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# Electronic control made easy

Software-based systems for efficient machines



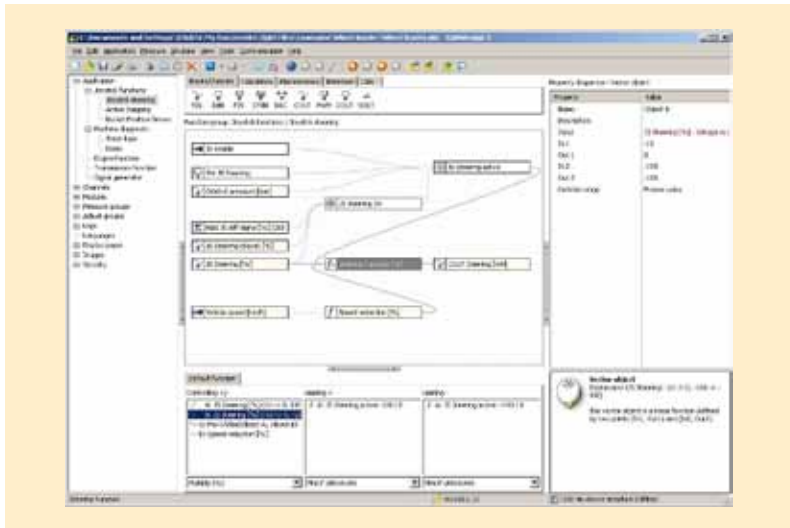
ENGINEERING YOUR SUCCESS.

# Electronic control made easy

Efficiency in focus – throughout the entire machine life cycle

The state-of-the-art IQAN system is a unique, totally electronic approach that replaces mechanical and electromechanical systems for controlling and monitoring hydraulics in mobile machines. With Parker's IQAN, you have complete freedom to design customized software without the need for advanced programming skills.

The flexible functions available within the IQAN system allow sophisticated applications to be programmed and optimized very quickly, enabling huge savings on development time – and cost. The IQAN software tools cover all phases of a machine's life cycle, from development through production to after sales.



## ▲ Dramatically reduced development costs

The wide range of outdoor modules with flexible I/O available with IQAN ensures complete machine management. The system offers a building-block approach that simplifies component design and installation while also reducing development time and expenses.



## ► Rugged design and excellent ergonomics

IQAN hardware is thoroughly tested for robust operation and compatibility with all kinds of mobile hydraulic equipment. In addition, it meets industry and government standards for operation in severe conditions, including extremely high or low temperatures, vibrations, mechanical impact and electromagnetic interference.





#### ► **Advanced diagnostics**

The IQAN control units have an advanced built-in diagnostics system that will help to minimize down-time in the case of failure in the field. Problems can be located either by the default system diagnostics delivered with the standard product, or by customer designed diagnostics functionality.

#### ► **No programming skills required**

IQAN is user-programmable via an advanced, highly intuitive graphic design tool, which dramatically simplifies development. Simulation of the control system can be carried out in parallel with the programming of machine functions.



PRODUCTION

AFTER

#### ► **Easy installation**

The design philosophy behind the IQAN system is based on simplicity in every way. The modular CAN bus structure offers total freedom in machine development – the rugged IQAN units can be placed in any area of the mobile machine, enabling a more compact design and/or minimised wiring, while reducing installation time to an absolute minimum.





# Intelligent software – the way ahead

40 years of motion control experience – ready to plug and play

Parker's experience in hydraulic motion control is second to none, with over forty years of experience in close collaboration with customers world-wide. What started with basic ergonomic demands from machine operators has developed into highly advanced

electro-hydraulic machine control knowledge, made accessible to everyone in the IQAN product range. An IQAN system will not only offer shorter development time for the machine manufacturer, but also maximum functionality and up-time for the machine owner once it enters the market.



## ▲ Intelligent display/control

The IQAN master modules incorporate powerful computing capacity with high processing speeds and multiple CAN bus interfaces. These features make the units extremely flexible and adaptable to a variety of applications with a wide range of hydraulic components and input devices such as joysticks, pedals and sensors.

## ► Multi master support

Complex machine layouts and demanding machine functionality can be facilitated easily with a multi master system design. Major benefits of such a system include distributed functionality and diagnostics, a distributed human machine interface (HMI), extended memory capacity, faster cycle time and additional I/Os. With IQAN, a multi master system will feel like a single master system.



## ▲ Sensors for every type of need

The IQAN sensors have been developed specifically for mobile applications and are designed from the ground up to excel in the demanding physical, regulatory and commercial environment of the mobile machine sector.

*Illustration shows possible product applications in an agricultural tractor.  
-image courtesy of Valtra Inc.*



► **Long-life precision controls**

At Parker, we know what reliability means for profitability. All IQAN control units are thoroughly tested and built to withstand many years of use and abuse in the toughest environments imaginable, while maintaining the precision needed for maximum productivity.



► **Safety**

All IQAN modules are designed with the functional safety requirements of mobile machines in mind. Where there is a need to prove the safety integrity of each implemented safety function; the safety controller IQAN-MC3 can be used.

It is designed in accordance with IEC 61508, and can be used to implement safety functions of up to SIL2.

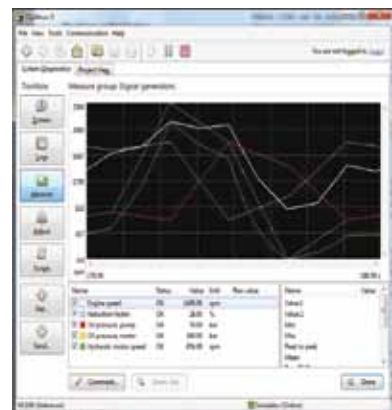


When applying EN ISO 138489-1 for safety functions, it can be used as a PLd subsystem.



◀ **Rugged 32-bit performance**

The IQAN control units have been designed with 32-bit performance to meet high computing demands. The rugged design of the IQAN hardware is tested for robust operation and compatibility with mobile hydraulic equipment. In addition, it meets industry and government standards for operation in severe conditions that include extremely high or low temperatures, vibrations, mechanical impact and electromagnetic interference.



# Easier development...

Cut time-to-market by several months

The IQAN software studios cover all phases of a machine's life cycle, from development through production to after sales. The main philosophy behind the IQAN Software Studios is that the OEM, with their extensive knowledge of their machine's life cycle, should be able to create software that makes

their product perform at top level, easy to produce and giving the end user maximum up-time.

All this can be achieved without any previous programming experience – anyone who knows what functions are needed can learn to build them in a remarkably short time.

## ► Create advanced functions – in minutes!

IQANdesign is an advanced design tool with an intuitive graphic interface, which simplifies application development for your mobile machine and reduces development time. This tool is mainly used for general system layout and machine function design. There is a wide range of predefined building blocks available, such as closed loop control, signal processing, math calculations, communication protocols (e.g. SAE J1939) and system diagnostics.

IQANdesign can be used to design systems with multiple masters. Multiple master design work is simplified by use of a project file that contains applications for all IQAN masters in the system.

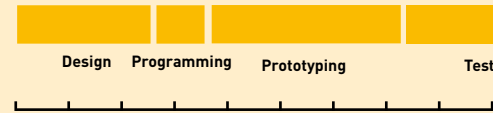
In addition to machine function design, IQANdesign also provides a simple way to accomplish display page programming using a simple drag and drop interface. The menu system can also be customized .

## The product development process

With conventional programming from scratch



With IQAN from Parker



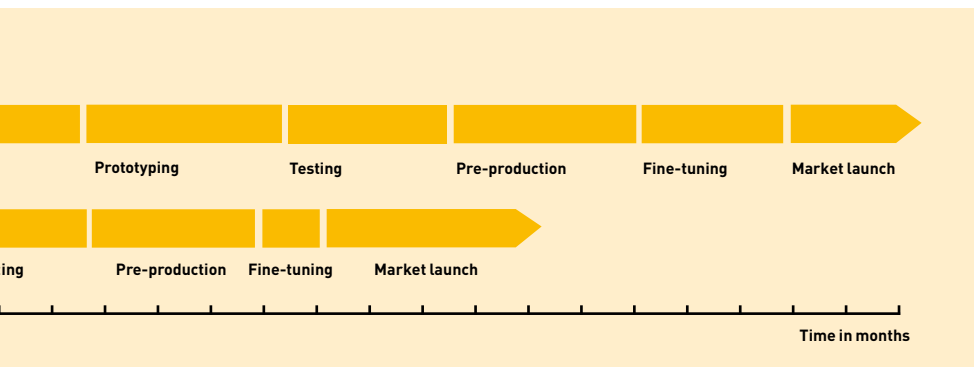
- **32-bit technology**
- **Outstanding motion control experience**
- **User-friendly**
- **Software-based development**
- **World-wide support**



## ◀ Increased productivity and reduced environmental impact

With IQAN Software studios, any OEM can create custom functions that optimize a machine's energy efficiency – the power can easily be made available when needed, and only then.





### ▼ Virtual simulation speeds up development

IQANsimulate is a simulation tool, which simplifies function testing and validation, reducing development time. It simulates all of the hardware modules in an IQAN application. Software simulation is a safer way to test new applications than on an actual machine. Simulation of all input values in your application is easy using the on-screen sliding bar interface. While simulating inputs you can simultaneously measure the resulting output values. Together with module and I/O error simulation you will be able to perform machine FMEA (Failure Modes and Effects Analysis). The simulator will behave just like the 'real thing', meaning you will be able to look at your display pages, adjust parameters, view logs, test your user interface and much more.



### ◀ Fine-tune in the real world

During the development phase you can use IQANrun to optimize your machine's performance with the help of IQANrun's advanced graphic measuring and machine statistics collection functions. IQANrun also offers a convenient way of developing the basic machine settings during the prototyping phase.

### ◀ Endless possibilities

Today, an OEM's engineering department wants to design and prototype new machines or features quickly and easily. The production department wants to automate, log and trace the delivery status. The service department wants to handle warranties, offer proactive maintenance and download machine upgrades. Finally, the machine owner wants a reliable machine with high productivity and low downtime. To meet all of these demands, IQAN Software Studios were designed to fulfill the needs of the machine life cycle model. IQAN tools give an extraordinary value over the product life cycle. A product generation that lives for 5-10 years can be easily be updated to remain competitive until it is replaced by the next product generation.



### ▲ Speed up production

Getting a machine design into production is time consuming. Testing equipment and procedures have to be developed and machine start-up and delivery status needs to be recorded. Fortunately, IQAN Software is tailor-made to fulfill all of these demands. Software tools from IQAN can be adapted to feature machine-specific procedures for maintenance, fault finding and web supported machine upgrades, while the machine owner can access spare parts manuals, maintenance videos, service intervals and service suggestions by the software.

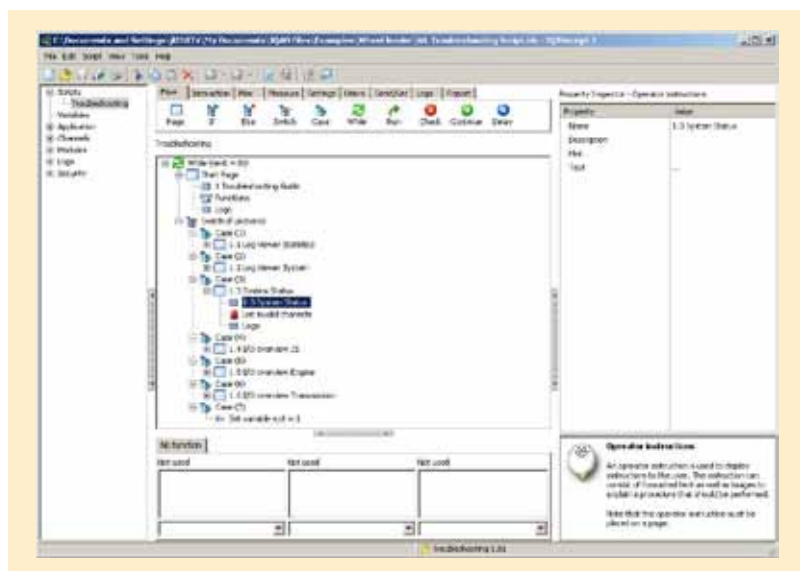
# ...easier production...

Set-up and customise in minutes – not days!

With IQANscript you create scripts using simple drag and drop operations. Each script is a sequence of actions that can be executed in IQANrun. A wide range of script actions are available to build scripts for different purposes. Using flow control actions such as conditions and loops you can control how the script is executed. With the different measure and

log actions, information can be retrieved from the master units to be analyzed by the script or displayed to the user. Setting actions provide full control of the master settings, making it possible to fine tune the machine using a script. IQANscript provides powerful building blocks for the script user interface. Using formatted text and images the script user is guided through

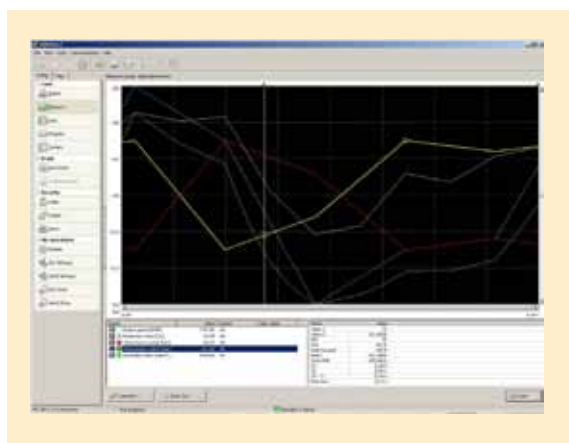
otherwise complex operations. Input from the user can also be collected and used by the script. To provide traceability you can include a customized report in the script. When the script is executed the results will be recorded in the report, making it possible to get a good overview as well as saving the report for future use.



## ▲ Fewer components, easier installation

IQANscript allows you to design machine startups with secured and standardized procedures. This increases manufacturing productivity and initial machine quality. By creating troubleshooting scripts you can guide both production and service personnel during the fault finding process. This decreases the fault finding time and makes it possible for less trained personnel to find problems that otherwise would require expert knowledge.

*The script concept was developed to help OEM production departments create routines for testing, tuning, setting options, logging, delivery sheets, etc.*



## ◀ Real-time adjustments

The user-friendly IQANrun software makes fine-tuning functions easy. Any changes can be followed on-screen in real-time for maximum control. The result for the end-user is a better performing mobile machine – and performance means profitability.



# ...and easier maintenance

## Cutting down-time with intelligent diagnostics systems

Today, service technicians have a large number of tools and documents to keep track of. Sometimes, it is hard for them to find the right information and to be sure they use the correct version of a software or document. The customize feature in IQAN Productive Studio was developed to solve this problem. It allows you to collect all machine software and information in one user interface and to distribute it to your users quickly and easily via the web. Machine downtime is minimised since the service technicians have all the information needed in one place and the information is always up to date.



### ▼ Upgrade anywhere

Functions can be easily tweaked to perfection on a laptop computer, and then downloaded to the IQAN master module – in a workshop or out in the field, in a matter of minutes.



IQANcustomize is a tool that enables customization of the IQANrun software functions and appearance to create a unique service and production tool. This is done by creating one or more pages using the graphical page editor in IQANcustomize. The pages can contain specific information for each machine type and will be displayed when IQANrun is started. Your company logo, graphics, links and information may all be integrated in the user interface of IQANrun. Using IQANcustomize you can also show or hide IQANrun functions, or make them available as links on any page, to assist users through a troubleshooting or tuning process.



- **Easy to install and set-up quickly**
- **Customize as desired**
- **Increase your delivery capacity**

### ◀ Remote diagnostics

With a modem connected to the master module, remote diagnostics on a machine out in the field becomes possible. Troubleshooting and updating of application software can be done remotely. There is no need to get to the machine for a first diagnosis, and if a physical repair is needed, the service technician is well prepared with advance information and can bring all the necessary spare parts and tools needed to get the machine running quickly.



# IQAN product range

Everything you need for complete control

IQAN by Parker offers a complete range of control products to meet your needs. No matter what your need is, Parker can offer anything from the most basic valve driver application to a complete control system for larger, more complicated machines.



IQAN master modules	MD4-7	MD4-5	MD3	MC2	MC3 (SIL2)	MC31	TOC2
Colour display	7.0"	5.7"	3.5"	-	-	-	-
Touchscreen	Yes	(Yes)	-	-	-	-	-
CAN interfaces	4	(4)	3	2	4	4	-
Ethernet ports	2	(2)	-	-	-	-	-
USB ports	-	-	1	1	-	-	-
RS-232 ports	-	-	1	-	-	-	1
Proportional outputs, double	-	-	-	8	4	4	2
Digital outputs	(4)	(4)	1	(8)	5	(10)	-
Voltage/Digital inputs	2/(10)	2/(10)	7/(7)	5/(5)	16/8	16/8	2/2
Frequency or pulse inputs	-	-	-	(5)	8	8	-

IQAN expansion modules	XA2	XS2	XT2	LC5-C01	XC21	XC10	XC22/23
CAN interface	1	1	2	1	1	1	1
Proportional outputs, double	6	-	5	-	-	4	-
Digital outputs	(12)	12	(6)	1	(8)	(20)	(8)
Voltage/Digital inputs	8/(12)	8/(20)	10/(10)	8/(13)	8/(20)	10/(26)	(8)/(20)
Proportional inputs, double	-	-	-	(3)	-	-	-
Frequency inputs	(1)	-	(3)	-	(10)	4	(10)
Axes	-	-	-	2	-	-	-
Buttons/triggers	-	-	-	8/1	-	-	-
Prop. rockers/Thumbwheels	-	-	-	up to 2	-	-	-

Sensors	RS52/RS53 RS60/RS70	RF50/RF55	RM50	ATS90	ATS50	ACC100
Type	Rotary	Rotary Friction	Tilt	Tilt, 2 axis	Tilt	Tilt, 1 axis
Measuring range	90° - 360°	90° - 360°	±10°	±10°	±10°	±40°
Signal range	0.5-4.5 Vdc	0.5-4.5 Vdc	Digital switch	0.5-4.5 Vdc	0.5-4.5 Vdc	1.67-3.19 Vdc
Supply voltage	5 Vdc	5 Vdc	5-24 Vdc	5 Vdc	5 Vdc	5 Vdc
Technology	Hall Effect	Hall Effect	Reed switch	Hall Effect	Hall Effect	Hall Effect



<b>IQAN analogue levers</b>	<b>LC5-X05</b>	<b>LSL</b>	<b>LST</b>	<b>LF1</b>	<b>LC6-X05</b>
Axes	2	1	1	1	2
Signal type per axis	crossed, dual	crossed, dual	crossed, dual	single	crossed, dual
Signal range	0.5-4.5 Vdc	0.5-4.5 Vdc	0.5-4.5 Vdc	0.8-3.2 Vdc	0.5-4.5 Vdc
Buttons/triggers	up to 8	up to 1	-	-	-
Thumbwheels/prop.	up to 2	-	-	-	up to 2

<b>IQAN Software</b>	<b>IQANdesign</b>	<b>IQANsimulate</b>	<b>IQANrun</b>	<b>IQANscript</b>	<b>IQANcustomize</b>	<b>IQANanalyze</b>
IQAN Creative Studio	x	x	x			x
IQAN Productive Studio		x	x	x	x	
IQAN Active Studio		x	x			



<b>ACC50</b>	<b>FP2000/ FP3000</b>	<b>FP4000</b>	<b>ADS50</b>	<b>GS50/ GS60</b>	<b>UTS</b>	<b>IQAN-ST</b>	<b>IQAN-SP035/ IQAN-SP500</b>
Acceleration	Proximity	Proximity	Linear	Speed	Tilt, 2 axis	Temperature	Pressure
±1.5 g	6.4-12.7 mm	6.8 mm	25.4 mm	0-10 kHz	±10°	-50-150 °C	0-500 Bar
0.5-4.5 Vdc	100 Vdc max	12 Vdc/5 A	0.5-4.5 Vdc	Digital switch	CAN	0.25-4.75 Vdc	0.5-4.5 Vdc
5 Vdc	100 Vdc max	12 Vdc	5 Vdc	5-24 Vdc	10-30 Vdc	5 Vdc	5 Vdc
Hall Effect	Reed switch	Reed/Relay	Hall Effect	Hall Effect	MEMS	RTC	Thin film



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