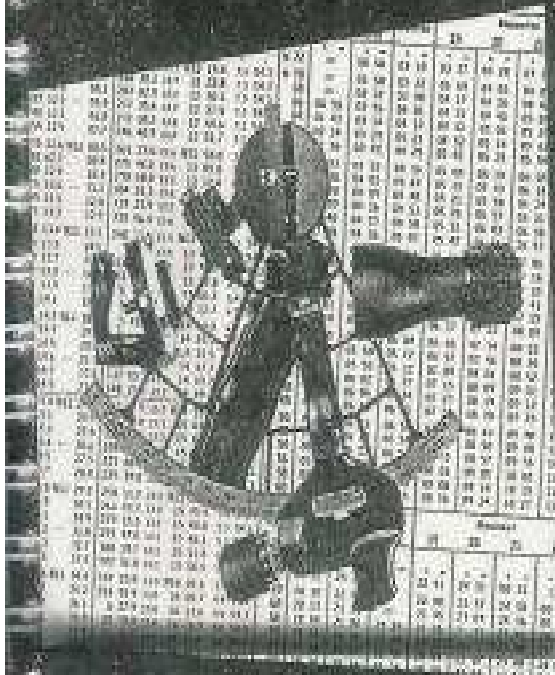


NAVISTAR
classic
Sextant



C. PLATH

OWNER'S MANUAL

NAVISTAR

classic

Sextant

March 1984

Revision 01

The " NAVISTAR classic " sextant in brass has been type approved by the German Hydrographic Institute in Hamburg, West Germany.

Type approval number: DHI 40 / 2 / 1 / 78.

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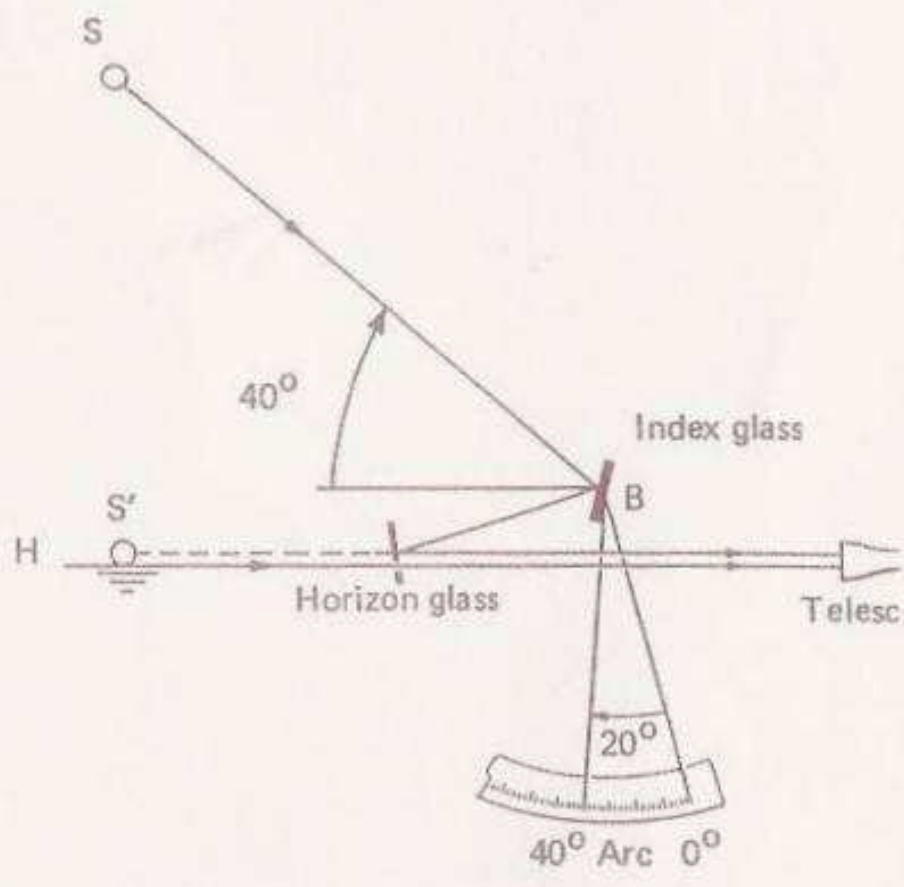
INTRODUCTION

More than sixty thousand C. PLATH sextants have become the indispensable tools of navigators and surveyors throughout the entire world. During the last one hundred and fifteen years, C. PLATH sextants have become a paragon of precision and reliability. Ease of use, extremely high durability and well above average accuracy have led to the enormous success of the traditionally designed "NAVISTAR classic" sextant.

The Principle of the Sextant (see fig. 1)

The sextant is an instrument especially designed for measuring angles. It is equipped with two mirrors called the horizon glass and the index glass. The horizontal axes of the two glasses are exactly parallel. The horizon glass is permanently fixed in position. The index glass can be rotated about its horizontal axis. This axis of rotation is the center point of the arc or limb.

In order to measure the angle between a line H (horizon) and an object S (the angle through S, index glass and H) the observer looks through the telescope past the horizon glass and observes the line H. Simultaneously the observer rotates the index mirror by moving the index arm along the limb until the reflected image of S lies on the horizon H seen through the telescope. The angle



Principle of the Sextant
Figure 1

of rotation of the index glass is only half of the angle measured, but the arc is calibrated so that the observer may read off the angle measured without having to make conversions.

TECHNICAL DATA

- Range -5° to $+125^{\circ}$
- Accuracy better than 10". May be tested at all national registration offices.
- Vernier graduation 0.2' (12")
- Number of horizon glass shades 3
- Number of index glass shades 4
- Telescope 4 x 40 or 6 x 30
- Illumination 3.5 V, battery powered
- Star elongation lens* 1
- Artificial horizon* with 3 x 22 telescope only
- Weight of brass sextant 1.9 kg
- Weight of light-alloy sextant 1.3 kg

Available as an optional extra.

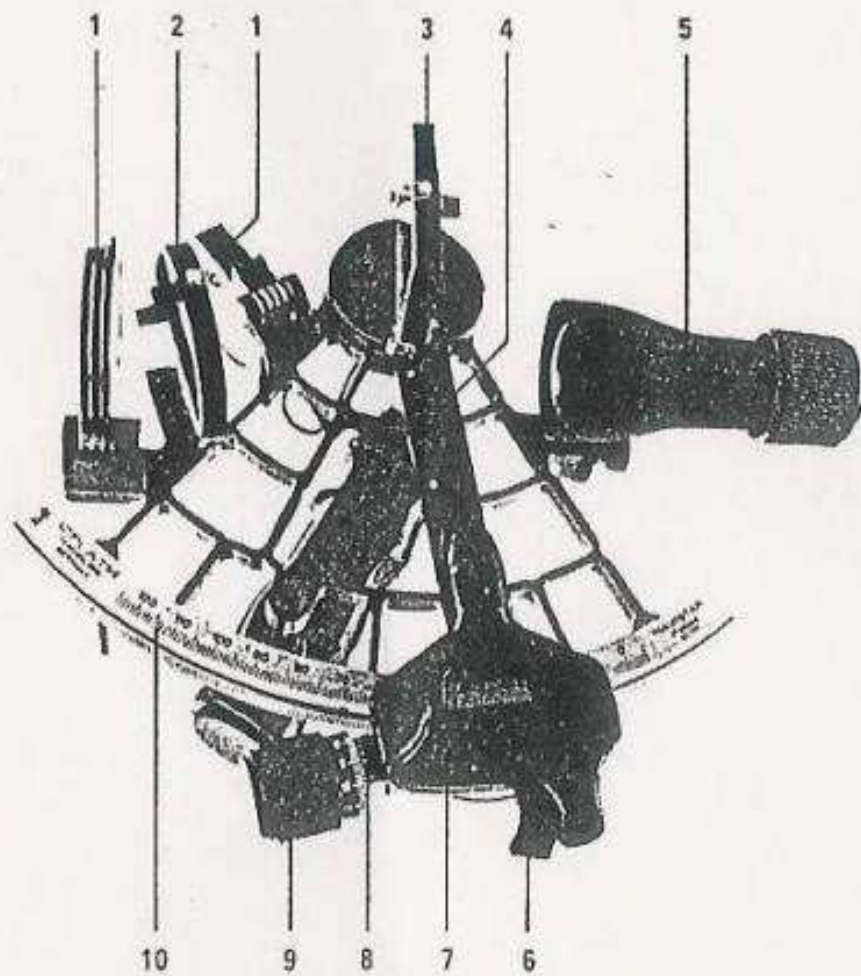
Whole Horizon Glass "Transflex"

The C. PLATH classic sextant is also available with a Whole Horizon Glass.

The application of the Whole Horizon Glass facilitates day sights and is of great assistance to the novice navigator.

Using specially coated optics the Whole Horizon Glass superimposes both the horizon and the celestial body on the entire mirror with no split image. This greatly simplifies "bringing down" the celestial body and eliminates the need for excessive "rocking". This feature is available optionally on most quality sextants, either as standard equipment on new sextants or as conversion kits for conventional sextants.

The C. PLATH Whole Horizon Glass system is designated "Transflex".



NAVISTAR classic

- | | |
|-----------------|-----------------------|
| 1 Shade glasses | 6 Quick release lever |
| 2 Horizon glass | 7 Index marking |
| 3 Index glass | 8 Vernier scale |
| 4 Index lever | 9 Micrometer drum |
| 5 Telescope | 10 Limb |

Figure 2

TAKING SIGHTS

Altitude of a Celestial Body

Carry out the following instructions to measure the altitude of a celestial body against a visible horizon.

- a) Set the index arm to 0° (see fig. 2).
- b) NOTE: TO PROTECT THE EYES WHEN OBSERVING THE SUN, ROTATE THE INDEX AND/OR HORIZON GLASS SHADES INTO POSITION IN FRONT OF THESE GLASSES BEFORE MAKING A SIGHT.

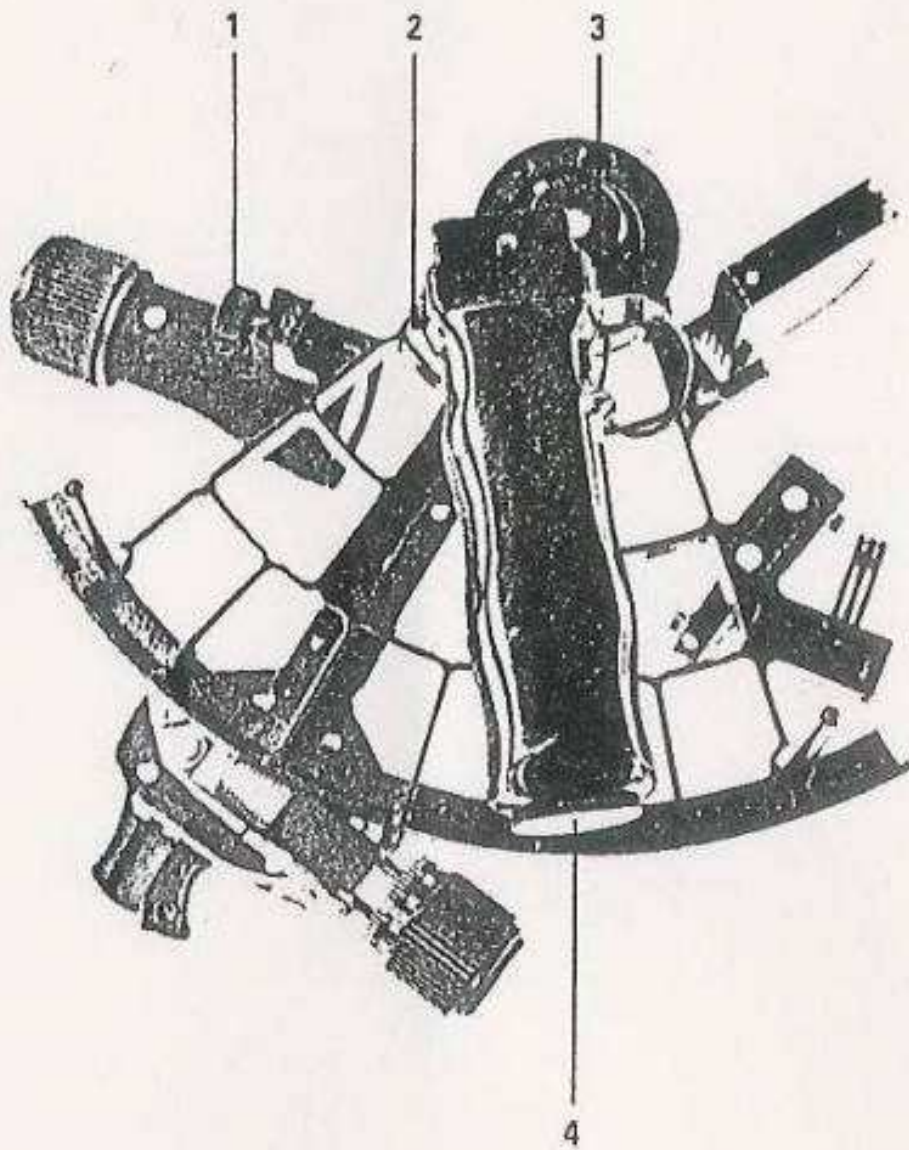
Observe the celestial body through the telescope.

- c) Bring the celestial body down to the horizon by pressing the quick release lever, swinging the index arm forwards and simultaneously tilting the sextant forwards. The celestial body remains visible during this operation.

Alternatively, when the altitude of the celestial body is known, the sextant may be preset to this value and the horizon scanned until the body is located.

- d) Release the quick release lever. The tangent screw engages in the limb. By turning the micrometer drum, bring the lower limb of the celestial body down to touch the horizon.

NOTE: The sextant must be held vertically when taking sights. To check that the sextant is being held vertically, swing the sextant from side to side in a pendulous movement; the reflected image of



NAVISTAR classic, seen from the rear

- 1. Telescope retaining screw
- 2. Illumination push button
- 3. Plug connector
- 4. Battery access cap

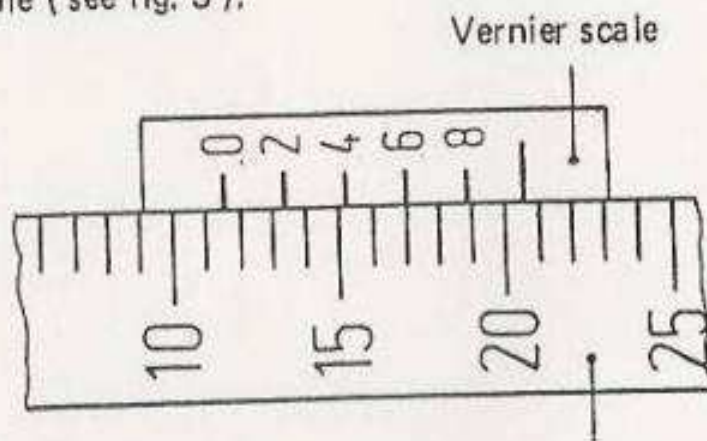
Figure 3

the celestial body will travel through an arc. Only the lowest part of this arc must touch the horizon.

e) The uncorrected altitude of the celestial body may now be read off:

- 1) Read off the number of whole degrees indicated on the arc to the right of the index marking on the index lever.
- 2) On the micrometer drum read off the minute index mark lying to the left of the zero index mark of the vernier scale (see fig. 4).
- 3) Read off the vernier scale index mark which lies closest to an index mark on the micrometer drum (tenths of a minute of arc).

Figure 4 demonstrates how the vernier scale may be read. When illumination is required for reading of the altitude, press the illumination button on the handle (see fig. 3).



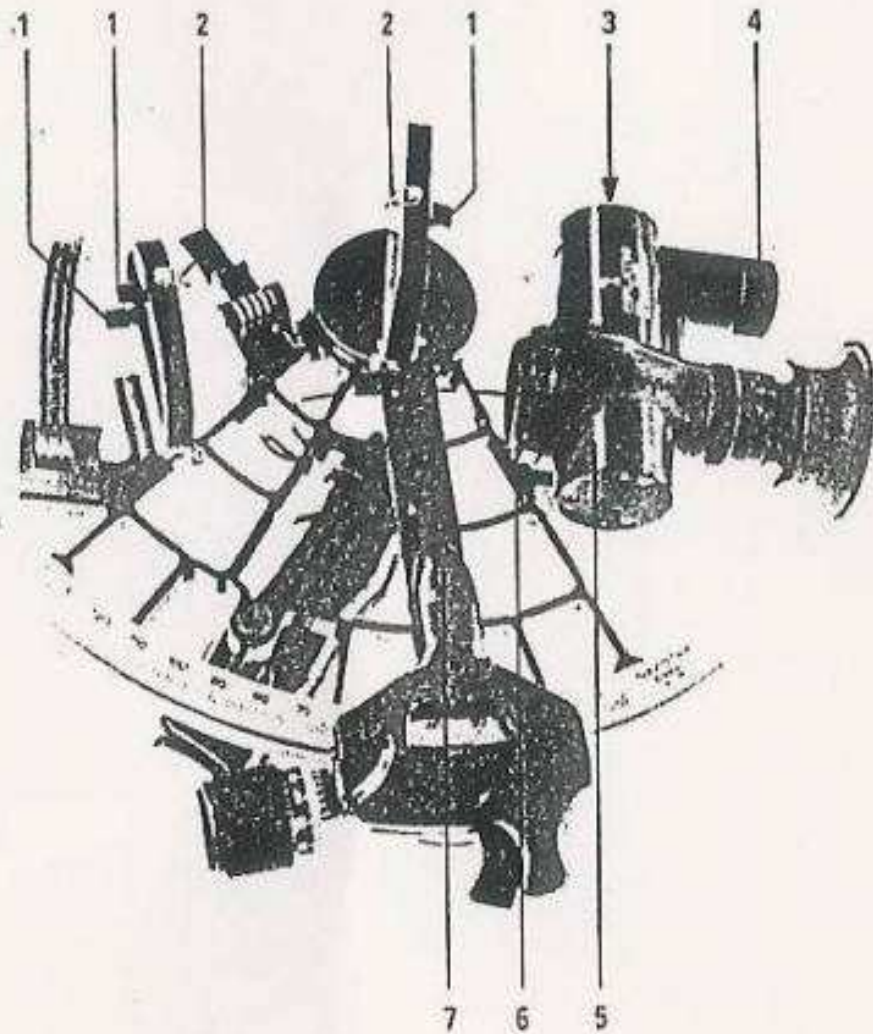
Example: 11·6'

Scale on micrometer drum

Reading the Vernier Scale

Figure 4

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NAVISTAR classic Sextant with
Bubble Artificial Horizon

- | | |
|------------------------|------------------------------|
| 1. Adjustment screws | 5. Bubble artificial horizon |
| 2. Retaining springs | 6. Adjustment screw |
| 3. Illumination access | 7. Lampholder cap |

Figure 5

Taking Sights with the Bubble Artificial Horizon

To measure the altitude of a celestial body when the horizon is insufficiently defined — during the hours of darkness, for example — proceed as follows:

- a) Loosen the screw securing the telescope and carefully remove the telescope (see fig. 1).
- b) Fit the bubble attachment to the sextant in the same way in which the telescope was attached and tighten the screw (see fig. 5 and page 14).

NOTE: A sight may only be taken when the artificial horizon has been adjusted to suit the sextant, as described on page 14.

- c) Insert the plug for the artificial horizon illumination in the upper most socket in the contact plate on the sextant handle (see fig. 3). Inserted in the lower socket is the plug for illumination of the arc.
- d) For observations with dark skies, remove the shade from the front of the device. Use the sextant shades for observations of bright celestial bodies when required.
- e) Set the index arm to 0° .
- f) Observe through the telescope of the artificial horizon device the selected celestial body.

- g) Bring the celestial body down to the horizon by pressing the quick release lever, moving the index arm forwards along the limb and simultaneously tilting the sextant forwards. The celestial body will remain visible during this operation. The bubble can also be seen on the lower edge of the field of view. The brightness of the bubble image may be varied by turning the brightness control located at the top of the artificial horizon device (see fig. 5).
- h) When the bubble travels upwards, carefully release the quick release lever so that the tangent screw engages in the limb. By turning the micrometer drum, bring the center point of the celestial body to cover the center point of the bubble. During this process, hold the sextant so that the bubble is positioned exactly in the center of the square.
- i) The uncorrected altitude of the celestial body may now be read off as described in the previous section.

NOTE: When using the artificial horizon attachment, correction for dip is unnecessary. The center of the bubble is the equivalent of the horizon.

Horizontal Angles

Proceed as follows to measure horizontal angles.

- a) Bring the index arm into the 0° position.
- b) With the instrument in the horizontal position, observe the right-hand object through the telescope.
- c) Turn the instrument in the horizontal position to the left, simultaneously following up with the index arm until the left-hand object covers the right-hand object.
- d) Read off the measured angle on the arc.

Accuracy

The accuracy of the C. PLATH "NAVISTAR classic" sextant is better than 20 seconds of arc, and according to the requirements of the German Hydrographic Institute may therefore be regarded as free of error. In practice, however, maximum obtainable accuracy is very much dependent on the experience of the user. This applies particularly to observations made at sea.

Index Error

When the two glasses lie parallel so that the reflected image and the object observed directly are exactly coincident, the sextant reading should be $0^{\circ} 0.0'$. Deviations from this reading are termed "index error".

Index error is caused by improper care of the sextant, e.g. a particularly heavy shock. The user must compensate for index error by adding the error, with the opposite sign (+ or -), to altitude readings.

Should the index error appear too large, or when the object observed and the reflected image thereof cannot be positioned exactly coincident (lateral displacement), refer to " Adjustment of the Glasses " on page 21.

CONVERSIONS

Fitting the artificial horizon attachment in place of the normal telescope.

The artificial horizon is a valuable accessory for the "NAVISTAR classic" sextant. With the aid of this device it is possible to measure the altitude of celestial bodies in misty weather conditions and during the hours of darkness.

The artificial horizon is fitted in place of the normal telescope to the sextant body. Before observations can be carried out, the sextant and the artificial horizon have to be adjusted to suit each other as described in the following procedure.

- a) Unscrew the telescope retaining screw (see Fig. 3) the telescope.
- b) Fit the artificial horizon into the groove in the attachment bracket on the sextant body and secure in place with the retaining screw.

NOTE: Do not attempt to tighten the retaining screw with the use of a tool (e.g. a pair of pliers). Always tighten by hand.

- c) Insert the plug connector in the top most socket in the contact plate on the sextant handle (see fig. 3).
- d) Fit the shade.

- e) Determine dip for the place of observation (from tables or calculation).

$$\text{Dip} = 1.76 \times \sqrt{h}$$

dip in minutes of arc,
height of the eye h in meters.

- f) Set the sextant to the theoretical dip value (arc of excess). Do not forget to take the sextant index error into consideration (see page 13).
- g) Insert the adjustment key* into the adjustment screw in the bubble horizon. The adjustment screw is located under the shade cap (see fig. 5).
- h) View the horizon through the bubble attachment.
- i) Press the illumination button. The bubble will become visible.
The brightness of the bubble formation can be varied by means of the brightness control (see fig. 5).
- j) Hold the sextant so that the bubble is positioned exactly in the center of the square.
- k) Carefully turn the adjustment key so that the center point of the bubble lies exactly on the horizon line (right-hand part of the field of view).
- l) Remove the adjustment key.

* Supplied with the artificial horizon attachment.

The artificial horizon is now adjusted to suit the sextant. It is not necessary to readjust the artificial horizon every time a sight is taken. However, it is a good idea to check the adjustment from time to time, particularly so when the artificial horizon is frequently fitted in place of the normal telescope. Frequent changing may be avoided when the artificial horizon is also used as a telescope. When the shade cap is removed, the artificial horizon attachment may be used as a 3 x 22 telescope.

Using a Different Type of Telescope

Two telescopes are available for the " NAVISTAR classic " sextant. These are the standard 4 x 40 and the 6 x 30.

The telescopes may be changed by loosening the attachment screw, removing the telescope, fitting the other telescope and tightening the retaining screw. Adjustment is not necessary.

NOTE: Do not attempt to tighten the retaining screw with the use of a tool (e.g. a pair of pliers). Always tighten by hand.

Star Elongation Glass

The star elongation glass is a type of distortion lens. It is mounted in the same fashion as the index shades and has the property of elongating the star-image into a streak.

As the elongation is horizontal, it is also a means of ascertaining that the portion of the horizon used is vertically below the observed star.

The star elongation is available as an optional extra and can be fitted by the manufacturer or at any of his service stations.

CARE

Cleaning

A soft chamois leather is recommended for cleaning the sextant. The leather should be slightly dampened with fresh water.

The glasses must be treated with special care. They are optically flat glasses whose surfaces have been vapour coated with rhodium. Remove splashes of sea water with a well dampened chamois leather. Remove fingerprints with a leather lightly dampened in alcohol. Clean the teeth cut in the limb at regular intervals with the brush supplied with the sextant.

CAUTION:

DO NOT APPLY GREASE TO THE LIMB OR TANGENT SCREW AS THIS WILL AFFECT THE ACCURACY OF THE INSTRUMENT.

Replacement of Batteries

- a) Unscrew the battery access cap at the base of the sextant handle (see fig. 3).
- b) Replace the batteries with a suitable type. The battery plus pole is to point to the top of the handle.
- c) Screw in the battery access cap and tighten by hand.

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Batteries

Federal Republic of Germany

Varta No. 251 spez. 1.5 V IEC R6

Japan

NOVEL 1.5 V UM-3 (S) JIS C8501

FUJI Electrochemical Co.

USA

EVEREADY No. E91 NEDA 15A 1.5 V Size AA

EVEREADY No. 1015 NEDA 15 A 1.5 V Size AA

NOTE:

Batteries may be stored for periods up to one year.

MAINTENANCE

General

Your " NAVISTAR classic " sextant is a high quality instrument and has been assembled on and with high precision complex machines. The owner is therefore not advised to carry out any other maintenance work than described in this handbook. Send your sextant, well packaged, to a C. PLATH service station* or to C. PLATH in Hamburg.

Replacement of Lamps

Arc Illumination (see fig. 5)

- a) Pull the lampholder carefully towards the index glass, moving the holder from side to side eases removal.
- b) Remove the lamp from the holder and fit a new 3.5 V, 0.3 A E 5.5 lamp (stock no. 31534).
- c) Refit the lampholder.

* A list of C. PLATH service stations is available on request.

Artificial Horizon Illumination (see fig. 5)

- a) Unscrew the two illumination cap retaining screws and remove the cap.
- b) Remove the lamp complete with holder from the retaining clamp.
- c) Unscrew the lamp and replace it with a 3.5 V, 0.3 A E 5.5 lamp (stock no. 31534).
- d) Fit the lamp and holder in the retaining clamp, fit the illumination cap and secure with retaining screws.

Adjustment of the Glasses

- Bring the glasses parallel to the glass housings by turning the adjustment screw (see fig. 5) with the key supplied with the sextant.

NOTE:

- Do not completely remove adjustment screws. Adjustment screws removed from housing must be replaced with new screws.

- Adjustment screw, stock no. 22368.
- Check that all three glass retaining springs (see fig. 5) are holding the glass in position by sliding a thin strip of paper under each spring.

Horizon Glass

Set the index arm to 0° . Set the micrometer drum to 0-0 minutes of arc. Observe a very distant object through the telescope. The object is to be at least one nautical mile away from the observer. Carefully and alternately turn the two horizon glass adjustment screws until the object observed and its reflected image are exactly coincident (in both vertical and horizontal planes).

Replacement Parts (see figs. 6 and 7)

Replacement parts may be ordered from

C. PLATH
Fabrik Nautischer Instrumente
Gertigstraße 48
2000 Hamburg 60
Federal Republic of Germany

Please quote in your order for replacement parts:

- a) the description of the part
- b) the stock no. of the part
- c) The serial number of the sextant engraved on the arc.

Several replacement parts are available only in pre-assembled subassemblies. See list from I to IX.