation Worksheet

Date	4/23/2025
Time	10:11 AM
Site ID	KRKF002
Location	Kirkland, WA
Address	SB 132ND AVE NE @ MUIR ELEMENTARY/KAMIAKIN MIDDLE
Posted Speed Limit	20MPH
Trigger Speed Limit	26MPH
Speed Type	School
Lidar Technician	Bryan Cole Beck
AutoPatrol Technician	Katrina Sorich
Lidar Serial Number	LP03126
Radar Serial Number	590-112/62115
Detection Type	Autopatrol-Radar
Measure Mode Capture	Yes
Photo enforcement signs present	Yes
Pass/ Fail	Pass
Ascending or Descending	Descending

City Lane	Times	Lidar Speeds	AP Speeds	Delta	Comments
1	10.11.37	24	25	1	
1	10.11.43	24	25	1	
1	10.11.45	28	29	1	
1	10.12.23	22	22	0	
1	10.12.42	19	19	0	

American Traffic Solutions™

Speed Validation Worksheet

Date	4/23/2025
Time	11:38 AM
Site ID	KRKF003
Location	Kirkland, WA
Address	EB 80TH ST @ ROSE HILL ELEMENTARY
Posted Speed Limit	20MPH
Trigger Speed Limit	26MPH
Speed Type	School
Lidar Technician	Bryan Cole Beck
AutoPatrol Technician	Katrina Sorich
Lidar Serial Number	LP03126
Radar Serial Number	590-113/65637
Detection Type	Autopatrol-Radar
Measure Mode Capture	Yes
Photo enforcement signs present	Yes
Pass/ Fail	Pass
Ascending or Descending	Descending

City Lane	Times	Lidar Speeds	AP Speeds	Delta	Comments
1	11.38.48	24	23	-1	
1	11.41.13	20	21	1	
1	11.41.19	25	24	-1	
1	11.41.42	23	23	0	
1	11.41.45	23	23	0	

American Traffic Solutions™

Speed Validation Worksheet

Date	4/23/2025
Time	11:31 AM
Site ID	KRKF004
Location	Kirkland, WA
Address	WB 80TH ST @ ROSE HILL ELEMENTARY
Posted Speed Limit	20MPH
Trigger Speed Limit	26MPH
Speed Type	School
Lidar Technician	Bryan Cole Beck
AutoPatrol Technician	Katrina Sorich
Lidar Serial Number	LP03126
Radar Serial Number	590-112/60096
Detection Type	Autopatrol-Radar
Measure Mode Capture	Yes
Photo enforcement signs present	Yes
Pass/ Fail	Pass
Ascending or Descending	Descending

City Lane	Times	Lidar Speeds	AP Speeds	Delta	Comments
1	11.31.22	23	23	0	
1	11.31.56	21	21	0	
1	11.32.34	20	19	-1	
1	11.33.03	27	26	-1	
1	11.33.38	23	24	1	

American Traffic Solutions™

Speed Validation Worksheet

Date	4/23/2025
Time	12:25 PM
Site ID	KRKF005
Location	Kirkland, WA
Address	SB 724 STATE ST @ LAKEVIEW ELEMENTARY SCHOOL
Posted Speed Limit	20MPH
Trigger Speed Limit	26MPH
Speed Type	School
Lidar Technician	Bryan Cole Beck
AutoPatrol Technician	Katrina Sorich
Lidar Serial Number	LP03126
Radar Serial Number	590-112/60101
Detection Type	Autopatrol-Radar
Measure Mode Capture	Yes
Photo enforcement signs present	Yes
Pass/ Fail	Pass
Ascending or Descending	Descending

City Lane	Times	Lidar Speeds	AP Speeds	Delta	Comments
1	12.25.14	24	25	1	
1	12.25.33	22	23	1	
1	12.26.38	27	27	0	
1	12.26.47	24	23	-1	
1	12.26.49	22	23	1	

American Traffic Solutions™

Speed Validation Worksheet

Date	4/23/2025
Time	11:58 AM
Site ID	KRKF006
Location	Kirkland, WA
Address	WB 10600 NE 68TH ST @ LAKEVIEW ELEMENTARY SCHOOL
Posted Speed Limit	20MPH
Trigger Speed Limit	26MPH
Speed Type	School
Lidar Technician	Bryan Cole Beck
AutoPatrol Technician	Katrina Sorich
Lidar Serial Number	LP03126
Radar Serial Number	590-113/61662
Detection Type	Autopatrol-Radar
Measure Mode Capture	Yes
Photo enforcement signs present	Yes
Pass/ Fail	Pass
Ascending or Descending	Descending

City Lane	Times	Lidar Speeds	AP Speeds	Delta	Comments
1	11.58.27	25	25	0	
1	11.58.46	24	24	0	
1	11.59.11	18	17	-1	
1	11.59.28	28	28	0	
1	11.59.31	24	24	0	

American Traffic Solutions™

Speed Validation Worksheet

Date	4/23/2025
Time	10:44 AM
Site ID	KRKF007
Location	Kirkland, WA
Address	NB 12637 84TH AVE NE @ SANDBURG ES / FINN HILL MS / THOREAU ES
Posted Speed Limit	20MPH
Trigger Speed Limit	26MPH
Speed Type	School
Lidar Technician	Bryan Cole Beck
AutoPatrol Technician	Katrina Sorich
Lidar Serial Number	LP03126
Radar Serial Number	590-112/61246
Detection Type	Autopatrol-Radar
Measure Mode Capture	Yes
Photo enforcement signs present	Yes
Pass/ Fail	Pass
Ascending or Descending	Descending

City Lane	Times	Lidar Speeds	AP Speeds	Delta	Comments
1	10.44.28	29	29	0	
1	10.47.13	26	27	1	
1	10.47.21	21	21	0	
1	10.47.24	20	21	1	
1	10.47.33	21	22	1	

American Traffic Solutions™

Speed Validation Worksheet

Date	4/23/2025
Time	11:00 AM
Site ID	KRKF008
Location	Kirkland, WA
Address	SB 14006 84TH AVE NE @ SANDBURG ES / FINN HILL MS / THOREAU ES
Posted Speed Limit	20MPH
Trigger Speed Limit	26MPH
Speed Type	School
Lidar Technician	Bryan Cole Beck
AutoPatrol Technician	Katrina Sorich
Lidar Serial Number	LP03126
Radar Serial Number	590-112/62140
Detection Type	Autopatrol-Radar
Measure Mode Capture	Yes
Photo enforcement signs present	Yes
Pass/ Fail	Pass
Ascending or Descending	Descending

City Lane	Times	Lidar Speeds	AP Speeds	Delta	Comments
1	11.00.19	25	24	-1	
1	11.00.39	21	20	-1	
1	11.01.09	28	28	0	
1	11.01.59	21	20	-1	
1	11.02.48	23	22	-1	

Radar Sensor Calibration Verification
Certificate of Calibration

Model: RRS24F-ST3

Part Number / Serial Number:
590-112 / 61555
Ex. 590-XXX / 6XXXX

Description:
Radar Characteristics Validation
In compliance with:
RRS24F-ST3 Radar Sensor Calibration Verification Procedure Documentation (5030-0150)

Date of Issue: August 16, 2024

Owner of EUT: **Verra Mobility**
1150 N. Alma School Rd
Mesa, AZ 85201

Attention of: **Engineering Department**
Phone: (480) 443-7000

Test Facility	
Test Laboratory	Keystone Compliance, LLC
Address	131 North Columbus Innerbelt
City, State, Zip Code	New Castle, PA 16101
Email	questions@keystonecompliance.com
Web Site	www.keystonecompliance.com

Test Personnel	
Name	Alex Herrin
Title	EMC Test Engineer
Signature	

Radar Sensor Calibration Verification
Certificate of Calibration

Model: RRS24F-ST3

Part Number / Serial Number:
590-112 / 61555
Ex. 590-XXX / 6XXXX

Date of Issue: August 16, 2024

The frequency measurements performed and recorded within this report demonstrate that the JENOPTIK RR24F-ST3 radar has an accuracy of less than or equal to 0.62 mph in the range of 6.21 mph to 62.14 mph and an accuracy of 0.62 mph to 1.86 mph in the range of 62.14 mph to 186.41 mph. This is equal to or better than +/- 1 mph accuracy up to 100 mph, as specified by the manufacturer.

FSK Frequency Set 1					
Nominal Frequency (GHz)	Measured Frequency (GHz)	Amplitude (dBm)	Frequency Deviation (MHz)	Limit (MHz)	Results
f_0 = 24.08	24.0786	13.9918297	-1.40	+/- 48.2	PASS
f_1 = 24.08725	24.08575	14.3924444	-1.50	+/- 48.2	PASS
f_2 = 24.089	24.0877	15.4210754	-1.30	+/- 48.2	PASS
f_3 = 24.09	24.088675	15.393436	-1.33	+/- 48.2	PASS

FSK Frequency Set 2					
Nominal Frequency (GHz)	Measured Frequency (GHz)	Amplitude (dBm)	Frequency Deviation (MHz)	Limit (MHz)	Results
f_0 = 24.12	24.118575	13.3162461	-1.43	+/- 48.2	PASS
f_1 = 24.12725	24.125725	13.5368565	-1.53	+/- 48.2	PASS
f_2 = 24.129	24.127675	14.9264865	-1.33	+/- 48.2	PASS
f_3 = 24.13	24.12865	14.9498464	-1.35	+/- 48.2	PASS

FSK Frequency Set 3					
Nominal Frequency (GHz)	Measured Frequency (GHz)	Amplitude (dBm)	Frequency Deviation (MHz)	Limit (MHz)	Results
f_0 = 24.16	24.15855	14.7046386	-1.45	+/- 48.2	PASS
f_1 = 24.16725	24.1657	14.8972447	-1.55	+/- 48.2	PASS
f_2 = 24.169	24.16765	15.7468736	-1.35	+/- 48.2	PASS
f_3 = 24.17	24.168625	15.925233	-1.38	+/- 48.2	PASS

Radar Sensor Calibration Verification
Certificate of Calibration

Model: RRS24F-ST3

Part Number / Serial Number:
590-112 / 62115
Ex. 590-XXX / 6XXXX

Description:
Radar Characteristics Validation
In compliance with:
RRS24F-ST3 Radar Sensor Calibration Verification Procedure Documentation (5030-0150)

Date of Issue: October 18, 2024

Owner of EUT: **Verra Mobility**
1150 N. Alma School Rd
Mesa, AZ 85201

Attention of: **Engineering Department**
Phone: (480) 443-7000

Test Facility	
Test Laboratory	Keystone Compliance, LLC
Address	131 North Columbus Innerbelt
City, State, Zip Code	New Castle, PA 16101
Email	questions@keystonecompliance.com
Web Site	www.keystonecompliance.com

Test Personnel	
Name	Alex Herrin
Title	EMC Test Engineer
Signature	

Radar Sensor Calibration Verification
Certificate of Calibration

Model: RRS24F-ST3

Part Number / Serial Number:
590-112 / 62115
Ex. 590-XXX / 6XXXX

Date of Issue: October 18, 2024

The frequency measurements performed and recorded within this report demonstrate that the JENOPTIK RR24F-ST3 radar has an accuracy of less than or equal to 0.62 mph in the range of 6.21 mph to 62.14 mph and an accuracy of 0.62 mph to 1.86 mph in the range of 62.14 mph to 186.41 mph. This is equal to or better than +/- 1 mph accuracy up to 100 mph, as specified by the manufacturer.

FSK Frequency Set 1					
Nominal Frequency (GHz)	Measured Frequency (GHz)	Amplitude (dBm)	Frequency Deviation (MHz)	Limit (MHz)	Results
f_0 = 24.08	24.0786	14.6078297	-1.40	+/- 48.2	PASS
f_1 = 24.08725	24.086075	14.7154444	-1.17	+/- 48.2	PASS
f_2 = 24.089	24.0877	15.9290754	-1.30	+/- 48.2	PASS
f_3 = 24.09	24.088675	16.183436	-1.33	+/- 48.2	PASS

FSK Frequency Set 2					
Nominal Frequency (GHz)	Measured Frequency (GHz)	Amplitude (dBm)	Frequency Deviation (MHz)	Limit (MHz)	Results
f_0 = 24.12	24.118575	14.7412461	-1.43	+/- 48.2	PASS
f_1 = 24.12725	24.125725	14.7428565	-1.53	+/- 48.2	PASS
f_2 = 24.129	24.12735	16.2064865	-1.65	+/- 48.2	PASS
f_3 = 24.13	24.128325	16.3678464	-1.67	+/- 48.2	PASS

FSK Frequency Set 3					
Nominal Frequency (GHz)	Measured Frequency (GHz)	Amplitude (dBm)	Frequency Deviation (MHz)	Limit (MHz)	Results
f_0 = 24.16	24.158875	15.9316386	-1.13	+/- 48.2	PASS
f_1 = 24.16725	24.166025	16.6142447	-1.22	+/- 48.2	PASS
f_2 = 24.169	24.167975	17.4428736	-1.03	+/- 48.2	PASS
f_3 = 24.17	24.16895	17.453233	-1.05	+/- 48.2	PASS

VERRA MOBILITY™

PREVENTIVE MAINTENANCE CHECKLIST

Date & Time: 04/05/2025 14:11:00 **Site ID:** KRKF001 **Location:** NB 132ND AVE NE @ MUIR ELEMENTARY/KAMIAKIN MIDDLE

Product: AutoPatrol **Technician Name:** Thomas Yuen **See Associated Ticket:** ☐

Item	Status	Note/Action (If Status N/A, please specify)
1. Clean dirt, grime, and graffiti off enclosure and glass.		
1.1. Clean Graffiti. *Check physical integrity. Check paint/housing for graffiti and (or) other vandalism.*	*Pass*	
1.2. Clean Glass: *Clean and inspect all glass and enclosures.*	*Pass*	
1.3. Clean Enclosure (Interior): *Clear vents/fans of obstruction. Remove dust and dirt by vacuum/wiping.*	*Pass*	
1.4. Check Enclosure: *If enclosure moved during cleaning, tighten base.*	*Pass*	
2. Perform a general site inspection to include environmental and road conditions.		
2.1. PLP/Loop Loop: *Check for exposed or cut loop wiring, and epoxy wear and tear.*	*N/A*	
2.2. Power & Grounding: *Inspect all power and grounding connections.*	*Pass*	
2.3. Radar: *Inspect radar and cables. Visually inspect antenna.*	*Pass*	
2.4. WVDs: *Check for popped out pucks, visible cracks, or other noticeable damage.*	*N/A*	
3. Inspect poles, bases, and enclosures.		

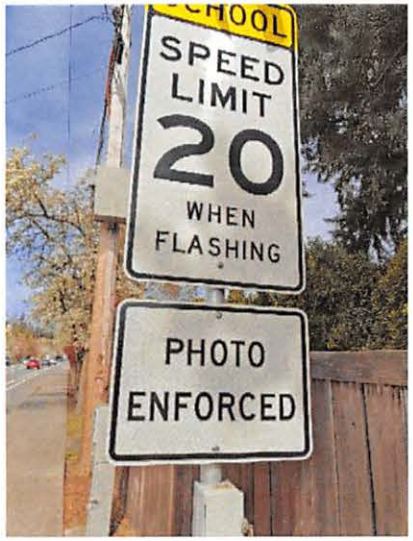
3.1. Pole: *Check sturdiness. Check hurricane collar and confirm screws are tight.*	*Pass*	
3.2. Base: *Check for cracks. Ensure bolts (and latch bolt) are tight and secure inside base.*	*Pass*	
3.3. Enclosure: *Confirm straps are tight and secure against pole. Tighten if loose.*	*Pass*	
4. Inspect cables and connections.		
4.1. Cables: *Check all cables for visible wear or damage.*	*Pass*	
4.2. Connections: *Check for exposed wires on pole connecting to radar, camera enclosure, and strobe.*	*Pass*	

5. Take (and attach) photo of enclosure, pole, and photo enforcement sign(s) for presence and damage.

5.1. Enclosure:

5.2. Pole:

5.3. Photo Enforcement Sign(s):



VERRA MOBILITY™

PREVENTIVE MAINTENANCE CHECKLIST

Date & Time: 04/06/2025 14:09:00 **Site ID:** KRKF002 **Location:** SB 132ND AVE NE @ MUIR ELEMENTARY/KAMIAKIN MIDDLE

Product: AutoPatrol **Technician Name:** Thomas Yuen **See Associated Ticket:** ☐

Item	Status	Note/Action (If Status N/A, please specify)
1. Clean dirt, grime, and graffiti off enclosure and glass.		
1.1. Clean Graffiti. *Check physical integrity. Check paint/housing for graffiti and (or) other vandalism.*	*Pass*	
1.2. Clean Glass: *Clean and inspect all glass and enclosures.*	*Pass*	
1.3. Clean Enclosure (Interior): *Clear vents/fans of obstruction. Remove dust and dirt by vacuum/wiping.*	*Pass*	
1.4. Check Enclosure: *If enclosure moved during cleaning, tighten base.*	*Pass*	
2. Perform a general site inspection to include environmental and road conditions.		
2.1. PLP/Loop Loop: *Check for exposed or cut loop wiring, and epoxy wear and tear.*	*N/A*	
2.2. Power & Grounding: *Inspect all power and grounding connections.*	*Pass*	
2.3. Radar: *Inspect radar and cables. Visually inspect antenna.*	*Pass*	
2.4. WVDs: *Check for popped out pucks, visible cracks, or other noticeable damage.*	*N/A*	
3. Inspect poles, bases, and enclosures.		

3.1. Pole: *Check sturdiness. Check hurricane collar and confirm screws are tight.*	*Pass*	
3.2. Base: *Check for cracks. Ensure bolts (and latch bolt) are tight and secure inside base.*	*Pass*	
3.3. Enclosure: *Confirm straps are tight and secure against pole. Tighten if loose.*	*Pass*	
4. Inspect cables and connections.		
4.1. Cables: *Check all cables for visible wear or damage.*	*Pass*	
4.2. Connections: *Check for exposed wires on pole connecting to radar, camera enclosure, and strobe.*	*Pass*	

5. Take (and attach) photo of enclosure, pole, and photo enforcement sign(s) for presence and damage.

5.1. Enclosure:

5.2. Pole:

5.3. Photo Enforcement Sign(s):