Headlight aiming

Introduction

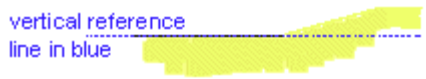
Counting the number of cars per day that flashes you because you have annoying lights is not the way to measure if you have your headlights correctly aimed or not. That will only create more hate against brighter light. What you should do if you are in doubt that your headlight is aimed too high or sending out too much glare, compare the amount of light that is emitted above cutoff to other cars of with similar headlight design: Place the cars 25ft away from a white wall (in the dark), or simply walk around the front of each car at different hights and compare brightness above cutoff. If there is more than a minor difference, you have work to do: Aim them lower and/or more to the right. If you are using higher lumens bulbs, you might have to insert additional shields. If you are unable to find a solution (even with experts help), go back to stock lighting, and start look into finding donor/aftermarked projectors.

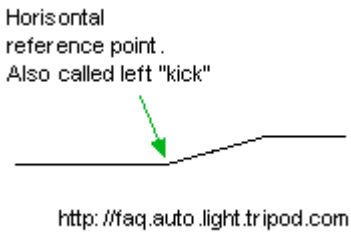
The three aiming dimensions

Headlamps need to be aimed horisontally and vertically. If you are retrofitting headlight optics from a different car you also have to deal with rotational aiming.

What is the reference lines/points for aiming?

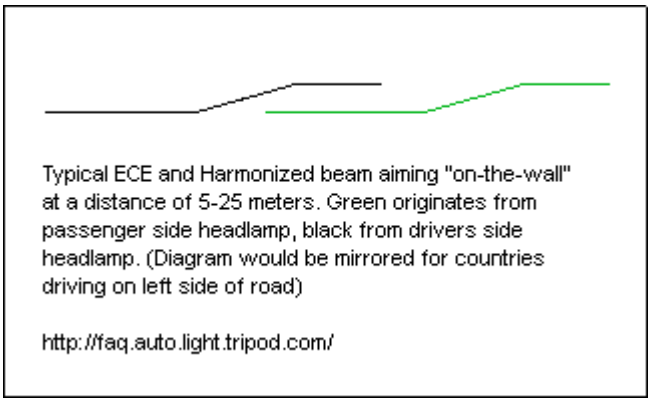
The lowest cuttoff line should always be used for aiming. This would be the left part of cutoff line (unless u are in UK). The right side of it cannot be used as a reference, hight will vary depending on manufacturer and model.





Initial vertical aiming

Because of the amounts of vehicles nowadays, its easier to find a similar vehicle bumper to aim on than a white wall. As an initial vertical aiming set cutoff line to the upper half of the bumper. Harmonized and ECE beam cutoff lines from the 2 headlamps are not supposed to form a two step pattern. They are supposed to be two identical steps at the same height above ground:

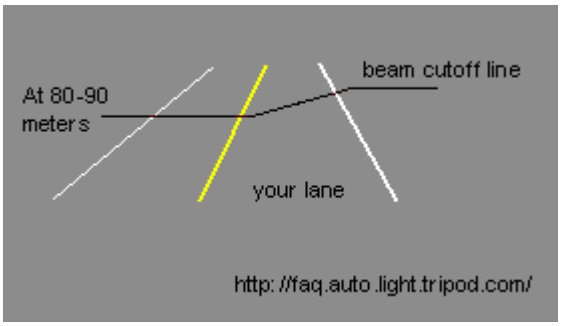


Final vertical aiming

Alt A) This can only be performed on a perfectly even surface. Measure the distance from ground to the headlight centers, and aim the flat part of the beam cutoff at 25' distance (against a vertical wall) to be 2.1 inches below the headlight center height. Cover one light with something while you're aiming the other light, and repeat for the 2nd light.

Alt B) Performing a totally accurate vertical alignment at 25' distance is more of a theorethical hight alignment. It requires a totally levelled ground. Try to do that in a parking lot or in front of your garage is next to impossible. There are always bumps and irregularities

that will become inaccurate factors.
A better approach for final DIY vertical aimig is to go for a ride. Note where cutoff line hits on average at a distance over a 20 minutes period. I say average here, bacause it will jump up and down alot. The average should definatly not go upwards. If it never peaks on any houses/walls or if they glare into your eyes from the road, they are too low. If it peaks up on second or third floor of a condo building, they are too high. Average should be hitting the ground around 80-90meters in front of you.



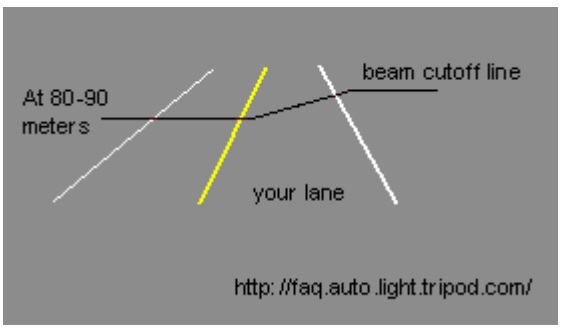
Right side of beam will actually go slightly upwards from headlamps. This may sound totally backwards, but it is not.

Initial horisontal aiming

Start a few feet away from a white wall (or from the bumper mentioned above). Drive slowly directly backwords 25feet and forward in a straight line and notice if any of the beams "wanders" sideways while vehicle moves. (It is probably advantagous to have a passenger looking at the beam and driver looks backwards. You don't want to wreck ur ride, right?) If beam does "wander", do neccesary horisontal adjustment. Repeat this process until beam is steady while vehicle moves back and forth in a straight line.

Final horisontal aiming - especially ECE and harmonized beam patterns:

At a distance, left and right side headlamp pattern will merge. On a long stretch, place horisontal reference point (left kick) between yellow line and your right road shoulder line. This pattern is more visible from the drivers seat when going down a hill reaching an uphill. Beam reach will be lower and contrast between light and road surface will be bigger. The intension with the high right flare is that driver will see alot more of the two and four legged creatures on right road shoulder compared to a totally straigth cutoff line. Its kinda hard to imagine, think it over while you drive at nite for a few days and u will see the light



What is current aiming standards say?

The U.S. vertical aiming standard is 2.1" of drop at 25ft, or 8.4" per 100ft. This actually mean that a taller vehicle (truck) with high mounted headlamps will have alot more reach than a compact car. ECE aiming standards have slightly less drop.

Is projector based headlamps aimed different than reflector based?

No, same aiming procudures applies to all headlights. However, if u are interested in tweaking, you might be able to aim a projector a degree or two higher due to sharper cutoff.

Why is projectors more picky to aim?

Projector units has sharper cutoff reflector units. With the sharper cutoff, comes also need for aiming withing smaller tolerances. If you have projector units that came with your car, rotation adjustment is done at the factory. For those of us who plan or have retrofitted a projector unit into a different car, already know or will run into this. With reflectors you might not notice much if rotate them 4 degrees. 4 degrees seems awfully little. But here is a beam presentation of a projector unit that has been rotated 4 degrees. You immedatly see there is something awkward, and over time you will annoy yourself to death. Light will be totally missing in a sector on the right flange. This is were you normally will se playing kids on the side of the road.

Back to Previous Menu