

#### 4. Setting Out a Circular Curve

A and B mark the diameter of a circle. Look through the optical square and move until the ranging poles at A and B are seen in coincidence as shown in example 1. Mark point C, the position of the optical square. ACB is 90°, thus C lies on a circle with diameter AB. By this means circular curves can be set out.

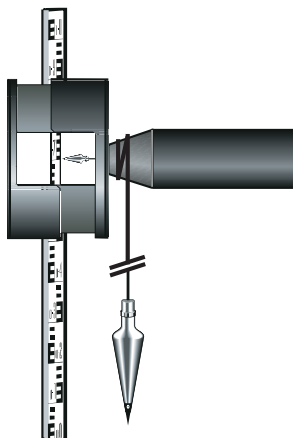
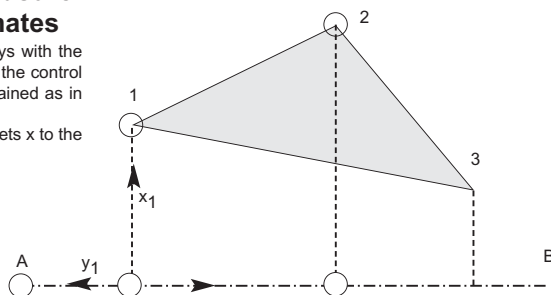
#### 5. Detail Surveys and Area Measurements using Local Coordinates

The Optical Square can be used for detail surveys with the tape and offset method. The perpendiculars from the control line AB to points 1, 2 & 3 to be surveyed are obtained as in example 3.

The distances y along the control line and the offsets x to the points to be surveyed are measured with a tape.

The area 123 can be calculated from:

$$\text{area} = \frac{1}{2}[x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)]$$



#### 6. Levelling and Determining the Horizontal

Simple height measurements can be made with an optical square and a plumb-bob.

Wind the plumb-bob string around the shaft of the Optical Square. Hold the Optical Square horizontal so that the plumb-bob is hanging from below the centre of the shaft.

Look into the prism at the plumb-bob line. At the same time, look straight through the gap in the Optical Square at the staff. Read the staff against the plumb-bob line.

#### Other Optical Instruments

York Survey Supply Centre carries a wide range of optical equipment for a variety of applications, from hand levels and abney levels to binoculars and automatic levels, together with ranging poles and prisms.

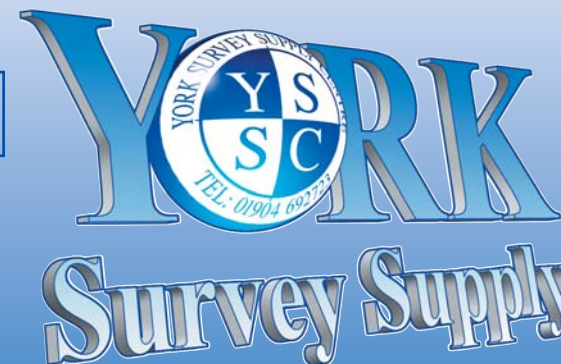
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## Double Prism Optical Square



Code: 36400

## Operating Instructions

## General Introduction

The Double Prism Optical Square comprises two pentaprisms of quality optical glass, housed in a sturdy aluminium casing. The housing cover can be rotated to cover the viewing window and protect the prisms when not in use.

The prisms are mounted above and below the 'through' sighting window, the upper one sighting from the right side, the lower one from the left. The pentaprisms are ground to refract the views by exactly  $90^\circ$ .

## Basic Operation

The Optical Square can be held for viewing in three ways, depending on the needs of the situation.

### Hand Held without Plumb

For a fast estimation of alignment, where exact position is not critical, hold the viewing window to the line of sight, and obtain the alignment required.

### Hand Held with Plumb

By hanging a Plumb Bob into the slot on the shaft, an exact position over a point can be maintained for alignment.

### Set on a Ranging Pole

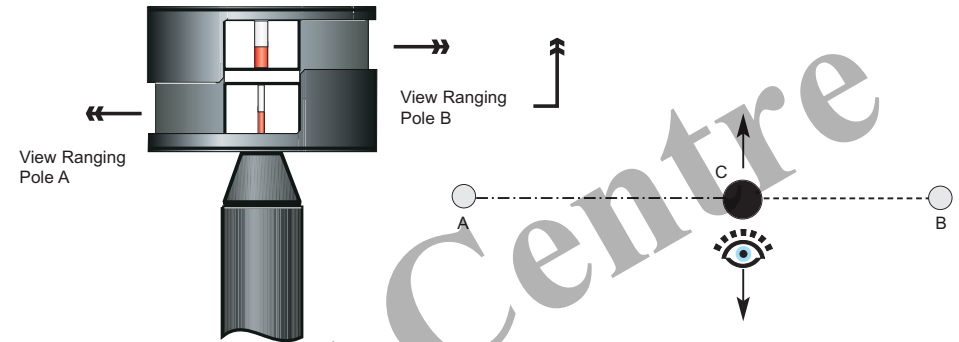
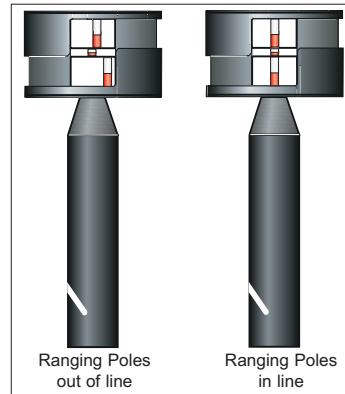
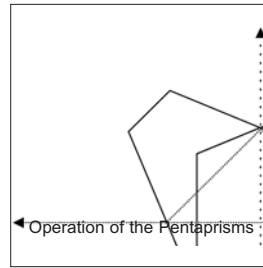
Using the Ranging Pole Adaptor (code 36451), the Optical Square can be slotted on top of a ranging pole, maintaining a standard height for line of sight, and, using a plumbing level to get a true vertical from the point of alignment.

## Accuracy

A right angle set with the Optical Square will be true to approximately  $\pm 1\text{cm}$  at about 30m.

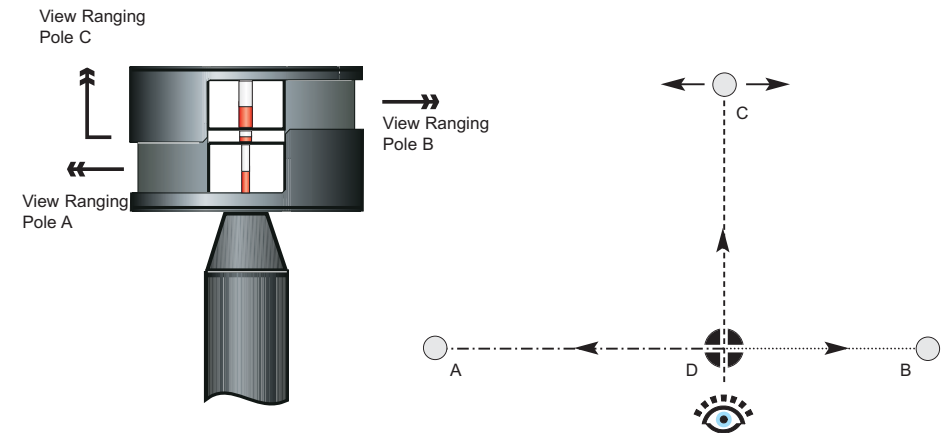
## Care and Maintenance

The Optical Square is a simple but robust instrument. It will withstand minor knocks and bangs and cannot go out of alignment. It should be transported and stored in the supplied belt pouch. Clean the prisms with alcohol & cotton buds or photographic lens tissue to avoid smearing.



Take up a position roughly in line between Poles A and B. Look through the window and sight pole A in the lower window and pole B in the upper. Move forwards or backwards at right angles to the line until the two poles appear to coincide. The Optical Square is now in line between A & B and point C can be marked.

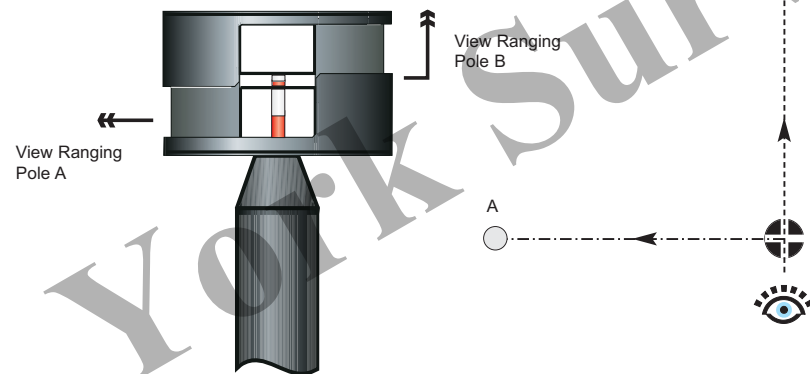
## 3. Placing a point on line between two points and at right angles to a third point



This is a combination of examples 1 and 2, as above. Start by setting the point on line between A and B, getting a coincidence in the prisms. Then move along the line towards Pole C, looking through the centre window. When the three poles line up, D is on line and ADC & BDC are at right angles.

## Examples for Setting Out Alignment & Basic Measurements

### 1. Setting Out A Right Angle



Hold the Optical Square over the alignment point, using either a plumb-bob or ranging pole to centre. Sight to Ranging Pole A through the lower prism. As Ranging Pole B is moved, view it through the centre window until the two images appear to coincide. The angle A to B is now  $90^\circ$  at the alignment point.