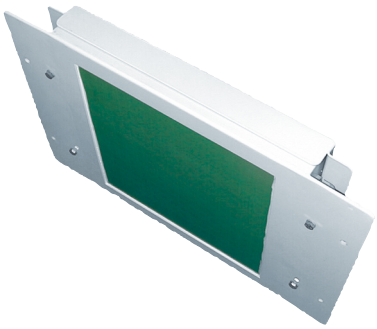
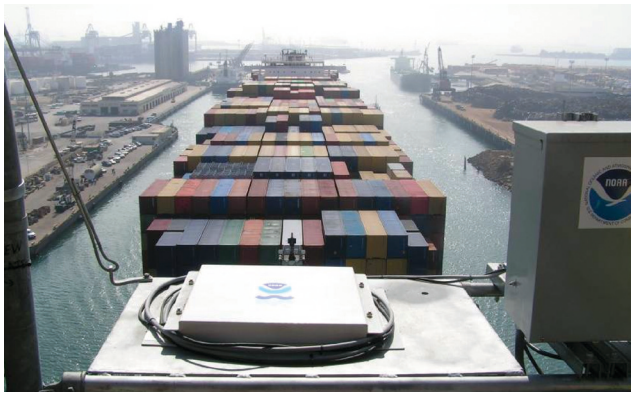
Bridge Clearance Monitoring
SM-094/2 Range Finder

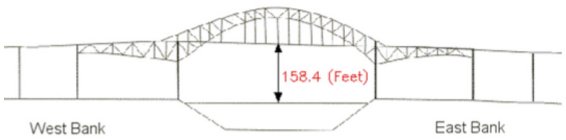
Your accurate and reliable microwave sensor for monitoring of:

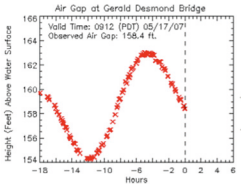
- Air Gap
- Bridge Sailing Clearance
- Water Level
- Waves
- Tide



The Miros Range Finder series is unrivalled in reliability, accuracy and measuring range. The SM-094/2 microwave sensor is unaffected by temperature and will penetrate and operate undisturbed in fog and heavy precipitation as well as sea spray.







Air gap sensor SM-094/N2/85 installed on the Gerald Desmond Bridge in Long Beach, California. (Pictures courtesy of W. Krug, NOAA)

In many ports around the world ships have to pass under one or several bridges either in the port entrance, between island or when coming up or down major rivers. As the ships have become larger and larger over the years, especially container- and cruise ships, passing safely under bridges has for many bridges and ships become a critical factor. However, not only the free sailing clearance is critical, but because of increased ship's draught also the under keel clearance must be sufficient.

The free sailing clearance and safe water depth will vary continuously and depend upon factors such as tide, amount of water in respective rivers and for suspension bridges with the load of passing traffic and the ambient temperature. When passing underneath is not considered safe, ships will either have to wait or make a detour costing them several extra hours or even days.

On this background it is very important from a safety aspect and for cost saving reasons to be able to accurately monitor the bridge sailing clearance and make this figure available to the pilot or master onboard ships approaching or with scheduled arrivals.

MIROS

In the US, NOAA through their PORTS® program, have instrumented a number of major US ports with several types of meteorological and oceanographic sensors.

In ports with critical bridges NOAA have installed air gap sensors using the Miros SM-094 Range Finder. The free sailing clearance is provided online over the internet and is in several ports also available over radio from the harbour master or port office.

Please visit PORTS® web site under: **http://www.tidesandcurrents.noaa.gov/dbports/** and then select Products/Ports-Real Time Obs. and then specific ports such as New York, Chesapeake Bay North etc. Look under (ag) to see the online presented air gap (bridge clearance) value for the various bridges instrumented by NOAA with the Miros air gap sensor.

If the sensor is mounted on a static part of the bridge structure, the SM-094 Range Finder may with the use of Miros MirLevel-03 software package, in addition to free sailing clearance also provide wave and tide information.

Main Characteristics

Microwave Transceiver:
Modulation: Triangular FMCW
Frequency: 9.4 – 9.8 GHz

Antenna:
Planar Patch antenna:
Wide beam: 10˚
Narrow beam: 5˚

Accuracy:
Better than 1 cm (individual measurements)
Better than 1 mm (averaged measurements)

Power Requirement:
9 – 36 VDC (nominal 24 VDC) 0.2A

Measurement Ranges:

SM-094/W2/10 Wide,	1 – 10 m
SM-094/W2/20 Wide,	1 – 20 m
SM-094/N2/20 Narrow,	3 – 20 m
SM-094/N2/50 Narrow,	3 – 50 m
SM-094/N2/85 Narrow,	3 – 85 m

Digital Signal Output:
ASCII on RS-422 (optionally on RS-232)

Samping interval / Data Output Rate:
User selectable 20 ms - 1 min (50 Hz - 0.016 Hz) or polling mode

Specifications are subject to change without prior notice.

DB/110 Rev 2.

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