

# **NHD-8000 Headlight Aimer**

## **User's Manual**

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## 1.0 General

NHD-8000 Headlight Tester (hereinafter “Instrument”) is used for testing the luminous intensity, headlight height and optic axis deviation of the headlights on automobiles and motorcycles. Equipped with LCD screen and the feature of direct battery operation and easy to be moved, it is very suitable for automotive maintenance and repair shops.

## 2.0 Main technical performance

### ● Operation Conditions

Ambient Temperature : 5 ~ 40 ; Relative humidity : less than 95%; Atmospheric pressure : 70.0 ~ 106.0KPa

Power supply : 1 pcs of DC9V battery (Can be provided by cigarette lighter or storage battery, allowed max. input voltage 25V)

Floor : The instrument and the vehicle must be placed at the same surface and the floor horizontal error shall not exceed 3%.

### ● Measuring range

Central height of the headlight: 30cm-130cm; Luminous intensity : 0 ~ 100,000cd

Optic axis deviation of high beam and low beam

Left - Right : L 4%/10m ~ R 4%/10m ( L 40cm/10m ~ R 40cm/10m )

Up - Down : U 2%/10m ~ D 4%/10m ( U 20cm/10m ~ D 40cm/10m )

### ● Indication error

luminous intensity of high beam :  $\pm 12\%$

optic axis deviation of high beam and low beam :  $\pm 0.5\%/10m$  (5cm/10m)

Center height of headlight :  $\pm 1cm$

### ● Measuring distance : 30-50cm

### ● Power consumption: <0.5W (for complete set of the instrument)

### ● Net Weight: 21kg

## 3.0 Construction and Components (Fig.1)

### 3.1 Base

The base is the installation plate for the post, it can be moved horizontally, with a brake lever.

### 3.2 Post

The post is for supporting the light-receiving box, with racks and a scale for measuring headlight height on it.

### 3.3 Elevator

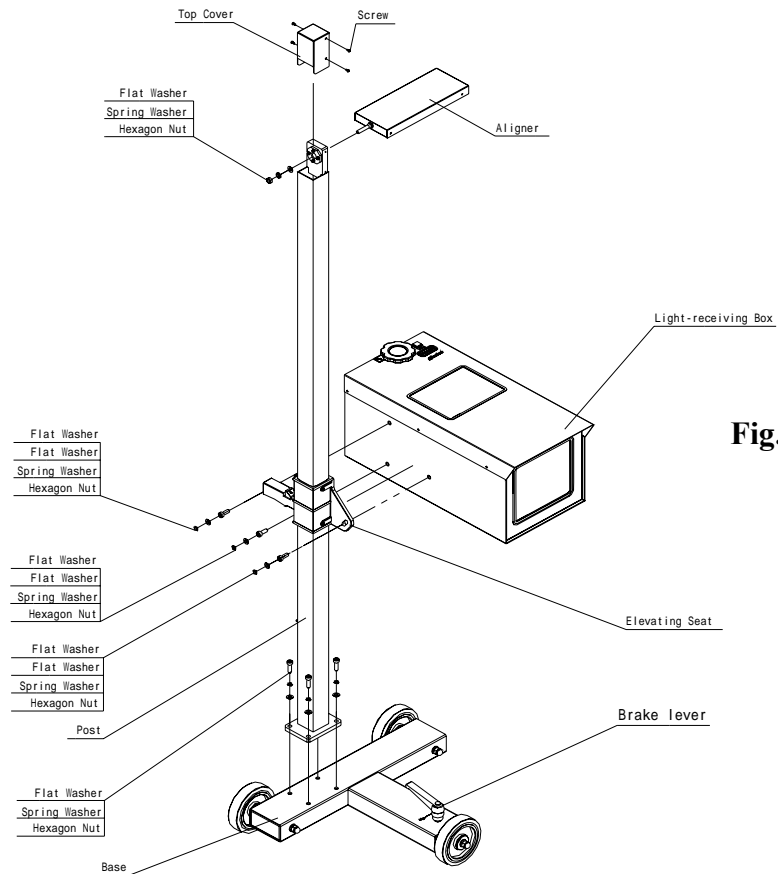
The elevator can be moved up and down along the post, the height of the light-receiving box is changed accordingly.

### 3.4 Light-receiving Box

Photoelectric detection parts and optical measuring system in the light-receiving box are used for testing the relative parameters.

### 3.5 Aligner

The aligner is used for alignment of the instrument and the vehicle to be inspected, and the horizontal alignment line must be vertical to the vehicle driving direction.



**Fig.1**

#### 4.0 Operation assembly and interface

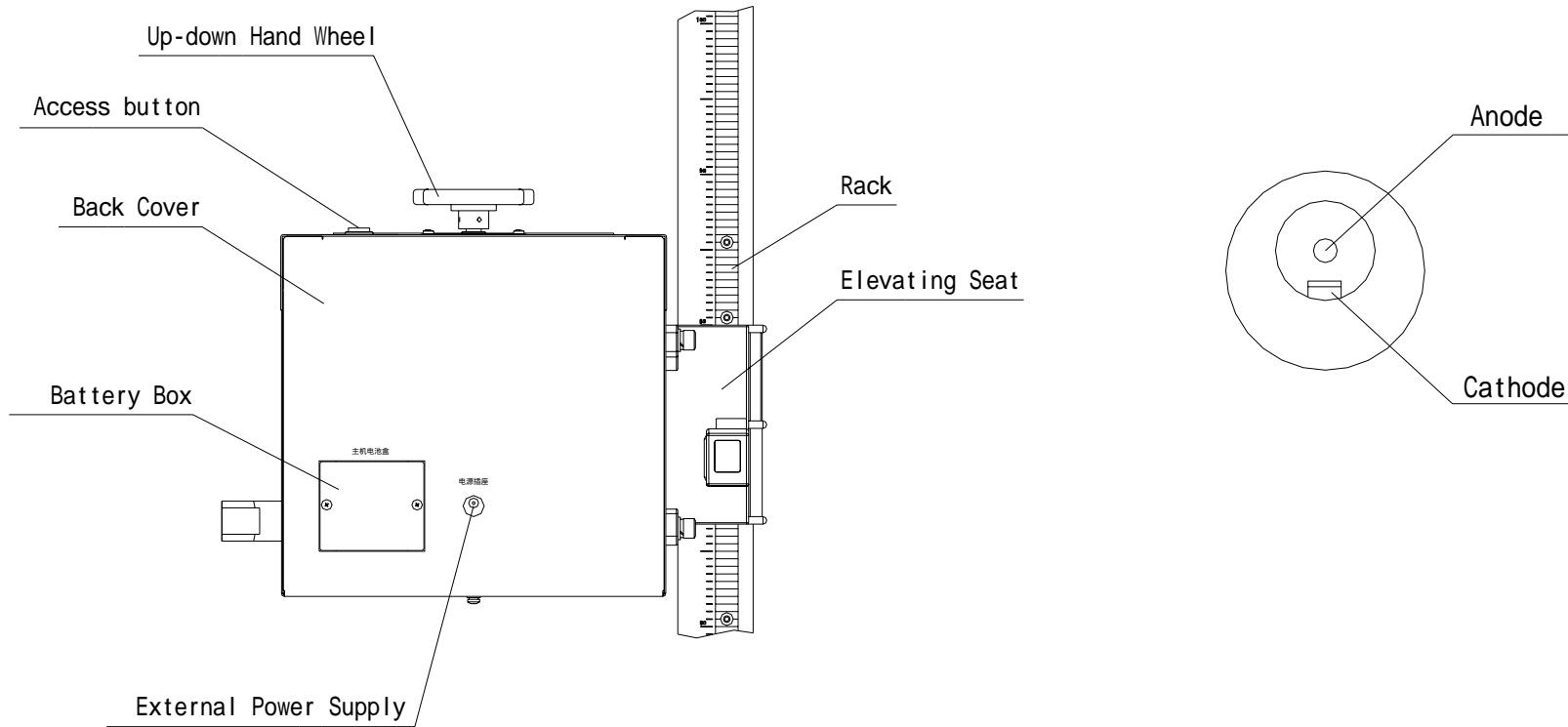


Fig. 2

The instrument is equipped with embedded DC9V battery or external 12V DC power supply, the max. external DC power input should be less than 25V, Fig. 2 shows polarity of the external power socket. When DC9V and external 12V DC power supply are installed at the same time, the instrument automatically uses the external 12V DC power. In order to provide convenient operation, an external power cable is provided. User can use it to obtain power supply directly from the cigar lighter of the vehicle or storage battery.

## 5.0 Assembly and Adjustment

### 5.1 Installation of Post

As shown in Fig. 3, fasten the 4 pcs of  $\phi 8$  plate washers, 4 pcs of  $\phi 8$  spring washers and 4 pcs of hexagon nut M24x25 on the base. The brake mechanism is for limiting the left-right movement of the instrument.

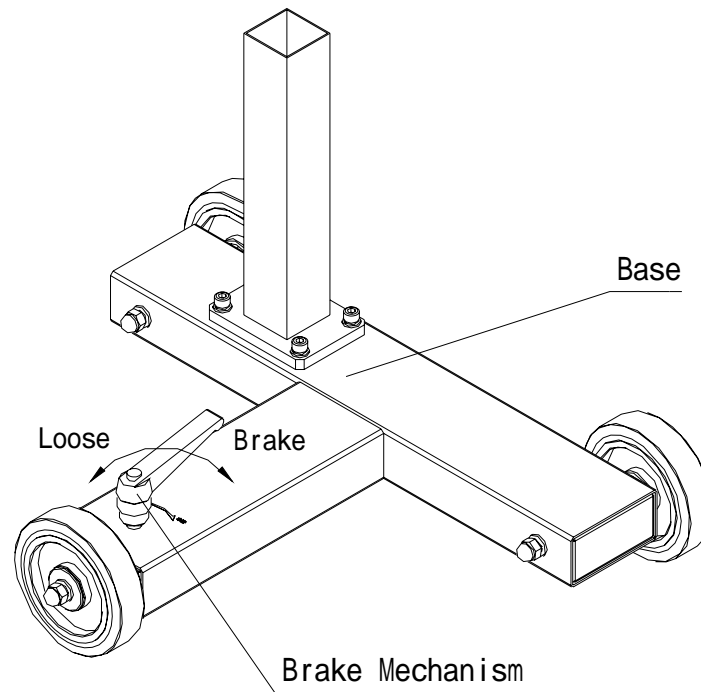


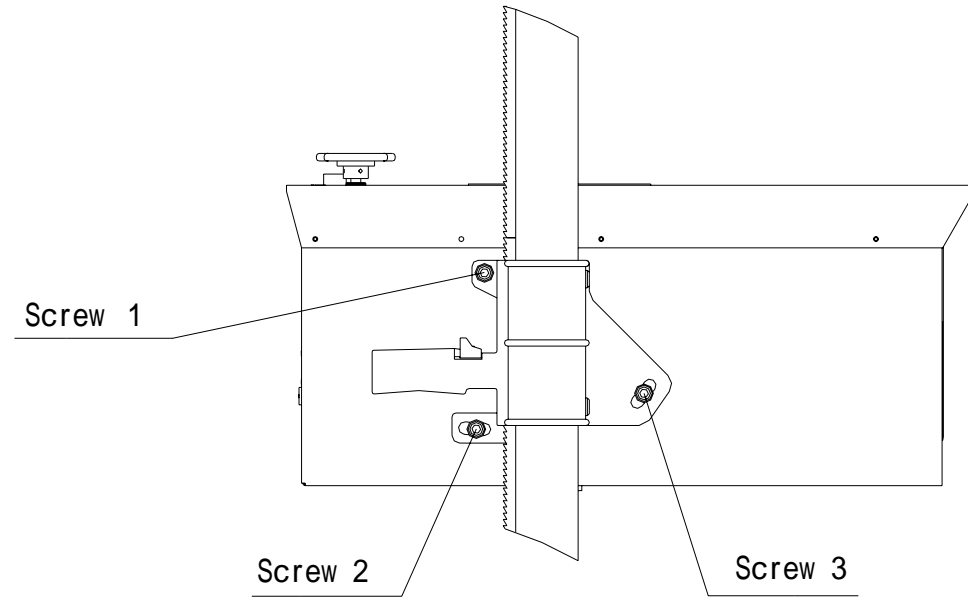
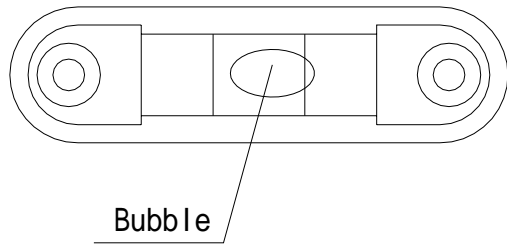
Fig. 3

### 5.2 Installation of Elevator

Install the elevator from the top of the post, and place it at a proper height for easy installation of the light-receiving box.

### 5.3 Installation of Light-Receiving Box

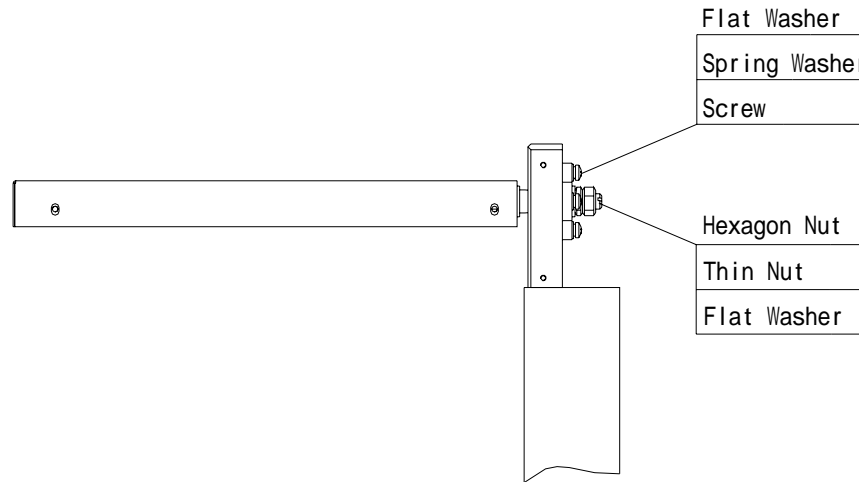
Use  $\phi 8$  flat washer,  $\phi 8$  spring washer and hexagon socket head crew M8X25 to install the light-receiving box on the elevator, slightly screw the bolts, adjust the levelness of the light-receiving box and make it able to rotate along screw 1. Rotate the light-receiving box. When the bubble in the middle of the upper cover of the light-receiving box is at the central position, the light-receiving box is horizontal. Fasten the 3 bolts and the levelness adjustment of the light-receiving box is completed. (See Fig. 4).



**Fig. 4**

**5.4 Installation of Aligner**

Use hexagon nut M8 and washers,  $\phi 8$  spring washer to install the aligner on the post (see Fig. 5). After adjustment, close all the covers and fasten the screws.



**Fig. 5**

## 6.0 Layout of Inspection Field

Fig. 6 shows the requirements of the inspection field and the ground levelness. Bold full lines or adhesive tapes should be used for the driving area of the vehicle rear wheels. (See fig.6).

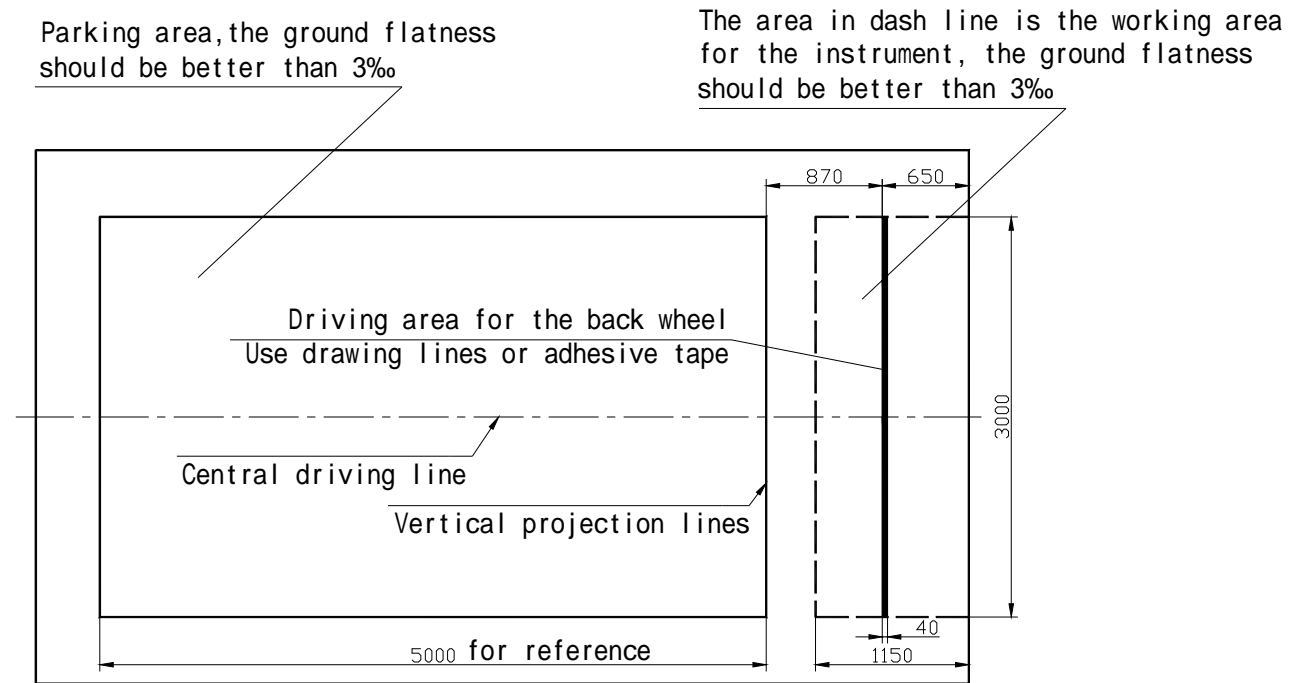


Fig. 6

## 7.0 Alignment of Instrument and Headlight

Before measurement, align the vehicle to be inspected as per the following 2 steps.

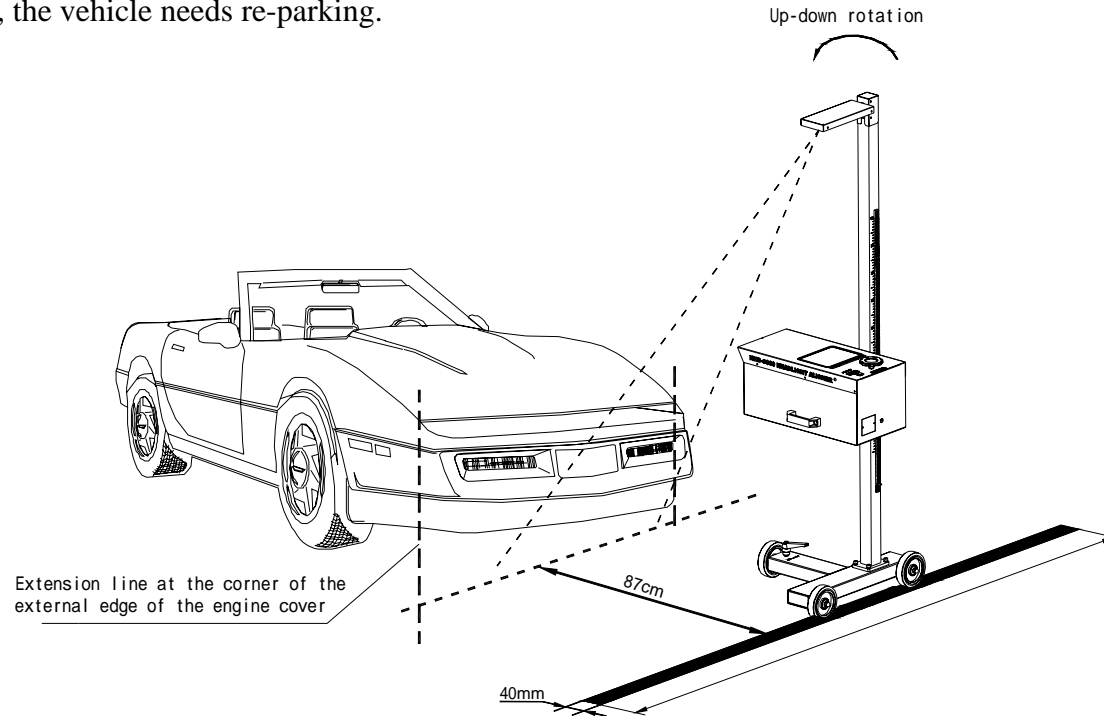
### 7.1 Vehicle Alignment

When guide rail and guiding line are used, vehicle alignment is not required.

Firstly, mark an area of 3000mm × 40mm with yellow lines at 88cm ahead of the vehicle being inspected, which is used for alignment of the two rear wheels of the instrument. (See Fig. 7)



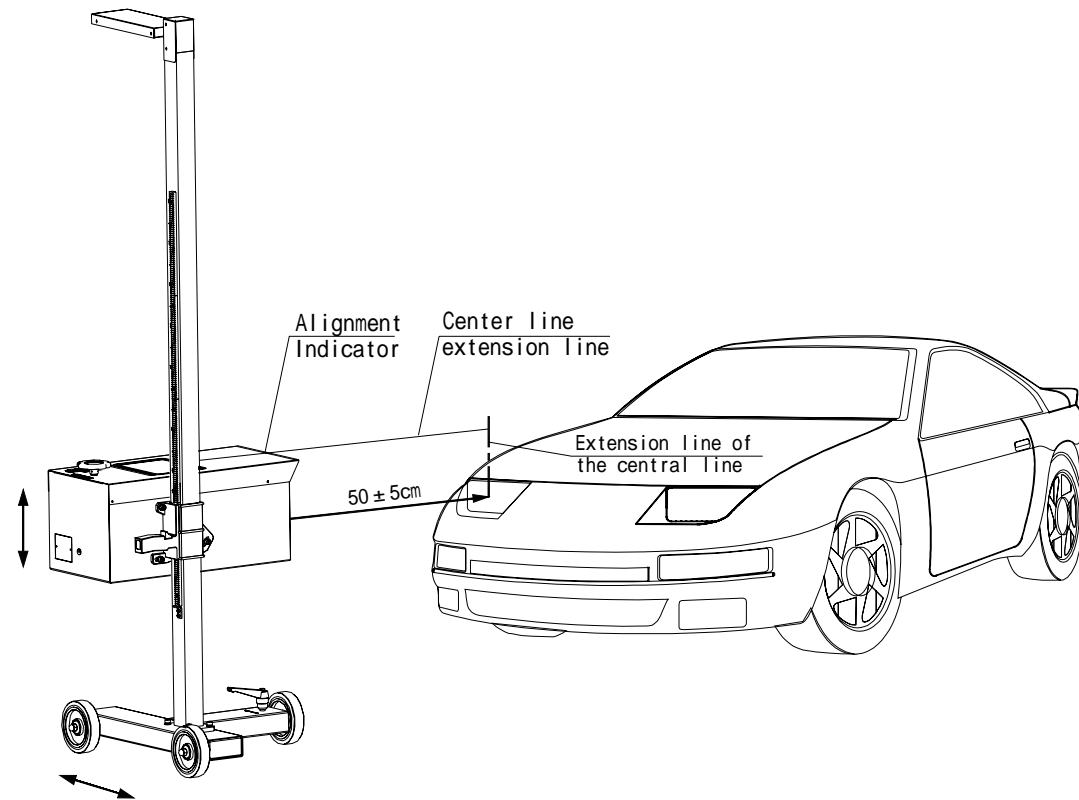
Before inspection, the lens of light-receiving box and the longitudinal centerline of the vehicle to be inspected should be vertical (which is called alignment). The aligner on the post is for this purpose of checking. The checking method is: Select two symmetric reference points on the vertical line of the longitudinal centerline of the vehicle (For example, the horizontal connection line from the left corner to the right corner at the edge of the front cover of the engine), hold the aligner and rotate it, when the horizontal aligned line is parallel to the connection line, the vehicle is aligned. Otherwise, the vehicle needs re-parking.



**Fig. 7**

### **7.2 Alignment of the Headlight to be Tested**

After operation as per 7.1, along the alignment line of the rear wheels (see Fig. 7), move the instrument to the front of the headlight to be inspected, use spanner to move the button on the elevator and use hands to move the light-receiving box, make the optical center of the Fresnel lens ahead of the light-receiving box as high as the center of the headlight being tested, and make the center line extension line of the two alignment indicators on the cover of the light-receiving box and the center line extension line of the headlight being tested at the vertical plane. As on Fig. 8, the instrument is aligned to the headlight and the inspection distance is  $50 \pm 5$ cm.



**Fig. 8**

## 8.0 Operation

### 8.1 High-beam Measurement

After adjustment according to 7.1 to 7.2, keep the instrument unmovable. Press the access button, adjust the up-down hand wheel of the screen while observing the real-time light intensity on the LCD screen. When the light intensity reaches the max value, do not move the up-down hand wheel any more. The measurement data displayed are the high-beam intensity of the headlight being tested. As shown on Fig. 9, the current light intensity is 20000cd; The relative movement of the light-receiving screen can be observed through the transparent glass window on the light-receiving box. The movement distance is the deviation of the headlight being tested. (Note: The deviation equals to the deviation of the 10M screen inspection.) Fig. 10 shows the deviation of high beam as down 0.5%/10m (5cm/10m), left-right 0.0% (0m/10m).

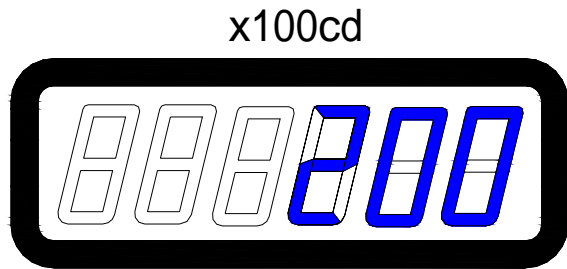


Fig. 9

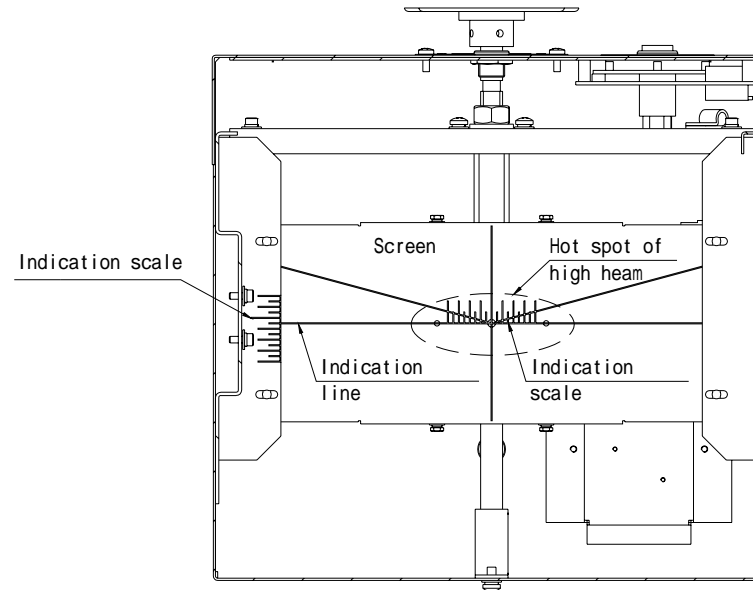


Fig. 10

### 8.2 Low Beam measurement and Manual Judgment

After adjustment according to 7.1 to 7.2, keep the instrument unmovable. Press the access button, adjust the up-down hand wheel of the screen, make the central point of the light-receiving box and the turning point of the cut-off line of the low beam basically overlapping, when the light intensity displayed on LCD is the min. value, read the optic axis deviation of the low beam on the indication scale of the light-receiving screen assembly (see Fig. 10). Judge the turning point (see Fig. 11) as the measurement result by the cut-off line on the screen. As the specification of the light distribution characteristics of low beam varies, the manual judgement for test result is only for reference. The judgement result is close to the test result by 10M screen inspection.

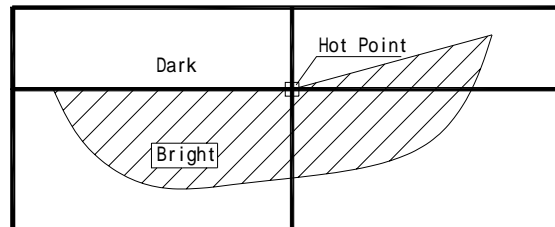


Fig. 11

### 8.3 Headlight Adjustment

In order to improve the adjustment efficiency, we recommend the following way to adjust the deviation of high beam / low beam, especially low-beam deviation. After adjustment according to 7.1 to 7.2, keep the instrument unmovable, adjust the up-down and left-right adjustment buttons respectively, make the up-down and left-right zero indicating line point at the user preset optic deviation. Under the real-time measurement mode, adjust the up-down button and left-right button, make the up-down zero indication points at the zero of the up-down scale on the screen, the left-right zero indication points at the zero of left-right scale. According to the light distribution characteristics on the screen viewed through the observation window, adjust the hot spot to close the screen center (For high beam, the brightest hot spot aligns with the screen center; For the low beam, the observed cut-off line nearly overlaps the cut-off line on the screen or the turning point overlaps the screen center). Adjust the headlight up and down, then left and right. When the high-beam / low-beam deviation is adjusted, adjust the headlight while observing the real-time light intensity on the LCD screen. When the light intensity is exactly the max. or min. value, do not move the headlight. The adjustment is completed. (Note: For high-beam, it corresponds to the max. value; For low-beam, it corresponds to the min. value;)

### 8.4 Indication Scale

The unit of the scale is %/10m (cm/10m) , the scale of each grid is 0.5%/10m (5cm/10m), which is 17.2 .

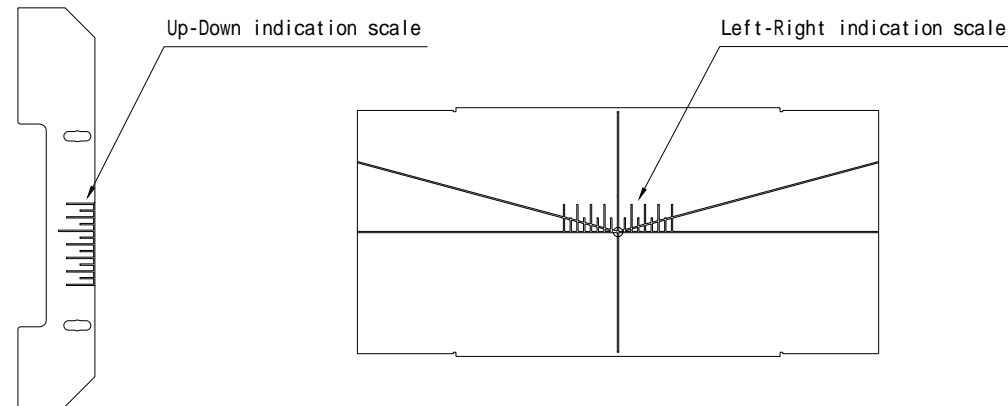


Fig. 12

## 9.0 Calibration

No frequent calibration is required during daily use. Periodic calibration can be every half a year or every year with the following steps,

### 9.1 Calibration Device and Filed

Calibrator : luminous intensity : 0-100,000cd (tolerance :  $\pm 4\%$ )

Optic angel : up  $3^\circ$  -down  $3^\circ$  、 left  $3^\circ$  -right  $3^\circ$  (tolerance :  $\pm 4^\circ$  )

(Note : calibration device is required for high-beam calibration. )

Theodolite : accuracy 6

Level gauge : level bulb angle: 20 / 2mm

Calibration field and instrument replacement follows ( Fig. 13 ):

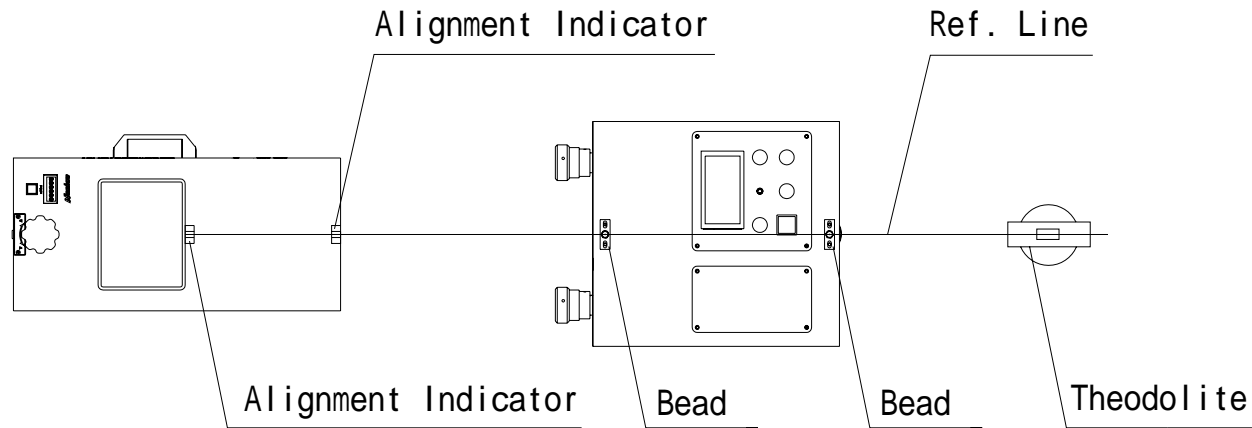
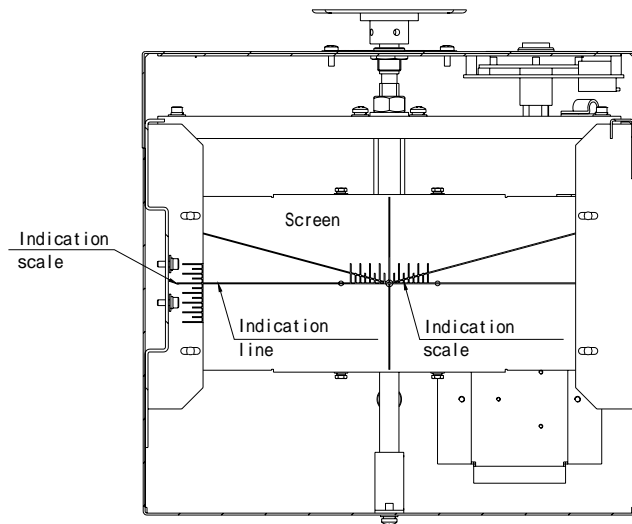


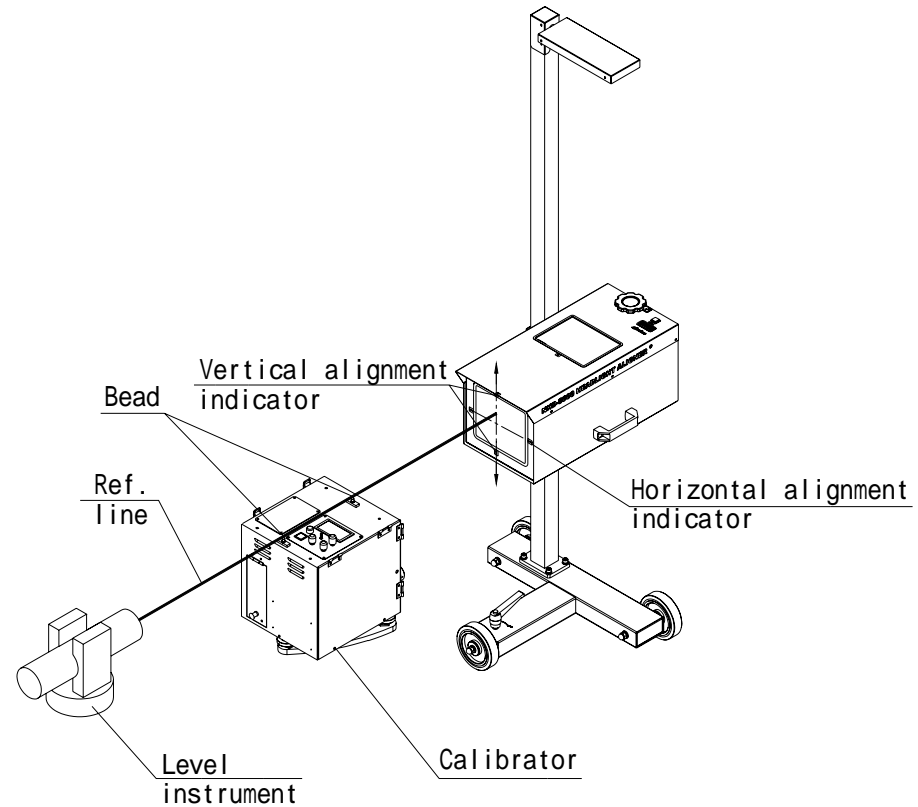
Fig. 13

### 9.2 Adjustment

Adjust the instrument (refer to 5.3) to make the bubble at the center of the light-receiving box. Adjust the up-down hand wheel of the screen, make the up-down indicator points at zero of the up-down scale on the screen, and the left-right indicator points at zero of the left-right scale (Fig. 14). Adjust the center height of the light-receiving box (align with the indication scale horizontally) and make it as high as the center of calibrator. Use theodolite to align the instrument, make the vertical alignment indicator of the light-receiving box and the reference line I are within the same vertical screen (see Fig. 15. If theodolite is not available, refer to Fig. 13, use a line to make the center line of the alignment indicator on the cover of the instrument and the bead of the calibrator on the same vertical plane.)



**Fig. 14**



**Fig. 15**

### 9.3 Light Intensity Calibration

After operation as per 9.2, set the light-receiving screen at the zero positions of the up-down indicator and left-right indicator. Switch on the instrument and set the luminous intensity of high-beam as 20000cd and up-down and left-right optic angle as  $0^\circ$ . As per Fig. 16, open the small cover on the side of the light-receiving box cover, adjust the embedded potentiometer, make the displayed intensity 20000cd. After adjustment, re-cover the small cover.

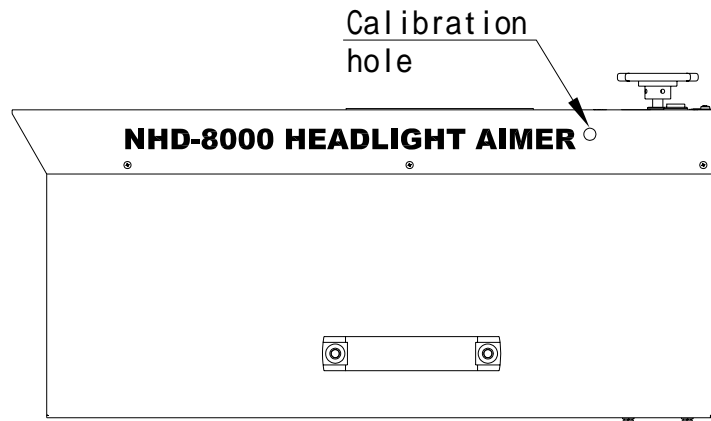


Fig. 16

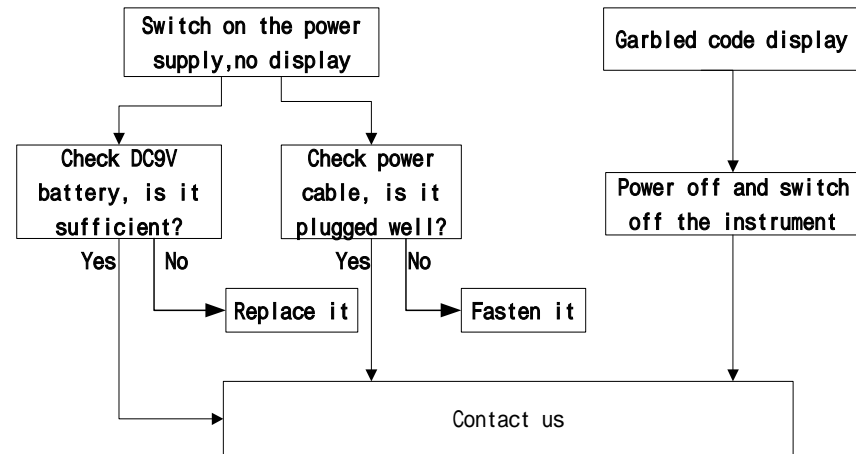


Fig. 17

### 10.0 Maintenance and Troubleshooting (Fig. 17)

The batteries should be taken out if the instrument is not used for a long time. If external power is applied for a long time, the 9V battery should be taken out. Replace the battery if power for emergency is insufficient. When the power for laser is insufficient, the laser hot spot is hard to be seen, replace the battery. Two battery boxes for laser are installed at the side of the light-receiving box. The instrument should be kept clean, no dust or oil on the concentration lens ahead of the light-receiving box. In case of pollution, use wet cloth (with a little detergent) to clean it. Do not put any object on the instrument.