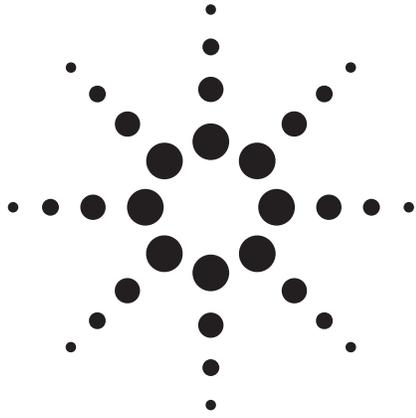


Electronic Functional Test of the Consolidated Automated Support System (CASS)

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

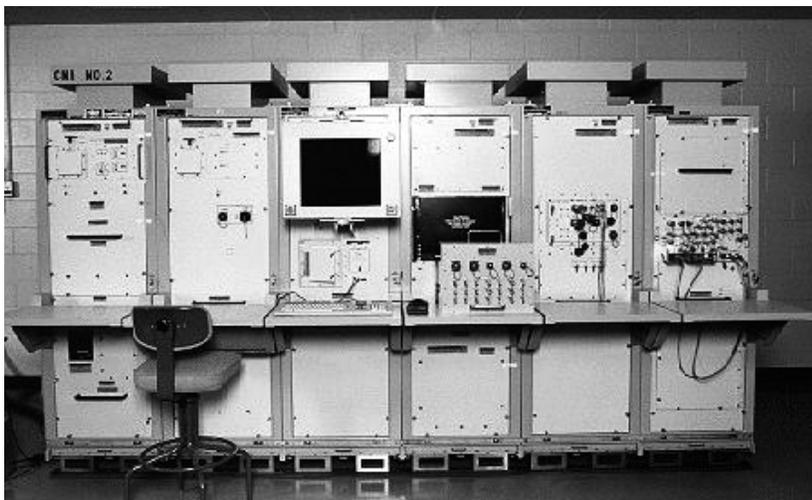


Figure 1: Picture of the CASS automatic test system



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- 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.

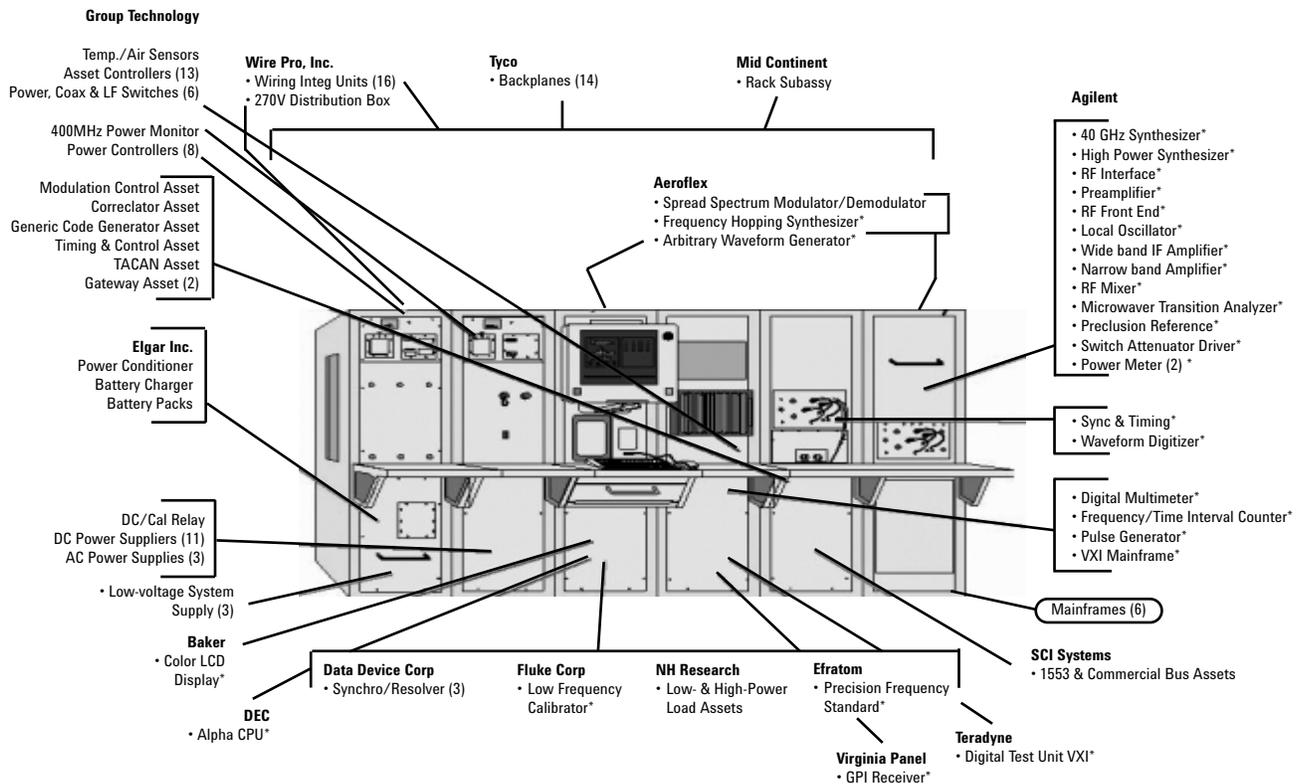
Every minor change would have boosted the cost and time needed for conversion to a prohibitive amount and would have resulted in major backward compatibility issues and costs.

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.



AN/USM-636 (V3)

*=COTS: Commercial Off the Shelf

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.

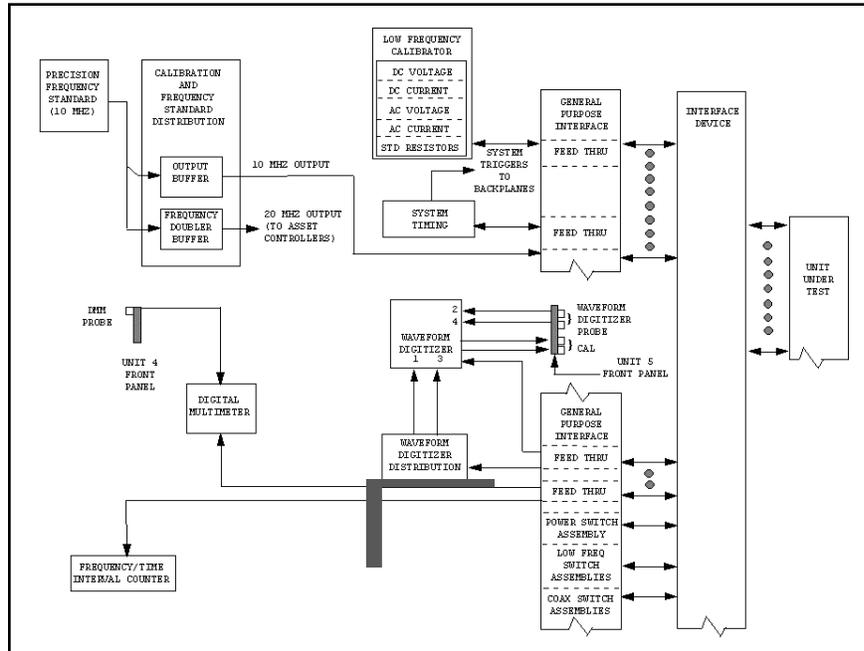


Figure 3: Hybrid test station functional block diagram

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

- *Agilent E8311A/12A VXI Pulse Pattern Generators*, photocard
- *Agilent E8311A/12A VXI Pulse/Pattern Generators*, data sheet

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Phone or Fax

United States:

(tel) 800 829 4444

(fax) 800 829 4433

Canada:

(tel) 877 894 4414

(fax) 905 282 6495

China:

(tel) 800 810 0189

(fax) 800 820 2816

Japan:

(tel) (81) 426 56 7832

(fax) (81) 426 56 7840

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(tel) (080) 769 0800

(fax) (080)769 0900

Latin America:

(tel) (305) 269 7500

Taiwan:

(tel) 0800 047 866

(fax) 0800 286 331

Other Asia Pacific Countries:

(tel) (65) 6375 8100

(fax) (65) 6755 0042

Email: tm_ap@agilent.com

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