HEADLIGHT BEAM TESTER
HBT ART. 2019

MAINTENANCE AND OPERATING MANUAL

Original version in Italian language

This operating manual is an essential part of the machine and must be properly read and stored as a reference for a proper use of the HBT during its working life.

Operating manual must be always read before acting any action on the HBT

The manufacturer has the right to make changes to the production and operating manual, without any obligation to update the production and previous manuals.

Index:

1. PREMISES

Dear Partner,

thanking for your choice of our product to be part of your equipment, we invite you to follow the guidelines of the manual. Operating manual will support you in a proper use and maintenance of the product during the time.

TECNOLUX SRL

2. OVERALL INFORMATION

Operating manual is a part of the HBT and it is essential for a correct and proper use of the tool.
Read it carefully and completely before installing and using the equipment.

The operating manual must be included in the HBT scope of delivery in case of resale.

Operating manual copies and re-editing without written Tecnolux srl authorization is prohibited.

2.1 DEFINITIONS AND SYMBOLS

Below listed a series of definitions, terminology and symbols used in the writing of this manual.

2.1.1 Definitions

Symbol	Description
	**1st level** operator: Trained and informed operator able to use the equipment in normal operating conditions and for simple maintenance.
	**Manufacturer Operator:** authorized and trained technician by the Manufacturer cann carry out complex operations, situations or, in any case, what is agreed with the user. Skills are mechanical and/or electrical and/or electronic and/or software type.

2.1.2 Symbols

NOTE

Providing important information and indications to be carefully read for a proper use of the HBT

DANGER

It indicates a situation causing potential injuries, even fatalities, or serious health damages

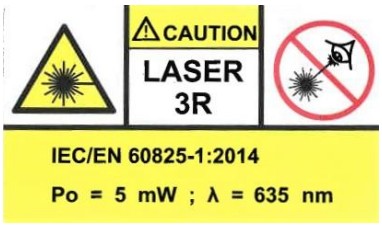
ATTENTION

It indicates a situation that could cause, even indirectly, damage to people, things and the environment with economic consequences.

WARNING

It indicates that you need to carefully follow the directions. Failure to comply with the report may cause malfunctions or dangerous conditions or damage.

SAFETY PICTOGRAMS

Warning signs (caution, caution check)		
	Direct laser line exposure is potentially dangerous	
	Stumbling danger	

Prohibition signs (Dangerous, Hazardous behavior, Interruption Devices, Emergency)	
	Prohibition of using water to extinguish fires

3. MANUFACTURER IDENTIFICATION

The label on the side of the equipment contains all the identifying data of the hbt.

The figure below shows the label format.

Fig.3.1

Mod.
Equipment model
Art.
Equipment identification code
Year
Production year
Serial no.
Manufacturing serial number
Weight:
HBT weight

It is absolutely forbidden to remove or tamper with the label . If the label is accidentally damaged, contact the manufacturer.

3.1 About technical support and maintenance

Contact your local contact wholesaler for fault reporting.

For communications or requests for information or spare parts, send the form "spare parts list, misfunctioning issue, warning issues “to the technical Support dpt as in **Annex 1**.

To maintain warranty coverage, Customer must follow manual instructions. Otherwise, product problems or malfunctions in the operation of the equipment will not be covered by warranty terms (in this regard, read carefully the warranty attached to the manual).

Manufacturer has the right to apply, without any notice, modifications on the product and documents to maintain production on technical development up to date. Modifications can not be applied on previous production items or documents. Even if some images could be slightly different from your product version, all safety and functioning process are always granted

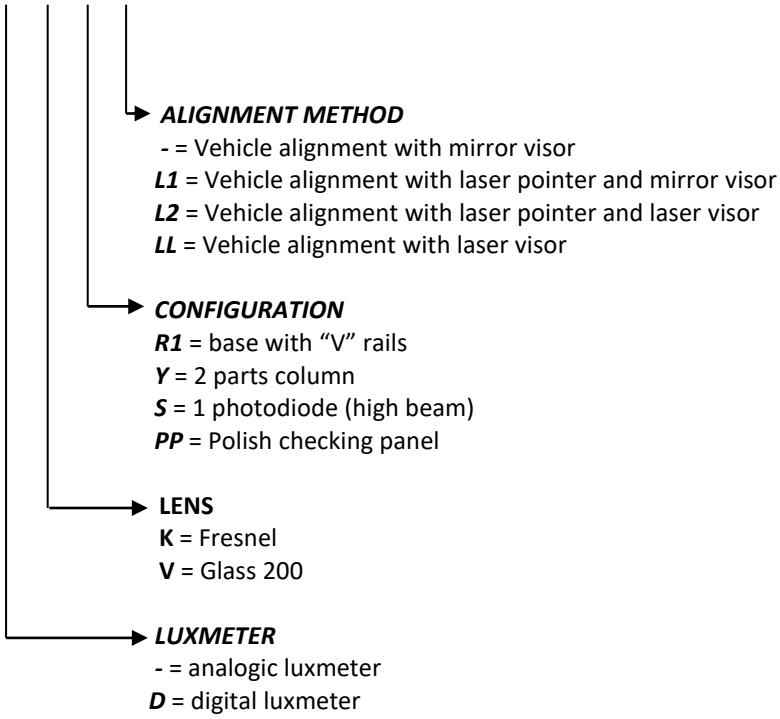
4. TECHNICAL DATA SHEET

4.1 Basic Configuration

Mirror visor for alignment (reflection mode)		
Test set up and measurement sizes		
Set up orientation test	Range of measurement	Distance
- VISUAL CHECK _UP and DOWN	0 – 40 cm	10 m
	0 – 4 %	
	0 – 2.288°	
- VISUAL CHECK_ RIGHT and LEFT	0 – 100 cm	
	0 – 10 %	
	0 – 6.000°	
Measurement		
Light intensity (lux)	0 - 240	25 m
	0 – 150.000	1 m
Light intensity (cd)	0 - 150.000	25 m
Operating height (center of the beam-floor)	da 240 a 1400 mm	
Protection degree of the case:	IP40	
Operating environmental conditions: – Temperature: – Relative humidity: – Pressure:	 5 °C – 45 °C 20 - 80% non-condensing 0,7 ÷ 1,04 atm	
Environmental storage conditions: – Temperature: – Relative humidity:	 -25 ÷ 45 °C ≤95% non-condensing.	
Overall dimensions	600 - 1740 - 6670 mm (width - height – length)	
Weight	Kg 34	
Battery	Version 2019/D – 2019/L1 Battery - alcaline 9V	

4.2 Options

On request the basic model can be updated with accessories.
The accessories, those can be installed on the basic model, are identified on HBT article number by a set of alphanumeric characters as follows:
Art. ***2019/ A / B / C / D***. The various fields are thus encoded (sign "**-**"means that the field is not used)



4.2.1 **single laser kit** (Art. 2019/L1)

Headlight alignment is equipped with laser pointer, the alignment of the vehicle is carried out using the mirror visor.

Headlight beam centering method	
Laser Class	2
Line shape	90 ° x 0.5mrad
Wave length	650nm
power	<=1mW

4.2.2 **double laser kit** (Art. 2019/L2 o LL)

Headlight beams alignment is equipped with laser pointer, alignment to the vehicle is done through the laser visor.

Vehicle alignment method	
Laser Class	3R
Line shape	130 ° x 0.5mrad
Wave length	635nm
power	5mW
Power supply 3 – 5 V	Battery AA 1,5 V (x3)

4.2.3 Options

After you purchase the headlight tester, you can install:

4.2.3.1 Handle /M

possibility to assemble a handle on the base to move the product.

4.3 Reference Regulations

The legislative references applied are:

- 2014/30/UE EMC Directive
- ISO 10604 Road vehicles — Measurement equipment for orientation of headlamp luminous beams
- 2011/65/CE RoHS2 Directive

5. INSTALLATION AND STORAGE

5.1 Goods acceptance

At unit arrival, open the packaging and check internal integrity of the parts.

Within the packaging there are the following parts:

1. Box containing the base
2. Column group
3. Mirror or laser visor
4. Optical box
5. Maintenance and operating manual
6. EC Conformity declaration
   Assembly accessories

In case of damages or missing items or evident defects of the item, NEVER try to repair it but immediately contact the service center by reporting the model, code and serial number of the equipment (see Figure 2.2.1. label).
Store the package, including the original packaging material, in case item needs to be returned for repair process.

clean periodically the unit casing with a soft moistened cloth with neutral and non-aggressive detergents and dry with a cloth.

5.2 How to assemble

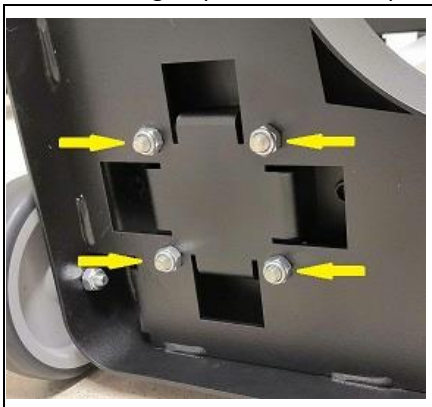
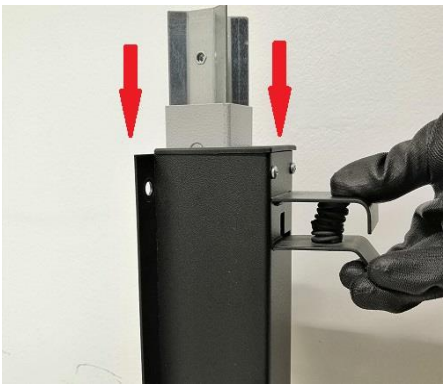
	**1st level operator:** Trained and informed operator able to use the equipment in normal operating conditions and for simple maintenance**.**

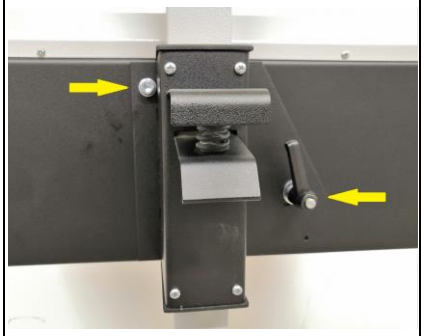
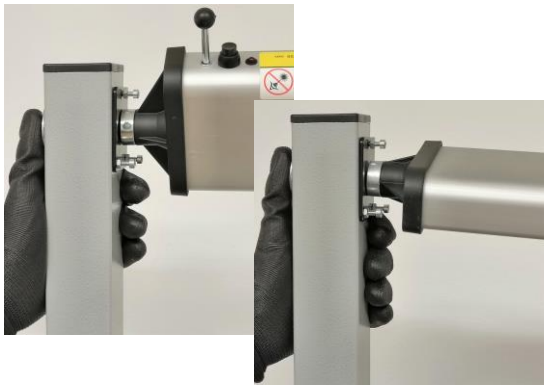
Equipment:

- Flat screwdriver
- x2 keys 13 mm
- Allen 6 mm

How to assemble

The following steps describe the operating assembling sequence.

		 
1. Insert the base into the column using the 4 nuts	2. insert the sliding system	3. Insert the second half of the column and fix it with the 2 lateral screws

		
4. Position the structure vertically, checking the correct orientation between base and column.	5. Take the optical box and fix it with the screw and lever to the structure	6. Remove the visor from the box and screw it to the support block. Then tighten through the hole in the viewer. Assembly is the same for mirror or laser visor.

Battery replacement 9V open the battery box cover unscrewing the 2 positions. Disconnect the cable plug. Replace the 2 batteries, connect the cable, lock the battery box case, and screw it back	

5.3 Storage

In the case of long-term storage headlight tester must be properly stored and must be protected from rain/water/high humidity. Stocking environment must be dry and dust free.

6. General description

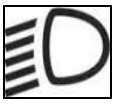
The headlight tester (HBT) is a device suitable for the check of all types of headlights of motor vehicles, vehicles and heavy duty vehicles.

The HBT is movable, based on rubber wheels (1), it is equipped with a system of alignment to the vehicle via visor, visor can be mirror visor or laser visor (2).

The optical box (3) is adjustable in height through a sliding system on precise and silent plastic skates and balanced by a spring mounted inside a sheet steel cover and column, column displays centimeter scale for the exact positioning in connection with optical box working height.

The HBT is equipped with an analog or digital (4) luxmeter. Luxmeter displays the light intensity value read by the HBT and referred to the headlight under test.

6.1 Reports, commands, status information

 Analog Luxmeter	Low beam reading • Kcd – Klux1mt • Lux25mt High beam reading • Kcd – Klux1mt • Lux25mt	 Digital Luxmeter	Low beam reading • Kcd – Klux1mt • Lux25mt High beam reading • Kcd – Klux1mt • Lux25mt
	Light intensity selection button	 	Low beam icon High beam icon

OVERALL LEGEND OF REFERENCE VALUES OF LIGHT INTENSITY READINGS						
TYPE BEAM	**MIN Cd**	**MAX Cd**	**MIN Kcd**	**MAX Kcd**	**MIN lux/25m**	**MAX lux/25m**
	3.750 cd	90.000 cd	3,75 Kcd	90 Kcd	6 lux/25m	144 lux/25m
	20.000 cd	150.000 cd	20 Kcd	150 Kcd	32 lux/25m	240 lux /25m
	1700 cd	11.500 cd	1,7 Kcd	11,5 Kcd	2,72 lux/25m	18,4 lux/25m

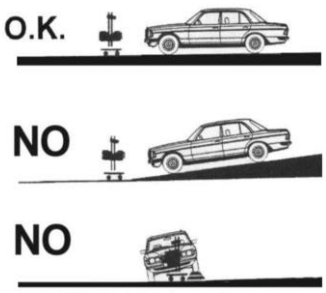
7. MEASURE GUIDELINE

Measurement methods and recommendations follow the regulation:
ISO 10604 Road Vehicles – Measurements equipment for orientation of head lamp luminous beams.

7.1 Getting Started

Before you start the measurement procedure, you have to verify that:

- the headlights are clean and dry
- vehicle wheels are in a straight position and nothing is affecting correct vehicle alignment (e.g. mud, snow, ice, etc.…);
- the vehicle has no distortions to the chassis
- the tire pressure is correct
- the headlight position regulator inside the cockpit must be set on "0" position;
- the vehicle is on a flat surface.
- the vehicle manufacturer's provisions (e.g. full tank, etc. see ISO 10604)



If area overall slope is higher than 0.1%, a rework of the working area can be required to obtain a flat reference surface. Vehicle area can be reworked with a proper adjustable platform and headlight tester area can be completed with precision rail installation.

Vehicles equipped with air suspension: engine must be on for five minutes before starting the test. Start headlights check only with engine on.

HEADLIGHT BEAM TESTER LEVELLING

Position the headlight tester in the center of the related working area.

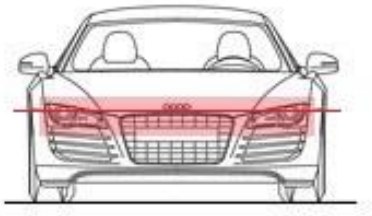
Check the position of the level inside the optical box, if it is not correctly levelled follow the process to get unit in plain:

- Loose the lever and adjust the position to be in level
- Once the correct position is found, tighten the snap lever
- Double-check the correct leveling

7.2 Headlight tester (HBT) positioning

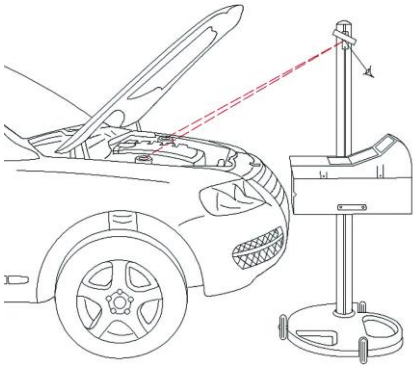
Place the headlight tester in front of the vehicle headlight at a distance between 20-40 cm. Measure the height from the floor to the center of the vehicle headlight and adjust the optical box to the corresponding height using the graduated scale printed on the column.
Use as reference the arrow on the top of the sliding assembly to point the reference height.

7.2.1 Mirror visor alignment method



YES

NO



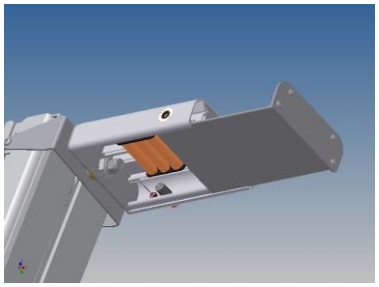
Look for two symmetrical points on the front of the vehicle (e.g. top of the windshield or the headlights themselves). Rotate the optical box looking in the mirror the two marks collimate with the black line screen-printed on the mirror

7.2.2 Laser visor alignment method

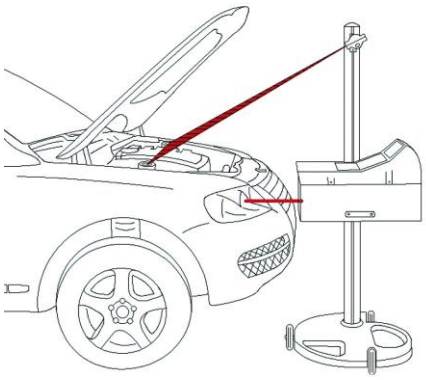
Headlight beam tester equipped with laser visor facilitates operator in aligning the unit in front of the car

Before you begin the alignment, define a dedicated working area to avoid staff exposure to the laser ray.
The laser device is class 2 according to la norm EN60825-1
Direct observation of the laser ray is not dangerous if eyelid reflex is preserved breaking the radiation of the cornea in less than 0.25 seconds if eyes have no ocular applications (such as glasses). This case direct exposure is not recommended.
Once alignment operations are completed, switch off the laser

Look for two symmetrical points on the front of the car,, (e.g.. windscreen or headlights themselves). turn the optical box until the two reference points match with the line projected by the visor.



The laser visor is powered by 3 AA-type stylus batteries. How to replace: unscrew the 2 screws placed on the plastic lid, remove the discharged batteries, replace them with new ones paying attention to the polarity



7.2.3 Headlight beam optical center alignment

BEAM TYPE INTRODUCTION

The actual versions of headlight beams on the market can be summarized in three main groups from the point of view of the end user:

- ✓ Parabola version
- ✓ Lenticular version
- ✓ LED matrix version

Parabola version consisting of a back slices panel and a bulb emitting the light projection.

Lenticular version consisting of a frontal lens emitting the light projection straight from the bulb through the lens

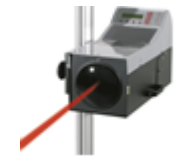
LED Matrix assembly version consisting of specific single LED assembly in a detailed cell.

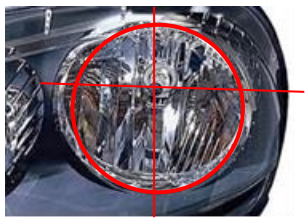
.

HOW TO CENTER THE BEAM

All TECNOLUX headlight testers are equipped with laser pointing system to ensure the correct aiming of the center of the beam/the bulb of the beam

- ✓ Parabola version
- ✓ Lenticular version
- ✓ LED Matrix





Parabola version:
Optical laser pointing system must be directed on the beam bulb

Lenticular version:
Optical laser pointing system must be directed in the center of the lens

Matrix LED version:

LED Assembly beam has to be checked, starting from low beam position centering Master the MASTER LED shape

7.3 Measurement Process

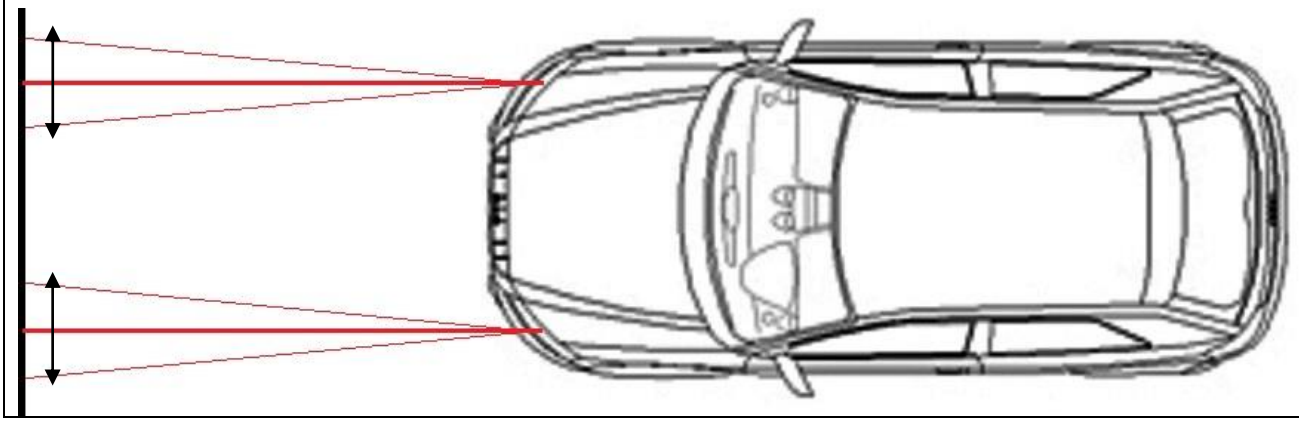
Test must be performed with the engine on. If you are operating indoors, before starting the engine, switch on the exhaust gas extraction system to expel the exhaust gases outside the working environment in accordance with the current legal provisions.

In case of vehicles with air suspension turn on the engine five minutes before starting the test and proceed with engine on.

CONCEPTS OF HEADLIGHT BEAM ASSEMBLY

INCLINATION = VERTICAL AXEL BEAM INCLINATION

DIRECTION = HORIZONTAL AXEL BEAM DEVIATION



7.3.1 EC HEADLIGHT BEAM

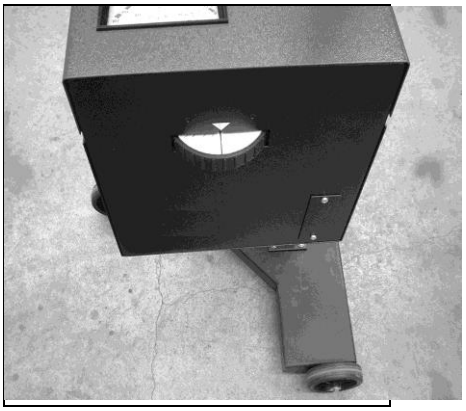
ADJUSTMENT

Read headlight nominal inclination on the top of the headlight case provided by the Manufacturer and set same nominal inclination on the HBT inclination knob placed on the back of the optical box.

ATTENTION!

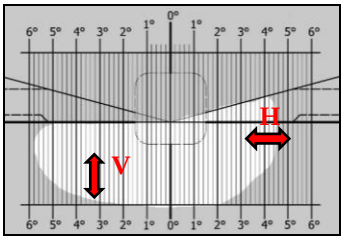
Remember that the adjustment of the headlights still complies with the current law, which stipulates that **for the low beam** positioned at a working height max 80 cm related vertical inclination must be 1%

Low beam vertical inclination for a working height higher than 80 cm, reference vertical inclination must be at least 1.5%



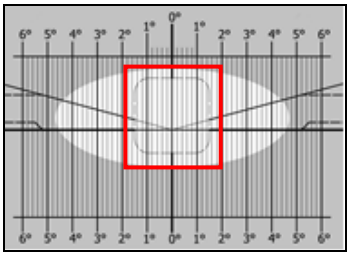
LOW BEAM CHECK

Image aside is displaying a correct adjusted low beam.
If light projection should be displaced above or below and left or right towards the HV main reference line, adjustment must be done till reconducting the image as aside displayed



HIGH BEAM CHECK

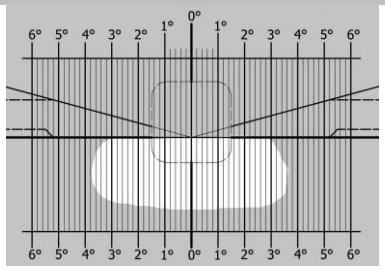
Image aside is displaying a correct adjusted high beam.
If light projection should be displaced above or below and left or right towards the HV main reference line, adjustment must be done till reconducting the image as aside displayed



FOG BEAM CHECK

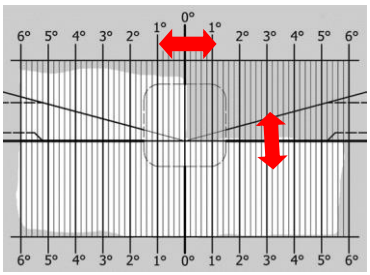
Image aside is displaying a correct adjusted fog beam.
If light projection should be displaced above or below and left or right towards the HV main reference line, adjustment must be done till reconducting the image as aside displayed display.

NB: on conventional basis reference vertical value for fog beam must be considered – 2%



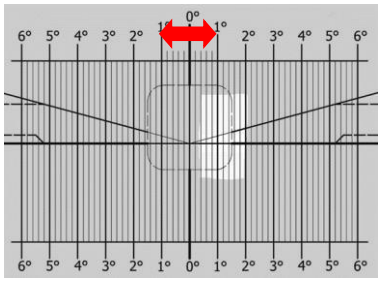
INTELLIGENT BEAM – ADDED SEGMENTS

DLA – DYNAMIC LIGHT ASSISTANCE



Intelligent beam can also include added beam projection to low beam and high beam ones.
DLA is a function to be activated through specific scan tool through EOBD.
Usually all car manufacturer/OEM clearly determines values to be respected in such a projection position: check is linked to the position in the horizontal/vertical deviation.

MATRIX SEGMENT



Intelligent beam can also include added beam projection to low beam and high beam ones.
MATRIX SEGMENT is a function to be activated through specific scan tool through EOBD.
Usually all car manufacturer/EOM clearly determines values to be respected in such a projection position: check is linked to the position in the horizontal deviation.

How to use

8. UNDERSTANDING OF MEASURED VALUES.

The following Sections explain the most important measurement quantities required for headlamp adjustment.

Pitch angle

The definition of the pitch angle is illustrated in the following.

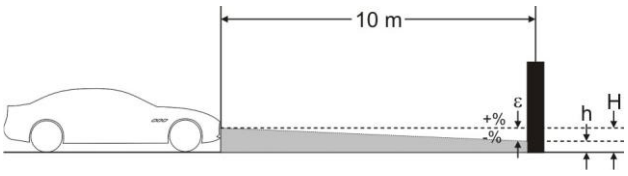
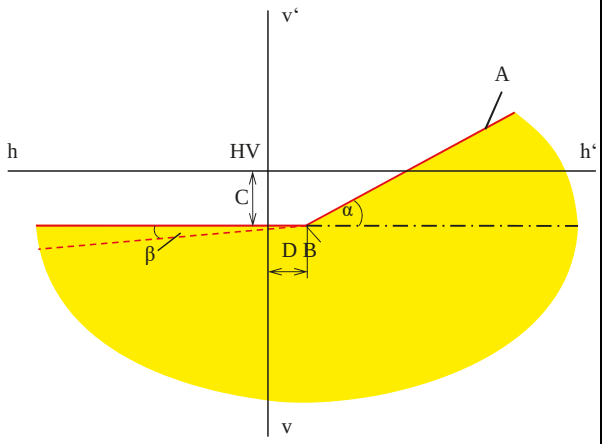


Fig. 10.1 pitch angle

- Definition of pitch angle
- "H": Height of centre of headlamp measured from the ground
- "h": Height of image projected by headlamp at a distance of 10 m, measured from the ground
- "ε": Pitch angle, calculated with the following formula: ε = [(H-h) / 1000] x 100

8.1 ECE EUROPEAN STANDARDS

8.1.1 LOW BEAM PATTERN



"A": bright-dim border, made up of two sections:
Horizontal section, rising straight line, also referred to as "shoulder". The bright-dim border must be within the tolerance range stipulated in the guideline.

"B": break point with asymmetrical light; center point with symmetrical light.

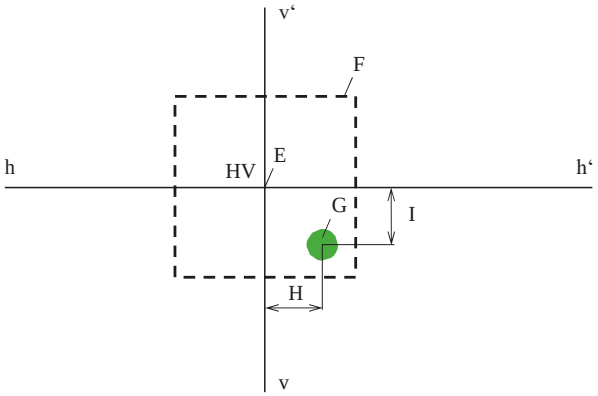
"C": deviation of the break point in vertical direction (also known as pitch angle). The value is always shown as an absolute value. Possible units: **%, cm / 10 m, degrees**

"D": deviation of the break point in horizontal direction. The value is always shown as an absolute value. Possible units: **%, cm / 10 m, degrees**

"α": angle between the "shoulder" and the horizontal section of the bright-dim border (also referred to as yaw angle with asymmetrical low beam).

"β": angle between the left portion of the bright-dim border and the horizontal (also referred to as roll angle, usually 0°).

8.1.2 HIGH BEAM PATTERN



"E": zero point of beam setter (centre of headlamp). This point is the basis for the measured values. Deviations are measured from this point.

"F": tolerance range. The high beam hot spot should be within this range.

"G": hot spot.

"H": horizontal distance of hot spot from centre point. Possible units: **%, cm / 10 m, degrees**

"I": vertical distance of hot spot from center point. Possible units: **%, cm / 10 m, degrees**

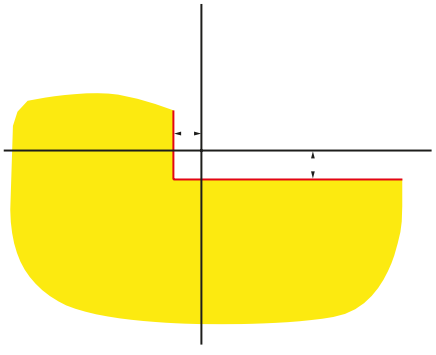
8.1.3 FOG BEAM PATTERN

The fog lamp is measured in a similar manner to the low beam, the difference being that the bright-dim does not have a break point but takes the form of a continuous horizontal line.

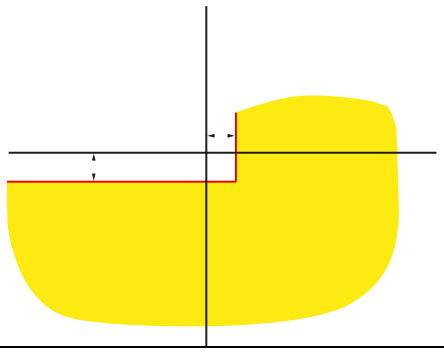
8.1.4 INTELLIGENT BEAMS

the introduction of intelligent headlamp systems, the accuracy of the headlamp configuration plays an increasingly important role. To be able to accurately set these headlamps, the vehicle manufacturers have provided a special configuration screen for these headlamps. This must be selected with a diagnostics device

8.1.4.1 Headlamps with Dynamic light Assistance (DLA)



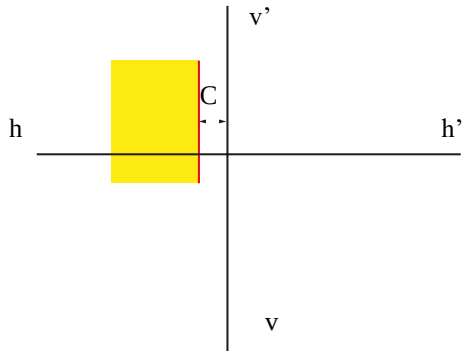
Left DLA headlamp projection



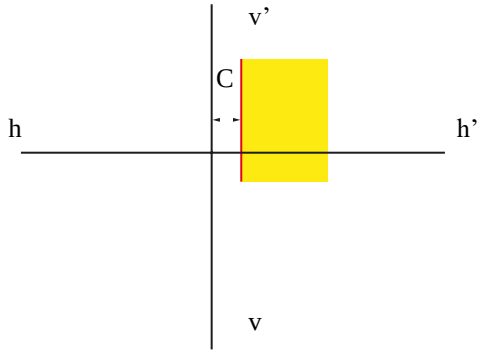
Right DLA headlamp projection

"A": deviation of the bright-dim border in horizontal direction from the median. The value is always shown as an absolute value. Possible units: %, cm / 10 m, degrees
"B": deviation of the bright-dim border in vertical direction from the median. The value is always shown as an absolute value. Possible units: %, cm / 10 m, degrees

8.1.4.2 Matrix function headlamps



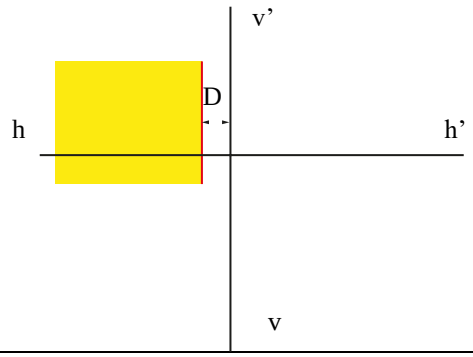
Left Matrix headlamp projection



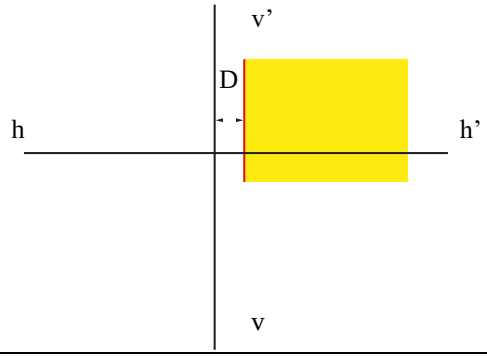
Right Matrix headlamp projection

"C": deviation of the bright-dim border in horizontal direction from the median. The value is always shown as an absolute value in angle minutes

8.1.4.3 Ford High Beam glare-free LED headlights (ILS)



Left ILS headlamp projection



Right ILS headlamp projection

"D": Deviation of the cut-off line in horizontal direction from the median. The value is always shown as an absolute value; the following units are possible: :%, cm / 10 m, degrees

9. MISFUNCTIONING AND ANOMALIES.

Faults Table

If the proposed intervention did not resolve the malfunction, operations must be stopped and Assistance Service must be called.

Never open optical box if not authorized.
In case of mishandling/opening/intervention in the inner part of the optical box warranty terms and conditions expire immediately and manufacturer declines any responsibility for product use.

10. DISPOSAL

INFORMATION TO USERS
The equipment is made up mostly of steel.
Other parts:
plastic, some details
cardboard and paper, packaging and documents
paint of the device, in epoxy powder anti-scratch.
For the disposal of the device comply with the provisions of the local authorities

11. INTERVENTION REQUEST FORM - SPARE PARTS

If there are any anomalies or malfunctions, Tecnolux SRL must be contacted to have the malfunction report form. This is a guide form in which the Customer will specify the type of anomaly encountered and once completed Tecnolux replies with actions list to resolve the issue.

12. ANNEX LIST

Annex to the operating manual:

document description

13. WARRANTY

TERMS AND CONDITIONS:

Tecnolux srl guarantees the equipment for the duration of **12 months.**

Warranty period starts from the date of purchase indicated on the sales invoice from Tecnolux to Customer.

Terms& conditions detailed through Tecnolux srl and Tecnolux authorized Distributor.

The company Tecnolux Ltd. denies any liability for any damage to persons or things, caused by misuse or imperfect use of the equipment.

The Judicial Forum of VERONA (ITALY) is responsible for any possible dispute.