

SMD108144 Tilman Solutions MBARI Doc Ricketts Control System Upgrade

Distributed Vehicle Equipment Control System II (DVECS II) ROV Control System

Overview

- PLC based control system
- Wonderware SCADA GUI
- Distributed I/O
- Fibre optic multiplexers
- Predominantly off the shelf equipment utilised
- Pressure tolerant PCB employed on ROV
- Ease of expansion
- Configurable for survey equipment
- Remote access available for diagnostics and updates
- Auto heading, depth, altitude and position as standard including mid water
- Ready for DEVECS S control system integration

Typical Control Station



Typical Control Console

Ergonomic control station

Touch screens employed

Low voltage power unit

High voltage power unit

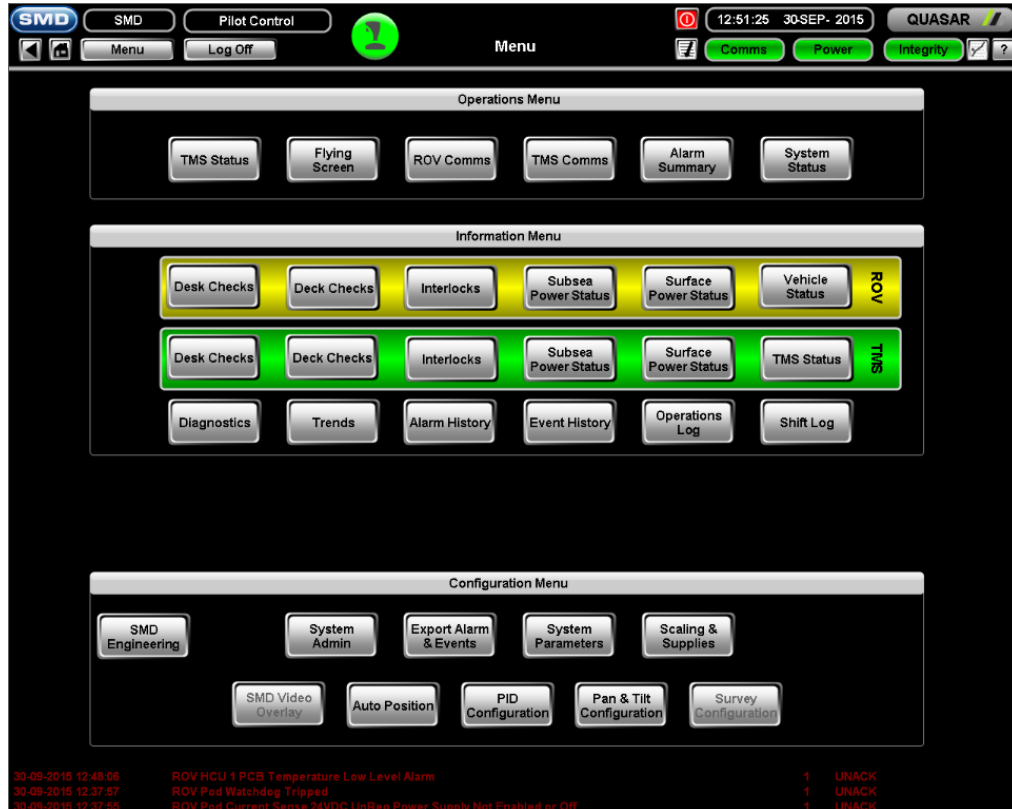
Can be housed in 20 ft container or stand alone

Control system can be integrated into existing system

- External interface to survey / third party equipment available

Dvecs II SCADA Touch Screen

Home/Main Menu Page



Screen is divided into three main functional areas

Top part of screen is dedicated to high level menu options and indications. This is shown on every page

Main screen area changes to show each different page as indicated in the centre of the top part of the screen ('Menu' shown on this page)

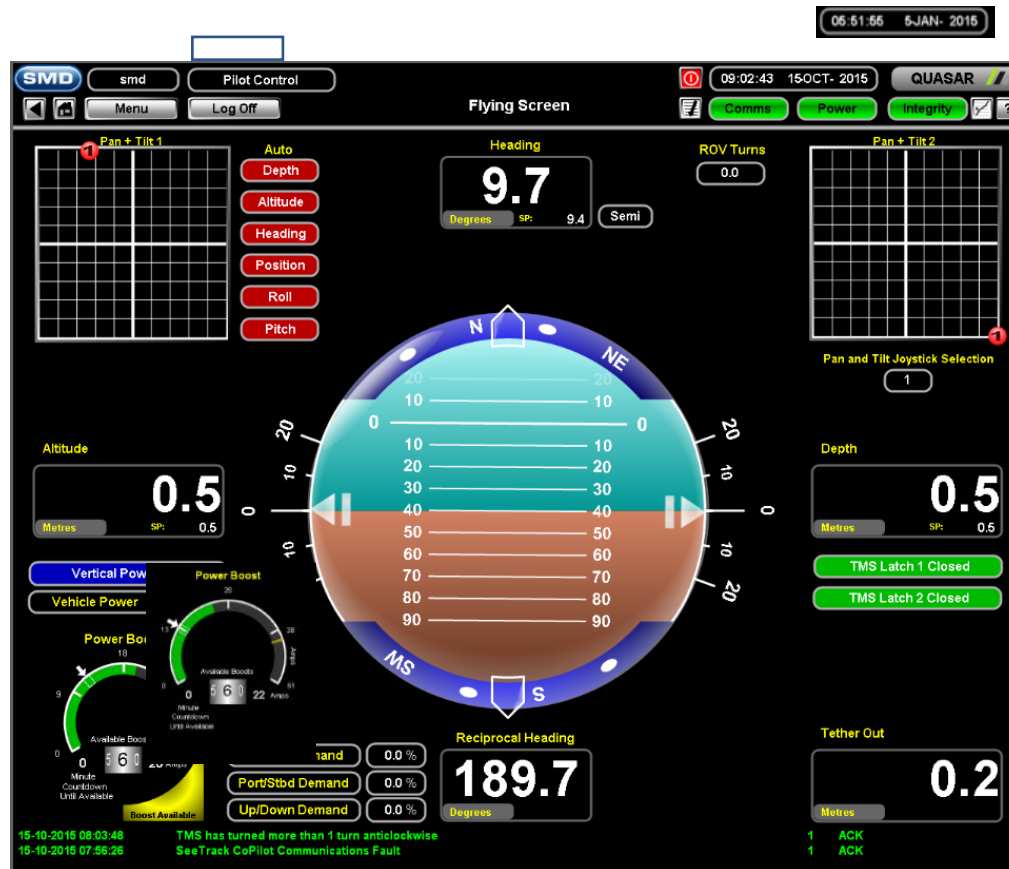
Bottom part of the screen shows the last three ACTIVE fault indications. Caption disappears when no longer active. This is shown on every page

The Menu page is organised so that the most frequently used pages are at the top of the page under the 'Operations Menu'. Pages relating to maintenance activities are lower down the page.

Selections available under the Configuration Menu may be restricted by password. Some selections may be unavailable due to the screen being accessed.



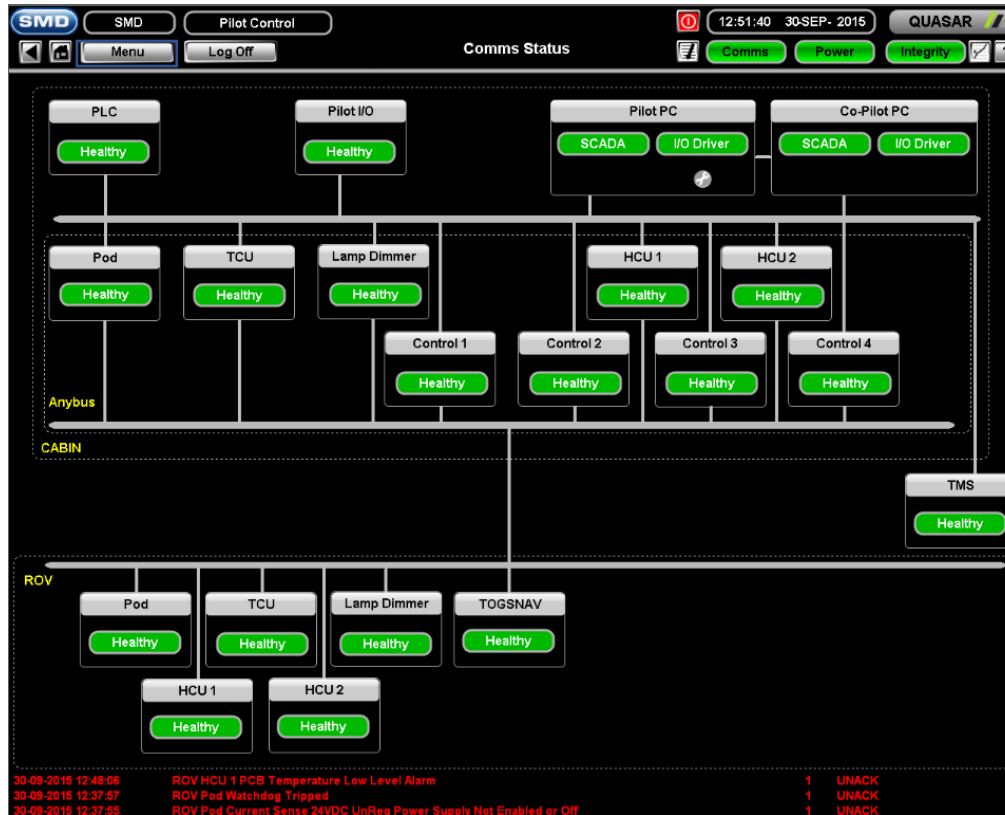
Flying Screen



Typical pilot flying screen

Configured to give the pilot the essential information when flying the ROV

Comms Status



Status information on devices the control system is communicating with.

Alarm Summary

Time	Name	Alarm Comment	Pri	State
30-09-2015 12:48:06	Alarm_Latch_NUM137	ROV HCU 1 PCB Temperature Low Level Alarm	1	UNACK
30-09-2015 12:37:57	Alarm_Latch_NUM303	ROV Pod Watchdog Tripped	1	UNACK
30-09-2015 12:37:55	Alarm_Latch_NUM241	ROV Pod Current Sense 24VDC UnReg Power Supply Not Enabled or Off	1	UNACK
30-09-2015 12:37:55	Alarm_Latch_NUM250	ROV Pod Current Sense 24VDC Reg Power Supply Not Enabled or Off	1	UNACK
30-09-2015 12:37:55	Alarm_Latch_NUM259	ROV Pod Current Sense 10VAC Reg Power Supply Not Enabled or Off	1	UNACK
30-09-2015 12:37:55	Alarm_Latch_NUM268	ROV Pod Moisture Power Supply Not Enabled or Off	1	UNACK
30-09-2015 12:37:55	Alarm_Latch_NUM255	ROV Pod Temperature Power Supply Not Enabled or Off	1	UNACK
30-09-2015 12:37:55	Alarm_Latch_NUM286	ROV Pod Humidity Power Supply Not Enabled or Off	1	UNACK
30-09-2015 12:37:55	Alarm_Latch_NUM277	ROV Pod Vacuum Power Supply Not Enabled or Off	1	UNACK
30-09-2015 12:17:59	Alarm_Latch_NUM203	Survey Interface Communications Fault	1	UNACK
30-09-2015 12:17:56	Alarm_Latch_NUM204	String received from Survey Interface Header Fault	1	UNACK
30-09-2015 12:17:54	Alarm_Latch_NUM205	String received from Survey Interface Hull Field detected	1	UNACK
30-09-2015 12:17:52	Alarm_Latch_NUM1254	Capillet Desk Point ID Point adapter Comms Link Failed or module fault	1	UNACK

Time	Name	Alarm Comment	Pri	State
30-09-2015 12:48:06	ROV HCU 1 PCB Temperature Low Level Alarm		1	UNACK
30-09-2015 12:37:57	ROV Pod Watchdog Tripped		1	UNACK
30-09-2015 12:37:55	ROV Pod Current Sense 24VDC UnReg Power Supply Not Enabled or Off		1	UNACK

Alarm Summary shows the screen divided into five areas: Time and date alarm latched; Latch string allocation number; Description and comment; Priority level; **Acknowledged** or **Unacknowledged** alarm status .

Options for navigating the Alarm, events and Log data is shown

ROV Status



Status screen showing bar graphs of system parameter.

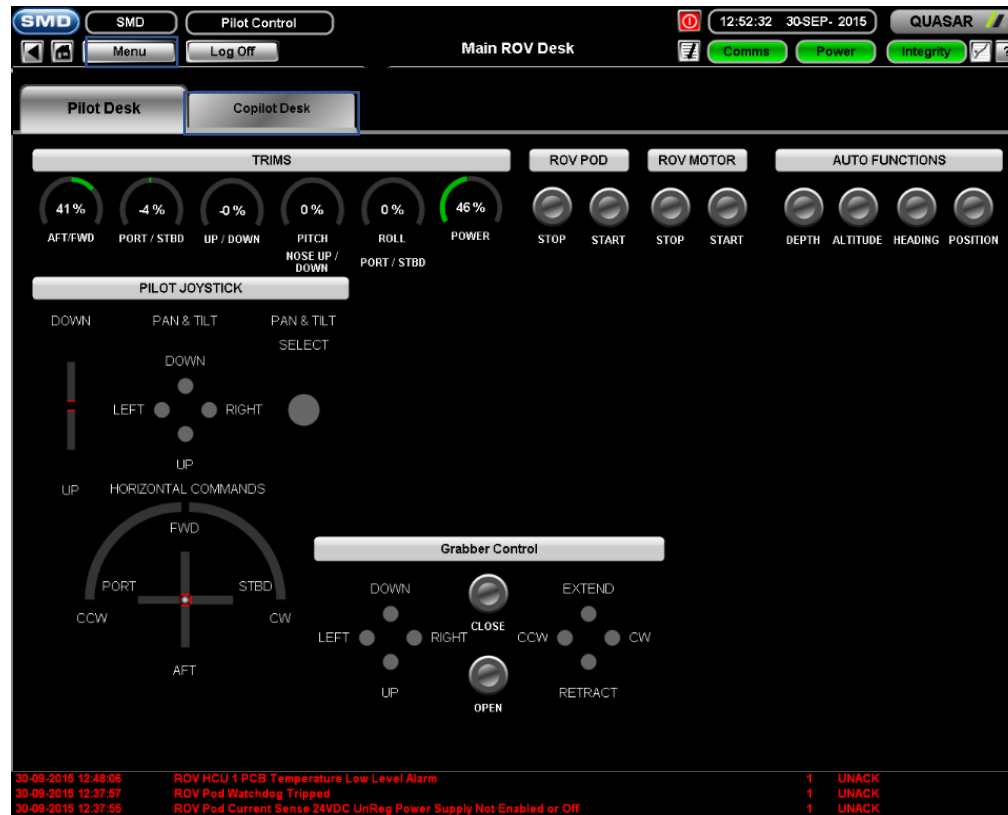
Launch mark indicator to allow user easily identify parameter that have changed since launch

ROV Status



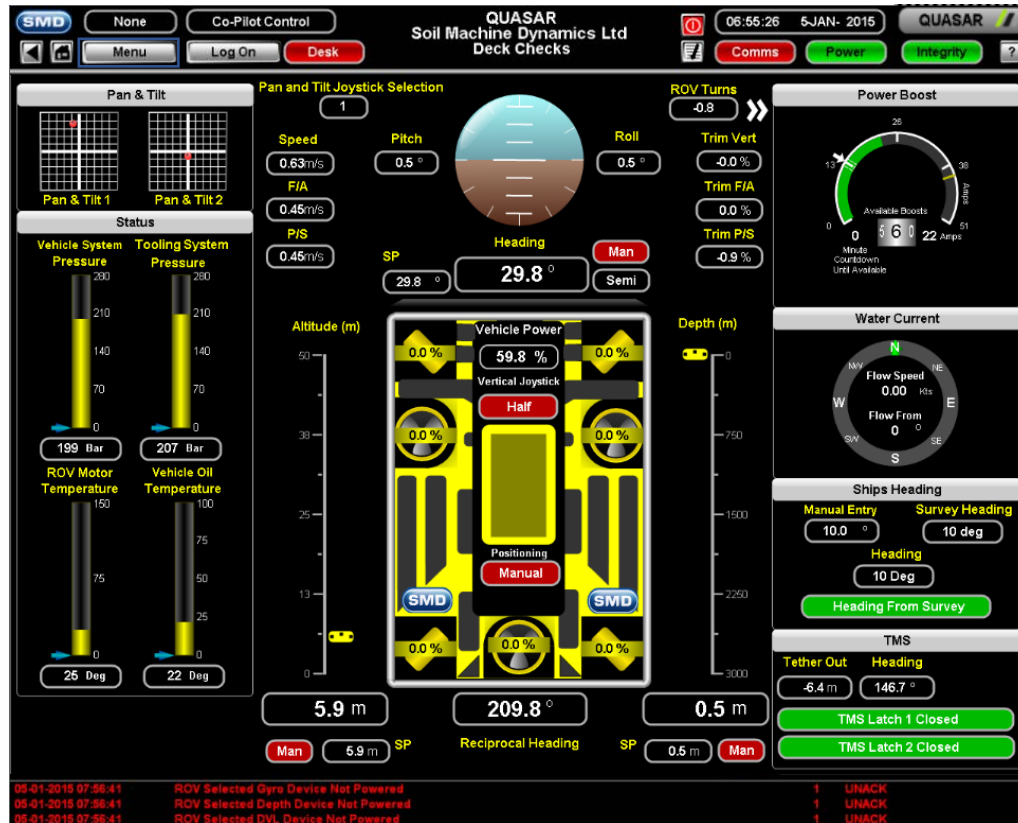
Real time trend analysis of data on the status screen.

ROV Pilot Desk Checks



Desk check screens to ensure system is operational on pre dive checks and aid with diagnostic

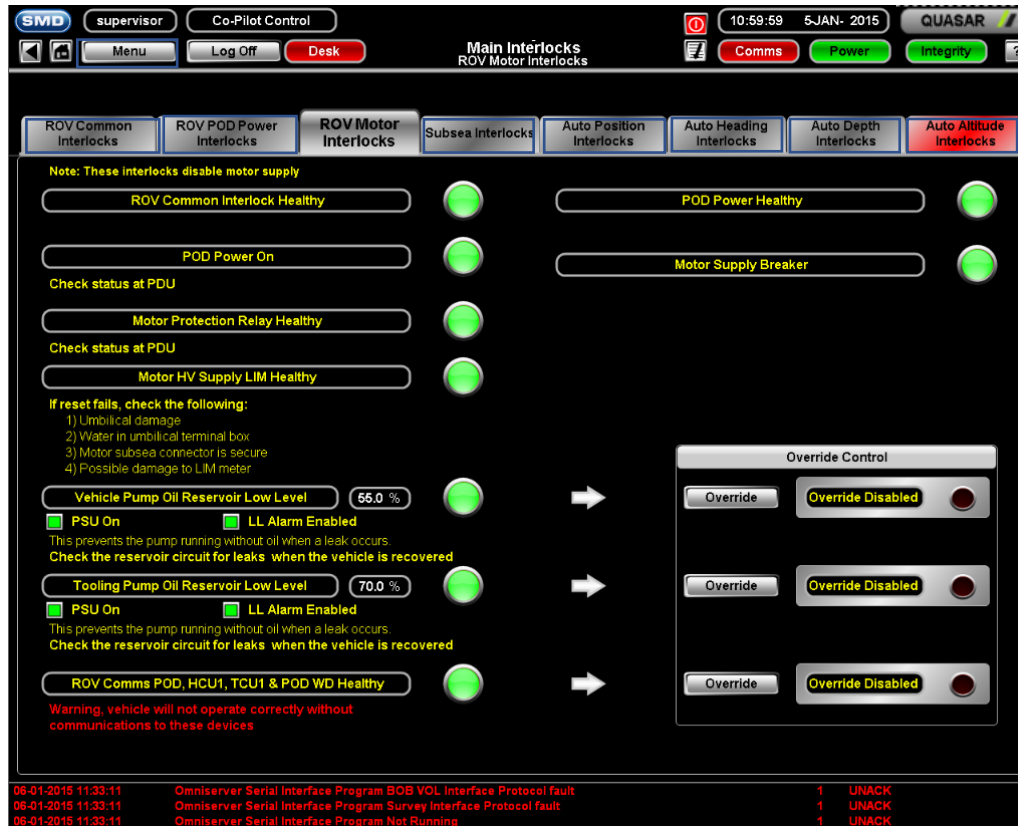
Deck Checks



Typical deck check screen.

This can also be used as an alternative flying screen.

ROV Main Interlocks

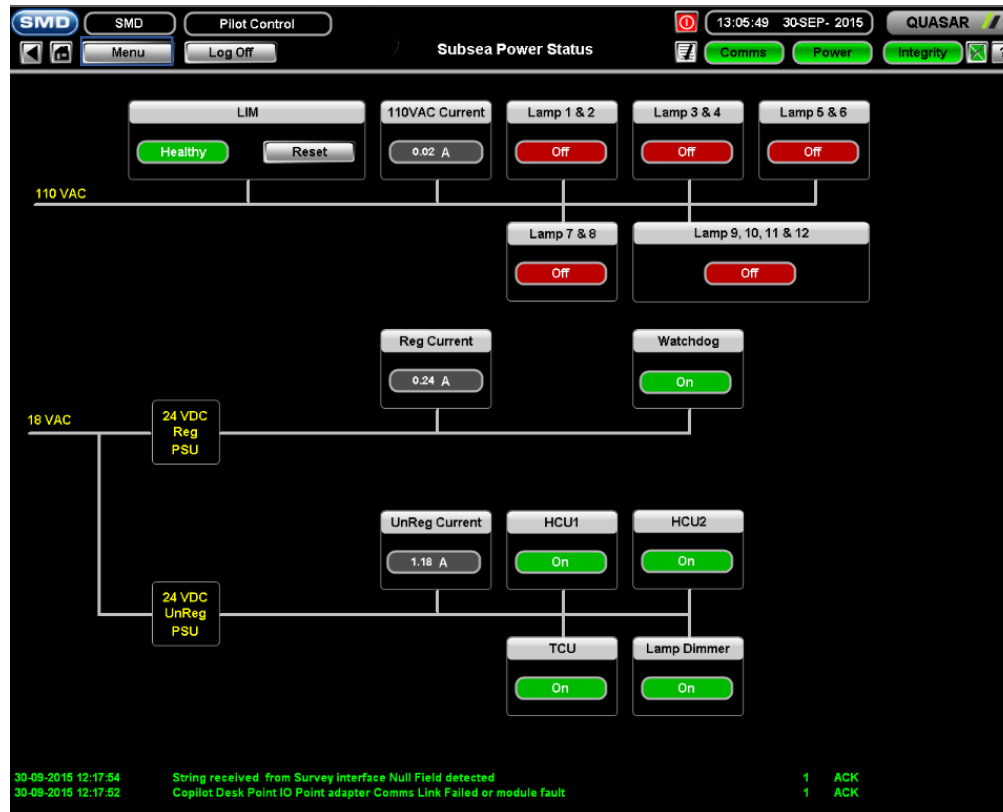


Interlock screens to aid with diagnostics

Overrides are available to allow critical operations to continue.

Overrides are only permitted at supervisor level

Subsea Power Status

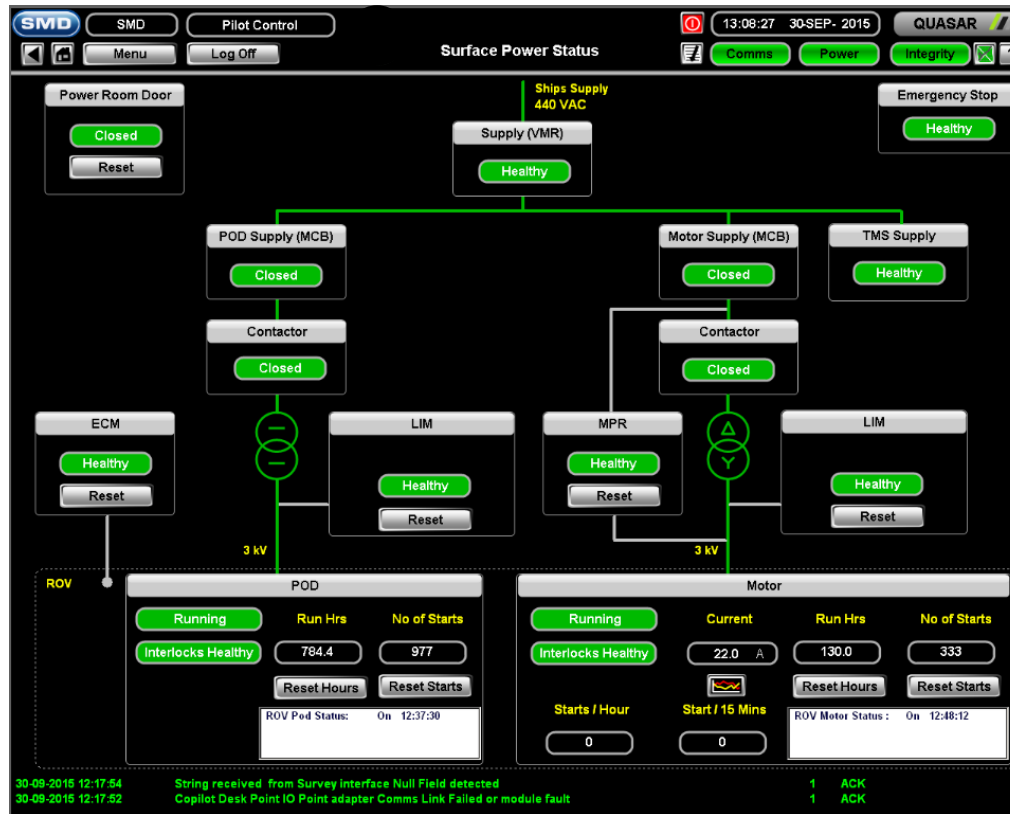


Subsea power status

Subsea LIM information and reset

Supply load indication

Surface Power Status

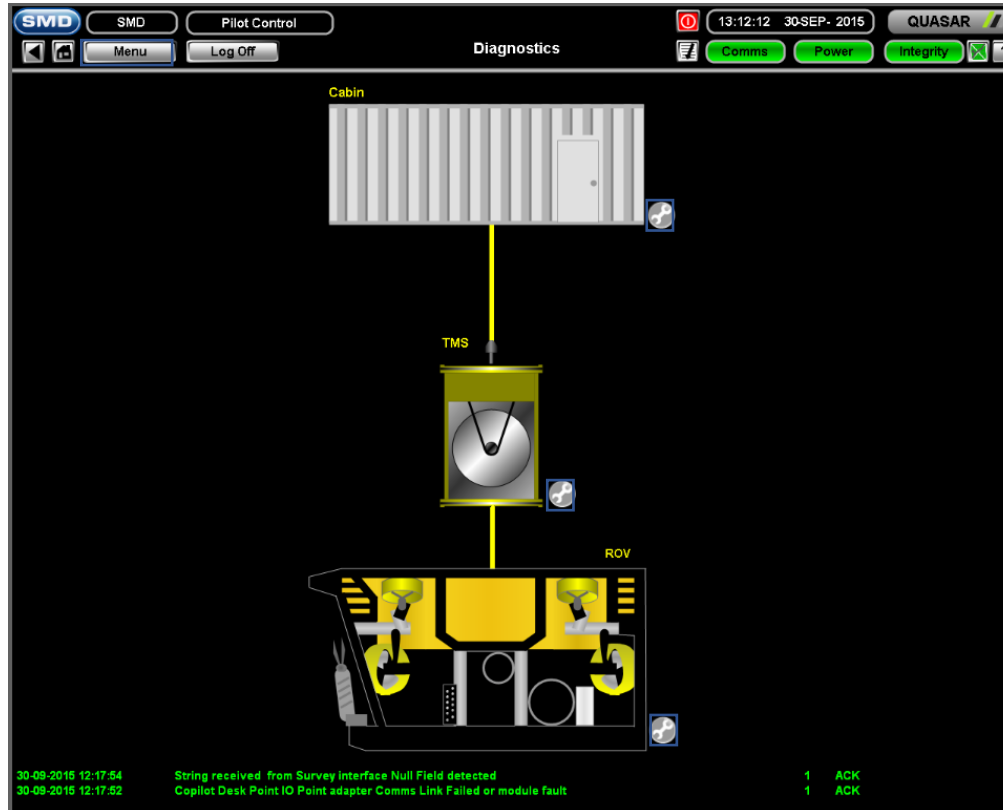


Surface power status

Graphical representation of surface power and safety systems

Supply load indication

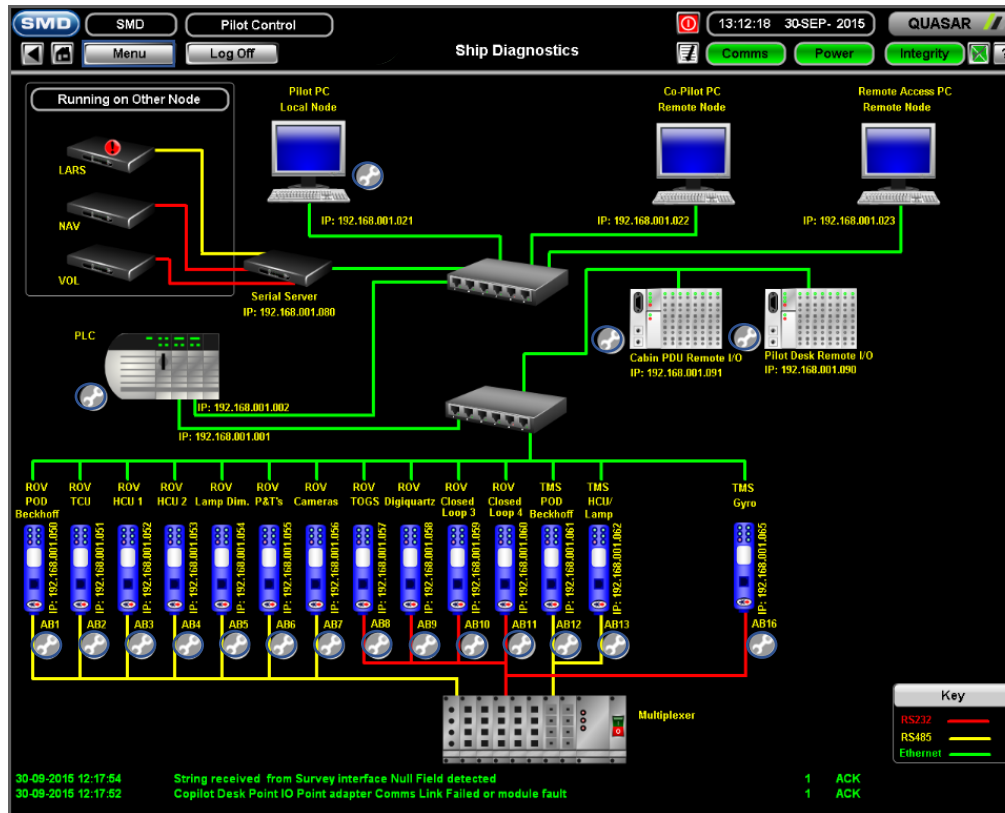
Diagnostics



Main diagnostic page

User can select which part of the control system to diagnose

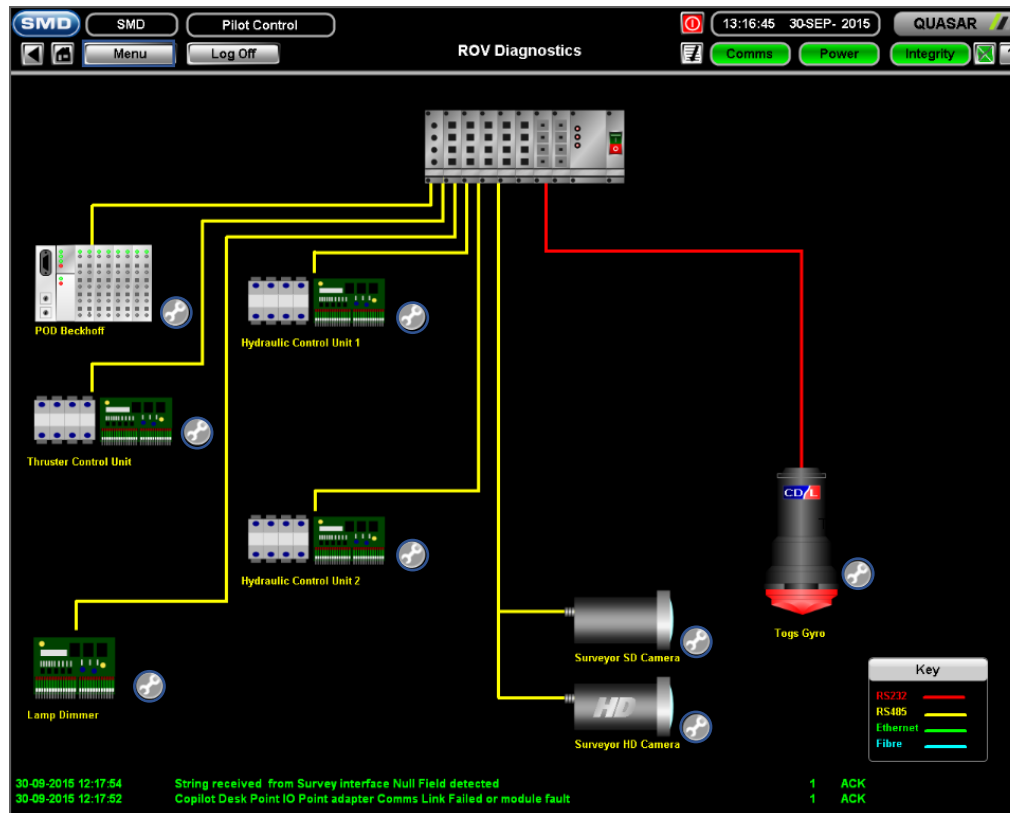
Diagnostics Cabin



Typical surface control diagnostics page

Click on the device to display specific data

ROV Diagnostics



Typical subsea control diagnostics page

Click on the device to display specific data

Note: diagnostic page will change depending on survey configuration

Trends



Up to 8 trend lines can be displayed at one time.

Both real time and archived data can be displayed while operating

Alarm History

Time	State	Name	Value	Operator	Alarm Comment
30/09/2015 01:05:35 PM	ACK, RTN	Alarm_Latch_NUM090	OFF	SMD	ROV Auto Positioning: Depth and Altitude Control are both
30/09/2015 01:05:35 PM	ACK, RTN	Alarm_Latch_NUM203	OFF	SMD	Survey Interface Communications Fault
30/09/2015 01:05:35 PM	ACK, RTN	Alarm_Latch_NUM204	OFF	SMD	String received from Survey Interface Header Fault
30/09/2015 01:05:35 PM	ACK, RTN	Alarm_Latch_NUM241	OFF	SMD	ROV Pod Current Sense 24VDC UnReg Power Supply Not E
30/09/2015 01:05:35 PM	ACK, RTN	Alarm_Latch_NUM250	OFF	SMD	ROV Pod Current Sense 24VDC Reg Power Supply Not Ena
30/09/2015 01:05:35 PM	ACK, RTN	Alarm_Latch_NUM259	OFF	SMD	ROV Pod Current Sense 110VAC Reg Power Supply Not En
30/09/2015 01:05:35 PM	ACK, RTN	Alarm_Latch_NUM268	OFF	SMD	ROV Pod Moisture Power Supply Not Enabled or Off
30/09/2015 01:05:35 PM	ACK, RTN	Alarm_Latch_NUM277	OFF	SMD	ROV Pod Vacuum Power Supply Not Enabled or Off
30/09/2015 01:05:35 PM	ACK, RTN	Alarm_Latch_NUM286	OFF	SMD	ROV Pod Humidity Power Supply Not Enabled or Off
30/09/2015 01:05:35 PM	ACK, RTN	Alarm_Latch_NUM295	OFF	SMD	ROV Pod Temperature Power Supply Not Enabled or Off
30/09/2015 01:05:35 PM	ACK, RTN	Alarm_Latch_NUM303	OFF	SMD	ROV Pod Watchdog Tripped
30/09/2015 01:05:35 PM	ACK, RTN	Alarm_Latch_NUM437	OFF	SMD	ROV HCU 1 PCB Temperature Low Level Alarm
30/09/2015 01:05:34 PM	ACK, ALM	Alarm_Latch_NUM1254	ON	SMD	Copilot Desk Point IO Point adapter Comms Link Failed or
30/09/2015 01:05:34 PM	ACK, ALM	Alarm_Latch_NUM295	ON	SMD	String received from Survey Interface Null Field detected
30/09/2015 01:05:34 PM	ACK, ALM	Alarm_Latch_NUM204	ON	SMD	String received from Survey Interface Header Fault
30/09/2015 01:05:34 PM	ACK, ALM	Alarm_Latch_NUM203	ON	SMD	Survey Interface Communications Fault
30/09/2015 01:05:34 PM	ACK, ALM	Alarm_Latch_NUM295	ON	SMD	ROV Pod Temperature Power Supply Not Enabled or Off
30/09/2015 01:05:34 PM	ACK, ALM	Alarm_Latch_NUM286	ON	SMD	ROV Pod Humidity Power Supply Not Enabled or Off
30/09/2015 01:05:34 PM	ACK, ALM	Alarm_Latch_NUM277	ON	SMD	ROV Pod Vacuum Power Supply Not Enabled or Off
30/09/2015 01:05:34 PM	ACK, ALM	Alarm_Latch_NUM268	ON	SMD	ROV Pod Moisture Power Supply Not Enabled or Off
30/09/2015 01:05:34 PM	ACK, ALM	Alarm_Latch_NUM259	ON	SMD	ROV Pod Current Sense 110VAC Reg Power Supply Not En
30/09/2015 01:05:34 PM	ACK, ALM	Alarm_Latch_NUM250	ON	SMD	ROV Pod Current Sense 24VDC Reg Power Supply Not Ena
30/09/2015 01:05:34 PM	ACK, ALM	Alarm_Latch_NUM241	ON	SMD	ROV Pod Current Sense 24VDC UnReg Power Supply Not E
30/09/2015 01:05:34 PM	ACK, ALM	Alarm_Latch_NUM303	ON	SMD	ROV Pod Watchdog Tripped
30/09/2015 01:05:34 PM	ACK, ALM	Alarm_Latch_NUM437	ON	SMD	ROV HCU 1 PCB Temperature Low Level Alarm
30/09/2015 01:05:34 PM	ACK, ALM	Alarm_Latch_NUM090	ON	SMD	ROV Auto Positioning: Depth and Altitude Control are both
30/09/2015 01:04:23 PM	UNACK, ALM	Alarm_Latch_NUM090	ON	SMD	ROV Auto Positioning: Depth and Altitude Control are both
30/09/2015 12:48:06 PM	UNACK, ALM	Alarm_Latch_NUM437	ON	None	ROV HCU 1 PCB Temperature Low Level Alarm
30/09/2015 12:37:57 PM	UNACK, ALM	Alarm_Latch_NUM303	ON	None	ROV Pod Watchdog Tripped
30/09/2015 12:37:55 PM	UNACK, ALM	Alarm_Latch_NUM241	ON	None	ROV Pod Current Sense 24VDC UnReg Power Supply Not E
30/09/2015 12:37:55 PM	UNACK, ALM	Alarm_Latch_NUM250	ON	None	ROV Pod Current Sense 24VDC Reg Power Supply Not Ena
30/09/2015 12:37:55 PM	UNACK, ALM	Alarm_Latch_NUM259	ON	None	ROV Pod Current Sense 110VAC Reg Power Supply Not En
30/09/2015 12:37:55 PM	UNACK, ALM	Alarm_Latch_NUM268	ON	None	ROV Pod Moisture Power Supply Not Enabled or Off
30/09/2015 12:37:55 PM	UNACK, ALM	Alarm_Latch_NUM277	ON	None	ROV Pod Vacuum Power Supply Not Enabled or Off
30/09/2015 12:37:55 PM	UNACK, ALM	Alarm_Latch_NUM286	ON	None	ROV Pod Humidity Power Supply Not Enabled or Off
30/09/2015 12:37:55 PM	UNACK, ALM	Alarm_Latch_NUM295	ON	None	ROV Pod Temperature Power Supply Not Enabled or Off
30/09/2015 12:37:47 PM	ACK, RTN	Alarm_Latch_NUM077	OFF		TMS Gyro Data Not Valid
30/09/2015 12:37:47 PM	ACK	Alarm_Latch_NUM077	OFF		TMS Gyro Data Not Valid
30/09/2015 12:37:47 PM	ACK, RTN	Alarm_Latch_NUM078	OFF		TMS Gyro Faulty
30/09/2015 12:37:47 PM	ACK	Alarm_Latch_NUM078	OFF		TMS Gyro Faulty
30/09/2015 12:37:41 PM	ACK, RTN	Alarm_Latch_NUM076	OFF		TMS Gyro Comms Link Failed
30/09/2015 12:37:41 PM	ACK	Alarm_Latch_NUM076	OFF		TMS Gyro Comms Link Failed
30/09/2015 12:37:41 PM	UNACK, ALM	Alarm_Latch_NUM077	ON	None	TMS Gyro Data Not Valid

(local) - WWAlmDb Displaying 1 to 48 of 48 records. Connected

Summary Events Shift Log Ops Log Filter Alarm ACK Alarm Silence

30-09-2015 12:17:54 String received from Survey Interface Null Field detected 1 ACK
30-09-2015 12:17:52 Copilot Desk Point IO Point adapter Comms Link Failed or module fault 1 ACK

Dedicated alarm manager

All alarms are saved and can be downloaded

Overall System Config

The screenshot shows a software interface for system configuration. On the left is a vertical sidebar with a list of menu items: 'Overall System Configuration' (highlighted), 'Control Configuration', 'LARS Configuration', 'ROV Configuration', 'ROV Settings', 'ROV Devices', 'TMS Configuration', 'TMS Settings', 'TMS Devices', 'Flight Trims', 'Load', 'Save', and 'Exit'. The main area of the interface is dark and contains three dropdown menus at the top: 'LARS Selection' (set to 'Not Installed'), 'TMS Selection' (set to 'Top Hat TMS'), and 'ROV Selection' (set to 'Quasar II'). At the bottom of the main area, there is a status bar with green text. On the left of the status bar, it shows two timestamps: '30.09.2016 12:17:54' and '30.09.2016 12:17:52'. In the center, it displays two error messages: 'Spring received from Survey Interface Null Field detected' and 'Copilot Desk Point IO Point adapter Comms Link Failed or module fault'. On the right, it shows two status indicators: '1 ACK' and '1 ACK'.

System Configuration

The system can be configured for the following items

- Type and amount of HCU's
- Type of TCU
- Gyro selection
- Depth transducer selection
- Altitude transducer selection
- INS selection
- TMS type

ROV Config

Overall System Configuration

Control Configuration

LARS Configuration

ROV Configuration

ROV Settings

ROV Devices

TMS Configuration

TMS Settings

TMS Devices

Flight Trims

Load

Save

Exit

Core Vehicle

Configurable Vehicle

HPU Configuration

Motor Selection

250HP

Dual Pump Set Installed

ROV HCU Configuration

HCU 1

12 Function

HCU 2

12 Function

HCU 3

None

ROV Lamp Configuration

Lamp Dimmer

12 Lamps & 2 HID

Grabber Selection

Port

5 Function

STBD

Manipulator

Pod Override

WARNING

ONLY USE WHEN USING
THE POD TEST POWER SUPPLY

OVERRIDE

30-08-2016 13:44:43 SeeTrack CoPilot Communications Fault 1 ACK

30-08-2016 12:17:54 String received from Survey Interface Null Field detected 1 ACK

30-09-2016 12:17:52 CoPilot Desk Point IO Point adapter Comms Link Failed or module fault 1 ACK

- ROV power selection
- HCU configuration
- Lamp configuration
- Graber configuration

Surveillance Config

Overall System Configuration

Core Vehicle

Configurable Vehicle

Survey Pod Configuration

Survey Port P30: None

Survey Port P31: None

Tooling Equipment

Tooling Pack: Zetetic's Installed

Tooling Tray Fitted: ☒

Water Current

Water Current Device: From TOGSNAV

POD Sensor Port Configuration

Port 9: TOGSNAV SMD Format

Port 10: Not Fitted

Port 11: Not Fitted

Port 12: Not Fitted

Port 13: Not Fitted

Protocol Selection

Primary Control Device

Gyro: TOGSNAV

Depth: TOGSNAV

Altitude: TOGSNAV

Velocity: TOGSNAV

GEO Reference: Not Fitted

Sound Reference: Not Fitted

Secondary Control Device

Gyro: Not Fitted

Depth: Not Fitted

Altitude: Analogue Input

Velocity: Not Fitted

GEO Reference: Not Fitted

Sound Reference: Not Fitted

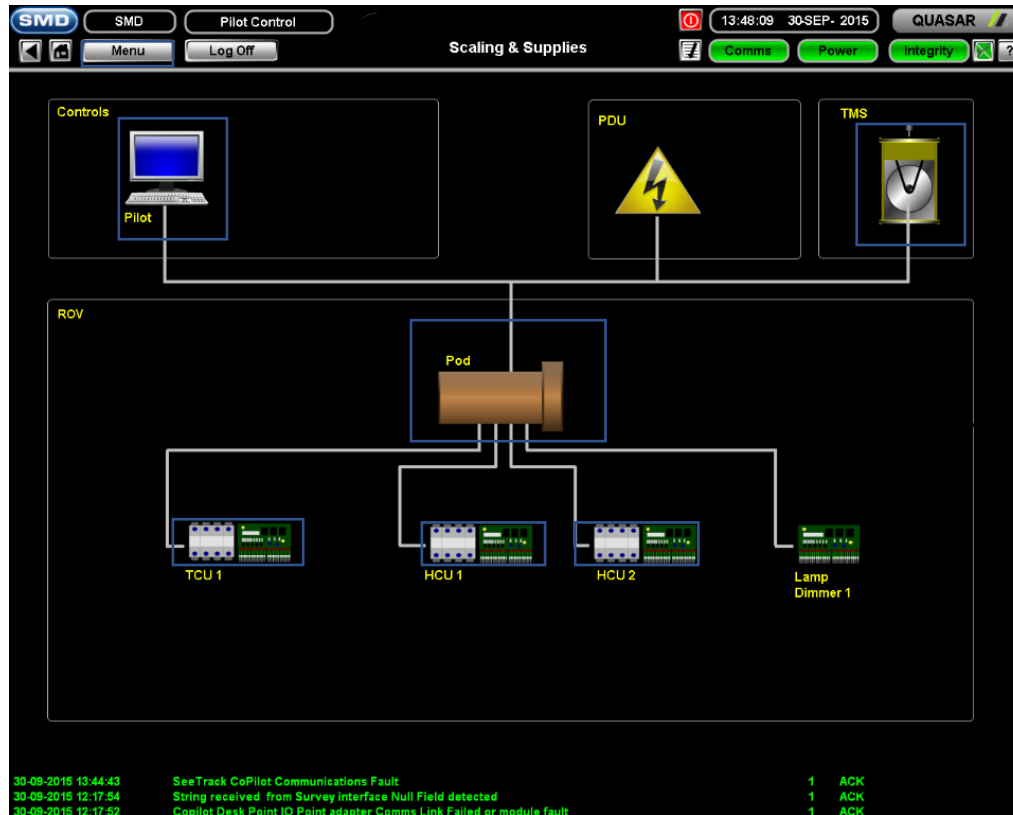
17-11-2016 14:06:51 Lost Connection to Co-Pilot SCADA 1 ACK

17-11-2016 13:44:02 Survey Interface Communications Fault 1 ACK

17-11-2016 13:43:59 String received from Survey Interface Null Field detected 1 ACK

- Drop down menus to select devices
- 5 independent configurable control ports
- Selection of primary and secondary control devices (back up gyro)

Scaling and Supplies

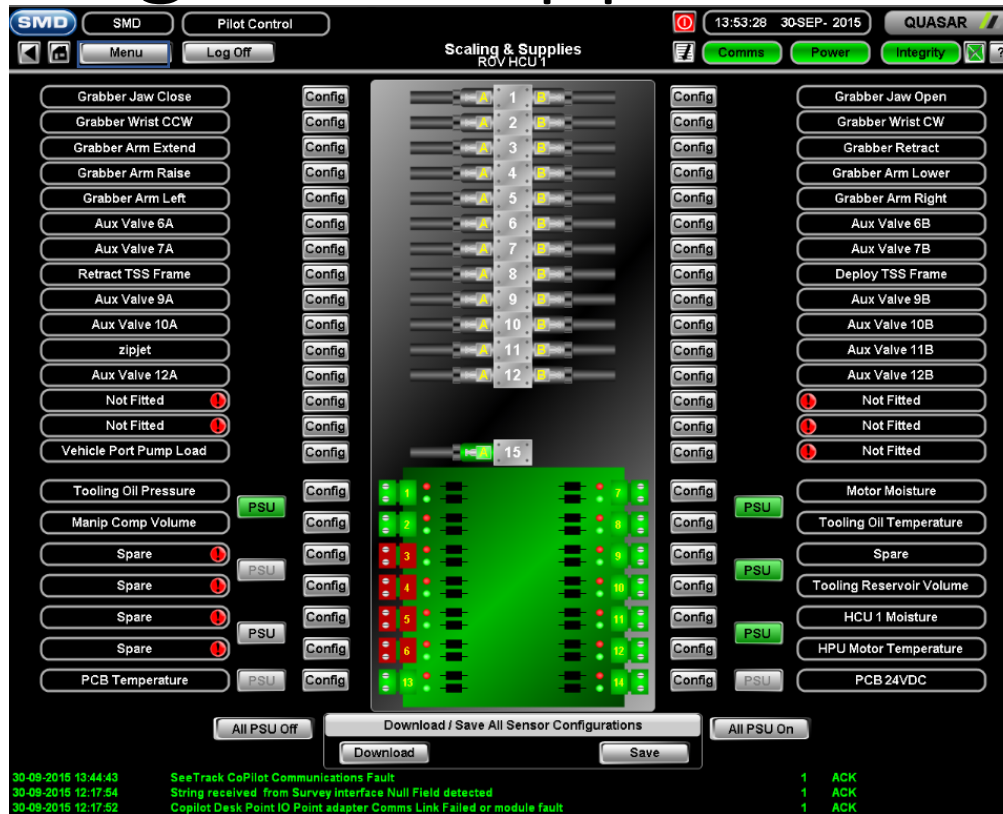


Scaling and Supplies

Activities performed in scaling and supplies

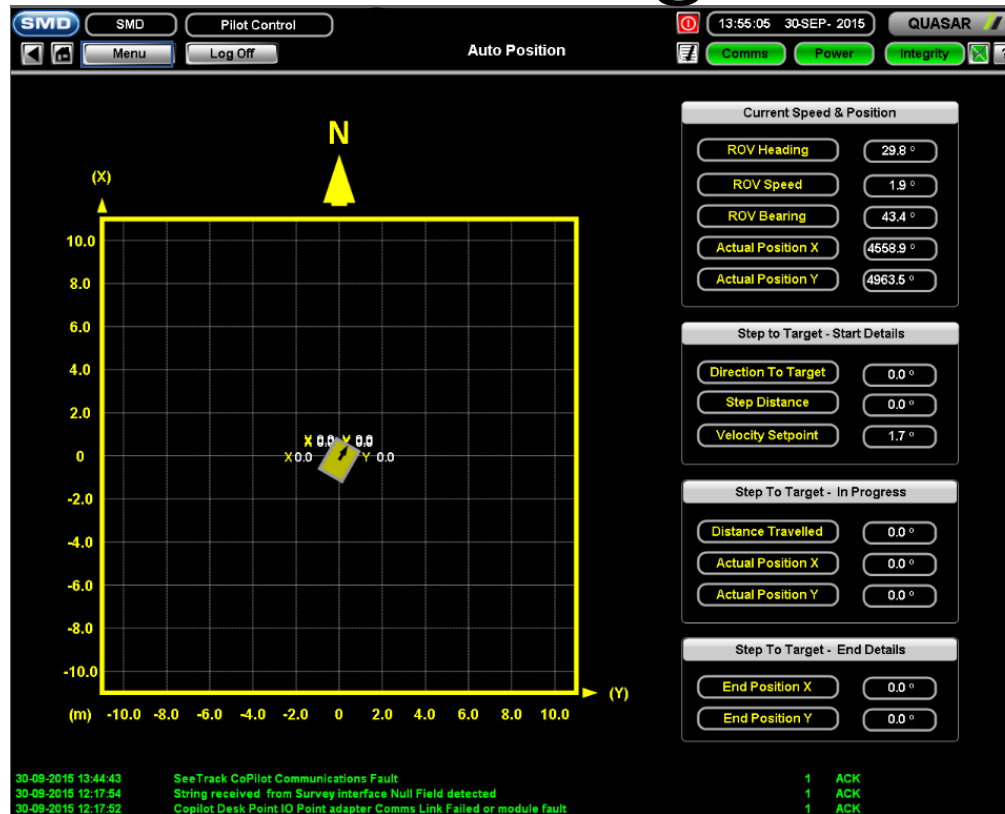
- Alarm enabling
- Calibrations of devices
- Archive of parameters
- Naming of parameters

Scaling and Supplies



Typical HCU scaling and supplies screen

Auto Positioning



SMD Standard Auto Positioning System

- Bottom lock station keeping if DVL or INS fitted
- Mid water station keeping positioning with INS fitted
- Manual fly and hold manoeuvres
- Auto step “hands off” move commands
- Graphical display of station keeping

END