

THE FUTURE OF ELECTRONIC CHARTS IN WARFARE AT SEA

WECDIS and AML

Concepts concerning WECDIS and AML (Additional Military Layers) to support warfare at sea have been developed for quite a few years - now they are being realised.

It was more than five years ago that NATO developed ideas concerning how navigation could be made safer, whilst at the same time bundling and providing additional information. The problem was, and still is, that in addition to the data necessary for navigation there are lots of specialist charts. This results in the same information being published not just once but several times, by various publishers, and designed to fit the requirements of different users. Apart from the fact that this brings about a lot of redundant work, it also implies the danger of misunderstandings when a special piece of information designed for the needs of one group is used for different purposes by members of another.

WECDIS

To address this issue the idea of WECDIS (Warship ECDIS) was born, but its outlines still have not been completely defined. Although the objective was laid down by a NATO Working Group as far back as 1999, the idea of what a WECDIS should comprise has not been completely ascertained. However, from the abbreviation WECDIS itself may be deduced its role: a Warship ECDIS, with ECDIS representing the well-known term Electronic Chart Display and Information System. This clearly indicates that WECDIS is based on functions for safe navigation as provided by an ECDIS, whilst combining these with additional military and non-military digital data and thus enhancing the respective commander's operational picture. Whatever the final definitions of WECDIS, it is beyond dispute that the use of AML is one of its essential requirements. AML stands for Additional Military Layers, being a project within the UKHO (United Kingdom Hydrographic Office) initiated by NATO.

The AML Concept

The purpose of AML is to provide a unified series of geospatial data products for use in a modular manner. These may act as an overlay to a chart display (vector or raster), as a complete display in their own right or can be processed by the system. AML product specifications are based on the specification framework published within STANAG 4564 (WECDIS). At present, the AML concept is restricted to maritime information, including selected aeronautical information for the conduct of marine operations and land-based information.

As of November 2001, six product specifications have become available, with more to follow. All have an S-57 implementation annex; the specification Contour Line Bathymetry (CLB) also has a DIGEST (Vector Product Format, VPF) annex.

The six product specifications published are:

- Contour Line Bathymetry (CLB): provides simple depth information as points, lines and areas
- Environment Seabed and Beach (ESB): provides features for amphibious operations, including any significant objects such as lights and landmarks
- Large Bottom Objects (LBO): provides all known bottom contacts for which at least one component of height, width or length is a minimum of five metres
- Marine Foundation and Facilities (MFF): provides information about coastline and boundaries, including miscellaneous tactical information together with major lights, buoys and other significant objects
- Routes, Areas and Limits (RAL): provides, for example, selected aeronautical information for the conduct of marine operations and land-based information, marine management areas, restricted areas like historic wrecks or offshore safety zones and Q-Routes
- Small Bottom Objects (SBO): provides all known bottom contacts whose greatest dimension is less than five metres

AML Symbolology

The target of AML is to provide a single product range designed to meet the information needs of all users. To avoid misunderstanding, plain and legible presentation is necessary for this product range. On 20th September 2002 the UK Hydrographic Office released AML basic default symbolology. This is being provided to assist with the further development of AML, but the AML symbolology has not been finally defined yet and a lot of development measures still need to be taken. In Germany, Hamburg-based Seven's took on the challenge presented by WECDIS and AML. It has launched a project in co-operation with the German Navy to create a functional prototype of an AML-enabled ECS. This will result in an enhanced version of the ORCA Navy software. The project is due to be finished in November 2003.

As has been stated above, the AML symbolology has not been finally defined yet. It has thus been necessary to develop additional symbols for the display of AML data. However, these newly created symbols are based on the proposals of the UKHO and the standards S-52 and S-57, just as the whole AML prototype takes into account these international standards.

Unlike concepts presented by other manufacturers active in the field of AML, the coming solution is based on defined and internationally

accepted standards that have been enlarged and adjusted to the new requirements. This approach thus does not constitute a proprietary solution, which always implies the danger of leading towards a future dead-end. On the contrary, utilising international standards will ensure future development and enlargement of the AML prototype currently under development. Furthermore, there will be not just a facility to display AML symbols but an additional entire software infrastructure consisting of tools for the production of AML information.

Facing the Challenge

One aspect may be picked out to illustrate the special challenges facing developers dealing with AML. In the original UKHO specifications it is stated that AML information could act as an “overlay”™ to a chart display. However, this is not that easily to achieve. Should AML data be added to an already existing ECDIS as a mere overlay, there would remain the danger of the AML data obscuring other information which might be at least as important, or maybe even more so. After all, AML data is meant to complement S-57 data, not to replace it.

An example: when CLB data (Contour Line Bathymetry data, the first of the six product specifications mentioned above) which provide depth information are displayed in a certain region they will overlay all other S-57 information in that specific area, for example buoyage, anchoring areas, etc. This is most certainly not desirable. What is needed instead is a mix of AML and S-57 information, making sure that the respective relevant information is displayed on the screen. Therefore AML information must not be added as overlay but needs to be inserted as a kind of inlay instead. In the AML prototype currently being developed this is achieved by a special procedure.

In addition to the traditional S-57 cells, there are now also so-called “displace cells”™. They were given this name because they are to displace S-57 cells when needed. By default, all CLB cells are marked as displace cells. Then by using certain programming routines it is ensured that only specific S-57 data will be replaced by AML data. This method allows for a highly flexible use of additional AML data within ECDIS systems. However, so far the technology cannot be freely applied but requires the employment of specific software tools. Up to now quite a few problems have been mastered while dealing with WECDIS and AML. However, some work in both software development and standardisation still needs to be done for the establishment of a future thriving AML infrastructure.

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