INTRODUCTORY REMARKS

Lights on mobile oil, gas and drilling platforms are not listed.

The date to which this publication has been amended will be found in the Preface. Updates to lights are promulgated in the fortnightly editions of *New Zealand Notices to Mariners*.

INTERNATIONAL NUMBERS OF LIGHTS

The numbers assigned to lights in the *Admiralty List of Lights and Fog Signals* publications, prefixed by the publication's Volume Letter, are the International Numbers, in accordance with the resolutions of the International Hydrographic Organization (IHO).

For all New Zealand lights the Volume Letter is K. For example, the International Number for Cape Kidnappers is K3992.

These letter-number combinations should be quoted whenever lights are referred to.

GENERAL INFORMATION

The duration of light and darkness are those for which the apparatus was designed. In practice they are subject to some degree of fluctuation, due to slight variations in the working speed of the apparatus. The duration of a flash may also appear to be less than normal when seen from a great distance, and haze has the same apparent effect.

The limits of sectors and of arcs of visibility, and the alignment of direction lights and leading lights are given **as seen by an observer from seaward. All bearings refer to the true compass and are measured clockwise from 000 to 359.**

Racons and Ramarks are included in the light lists when they are situated at a light station. For details of Coast Radio Stations and Radar Stations, reference must be made to the relevant volumes of the *Admiralty List of Radio Signals* (NP282).

Weather, ice, storm, danger, tide, tidal stream, traffic and port signals may be mentioned when they are shown at a light station but full details will be found in the *Admiralty Sailing Directions, New Zealand Pilot* (NP51).

LAYOUT OF COLUMN HEADINGS IN THE LIGHT LISTS

Column 1: Contains the International Number of each light – for clarity the prefix K is omitted.

Column 2: Location, name.
The names of lights having a range of 15 miles and over are printed in **bold** type.
Names of lights owned by Maritime New Zealand are annotated (M).

Column 3: Latitude and longitude are given to two decimal places of a minute.

Column 4: Characteristics.

Column 5: Elevation in metres above mean high water spring level.

Column 6: Nominal range in sea miles, in **bold** type if 15 miles or more.

Column 7: Description of structure and its height in metres.

Column 8: Remarks, including phase, sectors and arcs of visibility.

EXPLANATION — LIGHTS

Rhythmic lights: The character of a rhythmic light is quick flashing, flashing, isophase or occulting, solely according to the relative durations of light and darkness, and without any reference to the type of apparatus employed. At short distances, and in clear weather, flashing lights may show a faint continuous light.

Rhythmic lights produced by rotating apparatus may be detected at ranges greater than the geographical range by the appearance of the loom of the light.

Meteorological visibility is the greatest distance at which a black object of suitable dimensions can be seen and recognised against the horizon sky or, in the case of night observations, could be seen and recognised if the general illumination were raised to the normal daylight level.

Luminous intensity: The luminous flux leaving a light source, in a given direction, usually expressed as candlepower in candelas.

Lights with differing intensity may appear to change their character at different distances because a part of the character may not be visible. Lights exhibiting a very short flash may not be visible at the range calculated from the Luminous Range Diagram—see Diagram 1.

Sectors: Some lights change colour in sectors, some change character, and a few change both colour and character. Others show different colours in succession.

Aeromarine lights are marine-type lights in which a part of the beam is deflected to an angle of 10°–15° above the horizon for the use of aircraft.

Aero lights are often of great intensity and elevation. Their intensity is usually greater than that of most navigational lights and they may be the first lights, or looms of lights, to be sighted when approaching the land. Those likely to be visible from seaward are inserted in the light lists; their character is always preceded by the word "Aero". These lights are not designed for marine navigation and they are subject to changes of which prompt notification to the mariner may not always be possible. The details of the lights may not be complete and this information should be treated with caution.

Obstruction lights mark radio towers, chimneys and other obstructions to aircraft. Like aero lights, they are not maintained for marine navigation, and the same cautionary remarks apply. They are usually *red* in colour, either *fixed, flashing* or *occulting,* but other colours and characters may be employed.

Obstruction lights of high intensity and likely to be visible from seaward are listed with the character preceded by the word "Aero" and with the legend "**Obstruction**" in columns 4 and 8 respectively of the light lists.

Lights on wind turbines are usually located at the top of the turbine house/structure. Their light characteristics are normally aero fixed red; however, occasionally they may exhibit navigation light characteristics. Dependent on the stopped position of the blades, rotation of the turbine blades, prevailing wind speed and direction, vessel approach direction, these lights may on occasion appear to occult, flash or be interrupted. Care should be taken when identifying such lights for navigational purposes.

Daytime lights: Lights shown throughout 24 hours without change of character are annotated "Shown 24 hours" in column 8 of the light lists and during daylight, their intensity may be increased. If, by day, there are any differences to their character, elevation, range or arc of visibility, such differences are shown as a subsidiary entry to the light preceded by the words "*By day*" in column 4 of the light lists.

Cautionary Notes: Where ice conditions are prevalent the windows of lights may be covered with frost or ice, which will greatly reduce the sighting range.

Lights placed at a great elevation are more frequently obscured by cloud, etc., than those near sea level.

The distance of an observer from a light cannot be estimated from its apparent brightness.

The distance at which lights are sighted varies greatly with atmospheric conditions and this distance may be increased by abnormal atmospheric refraction. It will be reduced by fog, haze, dust, smoke or precipitation; a light of low intensity is easily obscured by any of these conditions and the sighting range of even a light of very high intensity is considerably reduced in such conditions. For this reason the intensity or nominal range of a light should always be considered when estimating the range at which it may be sighted, bearing in mind that varying atmospheric conditions may exist between the observer and the light—see Luminous Range Diagram (Diagram 1) and Geographical Range Table (Table 1).

The limits of sectors should not be relied upon; they are those for which the apparatus was designed and they should invariably be checked by compass bearing.

The limits of an arc of visibility are rarely clear cut, especially at a short distance, and instead of disappearing suddenly the light usually fades after the limit of the sector has been crossed.

At the boundary of sectors of different colour there is usually a small arc in which the light may be either obscured, indeterminate in colour, or *white*.

A light apparatus may be encountered where sector boundaries are defined with far greater accuracy than can be achieved with older sector lights.

In cold weather, and more particularly with rapid changes of weather, the lantern glass and screens are often covered with moisture, frost or snow; the sector of uncertainty is then considerably increased in width and coloured sectors may appear more or less *white*. The effect is greatest in *green* sectors and with weak lights. Under these conditions *white* sectors tend to extend into coloured and obscured sectors, and fixed or occulting lights into flashing ones.

White lights may have a *reddish* hue under some atmospheric conditions.

When a light is cut off by sloping land the bearing on which the light will disappear will vary with distance and the observer's height of eye.

NOMENCLATURE OF LIGHTS

A light must, on a given bearing, maintain a consistent character.

Lights exhibit a distinctive appearance by which they are recognised, e.g. Fixed, Flashing, etc. Those properties of their appearance by which they are distinguished are referred to as the **Character or Characteristics** of the light. The principal characteristics are generally the sequence of intervals of light and darkness exhibited and in some cases the sequence of colours of light exhibited. Lights which are exhibited without interruption or change of characteristics are called **Fixed lights.**

Normally, all lights other than fixed lights exhibit a sequence of intervals of light and darkness, the whole sequence being repeated identically at regular intervals. Such lights are called **Rhythmic lights,** and the time taken to exhibit one complete sequence is called the **Period** of the light. Each element of the sequence (*e.g.* a flash, an eclipse) is called a **Phase.**

Rhythmic lights which exhibit different colours during each sequence are called **Alternating lights.** The period of an alternating light is the time taken to exhibit the complete sequence, including all changes of colour.

The **intensity** of lights may be given in candelas in *italics*, in column 4 of the light lists.

Elevation is the vertical distance between the focal plane of the light and the level of Mean High Water Springs. For vertical lights, *e.g.* 2 F R(vert), the elevation listed is for the uppermost light.

Luminous range is the maximum distance at which a light can be seen at a given time, as determined by the intensity of the light and the meteorological visibility prevailing at that time; it takes no account of elevation, observer's height of eye or the curvature of the earth—see Luminous Range Diagram (Diagram 1).

Nominal range is the luminous range when the meteorological visibility is 10 nautical miles.

Geographical range is the maximum distance at which light from a light can theoretically reach an observer, as limited only by the curvature of the earth, the refraction of the atmosphere and by the elevation of the light and the height of eye of the observer—see Geographical Range Table (Table 1)

Loom: The diffused glow observed from a light below the horizon or hidden by an obstacle, due to atmospheric scattering.

Main light: The major of two or more lights situated on the same support or neighbouring supports.

Subsidiary (auxiliary) light: A light placed on or near the support of a main light and having a special use in navigation.

Sector light: A light presenting different appearances, either of colour or character, over various parts of the horizon. Where no sector limits or arcs of visibility are listed in column 8 of the light lists, then the light is assumed to be visible all around.

Leading lights: Two or more lights associated so as to form a leading line to be followed.

Lights described as "Lts in line" are particular cases, and are intended to mark limits of areas, alignments of cables, alignments for anchoring, etc.; they do not mark a direction to be followed.

Directional light: A light showing over a very narrow sector, forming a single leading light. This sector may be flanked by sectors of greatly reduced intensity, or by sectors of different colours or character.

Directional lights are also used to mark the limits of areas, etc., in the same way as "Lts in line".

Vertical lights: Two or more lights disposed vertically (or horizontally, or in a geometric shape) to give a different character or appearance. If the individual lights serve different purposes, the less important are termed auxiliary lights.

Reserve and Emergency lights: A distinction is made between Reserve lights and Emergency lights:

- **Reserve lights** retain the character of the main light but have a reduced range and their installation is usually restricted to major stations.
- **Emergency lights** are being installed at certain light stations. The apparatus is of lesser intensity and is automatically activated by a failure of the main light. It is normally visible at 5 miles.

  A second light sequence has been added and the term Emergency light or Reserve light had been used in column 2 of the light lists to indicate those stations where they have been installed; where Reserve or Emergency light details are confirmed they are included with the sequence.

Standby light: An alternative name use for Emergency light or Reserve light.

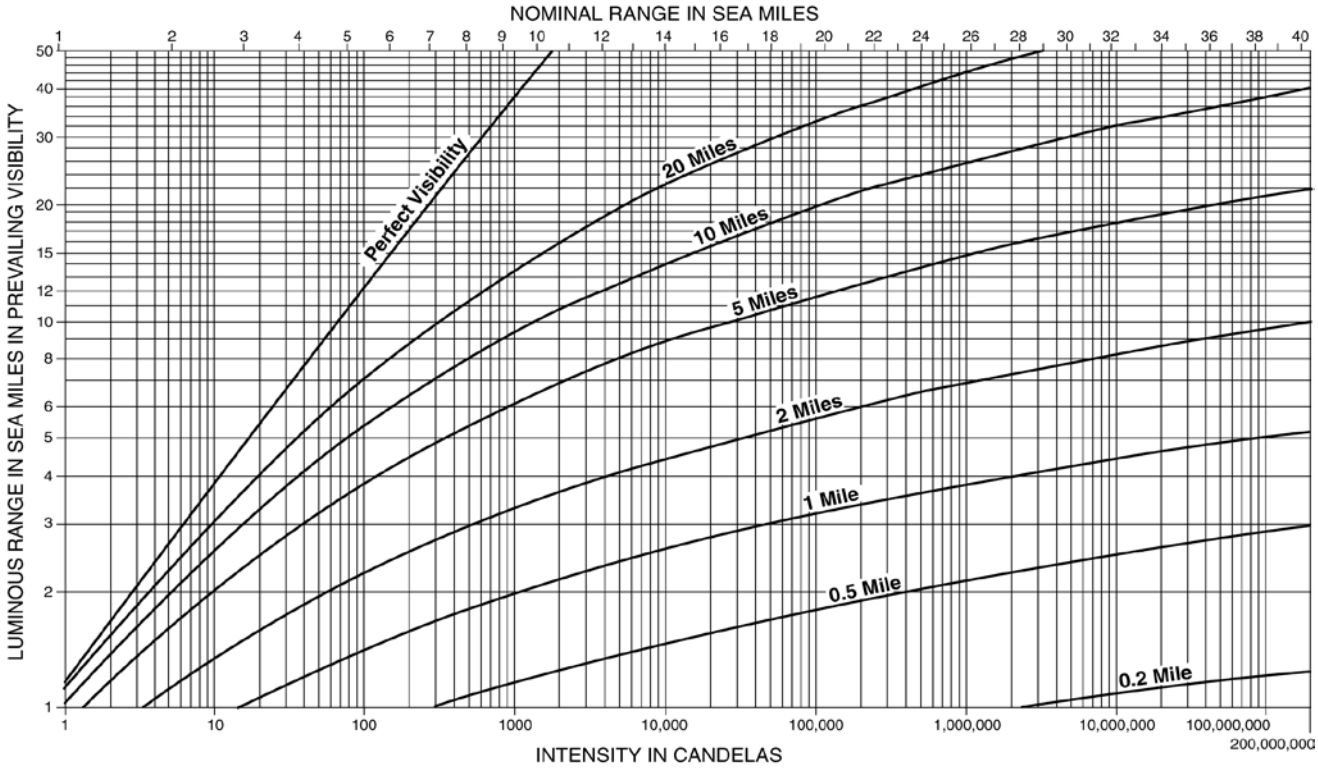
Description of structures:

- **Bands** Where the colour divisions of a structure, or any part of it, are horizontal, the term "bands" is used.
- **Stripes.** Where the colour divisions of a structure, or any part of it, are vertical, the term "stripes" is used.
- **Diagonal stripes.** Where the marking of a structure is in the form of a spiral, the term "diagonal stripes" is used.
- **Shape.** The shape of topmarks and daymarks is often shown diagrammatically; *e.g.* "White ◘ on beacon" or "Red ● on mast". Such symbols never refer to the plan cross-section of a structure.
- **Height** is measured from the top of the structure to the ground.

LUMINOUS RANGE DIAGRAM

This diagram gives the approximate range at which a light may be sighted in the prevailing meteorological visibility conditions. The straight line labelled “Perfect Visibility” gives the maximum possible luminous range. The diagram is entered from the top border with the charted nominal range of the light. At the point in the diagram where this intersects the appropriate visibility curve the approximate luminous range will be found from the left-hand scale. Example*:* K3690 North Cape (Otou) has a charted nominal range of 18 miles. For an estimated meteorological visibility of 20 miles, the approximate range at which light may be sighted is 30 miles.

DIAGRAM 1



CAUTIONS

1. The diagram gives luminous range i.e., the range at which a light may be sighted, irrespective of its elevation and of the observer’s height of eye.
2. Ranges are approximate.
3. The transparency of the atmosphere is not necessarily consistent between the observer and the light.
4. Glare from background lighting will reduce considerably the range at which lights are sighted.

INTENSITY

The power of a light is normally measured in candelas (cd), the international unit of luminous intensity. However for the purposes of this list, the significant property is not how bright a light is, but how far away it can be seen. Hence the measured intensity values for New Zealand lights have been converted to the corresponding nominal range figures in nautical miles. The correlation between intensity and nominal range may be seen by comparing the scales along the bottom and top of the Luminous Range Diagram.

TABLE 1 GEOGRAPHICAL RANGE TABLE

ELEVATION	HEIGHT OF EYE OF OBSERVER IN METRES																						
metres	1	2	3	4	5	6	7	8	9	10	12	14	16	18	20	22	24	26	28	30	35	40	45
	RANGE IN SEA MILES																						
0	2.0	2.9	3.5	4.1	4.5	5.0	5.4	5.7	6.1	6.4	7.0	7.6	8.1	8.6	9.1	9.5	10.0	10.4	10.7	11.1	12.0	12.8	13.6
1	4.1	4.9	5.5	6.1	6.6	7.0	7.4	7.8	8.1	8.5	9.1	9.6	10.2	10.6	11.1	11.6	12.0	12.4	12.8	13.2	14.0	14.9	15.7
2	4.9	5.7	6.4	6.9	7.4	7.8	8.2	8.6	9.0	9.3	9.9	10.5	11.0	11.5	12.0	12.4	12.8	13.2	13.6	14.0	14.9	15.7	16.5
3	5.5	6.4	7.0	7.6	8.1	8.5	8.9	9.3	9.6	9.9	10.6	11.1	11.6	12.1	12.6	13.0	13.5	13.9	14.3	14.6	15.5	16.4	17.1
4	6.1	6.9	7.6	8.1	8.6	9.0	9.4	9.8	10.2	10.5	11.1	11.7	12.2	12.7	13.1	13.6	14.0	14.4	14.8	15.2	16.1	16.9	17.7
5	6.6	7.4	8.1	8.6	9.1	9.5	9.9	10.3	10.6	11.0	11.6	12.1	12.7	13.2	13.6	14.1	14.5	14.9	15.3	15.7	16.6	17.4	18.2
6	7.0	7.8	8.5	9.0	9.5	9.9	10.3	10.7	11.1	11.4	12.0	12.6	13.1	13.6	14.1	14.5	14.9	15.3	15.7	16.1	17.0	17.8	18.6
7	7.4	8.2	8.9	9.4	9.9	10.3	10.7	11.1	11.5	11.8	12.4	13.0	13.5	14.0	14.5	14.9	15.3	15.7	16.1	16.5	17.4	18.2	19.0
8	7.8	8.6	9.3	9.8	10.3	10.7	11.1	11.5	11.8	12.2	12.8	13.3	13.9	14.4	14.8	15.3	15.7	16.1	16.5	16.9	17.8	18.6	19.4
9	8.1	9.0	9.6	10.2	10.6	11.1	11.5	11.8	12.2	12.5	13.1	13.7	14.2	14.7	15.2	15.6	16.0	16.4	16.8	17.2	18.1	18.9	19.7
10	8.5	9.3	9.9	10.5	11.0	11.4	11.8	12.2	12.5	12.8	13.5	14.0	14.5	15.0	15.5	15.9	16.4	16.8	17.2	17.5	18.4	19.3	20.0
11	8.8	9.6	10.3	10.8	11.3	11.7	12.1	12.5	12.8	13.2	13.8	14.3	14.9	15.4	15.8	16.3	16.7	17.1	17.5	17.9	18.8	19.6	20.4
12	9.1	9.9	10.6	11.1	11.6	12.0	12.4	12.8	13.1	13.5	14.1	14.6	15.2	15.7	16.1	16.6	17.0	17.4	17.8	18.2	19.1	19.9	20.7
13	9.4	10.2	10.8	11.4	11.9	12.3	12.7	13.1	13.4	13.7	14.4	14.9	15.4	15.9	16.4	16.8	17.3	17.7	18.1	18.4	19.3	20.2	20.9
14	9.6	10.5	11.1	11.7	12.1	12.6	13.0	13.3	13.7	14.0	14.6	15.2	15.7	16.2	16.7	17.1	17.6	18.0	18.3	18.7	19.6	20.4	21.2
15	9.9	10.7	11.4	11.9	12.4	12.8	13.2	13.6	14.0	14.3	14.9	15.5	16.0	16.5	17.0	17.4	17.8	18.2	18.6	19.0	19.9	20.7	21.5
16	10.2	11.0	11.6	12.2	12.7	13.1	13.5	13.9	14.2	14.5	15.2	15.7	16.2	16.7	17.2	17.7	18.1	18.5	18.9	19.2	20.1	21.0	21.7
17	10.4	11.2	11.9	12.4	12.9	13.3	13.7	14.1	14.5	14.8	15.4	16.0	16.5	17.0	17.4	17.9	18.3	18.7	19.1	19.5	20.4	21.2	22.0
18	10.6	11.5	12.1	12.7	13.2	13.6	14.0	14.4	14.7	15.0	15.7	16.2	16.7	17.2	17.7	18.1	18.6	19.0	19.4	19.7	20.6	21.5	22.2
19	10.9	11.7	12.4	12.9	13.4	13.8	14.2	14.6	14.9	15.3	15.9	16.5	17.0	17.5	17.9	18.4	18.8	19.2	19.6	20.0	20.9	21.7	22.5
20	11.1	12.0	12.6	13.1	13.6	14.1	14.5	14.8	15.2	15.5	16.1	16.7	17.2	17.7	18.2	18.6	19.0	19.4	19.8	20.2	21.1	21.9	22.7
22	11.6	12.4	13.0	13.6	14.1	14.5	14.9	15.3	15.6	15.9	16.6	17.1	17.7	18.1	18.6	19.1	19.5	19.9	20.3	20.7	21.5	22.4	23.2
24	12.0	12.8	13.5	14.0	14.5	14.9	15.3	15.7	16.0	16.4	17.0	17.6	18.1	18.6	19.0	19.5	19.9	20.3	20.7	21.1	22.0	22.8	23.6
26	12.4	13.2	13.9	14.4	14.9	15.3	15.7	16.1	16.4	16.8	17.4	18.0	18.5	19.0	19.4	19.9	20.3	20.7	21.1	21.5	22.4	23.2	24.0
28	12.8	13.6	14.3	14.8	15.3	15.7	16.1	16.5	16.8	17.2	17.8	18.3	18.9	19.4	19.8	20.3	20.7	21.1	21.5	21.9	22.8	23.6	24.4
30	13.2	14.0	14.6	15.2	15.7	16.1	16.5	16.9	17.2	17.5	18.2	18.7	19.2	19.7	20.2	20.7	21.1	21.5	21.9	22.2	23.1	24.0	24.7
35	14.0	14.9	15.5	16.1	16.6	17.0	17.4	17.8	18.1	18.4	19.1	19.6	20.1	20.6	21.1	21.5	22.0	22.4	22.8	23.1	24.0	24.9	25.6
40	14.9	15.7	16.4	16.9	17.4	17.8	18.2	18.6	18.9	19.3	19.9	20.4	21.0	21.5	21.9	22.4	22.8	23.2	23.6	24.0	24.9	25.7	26.5
45	15.7	16.5	17.1	17.7	18.2	18.6	19.0	19.4	19.7	20.0	20.7	21.2	21.7	22.2	22.7	23.2	23.6	24.0	24.4	24.7	25.6	26.5	27.2
50	16.4	17.2	17.9	18.4	18.9	19.3	19.7	20.1	20.5	20.8	21.4	22.0	22.5	23.0	23.4	23.9	24.3	24.7	25.1	25.5	26.4	27.2	28.0
55	17.1	17.9	18.6	19.1	19.6	20.0	20.4	20.8	21.2	21.5	22.1	22.7	23.2	23.7	24.1	24.6	25.0	25.4	25.8	26.2	27.1	27.9	28.7
60	17.8	18.6	19.3	19.8	20.3	20.7	21.1	21.5	21.8	22.2	22.8	23.3	23.9	24.3	24.8	25.3	25.7	26.1	26.5	26.9	27.7	28.6	29.4
65	18.4	19.2	19.9	20.4	20.9	21.4	21.7	22.1	22.5	22.8	23.4	24.0	24.5	25.0	25.5	25.9	26.3	26.7	27.1	27.5	28.4	29.2	30.0
70	19.0	19.9	20.5	21.1	21.5	22.0	22.4	22.7	23.1	23.4	24.0	24.6	25.1	25.6	26.1	26.5	26.9	27.4	27.7	28.1	29.0	29.8	30.6
75	19.6	20.5	21.1	21.7	22.1	22.6	23.0	23.3	23.7	24.0	24.6	25.2	25.7	26.2	26.7	27.1	27.5	27.9	28.3	28.7	29.6	30.4	31.2
80	20.2	21.0	21.7	22.2	22.7	23.1	23.5	23.9	24.3	24.6	25.2	25.8	26.3	26.8	27.3	27.7	28.1	28.5	28.9	29.3	30.2	31.0	31.8
85	20.8	21.6	22.2	22.8	23.3	23.7	24.1	24.5	24.8	25.1	25.8	26.3	26.9	27.3	27.8	28.3	28.7	29.1	29.5	29.9	30.7	31.6	32.4
90	21.3	22.1	22.8	23.3	23.8	24.2	24.6	25.0	25.4	25.7	26.3	26.9	27.4	27.9	28.4	28.8	29.2	29.6	30.0	30.4	31.3	32.1	32.9
95	21.8	22.7	23.3	23.9	24.3	24.8	25.2	25.5	25.9	26.2	26.8	27.4	27.9	28.4	28.9	29.3	29.7	30.1	30.5	30.9	31.8	32.6	33.4
100	22.3	23.2	23.8	24.4	24.9	25.3	25.7	26.1	26.4	26.7	27.3	27.9	28.4	28.9	29.4	29.8	30.3	30.7	31.1	31.4	32.3	33.2	33.9
110	23.3	24.2	24.8	25.4	25.8	26.3	26.7	27.0	27.4	27.7	28.3	28.9	29.4	29.9	30.4	30.8	31.3	31.7	32.1	32.4	33.3	34.1	34.9
120	24.3	25.1	25.8	26.3	26.8	27.2	27.6	28.0	28.3	28.7	29.3	29.8	30.4	30.9	31.3	31.8	32.2	32.6	33.0	33.4	34.3	35.1	35.9
130	25.2	26.0	26.7	27.2	27.7	28.1	28.5	28.9	29.2	29.6	30.2	30.8	31.3	31.8	32.2	32.7	33.1	33.5	33.9	34.3	35.2	36.0	36.8
140	26.1	26.9	27.6	28.1	28.6	29.0	29.4	29.8	30.1	30.5	31.1	31.6	32.2	32.6	33.1	33.6	34.0	34.4	34.8	35.2	36.0	36.9	37.7
150	26.9	27.7	28.4	28.9	29.4	29.9	30.2	30.6	31.0	31.3	31.9	32.5	33.0	33.5	34.0	34.4	34.8	35.2	35.6	36.0	36.9	37.7	38.5
160	27.7	28.6	29.2	29.8	30.2	30.7	31.1	31.4	31.8	32.1	32.7	33.3	33.8	34.3	34.8	35.2	35.6	36.0	36.4	36.8	37.7	38.5	39.3
170	28.5	29.4	30.0	30.5	31.0	31.5	31.9	32.2	32.6	32.9	33.5	34.1	34.6	35.1	35.6	36.0	36.4	36.8	37.2	37.6	38.5	39.3	40.1
180	29.3	30.1	30.8	31.3	31.8	32.2	32.6	33.0	33.3	33.7	34.3	34.9	35.4	35.9	36.3	36.8	37.2	37.6	38.0	38.4	39.3	40.1	40.9
190	30.0	30.9	31.5	32.1	32.5	33.0	33.4	33.7	34.1	34.4	35.0	35.6	36.1	36.6	37.1	37.5	37.9	38.4	38.7	39.1	40.0	40.8	41.6
200	30.8	31.6	32.2	32.8	33.3	33.7	34.1	34.5	34.8	35.1	35.8	36.3	36.8	37.3	37.8	38.3	38.7	39.1	39.5	39.8	40.7	41.6	42.3
220	32.2	33.0	33.6	34.2	34.7	35.1	35.5	35.9	36.2	36.5	37.2	37.7	38.3	38.7	39.2	39.7	40.1	40.5	40.9	41.4	42.1	43.0	43.8
240	33.5	34.3	35.0	35.5	36.0	36.4	36.8	37.2	37.6	37.9	38.5	39.1	39.6	40.1	40.4	41.0	41.4	41.8	42.2	42.6	43.5	44.3	45.1
260	34.8	35.6	36.3	36.8	37.3	37.7	38.1	38.5	38.8	39.2	39.8	40.4	40.9	41.4	41.8	42.3	42.7	43.1	43.5	43.9	44.8	45.6	46.4
280	36.0	36.9	37.5	38.0	38.5	39.0	39.4	39.7	40.1	40.4	41.0	41.6	42.1	42.6	43.1	43.5	43.9	44.3	44.7	45.1	46.0	46.8	47.6
300	37.2	38.1	38.7	39.2	39.7	40.2	40.6	40.9	41.3	41.6	42.2	42.8	43.3	43.8	44.3	44.7	45.1	45.5	45.9	46.3	47.2	48.0	48.8
320	38.4	39.2	39.9	40.4	40.9	41.3	41.7	42.1	42.4	42.8	43.4	43.9	44.5	45.0	45.4	45.9	46.3	46.7	47.1	47.5	48.3	49.2	50.0
340	39.5	40.3	41.0	41.5	42.0	42.4	42.8	43.2	43.5	43.9	44.5	45.1	45.6	46.1	46.5	47.0	47.4	47.8	48.2	48.6	49.5	50.3	51.1
360	40.6	41.4	42.1	42.6	43.1	43.5	43.9	44.3	44.6	45.0	45.6	46.1	46.7	47.2	47.6	48.1	48.5	48.9	49.3	49.7	50.6	51.4	52.2
380	41.6	42.5	43.1	43.7	44.1	44.6	45.0	45.3	45.7	46.0	46.6	47.2	47.7	48.2	48.7	49.1	49.5	50.0	50.3	50.7	51.6	52.4	53.2
400	42.7	43.5	44.1	44.7	45.2	45.6	46.0	46.4	46.7	47.0	47.7	48.2	48.7	49.2	49.7	50.1	50.6	51.0	51.4	51.7	52.6	53.5	54.2

USE OF GEOGRAPHICAL RANGE TABLE

CAUTION: The geographical range of a light, sometimes referred to as the dipping range, only be used for finding the distance off the light in clear weather when the luminous range is equal to or exceeds the geographical range.

Definition of geographical range: The maximum distance at which light from a light can theoretically reach an observer, as limited only by the curvature of the earth, the refraction of the atmosphere and by the elevation of the light and the height of eye of the observer.

The **Geographical Range Table** can be used to find the dipping or geographical range of a light as follows:

Enter the table at the top with the observer's height of eye and at the left, in the elevation column, with the height of the light as taken from the chart or the light lists in this publication. The dipping range can then be taken from the body of the table, e.g.

1. Height of eye of observer 9 metres, charted height of light 30 metres. Geographical range = 17.2 miles.
2. Height of eye 3 metres, charted height of light 52 metres. Geographical range = 18.18 miles.

To find out whether a light is of sufficient power to be visible at its extreme range reference must be made to the Light List and to the Luminous Range Diagram. For example, to find whether the following lights will be visible at dipping range to an observer having a height of eye of 8 metres. The estimated meteorological visibility is 20 miles.

(a) K3992 Cape Kidnappers. The Light List gives a nominal range of 8 miles and elevation of light 112 metres. The Geographical Range Table gives a range of 27.2 miles, the Luminous Range Diagram gives a range of 11 miles. This light, therefore, *will not* be visible at its dipping range for this particular observer.

(b) K3994 Castle Point. The Light List gives a nominal range of 19 miles and elevation of light 52 metres. The Geographical Range Table gives a range of 20.38 miles and the Luminous Range Diagram gives a range of 32 miles. This light *will* be visible at its dipping range for this particular observer.

NOTE:

1. Dipping ranges can only be used in clear weather when the loom of the light is visible before or after the light dips on the horizon.
2. Some lights whose charted range is less than their geographical range may be observed to dip on the horizon in conditions of excellent visibility.
3. Conditions of abnormal refraction may cause the dipping ranges to increase and consequently ranges obtained by this method should be used with caution.

NOMINAL RANGE

The nominal range of the light is the *maximum distance* at which the light can *just* be seen by a *normal observer at night, in conditions* when the actual (or meteorological) visibility is 10 miles.

VISIBILITY

Visibility is defined in terms of the distance (meteorological optical range) at which light transmitted is reduced to 5% or 0.05 of the light emitted. For all practical purposes this represents the same atmospheric conditions as for a daytime visibility defined in terms of the maximum distance at which large objects can be recognised. Meteorological visibility at 10 miles corresponds with an atmospheric transmission factor (a.t.f.) of 0.74 per mile; $0.74^{10} = 0.05$. For comparison: with an a.t.f. of 0.22 per mile, visibility is 2 miles; $0.22^{2} = 0.05$. with an a.t.f. of 0.86 per mile, visibility is 20 miles; $0.86^{20} = 0.05$.

The atmospheric transmission factor must always be associated with a length unit, and visibility will be in the same unit; e.g. in dense fog with an a.t.f. of 0.74 per metre, visibility would be 10 metres. Note that perfect visibility is an a.t.f. of 1.00 for any length unit.

VISIBLE RANGE

When the visibility is other than 10 miles (it is generally greater in New Zealand) the range at which a light can be expected to be seen can be obtained from the Luminous Range Diagram. It must be noted that neither the charted nominal range nor the Luminous Range Diagram take any account of curvature of the earth. The geographical range of a light must be obtained separately from the Geographical Range Table. The above instructions and Luminous Range Diagram are applicable to charted nominal ranges only.

TABLE 2 LIGHT CHARACTERISTICS

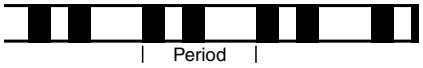
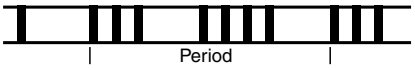
CLASS OF LIGHT	CHARACTERISTIC	GENERAL DESCRIPTION	ABBREVIATION	ILLUSTRATION
A – FIXED	Fixed	A light showing continuously and steadily.	F W	
B – RHYTHMIC		A rhythmic light is a light showing intermittently with a regular periodicity. The rhythmic character of a light is the regular periodic rhythm presented by the light.		
1 – Occulting, Group Occulting		A light in which the total duration of light in a period is longer than the total duration of darkness and the intervals of darkness (eclipses) are usually of equal duration.		
	(a) Occulting	An occulting light in which an eclipse is regularly repeated.	Oc W	
	(b) Group occulting	An occulting light in which a group of eclipses, specified in number, is regularly repeated. The total duration of light in each period may be equal to the total duration of darkness.	Oc(2)W	
	(c) Composite group occulting	A light similar to a group occulting light except that successive groups in a period have different numbers of eclipses. The total duration of light in each period may be equal to the total duration of darkness.	Oc(3+4)W	
2 – Isophase	Isophase	A light in which all the durations of light and darkness are clearly equal.	Iso W	
3 – Flashing, Group Flashing		A light in which the total duration of light in a period is shorter than the total duration of darkness and the appearances of light (flashes) are usually of equal duration.		
	(a) Flashing	A flashing light in which a flash is regularly repeated (at a rate of less than 50 flashes per minute).	Fl W	
	(b) Long flashing	A single-flashing light in which an appearance of light of not less than 2s duration (long flash) is regularly repeated.	LFl W	
	(c) Group flashing	A flashing light in which a group of flashes, specified in number, is regularly repeated.	Fl(3)W	
	(d) Composite group flashing	A light similar to a group-flashing light except that successive groups in a period have different numbers of flashes.	Fl(3+2)W	

TABLE 2 LIGHT CHARACTERISTICS

CLASS OF LIGHT	CHARACTERISTIC	GENERAL DESCRIPTION	ABBREVIATION	ILLUSTRATION
4 – Quick Lights		A light in which flashes are repeated at a rate of not less than 50 flashes per minute but less than 80 flashes per minute.		
	(a) Quick	A quick light in which a flash is regularly repeated.	Q W	
	(b) Group quick	A quick light in which a specified group is regularly repeated.	Q(9)W	
			Q(6)+LFl W	
	(c) Interrupted quick	A quick light in which the sequence of flashes is interrupted by regular repeated eclipses of constant and long duration.	IQ W	
NOTE: The group flashing light Fl(6)+LFl W is an exceptional light character reserved for use in IALA Buoyage System to indicate a South Cardinal mark.				
5 – Very Quick Lights		A light in which flashes are repeated at a rate of not less than 80 flashes per minute but less than 160 flashes per minute.		
	(a) Very quick	A very quick light in which a flash is regularly repeated.	VQ W	
	(b) Group very quick	A very quick light in which a specified group of flashes is regularly repeated.	VQ(3)W	
	(c) Interrupted very quick	A very quick light in which the sequence of flashes is interrupted by regularly repeated eclipses of constant and long duration.	IVQ W	
6 – Ultra Quick Lights		A light in which flashes are repeated at a rate of not less than 160 flashes per minute.		
	(a) Ultra quick	An ultra quick light in which a flash is regularly repeated.	UQ W	
	(b) Interrupted ultra quick	An ultra quick light is which the sequence of flashes is interrupted by eclipses of long duration.	IUQ W	
7 – Morse code	Morse code	A light in which appearances of light of two clearly different durations are grouped to represent a character or characters in the Morse Code.	Mo(K)W	
			Mo(AR)W	
			Mo(4)W	

TABLE 2 LIGHT CHARACTERISTICS

CLASS OF LIGHT	CHARACTERISTIC	GENERAL DESCRIPTION	ABBREVIATION	ILLUSTRATION
8 – Fixed and Flashing		A light in which a fixed light is combined with a flashing light of higher luminous intensity.		
	(a) Fixed and flashing	A fixed light varied, at regular intervals, by a single flash of higher luminous intensity.	FFl W	
	(b) Fixed and group flashing	A fixed light varied, at regular intervals, by a group of two or more flashes of higher luminous intensity.	FFl(2)W	
C – ALTERNATING		A light showing different colours alternately.		
1 – Alternating	Alternating	A continuous steady light which shows a change in colour.	Al WGR	
2 – Flashing, Group Flashing	(a) Alternating	See C1 and B3	AlFl WR	
	(b) Alternating group flashing	See C1 and B3	AlFl RW	
			AlFl WWRR	
3 – Occulting, Group Occulting	(a) Alternating occulting	See C1 and B1	AlOc WR	
	(b) Alternating group occulting	See C1 and B1	AlOc WGR	
4 – Fixed and Flashing, Fixed and Group Flashing	(a) Alternating fixed and flashing	See C1, A and B3	AlF W Fl R	
			AlF W Fl RG	
	(b) Alternating fixed and group flashing	See C1, A and B3	AlF W Fl(3)G	
	(c) Alternating fixed and composite group flashing	See C1, A and B3	AlF W Fl WRR	

FOG SIGNALS

Sound is often conveyed in an unpredictable way through the atmosphere and the following points should be remembered:

(a) Fog signals are heard at greatly varying distances.

(b) Under certain atmospheric conditions, if a fog signal is a combination of high and low tones, one of the tones may be inaudible.

(c) There are occasionally areas around a station in which the fog signal is wholly inaudible.

(d) Fog may exist a short distance from a station and not be observable from it, so that the signal may not be sounded.

(e) Some fog signal emitters cannot be started immediately after signs of fog are observed.

Mariners are therefore warned that fog signals should never be relied upon implicitly. Particular attention should be given to placing look-outs in positions in which the noises in the ship are least likely to interfere with the hearing of a fog signal; experience shows that, though such a signal may not be heard from the deck or bridge when the engines are moving, it may be heard when the ship is stopped, or from a quiet position.

Fog signals are mainly produced by the following types of emitters:

The *Diaphone* uses compressed air and *generally* emits a powerful, low-pitched sound, which often concludes with a brief sound of suddenly lowered pitch termed the “grunt”. Where it is known that the sound does not terminate in a “grunt”, the signal is annotated “No grunt”.

The *Horn* uses compressed air or electricity to vibrate a diaphragm and exists in a variety of types which differ greatly in their sound and power; some types, particularly those at major fog signal stations, combine emitter units which simultaneously produce sounds of different pitch; these are often very powerful. Others produce a single steady tone, whilst others vary continuously in pitch.

The *Siren* uses compressed air and exists in a variety of types which differ considerably in their sound and power.

The *Reed* uses compressed air and emits a weak, high-pitched sound; it is particularly weak when hand-operated.

The *Explosive* emitter produces short reports by the firing of explosive charges.

The *Bell*, the *Gong* and the *Whistle* may be operated by machinery, sounding a regular character; by hand, sounding a somewhat irregular character; or by wave action, sounding erratically.

Morse code fog signals: In a similar manner to lights, the abbreviation “Mo” is included in the abridged description of fog signals which consist of one or more characters of the Morse code; *e.g.* Horn Mo(AR), Horn Mo(4) and composite fog signals are described, *e.g.* Siren(2+3).
Fog signal emitters of all types vary greatly in power; reserve emitters are often especially weak.

Some fog signal emitters sound characters composed of separate blasts of two or more different pitches; these are annotated, in column 8 of the light lists, “2-tone”, “3-tone”, etc. Other emitters commence with an ascending pitch, or conclude with a descending pitch, and are annotated accordingly; others which produce a continuously-varying pitch are annotated “warble tone”.

ABBREVIATIONS USED IN THE LIGHT LISTS

AHP ..... Above Head of Passes (in miles)
AIS ..... Automatic Identification System Station
Al ..... Alternating
AtoN ..... Aid(s) to Navigation
bl ..... Blast
Bu ..... Blue
CALM ..... Catenary Anchor Leg Mooring
Dia ..... Diaphone
Dir Lt ..... Direction Light
E ..... East
ec ..... Eclipse (phase)
ED ..... Existence Doubtful
ENE ..... East Northeast
ESE ..... East Southeast
Explos ..... Explosive fog signal
F ..... Fixed
FFl ..... Fixed and flashing
FFl(. .) ..... Fixed and group flashing
Fl ..... Flashing
Fl(. .) ..... Group flashing
fl ..... Flash (phase)
FPSO ..... Floating Production Storage and Offloading facility
FSO ..... Floating Storage and Offloading facility
FSU ..... Floating Storage Unit
G ..... Green
GRP ..... Glass Reinforced Plastic
HFPB ..... High Focal Plane Buoy
(hor) ..... Horizontal
I ..... Interrupted
Intens ..... Intensified sector
Irreg ..... Irregular
Iso ..... Isophase
Lanby ..... Large Automatic Navigational Buoy
Lat ..... Latitude
Ldg Lts ..... Leading Lights
LED ..... Light Emitting Diode
LFl ..... Long flash
Lit ..... Light (no details known)
Long ..... Longitude
LPG ..... Liquid Petroleum Gas
lt ..... Light (phase)
Lt F ..... Light-float
Lts in line ..... Lights in line
(M) ..... Light owned by Maritime New Zealand
M ..... Sea miles
m ..... Metres
min ..... Minutes
Mo ..... Morse code light or fog signal
MV ..... Mercury vapour discharge lamp greenish-white in colour
N ..... North
NE ..... Northeast
NNE ..... North Northeast
NNW ..... North Northwest
NW ..... Northwest
Oc ..... Occulting
Oc(. .) ..... Group occulting
Occas ..... Occasional
(P) ..... Preliminary
PA ..... Position approximate
PEL ..... Port Entry Light
Q ..... Quick flashing
R ..... Red
Ra refl ..... Radar reflector
Racon ..... Radar responder beacon
RC ..... Circular radio beacon
Ramark ..... Radar beacon (continuous)
Ro Bn ..... Radio beacon
Rot ..... Rotating
RTE ..... Radar Target Enhancer
S ..... South
s ..... Seconds
SAR ..... Search and Rescue
SBM ..... Single Buoy Mooring
SE ..... Southeast
si ..... Silence
Sig Stn ..... Signal Station
SPM ..... Single Point Mooring
SSE ..... South Southeast
SSW ..... South Southwest
SV ..... Sodium vapour discharge lamp orange in colour
SW ..... Southwest
(T).. ..... Temporary
TALM ..... Taut Anchor Leg Mooring
TD ..... Temporarily discontinued (non-light AtoN)
TE ..... Temporarily extinguished (light AtoN)
TR ..... Racon temporarily discontinued
Unintens ..... Unintensified sector
UQ ..... Ultra quick flashing
(var) ..... Varying
(vert) ..... Vertical
Vi ..... Violet
Vis ..... Visible
VQ ..... Very quick flashing
W ..... West
W ..... White
Whis ..... Whistle
WNW ..... West Northwest
WSW ..... West Southwest
Y ..... Yellow, amber or orange