

GE
Intelligent Platforms

rugged
systems



imagination at work

Can you delegate the subsystem?

Every modern mil/aero platform is a “system of systems.” Each airliner, naval vessel, land vehicle or UAV, consists of many individual subsystems within the overall platform.

And each of these subsystems adds critical capabilities by performing important functions such as navigation, communication or vehicle management.

Each subsystem is crucial to the overall success of the platform, and must be tightly integrated with other components. However, each subsystem is also a distinct entity, which a prime contractor can delegate to subcontractors such as GE

Intelligent Platforms. This delegation however, places tremendous responsibility on the subcontractor because each subsystem is indispensable. It is a responsibility GE is well-equipped to assume.

Our goal is to deliver our subsystems with the best customer experience for you, the prime contractor, with an unparalleled level of service. We aim to earn your respect as your trusted program partner.



We put a lot more than hardware into each box.

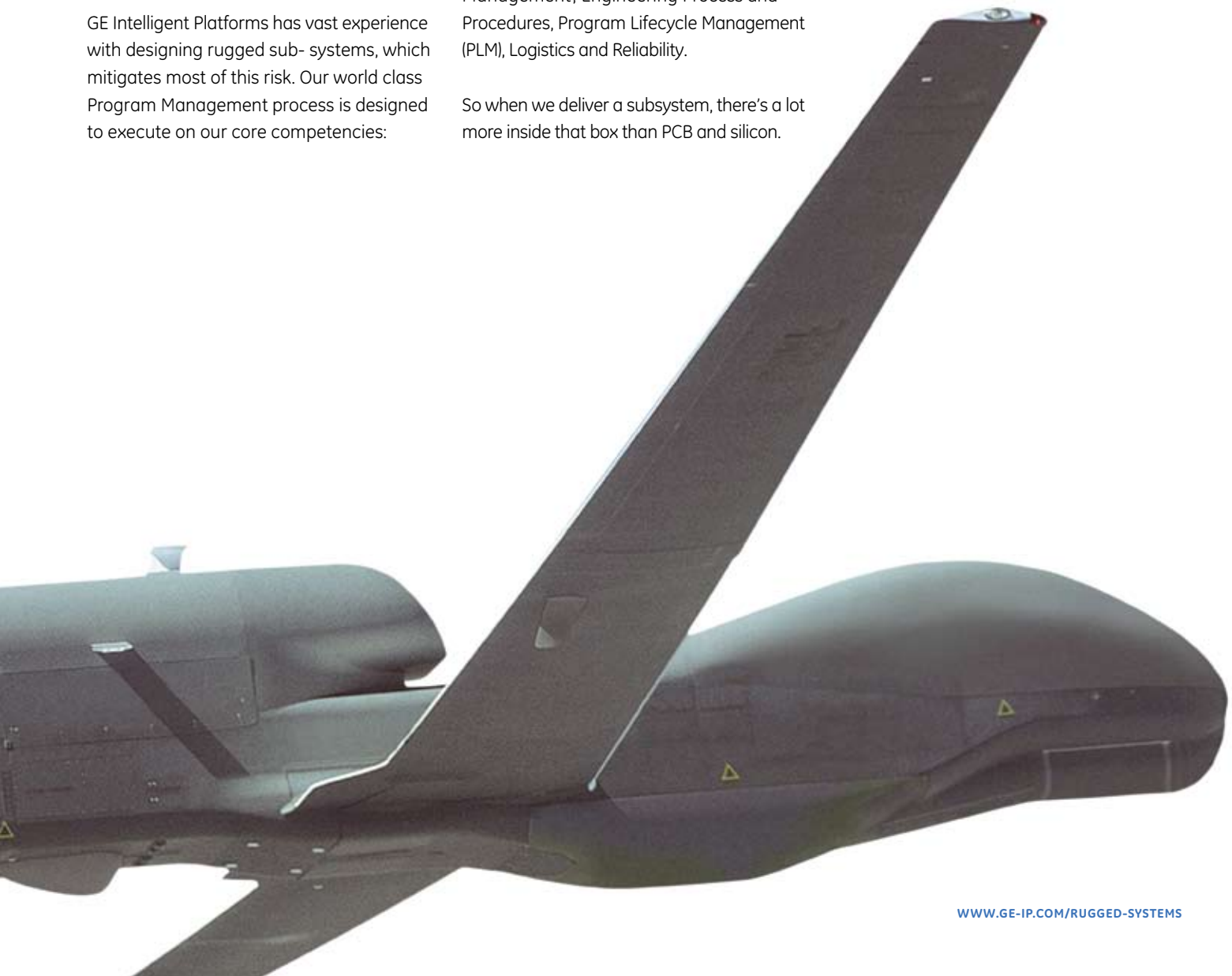
In theory, the process of designing and building a rugged, mil/aero subsystem would seem to be fairly straightforward. In practice, it is an extremely complex undertaking.

In fact, experience has shown that without the most careful planning, testing, analysis, documentation, validation, and support, it is a process fraught with danger.

GE Intelligent Platforms has vast experience with designing rugged sub- systems, which mitigates most of this risk. Our world class Program Management process is designed to execute on our core competencies:

Contract Management, Application Domain Knowledge, System Architecture, Thermal Management, Integration, Validation & Verification, Configuration Management, Engineering Process and Procedures, Program Lifecycle Management (PLM), Logistics and Reliability.

So when we deliver a subsystem, there's a lot more inside that box than PCB and silicon.



Integration. Documentation. Valid Qualification. Minus the aggravati

Our job is to make the system work. Period. For you, that eliminates the issue of multiple vendors and the potential for conflicts or finger-pointing. If there's a problem, come to us.

You have one point of contact for all questions or issues. You have a single part number, not a collection of parts. And you receive an integrated, tested, qualified and working subsystem ready to be loaded with your application software.

Our engineering capabilities encompass Systems, Mechanical, Electrical, Software, Test, Project and Reliability. Our hardware capabilities are equally expansive, ranging from chassis to hardware certification.

Qualification Testing

GE can provide Qualification Test Plan and Qualification Test Report documentation. The typical order of qualification testing would begin with Functional Testing followed by Thermal Cycling, Shock, Random Vibration, Thermal Vacuum, Electromagnetic Radiation Test and then an Open Box Inspection.

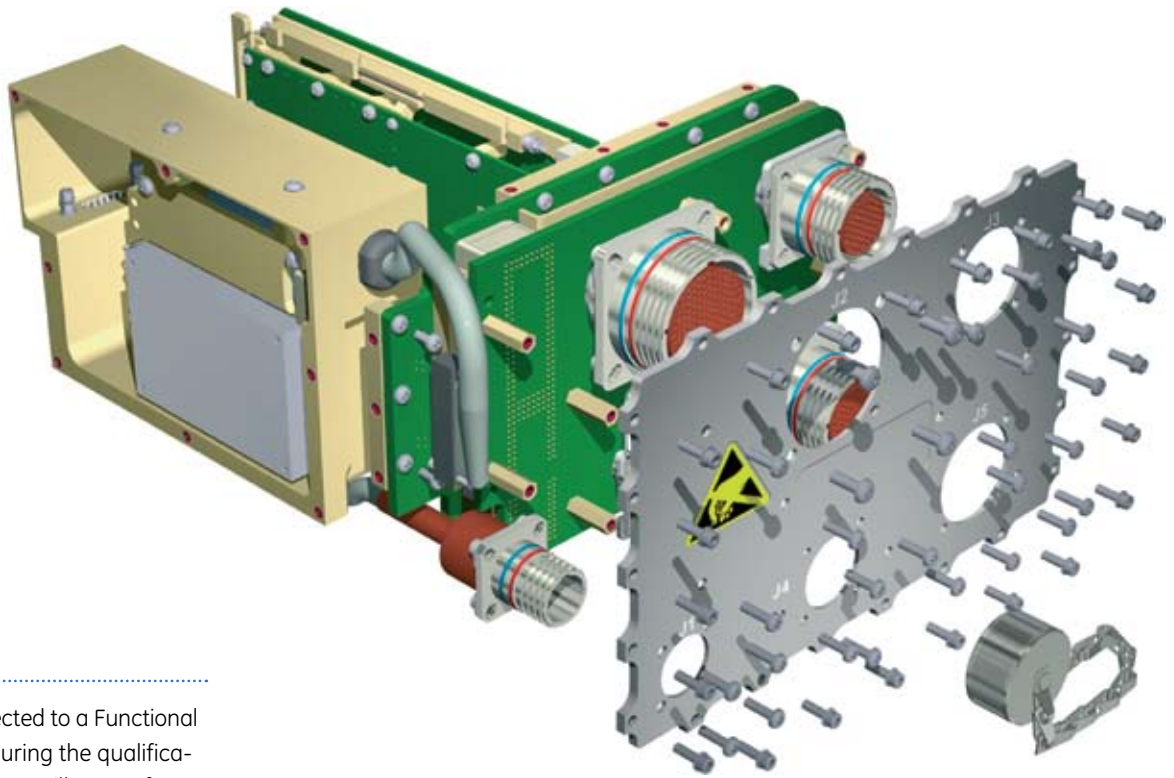
SUPPORT SERVICES

Chassis	All rugged levels, every cooling technology, all form factors
Backplane	CompactPCI, VMEbus, VPX, custom
SBCs	All form factors, rugged levels, Intel® and PowerPC®
Firmware, BIOS	Platform specific or standard
HW Integration	Fit together, bring-up
Built-In Test	System diagnostic SW
SW integration	Customer specific BSPs and SW
Testing	Temperature, shock, vibration, humidity, qualification
Certification	AS9100, MIL-STD-810, others
Lifecycle Management	Support programs designed for the life of our products
Application Engineering	Middleware and software drivers for product integration
Bus Analyzers	MIL-STD-1553 and ARINC 429 network bus analyzers

Our environmental testing includes state-of-the-art analysis of temperature, altitude, humidity, shock, vibration and EMI.



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Functional Testing

Each subsystem is subjected to a Functional Test (FT) several times during the qualification test procedure. The FT will most often be an automated process, but may include some user intervention.

Each part of a rugged subsystem must be tested to conform to the customer's requirements.

Thermal Design and Qualification Processes

Early in the design process, thermal analysis is conducted using computer modeling. The models simulate worst case thermal environments for the chassis and its subassemblies. The models characterize junction temperatures of suspect components and may suggest enhancements to layout to increase the probability of high temperature survival.

EMI Qualification

Systems are subjected to electromagnetic interference and susceptibility tests by an approved sub-contractor. The tests typically include Electromagnetic Compatibility (EMC); Electromagnetic Interference (EMI); control and dissipation of electrostatic charges; preclusion of an Electromagnetic Radiation Hazard (EMRADHAZ); and proper electrical bonding for MIL-STD-464.

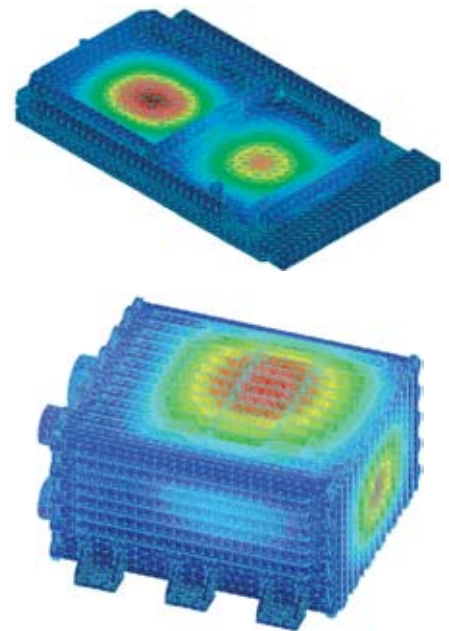
Shock and Vibration Analysis and Qualification

The goal of shock and vibration testing is primarily to simulate qualification level vibration and shock environments on chassis and subassemblies in order to identify potential failures. In addition, we are able to use test information as a basis for future design enhancements.

Engineering Development Units

Once the subsystem requirements have been decided upon, we are able to provide engineering development units (EDUs) which facilitate early software development.

EDUs are developed to customer specifications including a full complement of representative conduction cooled boards with the appropriate connectors or rear transition modules.



Thermal modeling is one of the methods used to qualify chassis and subassemblies.

MQ-8B Fire Scout.

The Fire Scout Unmanned Aerial Vehicle is an excellent example of a platform using several of our rugged subsystems. In this case, the prime contractor, Northrop Grumman, assigned GE the task of developing the UAV's Vehicle Management Computer (VMC), Payload Interface Unit, Controller Area Network Bus Hub and Imaging Control Unit. The VMC is responsible for supervising the many other subsystems onboard. The Fire Scout is in production for the U.S. Navy and units are planned for the US Army and Coast Guard.

Mission Control

Responsible for autonomous functions

Flight Control

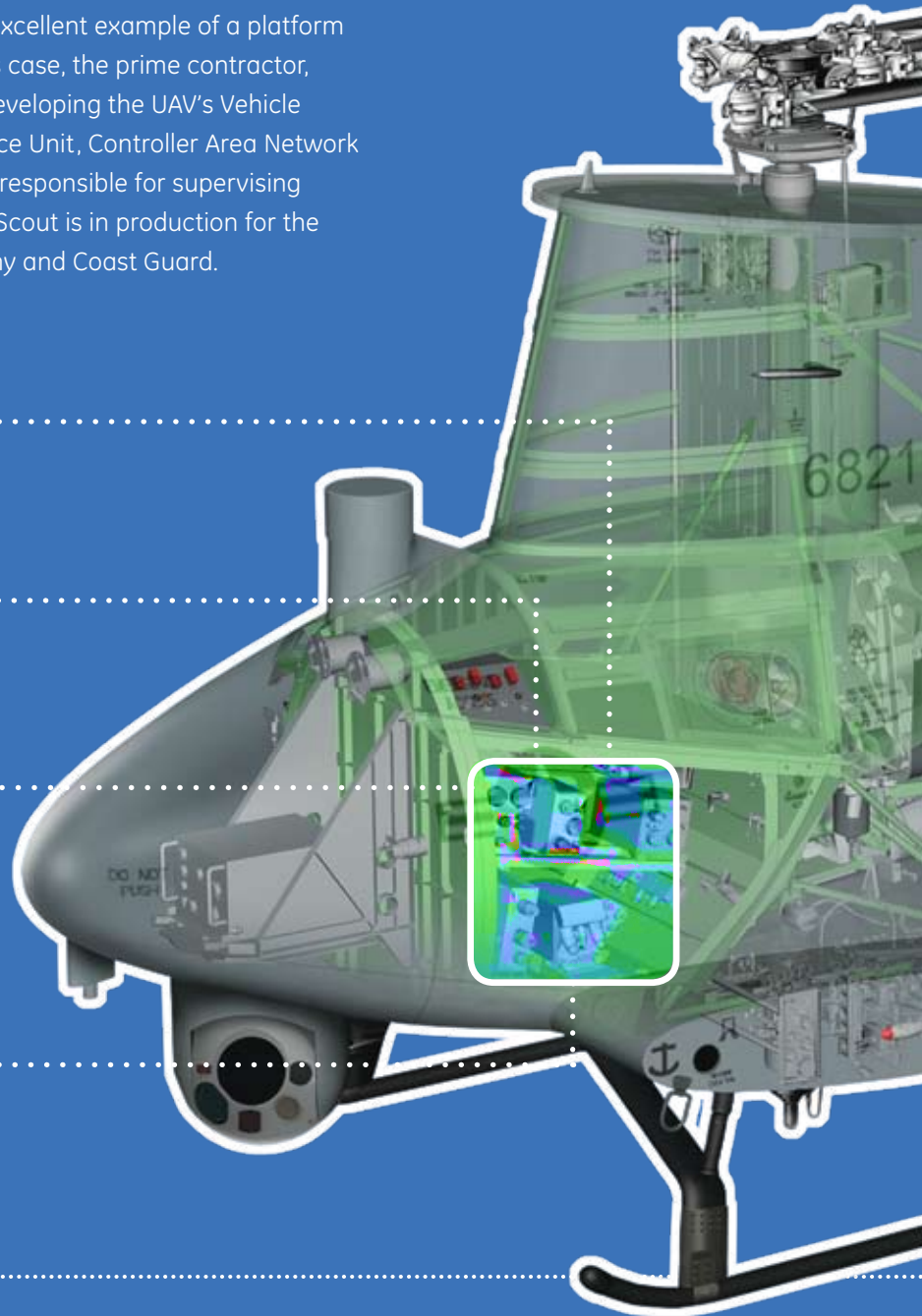
Manages avionics and flight functions

Sensor Processing & Sensor Management

Live video, IR, radar and other sensors. Controls cameras, antennas, mine detection and other inputs.

Vehicle Management

Monitors and regulates vehicle



AVC-VPX-3006

Embedded Training, imaging, digital mapping, and terrain visualization



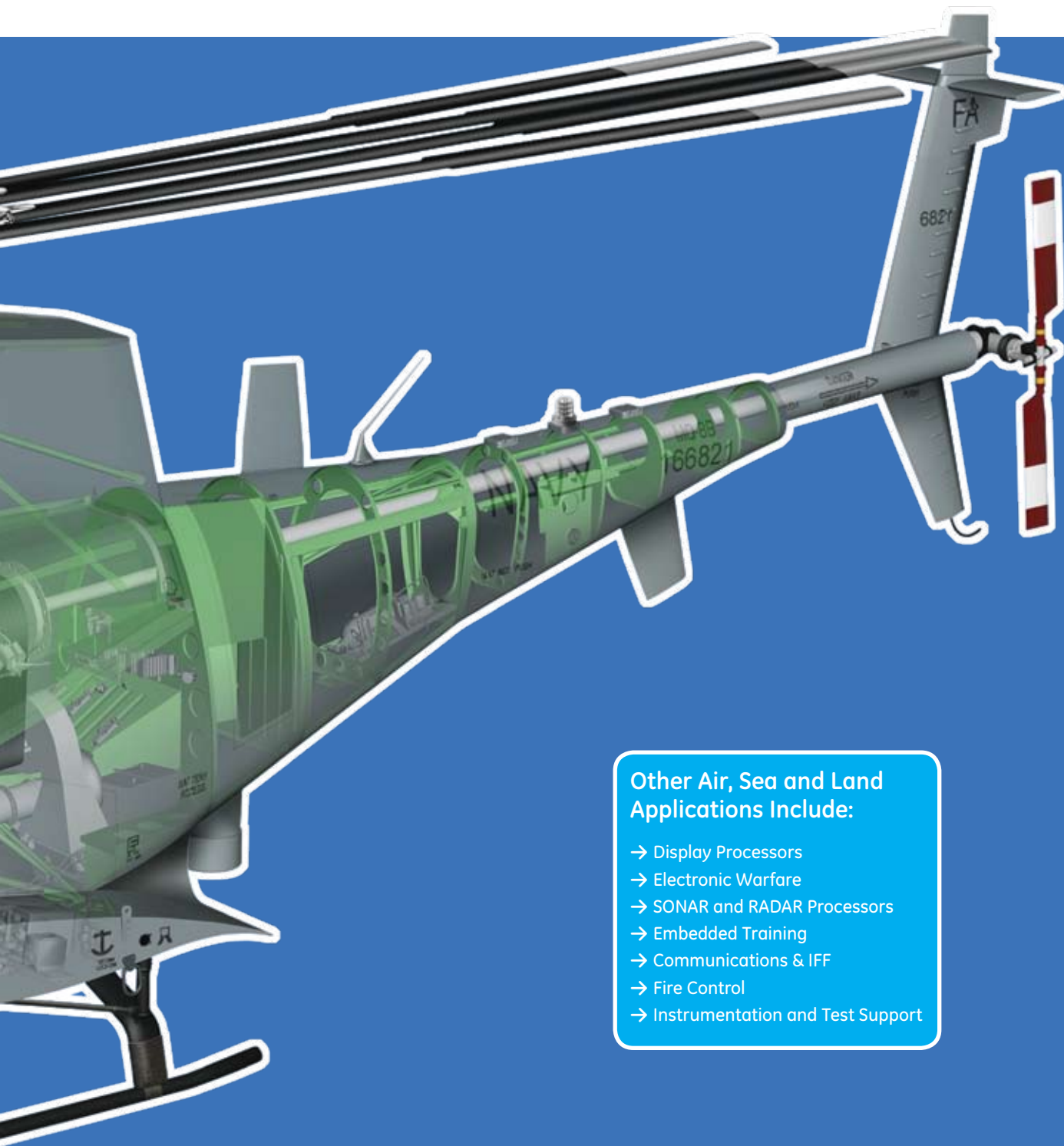
RES-110

Rugged managed Gigabit Ethernet switch



AVC-cPCI-3008

Real time, high-capacity aircraft data acquisition and processing



Other Air, Sea and Land Applications Include:

- Display Processors
- Electronic Warfare
- SONAR and RADAR Processors
- Embedded Training
- Communications & IFF
- Fire Control
- Instrumentation and Test Support



AVC-VME-6005

Features PCB wiring harness, forced-air, conduction cooling



ROC

Under 6 pounds and 100 cubic inches for tight spaces



RIU-2000

Compact, rugged Remote Interface Unit



GE Intelligent Platforms Contact Information

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Global regional phone numbers are listed by location on our web site at www.ge-ip.com/contact

www.ge-ip.com/rugged-systems