

**STATE OF MINNESOTA  
IN COURT OF APPEALS  
A15-1984**

State of Minnesota,  
Respondent,

vs.

Shane Lee Olson,  
Appellant.

**Filed December 5, 2016  
Affirmed  
Ross, Judge**

Sherburne County District Court  
File No. 71-VB-15-3373

Lori Swanson, Attorney General, St. Paul, Minnesota; and

Derek T. Archambault, Hawkins & Baumgartner, P.A., Anoka, Minnesota (for respondent)

John D. Ellenbecker, St. Cloud, Minnesota (for appellant)

Considered and decided by Cleary, Chief Judge; Worke, Judge; and Ross, Judge.

**S Y L L A B U S**

A police officer's controlled testing of a handheld laser speed-measuring device to establish that it is accurately measuring distance to a stationary object satisfies the foundational external-test requirement of Minnesota Statutes section 169.14, subdivision 10(a) (2014), allowing the district court to admit into evidence the officer's testimony of the device's speed readings.

## OPINION

**ROSS**, Judge

A police officer used a handheld laser device and clocked Shane Olson's car at 70 miles per hour in a 55-mile-per-hour zone. Olson challenged the ticket in court and objected to the admission of the officer's testimony of his speed. He argued that the officer's external testing of the laser unit failed to verify its reliability because the officer's testing proved only that the unit accurately measures distance, and speed depends on an accurate measure of both time and distance. The district court overruled the objection and found Olson guilty. Because the officer's external test verified not only that the laser unit was measuring distance accurately but also implicitly verified that it was measuring time accurately, the district court did not abuse its discretion by admitting the officer's testimony of the speed-device evidence, and we affirm.

## FACTS

Elk River police officer Andrew Zabee ticketed Shane Olson for speeding in July 2015. Officer Zabee testified at Olson's bench trial that Olson's car was traveling in a 55-mile-per-hour zone when the officer's handheld laser device indicated that Olson was moving at 70 miles per hour. Olson objected to the officer's testimony, contending that it lacked a proper evidentiary foundation, and the district court sustained the objection. The prosecutor questioned Officer Zabee further, and the officer testified that he was trained to use the laser device, that his car was stationary when he encountered Olson's car, that he pointed the laser device out his open window to avoid any distortion, and that the weather conditions were suitable for interference-free measurements by the device.

Olson again objected for lack of foundation, arguing that the officer's testimony failed to satisfy the external-test requirements of Minnesota Statutes section 169.14, subdivision 10(a)(4), which allows an officer to testify to a reading from a speed-testing device only if the officer first establishes that he performed an external test to verify that the device was functioning reliably. The district court asked Officer Zabee, "Are there any external tests done on this laser that you're aware of?" The officer answered, "No." The district court implicitly agreed with Olson that the state had not laid the proper testimonial foundation.

The prosecutor questioned Officer Zabee again. The officer testified that the device ran its own internal test when he activated it. He then performed an external "distance check." He explained that he successfully performed the distance check by targeting an object at a known distance from the unit, triggering the unit, and verifying that the distance displayed on the unit accurately matched the known distance. The district court then accepted the officer's testimony that the laser unit calculated Olson's speed at 70 miles per hour.

Olson cross-examined Officer Zabee. The officer admitted that he performed no separate test to establish that the device accurately measures speed. Olson again raised his foundational challenge and argued that the officer's testimony did not satisfy the statute because speed is calculated based on distance *and* time, not just distance. The prosecutor argued that the state has "never been required to prove up some sort of accurate measurement of time" for traditional radar units, so it need not prove time for the laser unit.

The district court held that Officer Zabee’s distance check satisfied the foundational requirements for speed-device evidence. It reasoned that section 169.14, subdivision 10(a)(4), does not specify that an external test is required “for every different component of whatever formula the device is using.” It found Olson guilty of speeding. Olson appeals.

### **ISSUE**

Does the district court act within its discretion and in compliance with Minnesota Statutes section 169.14, subdivision 10(a), when the court allows an officer to state a defendant’s speed based on the reading indicated on a laser device that the officer externally tested only for its ability to accurately measure distance to a stationary object?

### **ANALYSIS**

Olson asks us to reverse based on the purportedly erroneous evidentiary ruling. We review a district court’s evidentiary rulings for an abuse of discretion. *State v. Chavez-Nelson*, 882 N.W.2d 579, 588 (Minn. 2016). We will reverse only if the appellant establishes that the district court’s ruling reflects an abuse of discretion and that the ruling prejudiced his substantial rights. *Id.* Olson argues specifically that the district court should not have admitted Officer Zabee’s testimony that the laser device indicated that he was traveling at 70 miles per hour because the officer did not sufficiently test the unit. We think Olson is wrong on the law and the science.

Olson contends that the prosecutor failed to lay adequate foundation for the officer’s laser-result testimony. The relevant statute imposes four conditions before a district court may admit evidence of speed measured by a laser unit or other speed-measuring device:

- (1) the officer operating the device has sufficient training to properly operate the equipment;
- (2) the officer testifies as to the manner in which the device was set up and operated;

- (3) the device was operated with minimal distortion or interference from outside sources; and
- (4) the device was tested by an accurate and reliable external mechanism, method, or system at the time it was set up.

Minn. Stat § 169.14, subd. 10(a). The constitutionality of this legislative evidentiary requirement is not contested here, but, relevant to our application of the statute, we have held that “because [section] 169.14 complies with, rather than conflicts with, the rules of evidence, it does not violate the separation-of-powers doctrine.” *State v. Ali*, 679 N.W.2d 359, 365 (Minn. App. 2004).

Olson argues that the state failed to satisfy the fourth element of the foundational requirement—the completion of an external test “by an accurate and reliable external mechanism, method, or system.” He is wrong for two reasons. The first is that the statute does not require an external test to verify the precision of every component of a speed-measuring device’s calculation of speed. The second is that, even if it did, a distance-measurement check of a standard laser unit meets that requirement.

Caselaw regarding laser evidence is less developed than caselaw for radar evidence, but we have observed that the admissibility of laser evidence is analogous to the admissibility of radar evidence. *Ali*, 679 N.W.2d at 365. Police test traditional squad-car radar devices externally without necessarily measuring the speed of a moving physical object; they can verify the device’s accuracy by measuring the frequency of its radiating waves as modulated by a calibrated, vibrating tuning fork. *State v. Gerdes*, 291 Minn. 353, 357–60, 191 N.W.2d 428, 431–33 (1971). Olson does not identify any case that requires a more specific external test to satisfy subdivision 10(a)(4), and we have found none. *See*

*State v. McDonough*, 302 Minn. 468, 470, 225 N.W.2d 259, 260 (1975) (holding that radar device’s internal tuning fork serves as an adequate check on accuracy of external tuning fork); *State, City of St. Louis Park v. Bogren*, 410 N.W.2d 383, 385 (Minn. App. 1987) (stating that “use of properly calibrated internal and external tuning forks serves [as] an adequate test of radar accuracy”); *State v. Dow*, 352 N.W.2d 125, 127 (Minn. App. 1984) (affirming admission of officer’s testimony of radar results when tuning fork and calibrated speedometer on squad car were used to check radar’s accuracy). We have declared that the purpose of testing the radar unit is to determine that the mechanism is generally operating properly, not to determine that it is operating properly in every mode. *State v. Pulos*, 406 N.W.2d 75, 76 (Minn. App. 1987) (rejecting an argument that a radar device must be re-tested every time it is shifted from “moving” to “stationary” mode). And as to a laser device specifically, we rejected the argument that testing the device on a moving object is required to satisfy the statute’s external-test condition. *Ali*, 679 N.W.2d at 366. Under the caselaw, subdivision 10(a)(4) requires only that a device be tested by an “accurate and reliable” external method before an officer may testify about its results. *See id.*

This caselaw about the admissibility of speed-device evidence—particularly our *Ali* case—is informative. It teaches that we have never interpreted the statute so as to preclude an officer’s speed-device-results testimony simply because the officer’s external testing was not scientifically exhaustive. A defendant is of course free to attempt to impeach the officer’s testimony by criticizing the imprecise testing methodology and consequently calling the unit’s reliability into doubt. *See* Minn. R. Evid. 607 (“The credibility of a witness may be attacked by any party . . .”). But there is a substantial difference between

testimony that is insufficiently reliable to be convincing (an ultimate decision for the fact-finder) and testimony that is insufficiently reliable merely to be admitted (a preliminary decision of law for the court). This is where our reasoning in *Ali* is particularly useful. Again, we explained that the legislative foray into evidentiary foundations for trial testimony does not unconstitutionally cross the separation-of-powers line specifically because the statute “complies with, rather than conflicts with, the rules of evidence” as to foundational admissibility. *Ali*, 679 N.W.2d at 365. Olson essentially urges us to apply the statute to prohibit an officer from testifying about the laser unit’s speed calculation unless the officer’s earlier external testing covers every element of the unit’s speed calculation. Not only does the express language of the statute (calling for “an accurate and reliable external [testing] method”) not demand this sort of exhaustive testing, an exhaustive-testing obligation would also far exceed the *judicially* developed foundational requirements. Because we have already interpreted the statute as providing an admissibility rule that is consistent with rather than more restrictive than judicial foundational requirements for non-expert witnesses, we will not now interpret it as imposing a more formidable admissibility prerequisite. The caselaw convinces us that the limited, external distance test for proper laser-unit functionality clears the statutory hurdle even if a more exacting and probative accuracy test is conceivable.

Officer Zabee’s testing of the device is at least such a sufficient test. Olson does not argue that the officer’s external distance check was inaccurate or unreliable, only that some additional test for time must also have been performed before the officer could testify to what the device indicated about Olson’s speed. Olson does not propose an additional,

independent external test that would verify specifically the accuracy of the device's use of time. And we can think of none. We are convinced that he has failed to demonstrate that the district court abused its discretion by admitting the evidence.

Olson's argument also depends on a misunderstanding of the science of standard laser devices. So even if Olson is correct that the statute requires an officer to complete an external test of a laser unit for both time and distance before the officer may testify about the device's calculation of a defendant's speed, still we reject his appeal. This is because, as a matter of basic physics, Officer Zabee's distance check necessarily tested for *both* distance *and* time. And as such, the distance check is an "accurate and reliable external . . . method" to measure an object's speed.

Reviewing how now-customary laser devices work informs us that, when a laser device accurately calculates distance, *it necessarily is also accurately measuring time*. Olson correctly states that the accuracy of a speed calculation depends on the accuracy of both a time and distance measurement. But he overlooks the fact that a laser device first calculates an object's distance from the device in order to calculate its speed. *See 1 McCormick on Evidence* § 204(D) (Kenneth S. Broun, ed., 7th ed., June 2016) (explaining laser-based speed-measuring technology, stating that the physical principles the technology relies upon are "eminently sound," and referencing multiple jurisdictions that have expressly accepted the general reliability of laser technology); *see also* Datta Sainath Dwarampudi & Venkat Sai Vivek Kakumanu, *Efficiency of a LiDAR Speed Gun*, 1 Int'l J. of Electrical, Electronics & Data Comm. 27, 27–28 (2013); Ryan V. Cox & Carl Fors, *Admitting Light Detection and Ranging (LiDAR) Evidence in Texas: A Call for Statewide*



*Judicial Notice*, 42 St. Mary's L.J. 837, 849 (2011); *see cf. Ali*, 679 N.W.2d at 364 (indicating that a district court taking judicial notice of the general reliability of laser technology would not be an abuse of discretion).

Understanding how a laser device accurately calculates a known distance establishes the reliability of its time measurement. A laser unit measures *distance* specifically based on the constant *speed* of light and based on the *time* it takes for pulsed, infrared light to reflect off the target and return to the device. *See Efficiency of LiDAR* at 28; *Admitting LiDAR* at 849. The device calculates distance by multiplying half the reflection time by the invariable speed of light. *See Efficiency of LiDAR* at 28. Therefore if a laser device measures a known *distance* to an object accurately, it must necessarily be measuring the *time* taken for light to travel to and return from that object accurately. To calculate the speed of the object if it were moving, the device would then divide the object's change in distance between pulses of light by the amount of time elapsed between those same pulses. *Id.*; *see also Admitting LiDAR* at 849. And if the device's measurement of time is shown to be accurate as to its calculation of distance, there is no reason to assume that its measurement of time would be inaccurate as to its calculation of speed.

Olson's challenge is therefore met: because the laser unit was accurately calculating distance, it was also accurately measuring time and speed. There was no need for the officer to additionally test the pulse-interval component of the unit by also testing it on a moving object. We recognize that one certainly could test the device on a moving object, like a car with a verified speedometer, and that this additional test would bolster the trustworthiness of the officer's laser-results testimony. And we understand that the unit's ability to

precisely and accurately calculate the time that lapses between each of its myriad pulses is a necessary feature of its ability to accurately read a vehicle's speed. But for the purposes of the purely foundational statute bearing only on admissibility rather than scientific certainty, the district court acts within its discretion by reasonably assuming that a properly functioning laser unit that accurately applies time, distance, and speed in its calculations to a stationary object continues to apply those same elements accurately in its speed calculation of a moving object. Put another way, just as we liberally but reasonably presume under the statute that a radar unit that accurately calculates sound frequency will accurately calculate a car's speed, *Bogren*, 410 N.W.2d at 385, and that a radar unit that accurately calculates a car's speed in stationary mode will accurately calculate a car's speed in moving mode, *Pulos*, 406 N.W.2d at 76, the statute allows the district court to presume that a laser unit that accurately measures time when it calculates an object's distance will also accurately measure time when it calculates a car's speed. We expressly declined to require a moving-object laser test in *Ali*, and Olson's scientific argument does not call that holding into question.

We reject Olson's argument that Officer Zabee's external test failed to measure time and that it therefore failed to meet the statutory admissibility requirements.

## **D E C I S I O N**

The officer's external distance check established that the laser device was accurately measuring distance, and this necessarily indicated that the device was also accurately measuring time and speed. The district court did not err by holding that the distance check satisfied the requirements of section 169.14, subdivision 10(a)(4), and it did not abuse its

discretion by allowing the officer to testify that the laser device measured Olson's speed at 70 miles per hour.

**Affirmed.**