

Torpedo tube straightness, diameter checks and setting periscope bearings in line

Using the Taylor Hobson Micro Alignment Telescope

“The Micro Alignment Telescope provides a simple yet accurate method of checking the straightness and diameter of torpedo tubes.”

Optical system simplifies torpedo tube checking



Photo with kind permission of BAE Systems

The Taylor Hobson Micro Alignment Telescope is an optical device which generates a straight line reference which can be used to put things in line or used to measure how far things are out of align. (If you would like further details on this device contact Spectrum Metrology or Taylor Hobson for the latest brochure.)

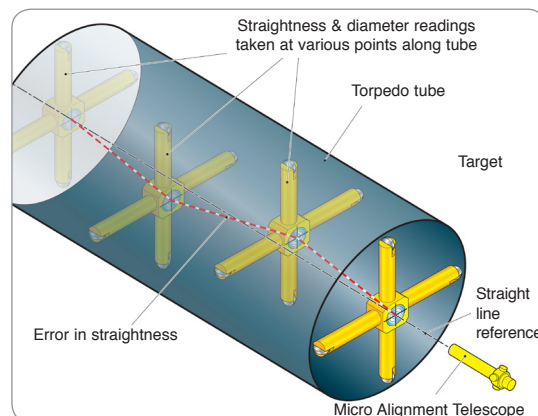


Figure 1: Checking for straightness and diameter of torpedo tube

The Micro Alignment Telescope is used as the basis for a simple solution to the numerous problems of torpedo tube distortion. The system provides an easy to operate and relatively inexpensive method of checking the straightness and diameter of torpedo tubes to tight tolerances. It eliminates the use of long cumbersome plug gauges and it is not necessary to dry-dock the vessel while the checks are carried out.

A further benefit is that the equipment can also be used for checking the alignment of torpedo stowage cradles.

The system uses a measuring head with central glass target, which is towed along the entire length of the tube. The target is viewed through the Micro Alignment Telescope, vertical and horizontal displacements at preselected points being measured. Simultaneously the tube diameter is measured by means of displacement transducers incorporated in the arms of the measuring head.

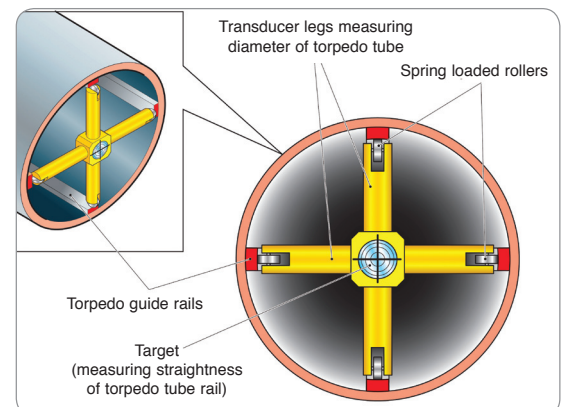
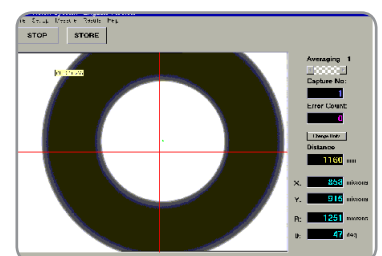


Figure 2: section through torpedo tube with measuring head inserted

The measured data is used to look at the tubes interior profile for comparison with a template.

The Micro Alignment Telescope uses a CCD camera linking directly to dedicated software on a tablet PC. The system is totally self-contained, its power requirements being provided by the Tablet PCs batteries.



Periscope bearing alignment tube

Periscopes are the eyes of a submarine. To use the periscope the submarine must leave the comparative safety of deep water and ascend to a position just below the surface. A periscope which is operating in misaligned bearing housings is slow to raise and lower. To overcome this resistance more power is required from the operating motors. The resultant power surge can result in a higher noise level which can be easily detected by the enemy.

Mounting of the periscope is by means of a series of bearings located in the submarine fin and pressure hull structure. Alignment of these bearings is critical and any misalignment can result in distortion of the periscope and possible damage to the bearing mountings themselves.

All alignment checks are made with reference to this main pressure hull bearing.

The Micro Alignment Telescope, fitted with a bore fixture with adjusting bracket, is mounted in an adjustable support plate situated at the top of the submarine fin.

A series of targets are then fixtured and positioned in the various bearings along the periscope and any misalignment calculated using the Micro Alignment Telescope.

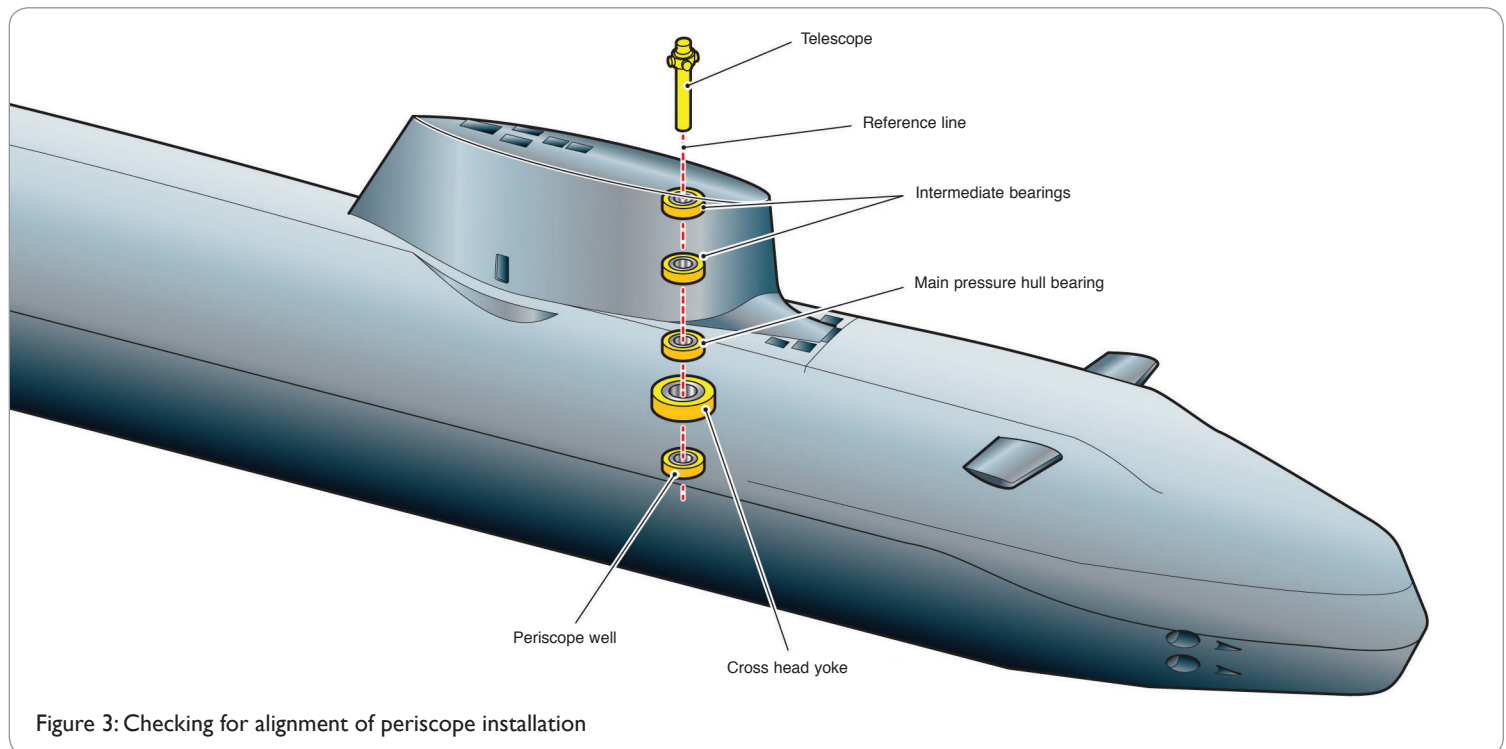


Figure 3: Checking for alignment of periscope installation

This application note demonstrates just one of the applications for the Taylor Hobson electro-optical metrology range.

Contact Spectrum Metrology to discuss your own measurement requirements.



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