Portion of Test System

- Ruggedized and field deployable to support factory to field operations with a reduced logistics footprint
- Open architecture PXI/LXI/VXI/GPIB instrumentation
- Digital, analog, video, and RF instrumentation for functional testing of modern electronics and avionics
- LabWindows/CVI, LabVIEW, & VB test programming environments with TestStand test executive
- IVI instrument drivers
- GUIs for direct control of system resources
- XML and SQL test results
- Chameleon code transformer for TPS re-host
- MAC Panel, Virginia Panel, or CTI system interface
- UPS power pack for operation from generators or any international power standard
- Fully automated system Self-Test
- Field calibration via NIST traceable standards
- Cost effective technology insertion and customization to meet new test requirement
Overview
Adaint’s Puma portable automatic test system provides a scalable, open-architecture platform for factory to field functional testing of a wide variety of weapon systems and commercial electronics. The Puma is a rugged mobile COTS based test system which accommodates PXI/LXI/VXI/GPIB instrumentation and industry leading software. It offers a scalable platform for testing digital, analog, RF, and video electronics and avionics. It supports organizational, intermediate, and depot level test activities. It provides high performance and excellent reliability at a very cost effective price.

Hardware
The Puma’s open-architecture leverages commercial hardware to provide the optimum framework for test system design as shown below:

- Reduced cost
- Heightened COTS usage
- Improved reliability
- High performance
- Maximizes commonality
- Easy/cost effective technology insertion

The Puma comes equipped with instrumentation necessary to meet specific application needs. The tester is populated with PXI/LXI/VXI/GPIB instruments best suited to meet the customer’s unique test needs. Typically PXI instrumentation is used for general purpose digital, analog, and low frequency RF testing. LXI instrumentation is used for high frequency RF testing up to 40 GHz, while VXI instrumentation is used to satisfy high performance digital test requirements. The Puma employs a standard 19-inch rack-mount system in a 14U 30g shock mounted enclosure.

System Interface
The Puma test system is available with either a MAC Panel or Virginia Panel interface. These industry leading COTS interfaces provide reliable, high density, compact, low cost interconnect to the Unit Under Test (UUT). In addition, they provide general purpose electro-mechanical interface that supports up to 2,500 power, signal, and coax pins sufficient to support most any test need. With these general purpose interfaces it’s possible to host many different UUTs on a single Interface Test Adapter (ITA) reducing overall system hardware while maximizing flexibility.

Software
A wide variety of COTS software is available on the Puma to support a diverse array of needs. This includes software for test management, test programming, instrument drivers, switching, calibration, re-host, and results storage. The Puma offers software products which provide high performance and withstand the test of time. This typically requires the software environment to be based upon commercial standards and/or industry leading products which have become de facto standards based on their wide usage.

As such, the Puma comes with the following available software products and standards to provide a robust environment for all facets of test:

- Microsoft Windows™
- LabWindows/CVI™
- LabVIEW™
- TestStand™
- Visual Basic
- IVI instrument drivers
- Switch Executive™
- Calibration Executive™
- XML/ATML/SQL database test results
- Chameleon Code Transformer
- Ethernet (TCP/IP) for remote control and easy field updates

Test Development
National Instruments LabWindows/CVI™ and LabVIEW™ programming languages are industry leading products. LabWindows/CVI is based upon the ANSI C standard and offers a high performance text based development environment. LabVIEW is the leading graphical programming language and has become a de facto industry standard for test and measurement applications. It provides an intuitive rapid development environment that is easy to use regardless of programming experience.

Both LabWindows/CVI and LabVIEW are modern programming languages which have continued to evolve and mature since the 1980s. They are both in widespread use and are expected to be available decades into the future.
due to their extensive industry adoption. In addition, both of these programming environments are also used by leading university engineering education programs ensuring a continuing stream of skilled programmers familiar with these tools. The use of LabWindows/CVI and LabVIEW enables the test industry to leverage rapidly changing computing technology. The longevity of both products provides a solid foundation for Test Program development that ensures the best in class performance while avoiding software obsolescence common with other commercial software.

**Test Management/Execution**

National Instruments TestStand™ is the de facto industry standard test executive. It organizes and controls automated test and measurement systems. It supports execution of most all modern programming languages including LabVIEW, LabWindows/CVI, Visual Basic, C++, C#, HTBasic, VEE, ATLAS, TCL, PERL, Java, Python, and Delphi. TestStand is used by 14 of 15 leading commercial electronic manufacturers making it the premiere test executive available today. TestStand provides a Graphical User Interface (GUI) for collection of UUT, user, and test related information. It also sequences tests and provides overall control of TPS execution.

**Instrument Drivers**

Interchangeable Virtual Instrument (IVI) drivers provide the latest in standardized instrument drivers to help promote device interchangeability. The IVI standards define an open driver architecture, a set of instrument classes, and shared software components. Together these provide critical elements needed to facilitate instrument interchangeability. This reduces the time and effort needed to integrate measurement devices into new or existing systems.

Systems designed with IVI drivers enjoy the benefits of standardized code that can be interchanged into other systems. This code also supports interchange of measurement devices helping to prevent hardware obsolescence. Interchangeability is supported on three levels: The IVI specifications allow architectural interchangeability via standard driver architecture that can be reused. The class specifications provide syntactic interchangeability which supports instrument exchange with minimal code changes. The highest level of interchangeability is achieved by using the IVI signal specifications.

**Test Results**

The Puma saves test results as ASCII text files, SQL relational database records, or Extensible Markup Language (XML) tagged data. It can also support the emerging Automatic Test Markup Language (ATML) that is being created by industry in collaboration with DoD to define a collection of XML schemas that allow test information to be exchanged in a common format that adheres to the XML standard.

**TPS Re-host**

The Puma can be loaded with Advint’s revolutionary Chameleon code transformer. The Chameleon provides automated test program source code conversion of legacy languages to modern programming environments to facilitate re-host from obsolete ATE onto the Puma.

Chameleon accommodates different TPS re-host needs with a single tool using its multi-lingual extensible models. It provides automatic import of legacy code via its powerful recursive parsing engine based upon a selected language schema. The parser creates XML tagged intermediary code that can rapidly be targeted to different target programming languages. It also supports the evolving ATML test descriptions, and provides robust query based report generation capability for TPS metrics.

The Chameleon preserves existing software investment and provides a migration path to modern programming languages. It dramatically
reduces TPS re-host cost and time and ensures traceability between new target and legacy code. It also increases conversion quality via its systematic translation process, and can generate formatted output to facilitate maintainability.

**Tester Self-Test**

Self-Test provides operational assurance of overall test system performance. The Puma is available with a comprehensive Self-Test capability that provides greater than 99% confidence level of correct system operation. System testing is accomplished via a fully automated Self-Test program and associated ITA. Self-Test provides automatic fault detection and isolation to the failed tester asset for remove and replace activity. The Self-Test/Calibration ITA shown below provides signal wrap-around of stimulus instruments to measurement devices to ensure proper test system operation.

![Self-Test/Calibration ITA](image)

The Self-Test/Calibration ITA also provides an interface to portable NIST traceable standards that are used for tester calibration in the factory/field. Calibration results are stored on the system and are available for easy operator access and review. The Puma provides automatic reminders of calibration due dates and automatically notifies the operator via display message and test report notification when the system is out of calibration.

**International Power Operation**

The Puma test system can be run using normal 110V power, or optionally equipped with a Universal Power Supply (UPS) to allow operation from generators or any international power standard. The UPS supports operation from 80-256 VAC at 47-440Hz, or 22-32 VDC power source. The battery backup allows the system to continue running for up to one (1) hour after the loss of primary power to allow the completion of testing and provide for the orderly shutdown of the test system.

**Direct Instrument Control**

In addition to the normal automated mode of operation, the Puma can also provide Graphical User Interfaces (GUIs) for direct control of system and UUT resources (e.g., Instruments, ITAs, test assemblies and UUTs). These GUIs allow the operator to manually control test system resources to facilitate debug, troubleshooting, and repair activities. This capability eliminates the need for other stand-alone General Purpose Test Equipment (GPTE). It also allows the test system to be used both in the front shop performing automated testing, and in the back shop operating in manual test mode.

**Field Calibration**

As test systems are extended further into the field the logistics of providing and performing calibration becomes significantly more complex. Providing a method of performing field calibration is critical especially as the quantity and location of fielded testers increase. Field calibration capability allows the Puma test instruments to be calibrated in place at the user’s site within its normal configuration. This optimizes overall calibration by allowing the tester to be calibrated as a system at the tester interface taking into account system switching and wiring/cabling. Field calibration minimizes system down time, shipment and calibration delays, and eliminates potential risks involved with equipment shipment to a calibration lab.

![Field Calibration](image)

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**Packaging**

The Puma test system comes in rugged enclosures that provide a shock-mounted chassis to house its instrumentation. The enclosure is a compact self-contained unit that also functions as the tester’s shipping container. The Puma’s small size and low weight support mobile operations with a reduced logistics footprint. If additional protection is needed during shipment a separate transit case can also be provided to house the tester as well to meet harsh environmental requirements. Other test related hardware (e.g., ITAs, cables, test assemblies, connector pliers, etc.) are packed and shipped in a separate transit case(s) with foam cut-outs for safe shipment and storage of test accessories.
PUMA Base Configuration Specifications

**Computer System & Software**

Embedded Slot-0 Controller
- NI PXI-8196 2 GHz Pentium
- *Optional Config:*
  - High Performance 3 GHz 1U Controller

Rugged 1U Industrial 15” Flat Screen Display
- 8 Port KVM

System Interfaces & Programming
- Windows
- Ethernet (TCP/IP)
- NI Lab Windows/CVI, LabVIEW, Visual Basic, TestStand, C++, IVI Drivers, XML/ATML
- TPS Re-Host: Chameleon Code Transformer
- Standard Instrument Soft Front Panels
- RS232, RS485, GPIB

**Analog Stimulus & Measurement**

NI PXI-4072 DMM 6.5 Digits & LCR Meter
NI PXI-6259 Multifunction DAQ
- 4 Channel Analog Out (16-bit @ 2.8 MS/s)
- 32 Channel Analog Input (16-bit)

NI PXI-7833R Reconfigurable Multifunction I/O & Motion Control
- 8 Channel Analog Out (16-bit @ 200 KHz/s)
- 8 Channel Analog In (16-bit @ 200 KHz/s)

NI PXI-5412 Arbitrary Waveform Generator
- 14-bit 100MS/s

NI PXI-5124 Digitizer/Scope (12 Bit 200MS/s)

**Digital Stimulus & Measurement**

NI PXI-6552 Digital Waveform Generator/Analyzer
- 20-Channel 100MHz Digital I/O
- -2 to 5.5 V, 100MHz, up to 64M Memory per channel

NI PXI-6528 60V Channel-Channel Isolated DIO
- 24-Channel Digital Output
- 24-Channel Digital Input

NI PXI-7833R Reconfigurable Multifunction I/O
- FPGA providing 96 pins of TTL DIO
- Bus Emulation: 1553B, Arinc422, etc.

*Optional Config:*
- Teradyne Di Series Digital Test Instrument

**RF & Microwave Stimulus & Measurement**

Aeroflex AccSynt 4000L LXI Synthetic Test System
- 0.2 – 40GHz Stimulus & Response
- Standard Parametric and Scalar Measurements

*Optional Config:*
- Traditional RF TRUs, or
- PXI Instruments from 0.3 to 6.0GHz

**Signal Switching**

General Purpose Switching
- 16 5A SPST Relays
- 200 1A SPST Relays
- 10 12A SPST Relays

**UUT Power**

UUT AC Power 115V (single phase)
UUT DC Power programmable up to 3200W
UUT Power Routing & Switching available

**System Interface**

MAC Panel L2000
Virginia Panel Gemini Series 90 (optional)
IEEE-P1505 Common Test Interface (optional)

**System Features**

Automated System Level Self-Test and Calibration
GPS Receiver
Environmental Monitoring System
Station Control Panel (On/Off, Emergency Off)
Power Monitoring
UPS
- Input
  - AC: 80 to 265VAC @ 47-440Hz
  - DC: 22-32VDC
- Output 2,500 VAC @ 115VAC
- Provides 30 minutes of backup operation

**System Physical Configuration**

19 Inch rack-mount system(s)
- Digital & Analog rack 14U
- AccSynt RF & Microwave 11U
30G shock mounted enclosures
- Enclosure Dimensions: 30”H x 22”W x 36”D

**System Options & Extensions**

Isolated Analog, Digital, and Serial I/O
Accessory Cases
Removable Hard Drives
Synchro/Resolver Stimulus and Measurement
Signal Switch Matrix
Electro-Optical Image Acquisition and Analysis
In-Circuit Test
- Huntron TrackerPXI and Access Prober