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SOCIETY OF AUTOMOTIVE ENGINEERS, INC. • TWO PENNSYLVANIA PLAZA • NEW YORK, NEW YORK 10001

# TECHNICAL REPORT

J599b

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## LIGHTING INSPECTION CODE – SAE J599b

Report of Lighting Division approved January 1937 and last revised by Lighting Committee July 1970.

This code is intended only for the inspection and maintenance of lighting equipment on motor vehicles that are in use.

The original SAE code, adopted in 1937, was drafted for use in preparing Interstate Commerce Commission regulations for trucks and buses in interstate operation under the 1935 Motor-Carrier Act. Subsequently, the SAE code served as a basis for Section 2, Lighting Systems of the American National Standard Code for Inspection Requirements for Motor Vehicles, ANS D7-1939. The ANSI inspection requirements for lighting systems were adopted by the Society as the SAE Recommended Practice in January 1940.

### 1. Definitions

**1.1 Sealed Beam Unit**—An integral and indivisible optical assembly with the name "Sealed Beam" molded in the lens.

**1.2 Upper Beam**—A beam intended primarily for distant illumination and for use on the open highway when not meeting other vehicles.

**1.3 Lower Beam**—A beam intended to illuminate the road ahead of the vehicle without causing undue glare to other drivers.

**1.4 7 in. Sealed Beam System**—A system employing two 7 in. Sealed Beam units.

**1.5 7 in. Type 2 Sealed Beam Unit**—A 7 in. diameter unit (with a numeral 2 molded in the lens), which provides an upper and a lower beam. These units are mechanically aimable. NOTE: Original 7 in. Sealed Beam units which can be identified by the absence of "2" on the lens shall be aimed visually on the upper beam.

**1.6 5 3/4 in. Sealed Beam System**—A system employing four 5 3/4 in. Sealed Beam units: two Type 1 and two Type 2.

**1.7 5 3/4 in. Type 1 Sealed Beam Unit**—A 5 3/4 in. diameter unit having a single filament and used in a four lamp system to provide the principal portion of the upper beam.

**1.8 5 3/4 in. Type 2 Sealed Beam Unit**—A 5 3/4 in. diameter unit having two filaments and used in a four lamp system to provide the lower beam and a secondary portion of the upper beam.

**1.9 Mechanically Aimable Sealed Beam Unit**—A unit having three pads on the face of the lens forming a plate which is intended to be used to adjust and inspect the aim of the unit when installed on the vehicle.

## SAE Standard

**1.10 Symmetrical Beam**—A beam in which both sides are symmetrical with respect to the median vertical plane of the beam.

**1.11 Asymmetrical Beam**—A beam in which both sides are not symmetrical with respect to the median vertical plane of the beam. All lower beams are asymmetrical. NOTE: The inspector should see that the driver understands how to use multiple beam headlamps so as to obtain the best road lighting with minimum glare to other users of the highway.

**2. Equipment**—It is recommended that mechanically aimable headlamps be aimed and inspected for aim by mechanical aimers. Another aiming and inspection method is by visual means on a screen at a distance of 25 ft ahead of the headlamps or on the screen of a headlamp testing machine. Photoelectric aiming and inspection is not recommended.

**2.1** The mechanical aimer used shall conform to the requirements of SAE J602. The device shall be in good repair, calibrated and used according to the manufacturer's instructions.

**2.2** If a screen is used, it should be of adequate size with a matte-white surface well shaded from extraneous light and properly adjusted to the floor area on which the vehicle stands. Provision should be made for moving the screen or its vertical centerline so that it can be aligned with the vehicle axis. In addition to the vertical centerline, the screen should be provided with four laterally adjustable vertical tapes and two vertically adjustable horizontal tapes. The four movable vertical tapes should be located on the screen at the left and right limits called for in the specification with reference to centerlines ahead of each headlamp unit. The headlamp centerlines shall be spaced either side of the fixed centerline on the screen by the amount the headlamp units are to the left and right. The horizontal tapes should be located on the screen at the upper and lower limits called for in the specifications with reference to the height of lamp centers and the plane on which the vehicle rests, not the floor on which the screen rests. See Fig. 1.

**2.3** The Headlamp Testing Machine used shall conform to the requirements of SAE J600. The device shall be in good repair, calibrated and used according to the manufacturer's instructions. Aiming and inspection shall be by visual means, not photoelectric.

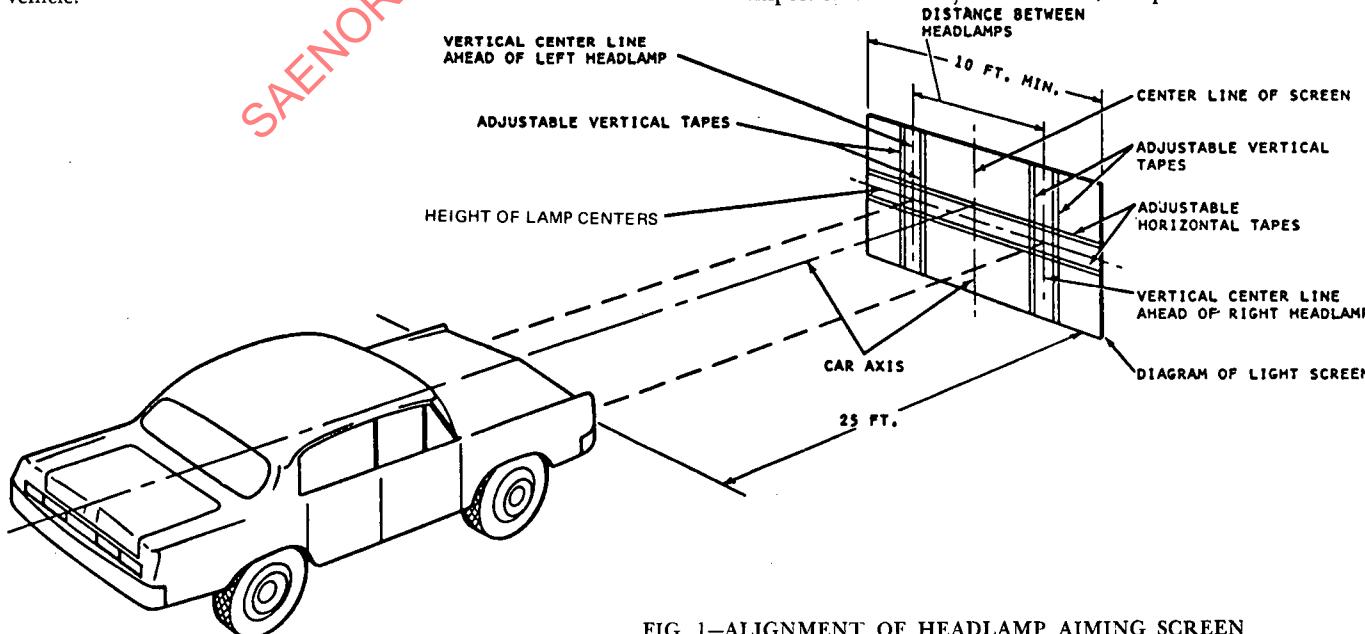


FIG. 1—ALIGNMENT OF HEADLAMP AIMING SCREEN

**3. Preparation for Headlamp Aim or Inspection**—Before checking beam aim, the inspector shall:

- 3.1 Remove ice or mud from under fenders.
- 3.2 See that no tire is noticeably deflated.
- 3.3 Check car springs for sag or broken leaves.
- 3.4 See that there is no load in the vehicle other than the driver.
- 3.5 Check functioning of any "level-ride" control.
- 3.6 Clean lenses and aiming pads.
- 3.7 Check for bulb burnout, broken mechanical aiming pads, and proper beam switching.
- 3.8 Stabilize suspension by rocking vehicle sideways.

**4. Headlamp Aim Adjustment for Service Facilities**

4.1 The following aim adjustment requirements should apply to dealers, service stations, and others who do headlamp adjusting.

4.2 It is recommended that mechanically aimable headlamps be aimed using mechanical aimers (paragraph 2.1). The aimers shall be calibrated for accuracy and shall be compensated for the level of the floor in the aiming area.

**4.3 Mechanical Aiming**

4.3.1 The correct mechanical aim for both Type 1 and Type 2 units is 0-0.

4.3.2 If a headlamp being serviced is not so aimed, the aim shall be corrected to 0-0.

**4.4 Visual Aiming**

4.4.1 The correct visual aim for Type 1 units is with the center of the high intensity zone at  $\frac{1}{2}$  above horizontal and straight ahead vertically based in inches on a screen at 25 ft. (See Fig. 2.)

4.4.2 The correct visual aim for Type 2 units is with the top edge of the high intensity zone of the lower beam  $2\frac{1}{2}$  above horizontal and the left edge at 1 right based in inches on a screen at 25 ft. (See Fig. 3.)

4.4.3 If the headlamp being serviced is not so aimed, it should be corrected to the above aim.

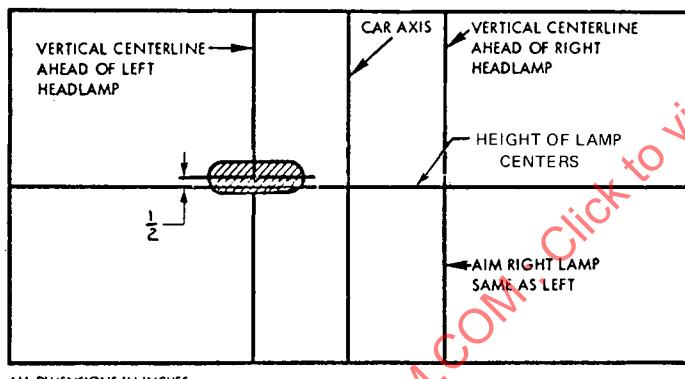


FIG. 2—HOW PROPERLY AIMED UPPER BEAM OF  $5\frac{3}{4}$  IN. TYPE 1 AND 7 IN. SEALED BEAM, (NOT MARKED "2" ON LENS) WILL APPEAR ON THE AIMING SCREEN 25 FT IN FRONT OF VEHICLE. (SHADED AREA INDICATES HIGH INTENSITY ZONE)

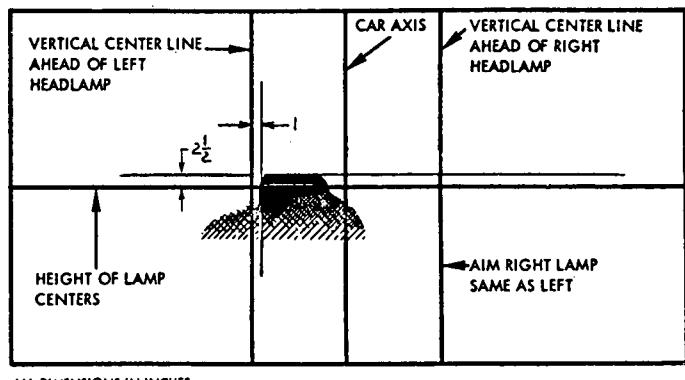


FIG. 3—HOW PROPERLY AIMED LOWER BEAM OF  $5\frac{3}{4}$  IN. AND 7 IN. TYPE 2 SEALED BEAM WILL APPEAR ON THE AIMING SCREEN 25 FT IN FRONT OF THE VEHICLE. (SHADED AREA INDICATES HIGH INTENSITY ZONE)

**5. Headlamp Aim Inspection Limits for Vehicle Inspection Facilities**

5.1 The following inspection limits should apply to stations that conduct mandatory inspection of vehicles.

5.2 It is recommended that mechanically aimable lamps be inspected using mechanical aimers (paragraph 2.1). The aimers shall be calibrated for accuracy and shall be compensated for the level of the floor in the inspection area.

**5.3 Mechanical Aim Inspection**

5.3.1 The mechanical inspection limits for both Type 1 and Type 2 units shall be 4 up to 4 down and 4 left to 4 right.

5.3.2 Failure to meet these limits shall be cause for rejection.

**5.4 Visual Aiming**

5.4.1 The visual inspection limits for Type 1 units shall be with the center of the high intensity zone from 5 up to 4 down and from 6 left to 6 right based in inches on a screen at 25 ft. (See Fig. 4.)

5.4.2 The visual inspection limits for Type 2 units shall be with the top edge of the high intensity zone from 7 up to 2 down and the left edge of the high intensity zone from 4 left to 6 right based in inches on a screen at 25 ft. (See Fig. 5.)

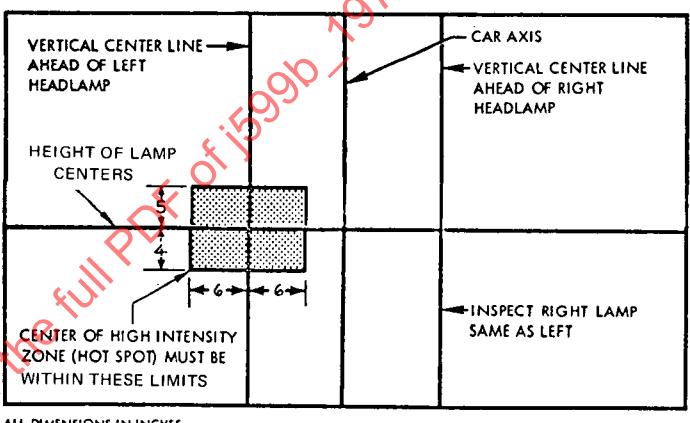


FIG. 4—AIM INSPECTION LIMITS FOR UPPER BEAM OF  $5\frac{3}{4}$  IN. TYPE 1 SEALED BEAM AND 7 IN. SEALED BEAM UNITS NOT MARKED "2" AT THE TOP OF THE LENS. ALSO, TWO-BEAM LAMPS NOT MARKED SEALED BEAM ON THE LENS

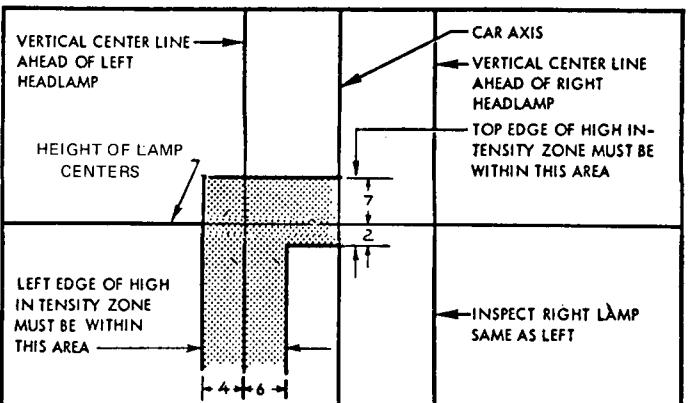


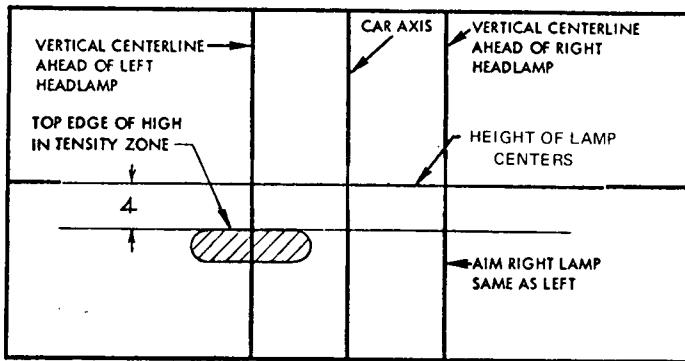
FIG. 5—AIM INSPECTION LIMITS FOR LOWER BEAM OF  $5\frac{3}{4}$  IN. TYPE 2 SEALED BEAM AND 7 IN. TYPE 2 SEALED BEAM AND FOR AUXILIARY PASSING LAMP

5.4.3 Failure to meet these limits shall be cause for rejection.

**6. Fog Lamps (Symmetrical Beams) Aim Adjustment for Service Facilities**

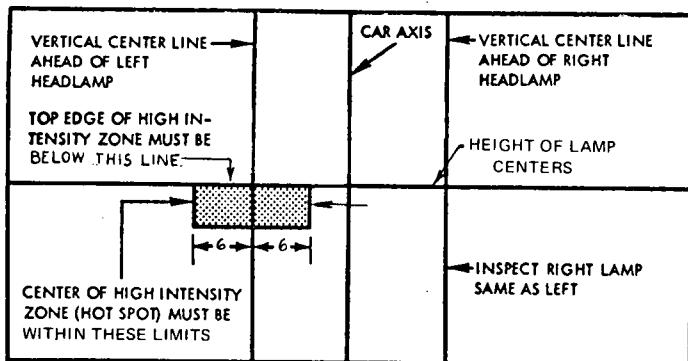
6.1 The following aim adjustment requirements should apply to dealers, service stations, and others who do headlamp adjusting.

6.2 The correct visual aim for fog lamps (symmetrical beams) is with the top edge of the high intensity zone 4 below horizontal and the center of the high intensity zone straight ahead vertically based in inches on a screen at 25 ft. (See Fig. 6.)



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FIG. 6—HOW PROPERLY AIMED FOG LAMP (SYMMETRICAL BEAM) WILL APPEAR ON THE AIMING SCREEN 25 FT IN FRONT OF VEHICLE. (SHADED AREA INDICATES HIGH INTENSITY ZONE)



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FIG. 7—AIM INSPECTION LIMITS FOR FOG LAMPS (SYMMETRICAL BEAM)

#### 7. Fog Lamps (Symmetrical Beam) Aim Inspection Limits for Vehicle Inspection Facilities

7.1 The following inspection limits should apply to stations that conduct mandatory inspection of vehicles.

7.2 The visual inspection limits for fog lamps (symmetrical beam) shall be with the top edge of the high intensity zone at horizontal or below and with the center of the high intensity zone from 6 left to 6 right based in inches on a screen at 25 ft. (See Fig. 7.)

#### 8. Fog Lamps (Asymmetrical Beam) and Passing Lamps Aim Adjustment and Inspection Limits

8.1 Lamp aim adjustment and inspection is the same as for Type 2 Sealed Beam headlamp units. See paragraph 4.4.2 for adjustment and 5.4.2 for inspection.

#### 9. General Lamp Inspection Other Than Headlamp Aim Inspection

This includes the following types of lamps: head, tail, stop, license, clearance, signal, marker, reflex reflector, and fog. Any of the following defects shall be cause for rejection.

9.1 Any bulb in any lamp which fails to function properly.

9.2 An improperly connected circuit which does not light the proper filaments for the different switch positions.

9.3 A cracked, broken, or missing lens.

9.4 A lens that is rotated, upside down, wrongside out, or is otherwise incorrectly installed. A lens marked "left" or "right", not appropriately installed.

9.5 A separate type lens, the name of which does not correspond with the name stamped on the lamp body, unless it is specifically approved for use with that lamp body.

9.6 A lamp with dirt or moisture inside, any obvious discoloration, contamination, or reflex reflector deterioration.

9.7 A lamp which is not securely fastened to the vehicle.

9.8 A lamp showing a beam of color contrary to law or regulation.

9.9 Any defects in wiring or lighting equipment that would be likely to influence adversely the effectiveness of the lighting performance.

9.10 Any auxiliary equipment placed on, in, or in front of the headlamp which is not a part of the originally approved equipment.

9.11 Beam indicator lamps which do not indicate the proper beam

to the driver and which do not function properly.

9.12 Any lamp or lens which is turned or inclined so that its light is not properly directed.

#### 9.13 Turn Signals.

9.13.1 Signaling unit not of an approved type.

9.13.2 Signaling unit not in an approved position.

9.13.3 Signaling unit not functioning properly.

9.13.4 Signaling unit not properly directed.

9.13.5 Signaling unit obscured.

9.13.6 Canceling mechanism, if used, not functioning properly.

TABLE 1—BEAM AIM FOR HEADLAMPS, FOG LAMPS, AND PASSING LAMPS

Lamp Type	Mechanical Aimer <sup>a</sup>		Visual Aim (Based in inches on screen at 25 ft)			
	Recommended Aim For Adjusting Stations		Area of High Intensity Zone To Be Used For Aiming	Aim-Chart Fig. No.	Recommended Aim For Adjusting Stations	
	Lateral	Vertical			Lateral Aim	Vertical Aim
5-3/4 in. Type 1 Sealed Beam	0	0	Center	2	V	—
5-3/4 in. and 7 in. Type 2 Sealed Beam	0	0	Top and left edges at lower beam	3	—	1R
7 in.—Not marked "2" on lens	Not mechanically aimable	Not mechanically aimable	Center of upper beam	2	V	—
Fog Lamps (symmetrical beams)	Not mechanically aimable	Not mechanically aimable	Vertical—top edge Horizontal—center	6	V	4D
Fog Lamps (asymmetrical beam) and Passing Lamp	Not mechanically aimable	Not mechanically aimable	Top and left edges	3	1R	2-1/2U

<sup>a</sup> Calibrate aimer at 0-0.

Abbreviations used: V—Vertical centerline straight ahead of lamp center

L, R—Left and right from V

U, D—Up and down from height of lamp center

TABLE 2—BEAM AIM INSPECTION LIMITS FOR HEADLAMPS, FOG LAMPS, AND PASSING LAMPS

Lamp Type	Mechanical Aimer <sup>a</sup>		Visual Aim Limits (Based in inches on screen at 25 ft)			
	Inspection Limits		Area of High Intensity Zone To Be Used For Inspection	Aim-Chart Fig. No.	Inspection Limits	
	Lateral	Vertical			Lateral Aim	Vertical Aim
5-3/4 in. Type 1 Sealed Beam	4L to 4R	4U to 4D	Center	4	6L to 6R	5U to 4D
5-3/4 in. and 7 in. Type 2 Sealed Beam	4L to 4R	4U to 4D	Top and left edges of lower beam	5	—	4L to 6R
7 in.—Not marked "2" on lens	Not mechanically aimable	Not mechanically aimable	Center of upper beam	4	6L to 6R	5U to 4D
Fog Lamps—(symmetrical beams)	Not mechanically aimable	Not mechanically aimable	Vertical—top edge Horizontal—center	7	6L to 6R	H or below
Fog Lamps (asymmetrical beam) and Passing Lamp	Not mechanically aimable	Not mechanically aimable	Top and left edges	5	4L to 6R	7U to 2D

<sup>a</sup> Calibrate aimer at 0-0.

Abbreviations used: H—Height of lamp centers

V—Vertical centerline straight ahead of lamp center

L, R—Left and right from V

U, D—Up and down from H