PXI: AN ADVANCED PLATFORM FOR FUNCTIONAL TEST

你好

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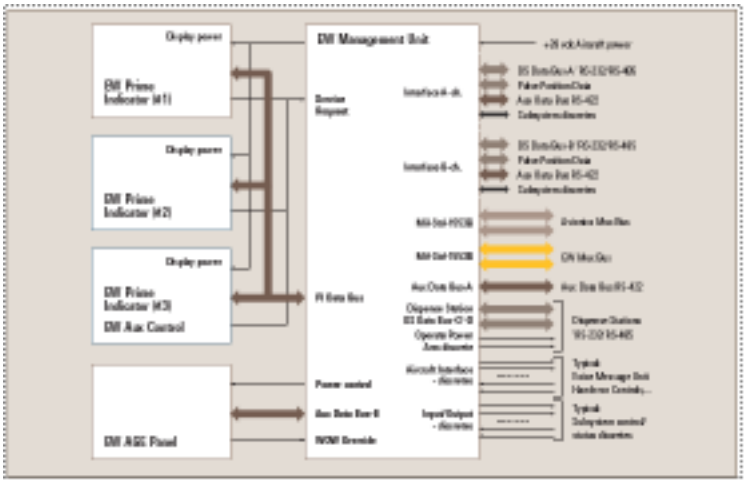
Agenda

- Older Applications
  - Upgrading to new architectures
- Cost Sensitive Switching
  - Suggested architectures
  - Tradeoffs
- PXI Architecture for Switching
  - Overview
  - Controller Implementation
    - Embedded
    - PCI-to-PXI Interfaces
    - USB Interface

Flight Management System



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Original Configuration
Combined Total
H 76”
W 168”
D 36”
Wt 6535 lbs

UPGRADE
H 76”
W 66”
D 37”
Wt 3100 lbs

3435 lbs lighter and 102” smaller

Moving Forward

- Many Existing Systems
  - Looking to lower cost, compatible solutions
    - Replicate individual functions of system
    - Lower cost
    - Similar Reliability
- New Programs
  - Compatibility with former TPS
- Long Term View
- Common Hardware

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Early Architecture - GPIB/RS232

- Commonly used in older systems
  - Example Pickering Interfaces System 10/20
- Switching system is isolated from the PC by the interface standard
- Power sequencing is not an issue
- Operating system is not a major issue

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Characteristics of GPIB/RS232

- Systems Are Mostly Proprietary
  - Users lock themselves into one manufacturer
- They Fit in Well With Bench Test Systems
  - Where a GPIB/RS232 interface is probably already present
    - May be no marginal costs
- Lack Flexibility
- Lack the Data Speed of PCI Interfaced Solutions

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Defining the Architecture

- Separate Functions
  - What each instrument/subsystem performs
  - Look for redundancies – can switching better share resources?
- Identify Possible Architecture/Replacements

  PXI
- Assess Parameters
  - Compatibility
  - Size
  - Budget

Proposal - The PXI Platform

- Modular Test Platform Based on the PCI Bus
  - Modules appear to be extensions of the PCI bus
  - Installed in a similar way to PCI cards
- Multi- Vendor Platform With Growing Acceptance in T&M
- Open Standard Controlled by the PXISA
- Broad Range of Switching Options Available

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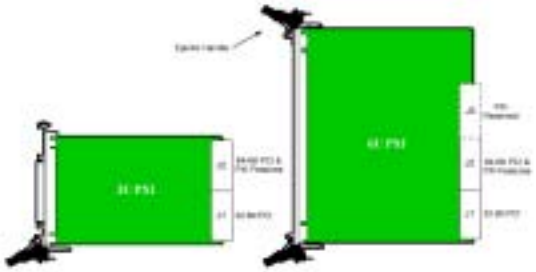
What is PXI?

- Uses PC SW and HW Technology:
  - Low Cost
  - High Performance
  - Ease of Use
- Modular, Rugged Form Factor with More Slots
- Built-in Instrumentation Features

PXI Systems Alliance

PXI modules



- 3U and 6U modules are defined
  - but by far the most common is 3U
  - both have a much smaller PCB area than VXI
    - but has a generally lower cost overhead per module

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Methods of Control

- Embedded PC
- PCI-PXI Interface

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PC Interface Issues

- Provide an Effective Interface for:
  - Instrumentation
  - Mixed instrumentation and switching
  - Switching only
- Issues in Some Applications
  - Need to sequence switching on/off of power supplies
    - Needed to ensure PCI bus starts correctly
    - Make sure PC does not hang
  - Can be vulnerable to changes in software
    - Microsoft Windows evolution and patches
    - VISA updates

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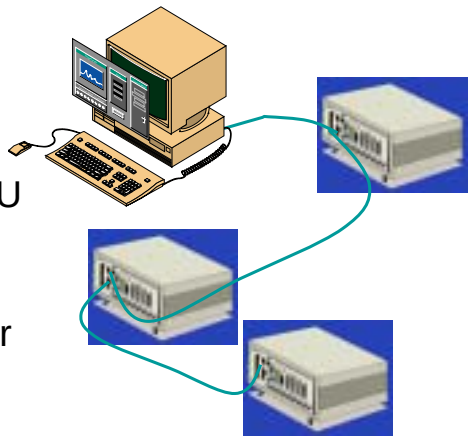
Embedded PC Approach

- Separate PC in Each Chassis
- Local Intelligence
- Minimizes Central CPU Overhead
- Expensive
- Additional Software for Multiple PC Control may be Custom



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Controlling PXI with a remote PC

- PCI Card Installed in the Desk Top PC
- PXI Module Installed in the PXI Chassis
- Interface Cabling and Software
- Options Available From Many Vendors
- Easy Interfacing to Software and PC – Well Recognized Architecture – Can Extend to Multiple Chassis

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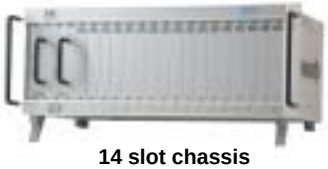
Pickering Interfaces – PXI Chassis

Small

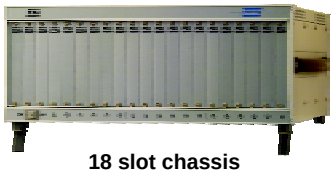
8 slot chassis with BRIC8 installed

Medium



14 slot chassis

Large



18 slot chassis

Portable

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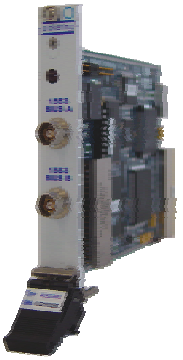
MIL-STD 1553

- Single / Multiple MIL-STD 1553 Terminals
- Concurrent Bus Controller,
  Remote Terminal & Bus Monitor
- Error Injection
- Programmable 32-bit Time Stamp
- Compatible with MIL-STD 1553A / B



Pickering Interfaces

Model 41-553

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Family of Digital Multimeters to cover every application

High performance
6.5 digit DMM

Multi-Function
PXI Card

- Three Versions of the 6 $^{1}/_{2}$ Digit Digital Multimeter
  - –Basic, Extended & Advanced
  - –Volts, current, 6 terminal resistance, inductance, capacitance
- Two Versions of the 5 $^{1}/_{2}$ Digit Multi-Function Module
  - – Low or High Voltage
  - – Plus input MUX, counter, serial ports, sine wave

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Arbitrary Waveform Generator

- ARB's and Function Generators
  - Generating repetitive or one cycle waveforms
- 41-610 Dual ARB – World First
  - 100 Ms/s, 14 bit
  - Differential outputs
- 41-600 ARB
  - 300 Ms/s, 14 bits

41-610

41-600

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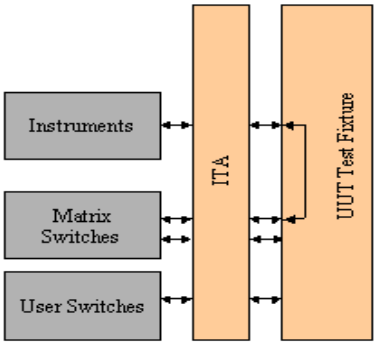
Switching Configurations

- "Pass-Through" Configuration
  - Easy changeover of TPS as configuration is done in ITA
    - Allows for newer TPS with minimal difficulty
  - Downside – signal integrity due to long lead lengths and many connectors
- Old Test Fixtures May Be Obsolete in Any Case



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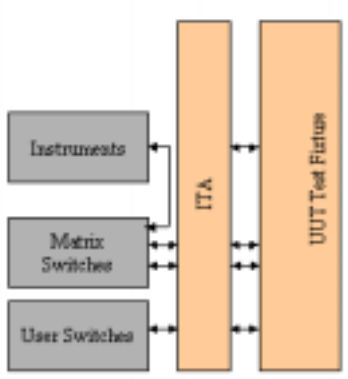
Switching Configurations

- "Hard Wired" Configuration
  - All Instruments go through signal management subsystem
  - Cable length managed, ensuring signal integrity
  - If designed properly, virtually any resource at any point
  - Signal Management subsystem must be very flexible
  - Lower cost subsystem may not be able to handle future requirements



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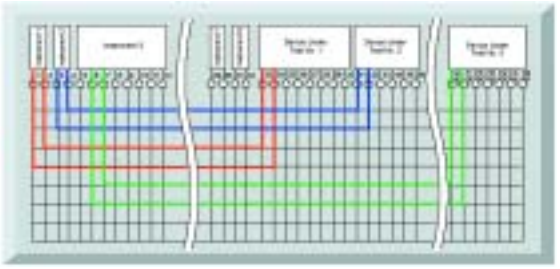
Switching Subsystem

- Also Known as "Signal Management"
- Lots of Choices
  - Stand Alone
  - Modular
    - VXI
    - PXI
- Same Configuration?
  - New layout more efficient?
  - Support new TPS
  - Signal Integrity
- How is it Interfaced to ITA?

Matrix testing



- Most efficient matrix testing uses X axis for all access points
- Y axis dimension sets the number of concurrent connections
- Requirement is for large scaleable X dimension and modest Y dimension

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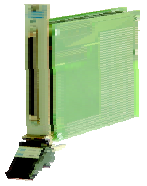
General Purpose Switching

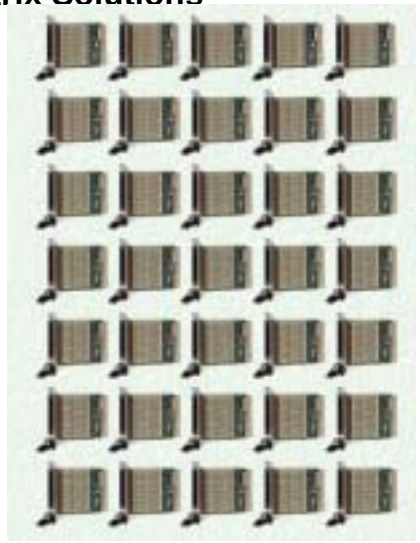




- Largest Range of General Purpose Switching Products Available From Any PXI Supplier
- Range Covers Wide Variety of Applications
  - Ruthenium reed relays suitable for low level signals
  - Available SPST, SPDT & DPST
  - Shielded versions
  - Switch up to 150 Volts, 1.25A with 20 Watts
  - Fast operating speed 250µS typical

High Density Matrix Solutions

1  =



- Application – 552 X 8 Matrix
  - > 4400 cross points
  - 35 “Standard” PXI 16 X 8 modules
  - Extensive cabling
  - Replaced by one BRIC

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- Lower cost
- Greater reliability

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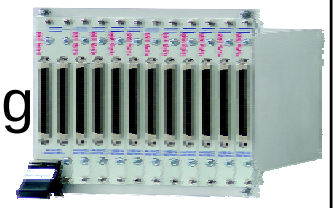
Matrix Switching



- Highest Density Matrix Switching in Any Format
  - (Up To 2208 Reed Relays per 4-Slot Module)
  - (Up To 4416 Reed Relays per 8-Slot Module)
- Modular and Expandable Construction
- Variety of Specification Choices
  - 4, 8 or 16 Channel Analog Bussing
  - Switch up to 150 Volts, 1A, 20W
  - 1 Pole, 1 Pole Screened or 2 Pole Switching

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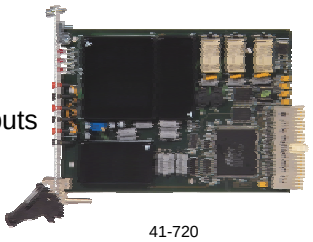
Programmable Power Supplies

- 41-740 Series
  - Dual Isolated Outputs 0-48VDC 1.3A
  - Programmable Current Limit
  - Outputs may be connected in Parallel or Series
  - Includes Over Voltage / Current & Short Circuit Protection
  - External DC or AC power
- 41-720 Series
  - Up to 4 fixed output voltages
  - D Type or Banana Connector Outputs
  - Fully isolated
  - PXI chassis powered



41-720

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Automotive Challenges

- Toughest Electronic Testing Requirements of Any Consumer Industry.
- Same Level of Technology As You Would Find in a Office
  - Function in vibration and temperature ranges that challenge their designers.
- Requirements for Reliability in Certain Safety Features of the Vehicle
- Deliver at the Lowest Possible Costs
- Daunting Task in Terms of Verification

Automotive PXI Test

- MEMS Sensors and Accelerometers
- ABS Brake Modules
- Dashboard Testing
- Transmission Control
- Body Controllers
- Airbag
- Engine Management Units

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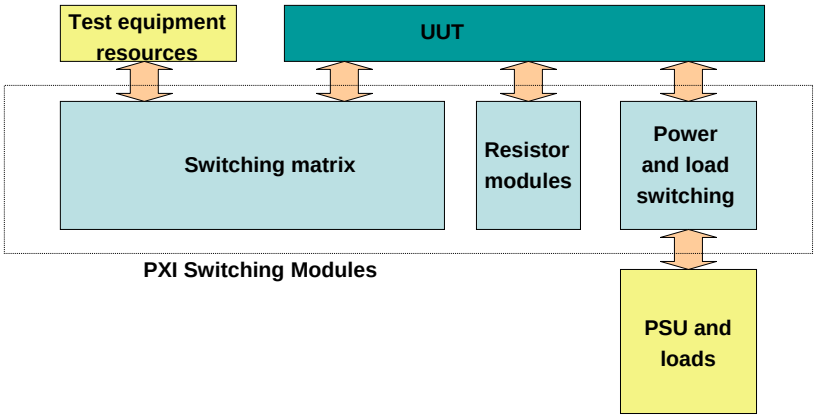
Automotive Test System



Instrumentation Management

- BRIC™ - Highest Density Switching Available in PXI
  - Up to 4,400 Crosspoints in 8 PXI Slots!
  - Internal 50 MHz Backplane Allows for Easy Expansion of Matrix with Minimal Cabling
- Low Thermal Offset for Accurate Measurements
- Broad range of Multiplexers and Matrices

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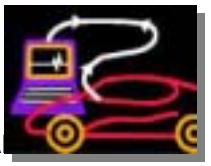
Load Management

- Switching from 0.5 Amp to over 30 AMPS
- Highest Density Switching Available in PXI
- Voltage Ranges up to 500 VAC – Ideal for Engine Management Units, ABS, etc.
- Simple Switching to Power Multiplexing
- Standard Cabling Available for all Modules
- High Reliability Reed Relays or Lower Cost Armature Relays

Automotive Protocol Communications



All Protocols Are Handled Simultaneously.

- Up to Eight Independent Can Channels. Standard 11-bit and Extended 29-bit Header (J1939), Optional Physical Layers for High-speed Dual-wire, Single-wire CAN(GMLA and DaimlerChrysler High Tolerance CAN.
- Multi-frame CAN (ISO-15765) and new J2534 Standard.
- Both Flavors of J1850: SCP, and GM CLASS2/DaimlerChrysler J1850.
- UART-based - KWP-2000, UBP, LIN, AOS, ACP, ISO-9141
- Custom Protocols on Request

Fully Compatible with Visual C++, Visual Basic, ActiveX, LabView and LabWindows

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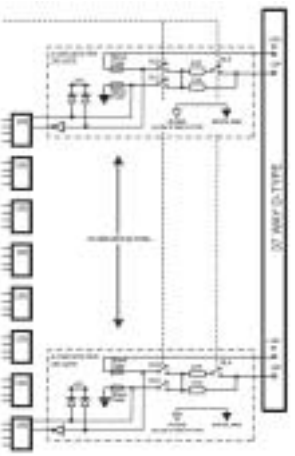
Automotive Dirty/Leaky Switch Simulator

- Simulates up to 32 Dirty Switch Contacts
- Suitable for Voltages to 42 V
- Robust Design Protected Against Faults in DUT
- Ideal for Simulating Real World Switches



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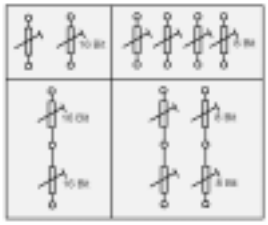
Programmable Resistor Modules

40-290 and 40-291
High density
Resistor module



40-295 and 40-296
Worlds highest density
Resistor module

- Simulate the Operation of Remote Sensors
  - Engine management systems
  - Process controllers
- Configured As High Density Variable Resistors
  - Or as potentiometers

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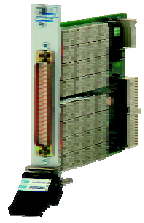
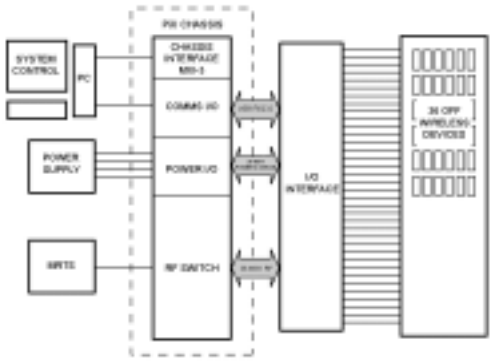
Power Switching Modules



- Up to 30 Amps at 250 VAC or 35 VDC
- 3U or 6U Versions Available
- 10 SPST or DPST Power Relays per 3U Module (10 Amps)
- Operating Speed 5 - 20ms Typical

Volume Testing a RF Device

- Target device could be a cellular phone, pager, WLAN, radio receiver …….



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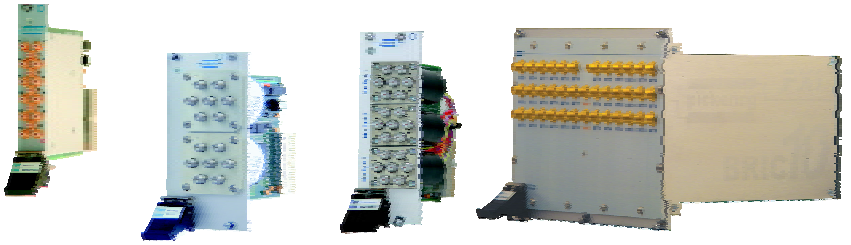
RF/Microwave Multiplexer Modules



- RF / Microwave Frequencies 1GHz up to 40GHz
- 4, 6, 8, 16, 18 and 36 Channel Mux Versions Available
- Single, Dual & Triple 6 Channel Multiplexers
- Configurable MUX
  - For the ultimate flexibility
-

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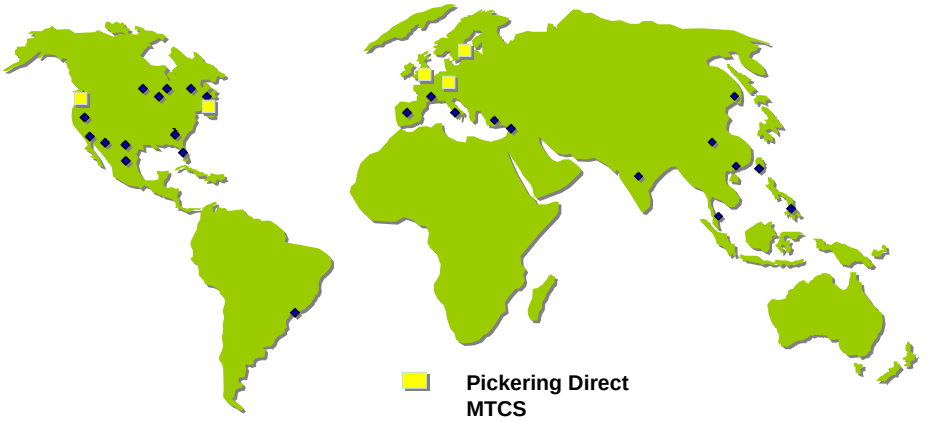
Worldwide Support



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Thank You

谢谢

www.pickeringtest.com