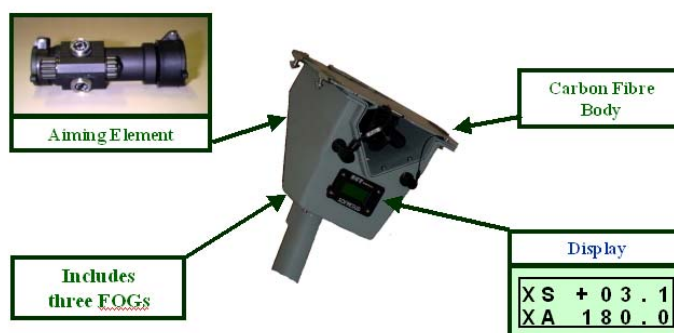


Concept of Operational Use for the “SOFRESUD QPD”

The Sighting Unit



1. COUNTERING THE NEW NAVAL THREAT

With the evolution of the stealth techniques for both air and surface threats, the reaction time for the defensive weapon systems is getting more and more crucial for the survivability of a warship.

Electromagnetic and electro-optical detection systems designed for the previous generation of threats have seen their ranges of first detection significantly reduced against this new type of threats, which are virtually undetectable until the very last moment.

Additionally, in many contexts, such as coastal or in straits operations, a warship is submitted to asymmetrical threats such as very fast patrol or speedboats conducting “swarm attacks”, or applying tactics of coordinated crossing routes in order to confuse the fire control tracking gates. In these situations the warship needs a very effective “last line” of defense. This makes it mandatory to have very short target acquisition times.

This threat evolution has shown the key value of an effective visual surveillance executed by look-outs or operators of a Weapon Direction Platform (WDP) Visual, able to designate and acquire very quickly an air or a surface target.

2. ESSENTIAL ROLE OF VISUAL WATCH

Visual targeting by visual means appears to be a key capability, both for target identification or target engagement purpose, despite of the sophisticated electromagnetic or electro-optical surveillance equipments, and of the use of advanced Tactical Data Systems or Combat Management Systems.

From a tactical point of view, visual sighting and its associated means of targeting are now the ultimate resort, or may be needed to fill the shortcomings of another detection system.

In a crisis situation, the closest range of the target interception becomes particularly critical, and is often subordinated to a very short engagement time, mainly depended on the target acquisition time.

3. THE SOFRESUD “QPD” SOLUTION

3.1 A PRODUCT OF NEW GENERATION

Faced to this new “sword and shield” challenge, SOFRESUD has developed an advanced Visual Sighting Device, called QPD (Quick Pointing Device) ensuring a very short acquisition time against the new air threat (Unmanned Air Vehicles, stealthy helicopters or stealthy aircraft), and for the last ditch of defence against harassing surface threats (fishing boats, very fast speedboats, drifting mines). The SOFRESUD QPD belongs to the category of advanced naval products, utilizing the most recent and proven gyrometers technologies applied in the market of naval optical sights of new generation.

Mastery of many high tech domains has permitted to the Company to develop successfully an accurate and light Visual Sighting Unit, based on the reflex behaviour of a human operator. The high level of performance of the QPD has been demonstrated during the extensive evaluation campaign conducted by the French Navy.

This Sighting Unit can be fitted for daylight capabilities only or for daylight and night vision.

Due to its main operational advantages, the SOFRESUD QPD has been selected by major western navies (French Navy, Italian Navy, UK Royal Navy) to fit their major combatant ships

3.2 THE OPERATIONAL USE

3.2.1 Daylight version of the QPD

In its daylight version, the QPD doesn't use a pedestal mount and is not a surveillance equipment. It is intended to be aimed at the threat visually detected with his eyes, without binoculars, by a look-out or by an operator of the Weapon Direction Platform (WDP) Visual.

After the direct visual detection, the operator points the pistol handgun shape Sighting Unit towards the target direction and transmits the targeting information to an electro-optical device, to a decoy sub-system, to a weapon system, or to the Combat Management System, by a trigger.

The QPD designation data (True Bearing and True Elevation) can also be sent to an electro-optical sensor in order to spot the direction of alert found by a look-out.

In the basic version of the QPD, the coordination between the Operations Room warfare modules, the WDP Visual Officer, and the QPD operator is done by voice.

However, due to its wide connectivity (see next section of this paper), the QPD can be connected to a display unit installed on the WDP, or on the bridge, in order to present feedback information related to the results of the pre-designation sent to an electro-optical device or the designations made to the weapon systems by the QPD.

It should be noted that the QPD presents on a LCD display at the rear face of its Sighting Unit, the true azimuth and elevation sent to the Combat system equipments, and needs to be connected to the ship navigation system.

The QPD has been designed to be operated through a reflex action with one hand, by a right-handed or a left-handed operator, and also by an operator wearing glasses or gloves.

The typical cycle of operation of the QPD is :

- ◆ visual detection of the target ;
- ◆ acquisition through the aiming device of the Sighting Unit ;
- ◆ periodic calibration of the Sighting Unit (after a typical use cycle of 3 minutes), which performs in less than 1 second the correction of the gyrometers drift.

3.2.2 Night version of the QPD

In this version, the QPD is fitted with IR binoculars or a Light Intensifier Device.

The Sighting Unit is placed on a “Supporting Stand” fastened to the bridge wing. This allows the lookout to exercise a watch against drifting mines or fishing boats or fast speedboats, and when spotting on a recognised threat, to send a pre-designation to an electro-optical device or a designation to a weapon system.

In this version, the calibration cycle of the Sighting Unit can be extended to 10 minutes without significant degradation of the designation accuracy.

3.2.3 Key operational performances

The main performance features of the QPD can be summarized as follows :

- ◆ typical reaction type against an air target : 3 seconds ;
- ◆ accuracy : better than 0.5° ;
- ◆ angle of coverage : 360° in bearing and $-30^\circ/+85^\circ$ in Elevation.

3.3 A KEY ELEMENT OF THE COMBAT SYSTEM

3.3.1 Wide connectivity

The QPD can be connected easily to the different Combat System sub-systems, especially by :

- ◆ the standard RS 422 interface (physical link and digital asynchronous protocols) : this interface is the basic connection with the ship navigation sub-system (course, pitch, roll and status of the navigation system) ;
- ◆ an analog link ;
- ◆ dedicated interface units, such as a Data Transfer Interface Unit, or a Data Transfer Interface Processor.

3.3.2 High flexibility

The QPD system is compatible with a loose or a tight level of integration with the Combat System.

The additional integration of the QPD required by the Customer must be specified in order to define accurately the dedicated feedbacks requested from the Combat System equipments to the QPD, knowing that the basic version of the QPD delivered by SOFRESUD in a partially integrated Visual Sighting System.

In particular, the data to be presented on a display unit associated to the QPD in order to facilitate a fast coordination between the different actors (operators of the Operations Room consoles, WDP Officer, Officer of the Bridge) must be defined in detail by the Combat System Prime Contactor.

