A Narrative Associated With Adding Reflectors to Lamps in Color Light Signals

Trans**L**ight **C**orp **– TLC** Slide-on Reflector for Colorlight Signals

Since the advent of color light signal for train control applications, there has been an effort to make the illuminated color as bright as possible to maximize safe train operations. Now, possibly more that ever, with larger and heavier trains, and with goals of improving train travel time, there is a growing inquiry to have signals that have greater projected beam patterns, permitting train crews to identify illuminated color signal displays as far as possible from the signals so train crews have more time for train handling safety, plus, reducing fuel consumption and mechanical wear associated with hard train braking.

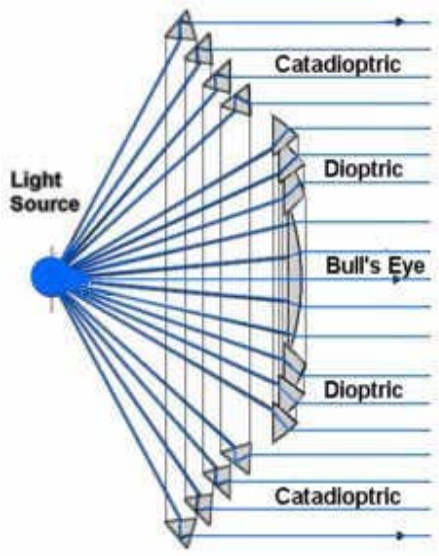
Many railroads are replacing Searchlight signals with Colorlight signals, and train crews are reporting the disparity of projected beam patterns. Comments from our customers have led TransLight to research options for economically increasing projected beam lumens patterns of Colorlight signals. Therefore, we developed this patent pending cost justifiable, "Slide-on Reflector" for Colorlight signals for increasing the projected beam lumens pattern and color intensity at a fraction of the cost for other options.

The terminology of Beam Candlepower or Beam Lumens refers to projected beam pattern of illumination. Comparing the two generic types of train control signals used, the Searchlight signal utilizing a deep parabolic reflector and the Colorlight signal that up until now has no reflector, that relies on lens set optics and focal distance alignment from the lamp's filament for projecting the beam lumens pattern. Searchlight signals with their parabolic reflector have the best projected beamlumens patterns when compared with Colorlight signals, and our Slide-on Reflector will increase the beam lumens projected color intensity patterns of Colorlight signals by about three times.

Brightness of a projected beam pattern from a signal should not be confused with surface brightness at the lens of the signal. Projected beam patterns will penetrate inclement weather conditions, whereas surface brightness may not have the same ability. We believe that the brighter and the greater distance of the projected color beam pattern will offer the best method for visibility by train crews for safer train handling operations.

Over the years, there has been a concern about what is referred to as "Phantom Signal Indication," which may mean that train crews reported seeing a color display other than intended. This phenomenon may mean one or more of the following:

Fresnel lens with single point Light source



1. An external light reflecting off the outer lens appearing to make a color other than intended.
2. An external light behind the Colorlight signal washing-out the displayed color.
3. An external light may have penetrated the color lens set and made the color appear lit when not lit.

Note; in the drawing that the Fresnel prisms angles are angled specifically for the single point light source (the lamp) to project the light from the lamp in a straight projection from the lens, which deters an external light source from entering the light fixture. Our finding indicated the Slide-on Reflector would not add to this phenomenon, but aid in reducing an occurrence. The Slide-on reflector is 2" in diameter, and designed specifically to reflect the extraneous light from the lamp that is not used in the optical focal alignment and project that light onto the inter lens, including the correct angle to the Fresnel rings within the lens increasing the intended luminous intensity of the whole area of the lens.

It has been proven that the brighter the projected beam light pattern, the more difficult it is for reflective external light or background wash-out phenomenons to occur. Concerning an external light penetrating the lens set of an unlit color and making it appear lit, as previous noted, we could not produce this situation during our extensive testing, with or without our Slide-on CLS Reflector, and if applicable at some point in time, we surmise that it must have been in the early 1900's, when plain single color lens were used with low lumens light sources, before the Fresnel lens sets (double lens) were used with higher lumens electric single light source lamps.

Because the optical focal relationship between the filament of the lamp and the existing optic lens set requires the filament of the lamp to be focused at a specific position to the lens set for maximizing the projected beam pattern, therefore, the angles from any single light source must be maintained. Without a reflector, only the lamps' filament illumination is used, limiting the projected beam pattern intensity. Our Slide-on Reflector is specifically designed to reflect a large portion of the extraneous light from the lamp's filament not used for the focal distance projection, projecting that additional light onto the optic center and fresnel prism area of the lens set, thereby increasing the luminous intensity of the entire projected beam pattern by up to about three times.

Viewing the fresnel diagram, notice that the Fresnel lens is designed for a single point light source, and multiple points light sources like LED arrays may not improve the intended projected beam pattern, like the CLS Reflector does. The specific design of the Slide-on Reflector assures consistent focal alignment, because all known lamp bases used for signaling lamps are uniform. Our Slide-on Reflector is designed so that it fits between the top rim of the lamp socket in the light fixture and the top rim of the lamp's base, in which there is available space (see pictures on "New Product Release" Flyer sheet). So once the reflector is applied, and slid up toward the top rim of the lamp's base and aligned parallel with the lens, it is in focus. The Reflector is warranted against breakage during regular relamping service intervals.

The included sheets with pictures is a good illustration of what the projected beam pattern is at 5-feet onto a flat white wall, and represents a side by side comparison of the same red lens Colorlight signal and lamp (bulb) with and without the CLS Slide-on Reflector. We used a red lens because it offers the most color filtering when compared with yellow or green. Yellow and green offers similar improved color intensity projected beam patterns. The beam pattern shown represents the actual produced results, and the improvement in luminous intensity is about three times better with the reflector than without when measured by a Lumens meter.

For your evaluation purposes, if you don't have a lumens meter or test fixture, we suggest that you use a piece of material about 4' X 4' and place about 5-feet from the lens, then evaluate the projected beam pattern without the reflector, then add the reflector and evaluate again. Another good method is to be about 100 to 500 feet from the lens and view the intensity and beam pattern spread, then apply the reflector and repeat the view. Or, you can go a greater distance from the signal until the beam pattern is hard to see, then apply the reflector and see the improvement, which will be in distance (spot beam) and spread (flood spread) patterns.

We suggest you satisfy yourself with the provided free samples that the color intensity improvement will give the train crews additional train handling safety that will cost justify the purchase. Field Installation is simple, remove the lamp, slide the reflector up the base until it stops at the top rim on the lamp's base, insert the lamp, make sure the reflector outer rim is parallel with the lens, and you're done. Because all SC Bay bases and filament alignments are made to the same dimensions, makes the reflector self-aligning. The reflector is reusable during relamping intervals, and is warranted with a free replacement against breakage.

We apologize for the volume of this memorandum, but we wanted to include enough data so that it might clarify areas that we previously discussed with customers that were common to all. If you have any inquiries, please contact us, and we will answer in an expedience fashion.