

Barometer Calibration for Hong Kong Voluntary Observing Ships during COVID-19

Chow Chi Kin

Accurate atmospheric pressure readings are crucial for mariners to appreciate the general weather conditions at high seas. In the old days, pressure and pressure tendency were among the most important weather observations for the ship captains to predict the weather en route during a voyage. A barometer is used to record the atmospheric pressure. Aneroid barometers consisting of an evacuated capsule with some mechanical components inside are most commonly used on ships as they are small in size, relatively cheap in cost and easy to install. However, the aging of the mechanical parts may in time inhibit the movement of the hairspring and lever inside. This will affect the accuracy of the readings, and frequent calibrations and maintenance are required.

Normally, the Port Meteorological Officer (PMO) helps calibrate the barometers onboard during regular Voluntary Observing Ship (VOS) visits. Pressure readings from the ship barometer (known as station pressure) will be compared against the readings of a reference barometer. The PMO will then manually calibrate the ship barometer such that the barometer will give a reading as close to that shown on the reference barometer as possible (Figure 1). However, there may still exist a small bias after performing the calibration procedure, and this bias is known as the 'index correction'. With this, the corrected sea level pressure can be derived based on the altitude of the barometer and outboard temperature by making reference to the height/temperature correction look up table. A label showing various corrections to be made will be stuck on the barometer for easy reference by the ship crew (Figure 2).



Figure 1. Barometer calibration by Port Meteorological Officer



Figure 2. Aneroid barometer

The ship visits by PMO are currently suspended in Hong Kong following the outbreak of the COVID-19 pandemic. On-site calibration of ship barometers become impracticable. However, the provision of barometer calibration service by the Hong Kong Observatory (HKO) continues via remote method. Shipmasters are invited to send the completed “[Barometer Comparison Check Service Request Form](#)” (Figure 3) to HKO with pressure reading of the ship barometer, height and temperature information via email or fax when the ship is berthed at Hong Kong. The PMO will then use the supplied information to compute the corresponding sea level pressure, which is then compared with the mean sea level pressure (MSLP) recorded at the HKO Headquarters at the specified observation time. Information on the correction required will then be sent back to the shipmasters for calibrating their barometers. Although this kind of calibration is indirect compared with on-site calibration, it is considered good enough to provide pressure comparison for contingency since Hong Kong is such a small city that the pressure difference between HKO and the port should be minimal. Remote calibration can also be performed any time not limited by the working hours or the availability of the PMO, and most importantly, effectively reduce the risk of cross infection during this critical period.

With the advance of technology, high precision digital barometers specialized for mariners have been developed in recent years and are made available commercially (Figure 4). Barometric measurements are taken digitally and the pressure change and tendency can be computed and displayed automatically. Comparing with the aneroid barometers, digital barometers are more compact in size with higher accuracy, and they require much less regular maintenance. HKO is progressively replacing the aneroid barometers onboard VOS with digital barometers and this can help reduce the need for barometer calibration service in long term.


香港天文台
HONG KONG OBSERVATORY

Barometer Comparison Check Service Request Form
(Barometer Comparison Check Service is provided for ships in Hong Kong Waters only)

Ship Information	
Ship Name	
Call Sign	
Name of Shipmaster	
Telephone & Marine Telephone	
Fax & Marine Fax	
E-mail	
Latitude	22 26.21 N
Longitude	114 06.96 E
Current port of call	HONG KONG
Expected Date/Time of Departure	11 Sep 2012 1300 HKT

Shipping agent at port	
Name of agent	
Telephone	
Fax	
E-mail	

Barometer	
Barometer reading (without correction to mean sea level or for instrumental error)	1021.0 (in 0.1hPa unit)
Location of barometer in your ship	CAPTAIN'S COCKPIT HOUSE
Outboard air temperature	26.0 (in 0.1 °C unit)
Time of reading (at the exact hour)	20120910 2200 (YYYYMMDDHH in UTC)
Height of barometer above sea level (The present height is usually between "in ballast" & "at full load")	In ballast - 45.00 m
	At present - 44.50 m
	At full load - 38.50 m

Applicant Details	
Name	
Post/Rank	CAPTAIN

Please send the completed form by Fax /E-mail to the Hong Kong Observatory :
 Fax: (852) 23024521
 E-mail: hkopms@hko.gov.hk

General Guide for taking the barometer reading:
 - The window or door of the house should keep open while measuring outboard air pressure.
 - Avoid strong winds always.
 - Read the barometer at the EXACT HOUR.

Figure 3. Sample of filled Barometer Comparison Check Service Request Form



Figure 4. High precision digital barometer for mariners