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Australian Standard™

Radar speed detection

Part 2: Operational procedures

This Australian Standard was prepared by Committee CS-068, Radar Speed Detection. It was approved on behalf of the Council of Standards Australia on 11 July 2003 and published on 11 August 2003.

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Australian Automobile Association
Australian Chamber of Commerce and Industry
Institution of Engineers, Australia
National Standards Commission
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Australian Standard™

Radar speed detection

Part 2: Operational procedures

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PREFACE

This Standard was prepared by Standards Australia Committee CS-068, Radar Speed Detection, to supersede AS 2898.2—1992. The initial request for the Standard was submitted by the Australian Automobile Association which wished to see the procedures for using radar speed detection devices formalized in a public document.

In preparing this Standard, cognizance was taken of *Model Performance Specifications for Police Traffic Radar Devices*, published by the US National Highway Traffic Safety Administration.

This Standard specifies the procedures to be followed when using devices which comply with the requirements of AS 2898.1 to measure the speed of target vehicles for the purpose of law enforcement or scientific measurement. It does not purport to be an exhaustive set of requirements for the metrological aspects of speed measurements by means of doppler radar. The establishment of such requirements falls within the area of responsibility of the National Standards Commission (NSC) rather than Standards Australia. The Committee was aware of OIML R91 *Radar equipment for the measurement of the speed of vehicles*, which sets out comprehensive metrological requirements and may be endorsed by the NSC for use in Australia.

This edition of the Standard has been expanded from the 1992 edition to—

- (a) include all image capture systems, not just photographic systems;
- (b) clarify certification and sealing requirements;
- (c) clarify the difference in alignment requirements for slant and direct radar devices; and
- (d) specify the training for device operators and image evaluators, rather than only providing guidance on these topics.

This Standard has been prepared to take into account the state of the art of radar speed detection in Australia at the time of publication.

This Standard is not intended to inhibit further advances in radar speed detection technology. The Committee will consider amending the Standard to include suitable requirements for new types of equipment as they become available.

The term ‘normative’ has been used in this Standard to define the application of the appendix to which it applies. A ‘normative’ appendix is an integral part of a Standard.

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STANDARDS AUSTRALIA**Australian Standard
Radar speed detection****Part 2: Operational procedures****SECTION 1 SCOPE AND GENERAL****1.1 SCOPE**

This Standard sets out the procedures to be followed when using a radar device to measure the speed of a target for law enforcement or for scientific measurement.

1.2 OBJECTIVE

The objective of this Standard is to provide operational requirements for radar speed detection devices and training of operators of such devices in order to ensure uniformity of practice in their use.

1.3 APPLICATION

This Standard is applicable to the use of radar devices complying with AS 2898.1.

1.4 REFERENCED DOCUMENTS

The following Standards are referred to in this Standard:

AS

2898 Radar speed detection

2898.1 Part 1: Functional requirements and definitions

4691 Laser-based speed detection devices

4691.2 Part 2: Operational procedures

1.5 DEFINITIONS

For the purpose of this Standard, the definitions set out in AS 2898.1 apply.

SECTION 2 OPERATIONAL PROCEDURES

2.1 OPERATOR

For the purpose of law enforcement, the operator of the radar device shall be a person trained in accordance with Appendix A and authorized to use radar devices to measure the speed of objects.

Records of persons authorized to use radar devices to measure the speed of objects shall be maintained.

The authorization of an operator shall lapse if the operator has not used a radar speed detection device for more than 12 months. Such an operator may be authorized following an appropriate period of retraining.

NOTES:

- 1 The authorizing body is the body with the responsibility for enforcing laws relating to speed at the location where the radar device is to be used.
- 2 Speed measurements taken by persons other than authorized operators are not considered to be valid for the purpose of this Standard unless such persons are under training and are being directly supervised by an authorized operator.

2.2 EQUIPMENT CERTIFICATION

2.2.1 Testing authority

Each testing authority shall be an organization or company recognized as being competent to carry out electronic testing in accordance with this Standard.

2.2.2 Frequency of testing

The radar device shall not be used unless it has been tested and certified by a testing authority as meeting the requirements set out in Clause 2.2.3 and been sealed by the testing authority within the past 12 months.

2.2.3 Testing procedure

The testing procedure shall ascertain that—

- (a) the device is correctly calibrated in accordance with the manufacturer's instructions; and
- (b) speed measurements within the accuracy specified in Clause 2.5.2 of the true speed are determinable.

2.2.4 Sealing

The testing authority shall seal the radar device only if the device satisfied the testing set out in Clause 2.2.3.

The seals shall be applied in such a manner as to effectively prevent interference with the speed computing circuitry of the device without breaking the seal. The testing authority shall keep records of all devices sealed, including—

- (a) identification of each device;
- (b) the date on which tests were conducted; and
- (c) the manner in which the device was sealed.

2.2.5 Certification

The testing authority shall issue a certificate only if the device has—

- (a) satisfied the test requirements in Clause 2.2.3; and
- (b) been sealed as prescribed in Clause 2.2.4.

2.3 VEHICLE-MOUNTED EQUIPMENT

2.3.1 Vehicle power source

If a radar device uses a vehicle for its source of power, the power supply shall be isolated from the effects of the vehicle's ignition circuit by connecting the radar device directly to the vehicle's battery using shielded cable.

2.3.2 Antenna

The antenna of a radar device may be mounted within the cabin of a vehicle; however, regardless of where the antenna is mounted, personnel should not come within 100 mm of the front of the radar antenna when the radar is operating.

2.3.3 Speed displays

Speed displays on a radar device which is mounted in a vehicle shall be in clear view of the operator. Mirrors shall not be used as a means of reading speed displays. Neither speed displays nor other parts of the radar device should obscure any speedometer in the vehicle.

2.4 SITE SELECTION

2.4.1 General

When selecting a site for the use of a radar device in the stationary mode, the factors listed in Clauses 2.4.2 to 2.4.7 shall be taken into account.

2.4.2 Electromagnetic interference (EMI)

The operator shall ensure that the effects of electromagnetic interference are minimized by careful site selection.

2.4.3 Reflections from stationary objects

The operator shall ensure that the radar beam is not being reflected away from the direction in which it is being aimed by stationary objects as this may lead to incorrect target identification.

NOTE: Typical stationary reflective objects are advertising hoardings, traffic signs, parked vehicles, metallic fences, sheds and phone boxes.

2.4.4 Detection area

The operator shall take into account the full detection area and the fact that the speed of any moving object within the detection area could be being measured at any given time.

NOTE: The detection area varies with different makes of radar devices.

2.4.5 Traffic density

The operator shall take into account the traffic density at the site at the time of measurement to ensure that targets can be clearly identified.

2.4.6 Extraneous moving objects

The operator shall take into account the fact that moving objects which are not on the roadway being monitored can be within the detection area.

NOTE: Such objects can be on adjacent service roads or highways, on the other side of divided roads, on properties bordering the roadway, or there may be trains on adjacent railways.

2.4.7 Alignment

The operator shall ensure the beam of the radar device is related to the flow of traffic as follows:

- (a) For slant radar devices, as near as possible to being parallel to the plane of the roadway and at the angle specified by the manufacturer, within the manufacturer's specified tolerances.

NOTE: The operator should be aware of the fact that if a slant radar antenna is not aligned in accordance with the manufacturer's specification, the speed measured by the radar device will be greater or less than the true speed of the target according to whether the angle to the flow of traffic is smaller or larger than specified.

- (b) For direct radar devices, as close as possible to being directly in line with the direction of travel of the target.

NOTE: The operator should be aware of the fact that if a direct radar antenna is not aligned with the direction of travel of the target the speed measured by the radar device can be less than the true speed of the target. This is referred to as the 'cosine angle effect' because the measured speed is equal to the true speed multiplied by the cosine of the angle between the antenna and the direction of travel of the target and hence cannot be higher than the true speed.

2.5 FIELD TESTING

2.5.1 General

The accuracy of the radar device shall be tested in accordance with Clause 2.5.3 at the commencement and end of operation.

2.5.2 Required accuracy

When tested in accordance with Clause 2.5.3, the required accuracy shall be—

- (a) for a direct radar device: +2, -3 km/h; or
- (b) for a slant radar device: ± 3 km/h up to a displayed speed of 100 km/h and $\pm 3\%$ of the reading for a displayed speed greater than 100 km/h.

If the accuracy of the radar device determined in accordance with Clause 2.5.3 is not within the required accuracy, then—

- (i) the device shall not be used until it has been rendered capable of producing the required accuracy, recertified and resealed in accordance with Clause 2.2; and
- (ii) all readings taken since the device was last tested in accordance with Clause 2.5.3 shall be deemed to be invalid.

2.5.3 Field testing procedure

The accuracy of the radar device shall be tested in at least one of the following ways:

- (a) In accordance with the manufacturer's recommended field testing procedure using any test equipment (e.g. tuning forks) approved by the manufacturer.
- (b) Against a vehicle's speedometer of known accuracy. Allowance shall be made for the known tolerance on the speed measured by the speedometer.

NOTE: The accuracy of the vehicle's speedometer need not necessarily be within the required accuracy specified in Clause 2.5.2 as this test is only intended to detect a gross error in the test carried out in accordance with the manufacturer's instructions.

- (c) Against another radar device which has been tested in accordance with Item (a) or Item (b) and meets the requirements of Clause 2.5.2 or against a laser-based speed detection device that meets the requirements of AS 4691.2.

2.6 TARGET IDENTIFICATION

2.6.1 General

A valid speed measurement shall only be taken when the target is clearly identifiable by direct observation or by image capture means.

2.6.2 Slant radar

2.6.2.1 General

Identification of the target by means of slant radar shall be achieved by employing the factors described in Clauses 2.6.2.2 to 2.6.2.5 to identify the target within the detection area.

2.6.2.2 Target

The operator of a slant radar device, other than one linked to an image capture system, shall ensure that there is only one object within the detection area capable of producing the measured speed. In the case of slant radar fitted with directional discrimination, only those objects travelling in the selected direction shall be considered capable of producing the measured speed.

2.6.2.3 Operator presence and visual observation

The operator of a slant radar device, other than one linked to an image capture system which has been designed and tested for unattended operation, shall visually monitor the object under investigation for sufficient time to identify it as the target. If the operator has any doubt that the speed measured by the radar device is not that of the object under investigation, that speed measurement shall be considered invalid. Mirrors shall not be used to observe the object under investigation.

An operator shall be in attendance whenever a radar device linked to an image capture system is taking a valid speed measurement to ensure that the device remains correctly aligned to the roadway and is functioning correctly.

NOTES:

- 1 The operator of a radar device linked to an image capture system is only required to monitor individual objects under investigation if the device has not been designed and tested for unattended operation.
- 2 Regardless of the fact that a radar device may have been designed and tested for unattended operation, this Standard only specifies requirements for attended operation of such devices.

2.6.2.4 Directional discrimination

Where fitted, the operator of a slant radar device other than one linked to an image capture system shall ensure that the directional discrimination facility is always used and is correctly set for the direction in which speed measurements are to be taken.

2.6.2.5 Speed preselection

Where the slant radar device is fitted with the facility for speed preselection, the operator should use the facility to discriminate between a target travelling at, or above, the preselected speed and surrounding traffic moving slower than the preselected speed.

2.6.3 Direct radar

2.6.3.1 General

Identification of the target by means of direct radar shall be achieved by employing the factors described in Clauses 2.6.3.2 to 2.6.3.6 to identify the target within the detection area.

2.6.3.2 Visual observation

The operator of a direct radar device shall visually monitor the object under investigation for sufficient time to identify it as the target. If the operator has any doubt that the speed measured by the radar device is not that of the object under investigation, that speed measurement shall be considered invalid. Mirrors shall not be used to observe the object under investigation.

2.6.3.3 Audio tracking

The operator shall monitor the audio doppler signal of a direct radar device for sufficient time to identify the target prior to taking a valid speed measurement. The audio doppler over this period shall be a single clear tone and its pitch shall only vary in proportion to the visually observed changes in speed of the object under investigation.

2.6.3.4 Reflective capability

The operator of a direct radar device shall take into account the effects of the relative size and shape of the target and its distance from the radar device when identifying the target.

2.6.3.5 Directional discrimination

Where fitted, the operator of a direct radar device shall ensure that the directional discrimination facility is always used, and is correctly set for the direction in which speed measurements are to be taken.

2.6.3.6 Speed preselection

Where the direct radar device is fitted with the facility for speed preselection, the operator should use the facility to discriminate between a target travelling at, or above, the preselected speed and surrounding traffic moving slower than the preselected speed.

2.7 MOBILE RADAR

2.7.1 General

In addition to the other applicable requirements specified in Section 2, radar devices shall comply with the requirements of Clauses 2.7.2 to 2.7.5 when used in the mobile mode.

2.7.2 Equipment certification

Both target channel and patrol channel of the radar device shall be tested and certified in accordance with Clause 2.2.

2.7.3 Field testing

The accuracy of both target speed and patrol speed shall be tested in accordance with Clause 2.5.

2.7.4 Reflections from stationary objects

A radar device should not be operated in the mobile mode in an area where there is a large number of stationary reflective objects normally present.

2.7.5 Patrol vehicle speed

The speed reading for the patrol vehicle shall be checked against a speedometer of known accuracy whenever a target speed measurement is taken. The operator shall ensure that the speed of the patrol vehicle is kept relatively constant while a target speed measurement is being taken.

2.8 EVALUATION OF CAPTURED IMAGES

For the purpose of law enforcement, images produced by a radar device linked to an image capture system shall be evaluated by a person trained in accordance with Appendix B and authorized to undertake this task. The evaluator need not be present at the time the image was captured.

The authorization of an evaluator shall lapse if the evaluator has not undertaken this task for more than 12 months. Such an evaluator may be reauthorized following an adequate period of retraining.

APPENDIX A
OPERATOR TRAINING
(Normative)

A1 SCOPE

This Appendix specifies the elements to be included in the training program for radar device operators. It is recognized that the proper use of radar devices relies on the skill and training of the operator.

A2 THEORY**A2.1 General**

The theory elements set out in Paragraphs A2.2 to A2.4 shall be included in the program.

A2.2 Radar principles

The basic principles of doppler radar shall be explained and their application to the type of radar which the operator will be using (slant or direct) shall be pointed out. This shall include the following points:

- (a) The principle of the doppler effect.
- (b) Effective range and width of the detection area.
- (c) Cosine angle effect.
- (d) Causes of interference.
- (e) Factors affecting target identification.
- (f) Differences between stationary and mobile modes.
- (g) The differential effect as it applies to mobile radar.
- (h) Shadowing as it applies to mobile radar.
- (i) Limitations of radar speed detection.
- (j) Effects of relative size, shape and distance of target.

A2.3 Set-up and field test procedures

The procedures to be followed when setting up the radar device and the method of testing the accuracy of the device shall be explained. The maximum allowable period between accuracy tests and the procedure to be followed if the device fails the test shall be set out.

A2.4 Site selection

The factors involved in the selection of a site at which to operate the radar device shall be explained.

A3 PRACTICAL TRAINING

Practical training in the operation of radar devices shall be carried out at typical sites under the supervision of an experienced accredited operator.

A4 EXAMINATION

At the completion of the program, candidates shall be set a written examination on the theory elements of radar operation and satisfy an examiner that they have achieved an acceptable level of proficiency in radar speed detection through a practical demonstration.

A5 ACCREDITATION

Accreditation shall only be granted to those candidates who achieve a satisfactory result in the written examination and practical test.

A6 FURTHER TRAINING

When a new type of radar device is introduced into operation, each operator who will be using it shall be trained to use the new device.

A7 REACCREDITATION

The accreditation of an operator shall lapse if the operator has not used a radar device for more than 12 months. Such an operator may be recredited following an adequate period of retraining.

APPENDIX B
TRAINING OF PERSONNEL TO EVALUATE CAPTURED IMAGES
(Normative)

B1 SCOPE

This Appendix specifies the elements to be included in the training program for personnel involved in the identification of targets from images produced by radar speed detection devices linked to an image capture system.

B2 VERIFICATION

The evaluator shall be trained to correctly execute the following procedures:

- (a) Verify details on the data block against the operator's statement. These details typically include:
 - (i) Location of site.
 - (ii) Date.
 - (iii) Time of day.
 - (iv) Direction of travel.
 - (v) Speed limit.
 - (vi) Device identification.
- (b) Understand and initiate the appropriate actions in response to any operator notes which may include reference to anomalous speeds being recorded.
- (c) Examine the images and, for each image, check the following points:
 - (i) Image number.
 - (ii) Any objects in the image, including the background, which could have reflected the radar beam away from the direction in which it was being directed.
 - (iii) Whether or not there is more than one object in the image. If more than one object is in the image, apply the prescribed procedure for target identification or reject the image, according to the guidelines being used.
 - (iv) Registration number or other identifier of the target.
 - (v) Whether the description of the target according to registration records matches the object in the image.
- (d) Reject those images where there is a possibility of an incorrect speed having been recorded or where the target cannot be clearly identified.

B3 EXAMINATION

At the completion of the training program, candidates shall complete a written examination on the theory of captured image evaluation and satisfy an examiner that they have achieved an acceptable level of proficiency in evaluating captured images through a practical demonstration.

B4 ACCREDITATION

Accreditation shall only be granted to those candidates who achieve satisfactory results in both the written examination and practical assessment.

B5 FURTHER TRAINING

When a new type of radar device is introduced into operation, each evaluator shall be trained in the evaluation techniques for use with the new system.

B6 REACCREDITATION

The accreditation of an operator shall lapse if the operator has not evaluated captured images for more than 12 months. Such an operator may be reaccredited following an adequate period of retraining.

NOTES

NOTES

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