Company Profile

S-PLANE Automation (Pty) Ltd is an internationally recognised aerospace and defence company specializing in product supply and development of autonomous systems and related subsystems. Our focus is fixed- and rotary-wing Unmanned Aerial Vehicles (UAVs) and their navigation, flight control and mission management subsystems. Product and development scope spans both the civil and military UAV markets, and also extends to autonomous land, sea-surface and underwater vehicles and their subsystems.

Our slogan, “Client Centred Automation Solutions”, accurately captures the company’s outlook and business model. Our approach is to work with and understand our clients’ requirements, before tailoring a specific solution to precisely meet their needs. Solutions are realised through application and adaptation of our mature baseline products and technology building-blocks, with strategic custom and cooperative development as required.

All of our products are available qualified and certified to appropriate industrial, aeronautical and military standards. Our highly qualified staff are well versed in professional, standards-based system, safety, software and hardware engineering, required to meet the safety, reliability and quality requirements of the aviation and defence industries. We pride ourselves in responsible and professional product development, sensible market and business strategies, and above all client satisfaction.

Contact Details
9B Cyclonite Road, The Interchange, Somerset West, South Africa, 7130
Phone: +27 21 851 9282, Fax: +27 86 298 4587
Email: info@s-plane.com, Web: www.s-plane.com

xSERIES UAV SUBSYSTEMS

S-PLANE’s newly released xSERIES of UAV subsystems represent the state-of-the-art in avionics and automation solutions for UAVs. The xSERIES was specifically designed from the ground up to be modular, scalable and rugged to robustly accommodate the wide variety of form, fit and function requirements faced by UAV subsystems. The result is a series of subsystems able to precisely meet the functional, physical and safety requirements of almost any UAV, while providing the latest in technology, standards, reliability and maintainability.

“Modular, scalable and rugged design architecture”

From high-end Mini-UAVs through to Tactical and Strategic UAVs, and across both the civil and military markets, the xSERIES promises the ideal UAV subsystem solution for both new developments and after-market upgrade / refurbishment of existing UAV platforms.

“Ideal for new developments and after-market refurbishment”

Contact S-PLANE for further information on any xSERIES products and for assistance in crafting a subsystem solution for your UAV.

“Latest in technology, standards, reliability and maintainability”

Modular | Scalable | Rugged

Rugged, Customisable Design

Modular and Scalable Architecture

3U VPX REDI Building Blocks
xFCU
Flight Control Unit
Overview
- Integrated navigation and flight control unit
- State-of-the-art GNSS and inertial navigation
- Full-envelope fixed- and rotary-wing flight control
- DO-178C Compliant software with ARINC 653 partitioning
- Multi-channel redundancy with dissimilar hardware
- xSERIES modular, scalable and rugged architecture
- Accommodates wide range of form, fit and function
- Future-proof VITA 46, 48 and 67 compliant architecture
- Rugged, conduction cooled, extended temperature
- SRU-Level Remove & Replace (R&R) maintenance

FCU Card
3U VPX REDI FCU on a Card
- Integrated GNSS/inertial Navigation (GPS, GLONASS, GALILEO, BEIDOU)
- Full-Envelope Fixed- and Rotary-Wing Flight and Mission Control
- 18x Fully Isolated Native I/O Ports
- Ethernet (AFDX), Serial, GPCR, ADC, PWM, Input Capture
- Stackable for Redundancy with Distributed and Dissimilar Hardware

IOE Card
3U VPX REDI I/O Expansion Card
- Provides industry standard I/O expansion
- AFDX: 2x100 Base FD ARINC 664 p7 Busses
- MIL-STD-1553: 4x Redundant A/B Notion II Channels
- ARINC 429: 8x RX Channels, 4x TX Channels, IRIGB
- Various other I/O supported

MPC Card
3U VPX REDI Multipurpose Comms
- Redundant LOS C2/Alemtary (UHF2, 4GHz, 60 km, 230 Mbps)
- LOS Video streaming (S-Band/S-Band, 30 km, 12 Mbps)
- Iridium satellite communication (Short Burst Data Service)
- GSM communication (GPRS, EDGE, HSPA, HSPA+)
- WLAN 802.11b/g, 54 Mbps Max

IPF Card
3U Input Power Filtering Card
- Input power filtering and protection
- Up to 2x high-power input busses per card
- MIL-STD-461F EM/EMC filtering
- Surge and continuous over-voltage protection
- Wide/Configurable input voltage range
- Bus health monitoring

REG Card
3U Power Regulation Card
- Power regulation and battery charging
- Up to 6x isolated power regulation channels per card
- Up to 700W power regulation per card
- Wide input voltage range with OVP
- Scalable architecture for parallel cards and current share
- Monitoring and voltage control

DBX Card
3U Power Distribution Card
- Power distribution, monitoring and control
- 32x Digitally controlled power channels
- Scalable parallel cards architecture
- Failsafe design for flight critical loads
- Voltage and current monitoring
- Transient voltage and current protection
**xADT**

**Airborne Data Terminal**

**Overview**
- Integrated payload and data link management unit
- Modular xSERIES design for straightforward customisation
- Common IP network for data routing and processing
- Application cards for acquisition, encoding and tracking
- Payload loop closure intelligence for automatic actions
- Payload recording and retrieval with bandwidth management
- UHF, S-Band and C-Band LOS data links
- GSM, Iridium and optional Inmarsat BLOS communication

**Performance Specifications**

<table>
<thead>
<tr>
<th>Performance</th>
<th>Range</th>
<th>Resolution</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airspeed</td>
<td>0 to 200 KIAS</td>
<td>&lt; 0.4V KIAS (V = Current KIAS)</td>
<td>&lt; 50V KIAS (V = Current KIAS)</td>
</tr>
<tr>
<td>Altitude</td>
<td>-1,600 to 25,000 ft Barometric Altitude</td>
<td>&lt; 0.2 ft</td>
<td>&lt; 40 + ALT/140 ft (ALT = Altitude in ft)</td>
</tr>
<tr>
<td>Climb Rate</td>
<td>±4,000 ft/min</td>
<td>&lt; 0.2 ft/min</td>
<td>&lt; 1 ft/min</td>
</tr>
<tr>
<td>Humidity</td>
<td>0 to 100 %</td>
<td>0.002 %</td>
<td>&lt; ±2% (5 to 95 % RH)</td>
</tr>
<tr>
<td>OAT</td>
<td>-30 to 85 °C</td>
<td>0.04 °C</td>
<td>&lt; ±0.2 °C</td>
</tr>
</tbody>
</table>

**PCU Card**

*3U VPX REDI*

Payload Control Card

- Payload management, control and routing functions
- Data link health, bandwidth and priority management
- High-resolution payload data recording and retrieval

**RTR Card**

*3U VPX REDI*

Data Routing Card

- 8/12 Port 1000-Base TX Ethernet switch
- Priority routing with optional AFDX
- Common IP network for payloads and data links

**VED Card**

*3U VPX REDI*

Video Encode & Decode Card

- Real-time multi-channel video encoding for IP transmission
- 2x HD or 4x SD input channels, H.264 compression
- HD/ED IDI, NTSC/PAL, HDTV, Y/CB/CY, S-Video, Component

**TRK Card**

*3U VPX REDI*

Video Tracking Card

- Concurrent multi-target detection, cueing and tracking
- Clutter rejection and multiple tracking algorithms
- Automatic track-loss detection and reacquisition

**MPC Card**

*3U VPX REDI*

Multipurpose Comms Card

- Redundant LOS C2/telemetry link (UHF/2.4GHz)
- LOS Video data link (S-Band / C-Band)
- Iridium satellite, GSM and WLAN communication

**LRD Card**

*3U VPX REDI*

Long Range Data Card

- Long range LOS C2/telemetry data link
- UHF Band, 150km, 115 kbps FD Serial Data
- Built-in health monitoring and diagnostics

**Typical Remote Installation**

- PCU Card
- RTR Card
- VED Card
- TRK Card
- MPC Card
- LRD Card

**Pitot/Static Port Connection**

- Redundant LOS C2/telemetry link
- UHF Band, 150km, 115 kbps FD Serial Data
- Built-in health monitoring and diagnostics

---

**xADU**

**Air-Data Unit**

**Overview**
- xSERIES compatible air-data measurement unit
- Modular extension to xFCU for remote installation
- Minimises pneumatic tubing and associated lag/errors
- Rugged, reliable, SWAP sensitive design
- RS-485 Digital serial interface (MIL-STD-1553 on request)
- Streaming or polling at up to 50Hz
- Airspeed: IAS, TAS, Mach Number
- Altitude: Barometric, Density Altitude, Climb Rate (VSI)
- Air Data: Humidity, OAT, Air Density
- Available with DO-178C certification evidence or as a pure hardware solution

**Performance Specifications**

<table>
<thead>
<tr>
<th>Performance</th>
<th>Range</th>
<th>Resolution</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airspeed</td>
<td>0 to 200 KIAS</td>
<td>&lt; 0.4V KIAS (V = Current KIAS)</td>
<td>&lt; 50V KIAS (V = Current KIAS)</td>
</tr>
<tr>
<td>Altitude</td>
<td>-1,600 to 25,000 ft Barometric Altitude</td>
<td>&lt; 0.2 ft</td>
<td>&lt; 40 + ALT/140 ft (ALT = Altitude in ft)</td>
</tr>
<tr>
<td>Climb Rate</td>
<td>±4,000 ft/min</td>
<td>&lt; 0.2 ft/min</td>
<td>&lt; 1 ft/min</td>
</tr>
<tr>
<td>Humidity</td>
<td>0 to 100 %</td>
<td>0.002 %</td>
<td>&lt; ±2% (5 to 95 % RH)</td>
</tr>
<tr>
<td>OAT</td>
<td>-30 to 85 °C</td>
<td>0.04 °C</td>
<td>&lt; ±0.2 °C</td>
</tr>
</tbody>
</table>
Subsystem verification tools are an integral part of any modern integration, verification and validation environment. Used for subsystem level testing, acceptance, qualification, integration and maintenance, these invaluable tools reduce development and verification life cycle costs and ensure subsystem and ultimately system-level safety.

“...reduce development and verification life cycle costs...”

S-PLANE offers a wide variety of modern, modular, standards-based UAV subsystem verification tools including Hardware In the Loop Simulators (HILS) and Special To-Type Test Equipment (STTE). These tools offer manual and automated testing, reporting, fault finding and analysis, and are typically customised from mature S-PLANE building blocks to precisely meet client requirements. Tools cater for testing and diagnostics at SRU through LRU and prime item level and are entirely self-contained. Tools are also available with DO-330 tool qualification evidence for DO-178C developments.

“Automated testing, reporting, fault finding and analysis”

Contact S-PLANE for further information and assistance in realising an automated verification environment for your system.

“DO-330 Qualified tools for DO-178C developments”
Overview
- Automated Test Bench (ATB) for Flight Control Units (FCUs)
- Test case definition, automated text execution & reporting
- High-fidelity, real-time, dynamic simulation
- 3D Visualisation; graphical reporting and logging tools
- DO-330 Tool qualification for DO-178C developments
- Flexible hardware and software architecture for customisation
- Optional SRU level testing for maintenance support

Simulation Models
- High-fidelity fixed and rotary wing aircraft dynamic models
- Wind, atmospheric, magnetic field and gravity environment models
- Complex ground-surface to landing gear interaction models
- System specific sensor, actuator and propulsion models

Applications
- On-site xFCU integration, verification, training and maintenance tool
- Custom FCU development, verification and integration tool
- System verification, demonstration & flight test preparation tool
- Flight and mission simulation for GCS verification (with payload simulation)

STTE
Special To-Type Test Equipment

Overview
- Subsystem specific automated verification tool
- Prime Item, LRU and SRU level testing and fault finding
- Self-contained, fully standalone design
- COTS Architecture with client customisation as required
- NI LabVIEW or similar Graphical User Interface

Advantages
- Simple, repeatable, cost-effective verification
- Automated text execution, result verification and reporting
- Selectable profiles for ATP, ESS, qualification etc.
- Automated fault detection and diagnosis
- Tool qualification evidence for DO-178C developments

Applications
- SRU: Board level fault detection and isolation
- FCU LRU: Dynamics, faults, interfaces, power
- PMU LRU: Supplies, loads, measurements, interfaces
- ADU LRU: Air-data, interfaces, power
- UAV Prime Item: Dynamics, faults, communications, power
- GCS Prime Item: Missions, payloads, power, interfaces, communications

3D Visualisation
- Fixed and Rotary Wing UAVs
- High Fidelity Dynamic Models
- Industrial PC
- Custom LRU Interfaces
- NI LabView Software

Virtual Horizon Display
- State Monitoring
- Scenario Management
- Measurement Equipment
- Integrated HMI
- SRU Level Board Testing

Simple | Accurate | Repeatable