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JJG

NATIONAL METROLOGICAL VERIFICATION

REGULATION OF THE PEOPLE'S REPUBLIC OF CHINA

JJG 527-2015

Replacing JJG 527-2007

Fixed Radar Vehicle Speed Measurement Devices

固定式机动车雷达测速仪

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Introduction

JJF 1002 “The Rules for Drafting National Metrological Verification Regulation”, JJF 1001 “General Terms in Metrology and Their Definitions” and JJF 1059.1 “Evaluation and Expression of Uncertainty in Measurement” constitute the basic series of specifications to support the revision of this Regulation. It mainly refers to JJF 1335-2012 “Program of Pattern Evaluation of Fixed-angle Radar Speed Measurement Devices” and JJG 1074-2012 “Vehicle Laser Speed Measurement Device”.

This Regulation is a revision to JJG 527-2007. Compared with JJG 527-2007, in addition to editorial modifications, the main technical changes are as follows:

- specified that this Regulation is applicable to fixed radar vehicle speed measurement devices (see Clause 1);
- deleted verification of speed measurement range, verification of simulating speed measurement error;
- added method that under real traffic flow status, use normal-driving vehicle as measured object to complete verification of field test speed measurement error (see 7.3.4);
- added example in Annex A that under real traffic flow status, to complete verification of field test speed measurement error.

The historical versions replaced by this Regulation are as follows:

- JJG 527-2007 “Verification Regulation of Automatic Monitor System for Vehicle Speeding”;
- JJG 527-1988 “Angled Nozzle Radar Measuring Speedometer”.

Verification Regulation of Fixed Radar Vehicle Speed Measurement Device

1 Scope

This Regulation is applicable to the first verification, the follow-up verification and in-use inspection for fixed radar vehicle speed measurement devices that use Doppler effect principle to measure vehicle's driving speed.

2 Normative references

JJG 1074-2012, *Vehicle Laser Speed Measurement Device*

JJF 1335-2012, *Program of Pattern Evaluation of Fixed-angle Radar Speed Measurement Devices*

GB/T 21255-2007, *Motor vehicle speed detector*

For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

3 Terms

3.1 fixed radar vehicle speed measurement device

a radar speedometer that is fixed and installed on measuring position, that is used to measure vehicle's driving speed

3.2 simulator for radar speed measuring device

a particular testing device that is used to receive continuous microwave signals from radar speedometer and send Doppler microwave signal which is corresponding to the set simulating speed

3.3 standard speed-measuring device for field test

a particular testing device that is used to measure vehicle's driving speed through testing area of fixed radar vehicle speed measurement device

5.4 Field test speed measurement error

When <100 km/h, it is $(-6\sim 0)$ km/h;

When ≥ 100 km/h, it is $(-6\sim 0)\%$.

6 General technical requirements

6.1 Appearance

6.1.1 Fixed radar vehicle speed measurement device shall have a nameplate to indicate product name, specification, model, number, nominal value of radar emission frequency, manufacturer and date. It shall indicate manufacturing license mark and number of measuring instrument.

6.1.2 Fixed radar vehicle speed measurement device shall not have mechanical damage that affects normal use on its look. Each fastener shall not be loose; structure shall be complete.

6.2 Requirements

6.2.1 Setting or adjusting keys of fixed radar vehicle speed measurement device shall be used as normal. Operating keys shall be light and flexible, with normal operation.

6.2.2 Cable and connector of fixed radar vehicle speed measurement device shall be complete, with reliable connection.

6.2.3 Fixed radar vehicle speed measurement device shall have independent speed display unit. After normal working, the display of display screen shall be complete, clear and eye-catching.

7 Control of measuring tools

Control of measuring tools includes: first verification, follow-up verification and in-use inspection.

7.1 Verification conditions

7.1.1 Environmental conditions for verification

7.1.1.1 Laboratory verification environment:

- 1) Temperature: $(15\sim 25)^{\circ}\text{C}$.
- 2) Relative humidity: $<85\%$.

methods in 7.3.1, 7.3.2, 7.3.3, verify general technical requirements, microwave emission frequency error, speed measuring range, simulating speed measurement error and field test speed measurement error first. Record valid data. Then according to method in 7.3.4, verify field test speed measurement error. In follow-up verification, microwave emission frequency error, speed measuring range, simulating speed measurement error can be exempted from verification.

7.3.1 Inspection of general technical requirements

After fixed radar vehicle speed measurement device is turned on, it shall be able to work as normal. Use hand-feeling, visual inspection methods to inspect. Results shall meet requirements of 6.1, 6.2.

7.3.2 Verification of microwave emission frequency error

Schematic diagram of microwave emission frequency verification error of fixed radar vehicle speed measurement device is shown as Figure 1. Make receiving antenna and microwave transmitting antenna of fixed radar vehicle speed measurement device are on a same axis. Connect output terminal of receiving antenna to microwave digital frequency meter.

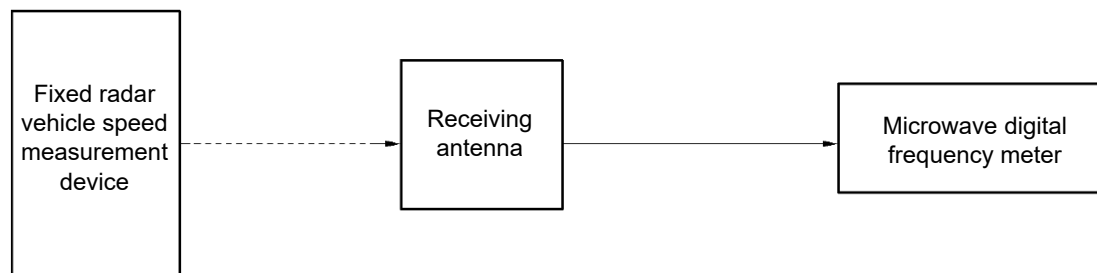


Figure 1 -- System block diagram for verification of microwave emission frequency error

Turn on power of microwave digital frequency meter, fixed radar vehicle speed measurement device. Pre-heat according to instructions on use of instrument. Make fixed radar vehicle speed measurement device continuously emit microwaves. Read measurement values on microwave digital frequency meter. Measure microwave emission frequency 3 times. Microwave emission frequency error is calculated according to formula (1):

$$\Delta f_x = f_0 - f_x \quad (1)$$

Where,

Δf_x - microwave emission frequency error of fixed radar vehicle speed

Install according to use requirements for standard speed-measuring device for field test (or standard speed-measuring device). Adjust to make it under normal working state. Verification personnel shall, on installation road of fixed radar vehicle speed measurement device, according to actual situation of road, select one of the following methods to perform verification of field test speed measurement error:

- (1) Under real traffic flow status, use normal-driving vehicle as measured object. Standard speed-measuring device for field test and fixed radar vehicle speed measurement device shall measure the same tested object in testing area simultaneously. Record 30 sets of valid measured values. Each speed-measuring error shall meet requirements of 5.4. See Annex A for specific operation.
- 2) Testing vehicle that is equipped with standard speed-measuring device drives at a constant tested speed. Standard speed-measuring device measures and displays speed when testing vehicle drives through testing area. At the same time, fixed radar vehicle speed measurement device measures speed of testing vehicle. Speed point of first verification is about 50%, 100% of limit speed. Perform at least two verifications for each tested speed. Each field test speed measurement error shall meet requirements of 5.4. Speed point of follow-up verification is about 100% of limit speed. Perform at least 3 verifications. Each field test speed measurement error shall meet requirements of 5.4.

In case of dispute, use the second method as arbitration verification method.

Filed speed-measuring error is calculated according to formula (2):

$$\Delta v = v - v_0 \quad (2)$$

Where,

Δv - field test speed measurement error, km/h;

v - measured speed of fixed radar vehicle speed measurement device, km/h;

v_0 - measured speed of standard speed-measuring device for field test or standard speed-measuring device, km/h.

Relative field test speed measurement error is calculated according to formula (3):

$$\delta = \frac{\Delta v}{v_0} \times 100\% \quad (3)$$