LUMINOUS INTENSITY & RANGE

HOW TO SELECT LIGHTED AIDS TO NAVIGATION

Lighted aids to navigation serve three purposes:

*** Warn the mariner of an obstruction**
*** Allow him to reliably establish his position**
*** Guide him through a dangerous area**

The mariner identifies a lighted aid to navigation by its colour and flash characteristics. Interpretation of lighted aids to navigation varies throughout the world so it is necessary to be familiar with the system appropriate to the area involved.

CALCULATING LUMINOUS INTENSITY

The luminous intensity of a beam from a marine light is measured in candelas. The approved abbreviation is cd.

The peak intensity for a white beam of light, measured directly from the lens, is expressed by the symbol (I_o). When the beam of light is revolved or the source of light is eclipsed, the peak intensity of the resulting flashing light is not appreciated as the effective intensity (I_e) can be calculated by means of Schmidt-Clausen formula. In order to make use of the formula, which is published in the IALA recommendation for calculating the effective intensity of a marine light, it is necessary to determine, by measurement, the variation of instantaneous intensity with time and the peak intensity. When it is not possible to measure the variation of instantaneous intensity with time, the effective intensity may be calculated from:

$$I_e = \frac{I_o \times t}{a + t}$$

I_e = effective intensity in candelas
I_o = peak intensity during the flash in candelas
t = duration of flash in seconds
a = value obtained from the table below.

	By night	By day
Flashes produced by blanking or switching	a = 0.2	a = 0.1
Flashes produced by rotating optical apparatus	a = 0.3	a = 0.15

The intensity so obtained should be applied to the intensity/range table for darkness and the nearest rounded-off value of range under the heading T = 0.74, published as the nominal night-time range. If the nominal day-time range is required, the intensity/range table for daylight should be used. The above formula applies to rhythmic lights in which the flashes are exhibited at any rate up to 300 flashes per minute. When the character of a list includes different flashes (eg, in a Morse Code character), the effective intensity should be taken as the least of those derived from the different flashes.

Where the beam of light passes through a colour filter or through the glazing of a lantern, further losses are incurred and allowance must be made for such losses before applying the intensity to the intensity/range tables. The final intensity through the glazing, if any, is then:

$I_e \times b \times c$

b = transmission factor of colour filter. Typical values are 0.25 for red and green, 0.5 for yellow.
c = transmission factor for lantern glazing, if any. This shall be taken as 0.9

LUMINOUS RANGE

The luminous range of a marine light is the distance at which it produces an eye illumination of 0.2 microlux. The nominal range is defined (IALA 1966) as the luminous range of light in an atmosphere in which the meteorological visibility, at a contrast ratio of 0.05, is 10 nautical miles; corresponding to atmosphere transmission factor of T - 0.74.