



In an industry which focuses on technology development, it can be easy to overlook the end-user's needs for simplicity and ease of use. In particular, control systems have always been considered as complex, and always perceived as needing an electronics/software guru to develop a suitable solution. The **OceanView™** system has been developed to address this problem, by providing a modular kit that requires no software writing skills and only basic electronics knowledge to quickly build a customized controls solution.

The subsea industry frequently has a need for assembling a tooling control system unique to the project at hand. In the past, various serial RS-485 and other interface devices have been hooked to a PC and custom software written to “glue” them all together. Generally, the interface to each device is unique and awkward, and a very high level of skill is required to realize useful results.

The **OceanView** control system combines the convenience of a “No Software – Plug and Play” solution to the rugged reliability of standard RS-485 I/O modules. The **OceanView** control system consists of two parts; 1) **In Oil Modules** – I/O function blocks that will operate at ambient pressure in oil, and 2) **Software** – a robust software package with a Graphical User Interface that allows the user to quickly configure module operation and control.

### I/O Modules

OceanWorks, Inc has partnered with ICP-DAS (<http://www.icpdas-usa.com/>) to bring their industry standard I-7000 line of RS-485 Intelligent I/O modules to the subsea market. These modules provide I/O function blocks that will operate at ambient pressure and are pressure tolerant to depths of 10,000 FSW when housed in an oil-filled enclosure. In addition to the **OceanView** software (which allows users to quickly and easily build a control system), the modules are also supplied with a number of drivers (LabView™, Active X, dll, DasyLab and C) so they can be also be used in any application which requires customized software to be written.



**OceanView** Modules

### Watchdog

The **OceanView** OV-7000 series modules are designed for industrial subsea applications. To enhance system reliability and predictability **OceanView** modules use a *Dual Watchdog* system to ensure positive control at all times.

**Dual watchdog = Communications Watchdog + Module Watchdog**



The *Module Watchdog* will reset the module if its embedded software has a problem or hangs up. If the module watchdog resets; the module will assume its power up state, detect the communications bus and execute the next command from the surface computer. The module watchdog is always running and cannot be turned off.

The *Communications Watchdog* monitors the communications link to the surface PC. If the communications link loses contact with the surface PC for a specific period of time (for example the fiber optic MODEM loses power) all the outputs of the modules will go to their predefined safe states.

The Power Up state and the Communications Lost safe state of all outputs are user defined and the Power Up state and the Communications Lost safe state of the outputs are not required to be the same.

This Dual Watchdog system means that **OceanView** is not dependant on the host Windows™ operating system for safety.

### **Module Function**

The **OceanView** product line currently includes seven different modules which provide the most common I/O features required for subsea control systems. In addition, the product line includes; a customizable subsea module (used to interface to serial devices), an RS-232 to RS-485 converter, a Communications Indicator module and a Water Detect module.

Up to 256 modules can be linked together via a standard two wire RS-485 network, with a baud rate of 1200bps up to 115.2 kbps. The modules require a voltage input of 10 – 30 VDC, and connections are made via terminal block connectors on each module. Operating temperatures can range from -25 to 75°C, which readily makes the modules suitable for operation in any region of the world.

The modules include status LEDs for diagnostic purposes, for example, the Digital modules have LEDs which indicate the status of each I/O line. These LEDs can be viewed through a transparent window, which can be easily included in an oil-filled housing. This feature can significantly benefit the system operator by reducing the need to open electronics enclosures in the harsh offshore environment.

The following list of **OceanView** modules details the specific features available on each building block:

- OV7017** - 8 Channel Analog Input Module
- OV7050** - Digital I/O Module
- OV7080** - Counter/Frequency Input
- OV7024** - 4 Channel, 14 Bit Analog Output Module
- OV7041** - 14 Channel Isolated Digital Input Module
- OV7044** - Isolated Digital I/O Module
- OV7067** - Relay Output Module
- OV7520** - RS232 to RS485 Converter
- OV7521** - Custom RS485/232 Input/Output (Allows serial devices, such as a compass, to be placed on the RS-485 bus.)
- OV125** - Water Detect
- OV100** – Communications Indicator



## Software

The overall philosophy of the **OceanView** software package is user friendliness and straight forward operation. Since software development is probably the most complex part of most control systems, the **OceanView** software package has been designed to remove the need for any software development knowledge.

Once the I/O modules are arranged in a network, the software will scan the network and automatically sense the I/O modules. A graphical menu of each module's features is then displayed for the user to arrange and label as required.

The user can configure, manipulate and operate the above modules using this intuitive control development system. The desired control system, is configured by progressing through a sequence of simple steps which assign the parameters of each required function.

### **User Interface**

For each I/O Point or channel on the individual modules, the user can assign an on-screen control. There are a variety of on-screen controls to choose from that are appropriate to subsea control systems, including; valves, gauges, switches and lamps. Each on screen control can be moved, labeled and configured as the user sees fit.

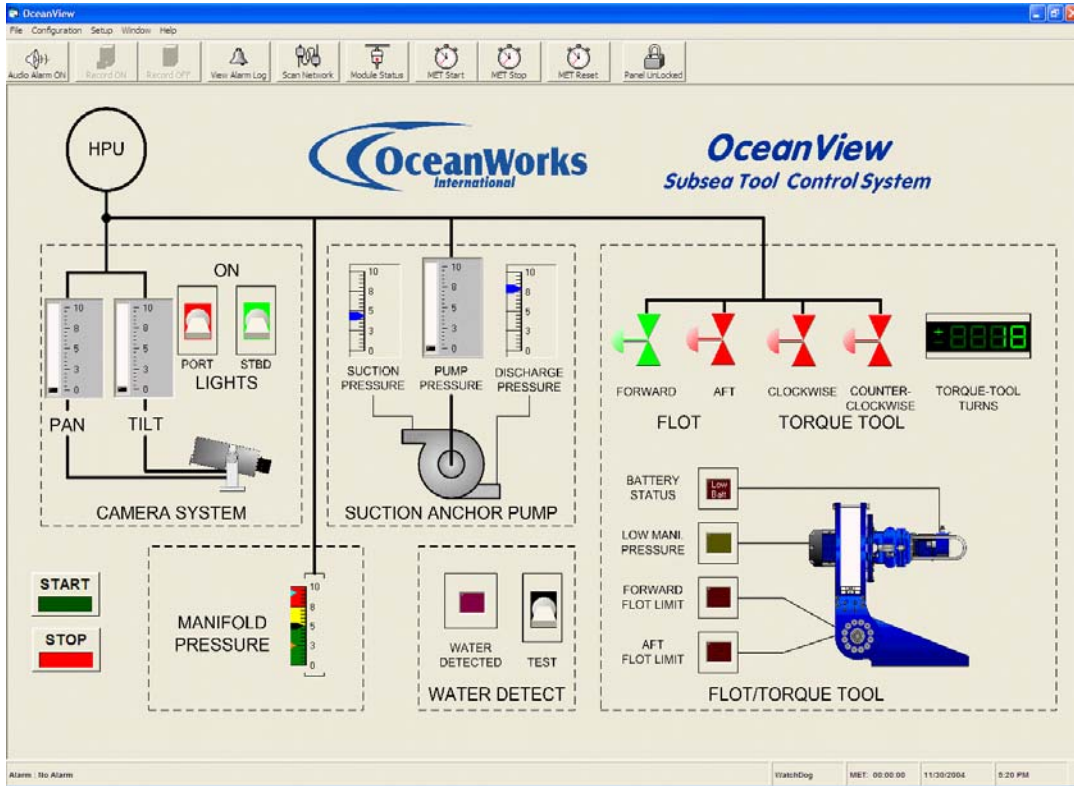
In addition to configuring each on-screen control's appearance; the user can also configure operational parameters of the controls such as scaling and alarms.

Once the user has the control panel arranged to their satisfaction, the user can enable the control panel by pressing the on-screen START button to begin module operation. In a similar fashion, the STOP button can be used to cease module operation.

### **Other Features**

**OceanView** includes the following additional features to enhance the control system's capabilities:

- Graphs of user selected I/O channels. The user can have multiple graphs, all graphing at different rates.
- Data logging of user selected channels.
- Alarm and Event logging.
- Simple graphics that can be used to enhance the appearance of the control panel
- The user can select any graphic image (.jpg, .gif, .bmp or metafile) as the background for the control panel. This feature allow the user to draw a detailed mimic of their application in a CAD package such as AutoCAD™ and use it as the background for their control panel – **High End Looks; Without the High End Hassle.**
- Password protection so that the operators can be prevented from changing the control panel.



Typical Control Panel Developed with **OceanView**

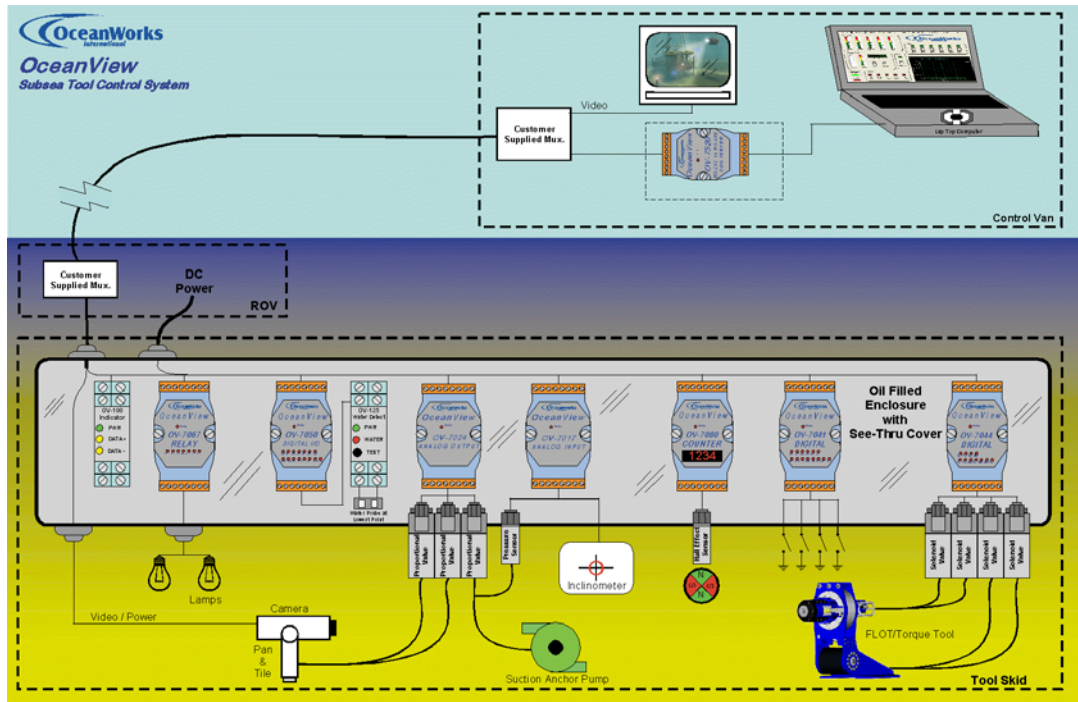


Diagram showing a typical **OceanView** application for each of the modules.



## Typical Applications

The **OceanView** system can be used for a variety of subsea control applications. Typical examples include;

- Controlling a tooling package that attaches to an ROV. This prevents the need to modify the host ROV's control system to accommodate custom tooling. It is particularly useful in a situation where the configuration of the tool changes frequently, or where the tool is required to be operated on different ROV systems.
- Controlling Remotely Operated Tool (ROT) systems.
- R&D / Scientific applications which require modification of features without necessitating a software redevelopment.

## Conclusion

The **OceanView** system provides an extremely cost-effective and simple solution to controlling subsea equipment. The use of standard industrial electronics and an intuitive Graphical User Interface provides users with a reliable control system solution that is quick to configure. The versatility of this system provides a unique capability to subsea equipment manufacturers and equipment operators, who need a control system solution that removes the financial and technical burden of comparable custom designed solutions.

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