Electronic Functional Test of the Consolidated Automated Support System (CASS)

Case Study

System Overview

Customer

A major U.S. defense electronics prime contractor

Introduction

Defense electronics is an industry that contributes vitally to the military security of the United States and its allies.

Universal automatic test equipment (ATE) solutions have long been a goal of the U.S. Armed Forces to limit the growing cost of development, procurement, and support of electronic systems.

Situation

The U.S. Navy's Consolidated Automated Support System (CASS) tests a wide variety of defense electronics systems on a standardized platform, thereby saving significant support and maintenance costs.

The first system went into service at the beginning of the '90s with traditional Rack&Stack equipment.

Detailed description of the CASS test system (as specified)

The station includes semiautomatic capabilities to test avionics units, the technology of which encompasses low frequency stimulus, low frequency measurement, and digital functions as well as specialized functions such as electro-optical (EO), radio-frequency (RF), and command, navigation, and interrogation (CNI).

These capabilities include stimulus, measurement, interface, control, calibration, self-maintenance, special instrumentation, and software functions necessary to perform end-to-end tests, fault isolation tests, and alignment or adjustment of units-under-test (UUTs).

Testing is performed with the stimuli and measurement capabilities specified herein.

This testing is performed when the UUTs are interfaced with the station through test program sets (TPSs) interface devices (IDs), and accessories. The station test capabilities are as follows:

- Testing UUT functional performance to detect and indicate faults and out-of-tolerance conditions
- Isolating UUT faults to the level-of-repair (LOR) inherent in the testability design of the UUT and/or defined by the UUT test documentation
- Adjusting and aligning UUTs
- Conducting station self-test using internal built-in test (BIT) and other station assets as required

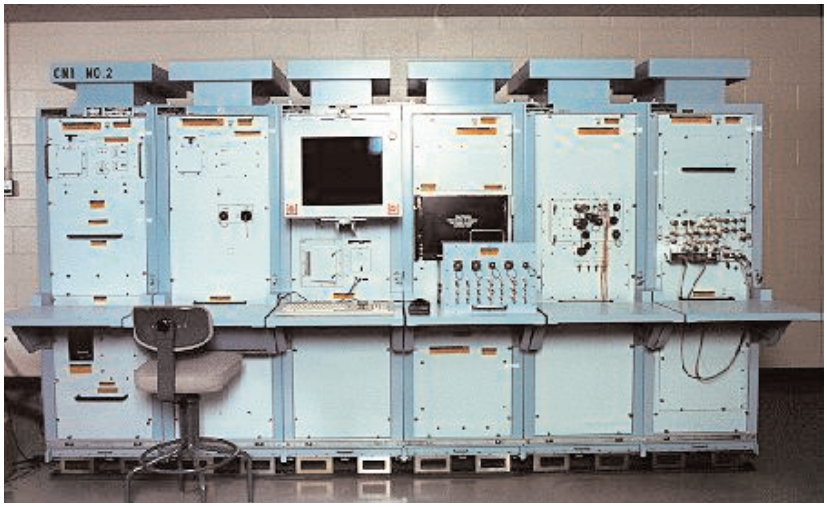

Figure 1: Picture of the CASS automatic test system

- Accommodating new test requirements to preclude technology obsolescence
- Performing in the defined fleet environment.

Problem

A new major revision was necessary to replace some instruments becoming obsolete at the end of the ’90s, including the timing synchronization system and the pulse test signals, both based on pulse generators.

The replacement solution had to be hardware compatible with the existing system’s key specifications, fit into the existing racks, be less expensive, and keep the test program adaptation effort very low.

Implications

With 14 years of work, more than 150 subcontractors and four hundred stations in service, the compatibility of hardware and software was the major issue.

Every minor change would have boosted the cost and time needed for conversion to a prohibitive amount and would have resulted in major backward compatibility issues and costs.

Solution

A partial replacement of the old obsolete instruments by two VXI C-size frames with VXI-instrumentation from Agilent Technologies was chosen.

The pulse generators played a major part in supporting this solution by:

- Offering hardware compatibility in all needed measurements
- Making software programming easy due to instrument drivers
- Being 45% cheaper than the predecessor instruments
- Saving rack space.

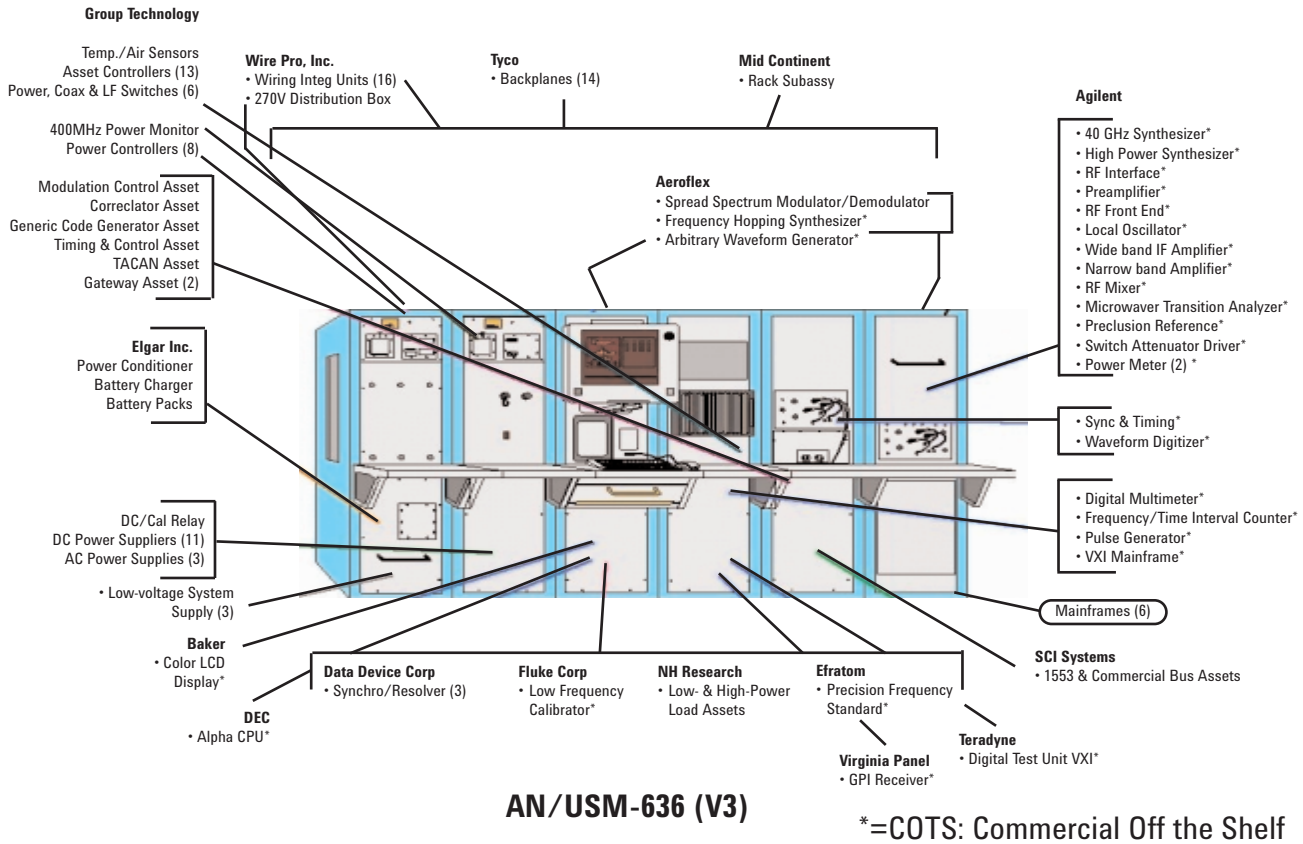

Figure 2: Block diagram of the CASS system

The chosen pulse generators were a special design, based on the Agilent E8311A, with minor modifications, to achieve the required compatibility.

An embedded PC in one of the VXI-mainframes was used to execute the low-level software driving the instruments.

Station block diagrams

The pulse generator (PGEN) in the CASS system is used to generate logic pulses with variable levels and transitions for the unit-under-test (UUT), while the System Timing Asset (STA) is used to generate Emitter Coupled Logic (ECL) timing synchronization pulses for other instrumentation in the test system.

The new versions of both instruments are modified commercial VXI C-1 products, residing in the Rack 4 VXI card cage.

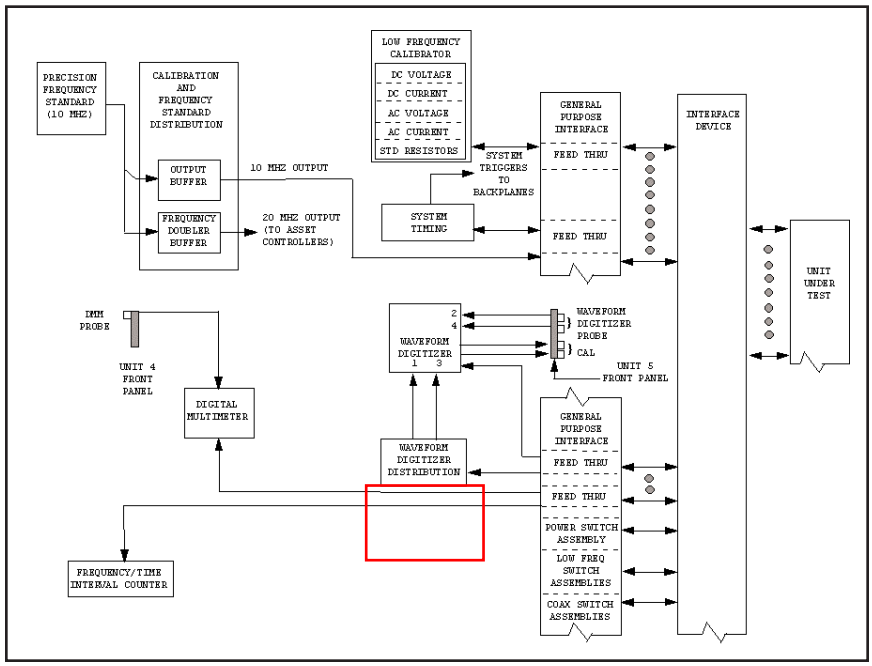

Figure 3: Hybrid test station functional block diagram

Configuration:	
Computer	National Instruments VXIpc-850
VXI	Rugged C-size, 11 slot mainframe, Z2532A
	modified E8311A (PGEN = pulse generator)
	modified E8311A (STA = pulse generator used as a System Timing Asset)
	Agilent Multimeter
	Agilent Frequency / Time Interval Counter
Other instruments, Fixture and Peripherals	As shown in station block diagram

Related Literature	Pub. Number
Agilent E8311A/12A VXI Pulse/ Pattern Generators, photocard	5968-5815E
Agilent E8311A/12A VXI Pulse/ Pattern Generators, data sheet	5968-5814E

For more information, please visit:
www.agilent.com/find/vxi

Agilent Technologies' Test and Measurement Support, Services, and Assistance

Agilent Technologies aims to maximize the value you receive, while minimizing your risk and problems. We strive to ensure that you get the test and measurement capabilities you paid for and obtain the support you need. Our extensive support resources and services can help you choose the right Agilent products for your applications and apply them successfully. Every instrument and system we sell has a global warranty. Support is available for at least five years beyond the production life of the product. Two concepts underlie Agilent's overall support policy: "Our Promise" and "Your Advantage."

Our Promise

"Our Promise" means your Agilent test and measurement equipment will meet its advertised performance and functionality. When you are choosing new equipment, we will help you with product information, including realistic performance specifications and practical recommendations from experienced test engineers. When you use Agilent equipment, we can verify that it works properly, help with product operation, and provide basic measurement assistance for the use of specified capabilities, at no extra cost upon request. Many self-help tools are available.

Your Advantage

"Your Advantage" means that Agilent offers a wide range of additional expert test and measurement services, which you can purchase according to your unique technical and business needs. Solve problems efficiently and gain a competitive edge by contracting with us for calibration, extra-cost upgrades, out-of-warranty repairs, and on-site education and training, as well as design, system integration, project management, and other professional services. Experienced Agilent engineers and technicians worldwide can help you maximize your productivity, optimize the return on investment of your Agilent instruments and systems, and obtain dependable measurement accuracy for the life of those products.

Get assistance with all your test and measurement needs at:
www.agilent.com/find/assist

Printed in U.S.A. 05/00
5968-5998E

Agilent Technologies
Innovating the HP Way