

the best that exists at present, or at least (which is already something) the least defective.

This is why the characteristics of this beam have been adopted as the standard for Europe by representatives of the countries participating in the I.S.O./T.C.22 Congress, which took place in London last June, after they had studied the results of international tests and examined the performances obtained with this new beam.

When considering the performance of headlights, there is too great a tendency to forget that there are other road users besides motorists, at least on European roads. The safety of pedestrians, cyclists, motorcyclists, i.e. all those who are without lighting source, or whose lighting is of reduced strength—can only be guaranteed on condition that no intense glare exists.

On the other hand, the motorist has to distinguish not only obstacles on the road; he must be able to see, quickly and unmistakably, lights often of reduced strength (lamps or reflectors on cycles). He will only be able to do this properly if the degree of glare is reduced.

A headlight with glare slightly stronger than any other—but also giving better sight distances—might offer some advantage. But if this headlight, for equal sight distances (or even shorter) produces a markedly stronger glare, it is not such a good system, and never will be; this is how European technicians conceive it.

The use of the yellow light has, for some time now, been the subject of heated and partisan discussions, whereas if we would only reflect for a moment, its usefulness is not likely to be contested. Its real value in various cases is often discussed; and when a slight advantage is discovered, it is declared to be inadequate; when the advantage appears greater, then there is doubt whether the circumstances in which it has proved its utility were frequently practical ones.

And yet, in spite of all the various tests, those most opposed to its use have never known a case where it proved a drawback. Therefore, why not use it?

It has been stated (Vol. IV, No. 1, page 8) that France—or at least her representative—is the last bulwark of defence of the yellow light; but this is a chronological error, since it would imply that those countries which had never adopted it have now abandoned it.

It would be more correct to say that, to date, France is the only country to have appreciated its advantages, which have proved sufficiently important since, for the last 20 years, the use of the yellow light is compulsory for motor-car headlights, and has now been made compulsory for cycles and motorcycles.

Comment on two points is indicated:

It has been stated in the GTB report that “when comparative tests were made in France, no appreciable difference was noted in the sight distances as between white and yellow headlights”. But this report states “with a limited number of observers”, and it might be useful to add that these were solely observers with absolutely normal eyesight.

The nature and variability of visual phenomena are such that, only after numerous tests on

many subjects can any valid rule be laid down.

On the other hand, in order to reach a practical conclusion, every type of observer should be taken into consideration; above all, we must not forget those with abnormal or defective eyesight, since they represent a considerable proportion of drivers who, more than any other, are accident-prone.

But this would involve a considerable amount of work which was not foreseen when making the tests on which are based the above-mentioned GTB conclusions. Despite the small number of observers, the full report of the GTB mentions a very notable difference between the time needed for readaptation after glare with white light and with yellow light, to the advantage of the latter.

Research work of this type has been undertaken by Messrs. R. Pagès and D. Fleury who reached the following conclusions after examining 115 observers⁽³⁾:

- a) a highly significant difference in favour of the yellow light for visual acuity at dusk, the average increase was of the order of 8% despite the absorption of light due to the coloured bulb, which absorption has been purposely neglected;
- b) also a highly significant divergence (increase of 11% in favour of the yellow light) in photopic vision;
- c) no significant difference between keenness of sight with white or yellow during glare;
- d) with the yellow light, time needed for readaptation after glare decreases by 24.4% (gain in time statistically highly significant);
- e) it is those persons with the worst eyesight who will benefit from the yellow light which gives better re-adaptation after glare.

We would also like to refer to the report submitted in April, 1955, by M. Fatras, Engineer at the Flying Test Centre Technical Services of the Armed Forces (Air) at the meeting of the Study Committee 3.3.C of the Comité Français d'Eclairage. M. Fatras describes the results obtained with a selective orange light used in

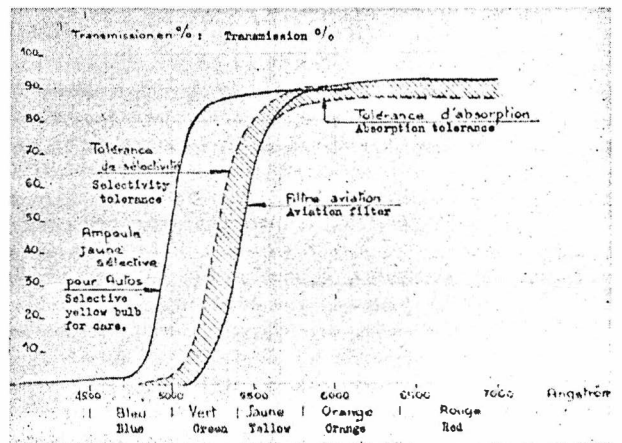


FIG. 3. Transmission curve of the selective glass used compared with that used for automobile lighting.

landing headlights. Fig. 3 shows the transmission curve of the selective glass used, compared with that for automobile lighting. More selective than the standard automobile glass, the filter used in aviation has a lower transmission factor, which is acceptable, in view of the power of the light sources used in aeroplanes; the power of absorption of this filter would be too strong for use on cars.

On the other hand, its effects are more striking and they tend to prove *a fortiori* the advantages of the yellow light amplified by those of the orange light.

This report is quite definite in its conclusions:

- a) with yellow filter, no diffusion phenomena, even with 250 W. power;
- b) with orange filter, keener perception of obstacles in relief, the peripheral vision remains correct — comfortable and agreeable lighting;
- c) orange filter is excellent when landing in darkness, in mist, drizzle or rain. (It should be noted that the headlights were situated in the axis of the aeroplane which is the worst possible solution from the point of view of visual perception);
- d) landing with disagreeable sensation (effect of luminous screen, lateness in distinguishing the runway, very vague notion of height, glare due to reflection from runway) with white light used when raining;
- e) no discomfort in similar conditions with orange light. The landing takes place as in full daylight, without either discomfort or glare;
- f) even without rain, bad perception of objects in relief with white light; landing pleasant with orange light;
- g) in every case, with or without mist, overcast skies or moonlight, even in clear weather, orange light is preferable to white light;
- h) orange light is especially appreciated (unanimous opinion of pilots) when flying conditions are unfavourable;
- i) even with excellent flying conditions, a headlamp with white light is never considered superior.

These very definite conclusions, which have induced the Technical Air Service to spread the use of the orange light, are shown to be of the utmost importance since Air Service technicians who undertook the work of comparing the white with the orange light were quite unaware of the work which had led to the adoption of the yellow light for automobiles. They had no preconceived ideas and carried out practical tests, not theoretical ones.

But it is far more interesting to seek comparative test conclusions in the work of technicians of countries which do not use the yellow light (or are even hostile to it).

If we take as a basis the results obtained by J. B. de Boer and J. F. T. Van Heemskerck Veeckens⁽⁴⁾, we note that for the same degree

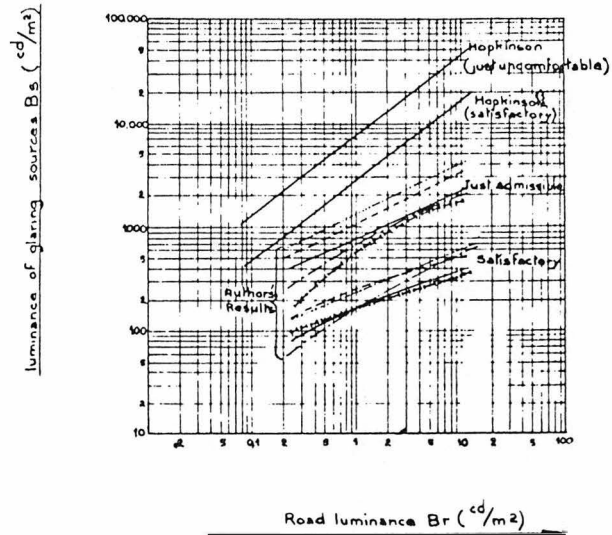


FIG. 4. Average results of observation on discomfort glare carried out by six observers.

- = incandescent lamps seen through the yellow filter.
- = sodium lamps
- = incandescent lamps
- · - · - · = tubular fluorescent lamps
- |—|—|—| = mercury lamps with fluorescent bulb

of comfort, the glare luminance compared with the road luminance is higher in the case of a light produced by an incandescent source filtered through a selective yellow lens than for any other light source, even sodium lamps (Fig. 4).

The intensity of a glaring light may be about 1½ times greater with a yellow light than with a white one, this with a similar feeling of discomfort.

There is an article in "Light and Lighting" (October 1954, page 287) by V. J. Jehu, entitled "A comparison of yellow and white headlamp beams". The author is very moderate in his conclusions; he states nevertheless that, in case of glare, there is an advantage of about 7% in sight distances with the yellow light, compared with the white light, although operating with high glare values. It is also stated in this article that the majority of observers consider the yellow light as less dazzling (and yet, in spite of everything, they prefer the white light!).

It has been said that the yellow light was of no advantage in a fog. It is of course no doubt true that thick fog very quickly absorbs light, but in thick fog traffic will practically be at a standstill.

What is of greater interest is the much more frequent incidence of unclear atmospheric conditions. It is true to say that, except in high altitudes, the atmosphere is hardly ever perfectly clear.

Town atmosphere is polluted, while in the country it is very often saturated at ground level; in nearly all seaboard regions—and this is the case all along the coast of Western Europe—it is impossible for the atmosphere to remain clear. It is in these slightly misty atmospheres that the yellow light proves of interest, especially as it suppresses, or at least limits, the luminous haze surrounding the headlamps,

which causes discomfort to the driver of the car as well as to the driver of the oncoming car.

There is a very simple thing to do when "haze" is noted; it is to place before the eyes of the observer a selective yellow filter. The haze disappears completely, at least at its most diffused part.

We could go on for some time discussing the many and great advantages of the yellow light. However small these advantages appear to be, they must not be overlooked. Fatal accidents happen every day in cases where drivers would have been able, within a few inches, to stop in time. It is these "few inches" which we must try to gain.

A sight distance increased by 7% is often a gain of 4 to 5 metres (13 to 15 ft.). This is equivalent to a gain of about one-fifth of a second in the reaction time of a driver, i.e. sufficient to transform a slow- into a quick-reacting driver.

The improvement in comfort combined with the use of the yellow light certainly reduces fatigue, which is a highly important factor in the case of drivers obliged to travel for long hours at a stretch.

If to the gain in sight distance and improvement in comfort, we were to add, as already seen, a decrease in the reaction time after glare, we can safely say that the use of the yellow light will certainly contribute to greater safety on the road.

We have already had occasion to state, and we can here and now confirm this, that in countries which have adopted the white light, a great many users demand the yellow light, even in the United States where spectacles with a yellow selective lens are on sale everywhere.

Many British and American drivers who have had occasion to live in France for any length of time, and who drive their own car, have often stated that they are now in favour of the yellow light.

Let not those who criticise it hasten to condemn it.

Seen at a distance, what appears as "the last bulwark" is perhaps, at closer range, more likely a "torch" which guides towards Safety!

REFERENCES

- (1) the principle of which was indicated even in 1954. See minutes of Journées de l'Éclairage, Monaco, 8th June, 1954, Communication by M. P. DEVAUX. See also: Ing. Dr. P. DEVAUX—"Nouvelles conceptions dans l'éclairage des automobiles"—*Bulletin S.F.E.*—Vol. V No. 55 (July 1955)—*Trasporti Pubblici* No. 7—luglio 1955. *Journal S.I.A.*—November, 1955.
- (2) Ing. Dr. P. DEVAUX—Progrès dans la sécurité par l'amélioration du faisceau croisement. This report was submitted at the F.I.S.I.T.A. Congress in Rome, May, 1956.
- (3) R. PAGES and D. FLEURY—Essais de vision crépusculaire et d'éblouissement, en lumière blanche et en lumière jaune, sur un groupe de 115 conducteurs. *Annales d'optique oculaire*—Vol. IV, No. 1—January, 1956.
- (4) Observations on discomfort glare in street-lighting; influence of the colour of the light. Report presented at the 13th session (Zurich 1955) of the International Lighting Committee.

FROM ONE HAND

... a promise and a guarantee. Shake hands on an honest bargain! Take advantage of the BOSCH bargain in performance and dependability. For BOSCH actually has everything in one hand: the entire electrotechnical equipment for your car.

Battery · starter · dynamo · spark plugs · ignition coil distributor · horns: Supertone, Two-tone, Fanfare head lamps · foglamps · reversing lamps · signal lamps parking lights · rear lights · license plate lights · stop lights · heater · interference protectors · switches.

This list represents a great variety of things with a great variety of functions - but they have one thing in common: they are FROM ONE HAND - FROM ONE HOUSE - OF ONE QUALITY! When you choose BOSCH, you choose

UNITY IN YOUR MOTOR

and that's a decisive reason for deciding on BOSCH

The advertisement features a central illustration of a hand holding a steering wheel, with a car's dashboard and steering column visible. To the right of this central image is a vertical column of five square boxes, each containing a different Bosch product: a round headlight, a spark plug, a battery, a horn, and a pair of headlights. Above the central image is a small circular logo of a bolt. To the left of the central image is the vertical text 'A.T.A. 256 B'. Below the central image is the large 'BOSCH' logo, followed by the text 'ROBERT BOSCH GMBH STUTTGART GERMANY'.